



รายงานวิจัยฉบับสมบูรณ์

การวิเคราะห์ปริมาณสาร phenolic acids ในผลไม้เขตร้อนบางชนิด
โดยวิธีไฮเพอร์ฟอร์มมานซ์ลิควิดโครมาโตกราฟี

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| 2. ผศ. ดร. นาทยา มนตรี | สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง วิทยาเขตชุมพร |

ชุดโครงการ Functional Fruits

สนับสนุนโดยสำนักงานกองทุนสนับสนุนการวิจัย (สกว.)
(ความเห็นในรายงานนี้เป็นของผู้วิจัย สกว. ไม่จำเป็นต้องเห็นด้วยเสมอไป)

Executive Summary

โครงการ “การวิเคราะห์ปริมาณสาร phenolic acids ในผลไม้เขตร้อนบางชนิด
โดยวิธีไฮเพอร์ฟอร์แมนซ์ลิควิดโครมาโตกราฟี”

สาร phenolic acids เป็นสารทุติยภูมิที่พืชสังเคราะห์ขึ้น อยู่ในกลุ่มสารประกอบฟีนอล มีโครงสร้างเป็นวงแหวนอะโรมาติกเบนซีน 1 วง และมีหมู่ไฮดรอกซิล 1 หมู่ ยึดติดกับวง มีคุณสมบัติในการป้องกันพืชจากการเข้าทำลายของเชื้อก่อโรคพืชและศัตรูพืชต่างๆ ซึ่งฤทธิ์ต้านสารอนุมูลอิสระของสาร phenolic acids ทำให้มีการศึกษาสารชนิดนี้มากขึ้น และพบว่าสาร phenolic acids มีผลลดความเสี่ยงในการเกิดโรคหลอดเลือดหัวใจ โรคเบาหวาน และโรคหลอดเลือดในสมองอุดตัน สาร phenolic acids มีมากในใบชา ผลไม้หลายชนิดรวมทั้งผลไม้ตระกูลเบอร์รี่ซึ่งเป็นผลไม้เขตร้อน จึงหาวิธีสกัดและวิเคราะห์ได้ง่ายและมีราคาไม่แพง ดังนั้นหากมีข้อมูลงานวิจัยที่ศึกษาปริมาณสาร phenolic acids ในผลไม้เขตร้อนที่มีในประเทศ ซึ่งหาวิธีสกัดได้ง่ายและมีราคาไม่แพง จะเป็นผลดีต่อสุขภาพของผู้บริโภค ลดความเสี่ยงในการเกิดโรสดังกล่าวที่ปัจจุบันพบว่ามีมากขึ้น งานวิจัยนี้จึงมีจุดประสงค์ที่จะทำการศึกษานี้และปริมาณของสาร phenolic acids 10 ชนิด (Protocatechuic acid, m-Hydroxybenzoic acid, Caffeic acid, Vanillic acid, p-Hydroxybenzoic acid, p-Coumaric acid, Ferulic acid, Veratric acid, Benzoic acid และ Cinnamic acid) จากผลไม้เขตร้อน 8 ชนิด ได้แก่ ผลมะขาม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอและส้มโชกุน ทั้งผลสด ผลอ่อนและผลแก่บริบูรณ์ รวมทั้งเนื้อผลที่ผ่านการอบแห้งที่อุณหภูมิ 65 องศาเซลเซียส โดยขั้นตอนการสกัดจะใช้เวลา 80% Methanol ระเหยตัวทำละลายด้วยเครื่อง Rotary Evaporator จากนั้นจะ purified crude phenolic acids แยกเป็น 3 ส่วน คือ free phenolic acid, phenolic acid liberated from ester bond และ phenolic acid liberated from glycosidic bond นำตัวอย่างวิเคราะห์ด้วยเครื่อง RP- HPLC DAD (Diode Array Detector) mobile phase A; Water:Trifluoroacetic acid (99.9:0.1), mobile phase B; Acetonitrile:Trifluoroacetic acid (99.9:0.1), gradient 10 – 50% B (0 – 30 min), 50 – 100% B (31 – 40 min), flow rate 0.6 ml/min

การวิจัยพบสาร phenolic acids ทั้ง 10 ชนิด ในชมพู่มะเหมี่ยวผลแก่อบแห้ง มะเฟืองผลแก่และผลอ่อน ทั้งสดและอบแห้ง ส้มโชกุนผลแก่และผลอ่อนอบแห้ง ส้มโอผลแก่และผลอ่อน ส้มโอผลแก่อบแห้ง ที่สกัดด้วย 80% methanol

ในผลสด พบว่าส้มโอผลแก่และชมพู่พันธุ์ทุลเกล้าผลแก่ มีปริมาณสาร phenolic acids รวมมากที่สุด คือ 0.04635 กรัม และ 0.05326 กรัม ต่อน้ำหนัก 1 กรัมผล ตามลำดับ

ในผลอบแห้ง พบว่าส้มโอผลแก่อบแห้ง มีปริมาณสาร phenolic acids รวมมากที่สุด คือ 1.437 กรัม ต่อน้ำหนักแห้ง 1 กรัม

ข้อมูลดังกล่าวจะเป็นประโยชน์ต่อผู้บริโภค เกษตรกรผู้ปลูกผลิตผล นอกจากนี้ยังสามารถนำข้อมูลจากการวิจัยนี้ไปใช้ศึกษาวิจัยด้านวิทยาศาสตร์สุขภาพที่เกี่ยวข้องต่อไปได้

บทคัดย่อ

งานวิจัยนี้เป็นการศึกษาชนิดและปริมาณสาร phenolic acids 10 ชนิด (Protocatechuic acid, m-Hydroxybenzoic acid, Caffeic acid, Vanillic acid, p-Hydroxybenzoic acid, p-Coumaric acid, Ferulic acid, Veratric acid, Benzoic acid และ Cinnamic acid) ในผลไม้เขตร้อน 8 ชนิด ได้แก่ มะยม ชมพู่มะเหมี่ยว มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโชกุน ส้มโอ ชมพู่พันธุ์ทุลเกล้า โดยวิเคราะห์สาร phenolic acids ทั้งผลสดผลแก่และผลอ่อน และผลที่ผ่านการอบแห้งที่ 65°C, 18 - 48 ชั่วโมง ด้วยเครื่อง RP- HPLC DAD (Diode Array Detector) mobile phase A; Water:Trifluoroacetic acid (99.9:0.1), mobile phase B; Acetonitrile:Trifluoroacetic acid (99.9:0.1), gradient 10 - 50% B (0 - 30 min), 50 - 100% B (31 - 40 min), flow rate 0.6 mL/min

การวิจัยพบสาร phenolic acids ทั้ง 10 ชนิด ในชมพู่มะเหมี่ยวผลแก่อบแห้ง มะเฟืองผลแก่และผลอ่อน ทั้งสดและอบแห้ง ส้มโชกุนผลแก่และผลอ่อนอบแห้ง ส้มโอผลแก่และผลอ่อน ส้มโอผลแก่อบแห้ง ที่สกัดด้วย 80% methanol

ในผลสด พบว่าส้มโอผลแก่และชมพู่พันธุ์ทุลเกล้าผลแก่ มีปริมาณสาร phenolic acids รวมมากที่สุด คือ 0.04635 กรัม และ 0.05326 กรัม ต่อน้ำหนัก 1 กรัมผล ตามลำดับ

ในผลอบแห้ง พบว่าส้มโอผลแก่อบแห้ง มีปริมาณสาร phenolic acids รวมมากที่สุด คือ 1.437 กรัม ต่อน้ำหนักแห้ง 1 กรัม

คำสำคัญ: Phenolic acid, RP- HPLC DAD, มะยม ชมพู่มะเหมี่ยว มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโชกุน ส้มโอ ชมพู่พันธุ์ทุลเกล้า

Abstract

Phenolic acids profiles (Protocatechuic acid, m-Hydroxybenzoic acid, Caffeic acid, Vanillic acid, p-Hydroxybenzoic acid, p-Coumaric acid, Ferulic acid, Veratric acid, Benzoic acid and Cinnamic acid) of eight tropical fruits; *Phyllanthus acidus* (L.); Skeels, *Syzygium malaccense*; Malay apple, *Averrhoa carambola* L.; Star fruit, *Baccaurea ramiflora*; Burmese grape, Rambai, *Bouea macrophylla* Griff; Plum mango, Thai sour Marian plum, *Citrus reticulata*; Shogun Oranges, *Citrus maxima* Merr.; pomelo and *Syzygium aqueum*; water apple were analyzed by RP- HPLC DAD (Diode Array Detector) according to the following condition; mobile phase A; water:Trifluoroacetic acid (99.9:0.1), mobile phase B; Acetonitrile : Trifluoroacetic acid (99.9:0.1), gradient 10 – 50% B (0 – 30 min), 50 – 100% B (31 – 40 min) with the flow rate at 0.6 ml/min. Both mature and immature of fresh fruits and dry fruits at 65°C, 18 - 48 hr were extracted with 80% methanol and purified into three fractions; free phenolic acid, phenolic acid liberated from ester bond and phenolic acid liberated from glycosidic bond before analysis.

Ten phenolic acids were identified in dry mature *Syzygium malaccense*; Malay apple, both fresh and dry mature and immature of *Averrhoa carambola* L.; Star fruit, dry mature and immature of *Citrus reticulata*; Shogun Oranges, fresh mature and immature as well as dry mature of *Citrus maxima* Merr.; pomelo.

Fresh mature *Citrus maxima* Merr.; pomelo and *Syzygium aqueum*; water apple showed the highest total phenolic acids of 0.04635 g and 0.05326 g/gram of fresh sample respectively.

Dry mature *Citrus maxima* Merr.; pomelo showed the highest total phenolic acids of 1.437 g/gram of dried sample.

Keywords: Phenolic acid, RP- HPLC DAD, Skeels, Malay apple, Star fruit, Burmese grape, Thai sour Marian plum, Shogun Oranges, Pomelo, Water apple



สัญญาเลขที่ RDG5520010

โครงการ “การวิเคราะห์ปริมาณสาร phenolic acids ในผลไม้เขตร้อนบางชนิด

โดยวิธีไฮเพอร์ฟอร์แมนซ์ลิกวิดโครมาโตกราฟี”

รายงานฉบับสมบูรณ์

ส่วนที่ 1 ข้อมูลโครงการ

ชื่อผู้รับทุน : นางสาวกมลวรรณ ชูชีพ



โครงการเริ่มเมื่อวันที่ 20 ตุลาคม พ.ศ. 2554 ถึง 19 ตุลาคม 2555

ได้รับการขยายเวลาทำวิจัย จนถึง 19 เมษายน 2556 รวมเวลาที่ทำวิจัยทั้งสิ้น 18 เดือน

ส่วนที่ 2 รายงานเนื้อหา

ปัญหาที่ทำวิจัยและความสำคัญของปัญหา

ผลไม้ไทยมีความหลากหลายทั้งชนิดและรสชาติที่เป็นเอกลักษณ์ ซึ่งทำให้ผลไม้ไทยหลายชนิดเป็นที่นิยมบริโภคทั้งในหมู่คนไทยและชาวต่างชาติ นอกเหนือจากความอร่อยและรสชาติแล้วหากมีข้อมูลเกี่ยวกับคุณค่าทางโภชนาการและสารสำคัญในผลไม้ไทยที่ส่งผลกระทบต่อสุขภาพ จะทำให้ความแพร่หลายในการบริโภคผลไม้ไทยมีมากขึ้น สารสำคัญต่างๆ ที่พบในผลไม้ไทยหลายชนิดมีคุณสมบัติต้านสารอนุมูลอิสระในร่างกายที่ก่อให้เกิดโรคต่างๆ เช่น มะเร็ง ความดันโลหิตสูง หัวใจ และเบาหวาน เป็นต้น สารสำคัญที่พบส่วนใหญ่ในพืชเป็นสารในกลุ่มสารประกอบฟีนอล ซึ่งพบว่ามีสาร phenolic acids ถึง 1 ใน 3 ของ dietary phenol ที่ถูกสังเคราะห์ในพืช สาร phenolic acids มีคุณสมบัติต้านสารก่อมะเร็ง สามารถลดความเสี่ยงของโรคที่มีสาเหตุมาจากการทำลายของสารอนุมูลอิสระ เช่น โรคหัวใจ ไขมันในเลือดสูง เบาหวาน มะเร็ง และ ไต สาร phenolic acids พบมากในใบชา กาแฟ และผลไม้ตระกูลเบอร์รี่ซึ่งเป็นผลไม้เขตร้อน จึงหาได้ยากในประเทศไทย เนื่องจากเมืองไทยมีอากาศร้อนชื้น ผลไม้ที่มีมากจึงเป็นผลไม้เขตร้อน ที่มีรสชาติหลากหลาย หากแต่ยังขาดข้อมูลทางวิทยาศาสตร์ที่สำคัญเกี่ยวกับสาร phenolic acids ซึ่งพบในผลไม้ไทยที่มีรสเปรี้ยวหรือเปรี้ยวอมหวาน ดังนั้นถ้ามีการวิเคราะห์ปริมาณสาร phenolic acids ในผลไม้เขตร้อนที่หาได้ทั่วไปในฤดูกาลต่างๆ จะส่งผลต่อการมีสุขภาพที่ดีเนื่องจากหาได้ทั่วไป ราคาไม่แพงเมื่อเทียบกับผลไม้เขต

หนาวที่มีสาร phenolic acids ปริมาณสูง และยังเป็นการส่งเสริมให้มีการบริโภคผลไม้ไทยมากขึ้น ส่งผลทางอ้อมในการช่วยให้สวนผลไม้ไทยยังคงเป็นทางเลือกอาชีพที่มั่นคงของเกษตรกร และเป็นการอนุรักษ์การปลูกผลไม้ไทยให้คงอยู่ต่อไป

สาร phenolic acids เป็นสารทุติยภูมิที่พืชสังเคราะห์ขึ้น อยู่ในกลุ่มสารประกอบฟีนอล มีโครงสร้างเป็นวงแหวนอะโรมาติกเบนซีน 1 วง และมีหมู่ไฮดรอกซิล 1 หมู่ ยึดติดกับวง มีคุณสมบัติในการป้องกันพืชจากการเข้าทำลายของเชื้อก่อโรคพืชและศัตรูพืชต่างๆ ซึ่งฤทธิ์ต้านสารอนุมูลอิสระของสาร phenolic acids ทำให้มีการศึกษาสารชนิดนี้มากขึ้น และพบว่าสาร phenolic acids มีผลลดความเสี่ยงในการเกิดโรคหลอดเลือดหัวใจ โรคมะเร็ง และโรคหลอดเลือดในสมองอุดตัน สาร phenolic acids มีมากในใบชา ผลไม้หลายชนิดรวมทั้งผลไม้ตระกูลเบอร์รี่ซึ่งเป็นผลไม้เขตหนาว จึงหาปริมาณได้ยากและมีราคาแพง หากมีข้อมูลงานวิจัยที่ศึกษาปริมาณสาร phenolic acids ในผลไม้เขตร้อนอื่นๆ ที่มีในประเทศ ซึ่งหาปริมาณได้ง่ายและราคาไม่แพง จะเป็นผลดีต่อสุขภาพของผู้บริโภค ลดความเสี่ยงในการเกิดโรคดังกล่าวที่ปัจจุบันพบว่ามีมากขึ้น

ดังนั้นงานวิจัยนี้จะทำการศึกษาทั้งชนิดและปริมาณของสาร phenolic acids จากผลมะยม ชมพู่ มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอและส้มโชกุน รวมทั้งเนื้อผลที่ผ่านการอบแห้งที่อุณหภูมิ 65 องศาเซลเซียส ข้อมูลจากงานวิจัยจะเป็นประโยชน์ต่อผู้บริโภค เกษตรกรผู้ปลูกผลิตผล และสามารถนำข้อมูลจากการวิจัยนี้ไปใช้ศึกษาวิจัยด้านวิทยาศาสตร์สุขภาพที่เกี่ยวข้องต่อไปได้

งานวิจัยที่เกี่ยวข้อง

Habib และคณะ (2011) วิเคราะห์ปริมาณสาร Phenolics ทั้งหมดในผลมะยมอบแห้งที่อุณหภูมิช่วง 60-70°C สกัดด้วย Petroleum Ether ปริมาณสาร Phenolics ทั้งหมด 159.601 mg/g GAE วิเคราะห์โดยวิธี Folin-Ciocalteu

Habib และคณะ (2011) วิเคราะห์ปริมาณสาร Phenolics ทั้งหมดในผลมะยมอบแห้งที่อุณหภูมิช่วง 60-70°C สกัดด้วย Chloroform ปริมาณสาร Phenolics ทั้งหมด 24.82 mg/g GAE วิเคราะห์โดยวิธี Folin-Ciocalteu

Chakraborty และคณะ (2012) วิเคราะห์ปริมาณสาร Phenolics ทั้งหมดในใบมะยมตากแห้ง แยกสกัดด้วย Methanol, Ethyl acetate และ Petroleum Ether ปริมาณสาร Phenolics ทั้งหมด จากสารสกัดด้วยตัวทำละลายแต่ละชนิดตามลำดับดังนี้ 73.08 ± 0.682 mg GAE /g, 45.87 ± 0.789 mg GAE /g และ 25.25 ± 0.577 mg GAE /g วิเคราะห์โดยวิธี Folin-Ciocalteu ปริมาณสาร Flavonoids และสาร Phenolics ที่พบในใบมะยม มีคุณสมบัติเป็นสารต้านอนุมูลอิสระ ระวังอาการปวด ต่อต้านการอักเสบ ที่มีประสิทธิภาพเมื่อเทียบกับตัวยาอ้างอิง ดังนั้นจึงเป็นตัวเลือกหนึ่งที่จะสามารถนำไปใช้เป็นตัวยาในการรักษาโรคที่มีสาเหตุมาจาก oxidative stress, บรรเทาความเจ็บปวดและการอักเสบได้

Reynertson และคณะ (2008) วิเคราะห์ปริมาณสาร Phenolics ทั้งหมด โดยวิธี Folin-Ciocalteu และวิเคราะห์สาร phenolics 8 ชนิด ได้แก่ Cyanidin 3-Glucoside, Delphinidin 3-Glucoside, Ellagic acid, Kaempferol, Myricetin, Quercetin, Quercitrin and Rutin ด้วยเครื่อง HPLC-PDA (Photo Diode Array detector) จากพืชในวงศ์ Myrtaceae (ชมพู่, ฝรั่ง) 14 สายพันธุ์ ปริมาณสาร Phenolics ทั้งหมดในผลชมพู่มะเหมี่ยว 8.58 ± 0.12 mg GAE /g และสาร Phenolics 4 ชนิด ดังนี้ Cyanidin 3-Glucoside $0.02 \pm 1.5 \times 10^{-3}$ mg/g, Ellagic acid $0.01 \pm 1.7 \times 10^{-3}$ mg/g, Quercetin 0.02 ± 0.01 mg/g และ Rutin $0.02 \pm 1.4 \times 10^{-3}$ mg/g สาร Phenolics ทั้งหมดที่พบในผลชมพู่มะเหมี่ยวมีค่า antiradical

activity ต่ำกว่าชมพูและฝรั่งพันธุ์อื่นๆ ในงานวิจัยนี้ โดยมีค่า antiradical activity อยู่ในลำดับที่ 13 จาก พีช ในวงศ์ Myrtaceae ทั้งหมด 14 สายพันธุ์ อย่างไรก็ตาม ไม่พบความสัมพันธ์ระหว่างสาร Phenolic แต่ละชนิดที่พบต่อค่า antiradical activity ซึ่งอาจเป็นไปได้ว่า สาร Phenolics ชนิดอื่นๆ มีผลต้านสารอนุมูลอิสระ

Savitha และคณะ (2011) วิเคราะห์ปริมาณสาร Phenolic acids ทั้งหมด และคุณสมบัติในการต้านอนุมูลอิสระ ของสารสกัดจากใบชมพูมะเหมี่ยว พบว่าการสกัดด้วย Methanol จะได้ปริมาณสาร Phenolic acids ทั้งหมด มากกว่าสกัดด้วยน้ำ โดยมีปริมาณสาร Phenolic acids ทั้งหมด 108.08 ± 12.03 mg GAE /g และ 82.07 ± 8.09 mg GAE /g ตามลำดับ และมีคุณสมบัติต้านอนุมูลอิสระดีกว่าการสกัดด้วยน้ำ เมื่อทดสอบคุณสมบัติในการต้านสารอนุมูลอิสระด้วย DPPH Scavenging Assay และ Hydroxyl Radical Scavenging Assay

Wetwitayaklung และคณะ (2012) พบว่าผลชมพูมะเหมี่ยว อบแห้งที่อุณหภูมิ 55°C , 72 ชั่วโมง สกัดด้วย Methanol มีปริมาณสาร Phenolic acids ทั้งหมด เพียง 0.22 ± 0.01 mg GAE /g และมีความสามารถในการต้านทานสารอนุมูลอิสระต่ำ จากงานวิจัยนี้พบว่าปริมาณสาร Phenolic acids ทั้งหมดที่พบในผลไม้ไทยที่ศึกษาสัมพันธ์กับความสามารถในการต้านสารอนุมูลอิสระ

Puttongsiri และ Haruenkit (2010) ศึกษาการเปลี่ยนแปลงปริมาณวิตามินซี total polyphenol, phenolic acids และ antioxidant activity ในน้ำคั้นส้มเขียวหวาน เคลือบผิวผลด้วยสาร Shellac เก็บรักษาที่อุณหภูมิ 4, 12 และ 20°C เป็นเวลา 5 สัปดาห์ มีปริมาณ total polyphenol ก่อนการเก็บรักษา 26.30 mg GA/100 ml และเพิ่มขึ้นเป็น 28.40, 29.99 และ 28.65 mg GA/100 ml หลังจาก 5 สัปดาห์ของการเก็บรักษาที่ 4, 12 และ 20°C ปริมาณ total polyphenol สัมพันธ์กับความสามารถในการต้านสารอนุมูลอิสระวิเคราะห์โดยวิธี Folin-Ciocalteu วิเคราะห์ปริมาณสาร phenolic acids จากสารสกัด Methanol ด้วยเครื่อง HPLC isocratic system ใช้ น้ำ 80% (เติม 20% Acetic acid): Acetonitrile 20% เป็น mobile phase วิเคราะห์ได้ปริมาณสาร phenolic acids ก่อนการเก็บรักษา ดังนี้ Caffeic acid, p-Coumaric acids, Sinapic acid และ Ferulic acid 2.54, 1.86, 4.79 และ 37.49 mg/l ตามลำดับ ปริมาณสาร phenolic acids เพิ่มขึ้นใน 4 สัปดาห์ของการเก็บรักษา และลดลงอย่างมีนัยสำคัญในสัปดาห์ที่ 5 ของการเก็บรักษาที่ 4, 12 และ 20°C ปริมาณสาร Sinapic acid, Caffeic acid และ p-Coumaric acid สัมพันธ์กับค่าความสามารถในการต้านสารอนุมูลอิสระ วิเคราะห์โดย DPPH assay ปริมาณสาร Ferulic acid สัมพันธ์กับค่าความสามารถในการต้านสารอนุมูลอิสระ วิเคราะห์โดย ABTS scavenging assay

การศึกษาสาร phenolic acids จากผลมะยม ชมพูมะเหมี่ยว ชมพูพันธุ์ทูลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และส้มโชกุน จะเป็นข้อมูลทางวิทยาศาสตร์ที่ก่อให้เกิดประโยชน์ในการวิจัยทางวิทยาศาสตร์สุขภาพเนื่องจากยังไม่มีงานวิจัยที่แพร่หลายของข้อมูลด้านสาร phenolic acids ทั้งชนิดและปริมาณที่พบในผลไม้ทั้ง 8 นอกจากนี้ข้อมูลที่ได้จากงานวิจัยจะเป็นการกระตุ้นให้ประชาชนหันมาบริโภคผลไม้ไทยเหล่านี้มากขึ้น ซึ่งส่งผลต่อการส่งเสริมการเพาะปลูกเพื่อการค้าและส่งผลทางอ้อมในการช่วยให้สวนผลไม้ไทยยังคงเป็นทางเลือกอาชีพที่มั่นคงของเกษตรกรได้

คุณสมบัติของสาร phenolic acids ที่คาดว่าจะตรวจวิเคราะห์ได้ในเนื้อผลไม้จากงานวิจัยนี้

1. m-Hydroxybenzoic acid (3-Hydroxybenzoic acid) เป็นสารต้านอนุมูลอิสระ
2. p-Hydroxybenzoic acid (4-Hydroxybenzoic acid) เป็นสารต้านอนุมูลอิสระ
3. Protocatechuic acid มีงานวิจัยพบว่าอาจช่วยลดการเจริญของเซลล์มะเร็ง

4. Vanillic acid มีความจำเพาะต่อเอนไซม์ 5'nucleotidase และสามารถยับยั้งการทำงานของเอนไซม์ 5'nucleotidase
5. Veratric acid เป็นสารต้านอนุมูลอิสระ, ลดความดันเลือด ลดความเสี่ยงในการเกิดโรคหัวใจ
6. Cafeic acid เป็นสารต้านอนุมูลอิสระ ยับยั้งการเกิดมะเร็ง
7. p-Coumaric acid เป็นสารต้านอนุมูลอิสระ ที่มีงานวิจัยพบว่าสามารถลดความเสี่ยงของการเกิดมะเร็ง กระเพาะอาหารเนื่องจากสามารถลดการสร้างสาร carcinogenic nitrosamines
8. Ferulic acid เป็นสารต้านอนุมูลอิสระ ที่ส่งผลโดยตรงต่อการยับยั้งมะเร็งตับและมะเร็งเต้านม
9. Benzoic acid มีคุณสมบัติเป็นสาร antiseptic ใช้รักษาโรคผิวหนังที่เกิดจากเชื้อรา
10. Cinnamic acid มีคุณสมบัติเป็นสาร antibacterial, antifungal

วัตถุประสงค์

1. เพื่อให้ได้ข้อมูลของสาร phenolic acids ทั้งชนิดและปริมาณในผลไม้เขตร้อนบางชนิดที่มีในประเทศ ที่ส่งผลต่อการมีสุขภาพดี
2. เพื่อให้ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนที่มีในประเทศ

ผลที่คาดว่าจะได้รับ

1. ทราบชนิดและปริมาณของสาร phenolic acids ที่ส่งผลต่อสุขภาพจากผลมะยม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และส้มโชกุน
2. ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนดังกล่าวซึ่งมีในประเทศ ส่งผลทางอ้อมในการช่วยให้สวนผลไม้ไทยยังคงเป็นทางเลือกอาชีพที่มั่นคงของเกษตรกรได้

ระเบียบวิธีวิจัย

ศึกษาชนิดและปริมาณของสาร phenolic acids ในผลไม้เขตร้อน ได้แก่ มะยม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และ ส้มโชกุน (วิเคราะห์ ผลอ่อน ผลแก่ และผลที่ผ่านการอบแห้ง)

แหล่งผลไม้ที่ใช้ในการวิจัย

ผลไม้	แหล่ง
1. มะยม	อ. เมือง จ. ชุมพร
2. ชมพู่มะเหมี่ยว	อ. เมือง จ. ชุมพร
3. ชมพู่พันธุ์ทุลเกล้า	อ. ดำเนินสะดวก จ. ราชบุรี
4. มะเฟือง	อ. เมือง จ. ชุมพร
5. มะไฟ	อ. เมือง จ. ชุมพร
6. มะปรางเปรี้ยว	อ. เมือง จ. ชุมพร
7. ส้มโอ	อ. ปะทิว จ. ชุมพร
8. ส้มโชกุน	อ. เมือง จ. ชุมพร

โดยตรวจสอบสาร phenolic acids กลุ่มต่างๆ ดังนี้

1. Hydroxybenzoic acids derivatives (HBA)
 - 1.1 m-Hydroxybenzoic
 - 1.2 p-Hydroxybenzoic
 - 1.3 Protocatechuic
 - 1.4 Vanillic
 - 1.5 Veratric
2. Hydroxycinnamic acid derivatives (HCA)
 - 2.1 Caffeic
 - 2.2 p-Coumaric
 - 2.3 Ferulic
3. สาร phenolic acids อื่นๆ
 - 3.1 Benzoic
 - 3.2 Cinnamic

โดยวิเคราะห์ชนิดและปริมาณของสาร phenolic acids ข้างต้น ด้วย reversed phase C-18 HPLC DAD (Diode Array Detector)

สารเคมีที่ใช้ในการวิจัย

1. Methanol AR Grade
2. Acetic acid HPLC Grade
3. Methanol HPLC Grade
4. Acetonitrile HPLC Grade
5. Trifluoroacetic acid
6. Water HPLC Grade
7. m-Hydroxybenzoic acid Fluka Analytical
8. p-Hydroxybenzoic acid Fluka Analytical
9. Protocatechuic acid Sigma
10. Vanillic acid Fluka Analytical
11. Veratric acid Sigma
12. Caffeic acid Sigma
13. p-Coumaric acid Sigma
14. Ferulic acid Sigma
15. Benzoic acid Sigma
16. Cinnamic acid SRL extrapure

อุปกรณ์ที่ใช้ในการวิจัย

1. Flask ขนาด 250 ml
2. Cylinder ขนาด 500 ml

3. Beaker ขนาด 50 ml, 250 ml, 1000 ml
4. Pipette ขนาด 5 ml, 10 ml
5. Micropipette
6. Volumetric flask ขนาด 25 ml, 50 ml, 1000 ml
7. ขวดใส่ mobile phase ขนาด 1000 ml
8. ขวดฝาเกลียวสำหรับใส่ตัวอย่าง ขนาด 40 ml, 250 ml
9. Centrifuge tube ขนาด 50 ml

เครื่องมือที่ใช้ในการวิจัย

1. เครื่องชั่ง 4 ตำแหน่ง
2. เครื่องชั่งกิโล
3. Hot air oven
4. เครื่องปั๊ม ชุดกรอง
5. Autoclave
6. Rotary shaker
7. เครื่อง centrifuge
8. Rotary evaporator
9. RP- HPLC DAD (Diode Array Detector)
- 10.. Freezer -80°C

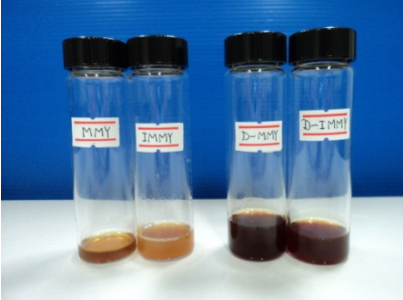
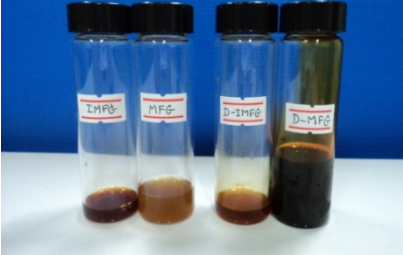
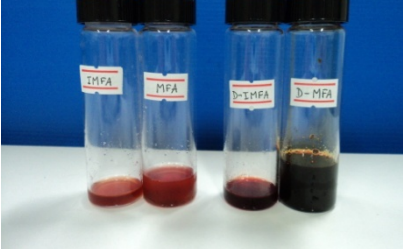
ผลไม้	น้ำหนักผลสด (กรัม)	
	ผลอ่อน	ผลแก่
มะยม	1.3	4.1
ชมพู่มะเหมี่ยว	47.80	83.80
มะเฟือง	35.13	75.24
มะไฟ	6.25	10.31
มะปราง	13.5	16.5
ส้มโชกุน	111.98	141.62
ส้มโอ	104.16	173.16
ชมพูพันธุ์ทุลเกล้า	46.27	89.46

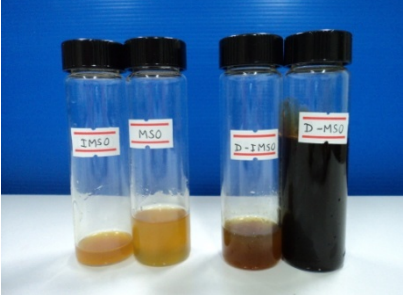
ขั้นตอนการทดลอง

1. แยกผลไม้ผลอ่อนและผลแก่ คัดเลือกผลที่ปราศจากบาดแผล ไม่มีตำหนิ ไม่มีโรคและแมลง มีขนาดผลรูปร่างและความบริบูรณ์ใกล้เคียงกัน ชั่งน้ำหนัก/ผล
2. สกัดสาร phenolic acid โดยใช้ 80% methanol
3. ตัวอย่างผลไม้ : 80% methanol (1 g : 5 ml) บดโดยใช้โกร่ง

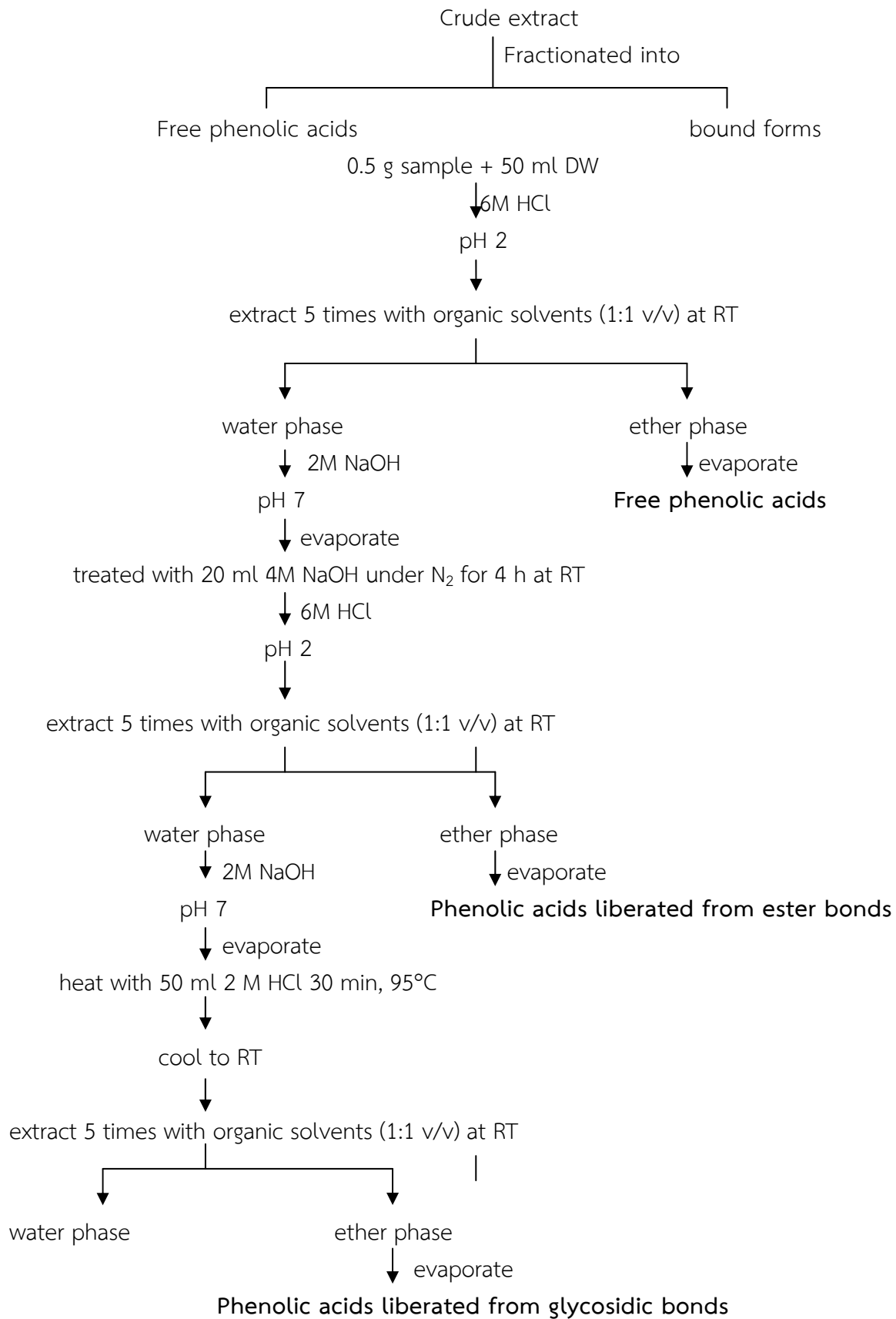
4. เขย่า ใช้ rotary shaker ความเร็ว 200 rpm 1 ชั่วโมง
5. ปั่นเหวี่ยง 1700 rpm 10 นาที
6. กรองใช้ vacuum filtration
7. ระเหยเอาตัวทำละลายออก ใช้เครื่องระเหยแบบหมุน (rotary evaporator)
8. เก็บตัวอย่างที่ -20 องศาเซลเซียส

รูปสารสกัดจากผลไม้ทั้งผลสด และผลที่อบแห้งที่ 65 องศาเซลเซียส ที่ผ่านการระเหยเอาตัวทำละลายออก

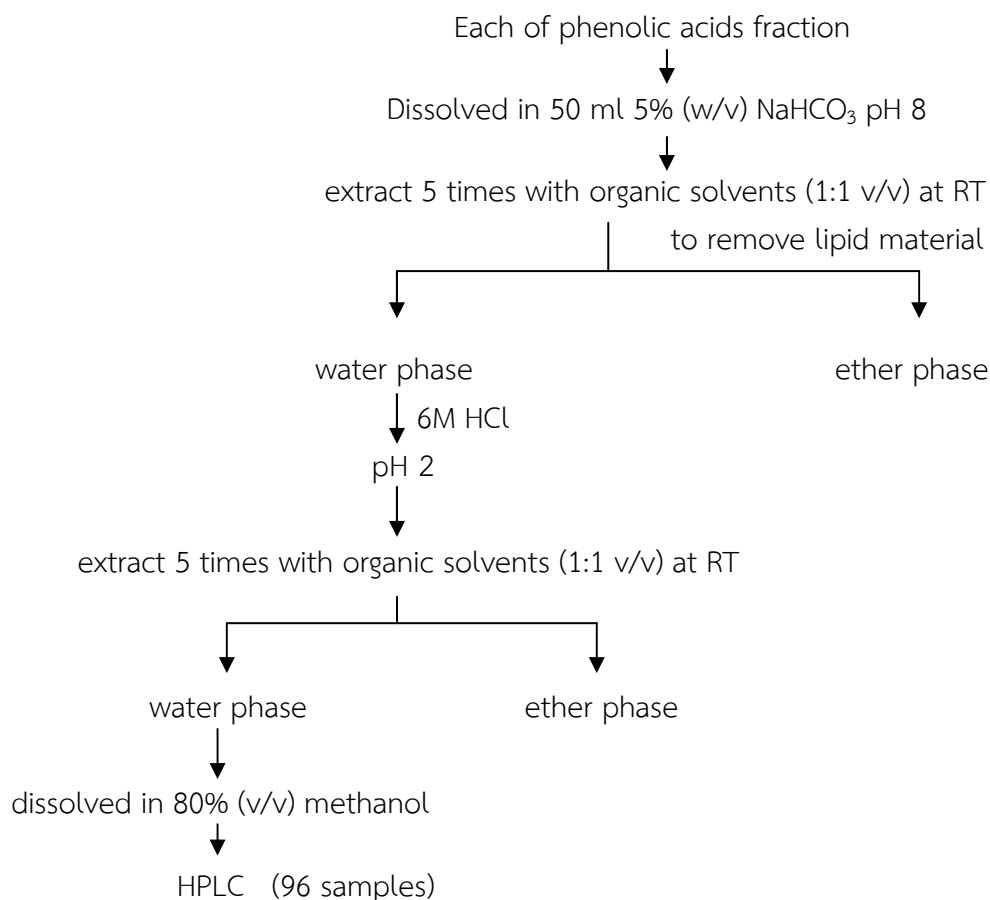
ผลไม้	
มะยม MMY (mature Mayom) IMMY (immature Mayom) D-MMY (Dry mature Mayom) D-IMMY (Dry immature Mayom)	
ชมพู่มะเหมี่ยว MMM (mature Mamiew) IMMM (immature Mamiew) D-MMM (Dry mature Mamiew) D-IMMM (Dry immature Mamiew)	
มะเฟือง MFG (mature Mafueng) IMFG (immature Mafueng) D-MFG (Dry mature Mafueng) D-IMFG (Dry immature Mafueng)	
มะไฟ MFA (mature Mafai) IMFA (immature Mafai) D-MFA (Dry mature Mafai) D-IMFA (Dry immature Mafai)	

ผลไม้	
มะปรางเปรี้ยว MPA (mature Maprang) IMPA (immature Maprang) D-MPA (Dry mature Maprang) D-IMPA (Dry immature Maprang)	
ส้มโชกุน MC (mature Chokoon) IMC (immature Chokoon) D-MC (Dry mature Chokoon) D-IMC (Dry immature Chokoon)	
ส้มโอ MSO (mature Som-O) IMSO (immature Som-O) D-MSO (Dry mature Som-O) D-IMSO (Dry immature Som-O)	
ชมพูพันธุ์ทุลเกล้า MTK (mature Toon Klao) IMTK (immature Toon Klao) D-MTK (Dry mature Toon Klao) D-IMTK (Dry immature Toon Klao)	

นำ crude extract ของตัวอย่างแต่ละชนิดตามภาพข้างต้น purified ให้ได้สาร phenolic acids 3 ส่วน ได้แก่ (1) Free Phenolic acid (FPA), (2) Phenolic acids liberated from ester bond (PA LIB EST B) และ (3) Phenolic acids liberated from glycosidic bond (PA LIB GLY B) ตามแผนภาพด้านล่างนี้



Purification of phenolic acids fraction



Mobile phase ที่ทดลองใช้ detect สารมาตรฐาน phenolic acid ต่างๆ เป็นดังนี้

Gradient program

1. Mobile phase A; Water : Trifluoroacetic acid (99.9:0.1)

Mobile phase B; Acetonitrile : Trifluoroacetic acid (99.9:0.1)

Gradient 10 – 50% B (0 – 30 min), 50 – 100% B (31 – 40 min)

Flow rate 0.6 mL/min

Detection wavelength 284 nm

Column temperature 25°C

Injection volume 20 µl

ความเข้มข้นของ mixed standard phenolic acids 0.0048, 0.0097, 0.0195, 0.0390, 0.0781, 0.1563, 0.3125, 0.625, 1.25, 2.5, 5.0, 10, 20, 30, 40 และ 50 ppm

ผลการวิจัย

ตารางที่ 1 ปริมาณและชนิดของสาร Phenolic acids จากการวิเคราะห์โดย HPLC-DAD detector เทียบกับ
สารมาตรฐาน Phenolic acids

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
MMY มะยมผลแก่	m-Hydroxy 1.53 µg/ml Ferulic 7.55 µg/ml	Proto 1.58 µg/ml m-Hydroxy 1.53 µg/ml p-Coumaric 2.57 µg/ml Ferulic 3.25 µg/ml Benzoic 1.07 µg/ml	p-Hydroxy 32.98 µg/ml
IMMY มะยมอ่อน	Ferulic acid 4.77 µg/ml Veratric 1.14 µg/ml	N/A	p-Hydroxy 26.78 µg/ml Benzoic 1.92 µg/ml
D-MMY	Proto 1.12 µg/ml m-Hydroxy 8.03 µg/ml p-Hydroxy 2.44 µg/ml p-Coumaric 1.74 µg/ml Veratric 1.87 µg/ml Ferulic 37.79 µg/ml Benzoic 4.77 µg/ml	m-Hydroxy 12.71 µg/ml p-Coumaric 6.01 µg/ml Ferulic 7.49 µg/ml	Proto 1.54 µg/ml p-Hydroxy 9.99 µg/ml Ferulic 1.66 µg/ml Veratric 1.67 µg/ml Caffeic + Vanillic 13.29 µg/ml
D-IMMY	p-Hydroxy 9.94 µg/ml Ferulic 4.00 µg/ml Veratric 232.64 µg/ml Benzoic 16.72 µg/ml	Proto 2.30 µg/ml m-Hydroxy 11.62 µg/ml p-Coumaric 8.84 µg/ml Ferulic 13.30 µg/ml p-Hydroxy 1.51 µg/ml Benzoic 3.89 µg/ml	m-Hydroxy 4.56 µg/ml Veratric 1.05 µg/ml Benzoic 14.79 µg/ml
MMM มะเหมี่ยว ผลแก่	m-Hydroxy 1.32 µg/ml p-Hydroxy 1.24 µg/ml	Proto 4.47 µg/ml	Proto 2.79 µg/ml m-Hydroxy 3.23 µg/ml p-Hydroxy 90.04 µg/ml Benzoic 2.49 µg/ml
IMMM มะเหมี่ยว ผลอ่อน	m-Hydroxy 1.42 µg/ml p-Hydroxy 16.56 µg/ml Ferulic 1.29 µg/ml Benzoic 1.32 µg/ml	Proto 1.16 µg/ml	p-Hydroxy 28.36 µg/ml Caffeic + Vanillic 3.70 µg/ml
D-MMM	p-Coumaric 4.23 µg/ml Ferulic 4.69 µg/ml Veratric 20.96 µg/ml Benzoic 5.52 µg/ml	Proto 3.42 µg/ml m-Hydroxy 9.50 µg/ml p-Coumaric 1.74 µg/ml Ferulic 2.94 µg/ml Benzoic 1.47 µg/ml	Proto 1.88 µg/ml Benzoic 31.92 µg/ml Caffeic + Vanillic 1.36 µg/ml

ตารางที่ 1 (ต่อ)

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
D-IMMM	Proto 3.75 µg/ml m-Hydroxy 8.71 µg/ml Ferulic 9.15 µg/ml p-Coumaric 1.33 µg/ml p-Hydroxy 57.80 µg/ml Benzoic 10.76 µg/ml Cinnamic 1.09 µg/ml	p-Coumaric 2.23 µg/ml p-Hydroxy 1.95 µg/ml Ferulic 1.11 µg/ml Veratric 2.42 µg/ml Benzoic 46.58 µg/ml Caffeic + Vanillic 1.49 µg/ml	Proto 1.93 µg/ml m-Hydroxy 1.70 µg/ml p-Coumaric 1.08 µg/ml Veratric 1.12 µg/ml Benzoic 11.02 µg/ml
MFG มะเฟืองผล แก่	Veratric 1.96 µg/ml Benzoic 6.17 µg/ml	Proto 1.36 µg/ml p-Coumaric 1.38 µg/ml Ferulic 4.19 µg/ml Benzoic 21.67 µg/ml Cinnamic 1.24 µg/ml	Proto 2.00 µg/ml m-Hydroxy 3.97 µg/ml p-Hydroxy 1.20 µg/ml Veratric 2.34 µg/ml Benzoic 47.88 µg/ml Caffeic + Vanillic 1.04 µg/ml
IMFG มะเฟืองผล อ่อน	m-Hydroxy 7.98 µg/ml p-Hydroxy 1.99 µg/ml Ferulic 2.73 µg/ml Veratric 11.54 µg/ml Benzoic 19.30 µg/ml	Proto 9.8 µg/ml m-Hydroxy 15.85 µg/ml p-Hydroxy 2.96 µg/ml p-Coumaric 22.72 µg/ml Ferulic 32.13 µg/ml Veratric 5.50 µg/ml Benzoic 22.98 µg/ml Cinnamic 12.63 µg/ml Caffeic + Vanillic 1.73 µg/ml	m-Hydroxy 2.64 µg/ml Benzoic 1.20 µg/ml
D-MFG	Ferulic 1.35 µg/ml Veratric 22.35 µg/ml Benzoic 26.27 µg/ml Caffeic + Vanillic 6.15 µg/ml	Proto 4.45 µg/ml m-Hydroxy 11.35 µg/ml p-Hydroxy 4.77 µg/ml p-Coumaric 5.93 µg/ml Ferulic 12.56 µg/ml Benzoic 72.74 µg/ml Cinnamic 3.34 µg/ml	Proto 3.6 µg/ml Veratric 5.99 µg/ml Benzoic 130.04 µg/ml Caffeic + Vanillic 8.21 µg/ml

ตารางที่ 1 (ต่อ)

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
D-IMFG	p-Hydroxy 1.47 µg/ml Veratric 16.00 µg/ml Benzoic 45.33 µg/ml Caffeic + Vanillic 2.94 µg/ml	Proto 4.72 µg/ml p-Hydroxy 14.64 µg/ml m-Hydroxy 3.72 µg/ml p-Coumaric 49.95 µg/ml Ferulic 53.15 µg/ml Veratric 10.39 µg/ml Benzoic 32.81 µg/ml Cinnamic 28.66 µg/ml	Veratric 2.03 µg/ml Benzoic 4.01 µg/ml Caffeic + Vanillic 1.20 µg/ml
MFA มะไฟผลแก่	Benzoic 2.01 µg/ml	Proto 3.02 µg/ml	Proto 1.42 µg/ml m-Hydroxy 3.39 µg/ml Benzoic 23.29 µg/ml Caffeic + Vanillic 2.01 µg/ml
IMFA มะไฟผลอ่อน	Benzoic 2.73 µg/ml	Proto 3.12 µg/ml Ferulic 1.00 µg/ml Veratric 1.15 µg/ml Benzoic 1.23 µg/ml	m-Hydroxy 7.23 µg/ml p-Hydroxy 171.40 µg/ml Benzoic 4.28 µg/ml
D-MFA	Proto 19.95 µg/ml m-Hydroxy 4.09 µg/ml Veratric 4.03 µg/ml Benzoic 1.84 µg/ml	Proto 3.66 µg/ml Ferulic 1.36 µg/ml Veratric 1.16 µg/ml Caffeic + Vanillic 1.45 µg/ml	Proto 2.23 µg/ml m-Hydroxy 4.90 µg/ml Veratric 23.55 µg/ml Benzoic 36.52 µg/ml Caffeic + Vanillic 7.95 µg/ml
D-IMFA	Proto 1.58 µg/ml Benzoic 2.05 µg/ml Caffeic + Vanillic 2.34 µg/ml	Proto 1.23 µg/ml Ferulic 2.23 µg/ml Benzoic 1.04 µg/ml Caffeic + Vanillic 22.14 µg/ml	Benzoic 3.78 µg/ml Caffeic + Vanillic 6.34 µg/ml
MPA มะปรางผลแก่	Veratric 4.17 µg/ml Benzoic 8.73 µg/ml	Proto 1.55 µg/ml	m-Hydroxy 2.37 µg/ml p-Hydroxy 11.67 µg/ml Benzoic 21.26 µg/ml Caffeic + Vanillic 10.35 µg/ml
IMPA มะปรางผลอ่อน	Veratric 5.47 µg/ml	Proto 2.75 µg/ml m-Hydroxy 1.44 µg/ml Ferulic 7.09 µg/ml p-Coumaric 4.09 µg/ml	Benzoic 40.35 µg/ml Caffeic + Vanillic 18.36 µg/ml

ตารางที่ 1 (ต่อ)

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
D-MPA	Benzoic 4.30 µg/ml Ferulic 1.31 µg/ml	Proto 4.44 µg/ml p-Hydroxy 3.90 µg/ml	Proto 1.65 µg/ml m-Hydroxy 1.78 µg/ml Veratric 18.04 µg/ml Benzoic 26.26 µg/ml Caffeic + Vanillic 5.13 µg/ml
D-IMPA	Ferulic 2.11 µg/ml	Proto 1.05 µg/ml	Benzoic 3.04µg/ml Caffeic + Vanillic 1.49 µg/ml
MC ส้มโชกุนผล แก่	m-Hydroxy 1.83 µg/ml p-Coumaric 4.15 µg/ml Benzoic 6.26 µg/ml	p-Coumaric 3.07 µg/ml Ferulic 7.65µg/ml Veratric 19.59 µg/ml Benzoic 9.79 µg/ml	m-Hydroxy 1.63 µg/ml Benzoic 8.95 µg/ml Caffeic + Vanillic 4.10 µg/ml
IMC ส้มโชกุนผล อ่อน	m-Hydroxy 4.02 µg/ml p-Coumaric 2.51 µg/ml Benzoic 5.52 µg/ml	p-Hydroxy 3.68 µg/ml Ferulic 4.55 µg/ml Veratric 84.05 µg/ml Benzoic 6.18 µg/ml	m-Hydroxy 5.52 µg/ml p-Hydroxy 628.97 µg/ml Benzoic 10.91 µg/ml Caffeic + Vanillic 1.15 µg/ml
D-MC	Proto 1.33 µg/ml m-Hydroxy 29.44µg/ml p-Hydroxy 2.44 µg/ml p-Coumaric 8.55 µg/ml Ferulic 7.53 µg/ml Benzoic 54.82 µg/ml	Proto 3.89 µg/ml m-Hydroxy 9.08 µg/ml p-Hydroxy 1.36 µg/ml p-Coumaric 4.01 µg/ml Ferulic 67.04 µg/ml Veratric 12.26 µg/ml Benzoic 14.61 µg/ml Caffeic + Vanillic 4.47 µg/ml	m-Hydroxy 1.81 µg/ml Ferulic 1.07 µg/ml Veratric 2.98 µg/ml Benzoic 137.18 µg/ml Caffeic + Vanillic 30.78 µg/ml
D-IMC	m-Hydroxy 39.54 µg/ml p-Hydroxy 2.10 µg/ml p-Coumaric 6.55 µg/ml Ferulic 3.70 µg/ml Caffeic + Vanillic 5.40 µg/ml	Proto 3.53 µg/ml m-Hydroxy 28.85 µg/ml p-Hydroxy 1.18 µg/ml p-Coumaric 7.18 µg/ml Ferulic 71.52 µg/ml Veratric 21.68 µg/ml Benzoic 6.63 µg/ml Caffeic + Vanillic 4.95 µg/ml	Ferulic 2.34 µg/ml Veratric 1.91 µg/ml Benzoic 147.68 µg/ml Caffeic + Vanillic 110.19 µg/ml

ตารางที่ 1 (ต่อ)

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
MSO ส้มโอผลแก่	p-Coumaric 1.03 µg/ml Veratric 6.01 µg/ml Benzoic 2.16 µg/ml	m-Hydroxy 4.87 µg/ml Ferulic 1.04 µg/ml	Proto 8.48 µg/ml m-Hydroxy 5.12 µg/ml p-Hydroxy 1137.56 µg/ml Veratric 2.92 µg/ml Benzoic 33.40 µg/ml Caffeic + Vanillic 20.97 µg/ml
IMSO ส้มโอผลอ่อน	p-Coumaric 28.57 µg/ml Veratric 16.60 µg/ml Benzoic 17.51 µg/ml	Proto 4.06 µg/ml m-Hydroxy 2.96 µg/ml p-Coumaric 10.05 µg/ml Ferulic 9.45 µg/ml Benzoic 4.49 µg/ml	Proto 1.80 µg/ml m-Hydroxy 1.11 µg/ml p-Hydroxy 336.44 µg/ml Ferulic 2.24 µg/ml Veratric 12.16 µg/ml Benzoic 8.15 µg/ml Caffeic + Vanillic 1.15 µg/ml
D-MSO	Proto 1.85 µg/ml m-Hydroxy 59.10 µg/ml p-Hydroxy 3.73 µg/ml p-Coumaric 1.41 µg/ml Ferulic 5.14 µg/ml Veratric 11.15 µg/ml Benzoic 13.13 µg/ml	m-Hydroxy 3.17 µg/ml p-Hydroxy 10.57 µg/ml Ferulic 2.57 µg/ml Veratric 13.71 µg/ml Caffeic + Vanillic 5.96 µg/ml	p-Hydroxy 2853.59 µg/ml Veratric 6.71 µg/ml Benzoic 31.37 µg/ml Caffeic + Vanillic 3.57 µg/ml
D-IMSO	p-Coumaric 31.55 µg/ml Veratric 1.67 µg/ml Benzoic 2.46 µg/ml	m-Hydroxy 5.64 µg/ml p-Hydroxy 2.63 µg/ml p-Coumaric 14.60 µg/ml Ferulic 18.95 µg/ml Veratric 9.91 µg/ml Benzoic 4.90 µg/ml	m-Hydroxy 3.74 µg/ml Veratric 18.23 µg/ml Benzoic 7.43 µg/ml
MTK ชมพูพันธุ์ ทุลเกล้าผล แก่	N/A	Proto 1.38 µg/ml Veratric 3.17 µg/ml Benzoic 1.63 µg/ml	Proto 3.69 µg/ml m-Hydroxy 101.87 µg/ml p-Hydroxy 757.17 µg/ml Veratric 1.59 µg/ml Benzoic 64.91 µg/ml Caffeic + Vanillic 3.71 µg/ml

ตารางที่ 1 (ต่อ)

ตัวอย่าง	Free Phenolic acids (FPA)	PA liberated from Ester bond	PA liberated from Glycosidic bond
IMTK ชมพูพันธุ์ ทุลเกล้าผล อ่อน	Ferulic 3.27 µg/ml	Proto 1.20 µg/ml Ferulic 1.15 µg/ml Veratric 2.24 µg/ml	Proto 1.82 µg/ml m-Hydroxy 1.72 µg/ml p-Hydroxy 655.70 µg/ml Veratric 3.71 µg/ml Caffeic + Vanillic 17.79 µg/ml
D-MTK	Proto 2.37 µg/ml m-Hydroxy 15.12 µg/ml p-Hydroxy 5.48 µg/ml Ferulic 1.53 µg/ml Veratric 3.75 µg/ml Benzoic 3.15 µg/ml	Proto 2.24 µg/ml p-Hydroxy 2.73 µg/ml Veratric 3.41 µg/ml Benzoic 1.87 µg/ml Caffeic + Vanillic 1.39 µg/ml	Proto 5.76 µg/ml m-Hydroxy 2.48 µg/ml p-Hydroxy 587.52 µg/ml Veratric 3.21 µg/ml Benzoic 48.90 µg/ml Caffeic + Vanillic 18.53 µg/ml
D-IMTK	p-Hydroxy 1.03 µg/ml Ferulic 1.13 µg/ml Veratric 10.30 µg/ml Benzoic 1.92 µg/ml	Proto 2.78 µg/ml Ferulic 1.29 µg/ml Veratric 1.99 µg/ml Benzoic 1.96 µg/ml	Proto 2.44 µg/ml p-Hydroxy 1.78 µg/ml Veratric 1.69 µg/ml Benzoic 35.37 µg/ml Caffeic + Vanillic 1.50 µg/ml

ตารางที่ 2 ค่า LOQ (Limit of qualification) ของ สารมาตรฐาน Phenolic acids แต่ละชนิด

No.	standard Phenolic acids	Retention time	ค่า LOQ
1	Protocatechuic acid (PA)	13.177	0.0048 ppm
2	m-Hydroxybenzoic acid (m-HA)	17.354	0.1563 ppm
3	Caffeic acid + Vanillic acid (CA, VAA)	18.008	0.0097 ppm
4	p-Hydroxybenzoic acid (p-HA)	19.368	0.1563 ppm
5	p-Coumaric acid (p-CMA)	22.209	0.0195 ppm
6	Ferulic acid (FA)	22.965	0.039-0.1563 ppm
7	Veratric acid (VEA)	23.591	0.0781 ppm
8	Benzoic acid (BA)	27.008	1.25 ppm
9	Cinnamic acid (CNA)	32.560	0.0097 ppm

ตารางที่ 3 ปริมาณสาร phenolic acids คิดเป็น g/g น้ำหนักผล

ผลไม้	Free Phenolic acid		FA liberated from ester bonds		FA liberated from Glycosidic bonds	
	µg/ml	g/g F or D wt	µg/ml	g/g F or D wt	µg/ml	g/g F or D wt
มะยมผลแก่	9.08	4.5×10^{-5}	10	7.0×10^{-5}	32.98	3.1×10^{-4}
มะยมผลอ่อน	5.91	4.4×10^{-5}	N/A	-	28.70	4.1×10^{-4}
มะยมผลแก่อบแห้ง	57.76	2.9×10^{-3}	26.21	1.8×10^{-3}	28.15	2.7×10^{-3}
มะยมผลอ่อนอบแห้ง	263.30	1.1×10^{-2}	41.46	2.3×10^{-3}	20.40	1.6×10^{-3}
ชมพู่มะเหมี่ยวผลแก่	2.56	3.8×10^{-5}	4.47	9.4×10^{-5}	98.55	2.8×10^{-3}
ชมพู่มะเหมี่ยวผลอ่อน	20.59	1.8×10^{-4}	1.16	1.4×10^{-5}	32.06	5.3×10^{-4}
ชมพู่มะเหมี่ยวผลแก่อบแห้ง	35.40	1.1×10^{-3}	19.07	8.0×10^{-4}	35.16	2.0×10^{-3}
ชมพู่มะเหมี่ยวผลอ่อนอบแห้ง	92.59	1.9×10^{-3}	55.78	1.6×10^{-3}	16.85	6.4×10^{-4}
มะเฟืองผลแก่	8.13	8.1×10^{-5}	29.84	4.2×10^{-4}	58.43	1.1×10^{-5}
มะเฟืองผลอ่อน	43.54	2.2×10^{-4}	126.30	8.8×10^{-4}	3.84	3.6×10^{-5}
มะเฟืองผลแก่อบแห้ง	56.12	5.6×10^{-3}	115.14	1.6×10^{-2}	147.84	2.8×10^{-2}
มะเฟืองผลอ่อนอบแห้ง	65.74	1.3×10^{-3}	198.04	5.5×10^{-3}	7.24	2.8×10^{-4}
มะไฟผลแก่	2.01	2.0×10^{-5}	3.02	4.2×10^{-5}	30.11	5.7×10^{-4}
มะไฟผลอ่อน	2.73	1.4×10^{-5}	6.50	4.6×10^{-5}	182.91	1.7×10^{-3}
มะไฟผลแก่อบแห้ง	29.91	1.8×10^{-3}	7.63	6.4×10^{-4}	75.15	8.6×10^{-3}
มะไฟผลอ่อนอบแห้ง	5.97	1.2×10^{-4}	26.64	7.5×10^{-4}	10.12	3.8×10^{-4}
มะปรางผลแก่	12.90	9.7×10^{-5}	1.55	1.6×10^{-5}	45.65	6.5×10^{-4}
มะปรางผลอ่อน	5.47	2.7×10^{-5}	15.37	1.1×10^{-4}	58.71	5.6×10^{-4}
มะปรางผลแก่อบแห้ง	5.61	2.8×10^{-4}	8.34	5.8×10^{-4}	52.86	5.0×10^{-3}
มะปรางผลอ่อนอบแห้ง	2.11	2.1×10^{-5}	1.05	1.5×10^{-5}	4.53	8.6×10^{-5}
ส้มโชกุนผลแก่	12.24	1.5×10^{-4}	40.10	7.0×10^{-4}	14.68	3.5×10^{-4}
ส้มโชกุนผลอ่อน	12.05	9.0×10^{-5}	98.46	1.0×10^{-3}	646.55	9.2×10^{-3}
ส้มโชกุนผลแก่อบแห้ง	104.11	2.7×10^{-2}	116.72	4.2×10^{-2}	173.82	8.6×10^{-2}
ส้มโชกุนผลอ่อนอบแห้ง	57.29	1.3×10^{-2}	145.52	4.7×10^{-2}	262.12	1.1×10^{-1}
ส้มโอผลแก่	9.20	1.8×10^{-4}	5.91	1.7×10^{-4}	1208.45	4.6×10^{-2}
ส้มโอผลอ่อน	62.68	3.1×10^{-4}	31.01	2.2×10^{-4}	363.05	3.4×10^{-3}
ส้มโอผลแก่อบแห้ง	95.51	2.4×10^{-2}	35.98	1.3×10^{-2}	2895.24	1.437
ส้มโอผลอ่อนอบแห้ง	35.68	2.1×10^{-3}	56.63	4.8×10^{-3}	29.40	3.4×10^{-3}
ชมพูพันธุ์ทุลเกล้าผลแก่	N/A	-	6.18	2.6×10^{-4}	932.94	5.3×10^{-2}
ชมพูพันธุ์ทุลเกล้าผลอ่อน	3.27	4.9×10^{-5}	4.59	9.6×10^{-5}	680.74	1.9×10^{-2}
ชมพูพันธุ์ทุลเกล้าผลแก่อบแห้ง	31.40	7.2×10^{-3}	11.64	3.7×10^{-3}	666.40	2.9×10^{-1}
ชมพูพันธุ์ทุลเกล้าผลอ่อนอบแห้ง	14.38	7.9×10^{-4}	8.02	6.2×10^{-4}	42.78	4.5×10^{-3}

ตารางที่ 4 สาร Phenolic acids ในผลไม้แต่ละชนิดและปริมาณสาร Phenolic acids รวมในผลไม้แต่ละชนิด คิดเป็น g/g น้ำหนักผลสดหรือแห้ง

ผลไม้	Phenolic acid									Total Phenolic acids
	PA	m-HA	CA, VAA	p-HA	p-CMA	FA	VEA	BA	CNA	
มะยมผลแก่	✓	✓	-	✓	✓	✓	-	✓	-	0.000425
มะยมผลอ่อน	-	-	-	✓	-	✓	✓	✓	-	0.000454
มะยมผลแก่อบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	-	0.0074
มะยมผลอ่อนอบแห้ง	✓	✓	-	✓	✓	✓	✓	✓	-	0.0149
ชมพูมะเหมี่ยวผลแก่	✓	✓	-	✓	-	-	-	✓	-	0.00293
ชมพูมะเหมี่ยวผลอ่อน	✓	✓	✓	✓	-	✓	-	✓	-	0.000724
ชมพูมะเหมี่ยวผลแก่อบแห้ง	✓	✓	✓	-	✓	✓	✓	✓	-	0.0039
ชมพูมะเหมี่ยวผลอ่อนอบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.00414
มะเฟืองผลแก่	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.0016
มะเฟืองผลอ่อน	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.001136
มะเฟืองผลแก่อบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.0496
มะเฟืองผลอ่อนอบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.00708
มะไฟผลแก่	✓	✓	✓	-	-	-	-	✓	-	0.0013
มะไฟผลอ่อน	✓	✓		✓	-	✓	✓	✓	-	0.00176
มะไฟผลแก่อบแห้ง	✓	✓	✓	-	-	✓	✓	✓	-	0.01104
มะไฟผลอ่อนอบแห้ง	✓	-	✓	-	-	✓	-	✓	-	0.00125
มะปรางผลแก่	✓	✓	✓	✓	-	-	✓	✓	-	0.000763
มะปรางผลอ่อน	✓	✓	✓	-	✓	✓	✓	✓	-	0.000697
มะปรางผลแก่อบแห้ง	✓	✓	✓	✓	-	✓	✓	✓	-	0.00586
มะปรางผลอ่อนอบแห้ง	✓	-	✓	-	-	✓	-	✓	-	0.000122
ส้มโชกุนผลแก่	-	✓	✓	-	✓	✓	✓	✓	-	0.0012
ส้มโชกุนผลอ่อน	-	✓	✓	✓	✓	✓	✓	✓	-	0.01029
ส้มโชกุนผลแก่อบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	-	0.155
ส้มโชกุนผลอ่อนอบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	-	0.17
ส้มโอผลแก่	✓	✓	✓	✓	✓	✓	✓	✓	-	0.04635
ส้มโอผลอ่อน	✓	✓	✓	✓	✓	✓	✓	✓	-	0.00393
ส้มโอผลแก่อบแห้ง	✓	✓	✓	✓	✓	✓	✓	✓	-	1.437
ส้มโอผลอ่อนอบแห้ง	-	✓	-	✓	✓	✓	✓	✓	-	0.0103
ชมพูพันธุ์ทุลเกล้าผลแก่	✓	✓	✓	✓	-	-	✓	✓	-	0.05326
ชมพูพันธุ์ทุลเกล้าผลอ่อน	✓	✓	✓	✓	-	✓	✓	-	-	0.0191
ชมพูพันธุ์ทุลเกล้าผลแก่อบแห้ง	✓	✓	✓	✓	-	✓	✓	✓	-	0.301
ชมพูพันธุ์ทุลเกล้าผลอ่อนอบแห้ง	✓	-	✓	✓	-	✓	✓	✓	-	0.00591

PA = Protocatechuic acid
 m-HA = m-Hydroxybenzoic acid
 CA = Cafeic acid
 VA = Vanillic acid
 p-HA = p-Hydroxybenzoic acid
 p-CMA = p-Coumaric acid
 FA = Ferulic acid
 VEA = Veratric acid
 BA = Benzoic acid
 CAN = Cinnamic acid

ดังนั้นปริมาณสาร phenolic ในผลไม้สดแต่ละชนิด มีดังนี้

ผลไม้	ผลอ่อน		ผลแก่	
	น้ำหนัก (g)	ปริมาณสาร Phenolic acid (g)/ผล	น้ำหนัก (g)	ปริมาณสาร Phenolic acid (g)/ผล
มะยม	1.3	0.00059	4.1	0.00174
ชมพู่มะเหมี่ยว	47.80	0.03460	83.80	0.24553
มะเฟือง	35.13	0.03990	75.24	0.12038
มะไฟ	6.25	0.01100	10.31	0.01340
มะปราง	13.5	0.00940	16.5	0.01258
ส้มโชกุน	111.98	1.15227	141.62	0.16994
ส้มโอ	104.16	0.40934	173.16	8.02596
ชมพูพันธุ์ทุลเกล้า	46.27	0.88375	89.46	4.76463

สรุปและวิจารณ์ผลการวิจัย

งานวิจัยนี้เป็นการศึกษาชนิดและปริมาณสาร phenolic acids ในผลไม้เขตร้อนบางชนิด ได้แก่ มะยมผลแก่ ผลอ่อน ชมพู่มะเหมี่ยวผลแก่ ผลอ่อน มะเฟืองผลแก่ ผลอ่อน มะไฟผลแก่ ผลอ่อน มะปรางเปรี้ยวผลแก่ ผลอ่อน ส้มโชกุนผลแก่ ผลอ่อน ส้มโอผลแก่ ผลอ่อน ชมพูพันธุ์ทุลเกล้าผลแก่ ผลอ่อน

ซึ่งผลแก่คือผลที่แก่จัดพร้อมบริโภค ผลอ่อนคือ ระยะ immature 60% หรือผลที่ใช้เวลาอีกประมาณ 3 สัปดาห์จึงจะแก่บริบูรณ์

การวิเคราะห์สาร phenolic acids จะวิเคราะห์ผลสดทั้งผลแก่และผลอ่อน และผ่านการอบแห้งที่ 65°C ระยะเวลาในการอบแห้งต่างกันขึ้นอยู่กับปริมาณน้ำและน้ำตาลในผลไม้แต่ละชนิด โดยมีระยะเวลาตั้งแต่ 18 - 48 ชั่วโมง

สาร phenolic acids ที่วิเคราะห์ได้แก่ m-Hydroxybenzoic acid, p-Hydroxybenzoic acid, Protocatechuic acid, Vanillic acid, Veratric acid, Cafeic acid, p-Coumaric acid, Ferulic acid, Benzoic acid และ Cinnamic acid

งานวิจัยนี้มีวัตถุประสงค์ 2 ข้อ และ ผลที่คาดว่าจะได้รับ 2 ข้อ ดังนี้
วัตถุประสงค์

1. เพื่อให้ได้ข้อมูลของสาร phenolic acids ทั้งชนิดและปริมาณในผลไม้เขตร้อนบางชนิดที่มีในประเทศ ที่ส่งผลต่อการมีสุขภาพดี
2. เพื่อให้ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนที่มีในประเทศ

ผลที่คาดว่าจะได้รับ

1. ทราบชนิดและปริมาณของสาร phenolic acids ที่ส่งผลต่อสุขภาพจากผลมะยม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และส้มโชกุน
2. ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนดังกล่าวซึ่งมีในประเทศ ส่งผลทางอ้อมในการช่วยให้สวนผลไม้ไทยยังคงเป็นทางเลือกอาชีพที่มั่นคงของเกษตรกรได้

พบสาร phenolic acids ทั้ง 10 ชนิด ในชมพู่มะเหมี่ยวผลแก่อบแห้ง มะเฟืองผลแก่และผลอ่อน ทั้งสดและอบแห้ง ส้มโชกุนผลแก่และผลอ่อนอบแห้ง ส้มโอผลแก่และผลอ่อน ส้มโอผลแก่อบแห้ง ที่สกัดด้วย 80% methanol

ในผลไม้สด พบว่าส้มโอผลแก่และชมพู่พันธุ์ทุลเกล้าผลแก่ มีปริมาณสาร phenolic acids รวม (หน่วยเป็นกรัม) มากที่สุดต่อน้ำหนัก 1 กรัมผล คือ 0.04635 และ 0.05326 ตามลำดับ

ในผลไม้อบแห้ง พบว่าส้มโอผลแก่อบแห้ง มีปริมาณสาร phenolic acids รวม (หน่วยเป็นกรัม) มากที่สุดต่อน้ำหนัก 1 กรัมผล คือ 1.437

งานวิจัยนี้สามารถให้ข้อมูลทั้งชนิดและปริมาณสาร phenolic acids ซึ่งทำให้ผู้รับข้อมูลเล็งเห็นถึงความสำคัญของผลไม้เขตร้อนทั้ง 8 ชนิด ซึ่งบางชนิดหารับประทานได้ยาก เนื่องจากไม่เป็นที่นิยมปลูกเพราะไม่เห็นคุณค่าที่มีในผลไม้บางชนิดเหล่านี้ ข้อมูลดังกล่าวจึงเป็นข้อมูลอ้างอิงเบื้องต้นในการส่งเสริมทั้งการปลูกและการบริโภคเพื่อสุขภาพได้

ในงานวิจัยนี้ได้สกัด phenolic acids เป็น 3 fractions เพื่อนำไปใช้วิเคราะห์ความสามารถในการต้านอนุมูลอิสระในขั้นตอนต่อไป เนื่องจากจากงานวิจัยอ้างอิงมีข้อมูลว่า แต่ละ fraction อาจพบสาร phenolic acids ต่างชนิดกัน ซึ่งน่าจะทำให้ความสามารถในการต้านอนุมูลอิสระมีค่าต่างกันตามชนิดของสาร phenolic acid นั้นๆ

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ภาคผนวก ก.

Chromatogram แสดงชนิดและปริมาณสาร phenolic acids ในตัวอย่างผลไม้

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Calibration Table

=====

Calib. Data Modified : 4/23/2013 10:26:42 AM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 1.000 %
Abs. Reference Window : 0.500 min
Rel. Non-ref. Window : 1.000 %
Abs. Non-ref. Window : 0.500 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Forced
Weight : Equal

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Lvl Sig	Amount [ug/ml]	Area	Amt/Area	Ref Grp Name
13.618	1 1	5.00000	266.11823	1.87886e-2	Proto
	2	10.00000	538.98181	1.85535e-2	
	3	20.00000	1089.59290	1.83555e-2	
	4	30.00000	1676.68372	1.78925e-2	
	5	40.00000	2211.73779	1.80853e-2	
	6	50.00000	2718.85693	1.83901e-2	
17.648	1 1	5.00000	90.68826	5.51339e-2	m-Hydroxy
	2	10.00000	197.55298	5.06193e-2	
	3	20.00000	387.24368	5.16471e-2	
	4	30.00000	626.15314	4.79116e-2	
	5	40.00000	844.84711	4.73458e-2	
	6	50.00000	1129.21838	4.42784e-2	
18.437	1 1	5.00000	751.70490	6.65155e-3	Cafeic + Vanilic
	2	10.00000	1500.11121	6.66617e-3	
	3	20.00000	3005.70020	6.65402e-3	
	4	30.00000	4688.96436	6.39800e-3	
	5	40.00000	6282.86084	6.36653e-3	
	6	50.00000	8017.90723	6.23604e-3	
19.683	1 1	5.00000	100.26305	4.98688e-2	p-Hydroxy
	2	10.00000	211.03293	4.73860e-2	
	3	20.00000	403.33032	4.95871e-2	
	4	30.00000	610.56775	4.91346e-2	
	5	40.00000	828.09027	4.83039e-2	
	6	50.00000	1037.01196	4.82155e-2	
22.499	1 1	5.00000	837.30859	5.97151e-3 +	p-Coum
	2	10.00000	1708.05457	5.85461e-3	
	3	20.00000	3471.54663	5.76112e-3	
	4	30.00000	5250.37354	5.71388e-3	
	5	40.00000	7086.28711	5.64470e-3	
	6	50.00000	8748.14258	5.71550e-3	
23.381	1 1	5.00000	308.89145	1.61869e-2 +	Ferulic
	2	10.00000	674.22302	1.48319e-2	
	3	20.00000	1453.70911	1.37579e-2	
	4	30.00000	2261.42041	1.32660e-2	
	5	40.00000	3167.96265	1.26264e-2	

RetTime [min]	Lvl Sig	Amount [ug/ml]	Area	Amt/Area	Ref Grp Name
23.993	1	50.00000	3958.35864	1.26315e-2	+ Veratric
		5.00000	65.18927	7.66997e-2	
		10.00000	151.12791	6.61691e-2	
		20.00000	180.76593	1.10640e-1	
		30.00000	283.60303	1.05782e-1	
		40.00000	308.85248	1.29512e-1	
27.223	1	50.00000	955.87512	5.23081e-2	+ Benz
		5.00000	40.21669	1.24326e-1	
		10.00000	82.37465	1.21397e-1	
		20.00000	166.08923	1.20417e-1	
		30.00000	249.53493	1.20224e-1	
		40.00000	331.78424	1.20560e-1	
32.718	1	50.00000	414.99094	1.20485e-1	+ Cinn
		5.00000	1214.66553	4.11636e-3	
		10.00000	2493.87500	4.00982e-3	
		20.00000	4967.44824	4.02621e-3	
		30.00000	7075.55371	4.23995e-3	
		40.00000	9988.04297	4.00479e-3	
		50.00000	1.24728e4	4.00871e-3	

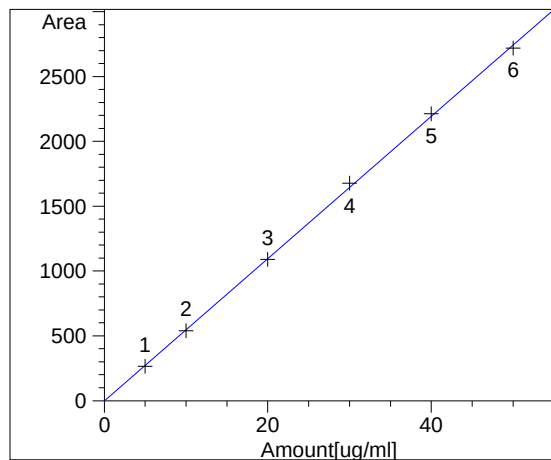
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Warning : Overlapping peak time windows at 23.381 min, signal 1

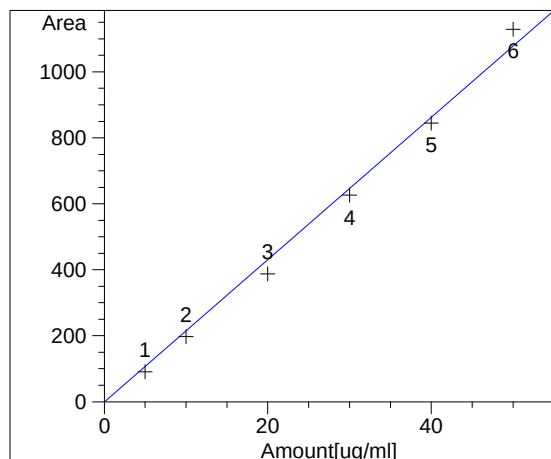
Peak Sum Table

No Entries in table

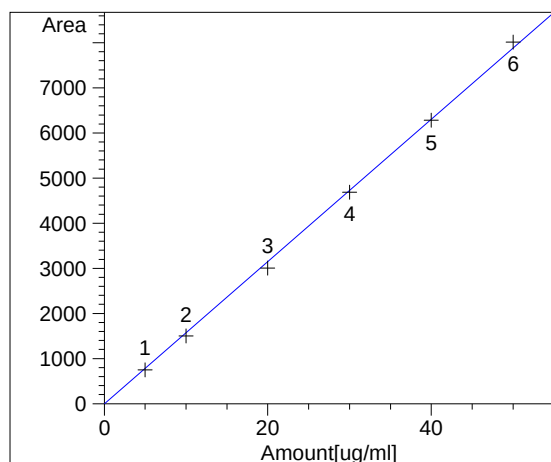
Calibration Curves



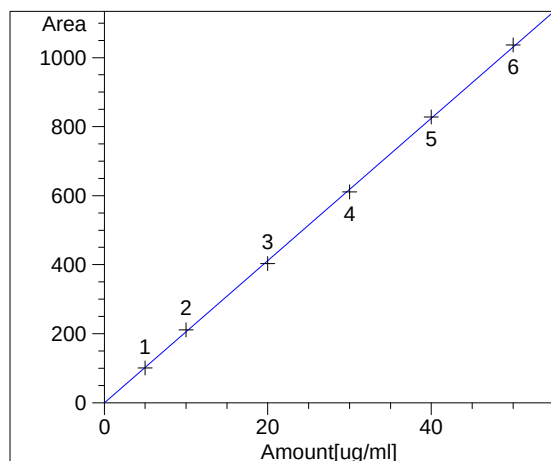
Proto at exp. RT: 13.618
DAD1 A, Sig=284,16 Ref=500,100
Correlation: 0.99994
Residual Std. Dev.: 20.25756
Formula: $y = mx$
m: 54.88238
x: Amount[ug/ml]
y: Area



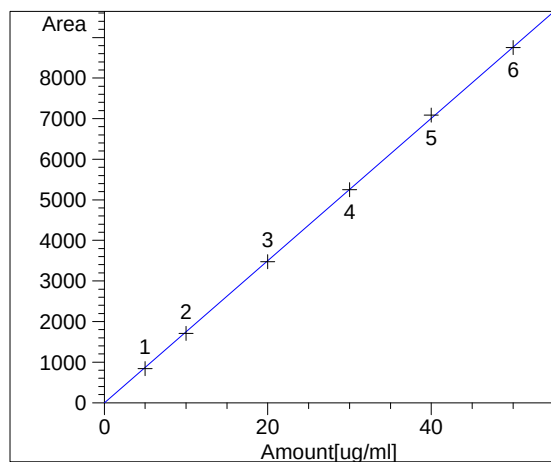
m-Hydroxy at exp. RT: 17.648
DAD1 A, Sig=284,16 Ref=500,100
Correlation: 0.99885
Residual Std. Dev.: 34.37085
Formula: $y = mx$
m: 21.57706
x: Amount[ug/ml]
y: Area



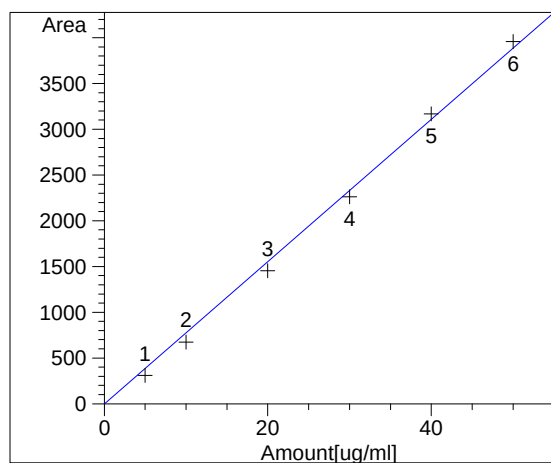
Cafeic + Vanilic at exp. RT: 18.437
 DAD1 A, Sig=284,16 Ref=500,100
 Correlation: 0.99982
 Residual Std. Dev.: 99.28104
 Formula: $y = mx$
 m: 157.78323
 x: Amount[ug/ml]
 y: Area



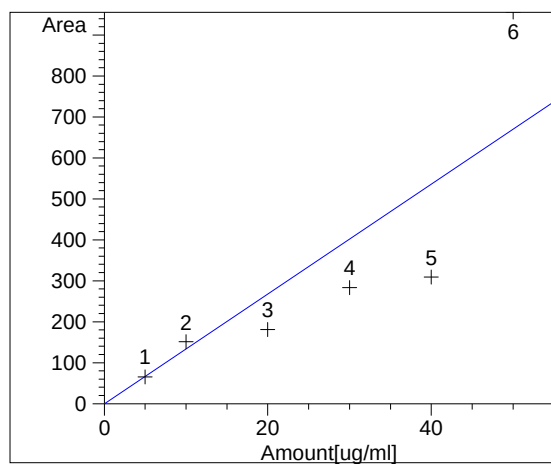
p-Hydroxy at exp. RT: 19.683
 DAD1 A, Sig=284,16 Ref=500,100
 Correlation: 0.99995
 Residual Std. Dev.: 6.70524
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 x: Amount[ug/ml]
 y: Area



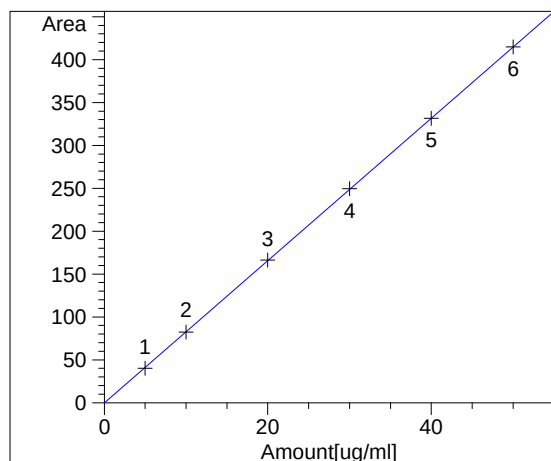
p-Coum at exp. RT: 22.499
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 Correlation: 0.99997
 Residual Std. Dev.: 45.97474
 Formula: $y = mx$
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 x: Amount[ug/ml]
 y: Area



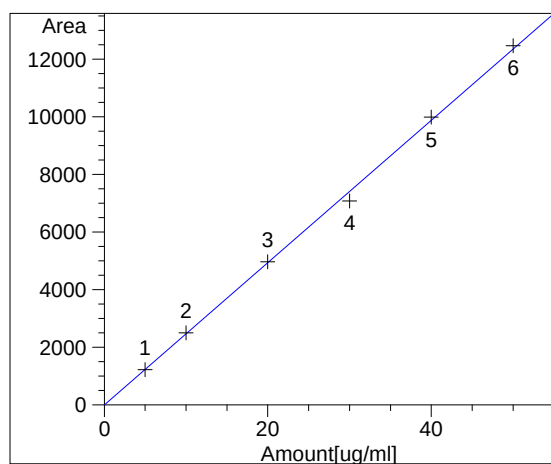
Ferulic at exp. RT: 23.381
 DAD1 A, Sig=284,16 Ref=500,100
 Correlation: 0.99939
 Residual Std. Dev.: 90.24742
 Formula: $y = mx$
 m: 77.79908
 x: Amount[ug/ml]
 y: Area



Veratric at exp. RT: 23.993
DAD1 A, Sig=284,16 Ref=500,100
Correlation: 0.93001
Residual Std. Dev.: 176.20663
Formula: $y = mx$
m: 13.41330
x: Amount[ug/ml]
y: Area

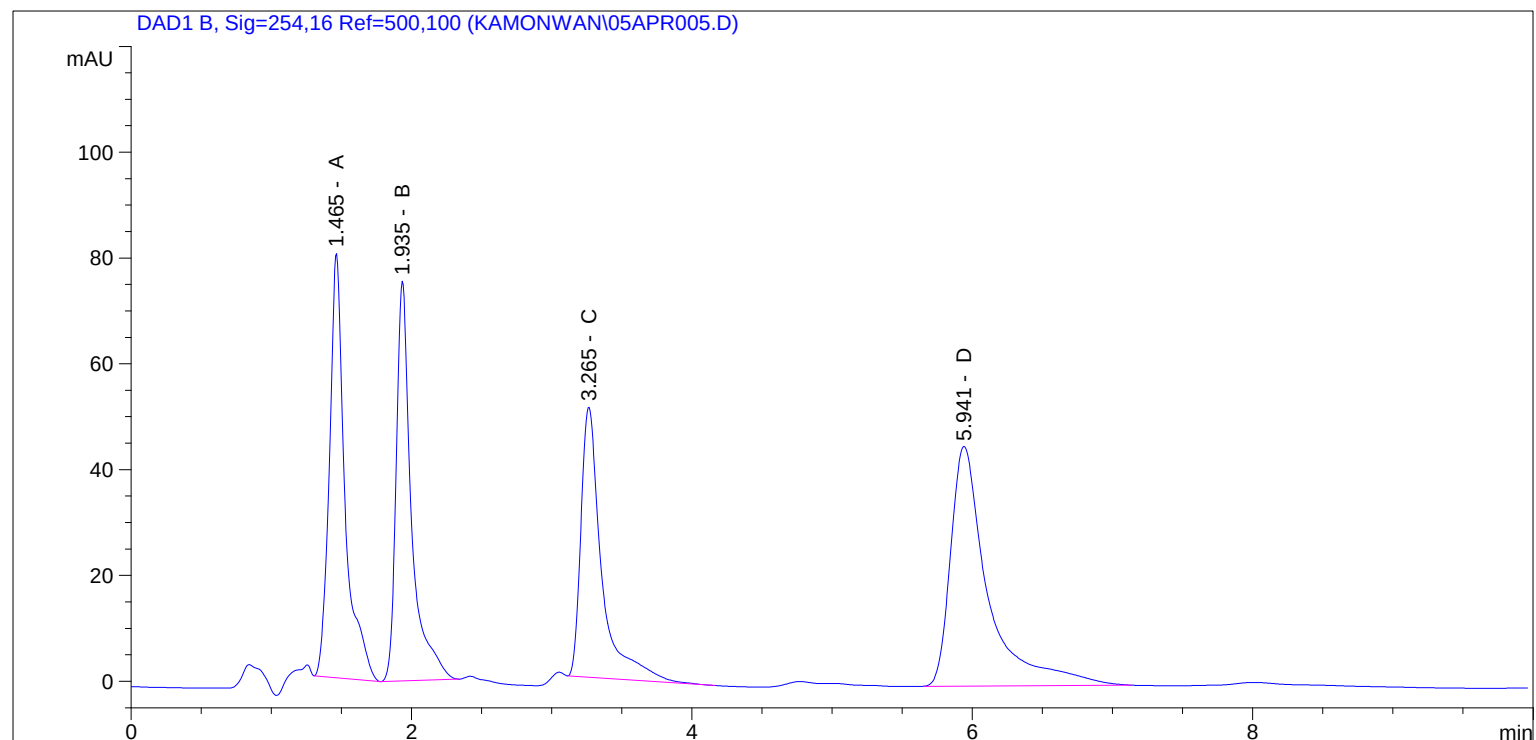


Benz at exp. RT: 27.223
DAD1 A, Sig=284,16 Ref=500,100
Correlation: 1.00000
Residual Std. Dev.: 0.68933
Formula: $y = mx$
m: 8.29929
x: Amount[ug/ml]
y: Area



Cinn at exp. RT: 32.718
DAD1 A, Sig=284,16 Ref=500,100
Correlation: 0.99979
Residual Std. Dev.: 167.40935
Formula: $y = mx$
m: 247.20209
x: Amount[ug/ml]
y: Area


```
=====
Injection Date   : 4/5/2013 12:21:46 PM      Seq. Line :    4
Sample Name      : sample                    Location  : Vial 1
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\TEST.M
Last changed     : 4/5/2013 11:33:18 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\TEST_C.M
Last changed     : 4/5/2013 2:08:37 PM by kamonwan
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      4/5/2013 2:03:16 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=254,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ppm]	Grp	Name
1.465	BB	622.46771	6.33111e-3	3.94091	A	
1.935	BB	571.93024	6.89710e-3	3.94466	B	
3.265	BBA	525.44275	7.52114e-3	3.95193	C	
5.941	BBA	840.49384	4.63260e-3	3.89368	D	

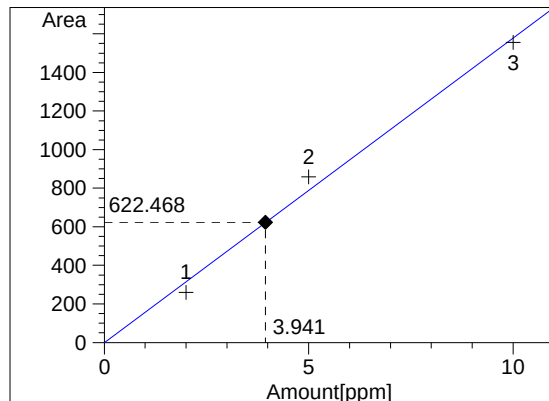
Totals : 15.73118

Results obtained with enhanced integrator!
1 Warnings or Errors :

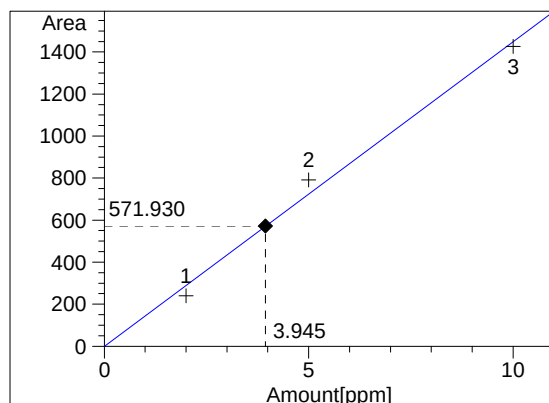
Warning : Calibration warnings (see calibration table listing)

```
=====
Injection Date   : 4/5/2013 12:21:46 PM      Seq. Line :    4
Sample Name      : sample                    Location  : Vial 1
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\TEST.M
Last changed     : 4/5/2013 11:33:18 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\TEST_C.M
Last changed     : 4/5/2013 2:08:37 PM by kamonwan
=====
```

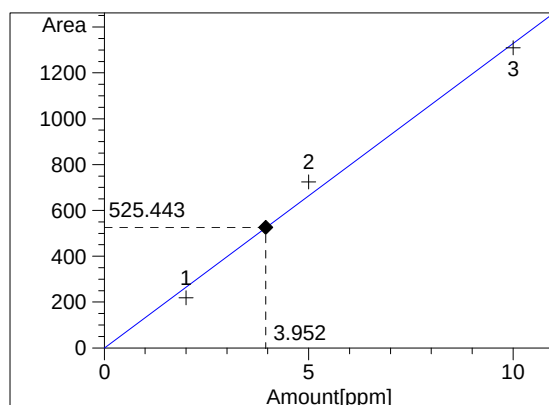
```
=====
                        Calibration Curves
=====
```



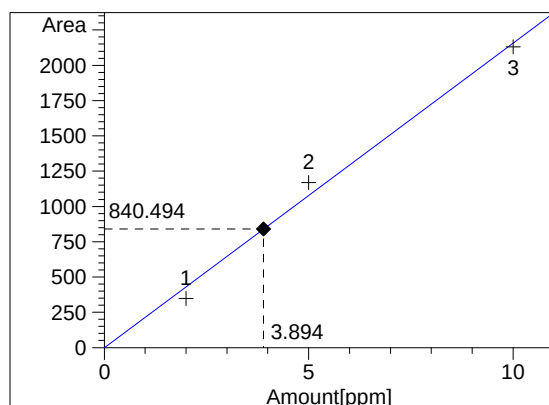
A at exp. RT: 1.464
DAD1 B, Sig=254,16 Ref=500,100
Correlation: 0.99867
Residual Std. Dev.: 65.39091
Formula: $y = mx$
m: 157.95019
x: Amount [ppm]
y: Area



B at exp. RT: 1.935
DAD1 B, Sig=254,16 Ref=500,100
Correlation: 0.99862
Residual Std. Dev.: 61.29574
Formula: $y = mx$
m: 144.98851
x: Amount [ppm]
y: Area



C at exp. RT: 3.263
DAD1 B, Sig=254,16 Ref=500,100
Correlation: 0.99863
Residual Std. Dev.: 55.95314
Formula: $y = mx$
m: 132.95855
x: Amount [ppm]
y: Area

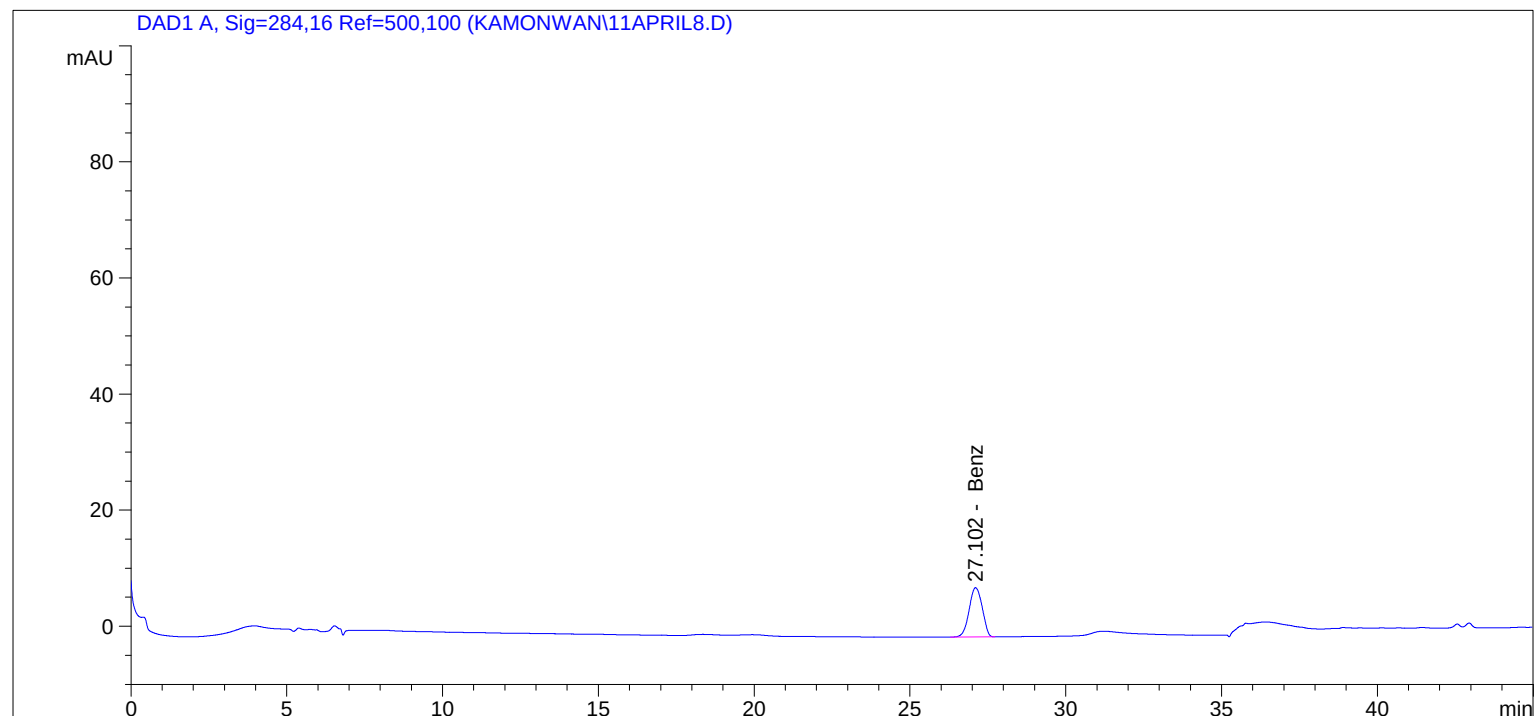


D at exp. RT: 5.933
DAD1 B, Sig=254,16 Ref=500,100
Correlation: 0.99869
Residual Std. Dev.: 88.75148
Formula: $y = mx$
m: 215.86128
x: Amount [ppm]
y: Area

```

=====
Injection Date   : 4/11/2013 3:26:45 PM      Seq. Line   :    8
Sample Name     : std. Benz 30 ppm          Location    : Vial 8
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/11/2013 11:40:31 AM by kamonwan
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:43:20 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
                        Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.557		0.0000	0.00000	0.0000	Proto
2	17.570		0.0000	0.00000	0.0000	m-Hydroxy
3	18.356		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.596		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.102	BB +	0.4677	247.24516	100.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 247.24516 100.0000

Results obtained with enhanced integrator!

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

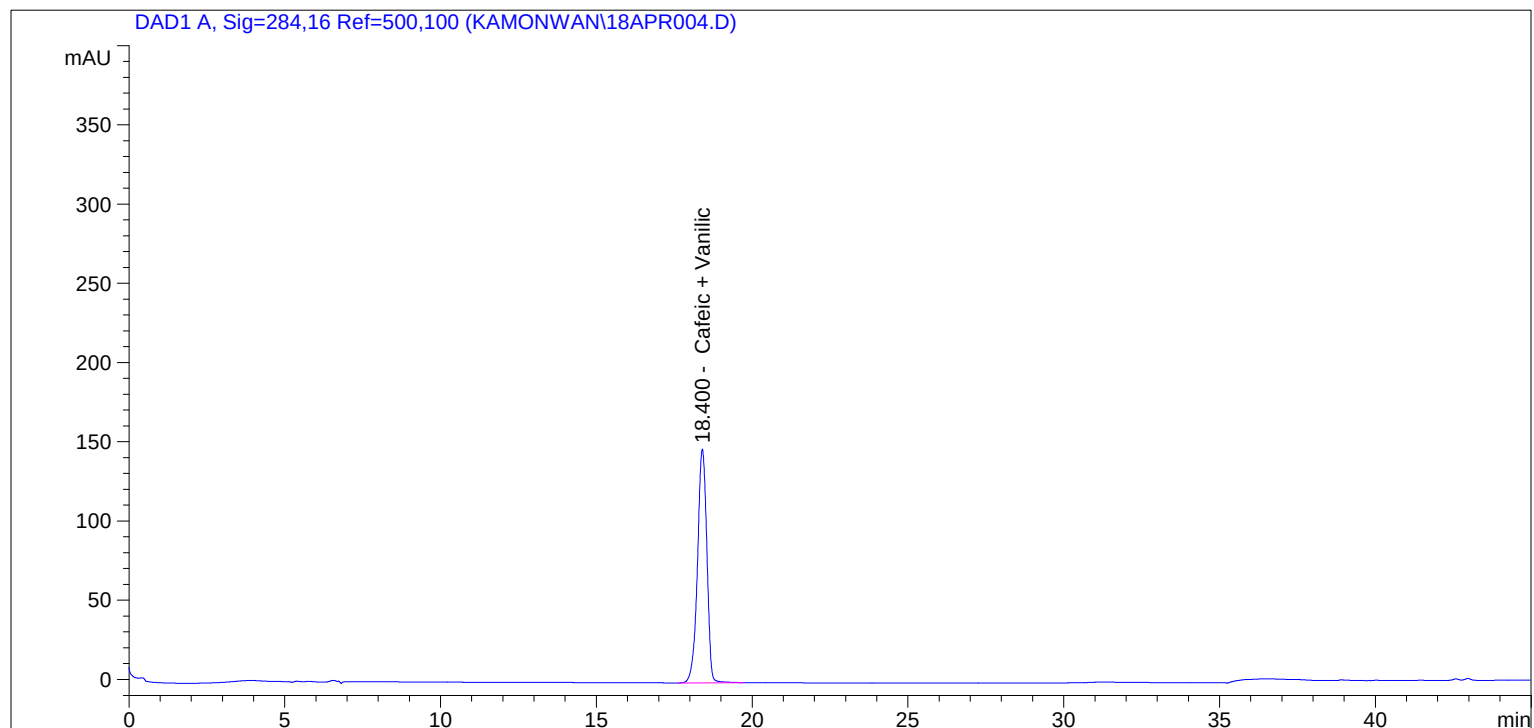
Warning : Time reference compound(s) not found

```

=====
*** End of Report ***

```

```
=====
Injection Date   : 4/18/2013 1:54:33 PM      Seq. Line   :    3
Sample Name      : cafeic 30 ppm             Location      : Vial 3
Acq. Operator    : kamonwan                  Inj           :    1
Acq. Instrument  : Instrument 1              Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:39:32 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618		0.0000	0.00000	0.0000	Proto
2	17.648		0.0000	0.00000	0.0000	m-Hydroxy
3	18.400	BB	0.3254	3079.25439	100.0000	Cafeic + Vanilic
4	19.683		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

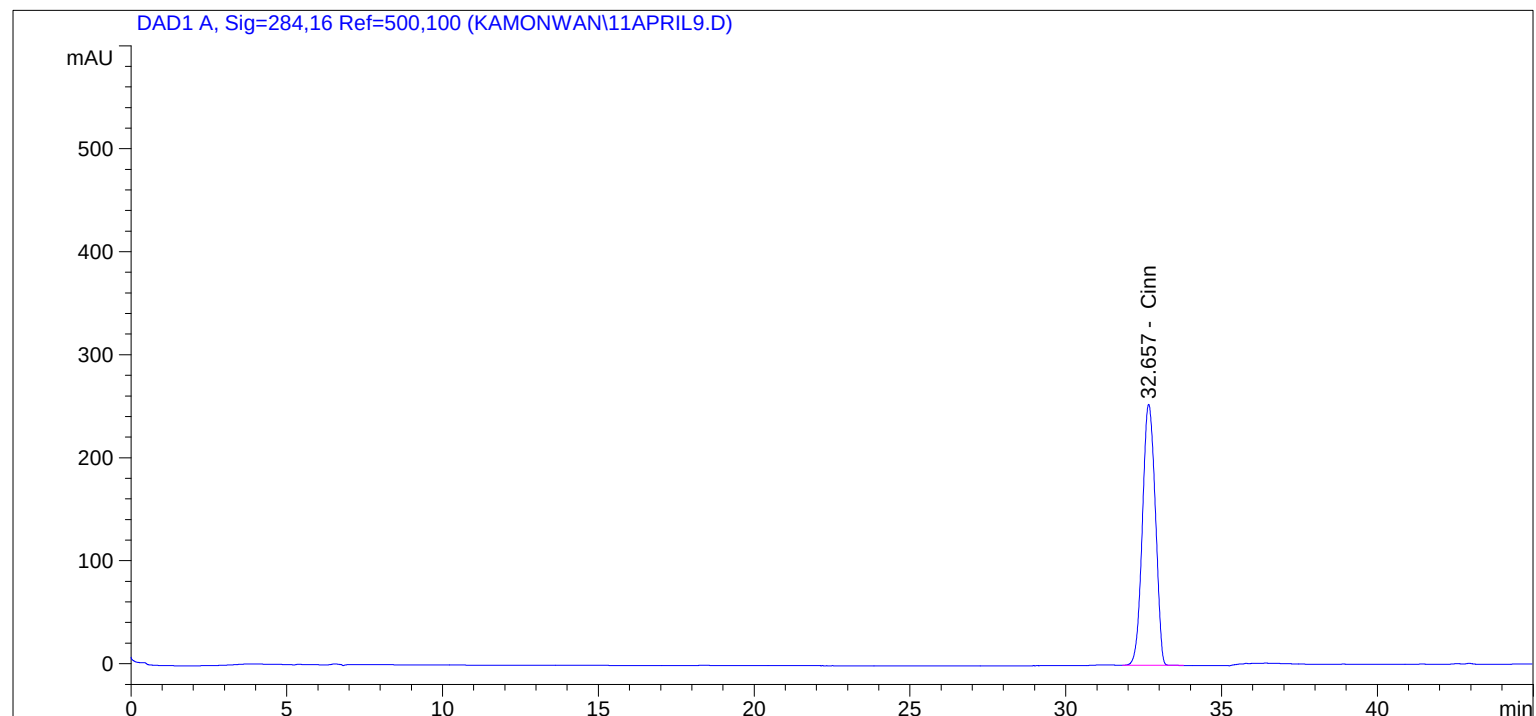
Totals : 3079.25439 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/11/2013 4:13:07 PM      Seq. Line :    9
Sample Name     : std. Cinn 30 ppm           Location  : Vial 9
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/11/2013 11:40:31 AM by kamonwan
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:44:08 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                        Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.592		0.0000	0.00000	0.0000	Proto
2	17.615		0.0000	0.00000	0.0000	m-Hydroxy
3	18.403		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.646		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.657	BB +	0.4662	7302.32568	100.0000	Cinn

Totals : 7302.32568 100.0000

Results obtained with enhanced integrator!

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

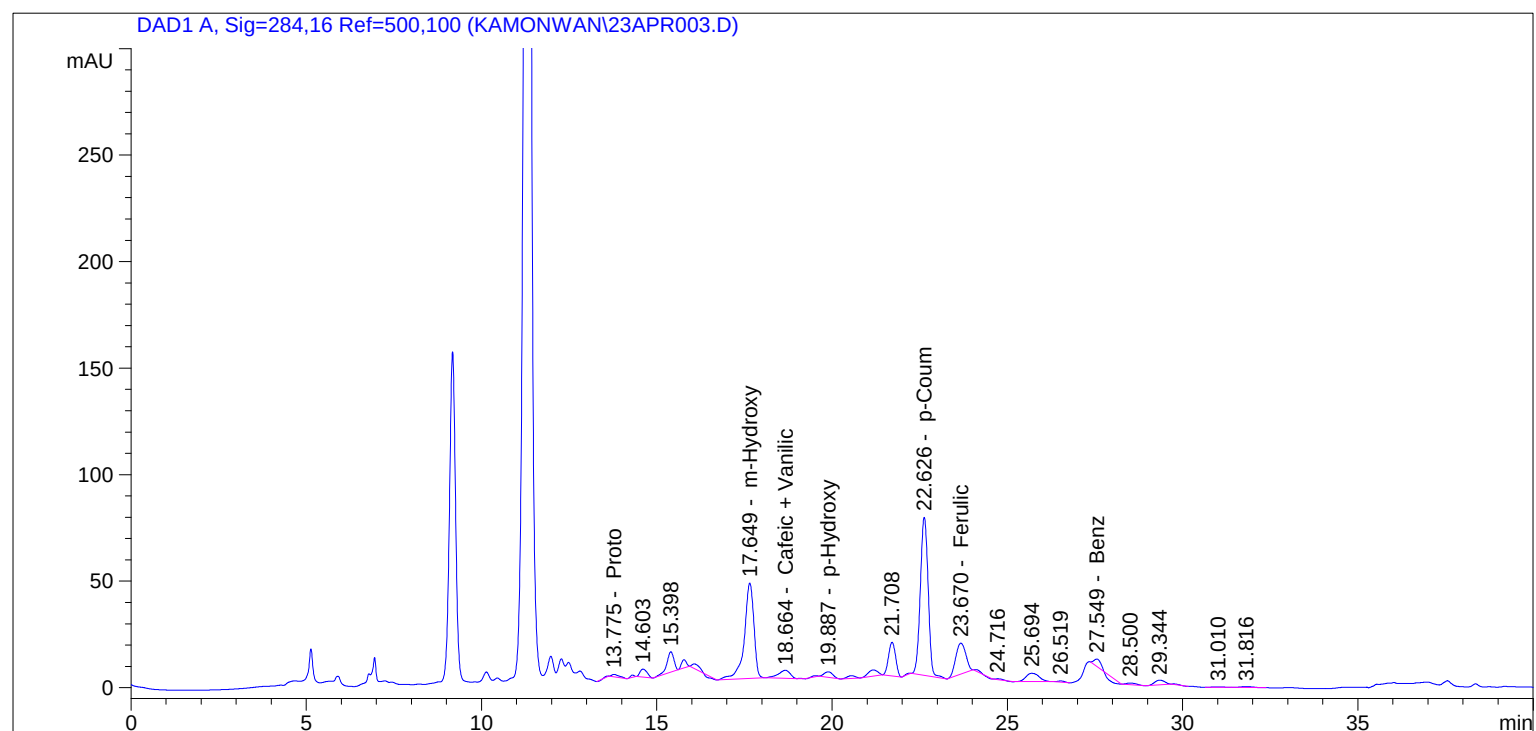
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
```

```

=====
Injection Date   : 4/23/2013 1:22:24 PM      Seq. Line :    3
Sample Name     : D-IMC FPA                 Location  : Vial 6
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 2:51:10 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.775	BB	19.40763	1.82208e-2	3.53622e-1		Proto
17.649	BB	853.31012	4.63455e-2	39.54710		m-Hydroxy
18.664	BB	87.86768	6.33781e-3	5.56889e-1		Cafeic + Vanilic
19.887	BB	43.36029	4.84779e-2	2.10202		p-Hydroxy
22.626	BB +	1149.67163	5.70136e-3	6.55469		p-Coum
23.670	BB +	288.35602	1.28536e-2	3.70642		Ferulic
24.091	BB +	5.02309	7.45529e-2	3.74486e-1		Veratric
27.549	BB +	4.51617e-1	1.20492e-1	5.44163e-2		Benz
32.718	-	-	-	-		Cinn

Totals : 53.24964

Results obtained with enhanced integrator!
 2 Warnings or Errors :

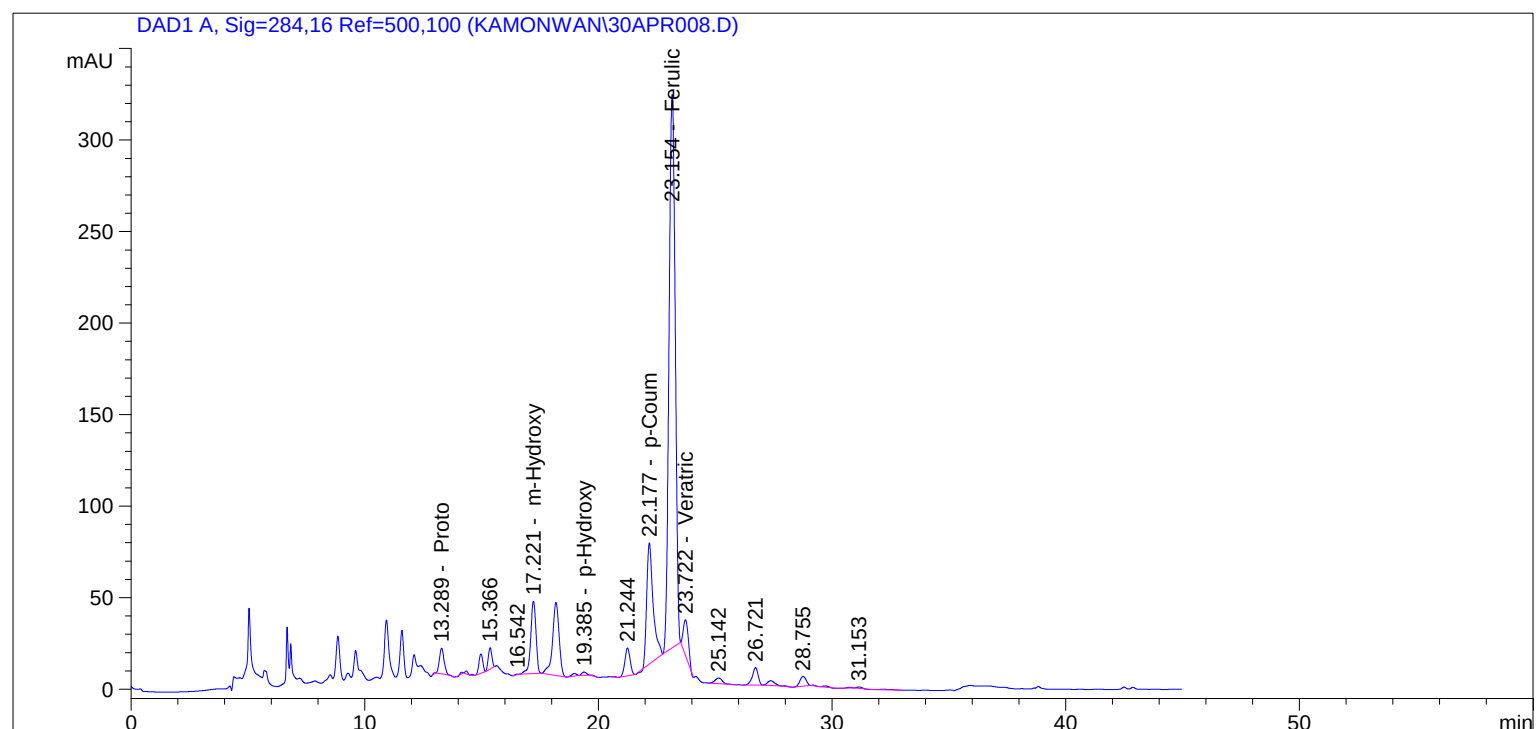
Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/30/2013 1:45:08 PM      Seq. Line   :      8
Sample Name     : D-IMC LIB EST B           Location    : Vial 8
Acq. Operator   : kamonwan                  Inj         :      1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 4:54:37 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.289	BB	193.74100	1.82208e-2	3.53011		Proto
17.221	BB	622.49939	4.63455e-2	28.85006		m-Hydroxy
18.184	BB	780.96027	6.33781e-3	4.94958		Cafeic + Vanilic
19.385	BB	24.38617	4.84779e-2	1.18219		p-Hydroxy
22.177	BB +	1260.90710	5.70136e-3	7.18888		p-Coum
23.154	BB +	5564.28955	1.28536e-2	71.52128		Ferulic
23.722	BB +	290.84769	7.45529e-2	21.68353		Veratric
27.374	BB +	55.09456	1.20492e-1	6.63847		Benz
32.718		-	-	-		Cinn

Totals : 145.54409

Results obtained with enhanced integrator!
2 Warnings or Errors :

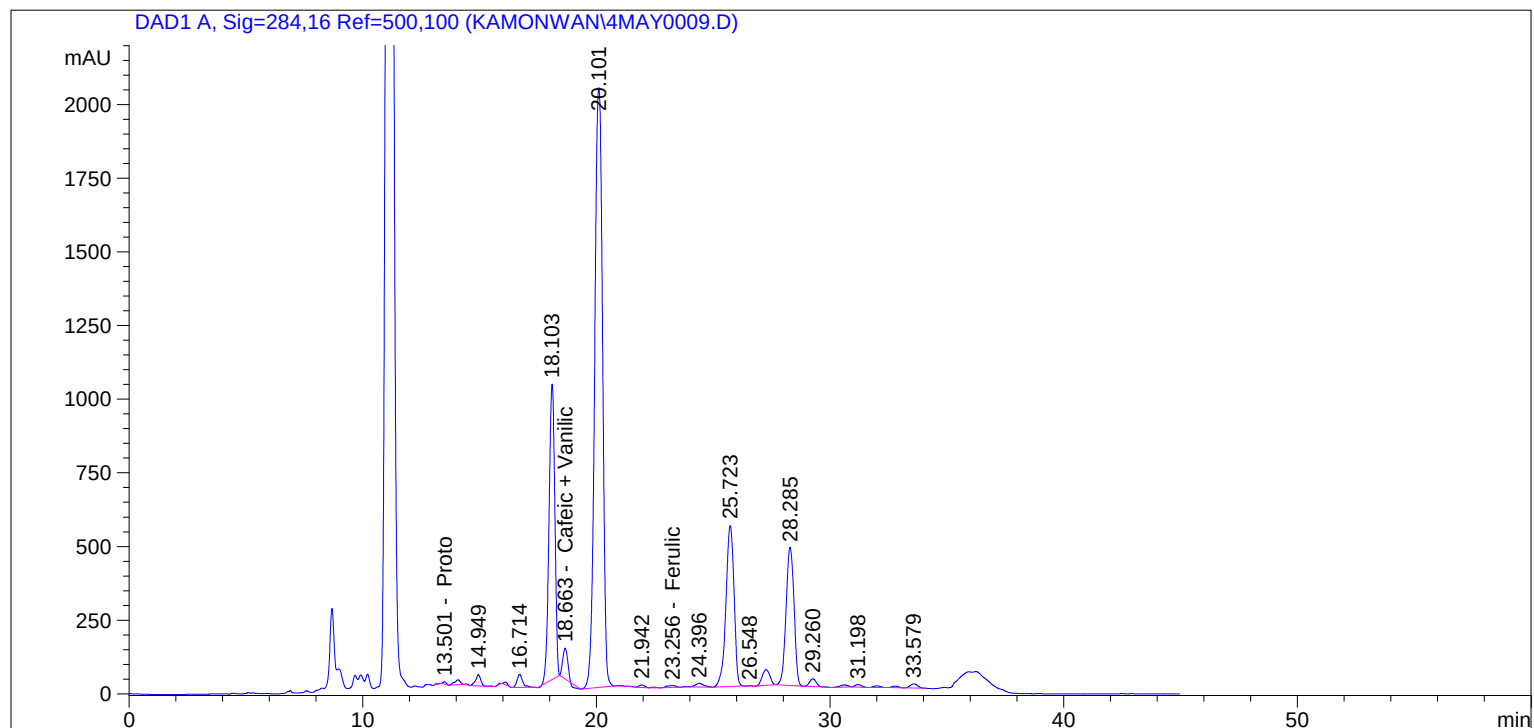
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 5/4/2013 3:13:59 PM	Seq. Line	: 9
Sample Name	: D-IMC LIB GLY B	Location	: Vial 9
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	5/4/2013 9:00:35 AM by Kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	5/4/2013 4:00:10 PM by Kamonwan		
	(modified after loading)		

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.501	BB	70.21041	1.82208e-2	1.27929		Proto
17.322	BB	9.30673	4.63455e-2	4.31325e-1		m-Hydroxy
18.663	BB	1385.39087	6.33781e-3	8.78034		Cafeic + Vanilic
19.635		-	-	-		p-Hydroxy
22.445	BB +	33.81357	5.70136e-3	1.92783e-1		p-Coum
23.256	BB +	182.27229	1.28536e-2	2.34286		Ferulic
23.826	BB +	25.73985	7.45529e-2	1.91898		Veratric
27.257	BB +	1225.41113	1.20492e-1	147.65252		Benz
32.785	BB +	115.90086	4.04527e-3	4.68851e-1		Cinn

Totals : 163.06695

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

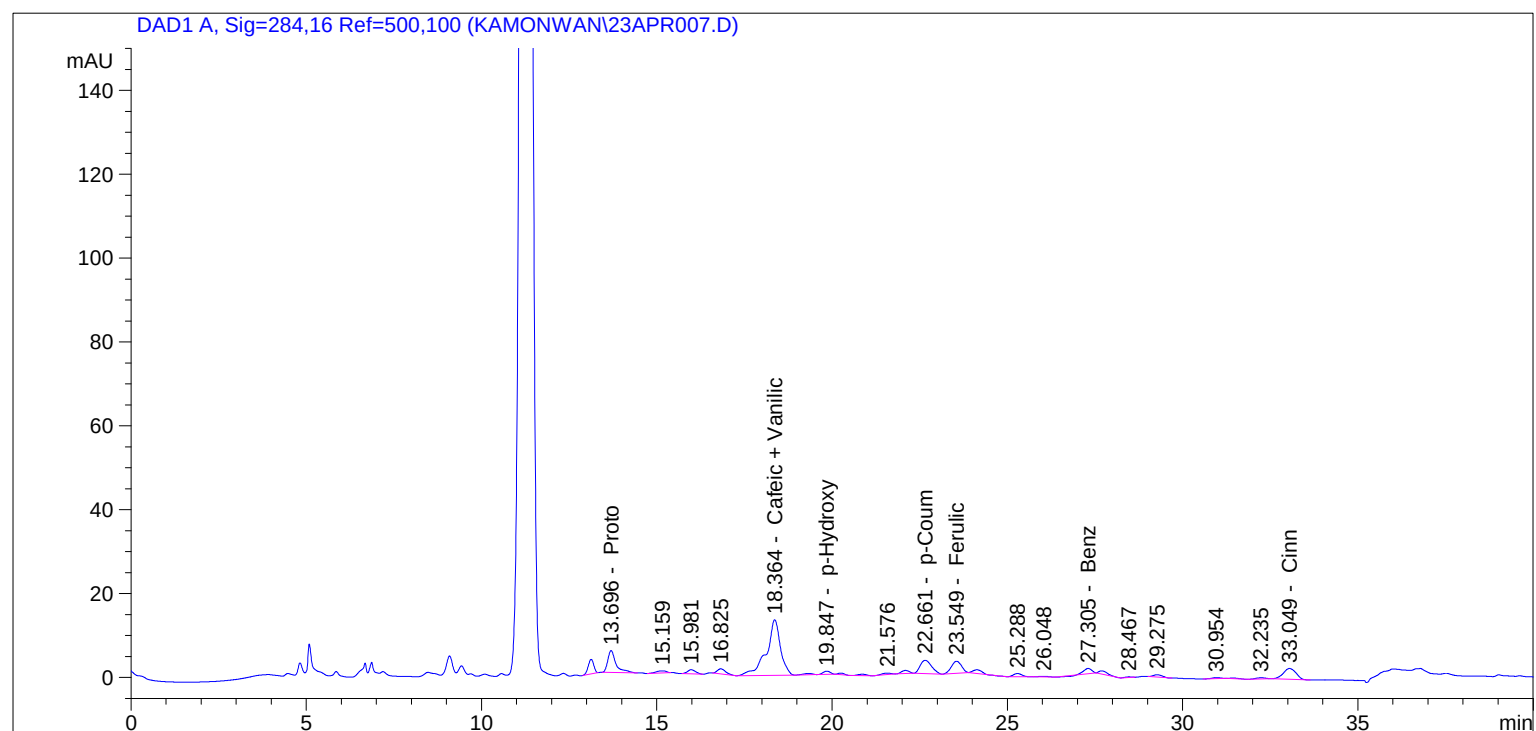
*** End of Report ***

=====


```

=====
Injection Date   : 4/23/2013 4:27:46 PM      Seq. Line :    7
Sample Name     : D-IMFA FPA                Location  : Vial 10
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 5:14:11 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.696	BB	87.03343	1.82208e-2	1.58582		Proto
17.775		-	-	-		m-Hydroxy
18.364	BB	369.94189	6.33781e-3	2.34462		Cafeic + Vanilic
19.847	BB	11.45951	4.84779e-2	5.55533e-1		p-Hydroxy
22.661	BB +	71.84473	5.70136e-3	4.09612e-1		p-Coum
23.549	BB +	57.56419	1.28536e-2	7.39908e-1		Ferulic
24.130	BB +	13.26309	7.45529e-2	9.88801e-1		Veratric
27.305	BB +	17.01974	1.20492e-1	2.05075		Benz
33.049	BB +	65.14812	4.04527e-3	2.63542e-1		Cinn

Totals : 8.93858

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

```

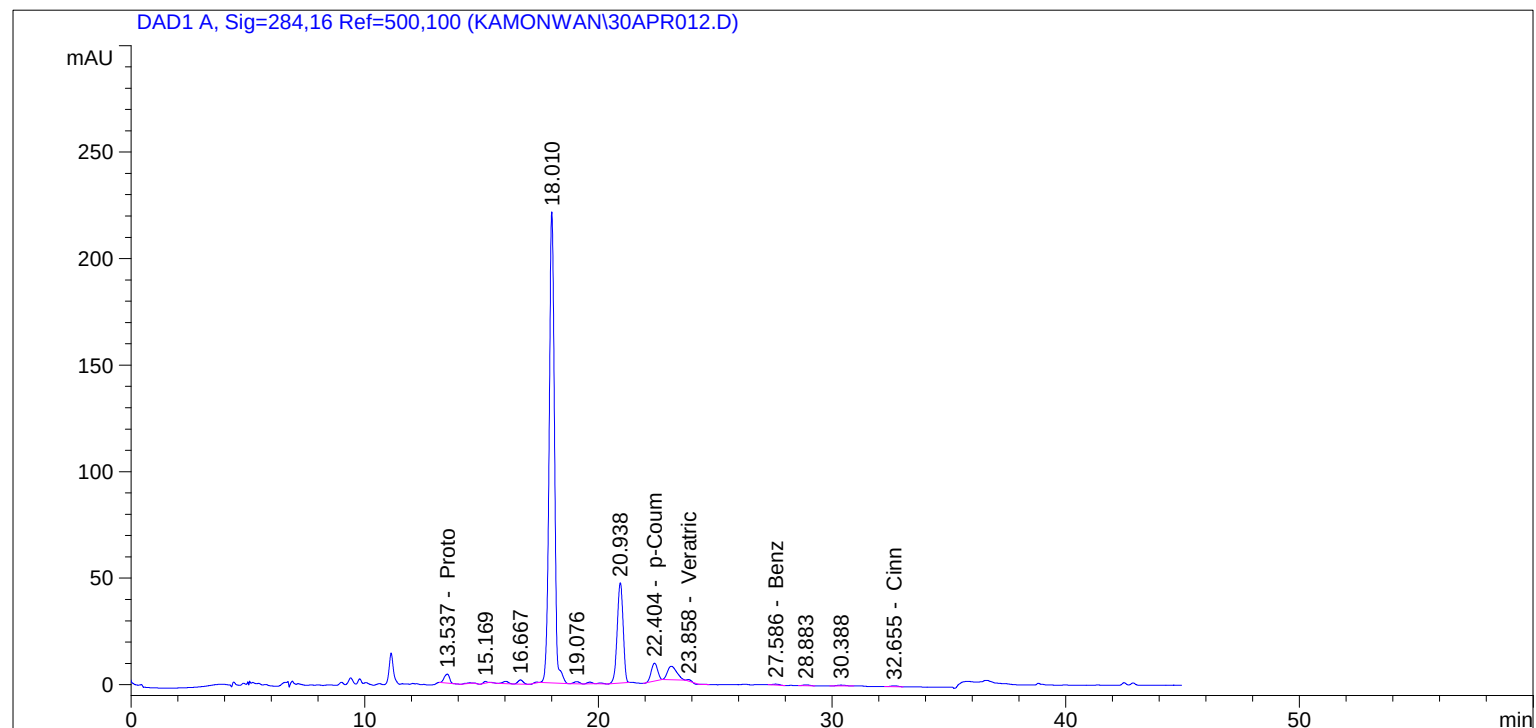
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/30/2013 4:50:31 PM      Seq. Line :   12
Sample Name     : D-IMFA LIB EST B          Location  : Vial 12
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 5:36:47 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.537	BB	67.86684	1.82208e-2	1.23659		Proto
17.360	BB	3.89448	4.63455e-2	1.80492e-1		m-Hydroxy
18.360		-	-	-		Cafeic + Vanilic
19.640	BB	11.86999	4.84779e-2	5.75432e-1		p-Hydroxy
22.404	BB +	158.64145	5.70136e-3	9.04471e-1		p-Coum
23.122	BB +	173.51390	1.28536e-2	2.23028		Ferulic
23.858	BB +	5.34593	7.45529e-2	3.98555e-1		Veratric
27.586	BB +	8.66433	1.20492e-1	1.04398		Benz
32.655	BB +	9.14478	4.04527e-3	3.69931e-2		Cinn

Totals : 6.60680

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

```

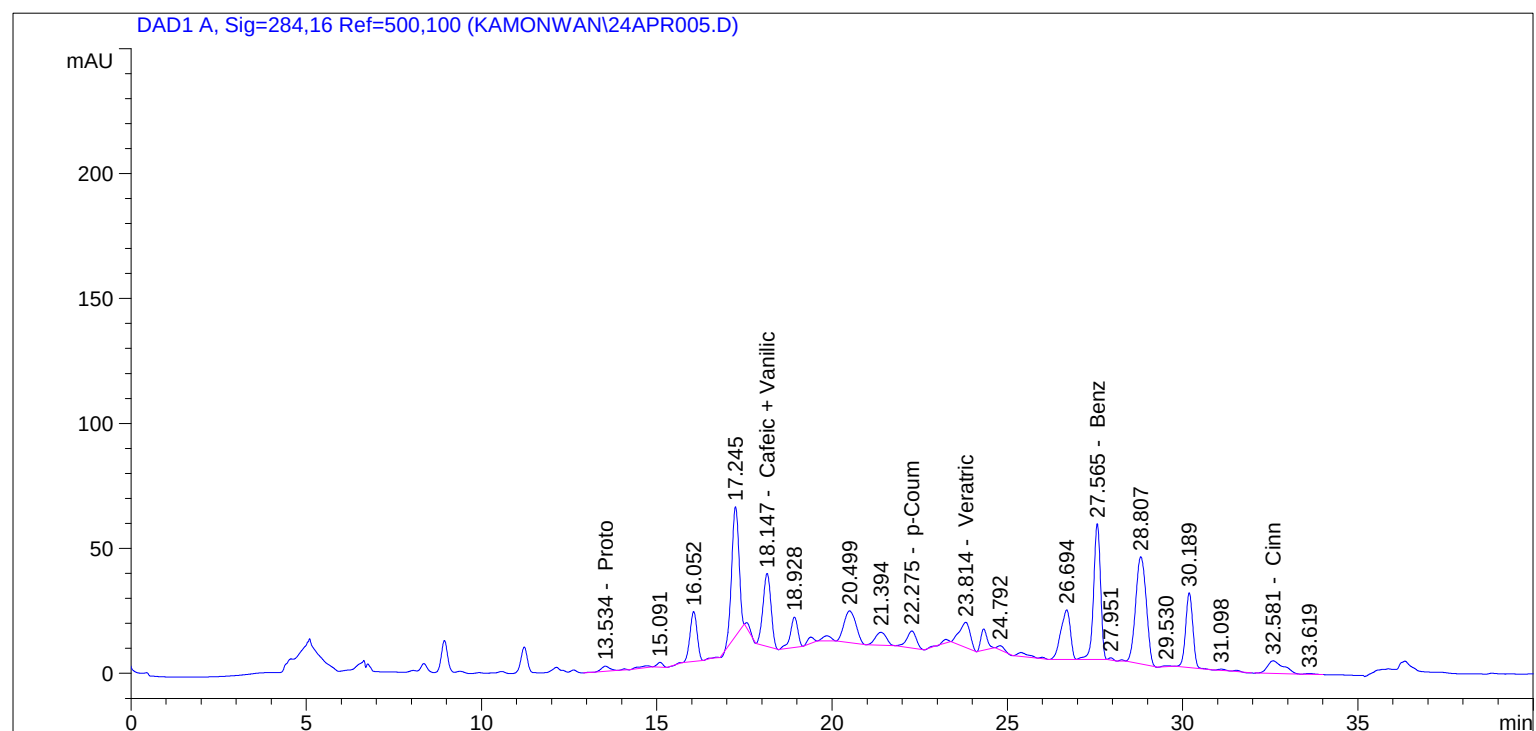
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/24/2013 11:22:43 AM      Seq. Line   :    5
Sample Name     : D-IMFG FPA                 Location    : Vial 5
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 12:19:30 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.534	BB	34.87743	1.82208e-2	6.35494e-1		Proto
17.564	BB	20.70137	4.63455e-2	9.59416e-1		m-Hydroxy
18.147	BB	464.21503	6.33781e-3	2.94211		Cafeic + Vanilic
19.396	BB	30.48478	4.84779e-2	1.47784		p-Hydroxy
22.275	BB +	127.01089	5.70136e-3	7.24134e-1		p-Coum
23.249	BB +	15.31916	1.28536e-2	1.96907e-1		Ferulic
23.814	BB +	214.73779	7.45529e-2	16.00932		Veratric
27.565	BB +	744.41901	1.20492e-1	89.69671		Benz
32.581	BB +	162.34789	4.04527e-3	6.56742e-1		Cinn

Totals : 113.29866

Results obtained with enhanced integrator!
 1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```

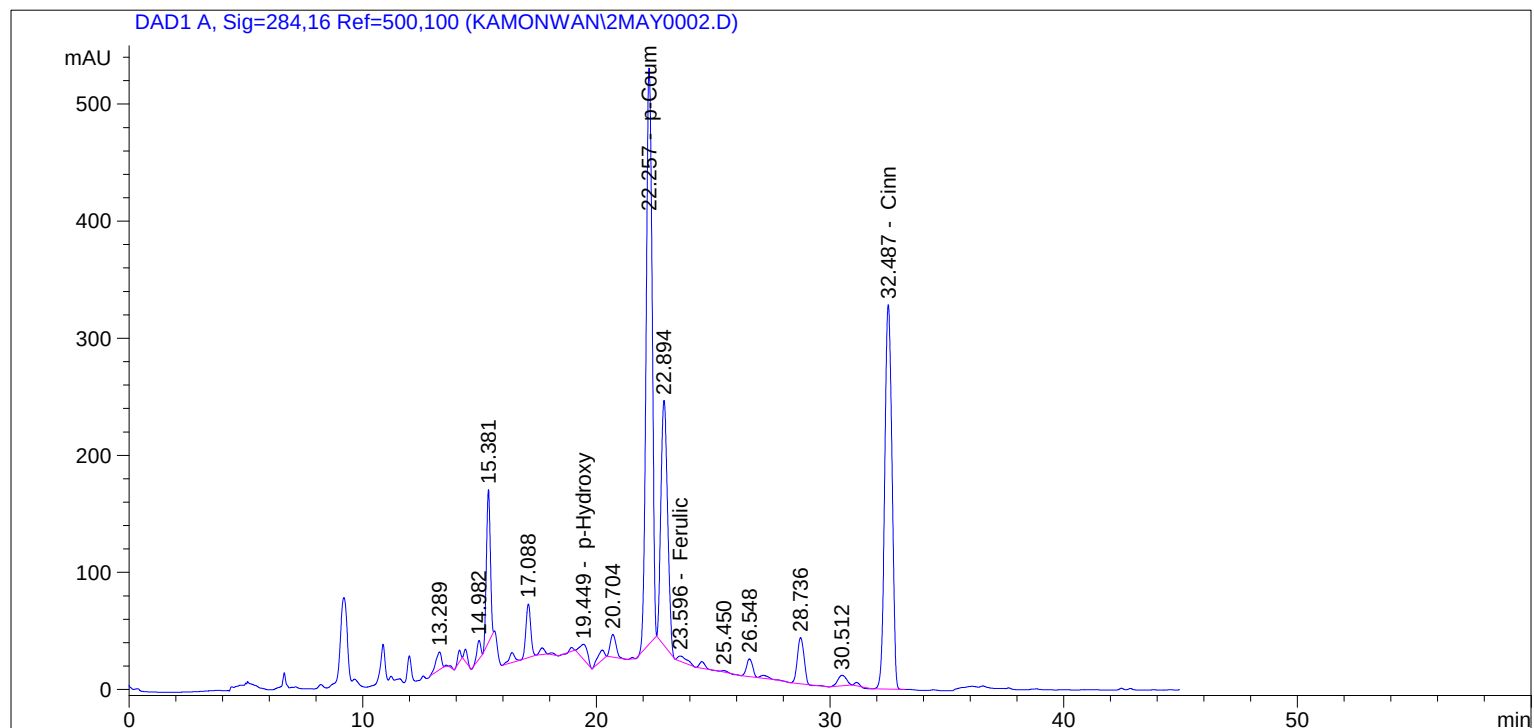
=====
*** End of Report ***
=====

```

=====

Injection Date	: 5/2/2013 12:34:50 PM	Seq. Line	: 2
Sample Name	: D-IMFG LIB EST B	Location	: Vial 2
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/2/2013 11:47:14 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/2/2013 1:22:31 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.574	BB	6.87191	1.82208e-2	1.25212e-1		Proto
17.681	BB	80.37222	4.63455e-2	3.72489		m-Hydroxy
18.086	BB	22.15195	6.33781e-3	1.40395e-1		Cafeic + Vanilic
19.449	BB	301.96222	4.84779e-2	14.63849		p-Hydroxy
22.257	BB +	8759.09277	5.70136e-3	49.93870		p-Coum
23.596	BB +	139.40997	1.28536e-2	1.79192		Ferulic
23.993		-	-	-		Veratric
27.143	BB +	54.19602	1.20492e-1	6.53020		Benz
32.487	BB +	7083.91113	4.04527e-3	28.65636		Cinn

Totals : 105.54617

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

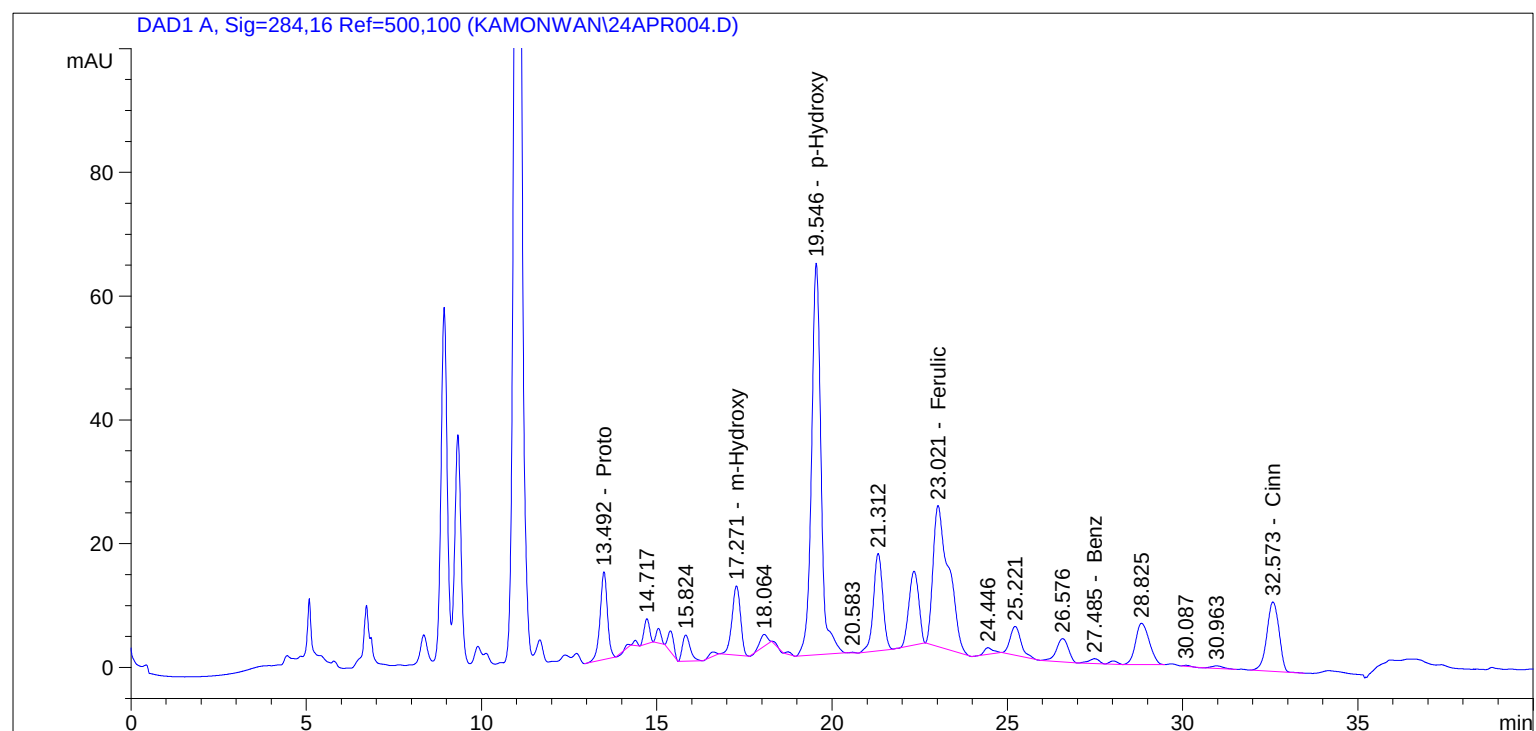
=====

*** End of Report ***

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Injection Date	: 4/24/2013 10:36:24 AM	Seq. Line	: 4
Sample Name	: D-IMMM FPA	Location	: Vial 4
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 11:24:39 AM by kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.492	BB	206.02858	1.82208e-2	3.75400		Proto
17.271	BB	188.02530	4.63455e-2	8.71413		m-Hydroxy
18.300	BB	1.68326	6.33781e-3	1.06682e-2		Cafeic + Vanilic
19.546	BB	1192.19788	4.84779e-2	57.79523		p-Hydroxy
22.336	BB +	233.73651	5.70136e-3	1.33261		p-Coum
23.021	BB +	711.92126	1.28536e-2	9.15077		Ferulic
23.993		-	-	-		Veratric
27.485	BB +	16.62725	1.20492e-1	2.00345		Benz
32.573	BB +	270.37595	4.04527e-3	1.09374		Cinn

Totals : 83.85461

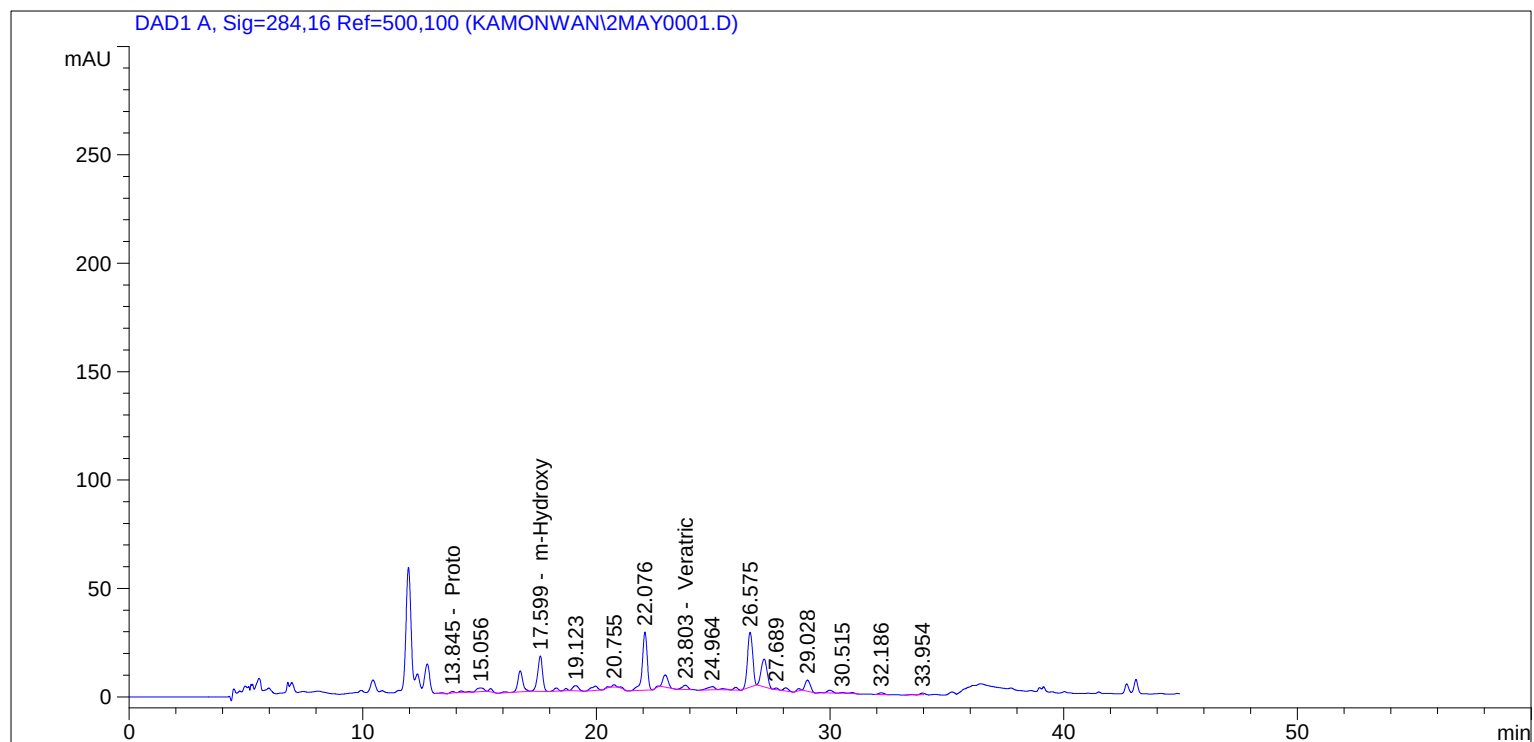
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

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*** End of Report ***

```
=====
Injection Date   : 5/2/2013 11:48:29 AM      Seq. Line   :    1
Sample Name      : D-IMMM LIB EST B          Location    : Vial 1
Acq. Operator    : Kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/2/2013 11:47:14 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/30/2013 5:37:41 PM by kamonwan
=====
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External Standard Report
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```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.845	BB	8.94774	1.82208e-2	1.63035e-1		Proto
17.599	BB	235.69124	4.63455e-2	10.92323		m-Hydroxy
18.699	BB	9.80726	6.33781e-3	6.21565e-2		Cafeic + Vanilic
19.959	BB	40.09470	4.84779e-2	1.94371		p-Hydroxy
22.635	BB +	3.55090	5.70136e-3	2.02449e-2		p-Coum
23.381		-	-	-		Ferulic
23.803	BB +	32.50381	7.45529e-2	2.42325		Veratric
27.174	BB +	226.74710	1.20492e-1	27.32126		Benz
32.718		-	-	-		Cinn

Totals : 42.85689

Results obtained with enhanced integrator!
2 Warnings or Errors :

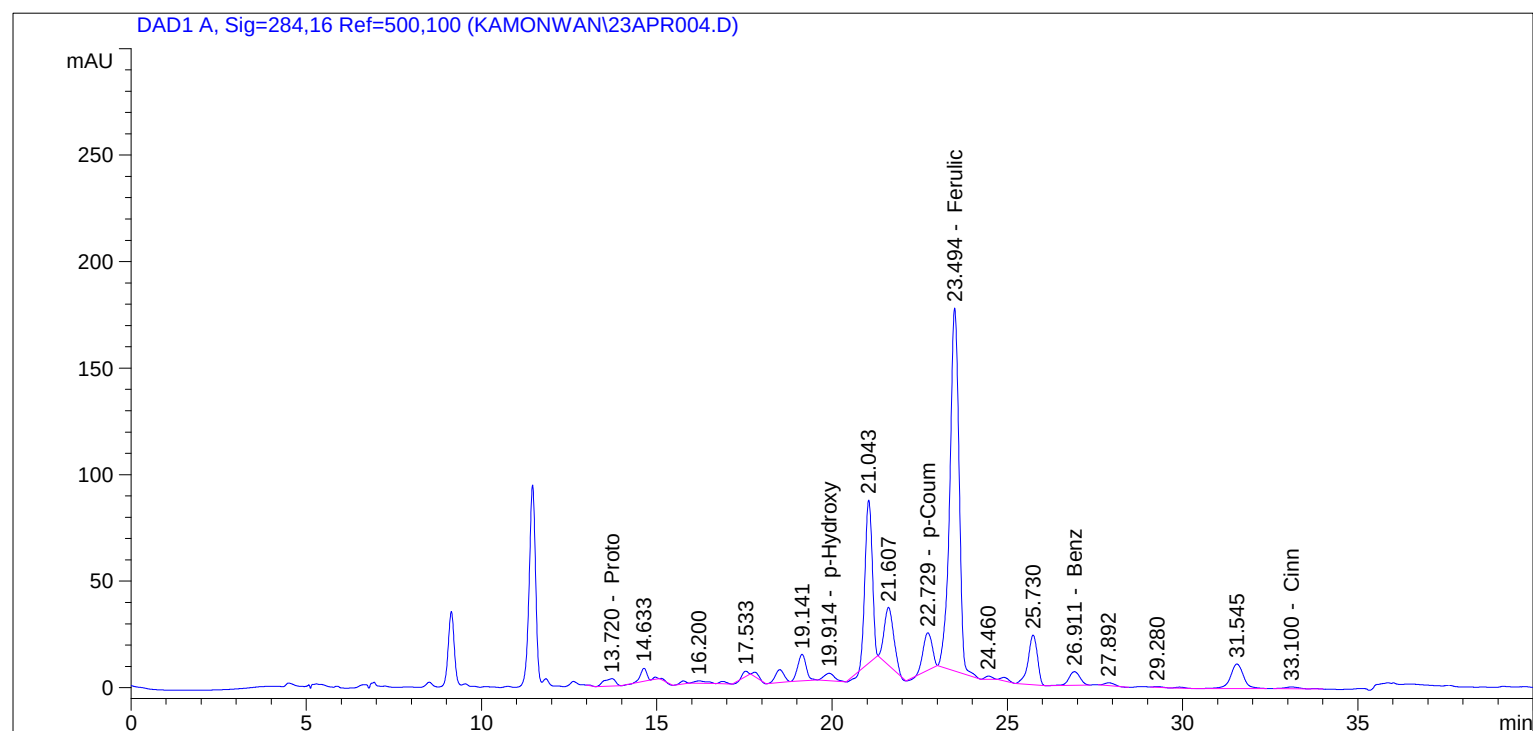
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

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*** End of Report ***
=====
```

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=====
Injection Date   : 4/23/2013 2:08:45 PM      Seq. Line   :    4
Sample Name     : D-IMMY FPA                Location    : Vial 7
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1               Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 2:57:24 PM by kamonwan
                  (modified after loading)
=====

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External Standard Report
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Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.720	BB	79.31830	1.82208e-2	1.44524		Proto
17.791	BB	23.15395	4.63455e-2	1.07308		m-Hydroxy
18.506	BB	103.29196	6.33781e-3	6.54645e-1		Cafeic + Vanilic
19.914	BB	71.47089	4.84779e-2	3.46476		p-Hydroxy
22.729	BB +	311.71481	5.70136e-3	1.77720		p-Coum
23.494	BB +	3121.29956	1.28536e-2	40.12001		Ferulic
23.993		-	-	-		Veratric
26.911	BB +	138.80348	1.20492e-1	16.72474		Benz
33.100	BB +	19.93977	4.04527e-3	8.06618e-2		Cinn

Totals : 65.34033

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

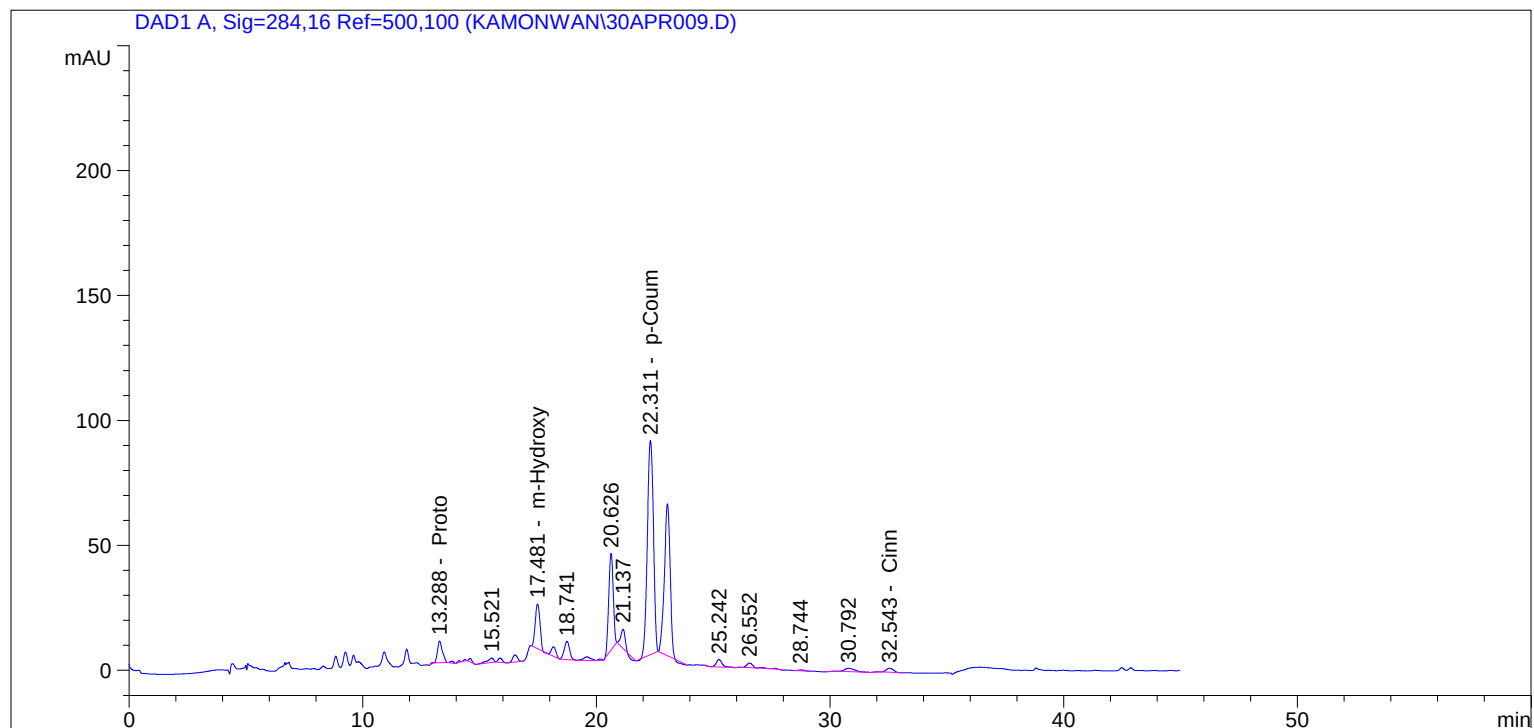
=====
*** End of Report ***
=====

```

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Injection Date	: 4/30/2013 2:31:28 PM	Seq. Line	: 9
Sample Name	: D-IMMY LIB EST B	Location	: Vial 9
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/30/2013 8:19:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/30/2013 4:56:39 PM by kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.288	BB	126.21140	1.82208e-2	2.29967		Proto
17.481	BB	250.76640	4.63455e-2	11.62190		m-Hydroxy
18.159	BB	51.17226	6.33781e-3	3.24320e-1		Cafeic + Vanilic
19.595	BB	31.17900	4.84779e-2	1.51149		p-Hydroxy
22.311	BB +	1551.40784	5.70136e-3	8.84513		p-Coum
23.038	BB +	1034.59619	1.28536e-2	13.29831		Ferulic
23.993		-	-	-		Veratric
27.051	BB +	4.94990	1.20492e-1	5.96425e-1		Benz
32.543	BB +	33.37684	4.04527e-3	1.35018e-1		Cinn

Totals : 38.63226

Results obtained with enhanced integrator!
2 Warnings or Errors :

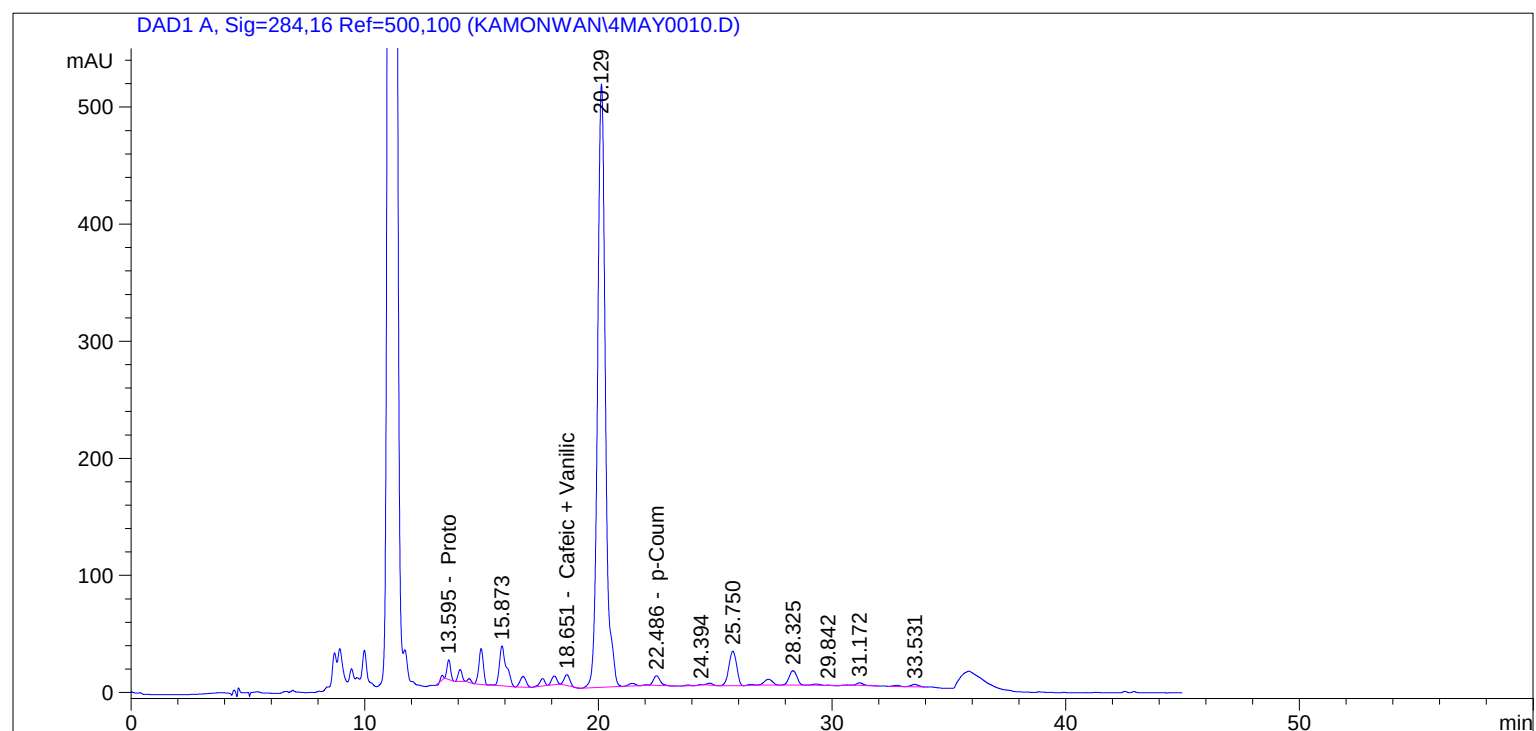
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

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*** End of Report ***

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=====
Injection Date   : 5/4/2013 4:00:20 PM      Seq. Line   :   10
Sample Name      : D-IMMY LIB GLY B         Location      : Vial 10
Acq. Operator    : Kamonwan                 Inj           :    1
Acq. Instrument  : Instrument 1             Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/4/2013 4:59:51 PM by Kamonwan
                  (modified after loading)
=====
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External Standard Report
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```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.595	BB	178.87317	1.82208e-2	3.25921		Proto
17.610	BB	98.41157	4.63455e-2	4.56094		m-Hydroxy
18.651	BB	153.56868	6.33781e-3	9.73289e-1		Cafeic + Vanilic
19.671		-	-	-		p-Hydroxy
22.486	BB +	161.05170	5.70136e-3	9.18213e-1		p-Coum
23.381		-	-	-		Ferulic
23.832	BB +	14.17740	7.45529e-2	1.05697		Veratric
27.272	BB +	122.72919	1.20492e-1	14.78791		Benz
32.757	BB +	18.39564	4.04527e-3	7.44154e-2		Cinn

Totals : 25.63094

Results obtained with enhanced integrator!
2 Warnings or Errors :

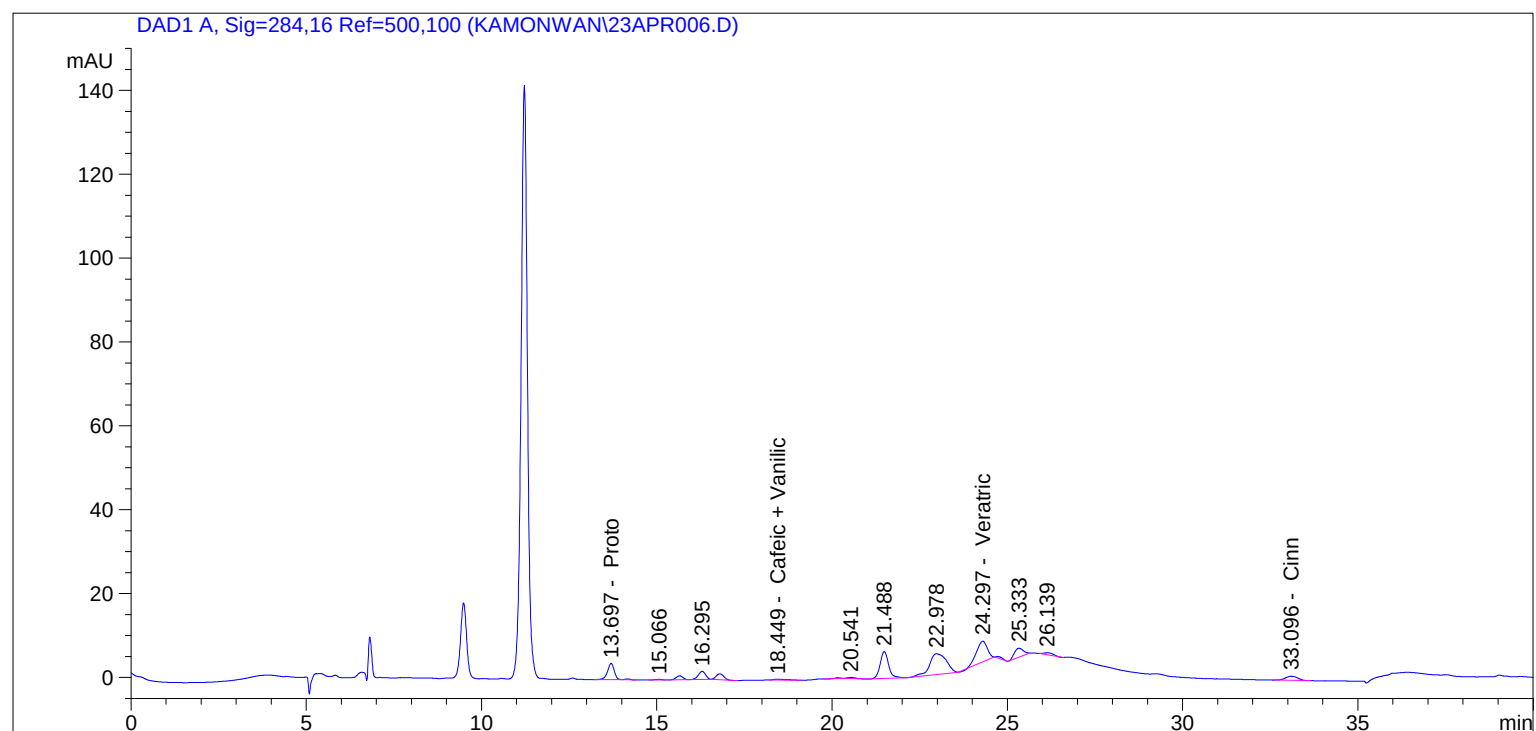
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/23/2013 3:41:26 PM      Seq. Line :    6
Sample Name     : D-IMPA FPA                Location  : Vial 9
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 4:43:59 PM by kamonwan
                  (modified after loading)
=====

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External Standard Report
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Sorted By           : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.697	BB	51.58484	1.82208e-2	9.39916e-1		Proto
17.872		-	-	-		m-Hydroxy
18.449	BB	5.08308	6.33781e-3	3.22156e-2		Cafeic + Vanilic
20.172	BB	1.86768	4.84779e-2	9.05410e-2		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
24.297	BB +	105.74812	7.45529e-2	7.88382		Veratric
27.223		-	-	-		Benz
33.096	BB +	24.36204	4.04527e-3	9.85511e-2		Cinn

Totals : 9.04505

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

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*** End of Report ***
=====

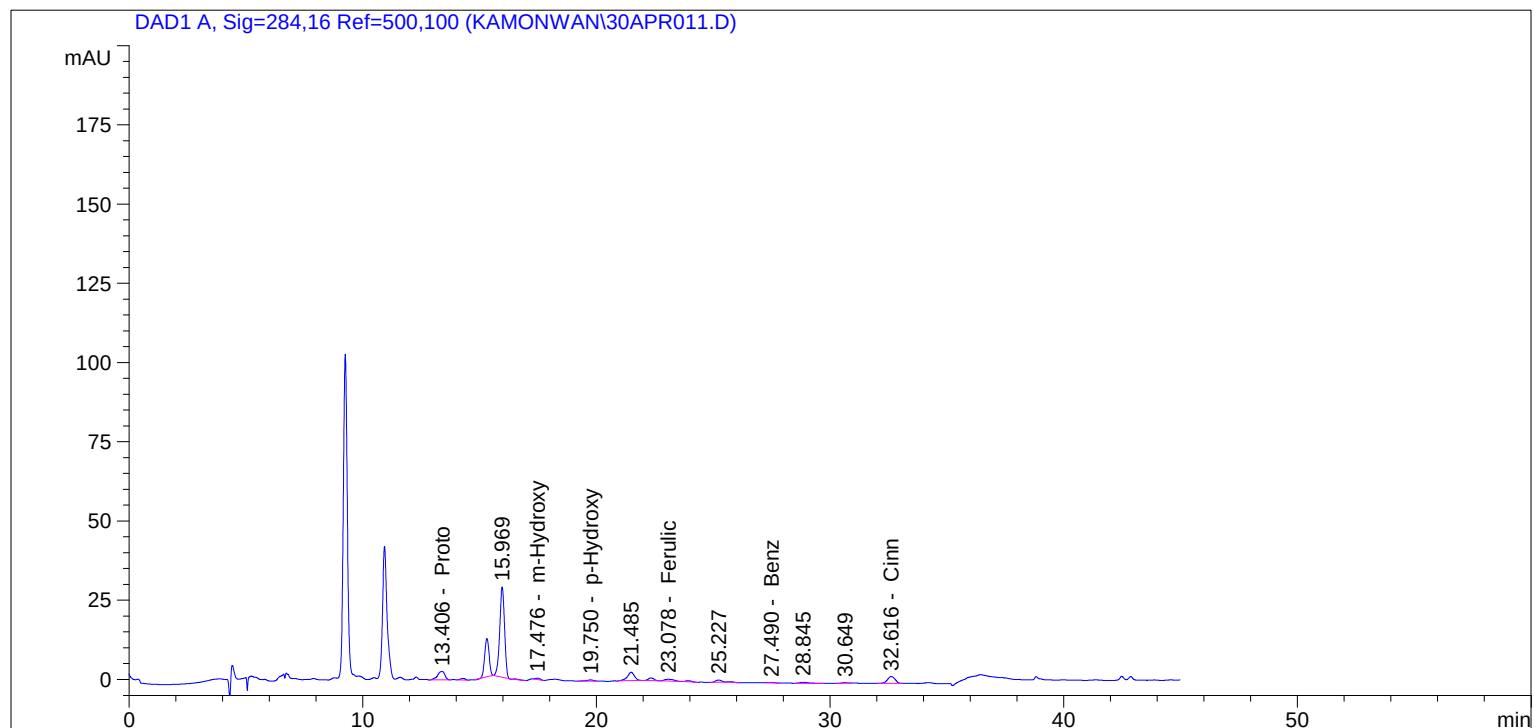
```

=====

Injection Date	: 4/30/2013 4:04:12 PM	Seq. Line	: 11
Sample Name	: D-IMPA LIB EST B	Location	: Vial 11
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/30/2013 8:19:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/30/2013 5:01:09 PM by kamonwan		

(modified after loading)

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.406	BB	57.87847	1.82208e-2	1.05459		Proto
17.476	BB	5.75273	4.63455e-2	2.66613e-1		m-Hydroxy
18.306		-	-	-		Cafeic + Vanilic
19.750	BB	7.24834	4.84779e-2	3.51384e-1		p-Hydroxy
22.339	BB +	15.15751	5.70136e-3	8.64183e-2		p-Coum
23.078	BB +	16.52231	1.28536e-2	2.12372e-1		Ferulic
23.934	BB +	5.61550	7.45529e-2	4.18652e-1		Veratric
27.490	BB +	2.30986	1.20492e-1	2.78321e-1		Benz
32.616	BB +	49.73490	4.04527e-3	2.01191e-1		Cinn

Totals : 2.86954

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

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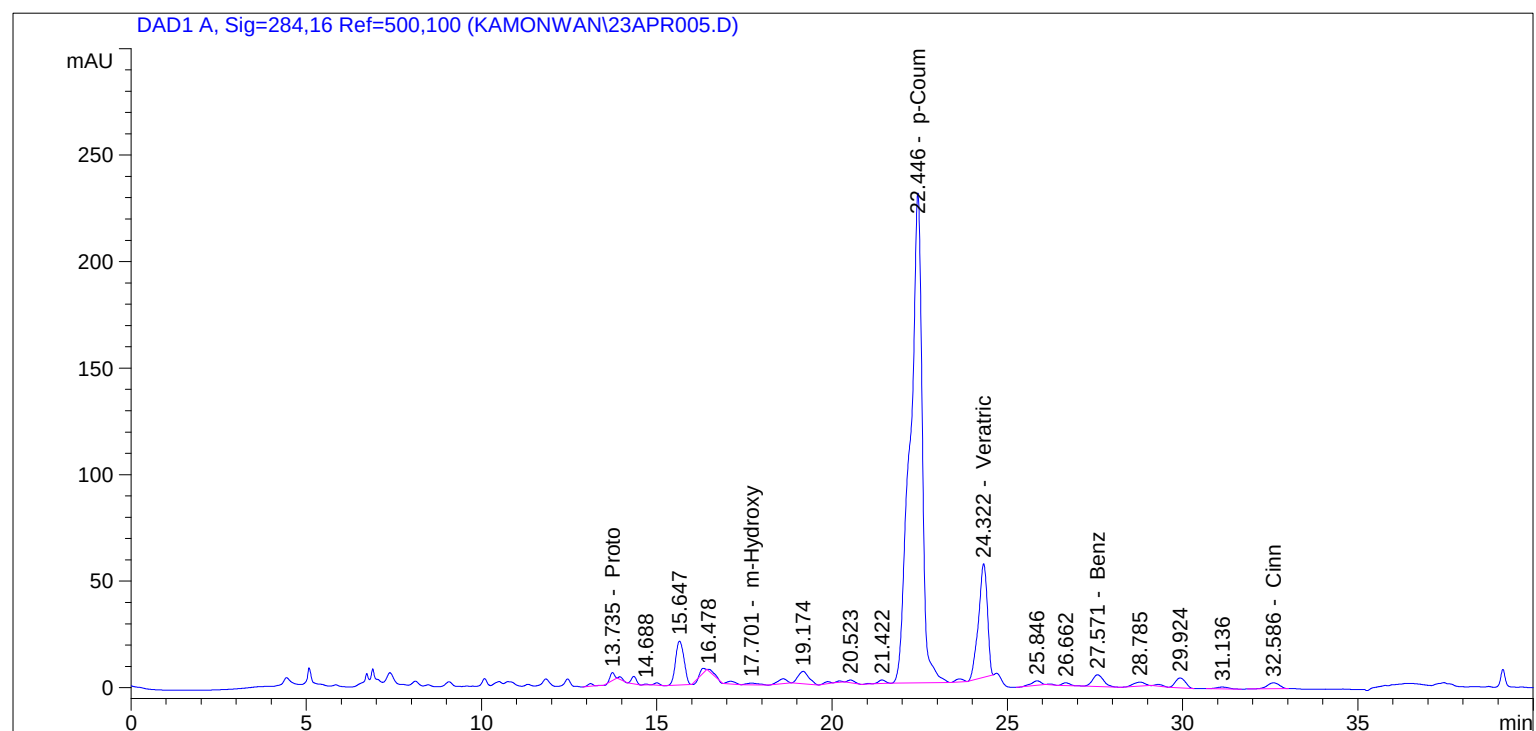
*** End of Report ***

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=====
Injection Date   : 4/23/2013 2:55:06 PM      Seq. Line   :    5
Sample Name     : D-IMSO FPA                Location    : Vial 8
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 2:57:24 PM by kamonwan
                  (modified after loading)
=====

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External Standard Report
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Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.735	BB	30.71688	1.82208e-2	5.59686e-1		Proto
17.701	BB	20.61028	4.63455e-2	9.55194e-1		m-Hydroxy
18.605	BB	41.11462	6.33781e-3	2.60577e-1		Cafeic + Vanilic
19.877	BB	10.53149	4.84779e-2	5.10544e-1		p-Hydroxy
22.446	BB +	5533.54053	5.70136e-3	31.54868		p-Coum
23.631	BB +	22.50975	1.28536e-2	2.89332e-1		Ferulic
24.322	BB +	940.55237	7.45529e-2	70.12087		Veratric
27.571	BB +	119.18555	1.20492e-1	14.36093		Benz
32.586	BB +	68.80595	4.04527e-3	2.78339e-1		Cinn

Totals : 118.88415

Results obtained with enhanced integrator!
 1 Warnings or Errors :

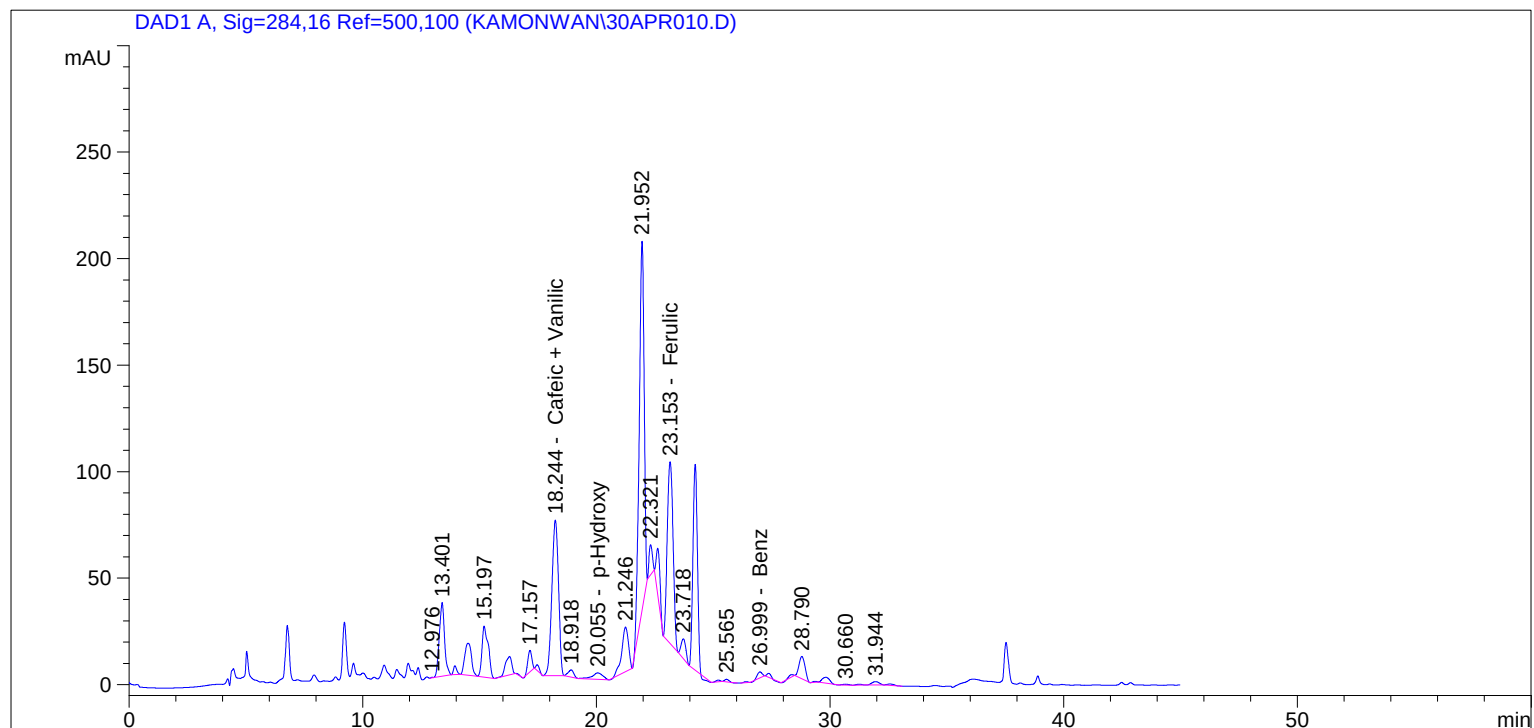
Warning : Calibration warnings (see calibration table listing)

```

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*** End of Report ***
=====

```

```
=====
Injection Date   : 4/30/2013 3:17:51 PM      Seq. Line :   10
Sample Name     : D-IMSO LIB EST B          Location  : Vial 10
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 4:59:10 PM by kamonwan
                  (modified after loading)
=====
```



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External Standard Report
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```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.947	BB	40.69330	1.82208e-2	7.41464e-1		Proto
17.466	BB	28.37064	4.63455e-2	1.31485		m-Hydroxy
18.244	BB	1441.92249	6.33781e-3	9.13863		Cafeic + Vanilic
20.055	BB	95.09616	4.84779e-2	4.61006		p-Hydroxy
22.624	BB +	240.87213	5.70136e-3	1.37330		p-Coum
23.153	BB +	1474.02490	1.28536e-2	18.94656		Ferulic
24.226	BB +	1265.16296	7.45529e-2	94.32152		Veratric
26.999	BB +	40.73983	1.20492e-1	4.90883		Benz
32.563	BB +	11.28190	4.04527e-3	4.56384e-2		Cinn

Totals : 135.40085

Results obtained with enhanced integrator!
1 Warnings or Errors :

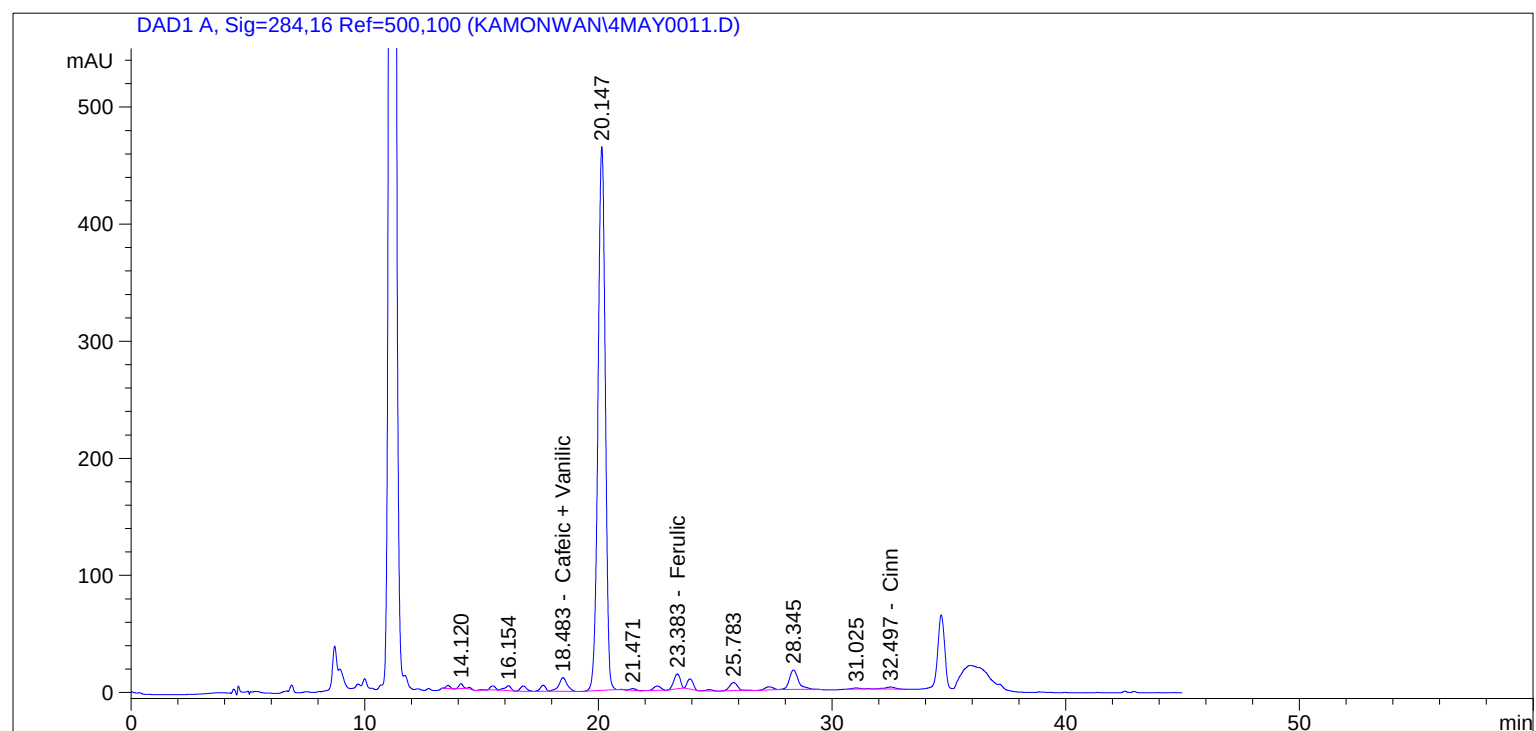
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 5/4/2013 4:46:41 PM	Seq. Line	: 11
Sample Name	: D-IMSO LIB GLY B	Location	: Vial 11
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/4/2013 9:00:35 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/4/2013 4:59:51 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.564	BB	29.36329	1.82208e-2	5.35022e-1		Proto
17.641	BB	80.81855	4.63455e-2	3.74558		m-Hydroxy
18.483	BB	283.75516	6.33781e-3	1.79839		Cafeic + Vanilic
19.696		-	-	-		p-Hydroxy
22.514	BB +	79.74126	5.70136e-3	4.54633e-1		p-Coum
23.383	BB +	244.68217	1.28536e-2	3.14505		Ferulic
23.922	BB +	154.51144	7.45529e-2	11.51927		Veratric
27.306	BB +	61.70373	1.20492e-1	7.43482		Benz
32.497	BB +	59.04668	4.04527e-3	2.38860e-1		Cinn

Totals : 28.87162

Results obtained with enhanced integrator!
2 Warnings or Errors :

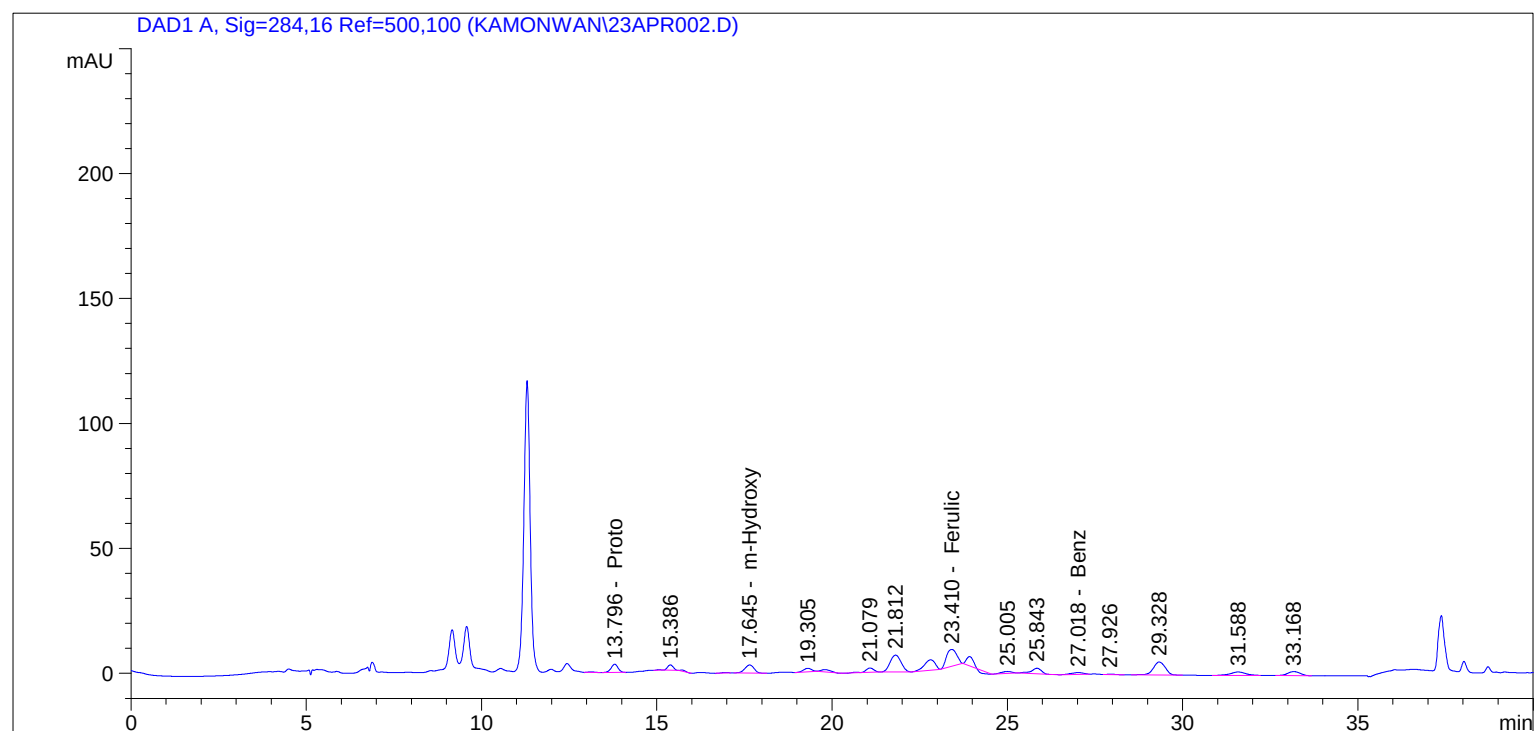
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

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*** End of Report ***

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```
=====
Injection Date   : 4/23/2013 12:36:05 PM      Seq. Line   :    2
Sample Name      : D-IMTK FPA                  Location    : Vial 5
Acq. Operator    : kamonwan                     Inj         :    1
Acq. Instrument  : Instrument 1                 Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 2:48:12 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.796	BB	45.60532	1.82208e-2	8.30965e-1		Proto
17.645	BB	59.37341	4.63455e-2	2.75169		m-Hydroxy
18.695		-	-	-		Cafeic + Vanilic
19.796	BB	16.63895	4.84779e-2	8.06621e-1		p-Hydroxy
22.813	BB +	88.62014	5.70136e-3	5.05255e-1		p-Coum
23.410	BB +	138.26765	1.28536e-2	1.77724		Ferulic
23.921	BB +	33.76931	7.45529e-2	2.51760		Veratric
27.018	BB +	16.00151	1.20492e-1	1.92806		Benz
32.718		-	-	-		Cinn

Totals : 11.11743

Results obtained with enhanced integrator!
2 Warnings or Errors :

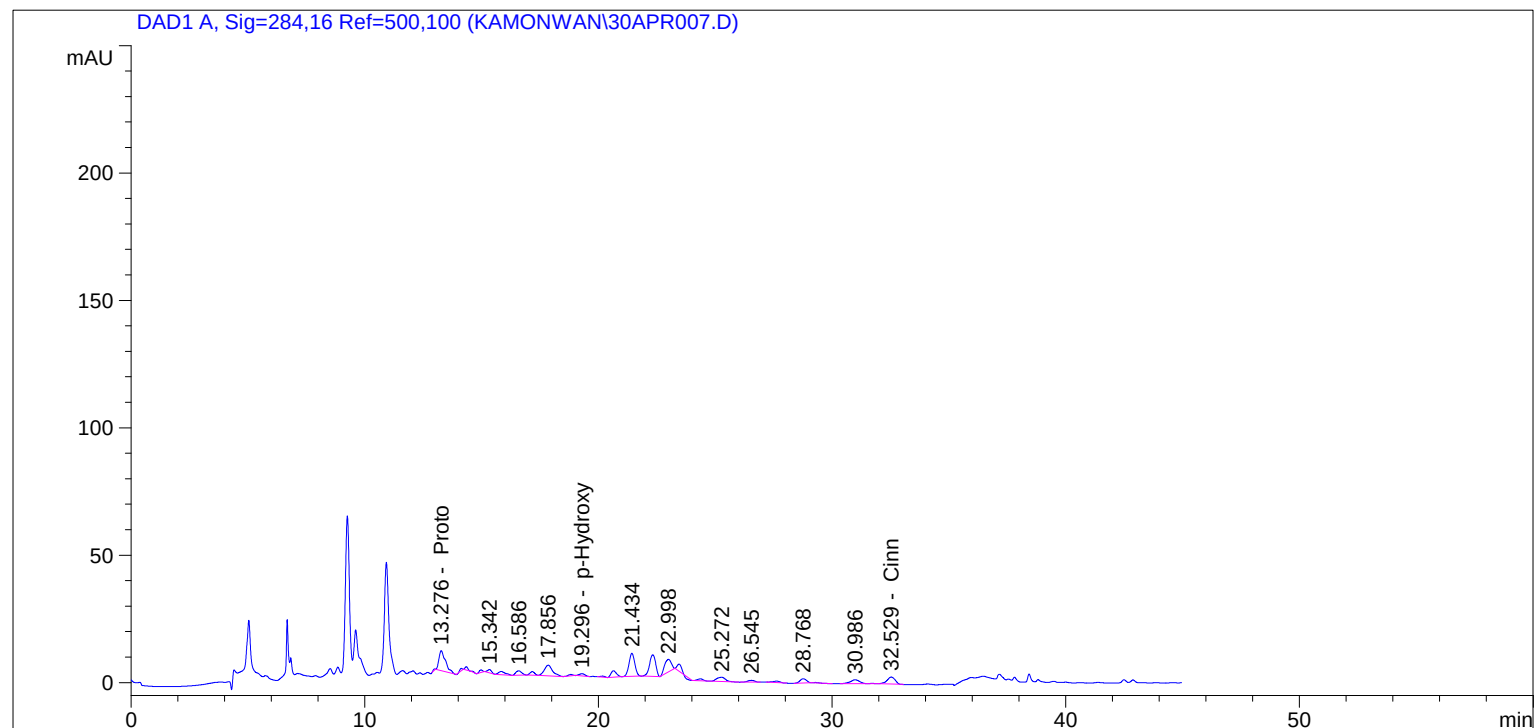
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/30/2013 12:58:47 PM      Seq. Line :    7
Sample Name     : D-IMTK LIB EST B           Location  : Vial 7
Acq. Operator   : kamonwan                   Inj       :    1
Acq. Instrument : Instrument 1                Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 1:47:07 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.276	BB	152.73656	1.82208e-2	2.78298		Proto
17.175	BB	19.12655	4.63455e-2	8.86430e-1		m-Hydroxy
18.295		-	-	-		Cafeic + Vanilic
19.296	BB	14.88918	4.84779e-2	7.21796e-1		p-Hydroxy
22.325	BB +	156.22878	5.70136e-3	8.90716e-1		p-Coum
23.453	BB +	26.79871	1.28536e-2	3.44461e-1		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.529	BB +	67.16677	4.04527e-3	2.71708e-1		Cinn

Totals : 5.89809

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

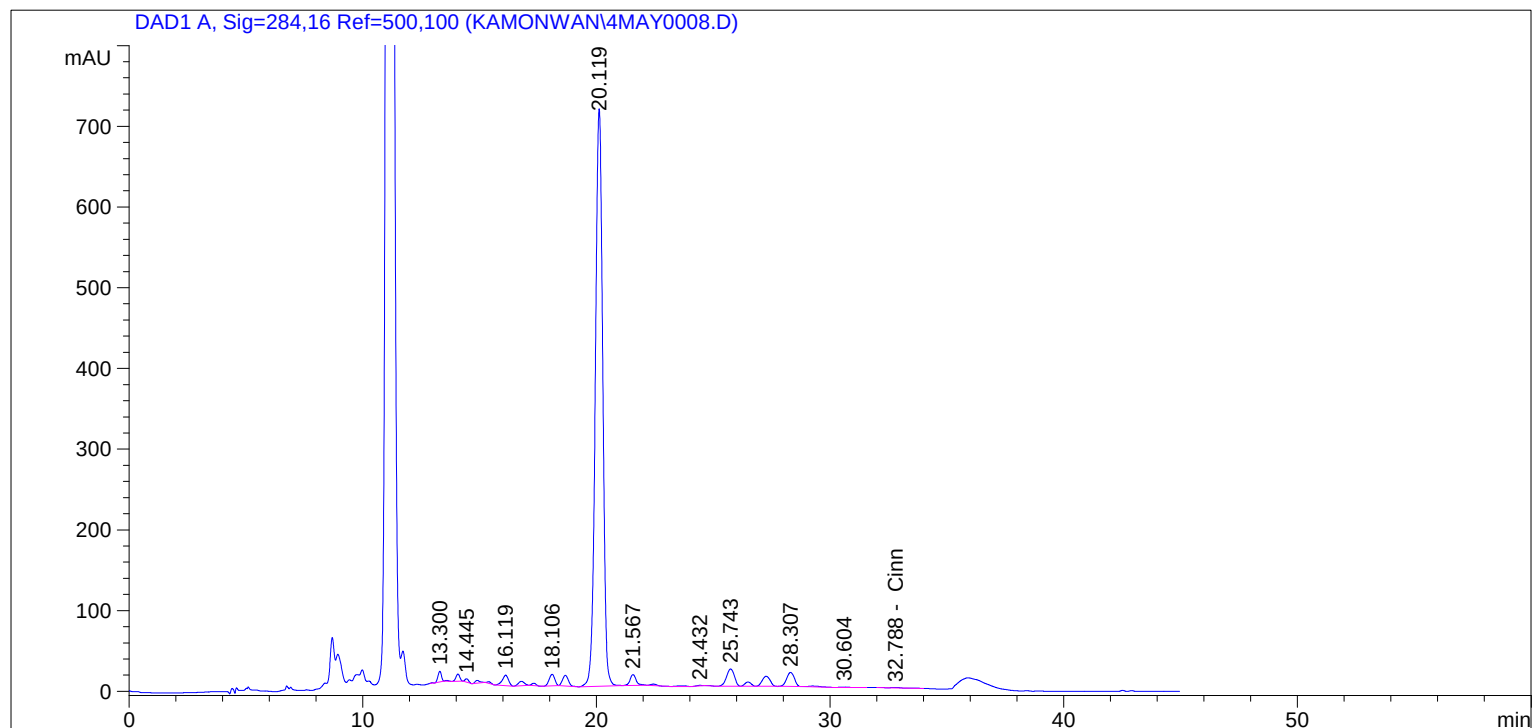
```

=====
*** End of Report ***
=====

```



```
=====
Injection Date   : 5/4/2013 2:27:39 PM      Seq. Line :    8
Sample Name      : D-IMTK LIB GLY B         Location  : Vial 8
Acq. Operator    : Kamonwan                 Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/4/2013 3:26:01 PM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.587	BB	8.60500	1.82208e-2	1.56790e-1		Proto
17.321	BB	38.51334	4.63455e-2	1.78492		m-Hydroxy
18.673	BB	223.04465	6.33781e-3	1.41361		Cafeic + Vanilic
19.633		-	-	-		p-Hydroxy
22.442	BB +	27.19063	5.70136e-3	1.55023e-1		p-Coum
23.381		-	-	-		Ferulic
23.687	BB +	22.78707	7.45529e-2	1.69884		Veratric
27.263	BB +	293.50546	1.20492e-1	35.36513		Benz
32.788	BB +	14.91227	4.04527e-3	6.03242e-2		Cinn

Totals : 40.63464

Results obtained with enhanced integrator!
2 Warnings or Errors :

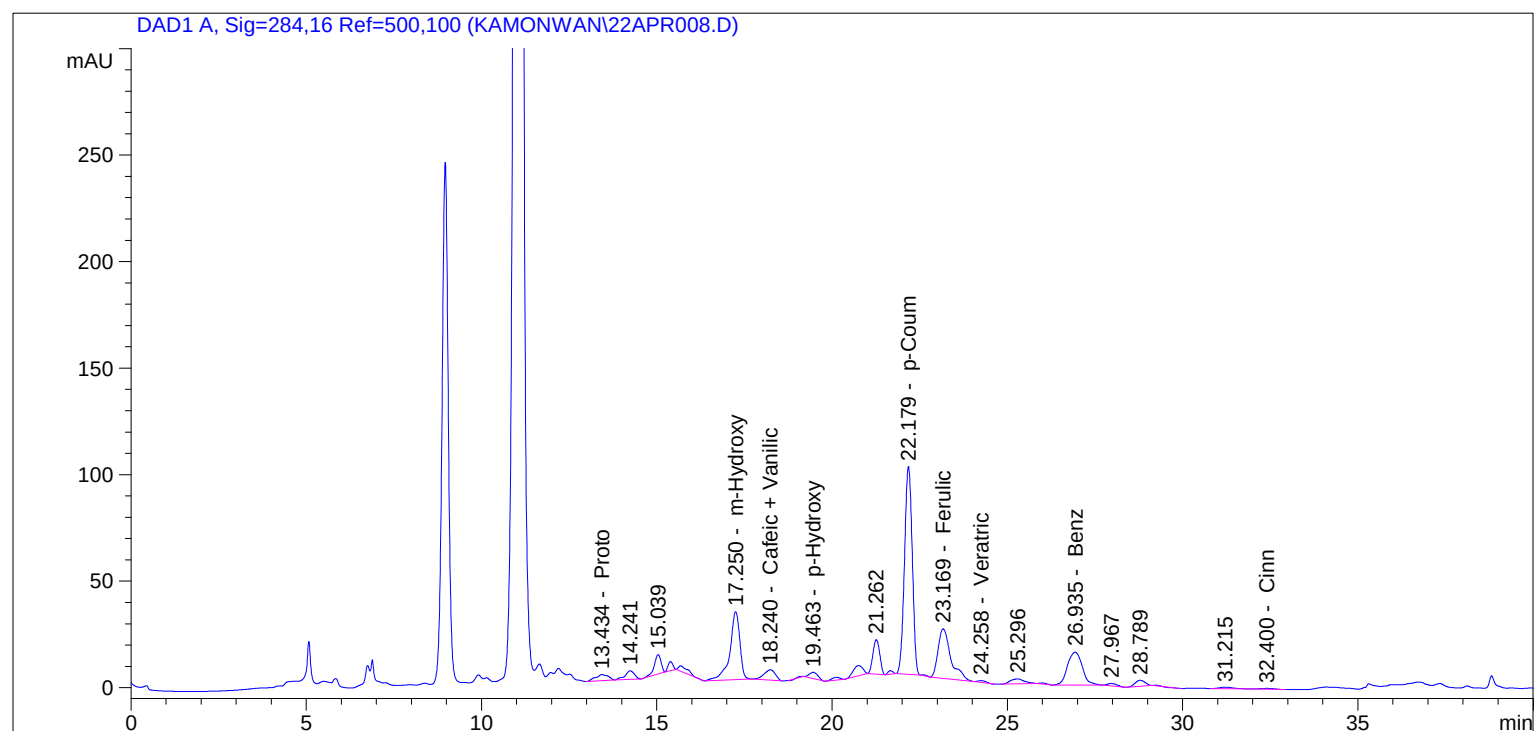
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/22/2013 3:03:55 PM      Seq. Line   :    8
Sample Name     : D-MC FPA                  Location    : Vial 8
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1               Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:33:59 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.434	BB	73.20423	1.82208e-2	1.33384		Proto
17.250	BB	635.12573	4.63455e-2	29.43523		m-Hydroxy
18.240	BB	110.82648	6.33781e-3	7.02397e-1		Cafeic + Vanilic
19.463	BB	50.42369	4.84779e-2	2.44443		p-Hydroxy
22.179	BB +	1499.45593	5.70136e-3	8.54893		p-Coum
23.169	BB +	586.44360	1.28536e-2	7.53792		Ferulic
24.258	BB +	13.24079	7.45529e-2	9.87139e-1		Veratric
26.935	BB +	454.90219	1.20492e-1	54.81218		Benz
32.400	BB +	11.07025	4.04527e-3	4.47822e-2		Cinn

Totals : 105.84686

Results obtained with enhanced integrator!
 1 Warnings or Errors :

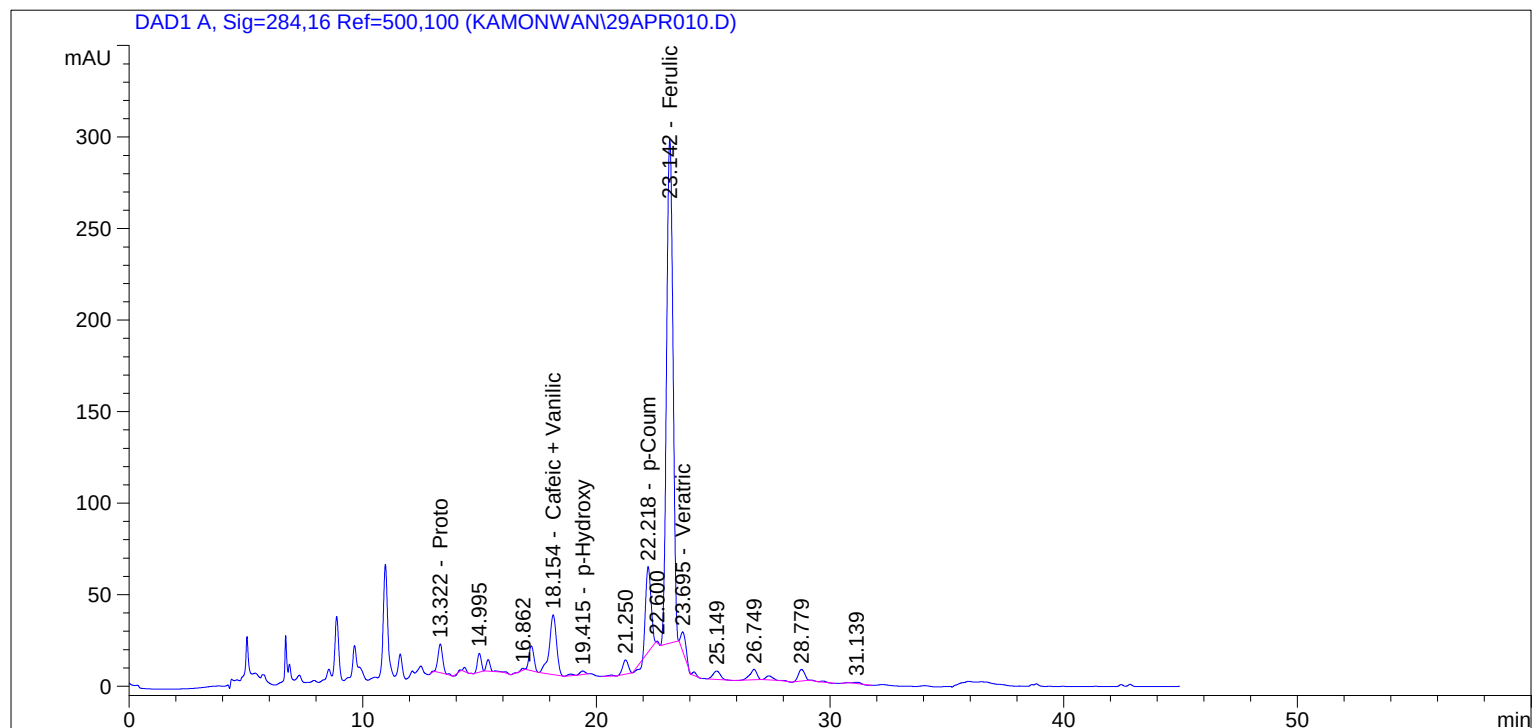
Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/29/2013 4:44:56 PM      Seq. Line   :   10
Sample Name     : D-MC LIB EST B            Location    : Vial 10
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/29/2013 5:31:49 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.322	BB	213.55154	1.82208e-2	3.89108		Proto
17.219	BB	196.07858	4.63455e-2	9.08736		m-Hydroxy
18.154	BB	705.58728	6.33781e-3	4.47188		Cafeic + Vanilic
19.415	BB	28.14828	4.84779e-2	1.36457		p-Hydroxy
22.218	BB +	704.81390	5.70136e-3	4.01839		p-Coum
23.142	BB +	5215.12988	1.28536e-2	67.03331		Ferulic
23.695	BB +	164.61140	7.45529e-2	12.27225		Veratric
27.390	BB +	46.70899	1.20492e-1	5.62807		Benz
32.718		-	-	-		Cinn

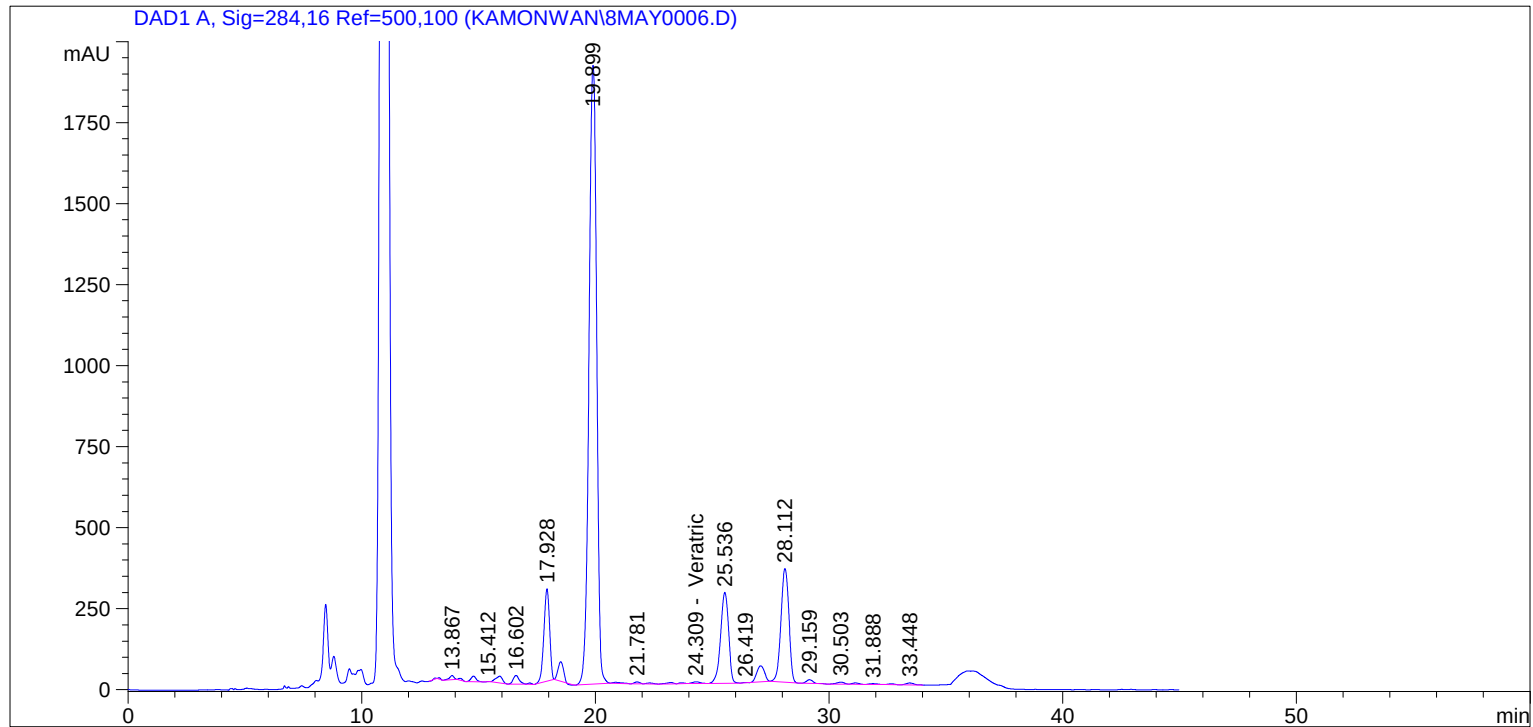
Totals : 107.76691

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/8/2013 12:36:12 PM      Seq. Line   :    6
Sample Name      : D-MC LIB GLY B            Location    : Vial 6
Acq. Operator    : Kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/8/2013 1:26:08 PM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.311	BB	29.09843	1.82208e-2	5.30196e-1		Proto
17.188	BB	39.21186	4.63455e-2	1.81729		m-Hydroxy
18.517	BB	971.25043	6.33781e-3	6.15560		Cafeic + Vanilic
19.526		-	-	-		p-Hydroxy
22.319	BB +	54.53933	5.70136e-3	3.10948e-1		p-Coum
23.226	BB +	83.43976	1.28536e-2	1.07250		Ferulic
24.309	BB +	120.73827	7.45529e-2	9.00138		Veratric
27.072	BB +	1138.32983	1.20492e-1	137.15990		Benz
32.656	BB +	50.58975	4.04527e-3	2.04649e-1		Cinn

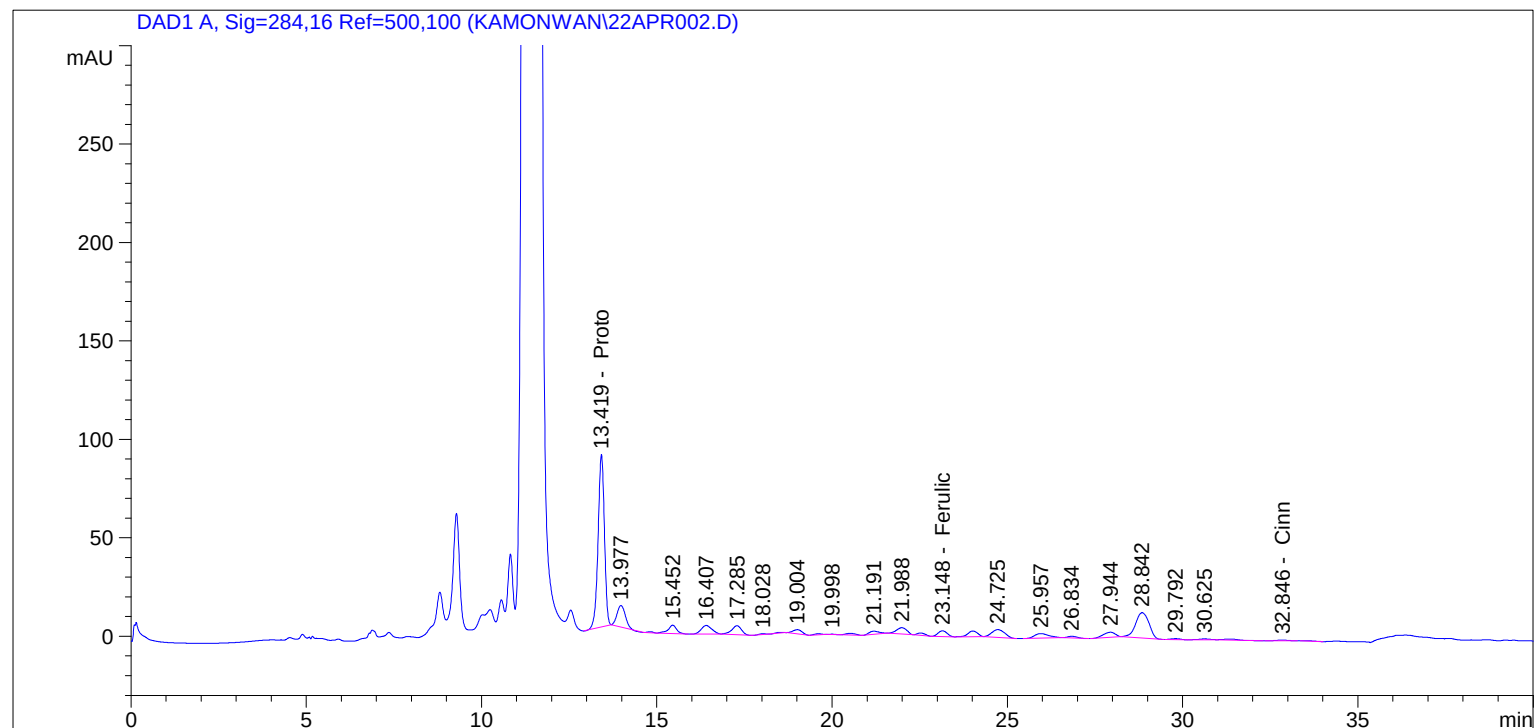
Totals : 156.25247

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/23/2013 10:07:19 AM      Seq. Line :    2
Sample Name      : D-MFA FPA                  Location  : Vial 2
Acq. Operator    : kamonwan                   Inj       :    1
Acq. Instrument  : Instrument 1                Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 2:38:08 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.419	BB	1094.75940	1.82208e-2	19.94738		Proto
17.665		-	-	-		m-Hydroxy
18.531	BB	6.44507	6.33781e-3	4.08476e-2		Cafeic + Vanilic
19.605	BB	7.94170	4.84779e-2	3.84997e-1		p-Hydroxy
22.521	BB +	19.62634	5.70136e-3	1.11897e-1		p-Coum
23.148	BB +	51.92996	1.28536e-2	6.67488e-1		Ferulic
24.013	BB +	54.09799	7.45529e-2	4.03316		Veratric
27.223		-	-	-		Benz
32.846	BB +	10.79803	4.04527e-3	4.36810e-2		Cinn

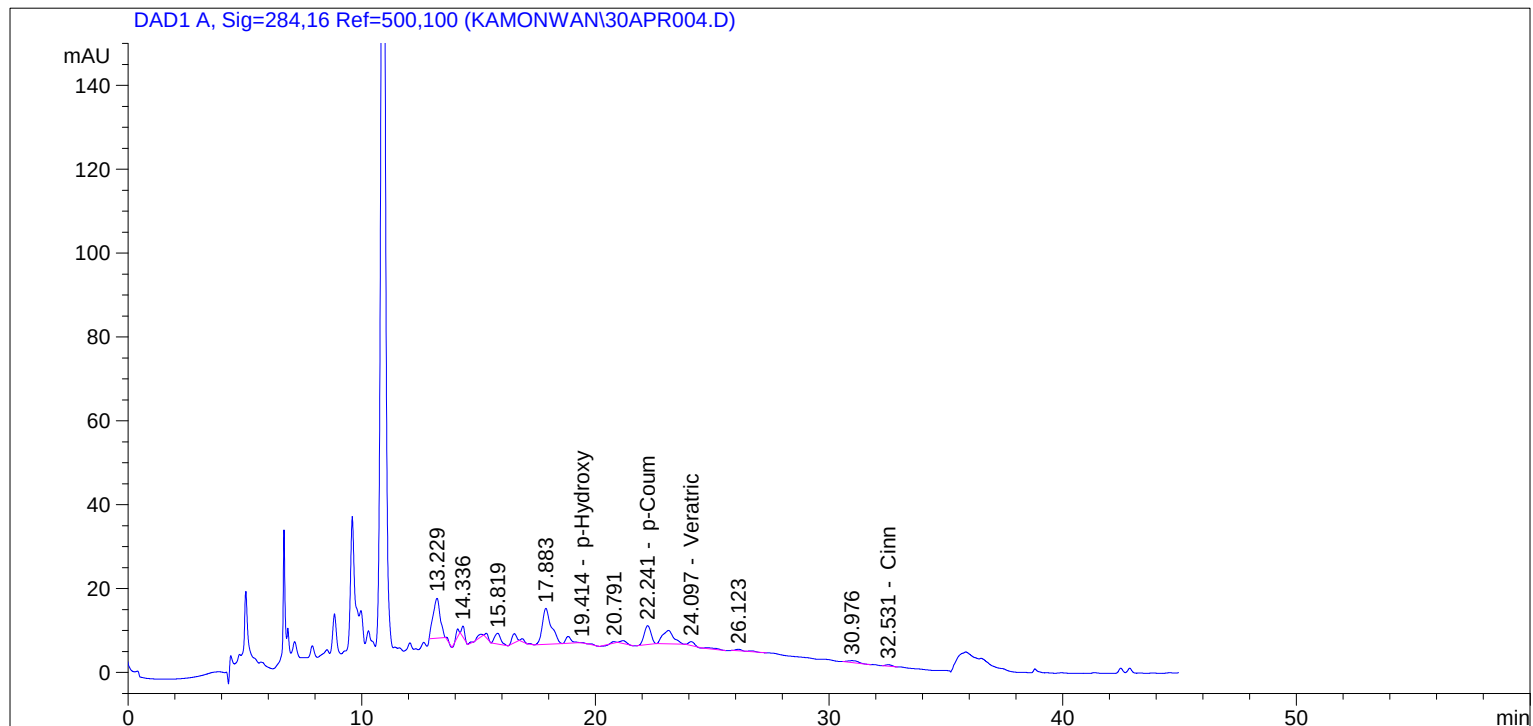
Totals : 25.22945

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/30/2013 10:39:46 AM      Seq. Line :    4
Sample Name      : D-MFA LIB EST B            Location  : Vial 4
Acq. Operator    : kamonwan                   Inj       :    1
Acq. Instrument  : Instrument 1                Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/30/2013 1:44:12 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.641	BB	2.45454	1.82208e-2	4.47236e-2		Proto
17.196	BB	1.84025	4.63455e-2	8.52875e-2		m-Hydroxy
18.226		-	-	-		Cafeic + Vanilic
19.414	BB	1.32391	4.84779e-2	6.41802e-2		p-Hydroxy
22.241	BB +	91.34257	5.70136e-3	5.20776e-1		p-Coum
23.130	BB +	106.55780	1.28536e-2	1.36965		Ferulic
24.097	BB +	15.65607	7.45529e-2	1.16721		Veratric
27.223		-	-	-		Benz
32.531	BB +	7.11503	4.04527e-3	2.87822e-2		Cinn

Totals : 3.28061

Results obtained with enhanced integrator!
2 Warnings or Errors :

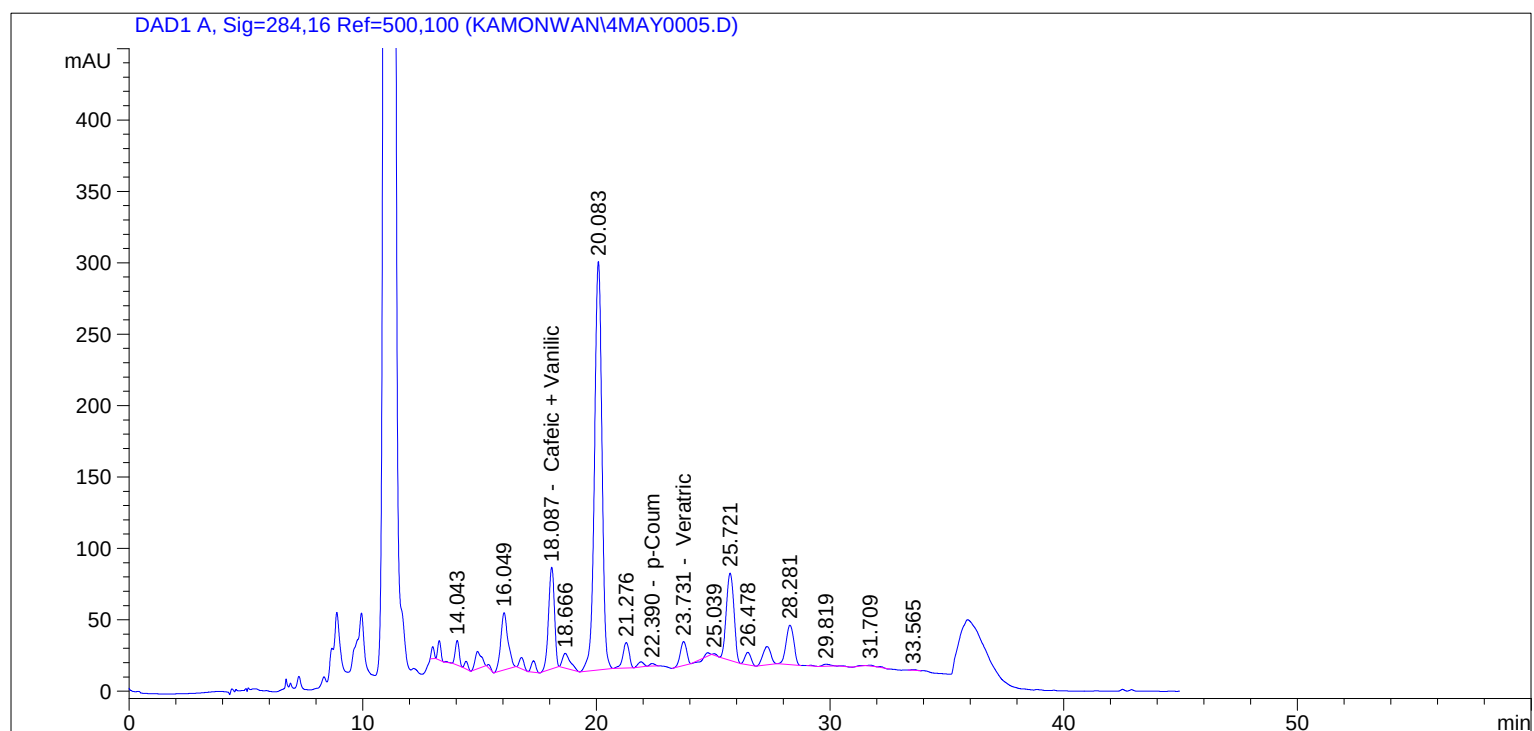
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 5/4/2013 12:08:36 PM	Seq. Line	: 5
Sample Name	: D-MFA LIB GLY B	Location	: Vial 5
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/4/2013 9:00:35 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/4/2013 1:06:43 PM by Kamonwan		
	(modified after loading)		

=====



=====

External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.560	BB	4.59294	1.82208e-2	8.36870e-2		Proto
17.306	BB	105.91680	4.63455e-2	4.90877		m-Hydroxy
18.087	BB	1255.10132	6.33781e-3	7.95459		Cafeic + Vanilic
19.587		-	-	-		p-Hydroxy
22.390	BB +	27.14875	5.70136e-3	1.54785e-1		p-Coum
23.381		-	-	-		Ferulic
23.731	BB +	316.00018	7.45529e-2	23.55872		Veratric
27.303	BB +	303.10782	1.20492e-1	36.52214		Benz
32.718		-	-	-		Cinn

Totals : 73.18269

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

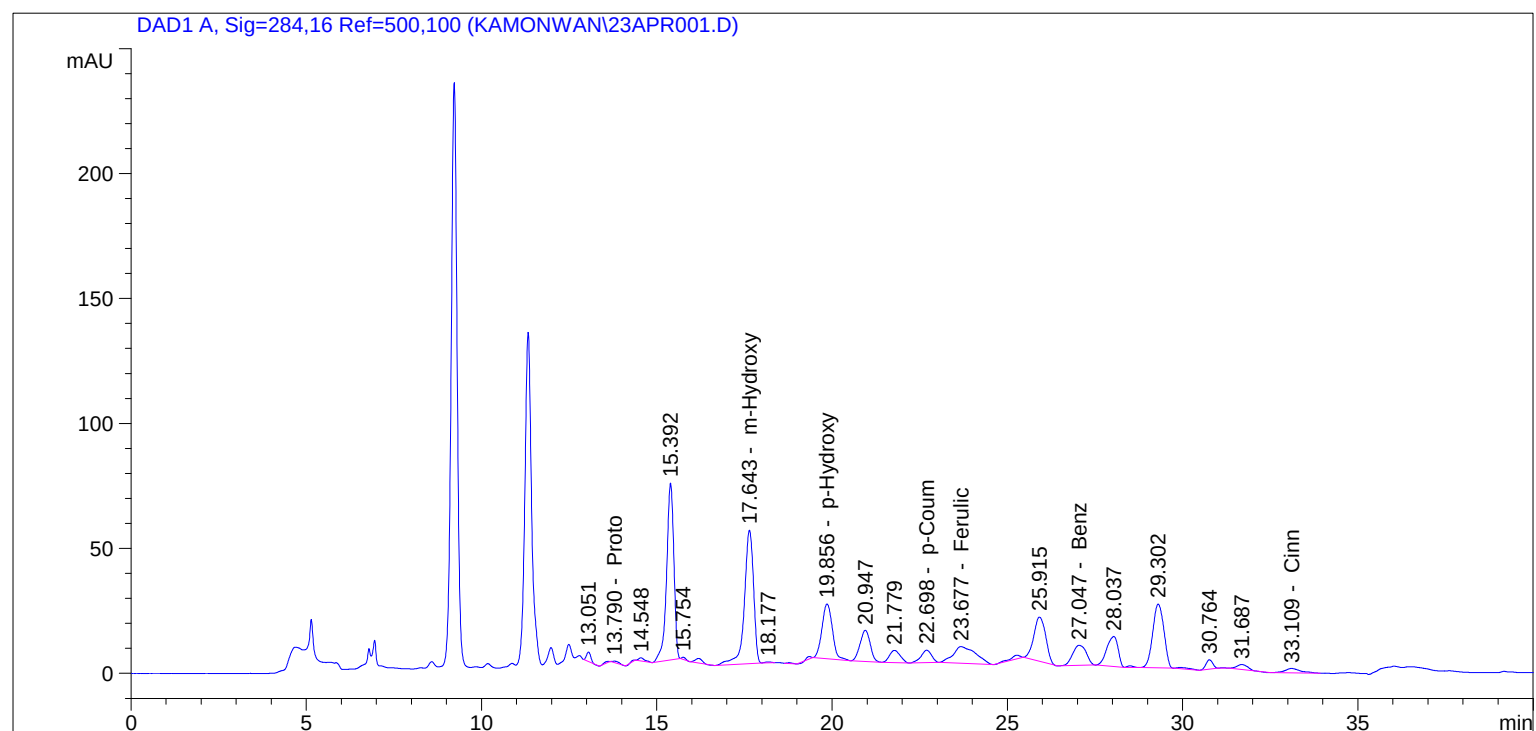
*** End of Report ***

=====

```

=====
Injection Date   : 4/23/2013 11:49:43 AM      Seq. Line   :    1
Sample Name     : D-MFG FPA                  Location    : Vial 4
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 2:48:12 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.790	BB	8.49026	1.82208e-2	1.54699e-1		Proto
17.643	BB	971.69092	4.63455e-2	45.03352		m-Hydroxy
18.783	BB	2.67620	6.33781e-3	1.69612e-2		Cafeic + Vanilic
19.856	BB	450.81766	4.84779e-2	21.85469		p-Hydroxy
22.698	BB +	105.37524	5.70136e-3	6.00782e-1		p-Coum
23.677	BB +	299.97061	1.28536e-2	3.85571		Ferulic
23.993		-	-	-		Veratric
27.047	BB +	218.00627	1.20492e-1	26.26806		Benz
33.109	BB +	53.00980	4.04527e-3	2.14439e-1		Cinn

Totals : 97.99886

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

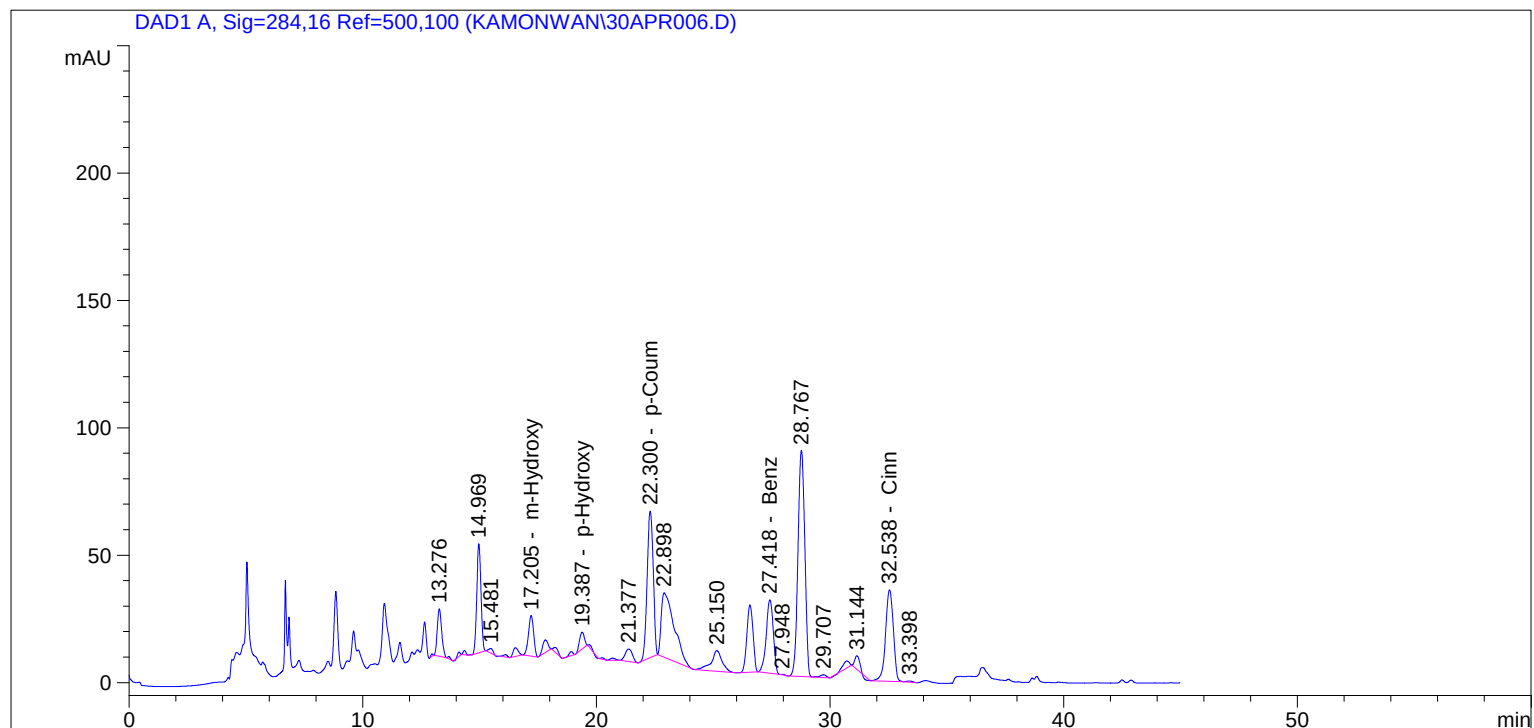
```

=====
*** End of Report ***
=====

```



```
=====
Injection Date   : 4/30/2013 12:12:23 PM      Seq. Line :    6
Sample Name     : D-MFG LIB EST B            Location  : Vial 6
Acq. Operator   : kamonwan                   Inj       :    1
Acq. Instrument : Instrument 1                Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 1:47:07 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.681	BB	6.94176	1.82208e-2	1.26484e-1		Proto
17.205	BB	244.90268	4.63455e-2	11.35014		m-Hydroxy
18.229	BB	25.01540	6.33781e-3	1.58543e-1		Cafeic + Vanilic
19.387	BB	98.53599	4.84779e-2	4.77682		p-Hydroxy
22.300	BB +	1040.61194	5.70136e-3	5.93290		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.418	BB +	603.62317	1.20492e-1	72.73190		Benz
32.538	BB +	827.09674	4.04527e-3	3.34583		Cinn

Totals : 98.42262

Results obtained with enhanced integrator!
2 Warnings or Errors :

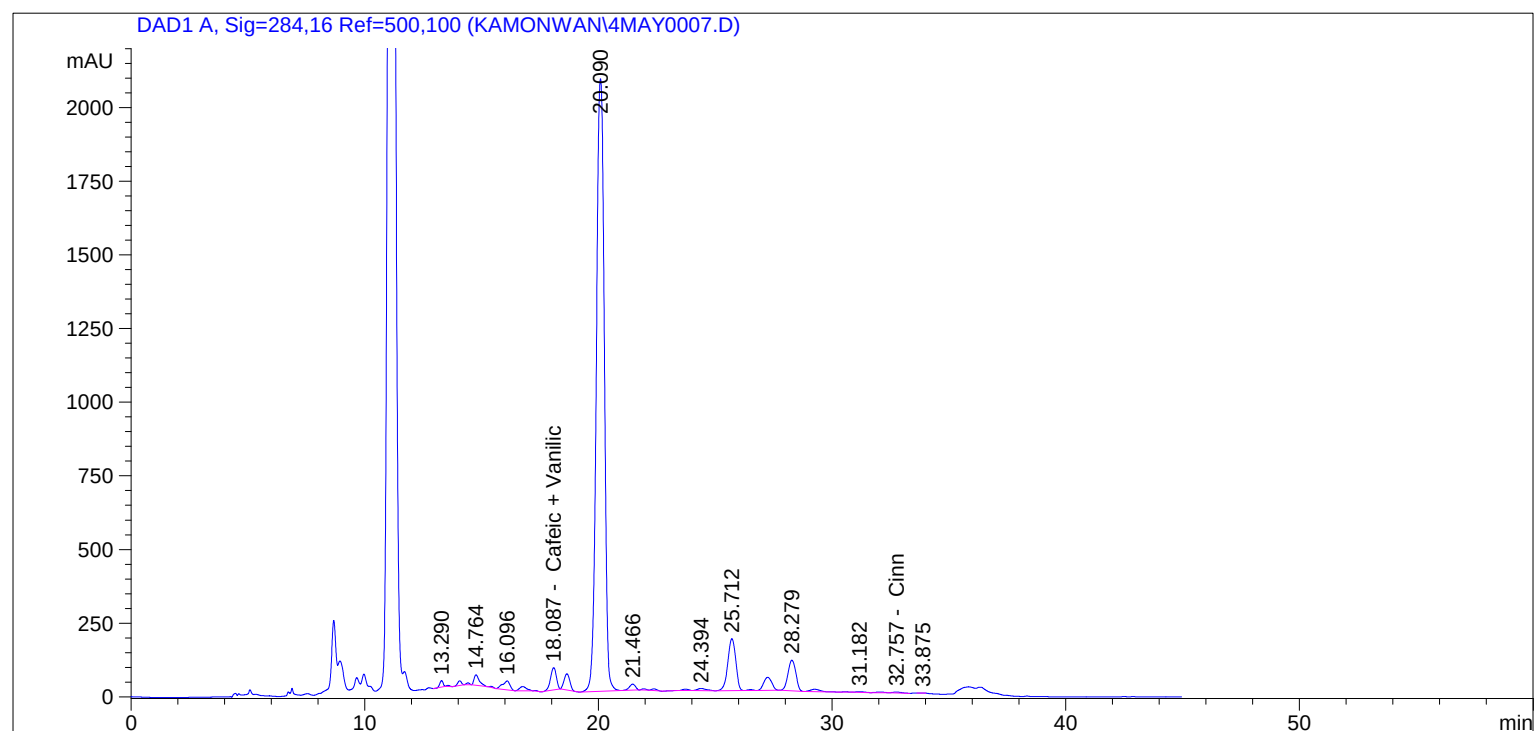
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 5/4/2013 1:41:18 PM      Seq. Line :    7
Sample Name     : D-MFG LIB GLY B          Location  : Vial 7
Acq. Operator   : Kamonwan                 Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/4/2013 2:28:55 PM by Kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.560	BB	26.70070	1.82208e-2	4.86508e-1		Proto
17.308	BB	19.76464	4.63455e-2	9.16003e-1		m-Hydroxy
18.087	BB	1295.26697	6.33781e-3	8.20915		Cafeic + Vanilic
19.574		-	-	-		p-Hydroxy
22.375	BB +	86.96222	5.70136e-3	4.95803e-1		p-Coum
23.332	BB +	10.39129	1.28536e-2	1.33566e-1		Ferulic
23.723	BB +	80.44635	7.45529e-2	5.99751		Veratric
27.241	BB +	1079.10938	1.20492e-1	130.02430		Benz
32.757	BB +	69.16674	4.04527e-3	2.79798e-1		Cinn

Totals : 146.54263

Results obtained with enhanced integrator!
 2 Warnings or Errors :

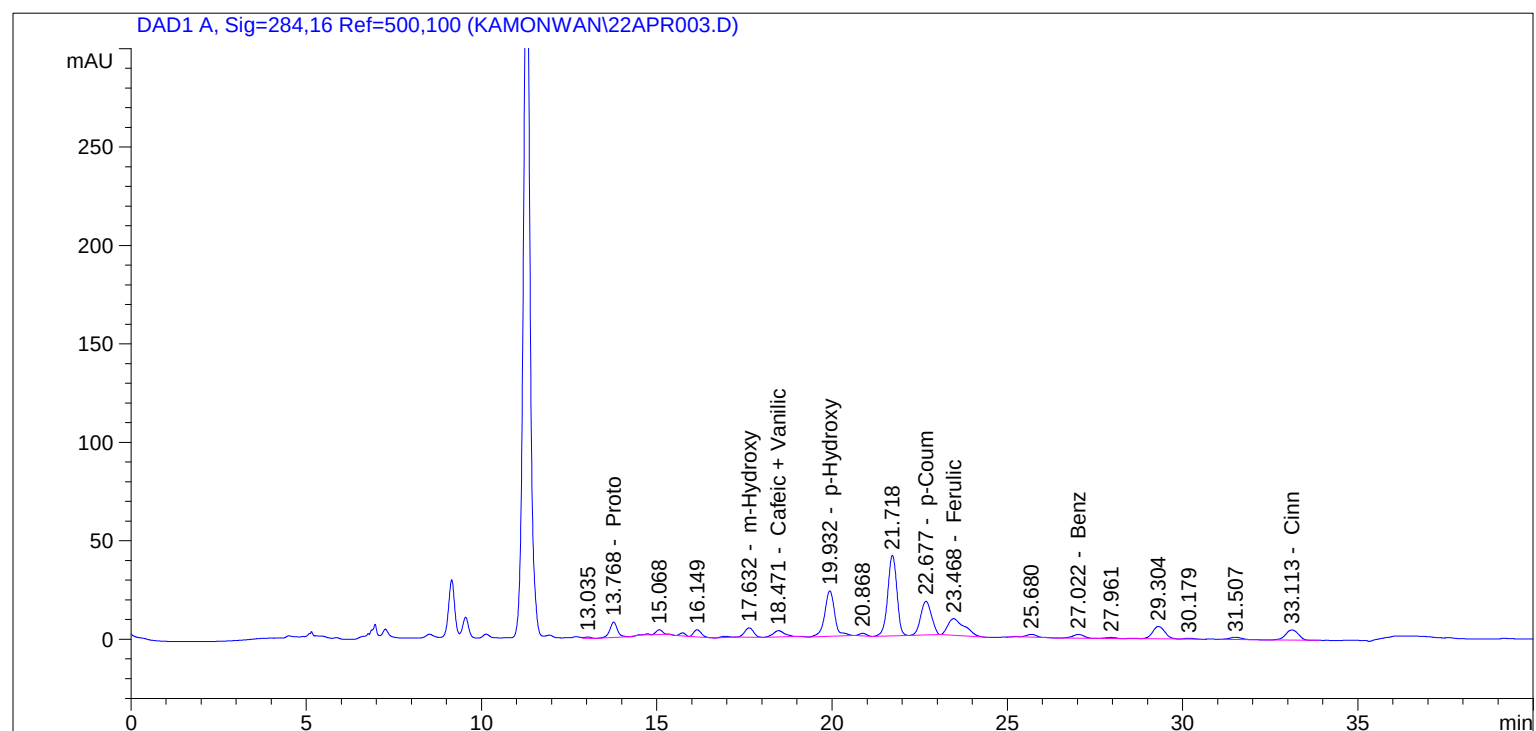
Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/23/2013 10:53:39 AM      Seq. Line   :    3
Sample Name     : D-MMM FPA                  Location    : Vial 3
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 2:38:08 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.768	BB	117.97968	1.82208e-2	2.14968		Proto
17.632	BB	84.23259	4.63455e-2	3.90380		m-Hydroxy
18.471	BB	71.76286	6.33781e-3	4.54819e-1		Cafeic + Vanilic
19.932	BB	456.27725	4.84779e-2	22.11936		p-Hydroxy
22.677	BB +	364.98322	5.70136e-3	2.08090		p-Coum
23.468	BB +	281.22418	1.28536e-2	3.61475		Ferulic
23.993		-	-	-		Veratric
27.022	BB +	45.80533	1.20492e-1	5.51919		Benz
33.113	BB +	132.17653	4.04527e-3	5.34690e-1		Cinn

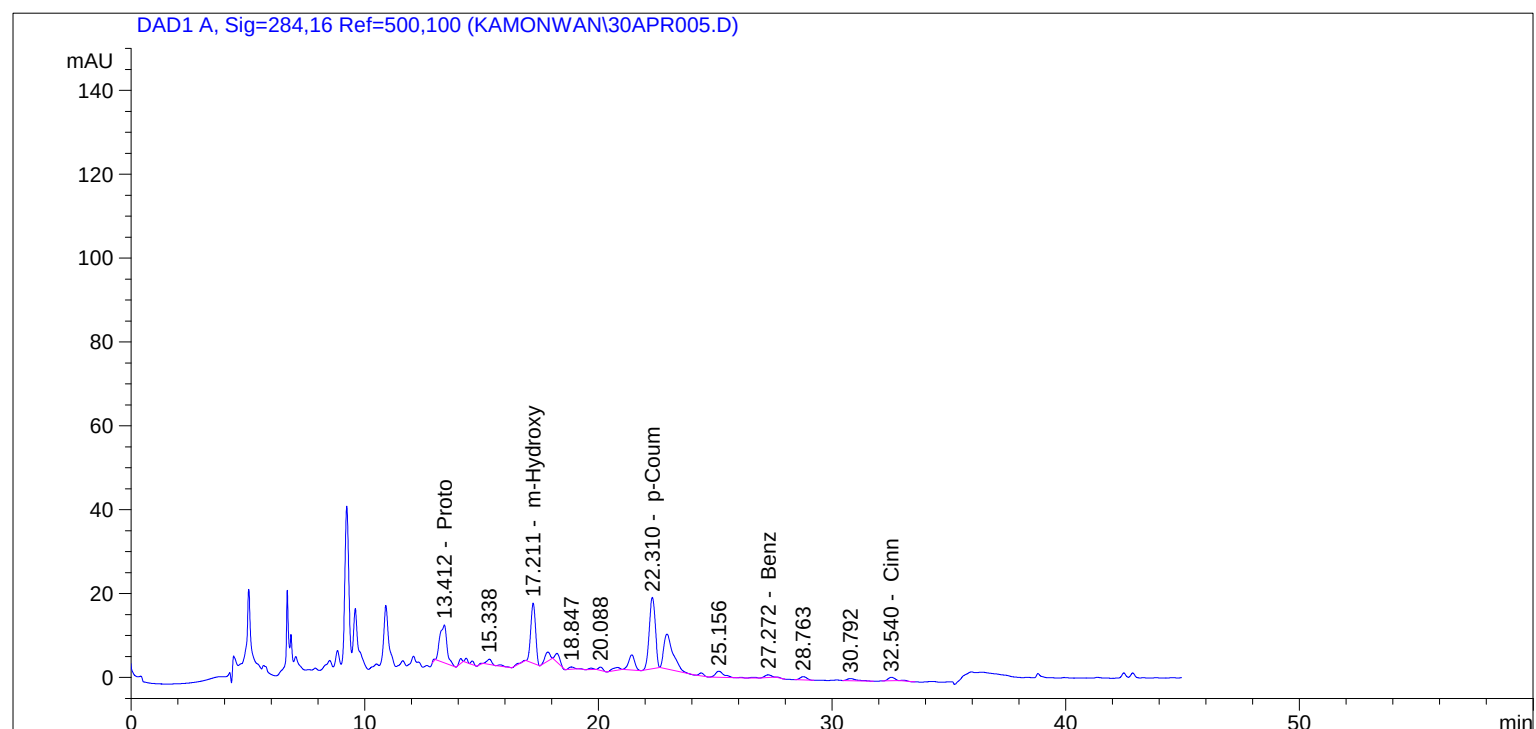
Totals : 40.37719

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/30/2013 11:26:05 AM      Seq. Line :    5
Sample Name     : D-MMM LIB EST B            Location  : Vial 5
Acq. Operator   : kamonwan                   Inj       :    1
Acq. Instrument : Instrument 1                Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/30/2013 1:44:12 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.412	BB	187.79108	1.82208e-2	3.42170		Proto
17.211	BB	205.04111	4.63455e-2	9.50274		m-Hydroxy
18.229	BB	29.80796	6.33781e-3	1.88917e-1		Cafeic + Vanilic
19.692	BB	4.77651	4.84779e-2	2.31555e-1		p-Hydroxy
22.310	BB +	306.78253	5.70136e-3	1.74908		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.272	BB +	12.22240	1.20492e-1	1.47270		Benz
32.540	BB +	16.09808	4.04527e-3	6.51211e-2		Cinn

Totals : 16.63181

Results obtained with enhanced integrator!
2 Warnings or Errors :

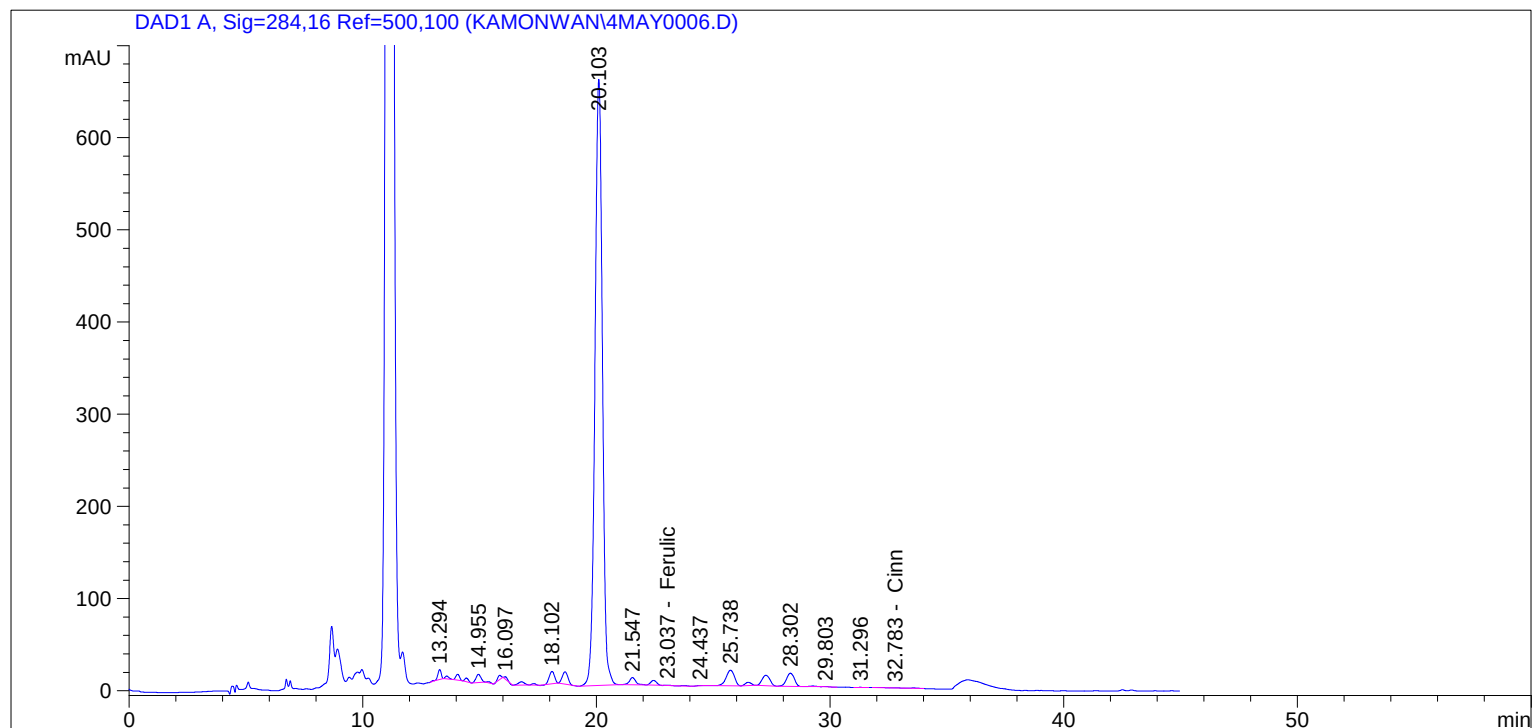
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 5/4/2013 12:54:55 PM      Seq. Line :    6
Sample Name     : D-MMM LIB GLY B          Location  : Vial 6
Acq. Operator   : Kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/4/2013 1:56:23 PM by Kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.595	BB	34.67071	1.82208e-2	6.31728e-1		Proto
17.318	BB	20.80299	4.63455e-2	9.64126e-1		m-Hydroxy
18.659	BB	223.45953	6.33781e-3	1.41624		Cafeic + Vanilic
19.636		-	-	-		p-Hydroxy
22.445	BB +	90.29990	5.70136e-3	5.14832e-1		p-Coum
23.037	BB +	7.75051	1.28536e-2	9.96221e-2		Ferulic
23.757	BB +	9.17699	7.45529e-2	6.84171e-1		Veratric
27.252	BB +	264.91385	1.20492e-1	31.92006		Benz
32.783	BB +	6.69543	4.04527e-3	2.70848e-2		Cinn

Totals : 36.25787

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

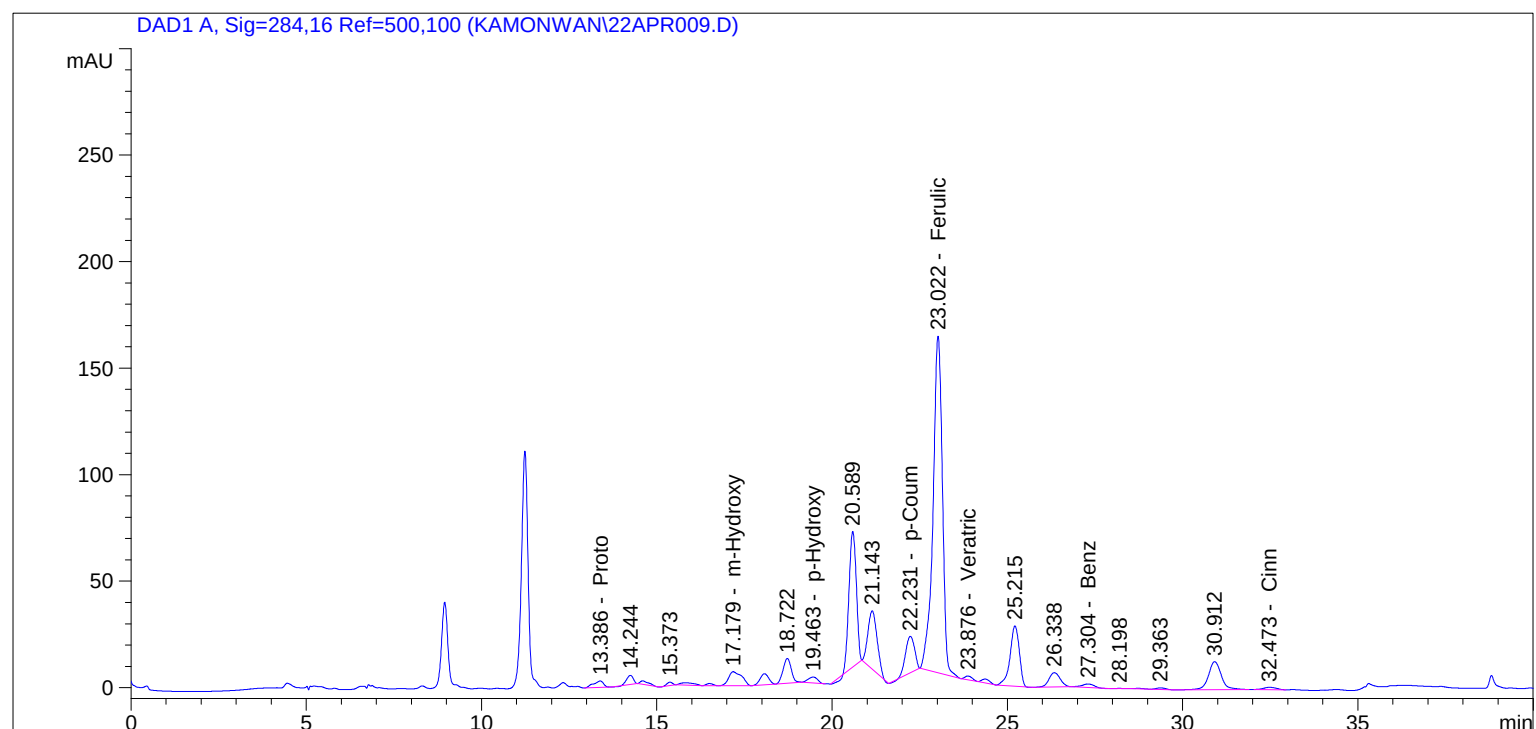
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/22/2013 3:50:15 PM      Seq. Line   :    9
Sample Name     : D-MMY FPA                 Location    : Vial 9
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1               Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:38:15 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.386	BB	61.53025	1.82208e-2	1.12113		Proto
17.179	BB	173.37030	4.63455e-2	8.03494		m-Hydroxy
18.071	BB	89.73549	6.33781e-3	5.68726e-1		Cafeic + Vanilic
19.463	BB	50.51006	4.84779e-2	2.44862		p-Hydroxy
22.231	BB +	305.62659	5.70136e-3	1.74249		p-Coum
23.022	BB +	2940.04907	1.28536e-2	37.79028		Ferulic
23.876	BB +	25.17154	7.45529e-2	1.87661		Veratric
27.304	BB +	39.61774	1.20492e-1	4.77363		Benz
32.473	BB +	26.39787	4.04527e-3	1.06787e-1		Cinn

Totals : 58.46321

Results obtained with enhanced integrator!
 1 Warnings or Errors :

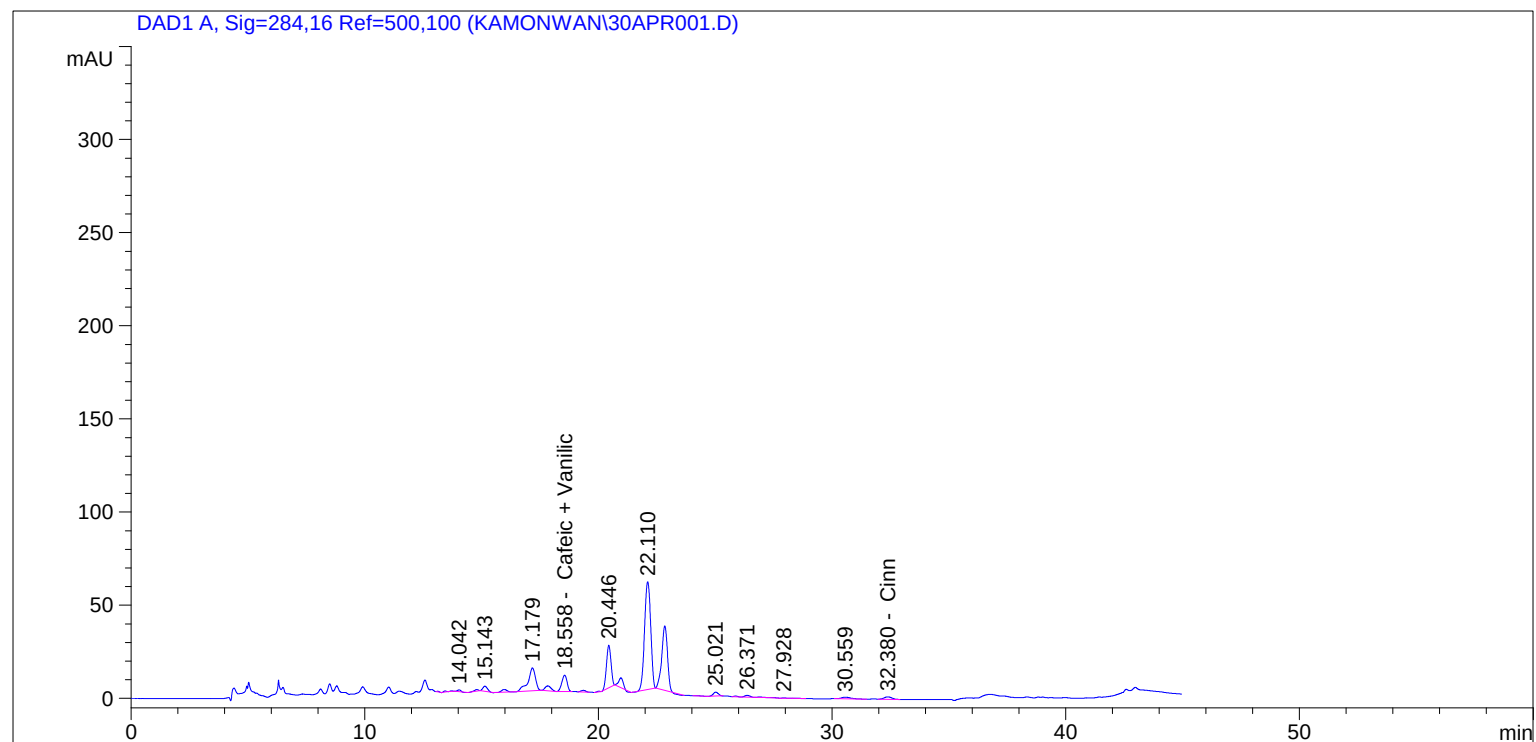
Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/30/2013 8:20:46 AM      Seq. Line   :    1
Sample Name      : D-MMY LIB EST B           Location    : Vial 1
Acq. Operator    : kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/29/2013 5:33:12 PM by kamonwan
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.715	BB	2.28723	1.82208e-2	4.16751e-2		Proto
17.833	BB	48.44498	4.63455e-2	2.24521		m-Hydroxy
18.558	BB	138.87549	6.33781e-3	8.80166e-1		Cafeic + Vanilic
20.021	BB	2.64794	4.84779e-2	1.28367e-1		p-Hydroxy
22.843	BB +	583.24268	5.70136e-3	3.32527		p-Coum
23.381		-	-	-		Ferulic
24.165	BB +	2.27699	7.45529e-2	1.69756e-1		Veratric
26.911	BB +	4.31643	1.20492e-1	5.20096e-1		Benz
32.380	BB +	28.28735	4.04527e-3	1.14430e-1		Cinn

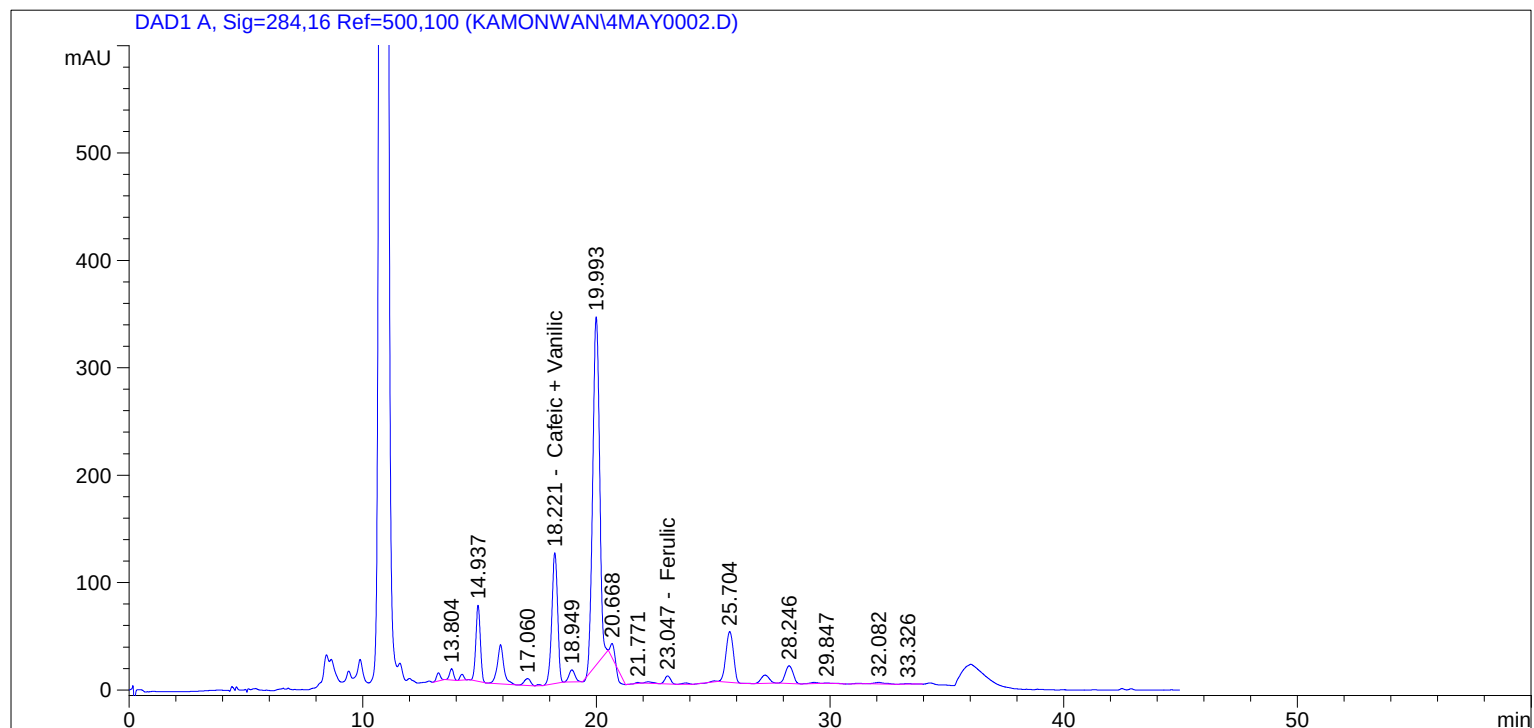
Totals : 7.42497

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/4/2013 9:49:36 AM      Seq. Line   :    2
Sample Name      : D-MMY LIB GLY B          Location    : Vial 2
Acq. Operator    : Kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/4/2013 10:40:20 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.241	BB	84.56968	1.82208e-2	1.54093		Proto
17.540	BB	11.91773	4.63455e-2	5.52333e-1		m-Hydroxy
18.221	BB	2097.29248	6.33781e-3	13.29224		Cafeic + Vanilic
19.440		-	-	-		p-Hydroxy
22.222	BB +	34.58183	5.70136e-3	1.97163e-1		p-Coum
23.047	BB +	129.59418	1.28536e-2	1.66575		Ferulic
23.818	BB +	22.52698	7.45529e-2	1.67945		Veratric
27.216	BB +	188.34479	1.20492e-1	22.69408		Benz
32.718		-	-	-		Cinn

Totals : 41.62195

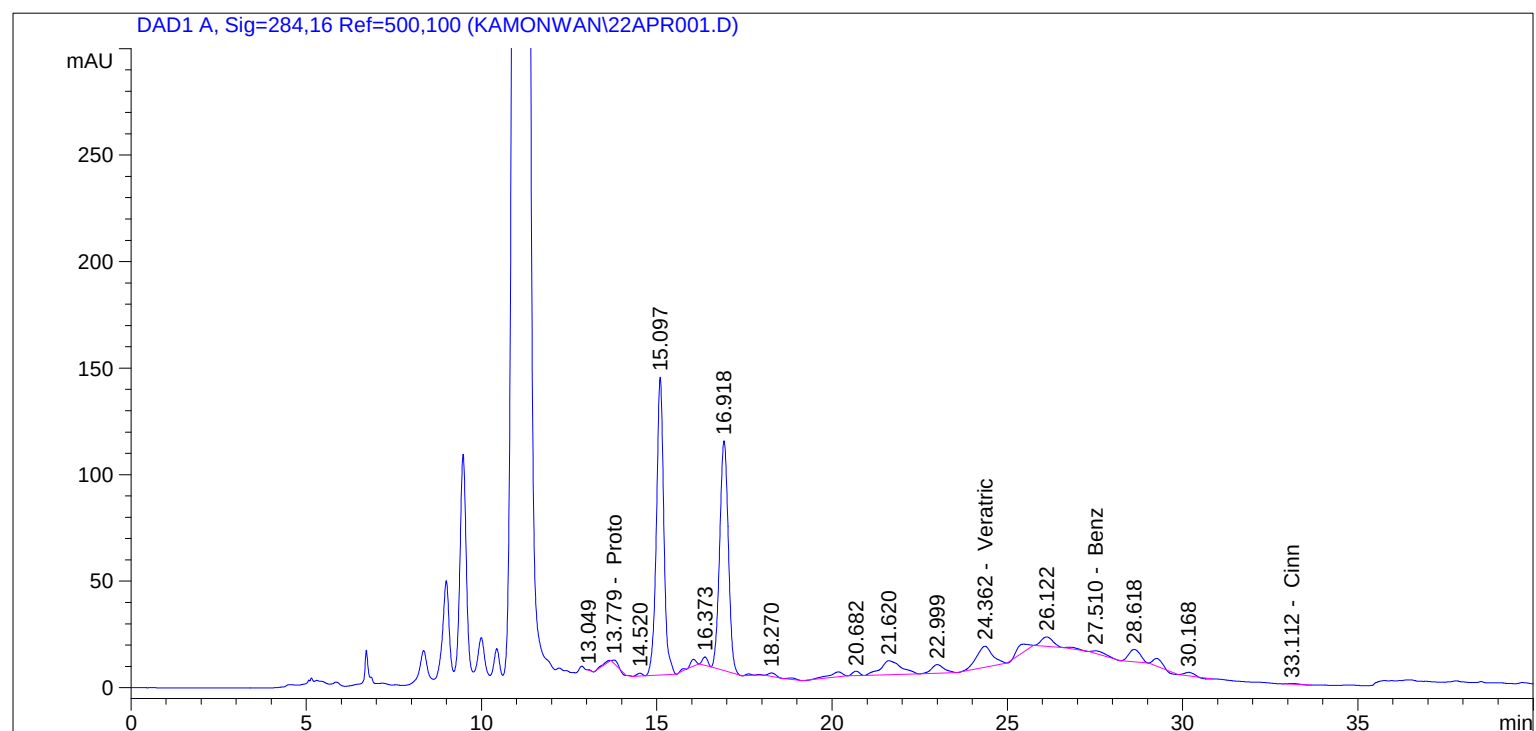
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```



```
=====
Injection Date   : 4/23/2013 9:21:01 AM      Seq. Line   :    1
Sample Name      : D-MPA FPA                  Location    : Vial 1
Acq. Operator    : kamonwan                    Inj         :    1
Acq. Instrument  : Instrument 1                Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/23/2013 9:19:49 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 2:33:30 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.779	BB	14.66103	1.82208e-2	2.67136e-1		Proto
17.923	BB	2.84732	4.63455e-2	1.31961e-1		m-Hydroxy
18.830	BB	10.38815	6.33781e-3	6.58381e-2		Cafeic + Vanilic
20.180	BB	63.58944	4.84779e-2	3.08268		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
24.362	BB +	321.14374	7.45529e-2	23.94218		Veratric
27.510	BB +	35.72118	1.20492e-1	4.30413		Benz
33.112	BB +	8.16327	4.04527e-3	3.30227e-2		Cinn

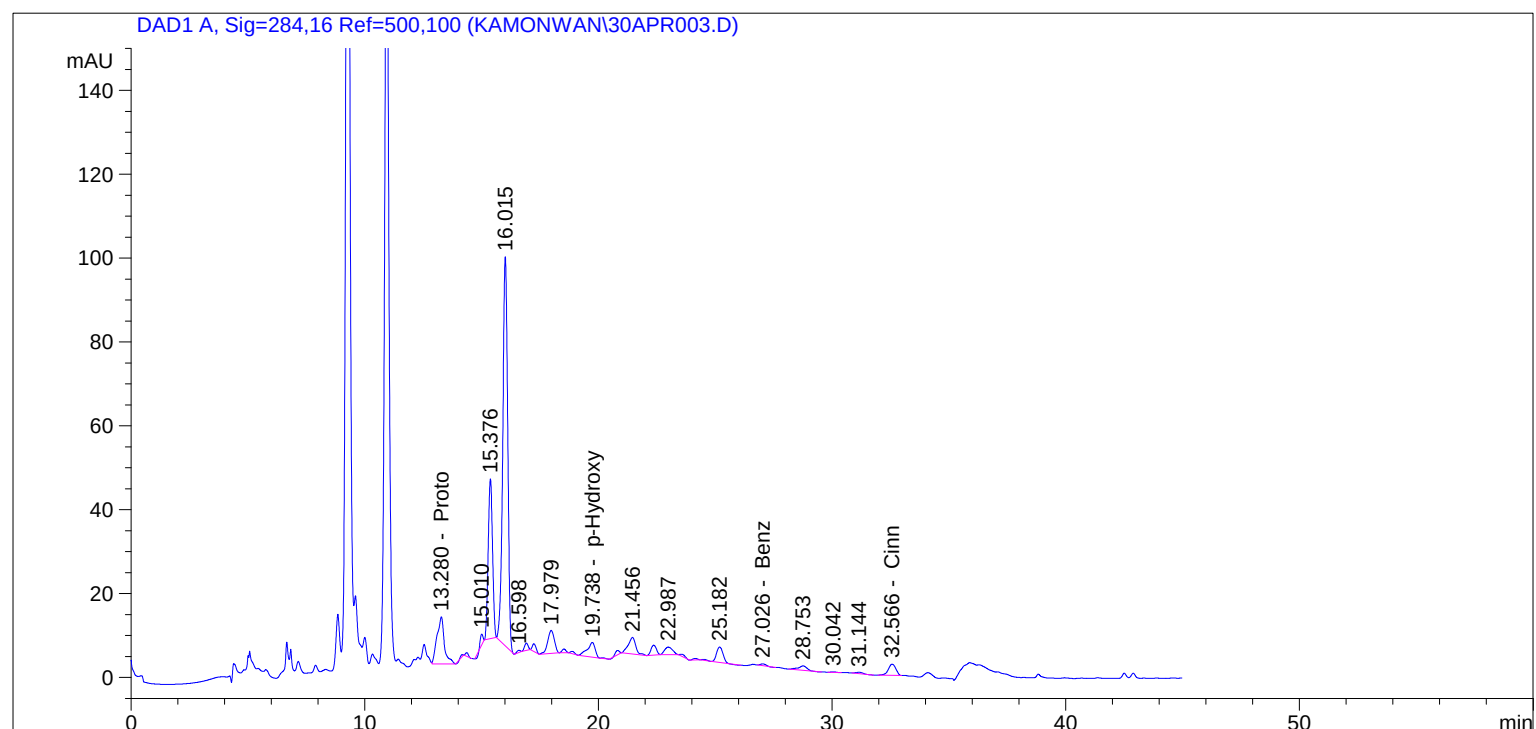
Totals : 31.82695

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/30/2013 9:53:25 AM      Seq. Line   :    3
Sample Name      : D-MPA LIB EST B           Location    : Vial 3
Acq. Operator    : kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/30/2013 1:41:49 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.280	BB	243.97211	1.82208e-2	4.44536		Proto
17.239	BB	19.76555	4.63455e-2	9.16045e-1		m-Hydroxy
18.525	BB	10.52856	6.33781e-3	6.67280e-2		Cafeic + Vanilic
19.738	BB	80.58052	4.84779e-2	3.90637		p-Hydroxy
22.363	BB +	37.45205	5.70136e-3	2.13527e-1		p-Coum
23.550	BB +	6.44876	1.28536e-2	8.28899e-2		Ferulic
24.138	BB +	4.97585	7.45529e-2	3.70964e-1		Veratric
27.026	BB +	6.54695	1.20492e-1	7.88856e-1		Benz
32.566	BB +	59.17873	4.04527e-3	2.39394e-1		Cinn

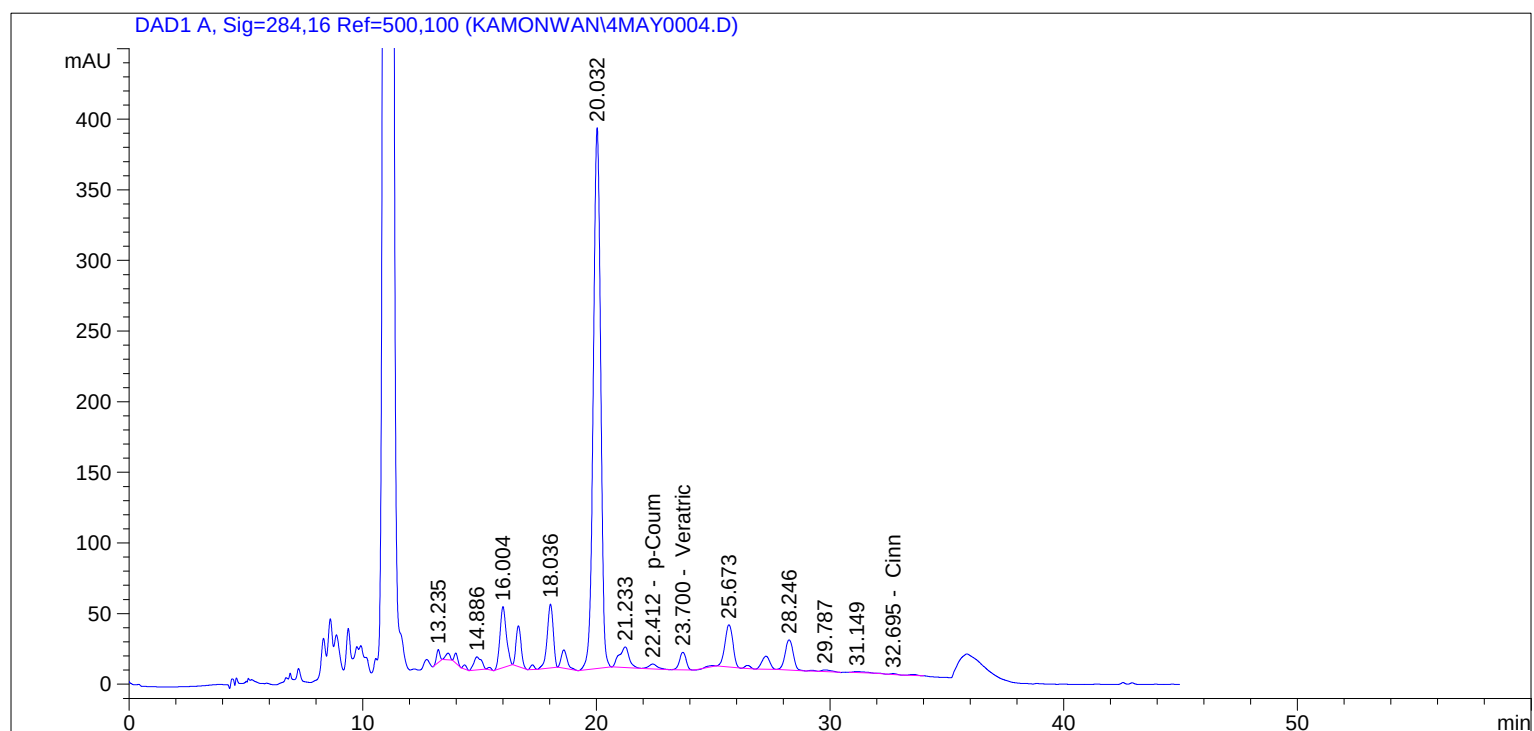
Totals : 11.03014

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/4/2013 11:22:17 AM      Seq. Line :    4
Sample Name      : D-MPA LIB GLY B           Location  : Vial 4
Acq. Operator    : Kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/4/2013 12:08:56 PM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.654	BB	61.91858	1.82208e-2	1.12821		Proto
17.263	BB	38.58842	4.63455e-2	1.78840		m-Hydroxy
18.608	BB	226.36617	6.33781e-3	1.43467		Cafeic + Vanilic
19.606		-	-	-		p-Hydroxy
22.412	BB +	86.02532	5.70136e-3	4.90461e-1		p-Coum
23.381		-	-	-		Ferulic
23.700	BB +	242.14386	7.45529e-2	18.05252		Veratric
27.259	BB +	217.94368	1.20492e-1	26.26052		Benz
32.695	BB +	12.80367	4.04527e-3	5.17944e-2		Cinn

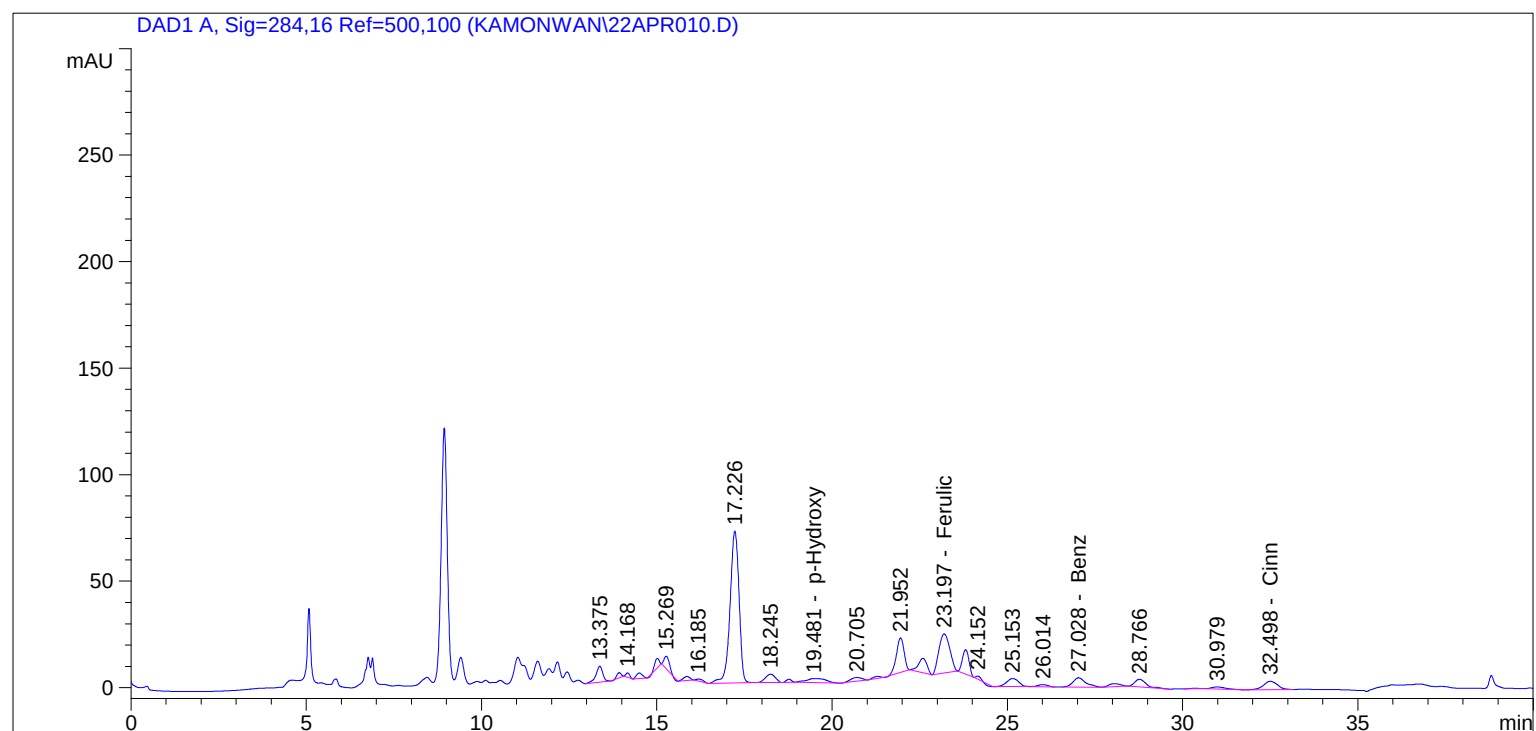
Totals : 49.20656

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/22/2013 4:36:35 PM      Seq. Line :   10
Sample Name     : D-MSO FPA                  Location  : Vial 10
Acq. Operator   : kamonwan                   Inj       :    1
Acq. Instrument : Instrument 1                Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:38:15 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.929	BB	20.54199	1.82208e-2	3.74291e-1		Proto
17.718		-	-	-		m-Hydroxy
18.767	BB	15.03098	6.33781e-3	9.52635e-2		Cafeic + Vanilic
19.481	BB	77.11247	4.84779e-2	3.73825		p-Hydroxy
22.589	BB +	114.84676	5.70136e-3	6.54782e-1		p-Coum
23.197	BB +	399.84732	1.28536e-2	5.13949		Ferulic
23.809	BB +	149.64220	7.45529e-2	11.15625		Veratric
27.028	BB +	108.95551	1.20492e-1	13.12829		Benz
32.498	BB +	108.66144	4.04527e-3	4.39565e-1		Cinn

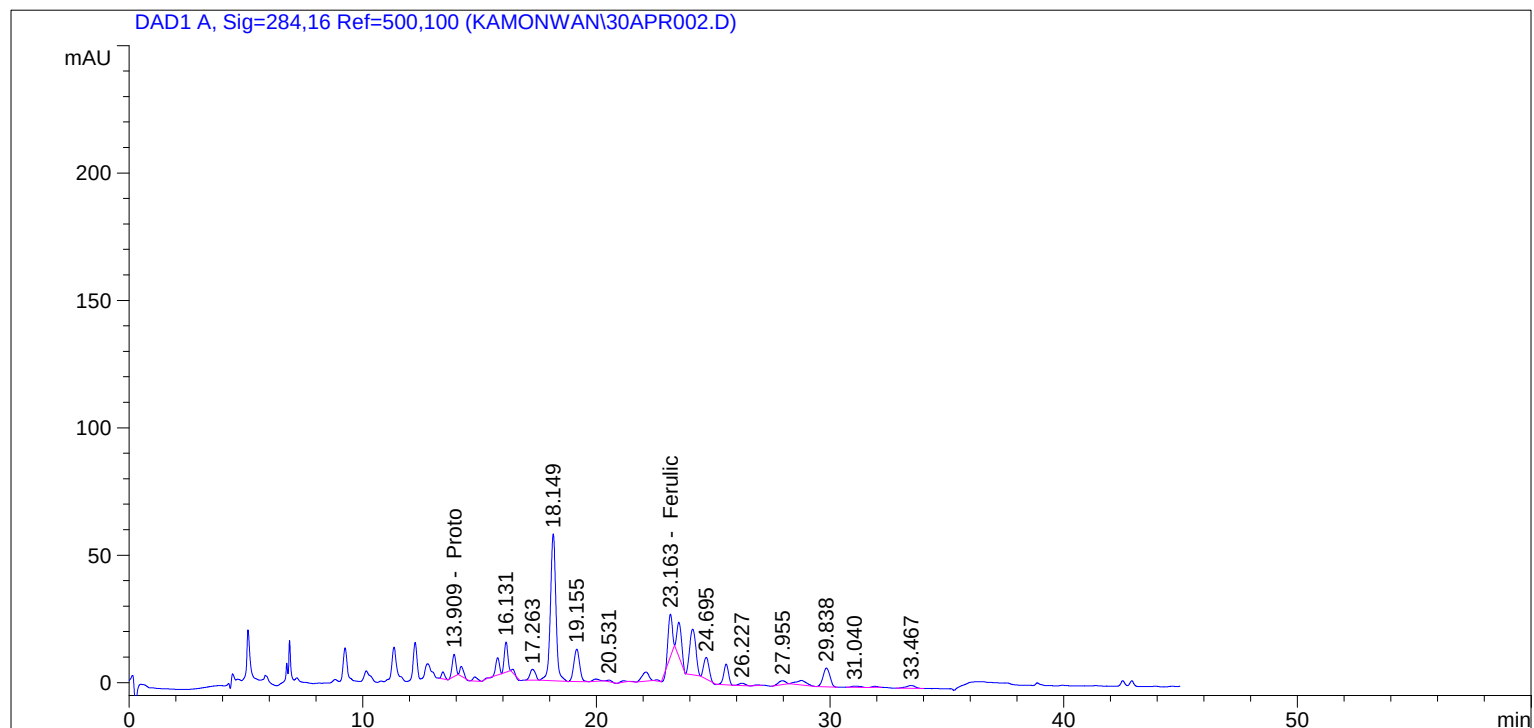
Totals : 34.72618

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/30/2013 9:07:06 AM      Seq. Line :    2
Sample Name      : D-MSO LIB EST B           Location  : Vial 2
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/30/2013 8:19:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/30/2013 1:40:15 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.909	BB	96.56467	1.82208e-2	1.75948		Proto
17.716		-	-	-		m-Hydroxy
18.508		-	-	-		Cafeic + Vanilic
19.974	BB	15.94895	4.84779e-2	7.73171e-1		p-Hydroxy
22.586	BB +	5.63302	5.70136e-3	3.21159e-2		p-Coum
23.163	BB +	200.66785	1.28536e-2	2.57931		Ferulic
24.116	BB +	329.22351	7.45529e-2	24.54455		Veratric
26.870	BB +	3.34926	1.20492e-1	4.03559e-1		Benz
32.718		-	-	-		Cinn

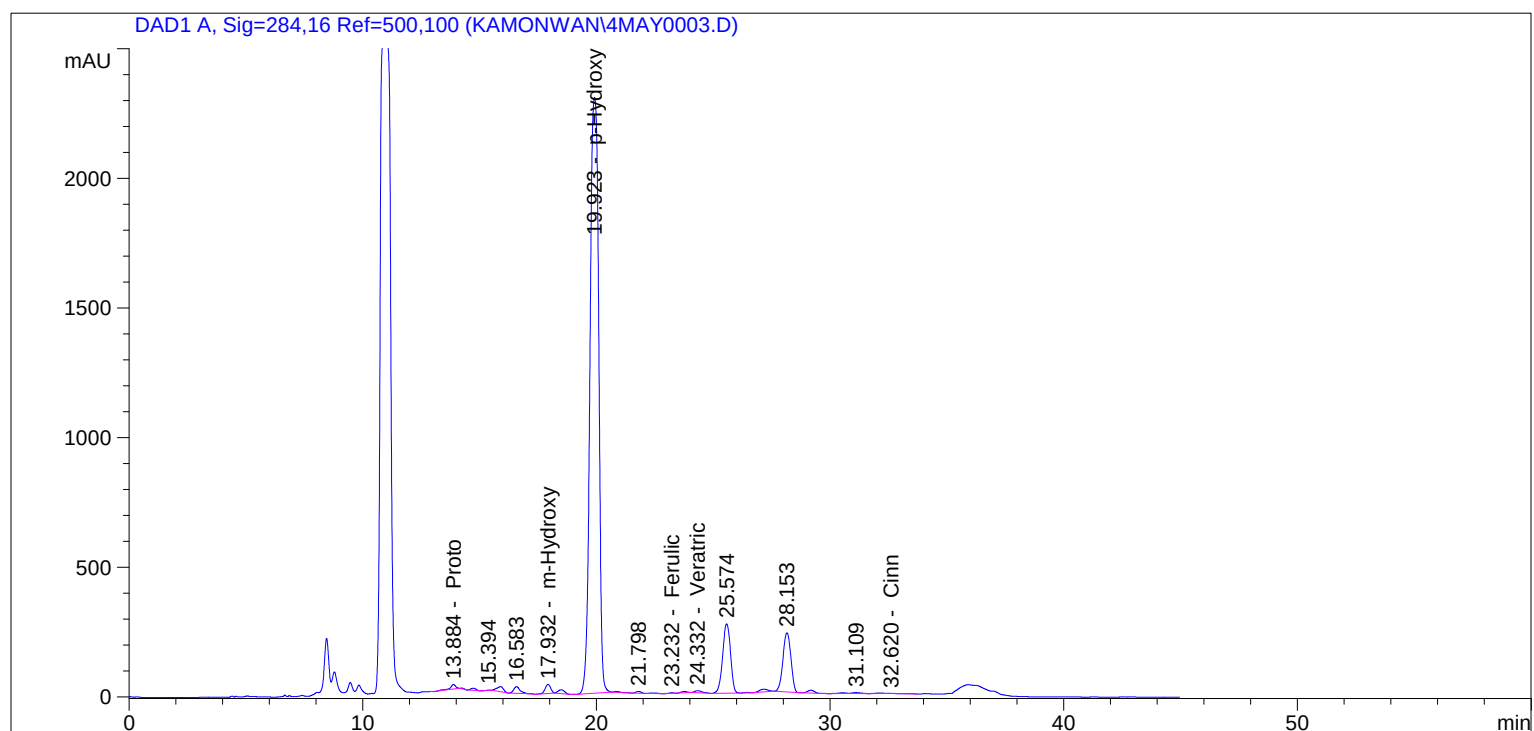
Totals : 30.09219

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/4/2013 10:35:57 AM      Seq. Line :    3
Sample Name      : D-MSO LIB GLY B           Location  : Vial 3
Acq. Operator    : Kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/4/2013 11:53:20 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.884	BB	292.86029	1.82208e-2	5.33614		Proto
17.932	BB	563.33124	4.63455e-2	26.10788		m-Hydroxy
18.493	BB	267.34601	6.33781e-3	1.69439		Cafeic + Vanilic
19.923	BB	5.88506e4	4.84779e-2	2852.95102		p-Hydroxy
22.454	BB +	57.72167	5.70136e-3	3.29092e-1		p-Coum
23.232	BB +	33.65735	1.28536e-2	4.32619e-1		Ferulic
24.332	BB +	180.46312	7.45529e-2	13.45404		Veratric
27.170	BB +	260.36627	1.20492e-1	31.37211		Benz
32.620	BB +	7.74629	4.04527e-3	3.13358e-2		Cinn

Totals : 2931.70863

Results obtained with enhanced integrator!
1 Warnings or Errors :

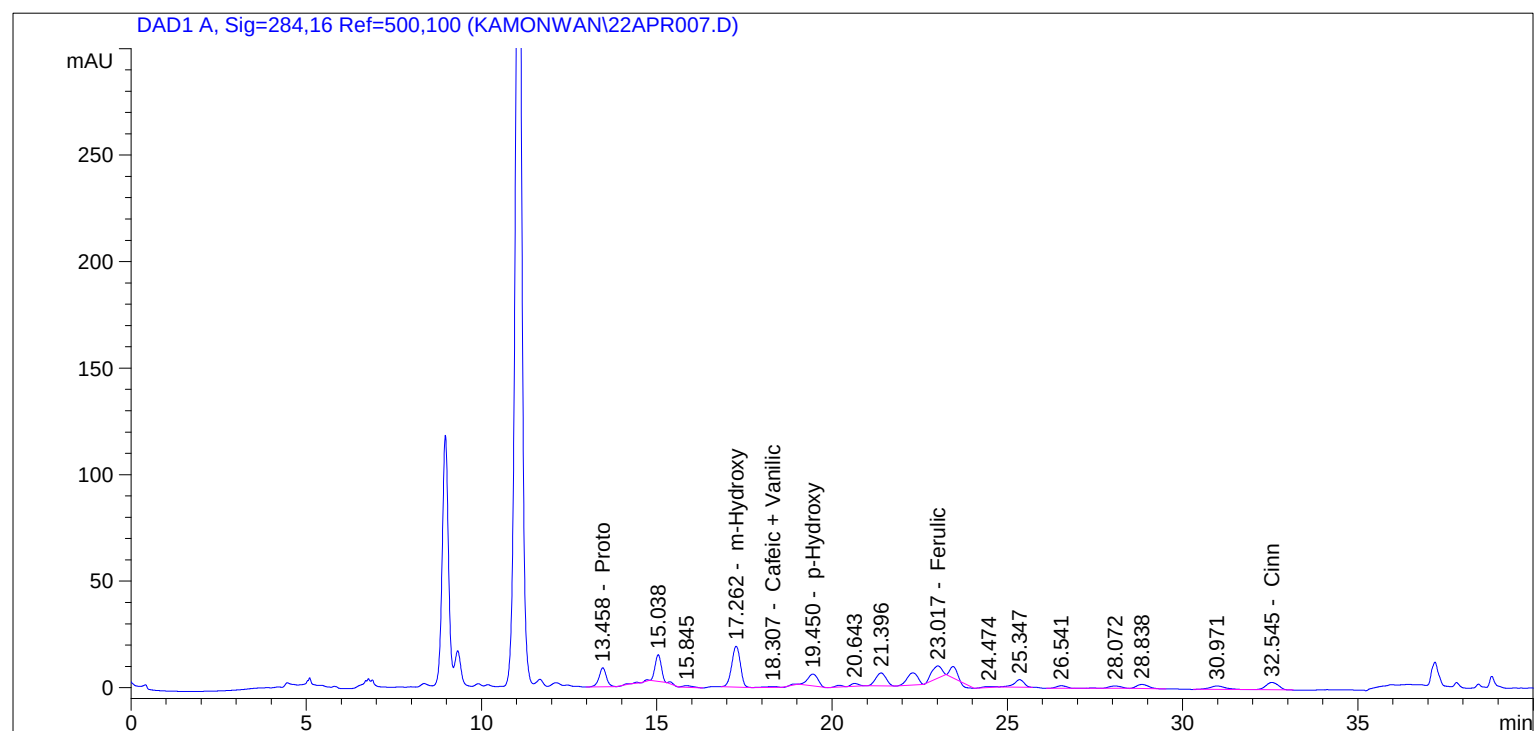
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/22/2013 2:17:34 PM	Seq. Line	: 7
Sample Name	: D-MTK FPA	Location	: Vial 7
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	4/22/2013 9:14:27 AM by kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	4/23/2013 1:33:59 PM by kamonwan		
	(modified after loading)		

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.458	BB	130.38857	1.82208e-2	2.37578		Proto
17.262	BB	326.36472	4.63455e-2	15.12554		m-Hydroxy
18.307	BB	10.03260	6.33781e-3	6.35847e-2		Cafeic + Vanilic
19.450	BB	113.11953	4.84779e-2	5.48380		p-Hydroxy
22.301	BB +	122.32080	5.70136e-3	6.97394e-1		p-Coum
23.017	BB +	119.49791	1.28536e-2	1.53598		Ferulic
23.993		-	-	-		Veratric
27.434	BB +	2.36548	1.20492e-1	2.85022e-1		Benz
32.545	BB +	86.22141	4.04527e-3	3.48789e-1		Cinn

Totals : 25.91589

Results obtained with enhanced integrator!
2 Warnings or Errors :

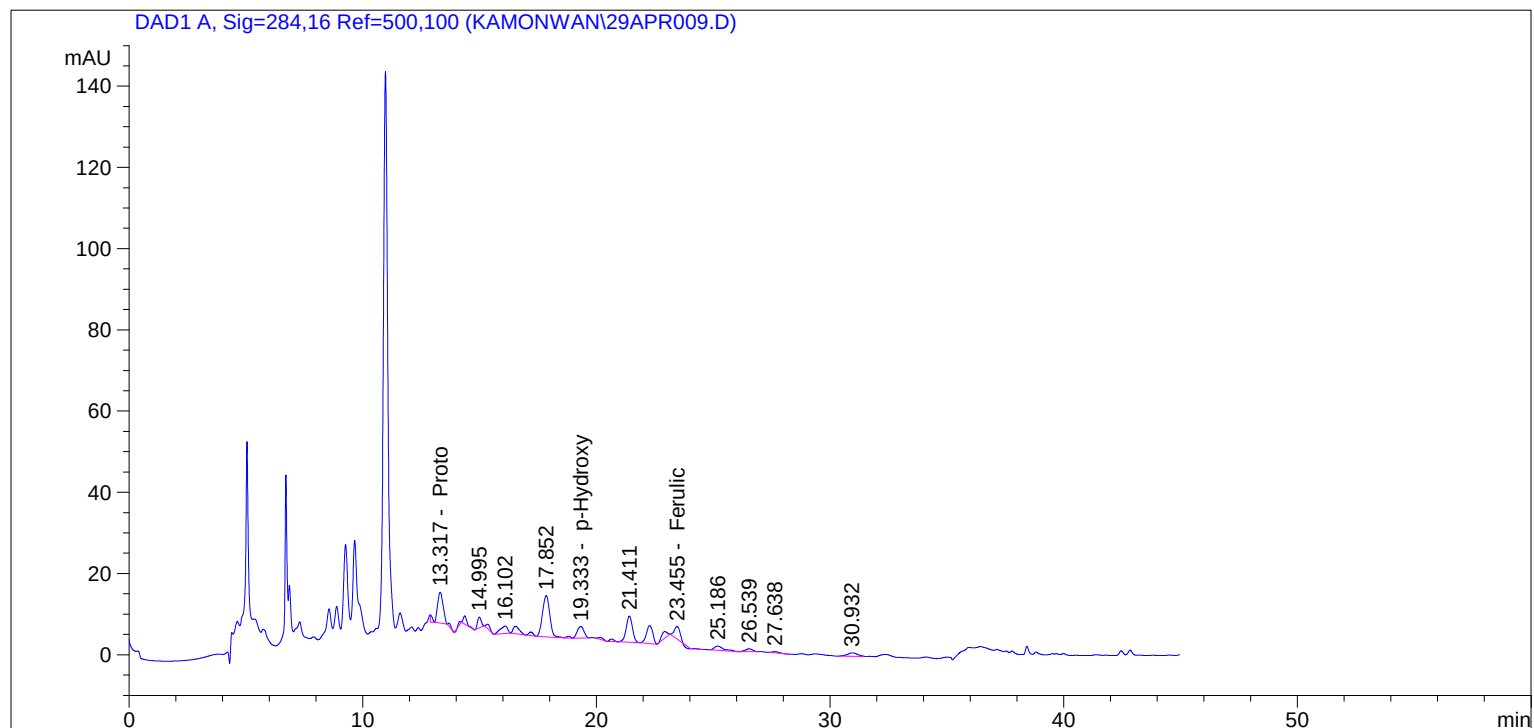
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

=====

```
=====
Injection Date   : 4/29/2013 3:58:34 PM      Seq. Line   :    9
Sample Name      : D-MTK LIB EST B           Location    : Vial 9
Acq. Operator    : kamonwan                  Inj         :    1
Acq. Instrument  : Instrument 1               Inj Volume   : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/29/2013 4:45:01 PM by kamonwan
                  (modified after loading)
=====
```



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External Standard Report
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```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.317	BB	123.31738	1.82208e-2	2.24694		Proto
17.193	BB	12.02491	4.63455e-2	5.57301e-1		m-Hydroxy
18.259		-	-	-		Cafeic + Vanilic
19.333	BB	56.36337	4.84779e-2	2.73238		p-Hydroxy
22.281	BB +	82.97618	5.70136e-3	4.73077e-1		p-Coum
23.455	BB +	45.79168	1.28536e-2	5.88589e-1		Ferulic
24.218	BB +	2.03123	7.45529e-2	1.51434e-1		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 6.74972

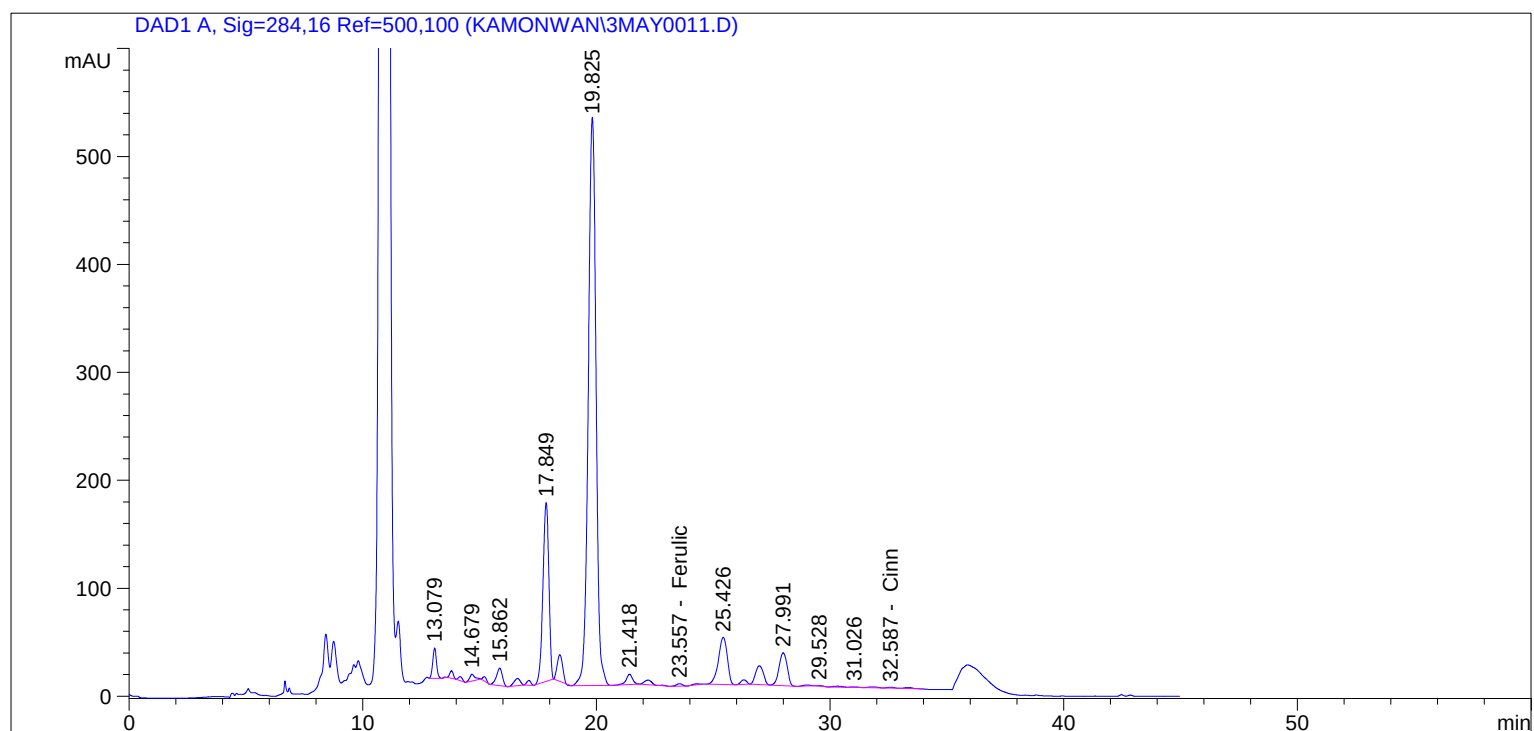
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```



```
=====
Injection Date   : 5/3/2013 5:15:18 PM      Seq. Line :   11
Sample Name      : D-MTK LIB GLY B          Location  : Vial 11
Acq. Operator    : Kamonwan                 Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/3/2013 9:29:49 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/3/2013 6:14:42 PM by Kamonwan
                  (modified after loading)
=====
```



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=====
External Standard Report
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```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.521	BB	4.42183	1.82208e-2	8.05692e-2		Proto
17.108	BB	53.64519	4.63455e-2	2.48621		m-Hydroxy
18.436	BB	398.00378	6.33781e-3	2.52247		Cafeic + Vanilic
19.432		-	-	-		p-Hydroxy
22.212	BB +	91.21915	5.70136e-3	5.20073e-1		p-Coum
23.557	BB +	43.10570	1.28536e-2	5.54064e-1		Ferulic
24.299	BB +	19.81874	7.45529e-2	1.47754		Veratric
26.974	BB +	405.82211	1.20492e-1	48.89841		Benz
32.587	BB +	16.35443	4.04527e-3	6.61581e-2		Cinn

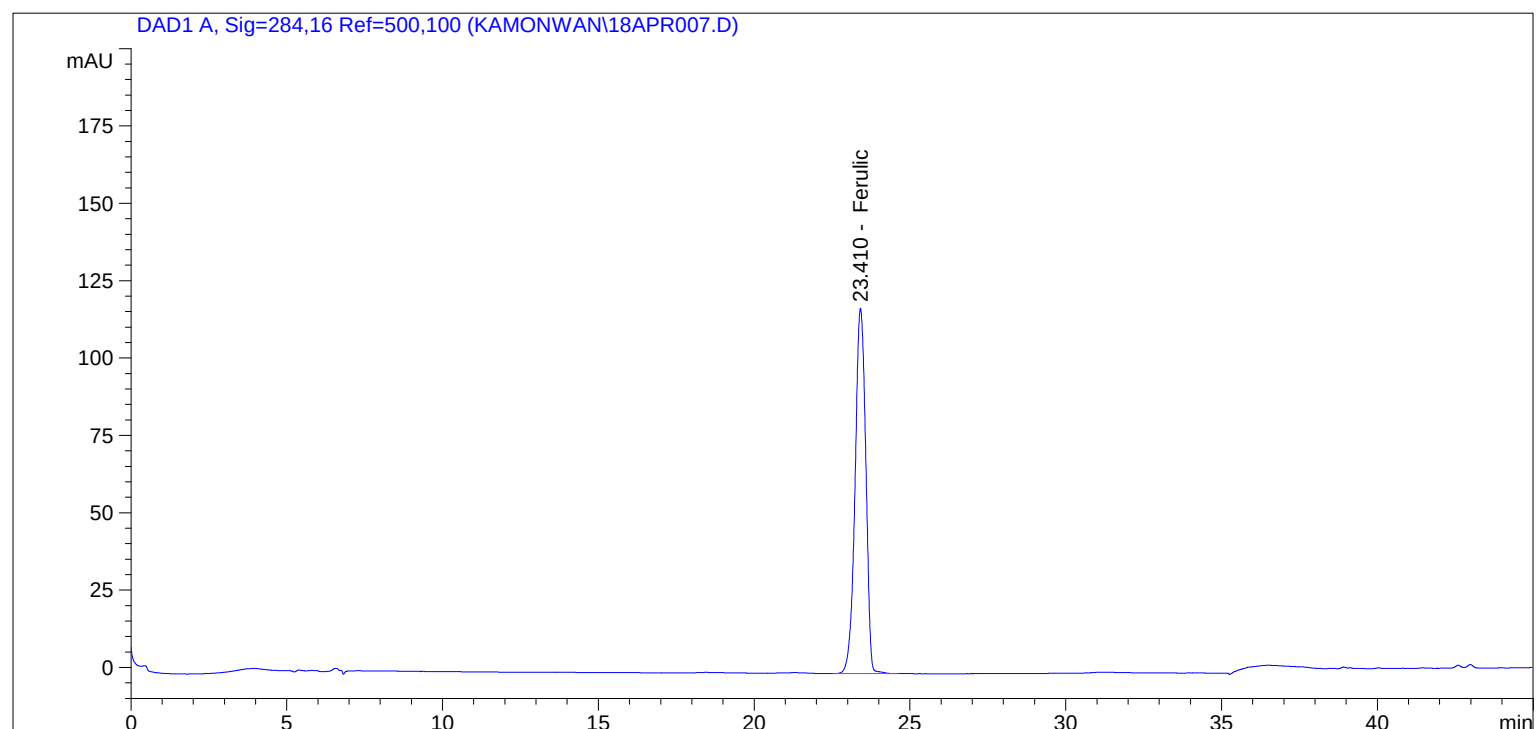
Totals : 56.60551

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/18/2013 4:13:33 PM      Seq. Line :    6
Sample Name      : ferulic 30 ppm            Location  : Vial 6
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:40:28 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                        Area Percent Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.634		0.0000	0.00000	0.0000	Proto
2	17.669		0.0000	0.00000	0.0000	m-Hydroxy
3	18.460		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.707		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.410	BB +	0.3804	2818.31030	100.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 2818.31030 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

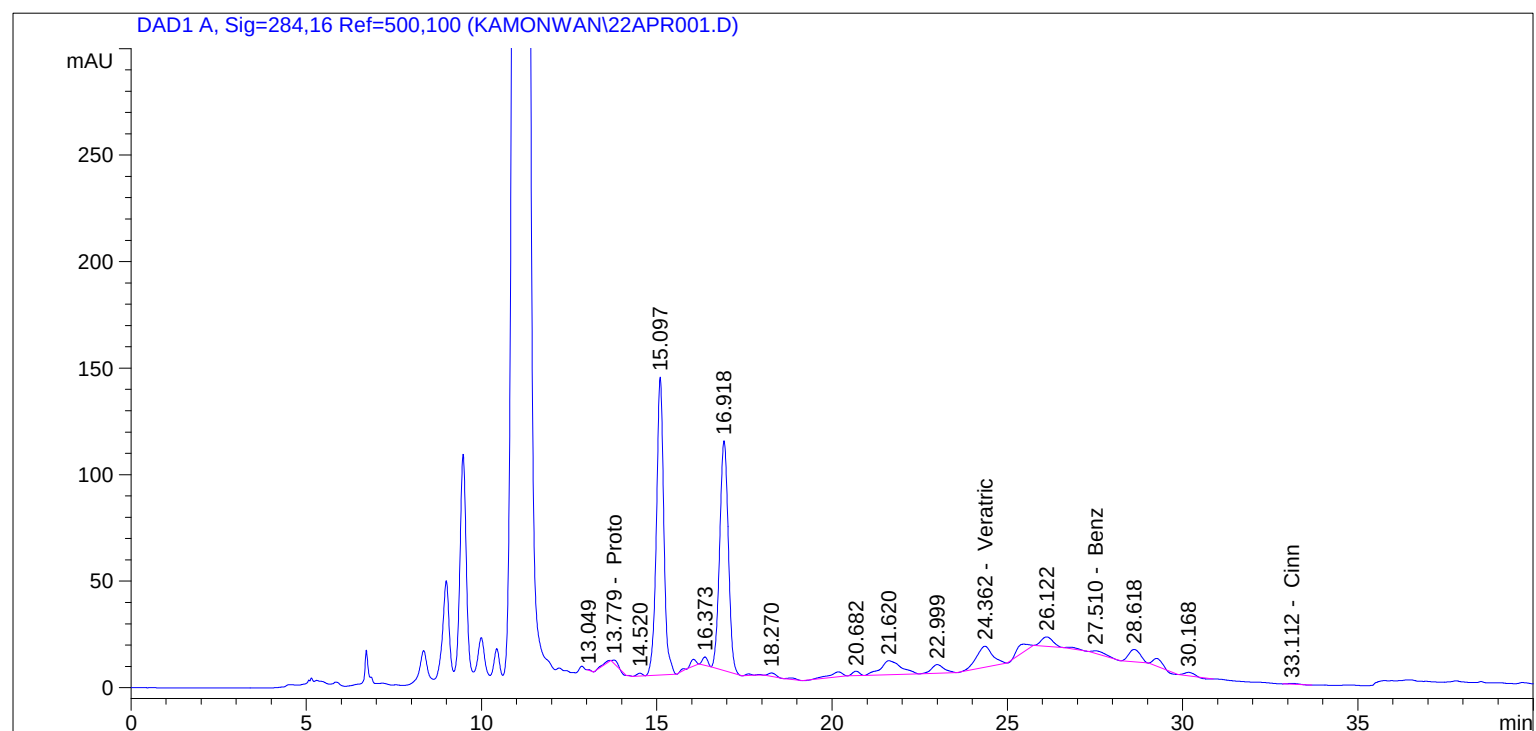
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/23/2013 9:21:01 AM	Seq. Line	: 1
Sample Name	: D-MPA FPA	Location	: Vial 1
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/23/2013 9:19:49 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 2:33:30 PM by kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.779	BB	14.66103	1.82208e-2	2.67136e-1		Proto
17.923	BB	2.84732	4.63455e-2	1.31961e-1		m-Hydroxy
18.830	BB	10.38815	6.33781e-3	6.58381e-2		Cafeic + Vanilic
20.180	BB	63.58944	4.84779e-2	3.08268		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
24.362	BB +	321.14374	7.45529e-2	23.94218		Veratric
27.510	BB +	35.72118	1.20492e-1	4.30413		Benz
33.112	BB +	8.16327	4.04527e-3	3.30227e-2		Cinn

Totals : 31.82695

Results obtained with enhanced integrator!
2 Warnings or Errors :

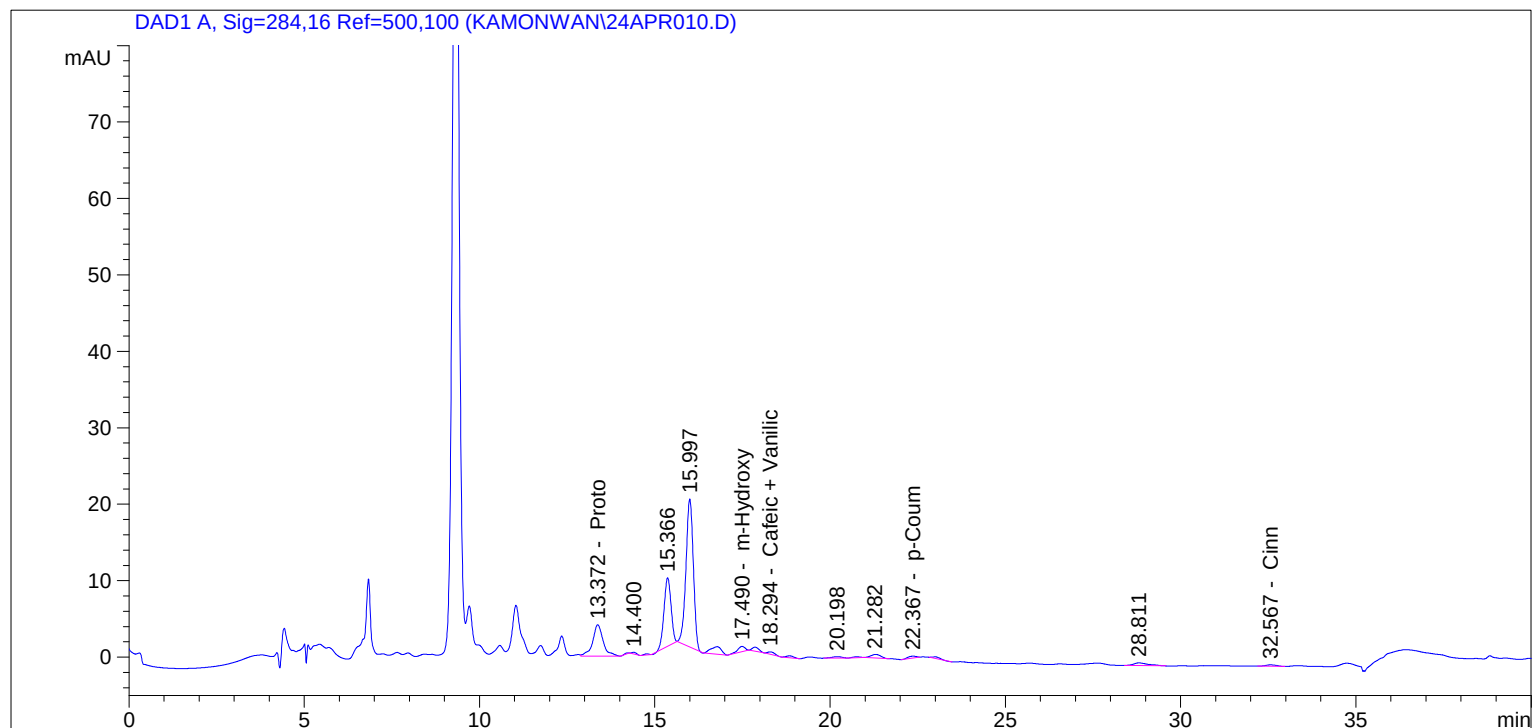
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

=====

```
=====
Injection Date   : 4/24/2013 3:14:30 PM      Seq. Line :   10
Sample Name      : MPA LIB EST B             Location  : Vial 10
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/24/2013 4:05:56 PM by kamonwan
                  (modified after loading)
=====
```



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=====
External Standard Report
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```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.372	BB	85.31809	1.82208e-2	1.55456		Proto
17.490	BB	10.12155	4.63455e-2	4.69089e-1		m-Hydroxy
18.294	BB	4.30851	6.33781e-3	2.73065e-2		Cafeic + Vanilic
19.567		-	-	-		p-Hydroxy
22.367	BB +	3.99080	5.70136e-3	2.27530e-2		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.567	BB +	3.98378	4.04527e-3	1.61155e-2		Cinn

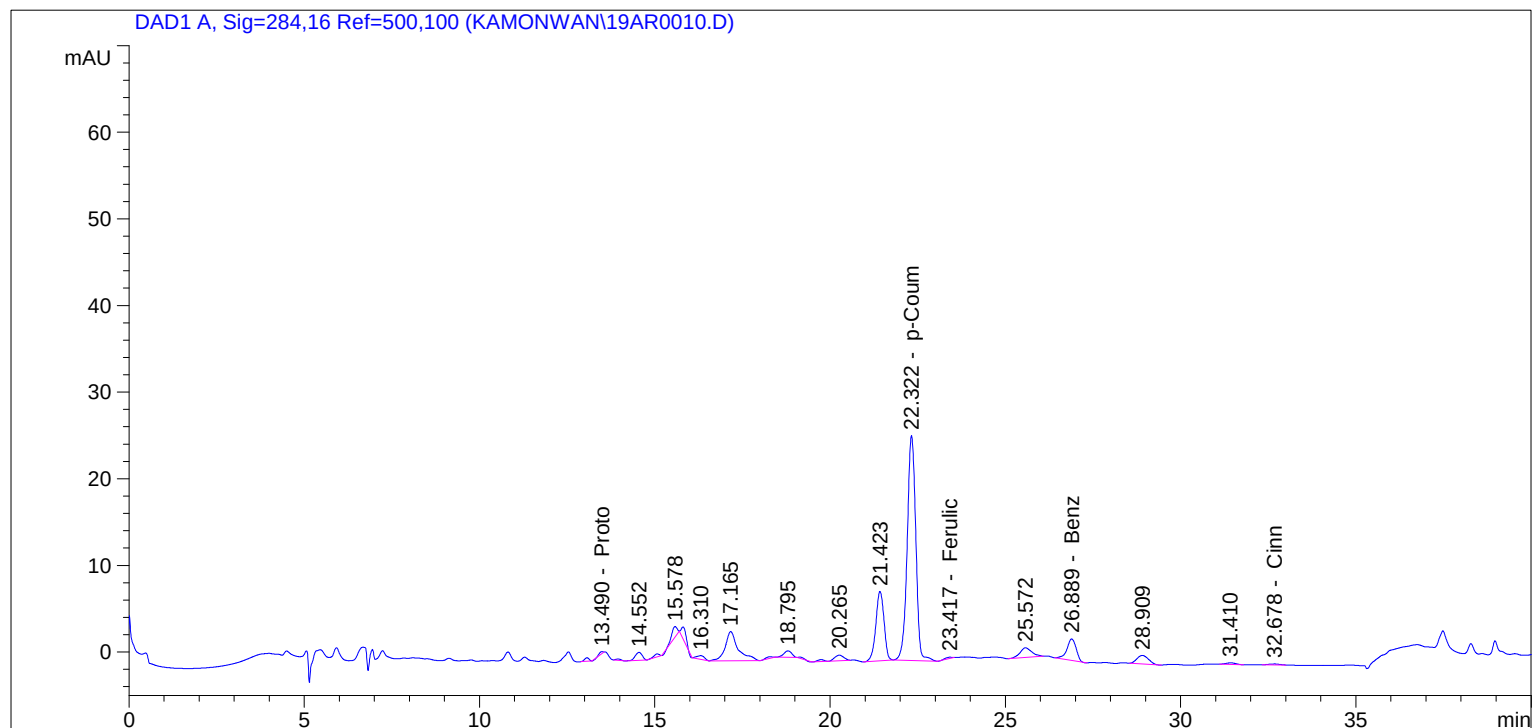
Totals : 2.08983

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/19/2013 4:33:17 PM      Seq. Line   :    10
Sample Name      : IMC FPA                    Location      : Vial 10
Acq. Operator    : kamonwan                    Inj           :     1
Acq. Instrument  : Instrument 1                Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 11:26:01 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.490	BB	1.75076	1.82208e-2	3.19001e-2		Proto
17.509		-	-	-		m-Hydroxy
18.280	BB	2.55394	6.33781e-3	1.61864e-2		Cafeic + Vanilic
19.742	BB	3.06437	4.84779e-2	1.48554e-1		p-Hydroxy
22.322	BB +	441.63675	5.70136e-3	2.51793		p-Coum
23.417	BB +	2.18335	1.28536e-2	2.80640e-2		Ferulic
23.993		-	-	-		Veratric
26.889	BB +	45.86105	1.20492e-1	5.52590		Benz
32.678	BB +	2.35534	4.04527e-3	9.52798e-3		Cinn

Totals : 8.27806

Results obtained with enhanced integrator!
2 Warnings or Errors :

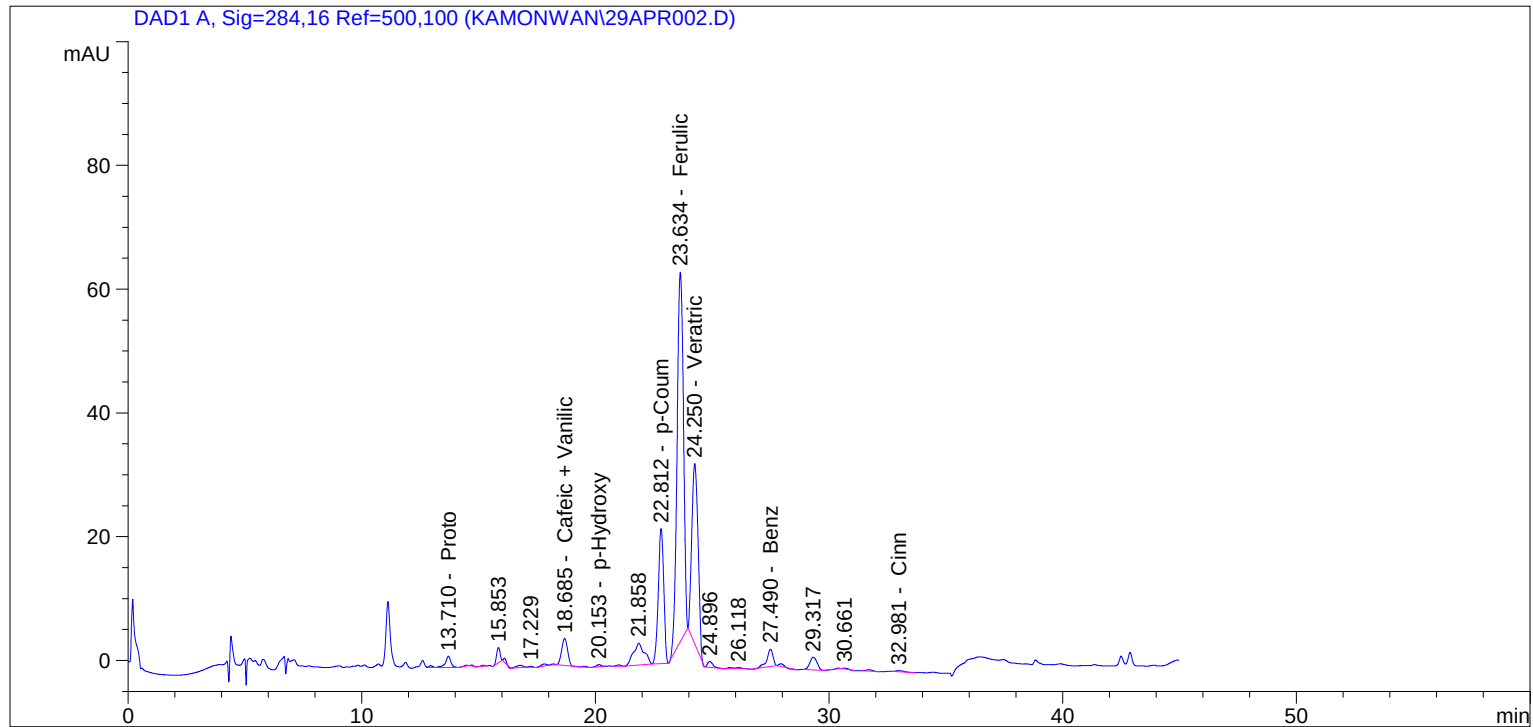
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

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Injection Date	: 4/29/2013 10:34:07 AM	Seq. Line	: 2
Sample Name	: IMC LIB EST B	Location	: Vial 2
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/29/2013 9:46:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/29/2013 11:21:02 AM by kamonwan		
	(modified after loading)		

=====



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.710	BB	29.36482	1.82208e-2	5.35050e-1		Proto
17.804	BB	5.19637	4.63455e-2	2.40828e-1		m-Hydroxy
18.685	BB	76.05002	6.33781e-3	4.81990e-1		Cafeic + Vanilic
20.153	BB	4.80133	4.84779e-2	2.32758e-1		p-Hydroxy
22.812	BB +	354.24405	5.70136e-3	2.01967		p-Coum
23.634	BB +	1128.14453	1.28536e-2	14.50074		Ferulic
24.250	BB +	544.79517	7.45529e-2	40.61604		Veratric
27.490	BB +	51.30328	1.20492e-1	6.18165		Benz
32.981	BB +	5.15330	4.04527e-3	2.08465e-2		Cinn

Totals : 64.82957

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

=====

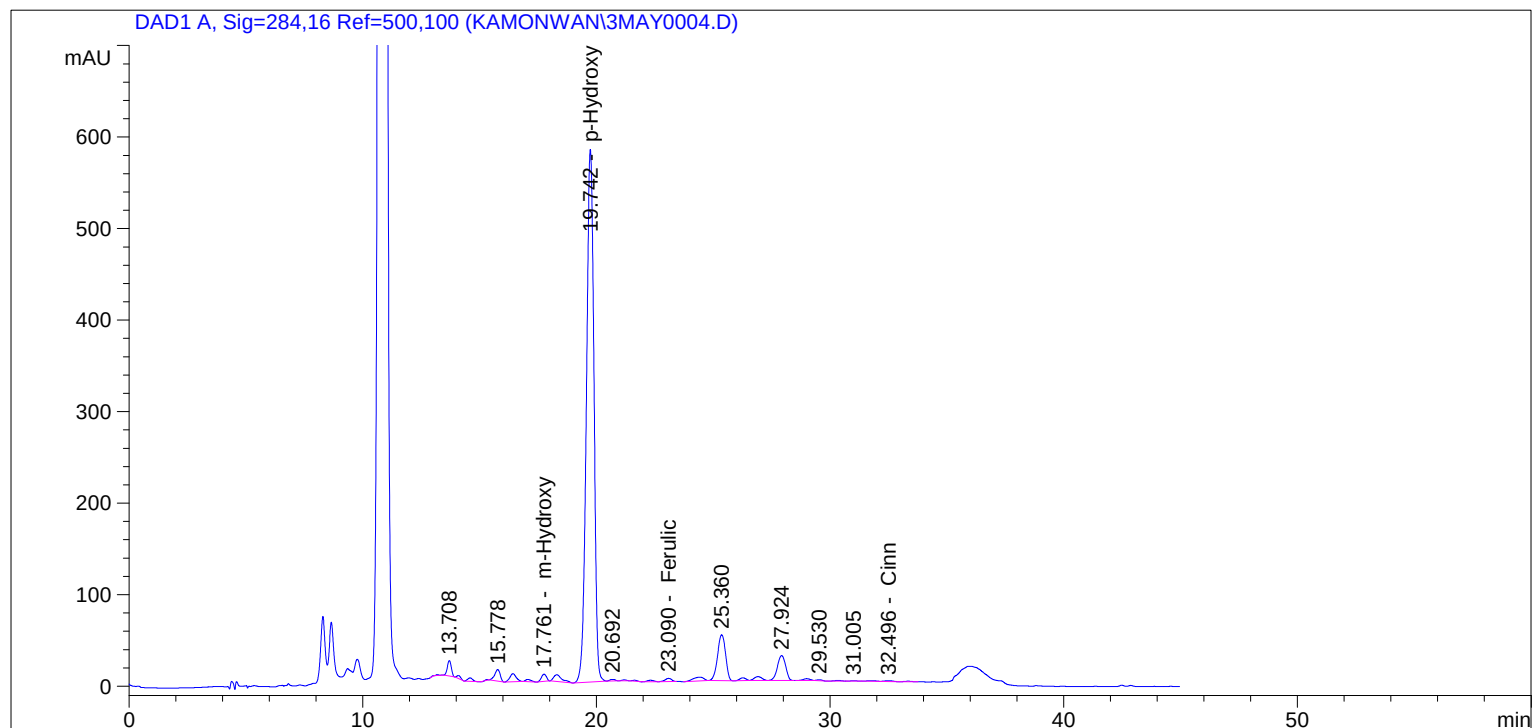
*** End of Report ***

=====

Injection Date	: 5/3/2013 11:50:48 AM	Seq. Line	: 4
Sample Name	: IMC LIB GLY B	Location	: Vial 4
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/3/2013 3:07:59 PM by Kamonwan		

(modified after loading)

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.399	BB	7.67065e-1	1.82208e-2	1.39765e-2		Proto
17.761	BB	119.12257	4.63455e-2	5.52080		m-Hydroxy
18.308	BB	182.68715	6.33781e-3	1.15784		Cafeic + Vanilic
19.742	BB	1.29716e4	4.84779e-2	628.83629		p-Hydroxy
22.314	BB +	33.57459	5.70136e-3	1.91421e-1		p-Coum
23.090	BB +	66.49111	1.28536e-2	8.54652e-1		Ferulic
23.993		-	-	-		Veratric
26.916	BB +	90.60767	1.20492e-1	10.91752		Benz
32.496	BB +	20.09899	4.04527e-3	8.13059e-2		Cinn

Totals : 647.57380

Results obtained with enhanced integrator!
2 Warnings or Errors :

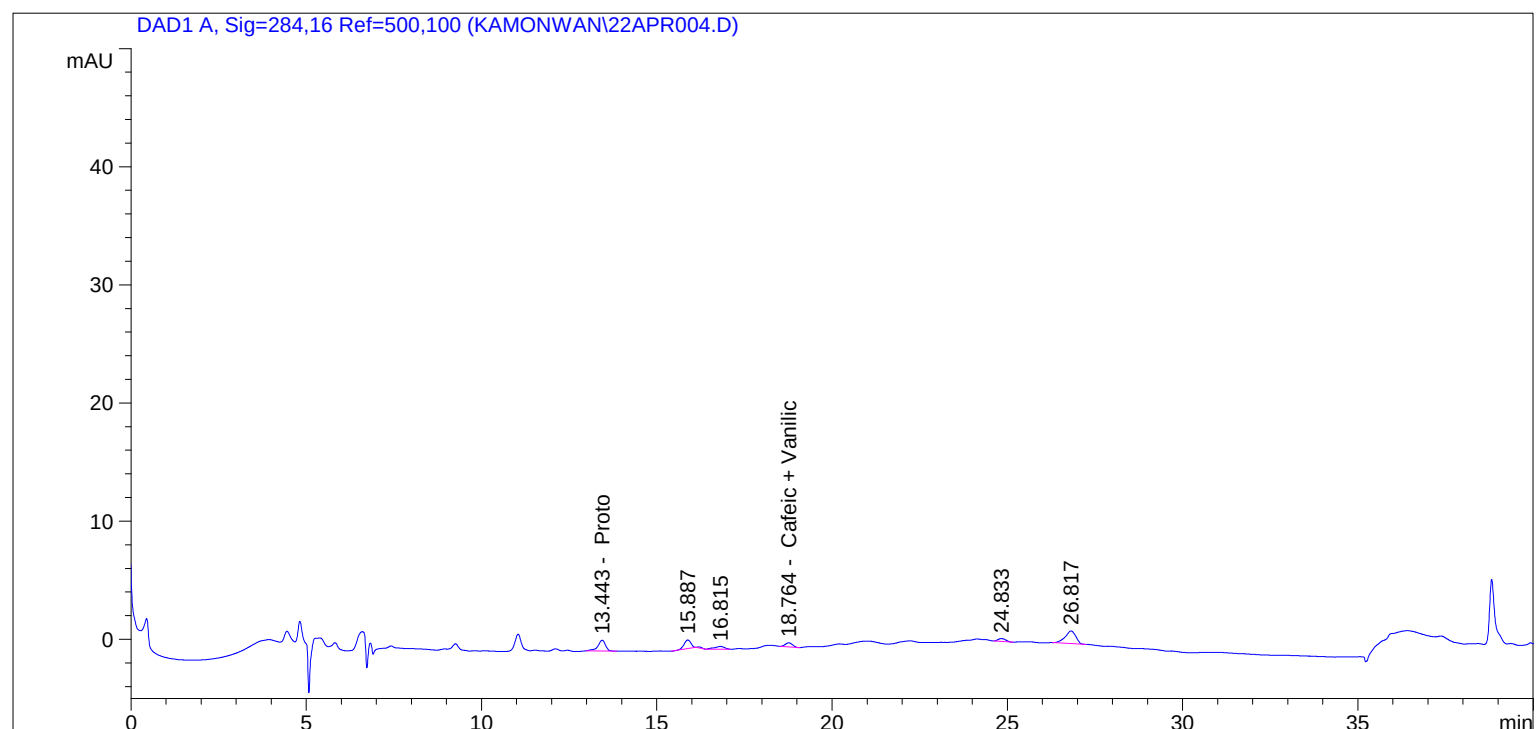
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

=====

```
=====
Injection Date   : 4/22/2013 11:58:33 AM      Seq. Line :    4
Sample Name     : IMFA FPA                  Location  : Vial 4
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:25:55 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.443	BB	14.23612	1.82208e-2	2.59393e-1		Proto
17.648		-	-	-		m-Hydroxy
18.764	BB	4.97848	6.33781e-3	3.15527e-2		Cafeic + Vanilic
19.683		-	-	-		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 2.90946e-1

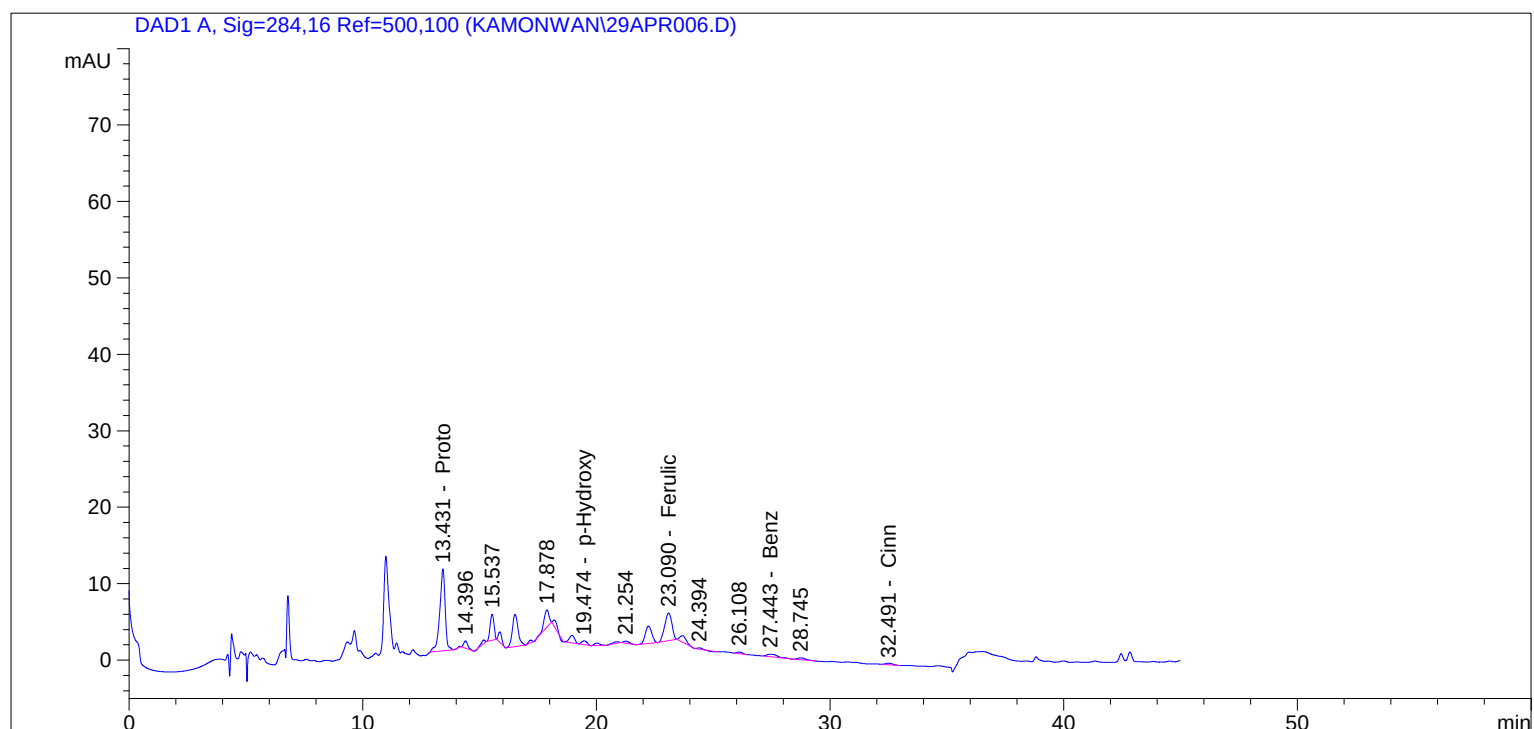
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```



```
=====
Injection Date   : 4/29/2013 1:39:30 PM      Seq. Line   :    6
Sample Name      : IMFA LIB EST B            Location      : Vial 6
Acq. Operator    : kamonwan                  Inj           :    1
Acq. Instrument  : Instrument 1              Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/29/2013 2:28:07 PM by kamonwan
                  (modified after loading)
=====
```



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=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.431	BB	171.50136	1.82208e-2	3.12489		Proto
17.187	BB	3.78461	4.63455e-2	1.75400e-1		m-Hydroxy
18.197	BB	8.48020	6.33781e-3	5.37459e-2		Cafeic + Vanilic
19.474	BB	8.51142	4.84779e-2	4.12615e-1		p-Hydroxy
22.225	BB +	44.35722	5.70136e-3	2.52896e-1		p-Coum
23.090	BB +	78.06625	1.28536e-2	1.00343		Ferulic
23.677	BB +	15.54539	7.45529e-2	1.15895		Veratric
27.443	BB +	10.21800	1.20492e-1	1.23119		Benz
32.491	BB +	4.15948	4.04527e-3	1.68262e-2		Cinn

Totals : 7.42995

Results obtained with enhanced integrator!

1 Warnings or Errors :

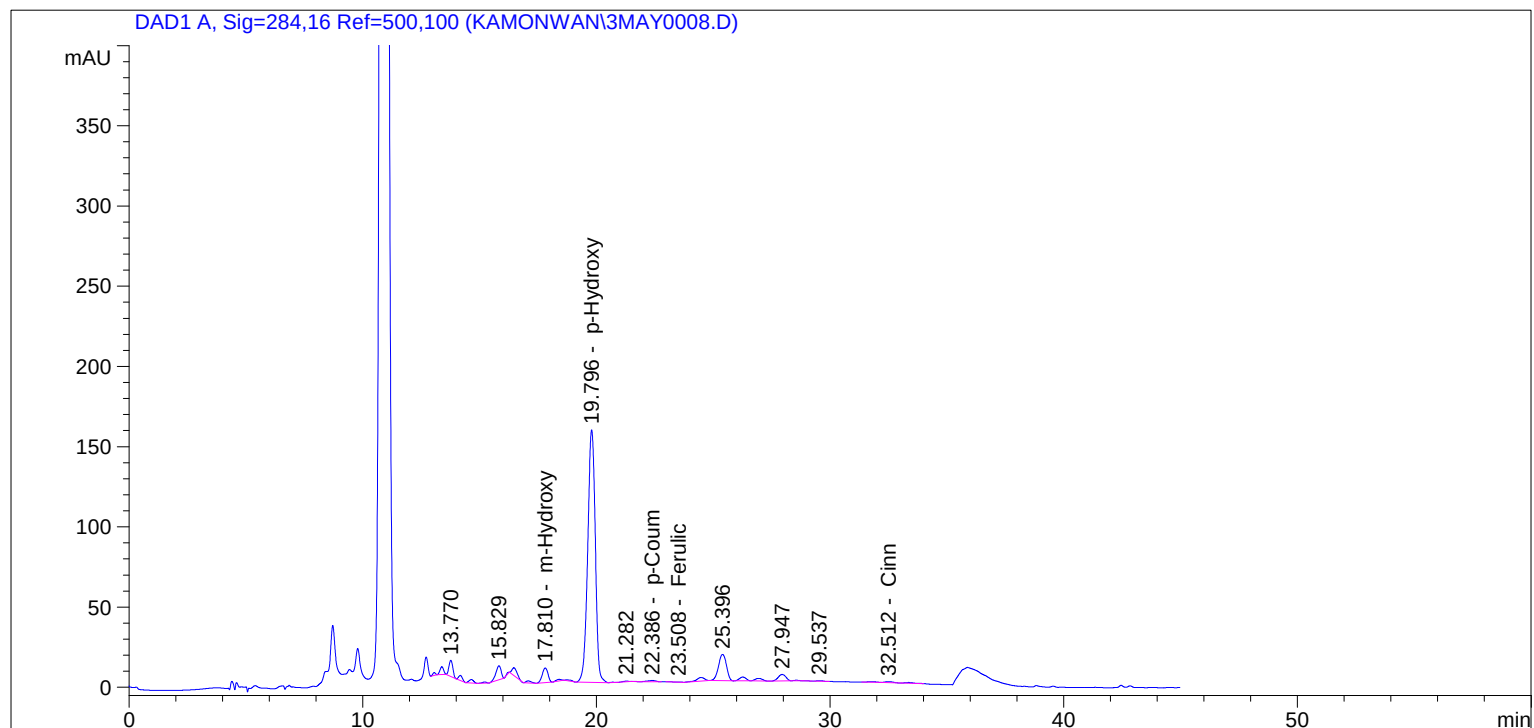
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 5/3/2013 2:56:14 PM	Seq. Line	: 8
Sample Name	: IMFA LIB GLY B	Location	: Vial 8
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	5/3/2013 3:12:22 PM by Kamonwan		
	(modified after loading)		

=====



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.386	BB	53.39045	1.82208e-2	9.72816e-1		Proto
17.810	BB	156.15047	4.63455e-2	7.23687		m-Hydroxy
18.402	BB	15.99349	6.33781e-3	1.01364e-1		Cafeic + Vanilic
19.796	BB	3534.87842	4.84779e-2	171.36343		p-Hydroxy
22.386	BB +	22.06208	5.70136e-3	1.25784e-1		p-Coum
23.508	BB +	1.40493	1.28536e-2	1.80584e-2		Ferulic
23.993		-	-	-		Veratric
26.942	BB +	35.57846	1.20492e-1	4.28693		Benz
32.512	BB +	13.21047	4.04527e-3	5.34400e-2		Cinn

Totals : 184.15870

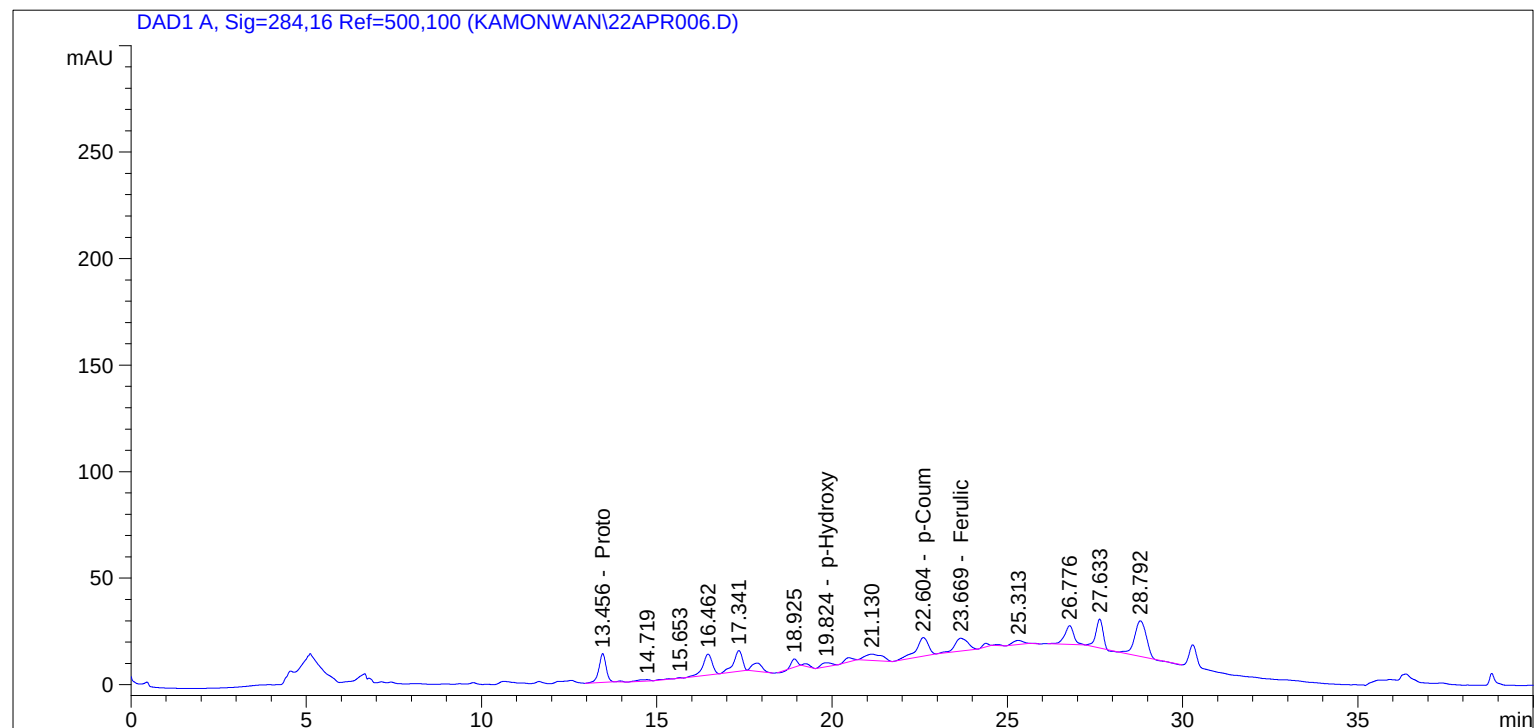
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

```
=====
Injection Date   : 4/22/2013 1:31:12 PM      Seq. Line   :    6
Sample Name     : IMFG FPA                  Location    : Vial 6
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:33:59 PM by kamonwan
                  (modified after loading)
=====
```



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=====
External Standard Report
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```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.456	BB	192.11533	1.82208e-2	3.50049		Proto
17.861	BB	75.97904	4.63455e-2	3.52129		m-Hydroxy
18.524		-	-	-		Cafeic + Vanilic
19.824	BB	38.15466	4.84779e-2	1.84966		p-Hydroxy
22.604	BB +	212.34857	5.70136e-3	1.21067		p-Coum
23.669	BB +	154.89079	1.28536e-2	1.99091		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 12.07302

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

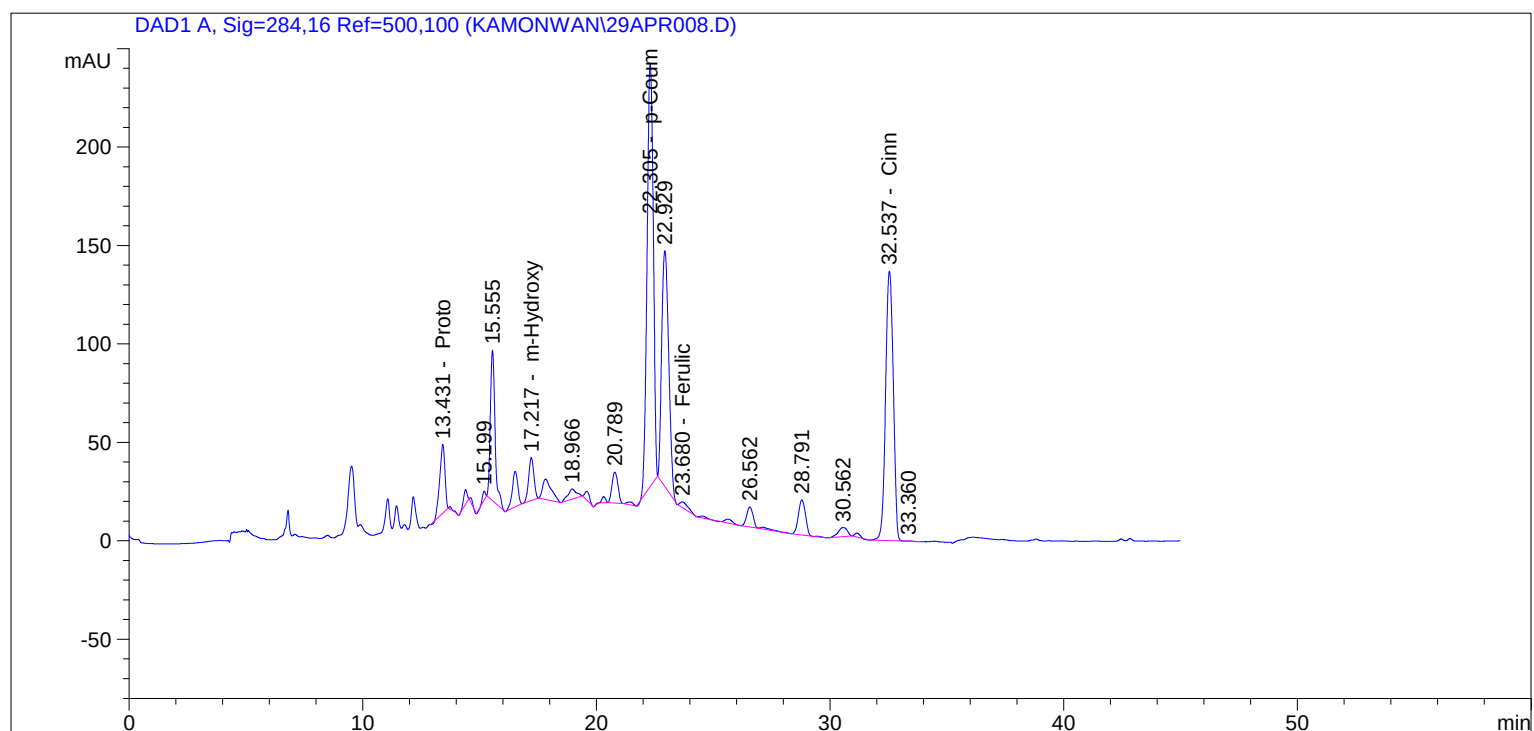
```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/29/2013 3:12:13 PM	Seq. Line	: 8
Sample Name	: IMFG LIB EST B	Location	: Vial 8
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/29/2013 9:46:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/29/2013 4:00:58 PM by kamonwan		

(modified after loading)

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.431	BB	537.81970	1.82208e-2	9.79950		Proto
17.217	BB	342.05045	4.63455e-2	15.85251		m-Hydroxy
18.278		-	-	-		Cafeic + Vanilic
19.590	BB	61.08078	4.84779e-2	2.96107		p-Hydroxy
22.305	BB +	3985.52588	5.70136e-3	22.72290		p-Coum
23.680	BB +	73.83821	1.28536e-2	9.49088e-1		Ferulic
23.993		-	-	-		Veratric
27.104	BB +	26.07581	1.20492e-1	3.14193		Benz
32.537	BB +	3123.07397	4.04527e-3	12.63369		Cinn

Totals : 68.06068

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

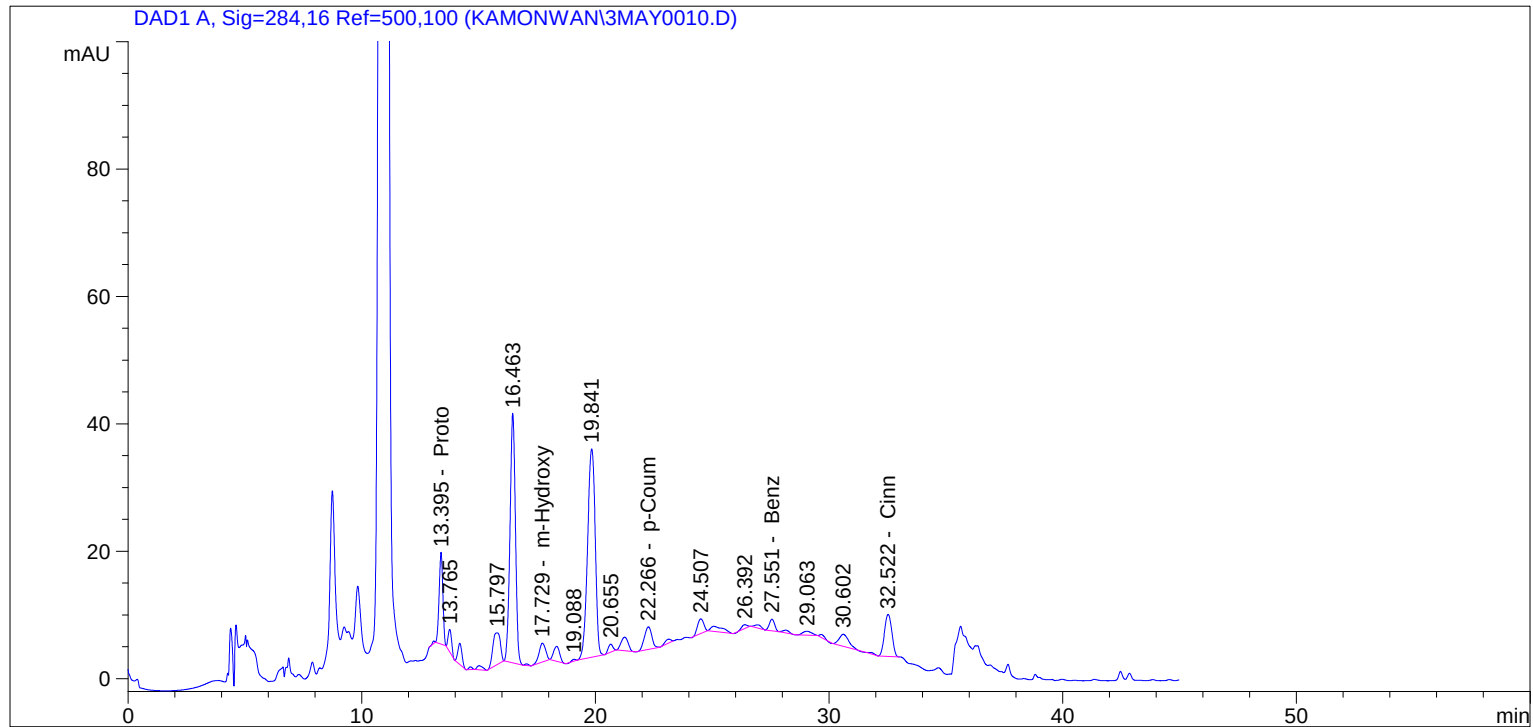
*** End of Report ***

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=====

Injection Date	: 5/3/2013 4:28:56 PM	Seq. Line	: 10
Sample Name	: IMFG LIB GLY B	Location	: Vial 10
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	5/3/2013 6:12:47 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.395	BB	159.81216	1.82208e-2	2.91190		Proto
17.729	BB	56.97662	4.63455e-2	2.64061		m-Hydroxy
18.340	BB	41.60007	6.33781e-3	2.63653e-1		Cafeic + Vanilic
19.479		-	-	-		p-Hydroxy
22.266	BB +	78.48304	5.70136e-3	4.47460e-1		p-Coum
23.140	BB +	10.34671	1.28536e-2	1.32993e-1		Ferulic
23.993		-	-	-		Veratric
27.551	BB +	28.14247	1.20492e-1	3.39095		Benz
32.522	BB +	144.97874	4.04527e-3	5.86479e-1		Cinn

Totals : 10.37405

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

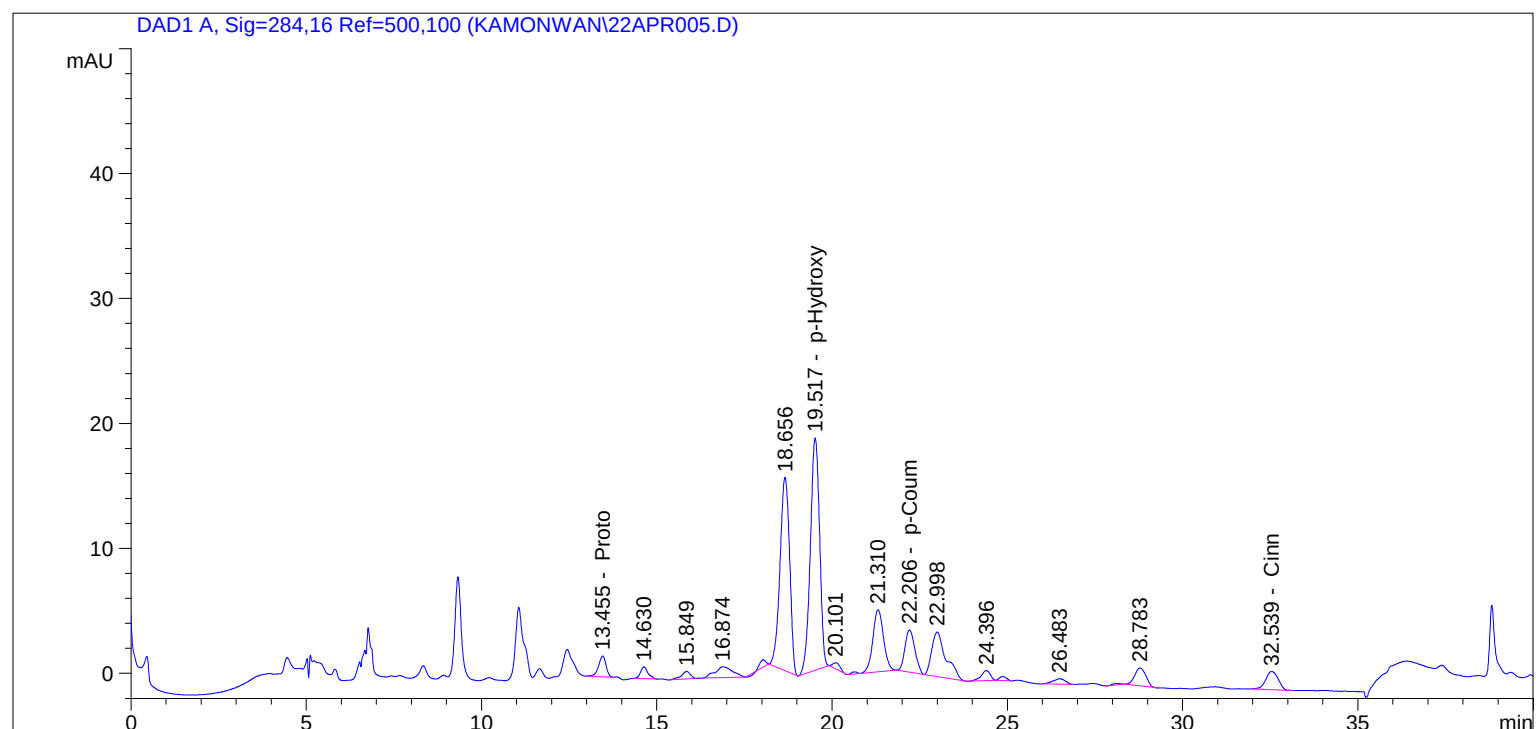
*** End of Report ***

=====

```

=====
Injection Date   : 4/22/2013 12:44:53 PM      Seq. Line :    5
Sample Name     : IMMM FPA                  Location  : Vial 5
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/22/2013 9:14:27 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 1:28:36 PM by kamonwan
                  (modified after loading)
=====

```



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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.455	BB	24.82915	1.82208e-2	4.52407e-1		Proto
17.418		-	-	-		m-Hydroxy
18.029	BB	5.89889	6.33781e-3	3.73861e-2		Cafeic + Vanilic
19.517	BB	341.61316	4.84779e-2	16.56068		p-Hydroxy
22.206	BB +	66.69849	5.70136e-3	3.80272e-1		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.539	BB +	35.78901	4.04527e-3	1.44776e-1		Cinn

Totals : 17.57552

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

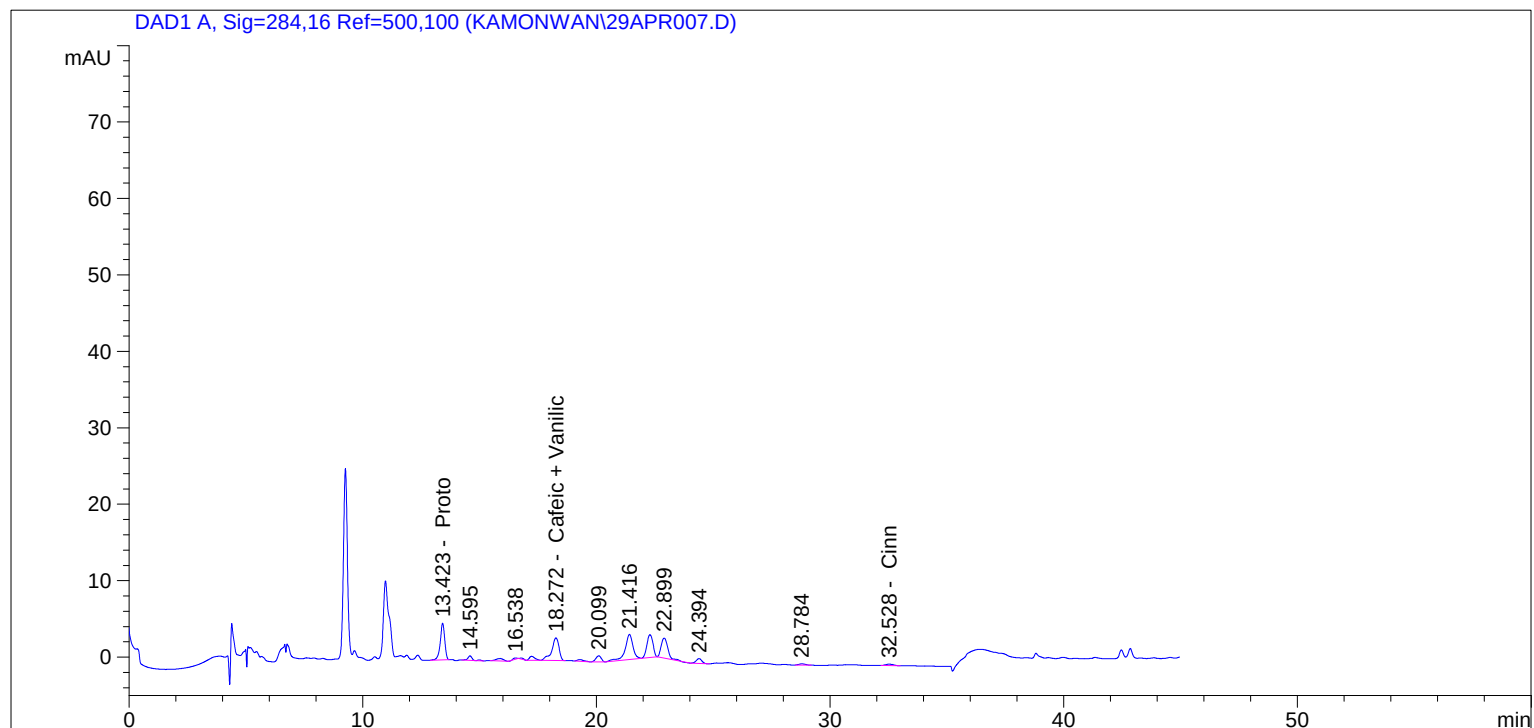
=====
*** End of Report ***
=====

```

=====

Injection Date	: 4/29/2013 2:25:52 PM	Seq. Line	: 7
Sample Name	: IMMM LIB EST B	Location	: Vial 7
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/29/2013 9:46:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/29/2013 3:12:32 PM by kamonwan		
	(modified after loading)		

=====



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.423	BB	64.10122	1.82208e-2	1.16797		Proto
17.226	BB	8.86318	4.63455e-2	4.10769e-1		m-Hydroxy
18.272	BB	64.83802	6.33781e-3	4.10931e-1		Cafeic + Vanilic
19.312	BB	3.99241	4.84779e-2	1.93544e-1		p-Hydroxy
22.292	BB +	53.22908	5.70136e-3	3.03478e-1		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.528	BB +	4.04344	4.04527e-3	1.63568e-2		Cinn

Totals : 2.50305

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

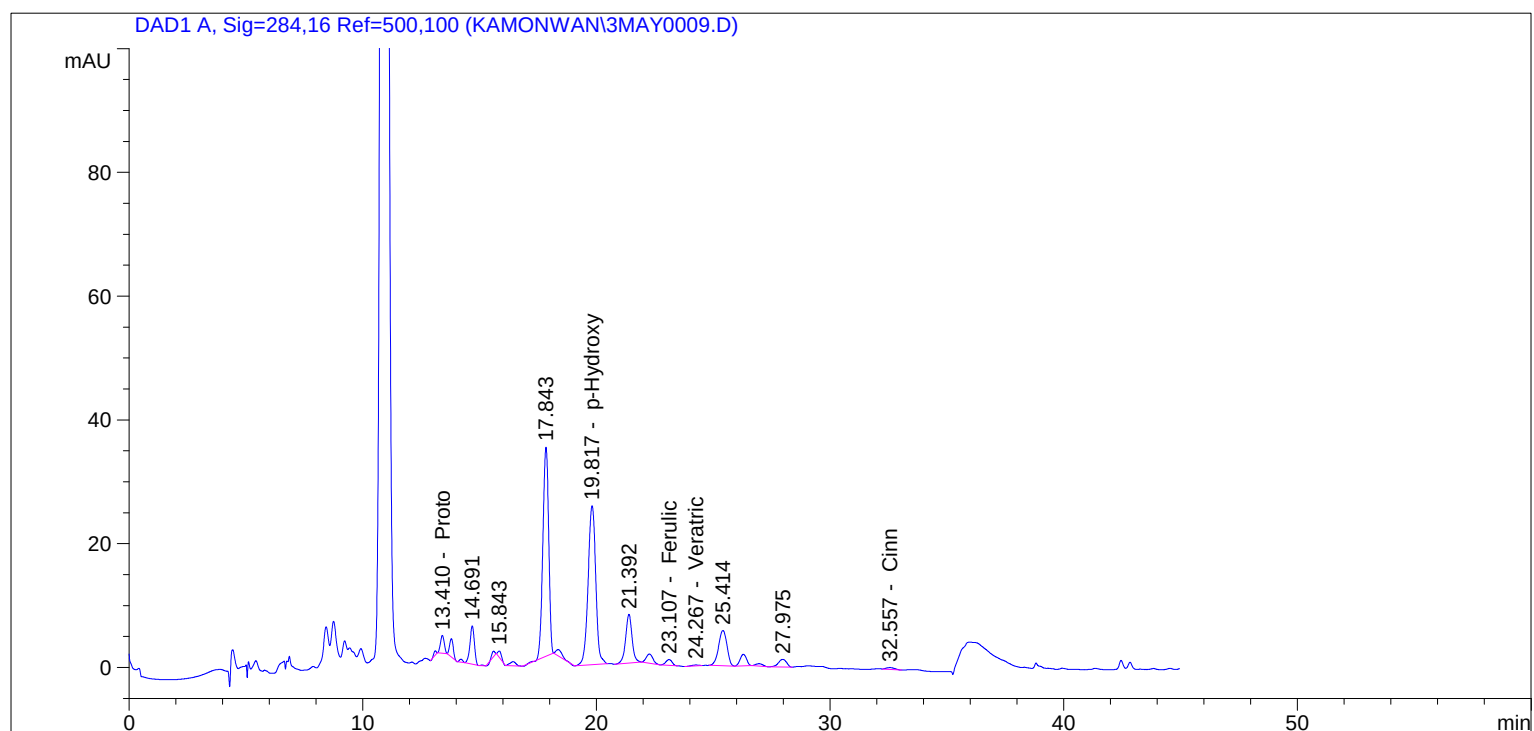
*** End of Report ***

=====

```

=====
Injection Date   : 5/3/2013 3:42:34 PM      Seq. Line :    9
Sample Name     : IMMM LIB GLY B           Location  : Vial 9
Acq. Operator   : Kamonwan                 Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/3/2013 9:29:49 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/3/2013 4:31:24 PM by Kamonwan
                  (modified after loading)
=====

```



```

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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.410	BB	32.70928	1.82208e-2	5.95989e-1		Proto
17.464		-	-	-		m-Hydroxy
18.362	BB	18.27185	6.33781e-3	1.15804e-1		Cafeic + Vanilic
19.817	BB	584.89288	4.84779e-2	28.35437		p-Hydroxy
22.265	BB +	28.92638	5.70136e-3	1.64920e-1		p-Coum
23.107	BB +	17.13949	1.28536e-2	2.20305e-1		Ferulic
24.267	BB +	3.26373	7.45529e-2	2.43320e-1		Veratric
26.963	BB +	8.07489	1.20492e-1	9.72962e-1		Benz
32.557	BB +	7.34949	4.04527e-3	2.97307e-2		Cinn

Totals : 30.69740

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

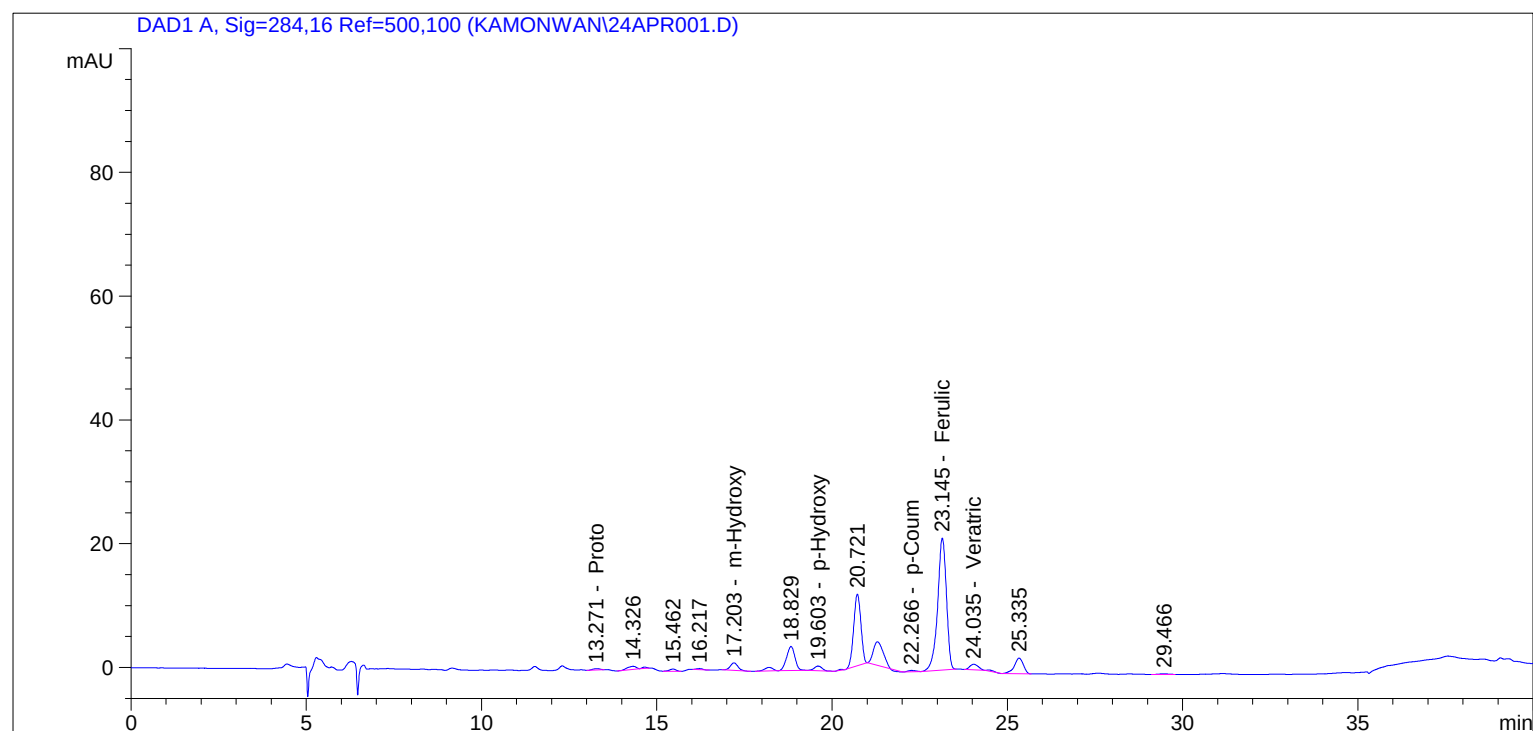
```



```

=====
Injection Date   : 4/24/2013 8:17:25 AM      Seq. Line   :    1
Sample Name     : IMMY FPA                  Location    : Vial 1
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1               Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 9:26:50 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.271	BB	3.13358	1.82208e-2	5.70963e-2		Proto
17.203	BB	18.70602	4.63455e-2	8.66940e-1		m-Hydroxy
18.201	BB	9.54310	6.33781e-3	6.04824e-2		Cafeic + Vanilic
19.603	BB	11.63784	4.84779e-2	5.64178e-1		p-Hydroxy
22.266	BB +	3.22070	5.70136e-3	1.83624e-2		p-Coum
23.145	BB +	371.03851	1.28536e-2	4.76919		Ferulic
24.035	BB +	15.40922	7.45529e-2	1.14880		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 7.48505

Results obtained with enhanced integrator!
 2 Warnings or Errors :

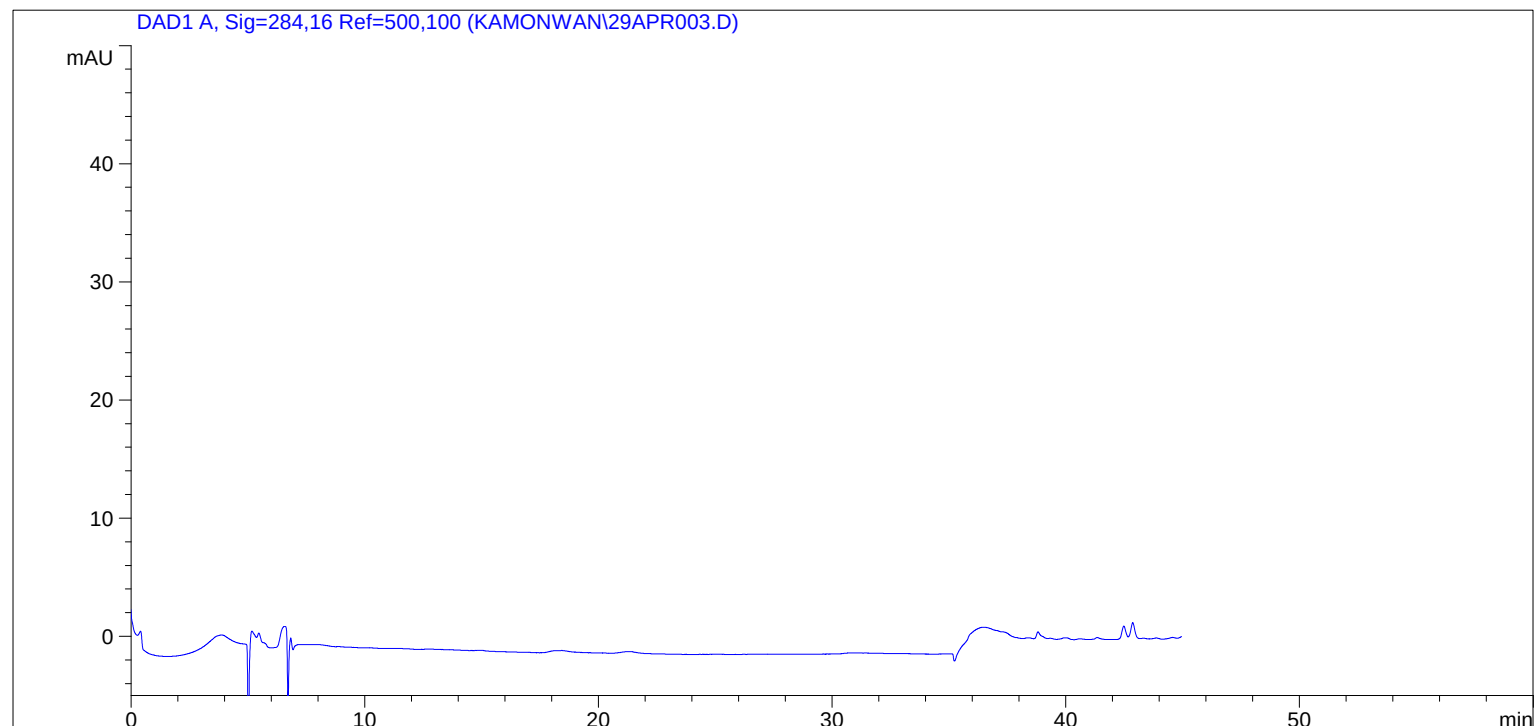
Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/29/2013 11:20:28 AM      Seq. Line :    3
Sample Name     : IMMY LIB EST B              Location  : Vial 3
Acq. Operator   : kamonwan                    Inj       :    1
Acq. Instrument : Instrument 1                 Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/29/2013 12:07:00 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.618	-	-	-	-	-	Proto
17.648	-	-	-	-	-	m-Hydroxy
18.437	-	-	-	-	-	Cafeic + Vanilic
19.683	-	-	-	-	-	p-Hydroxy
22.499	-	-	-	-	-	p-Coum
23.381	-	-	-	-	-	Ferulic
23.993	-	-	-	-	-	Veratric
27.223	-	-	-	-	-	Benz
32.718	-	-	-	-	-	Cinn

Totals : 0.00000

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
```

```
=====
Injection Date   : 4/29/2013 11:20:28 AM      Seq. Line :    3
Sample Name      : IMMY LIB EST B             Location  : Vial 3
Acq. Operator    : kamonwan                   Inj       :    1
Acq. Instrument  : Instrument 1                Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/29/2013 12:07:00 PM by kamonwan
                  (modified after loading)
=====
```

```
=====
                          Area Percent Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618		0.0000	0.00000	0.0000	Proto
2	17.648		0.0000	0.00000	0.0000	m-Hydroxy
3	18.437		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.683		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 0.00000 0.0000

Results obtained with enhanced integrator!

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

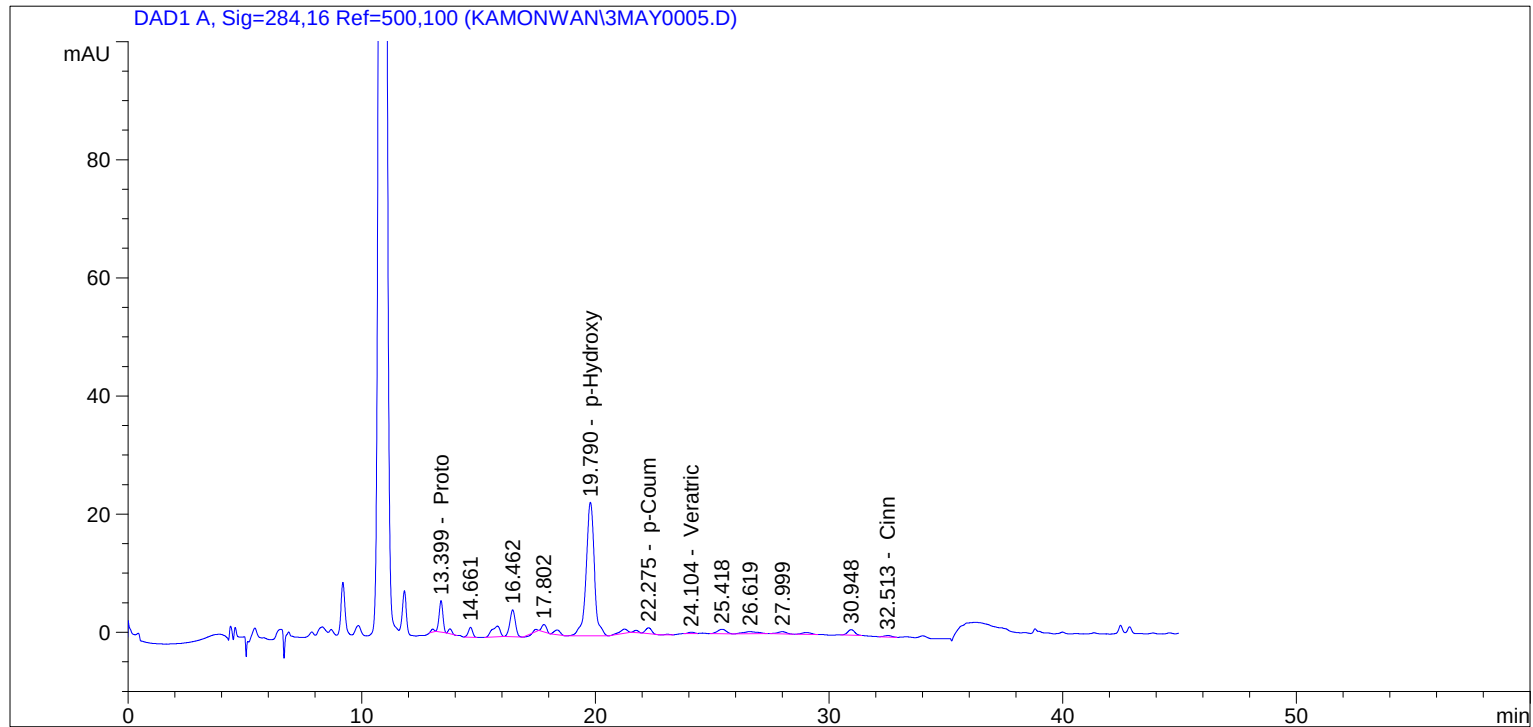
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 5/3/2013 12:37:06 PM	Seq. Line	: 5
Sample Name	: IMMY LIB GLY B	Location	: Vial 5
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/3/2013 3:10:37 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.399	BB	59.81185	1.82208e-2	1.08982		Proto
17.460	BB	1.09414	4.63455e-2	5.07083e-2		m-Hydroxy
18.358	BB	14.76704	6.33781e-3	9.35907e-2		Cafeic + Vanilic
19.790	BB	552.38220	4.84779e-2	26.77832		p-Hydroxy
22.275	BB +	17.89761	5.70136e-3	1.02041e-1		p-Coum
23.113	BB +	1.61710	1.28536e-2	2.07856e-2		Ferulic
24.104	BB +	3.87541	7.45529e-2	2.88923e-1		Veratric
27.223		-	-	-		Benz
32.513	BB +	5.32198	4.04527e-3	2.15289e-2		Cinn

Totals : 28.44572

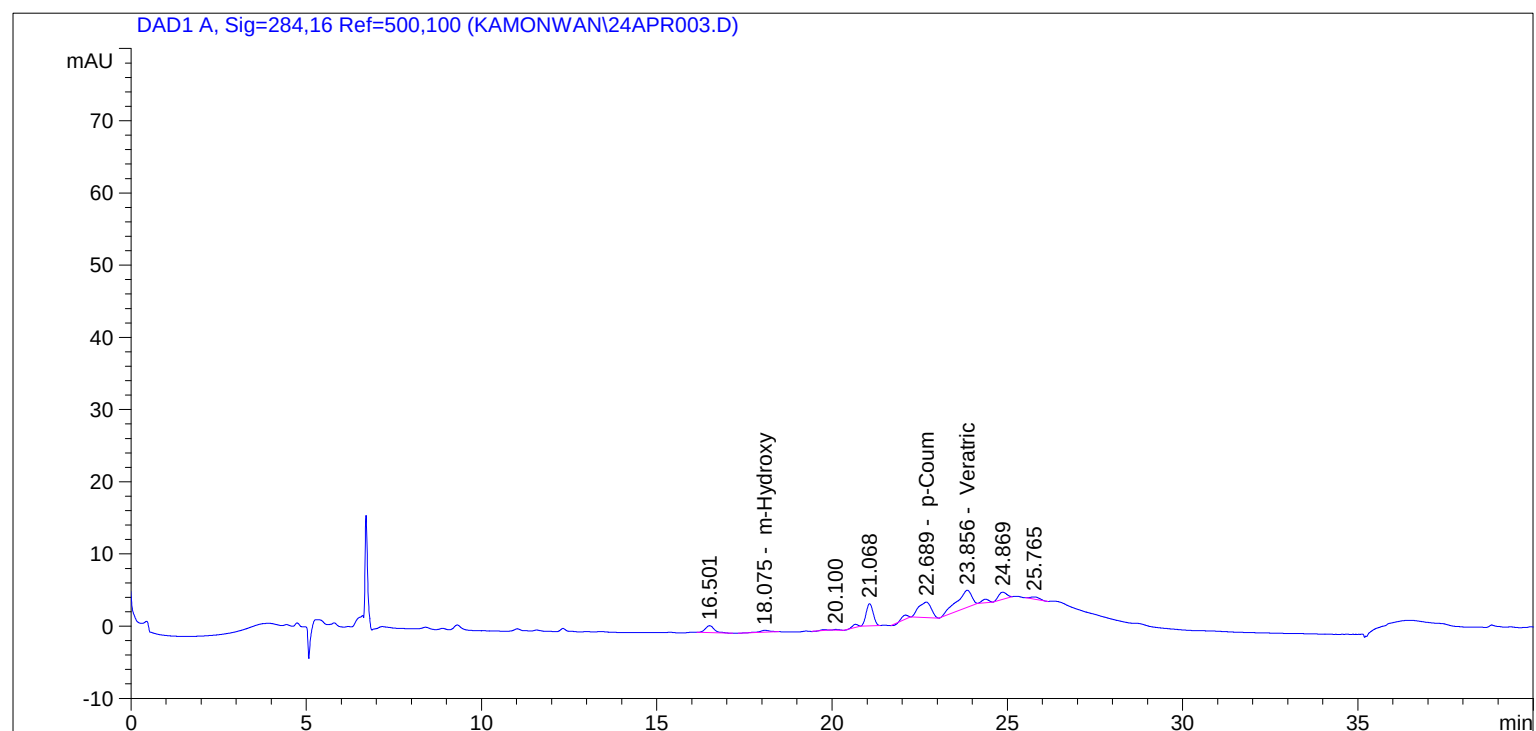
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

```
=====
Injection Date   : 4/24/2013 9:50:03 AM      Seq. Line   :    3
Sample Name     : IMPA FPA                  Location    : Vial 3
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 10:38:56 AM by kamonwan
                  (modified after loading)
=====
```



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=====
External Standard Report
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```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.733		-	-	-		Proto
18.075	BB	5.65693	4.63455e-2	2.62174e-1		m-Hydroxy
18.593		-	-	-		Cafeic + Vanilic
19.780	BB	1.56733	4.84779e-2	7.59807e-2		p-Hydroxy
22.689	BB +	53.63840	5.70136e-3	3.05812e-1		p-Coum
23.381		-	-	-		Ferulic
23.856	BB +	73.40296	7.45529e-2	5.47240		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 6.11637

Results obtained with enhanced integrator!
2 Warnings or Errors :

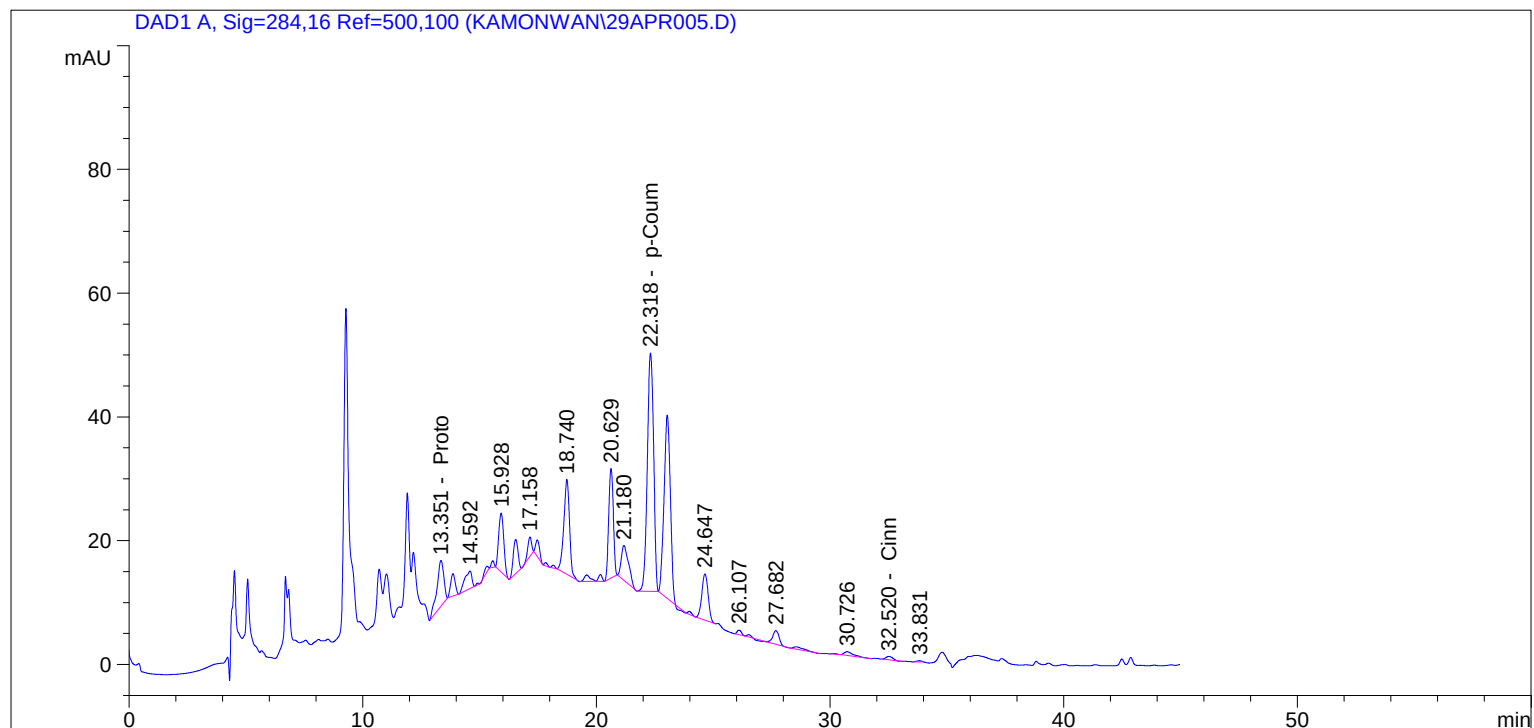
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/29/2013 12:53:09 PM	Seq. Line	: 5
Sample Name	: IMPA LIB EST B	Location	: Vial 5
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/29/2013 9:46:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/29/2013 1:48:40 PM by kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.351	BB	150.90640	1.82208e-2	2.74963		Proto
17.472	BB	31.21199	4.63455e-2	1.44654		m-Hydroxy
18.157	BB	4.29382	6.33781e-3	2.72134e-2		Cafeic + Vanilic
19.590	BB	18.74704	4.84779e-2	9.08817e-1		p-Hydroxy
22.318	BB +	718.43842	5.70136e-3	4.09607		p-Coum
23.035	BB +	551.79419	1.28536e-2	7.09255		Ferulic
23.973	BB +	6.33718	7.45529e-2	4.72455e-1		Veratric
27.223		-	-	-		Benz
32.520	BB +	11.52760	4.04527e-3	4.66323e-2		Cinn

Totals : 16.83991

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

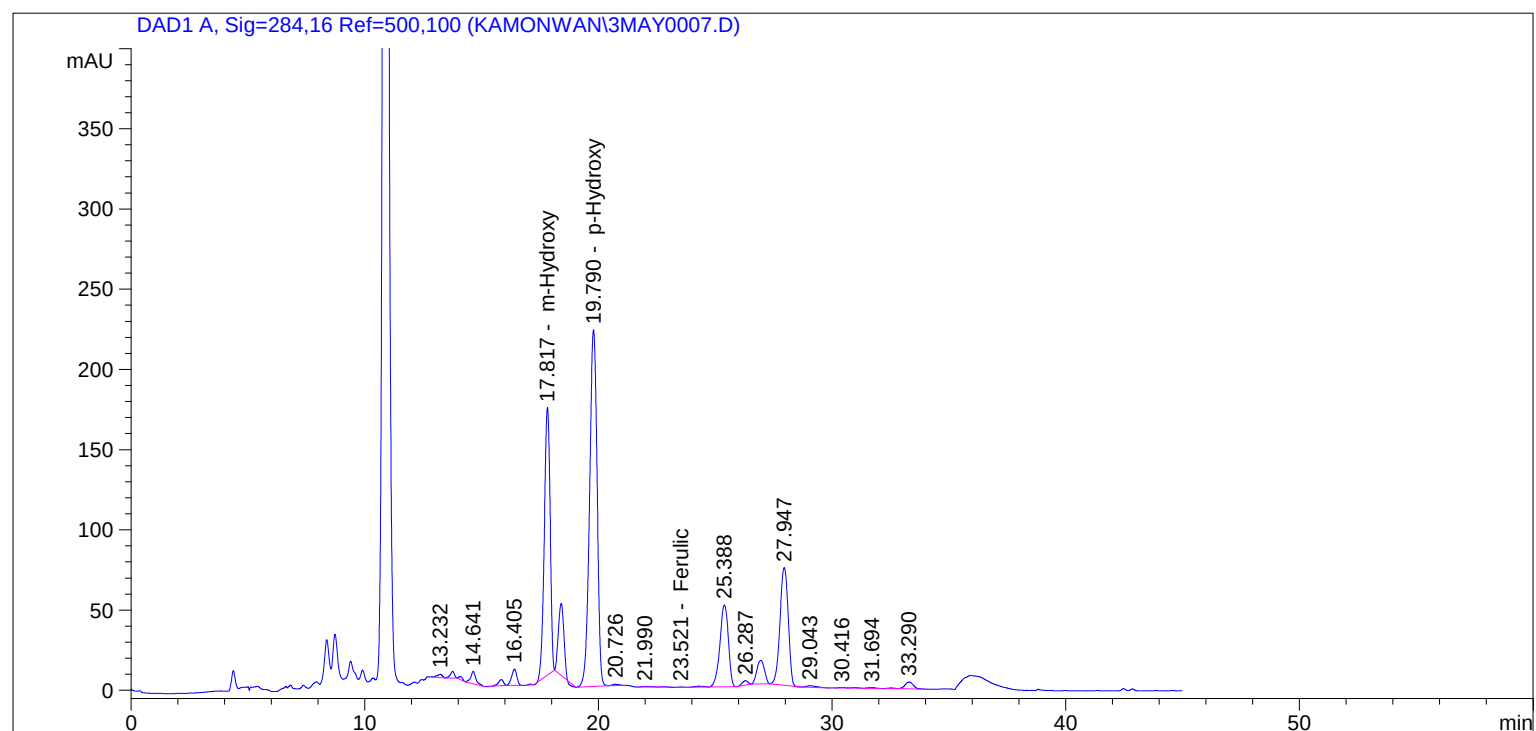
=====

*** End of Report ***

=====

Injection Date	: 5/3/2013 2:09:48 PM	Seq. Line	: 7
Sample Name	: IMPA LIB GLY B	Location	: Vial 7
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	5/3/2013 3:12:22 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.762	BB	49.91373	1.82208e-2	9.09467e-1		Proto
17.817	BB	2896.99243	4.63455e-2	134.26263		m-Hydroxy
18.404	BB	710.42603	6.33781e-3	4.50254		Cafeic + Vanilic
19.790	BB	4965.27441	4.84779e-2	240.70600		p-Hydroxy
22.809	BB +	2.80174	5.70136e-3	1.59737e-2		p-Coum
23.521	BB +	2.14691	1.28536e-2	2.75956e-2		Ferulic
24.298	BB +	16.09723	7.45529e-2	1.20009		Veratric
26.940	BB +	334.85693	1.20492e-1	40.34766		Benz
32.513	BB +	5.47411	4.04527e-3	2.21443e-2		Cinn

Totals : 421.99411

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

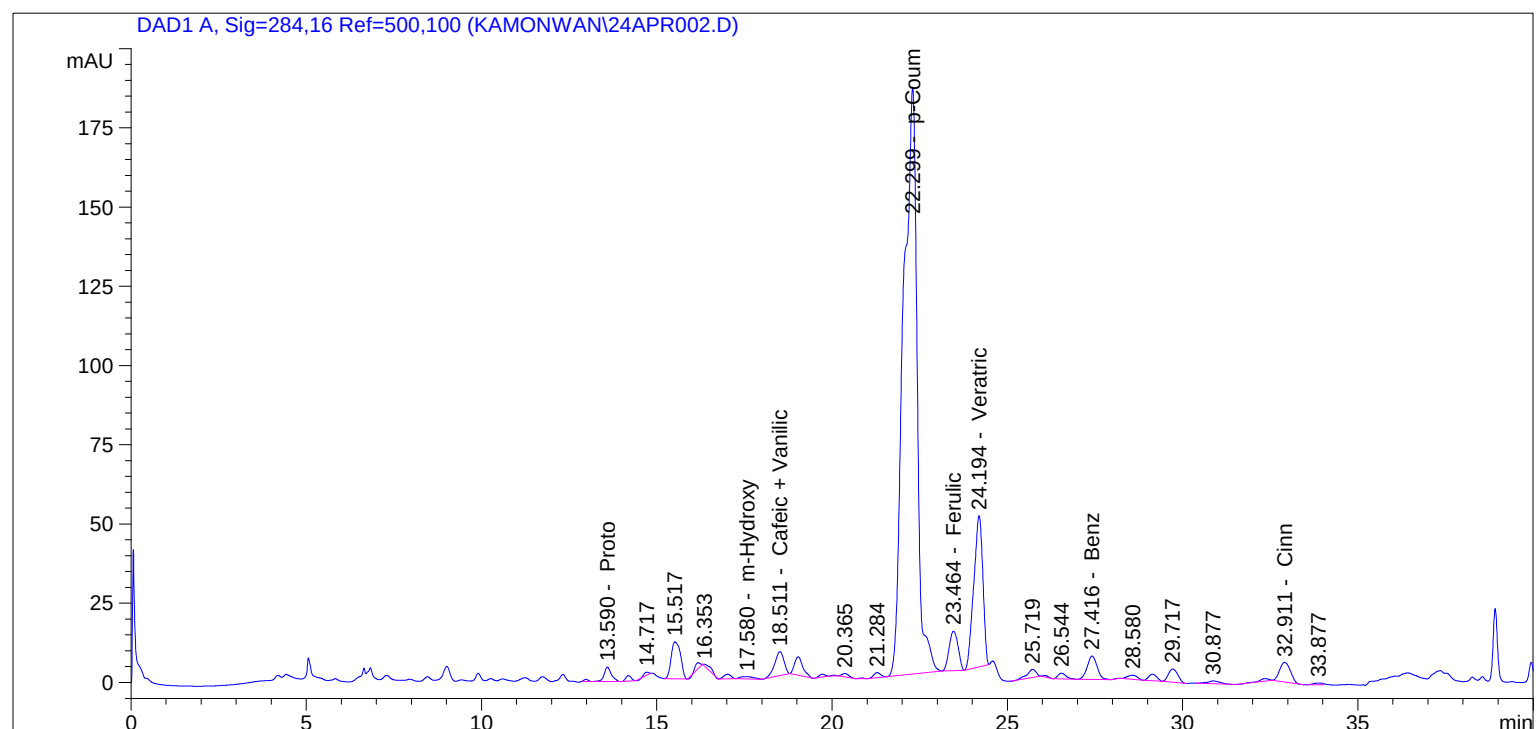
=====

*** End of Report ***

```

=====
Injection Date   : 4/24/2013 9:03:43 AM      Seq. Line   :    2
Sample Name     : IMSO FPA                  Location    : Vial 2
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 9:51:30 AM by kamonwan
                  (modified after loading)
=====

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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.590	BB	66.77206	1.82208e-2	1.21664		Proto
17.580	BB	18.59085	4.63455e-2	8.61603e-1		m-Hydroxy
18.511	BB	138.57788	6.33781e-3	8.78280e-1		Cafeic + Vanilic
19.724	BB	10.81172	4.84779e-2	5.24129e-1		p-Hydroxy
22.299	BB +	5011.09619	5.70136e-3	28.57004		p-Coum
23.464	BB +	222.84592	1.28536e-2	2.86438		Ferulic
24.194	BB +	862.40369	7.45529e-2	64.29466		Veratric
27.416	BB +	145.32747	1.20492e-1	17.51083		Benz
32.911	BB +	130.38728	4.04527e-3	5.27452e-1		Cinn

Totals : 117.24801

Results obtained with enhanced integrator!
 1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```

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*** End of Report ***
=====

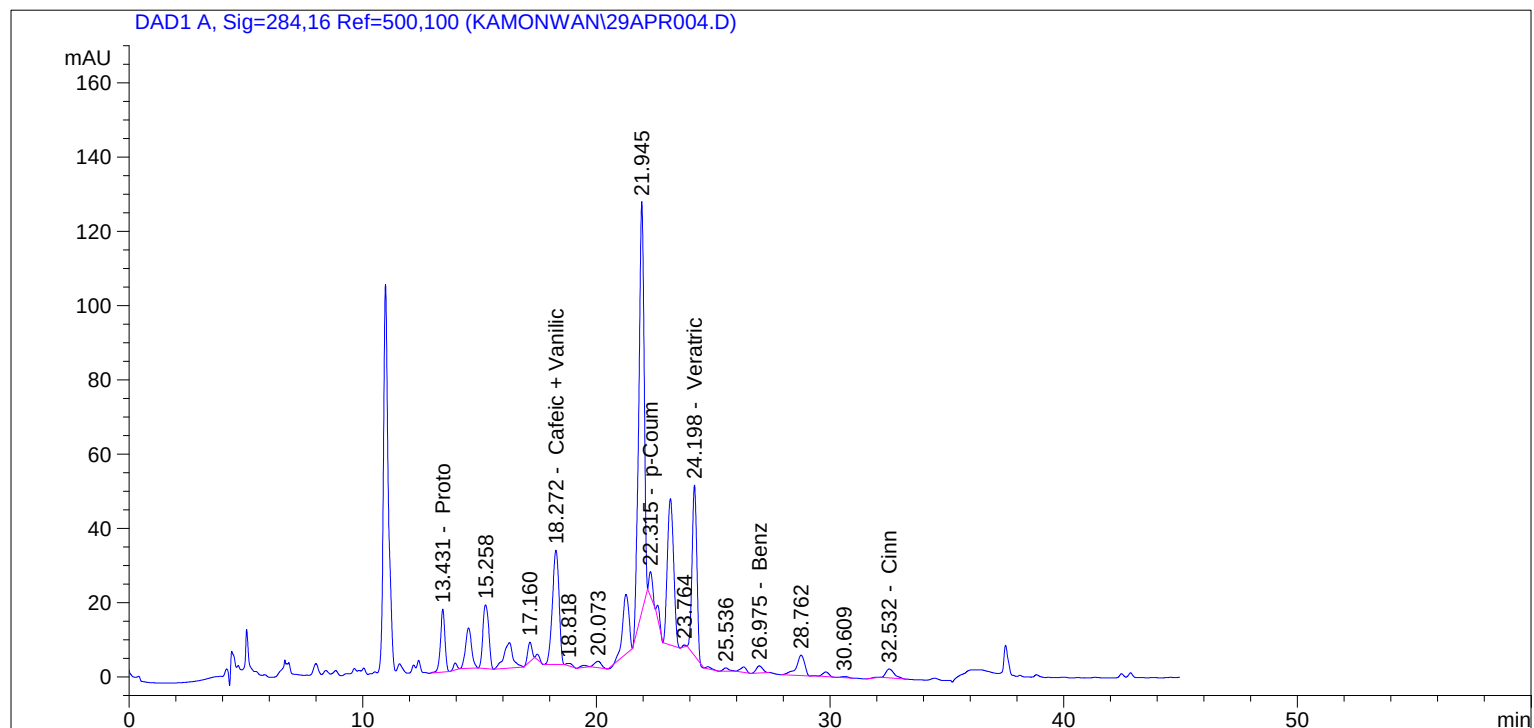
```


=====

Injection Date	: 4/29/2013 12:06:49 PM	Seq. Line	: 4
Sample Name	: IMSO LIB EST B	Location	: Vial 4
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/29/2013 9:46:46 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/29/2013 1:36:31 PM by kamonwan		

(modified after loading)

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.431	BB	222.83896	1.82208e-2	4.06030		Proto
17.473	BB	15.16472	4.63455e-2	7.02817e-1		m-Hydroxy
18.272	BB	608.96606	6.33781e-3	3.85951		Cafeic + Vanilic
19.472	BB	10.22590	4.84779e-2	4.95730e-1		p-Hydroxy
22.315	BB +	67.72712	5.70136e-3	3.86136e-1		p-Coum
23.168	BB +	735.51581	1.28536e-2	9.45404		Ferulic
24.198	BB +	644.33984	7.45529e-2	48.03738		Veratric
26.975	BB +	37.31661	1.20492e-1	4.49636		Benz
32.532	BB +	61.17415	4.04527e-3	2.47466e-1		Cinn

Totals : 71.73974

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

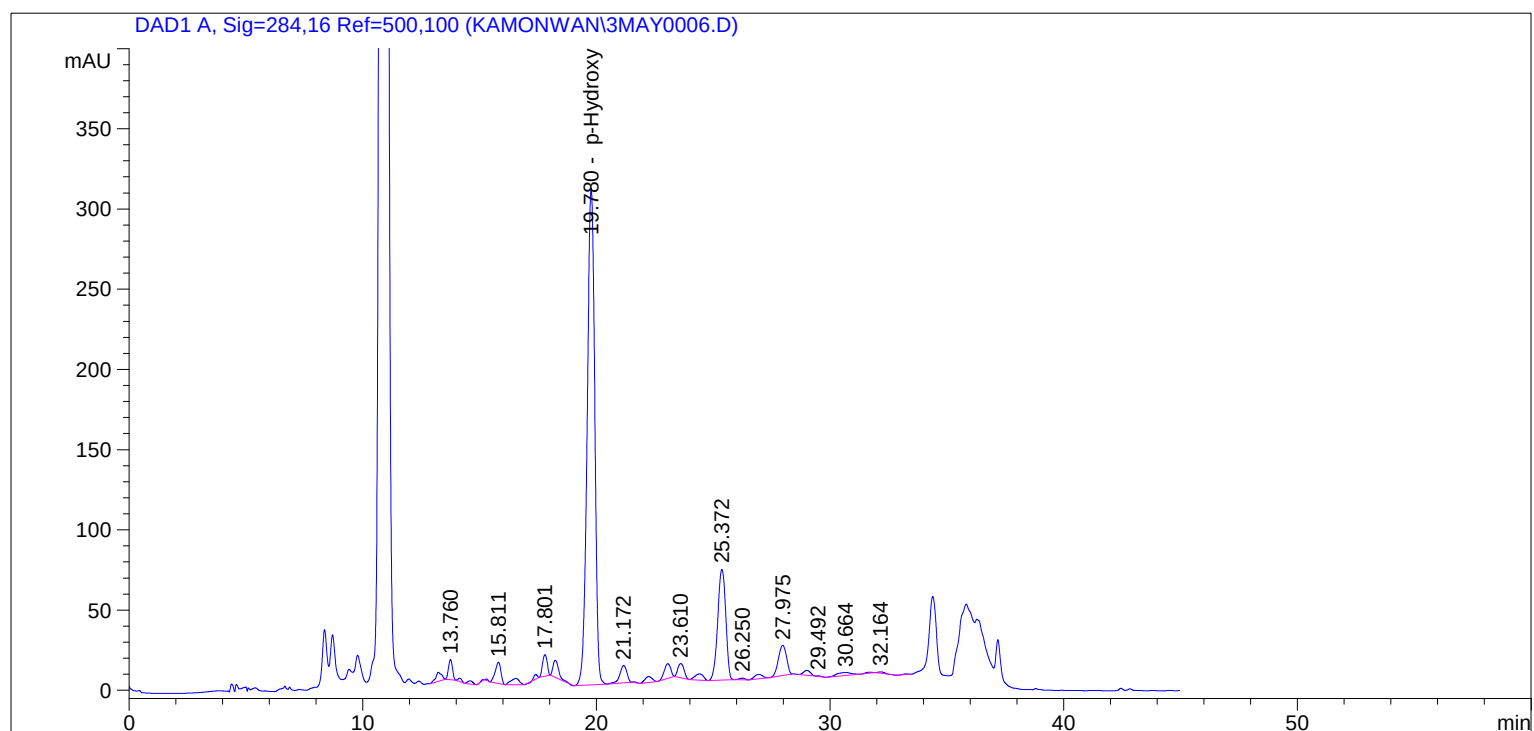
=====

*** End of Report ***

=====

Injection Date	: 5/3/2013 1:23:25 PM	Seq. Line	: 6
Sample Name	: IMSO LIB GLY B	Location	: Vial 6
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/3/2013 9:29:49 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/3/2013 3:12:22 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.241	BB	99.15270	1.82208e-2	1.80664		Proto
17.409	BB	23.98599	4.63455e-2	1.11164		m-Hydroxy
18.247	BB	182.18016	6.33781e-3	1.15462		Cafeic + Vanilic
19.780	BB	6938.64844	4.84779e-2	336.37100		p-Hydroxy
22.240	BB +	77.43149	5.70136e-3	4.41464e-1		p-Coum
23.057	BB +	174.27881	1.28536e-2	2.24011		Ferulic
23.993		-	-	-		Veratric
26.952	BB +	67.70595	1.20492e-1	8.15804		Benz
32.718		-	-	-		Cinn

Totals : 351.28353

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

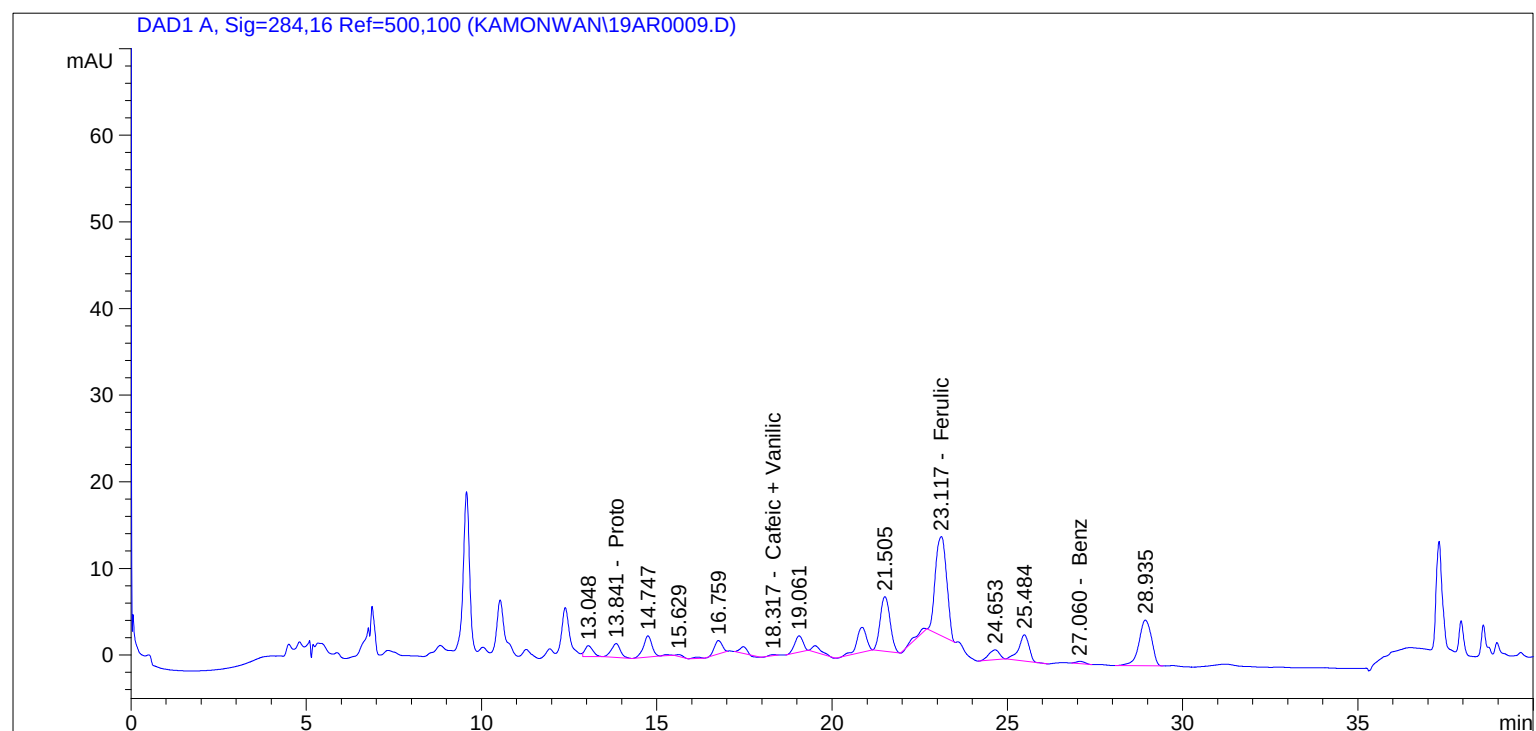
*** End of Report ***

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```

=====
Injection Date   : 4/19/2013 3:46:55 PM      Seq. Line   :    9
Sample Name     : IMTK FPA                  Location    : Vial 9
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 11:26:01 AM by kamonwan
                  (modified after loading)
=====

```



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External Standard Report
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Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.841	BB	28.50631	1.82208e-2	5.19407e-1		Proto
17.468	BB	9.80167	4.63455e-2	4.54264e-1		m-Hydroxy
18.317	BB	1.45392	6.33781e-3	9.21469e-3		Cafeic + Vanilic
19.513	BB	13.67570	4.84779e-2	6.62969e-1		p-Hydroxy
22.619	BB +	9.46167	5.70136e-3	5.39444e-2		p-Coum
23.117	BB +	255.07915	1.28536e-2	3.27869		Ferulic
23.993		-	-	-		Veratric
27.060	BB +	4.38450	1.20492e-1	5.28298e-1		Benz
32.718		-	-	-		Cinn

Totals : 5.50679

Results obtained with enhanced integrator!
 2 Warnings or Errors :

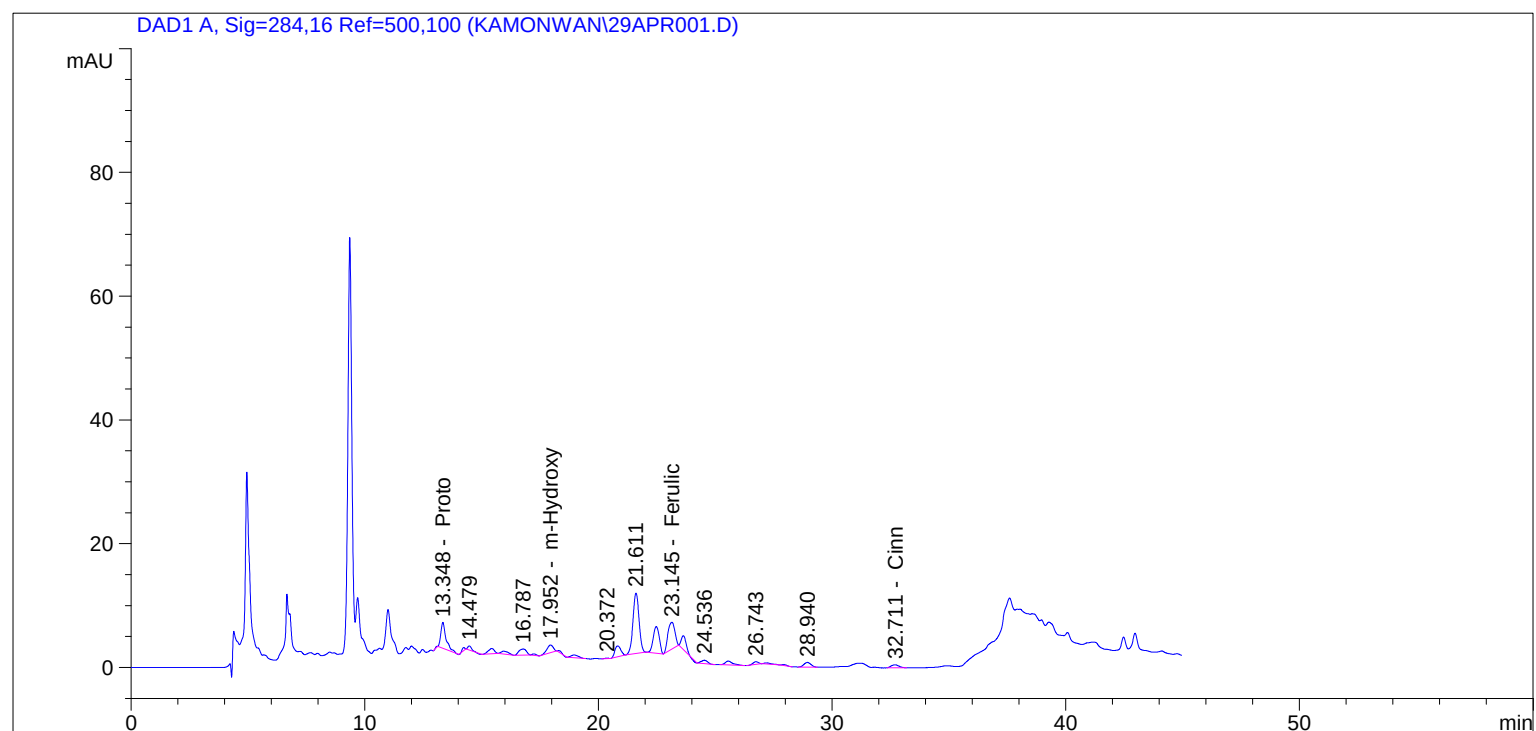
Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/29/2013 9:47:47 AM      Seq. Line :    1
Sample Name      : IMTK LIB EST B            Location  : Vial 1
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/29/2013 9:46:46 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/29/2013 10:35:46 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
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```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.348	BB	65.88834	1.82208e-2	1.20054		Proto
17.952	BB	23.26226	4.63455e-2	1.07810		m-Hydroxy
18.305	BB	2.37708	6.33781e-3	1.50655e-2		Cafeic + Vanilic
19.663		-	-	-		p-Hydroxy
22.476	BB +	77.77547	5.70136e-3	4.43426e-1		p-Coum
23.145	BB +	90.19032	1.28536e-2	1.15927		Ferulic
23.636	BB +	30.13249	7.45529e-2	2.24646		Veratric
27.194	BB +	4.18576	1.20492e-1	5.04352e-1		Benz
32.711	BB +	11.02988	4.04527e-3	4.46189e-2		Cinn

Totals : 6.69184

Results obtained with enhanced integrator!
2 Warnings or Errors :

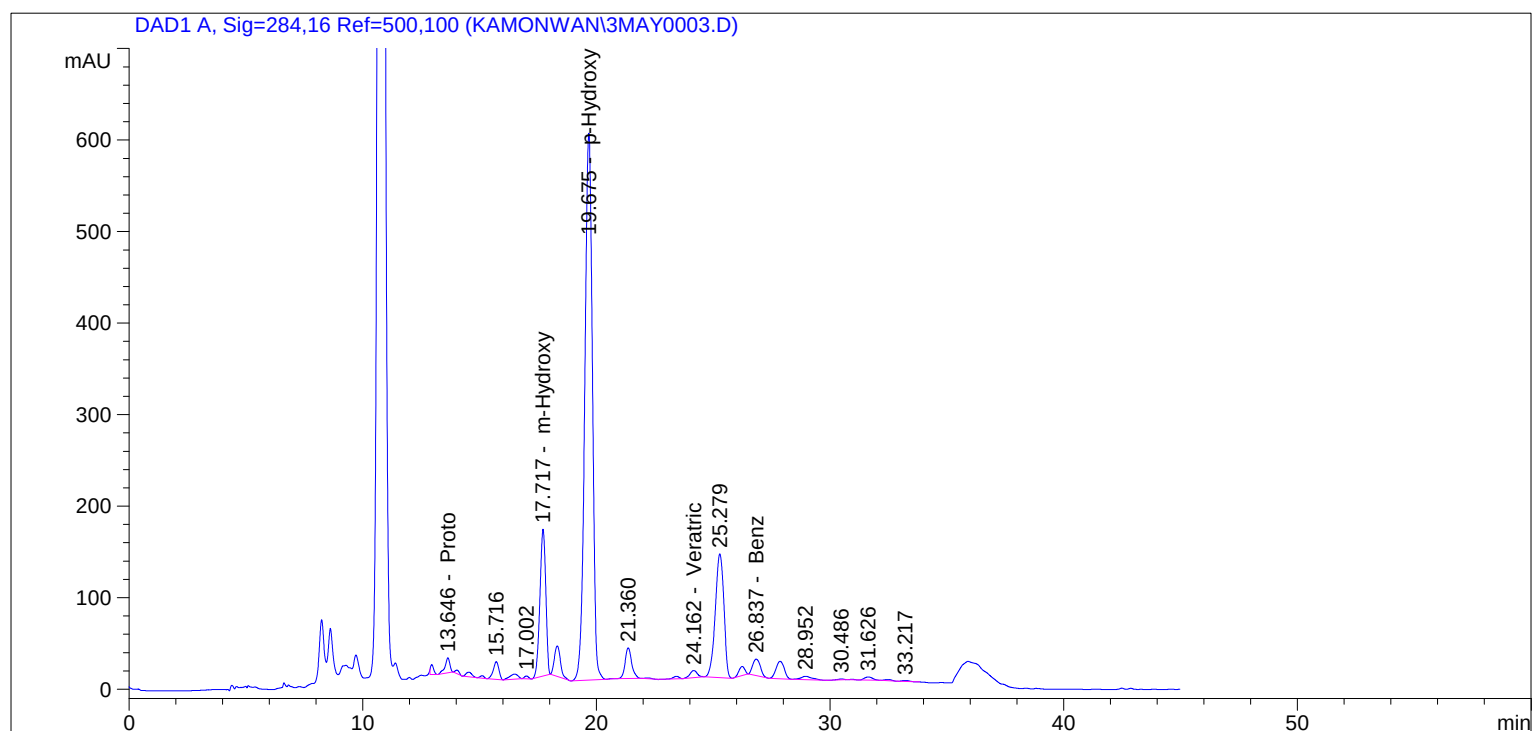
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 5/3/2013 11:04:28 AM      Seq. Line :    3
Sample Name     : IMTK LIB GLY B           Location  : Vial 3
Acq. Operator   : Kamonwan                 Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/3/2013 9:29:49 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/3/2013 3:07:59 PM by Kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.646	BB	243.82634	1.82208e-2	4.44271		Proto
17.717	BB	2806.59302	4.63455e-2	130.07302		m-Hydroxy
18.324	BB	599.49091	6.33781e-3	3.79946		Cafeic + Vanilic
19.675	BB	1.35228e4	4.84779e-2	655.55494		p-Hydroxy
22.199	BB +	16.15531	5.70136e-3	9.21072e-2		p-Coum
23.422	BB +	49.77818	1.28536e-2	6.39830e-1		Ferulic
24.162	BB +	170.26744	7.45529e-2	12.69392		Veratric
26.837	BB +	411.84381	1.20492e-1	49.62398		Benz
32.464	BB +	29.09966	4.04527e-3	1.17716e-1		Cinn

Totals : 857.03768

Results obtained with enhanced integrator!
 1 Warnings or Errors :

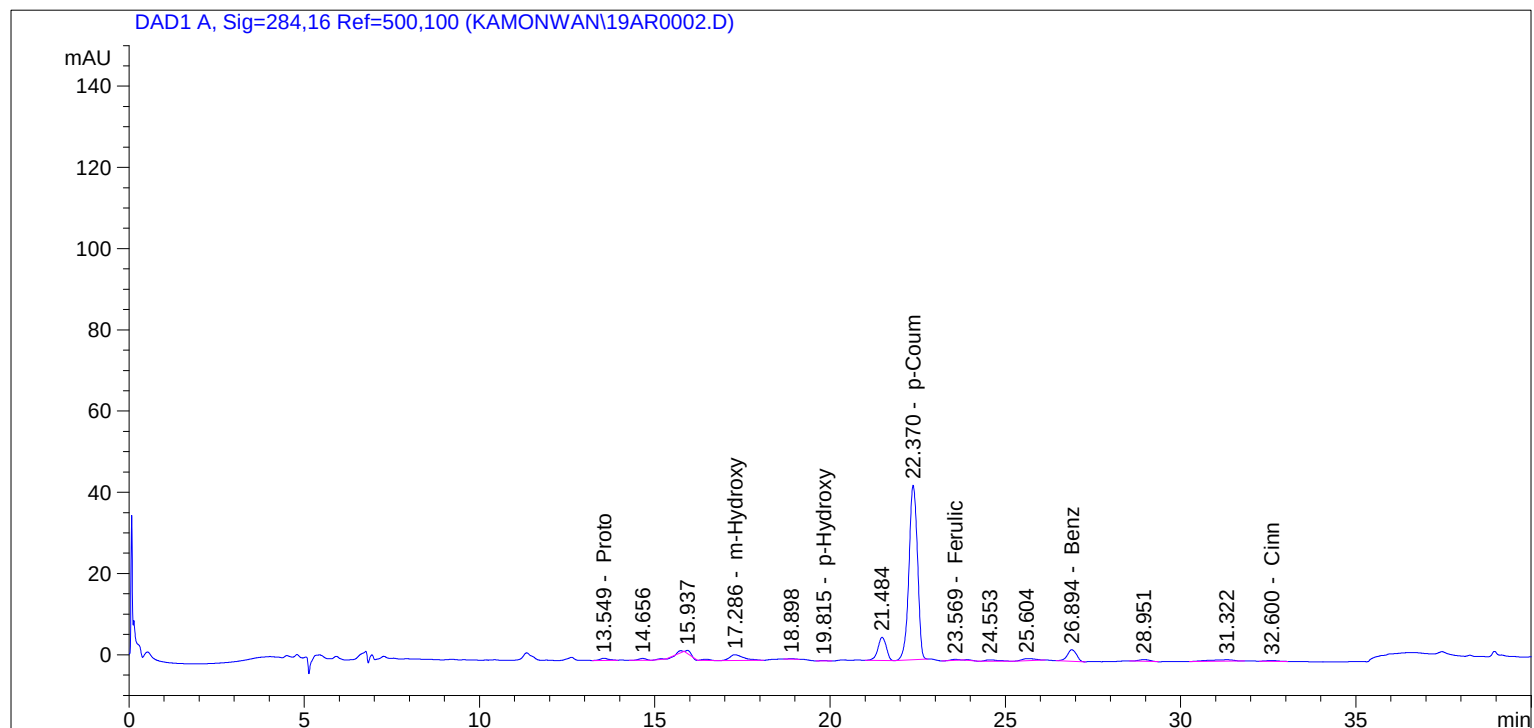
Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/19/2013 10:22:34 AM      Seq. Line   :    2
Sample Name      : MC FPA                      Location    : Vial 2
Acq. Operator    : kamonwan                     Inj         :    1
Acq. Instrument  : Instrument 1                 Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:59:33 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.549	BB	8.58489	1.82208e-2	1.56423e-1		Proto
17.286	BB	39.55266	4.63455e-2	1.83309		m-Hydroxy
18.331		-	-	-		Cafeic + Vanilic
19.815	BB	1.33790	4.84779e-2	6.48586e-2		p-Hydroxy
22.370	BB +	728.08844	5.70136e-3	4.15109		p-Coum
23.569	BB +	3.21726	1.28536e-2	4.13534e-2		Ferulic
23.921	BB +	2.07132	7.45529e-2	1.54423e-1		Veratric
26.894	BB +	51.97229	1.20492e-1	6.26226		Benz
32.600	BB +	4.02584	4.04527e-3	1.62856e-2		Cinn

Totals : 12.67978

Results obtained with enhanced integrator!
2 Warnings or Errors :

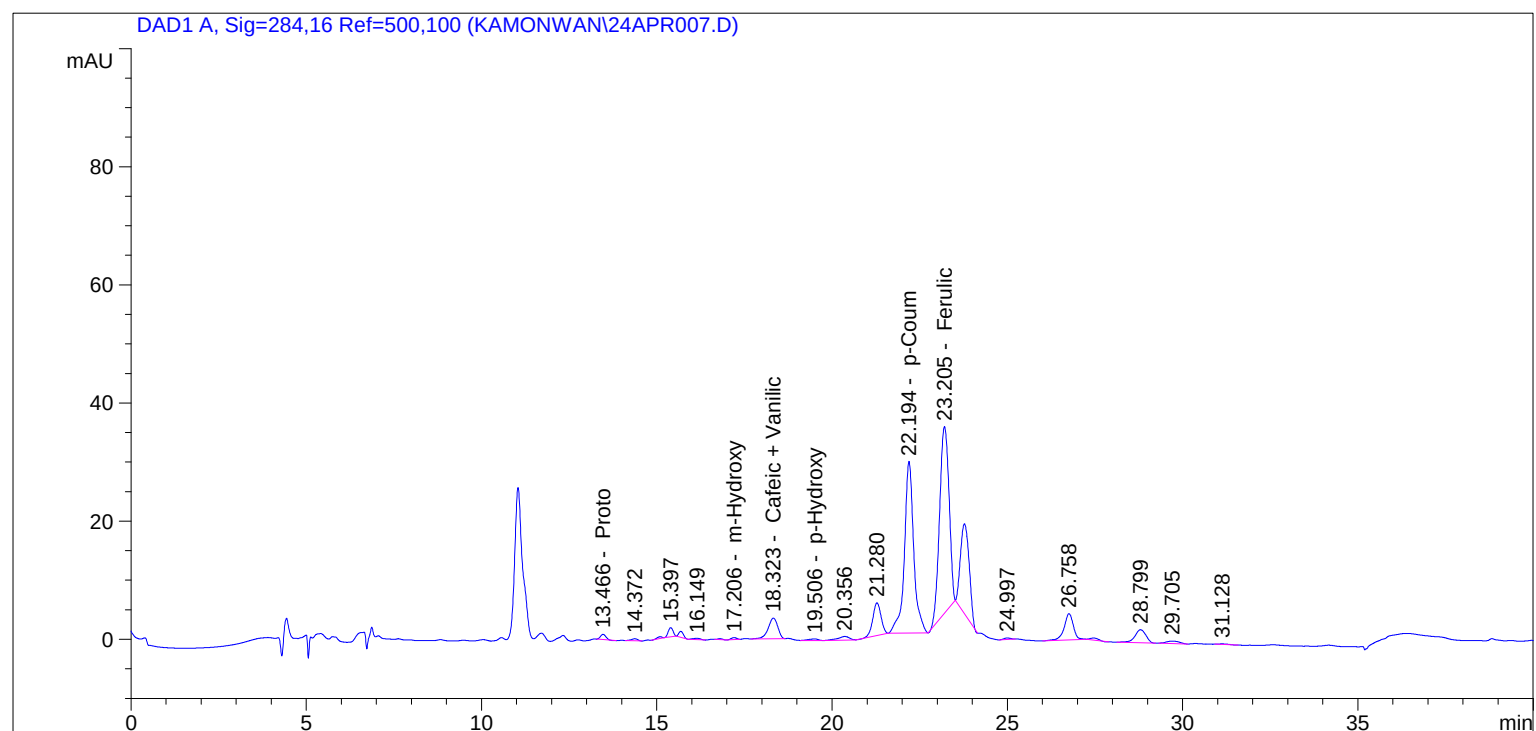
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/24/2013 12:55:24 PM      Seq. Line   :    7
Sample Name     : MC LIB EST B                Location    : Vial 7
Acq. Operator   : kamonwan                    Inj         :    1
Acq. Instrument : Instrument 1                 Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 1:42:27 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.466	BB	9.74943	1.82208e-2	1.77642e-1		Proto
17.206	BB	3.72864	4.63455e-2	1.72806e-1		m-Hydroxy
18.323	BB	65.83003	6.33781e-3	4.17218e-1		Cafeic + Vanilic
19.506	BB	4.93221	4.84779e-2	2.39103e-1		p-Hydroxy
22.194	BB +	539.38916	5.70136e-3	3.07525		p-Coum
23.205	BB +	595.43292	1.28536e-2	7.65347		Ferulic
23.775	BB +	262.83450	7.45529e-2	19.59506		Veratric
27.455	BB +	4.88180	1.20492e-1	5.88219e-1		Benz
32.718		-	-	-		Cinn

Totals : 31.91877

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

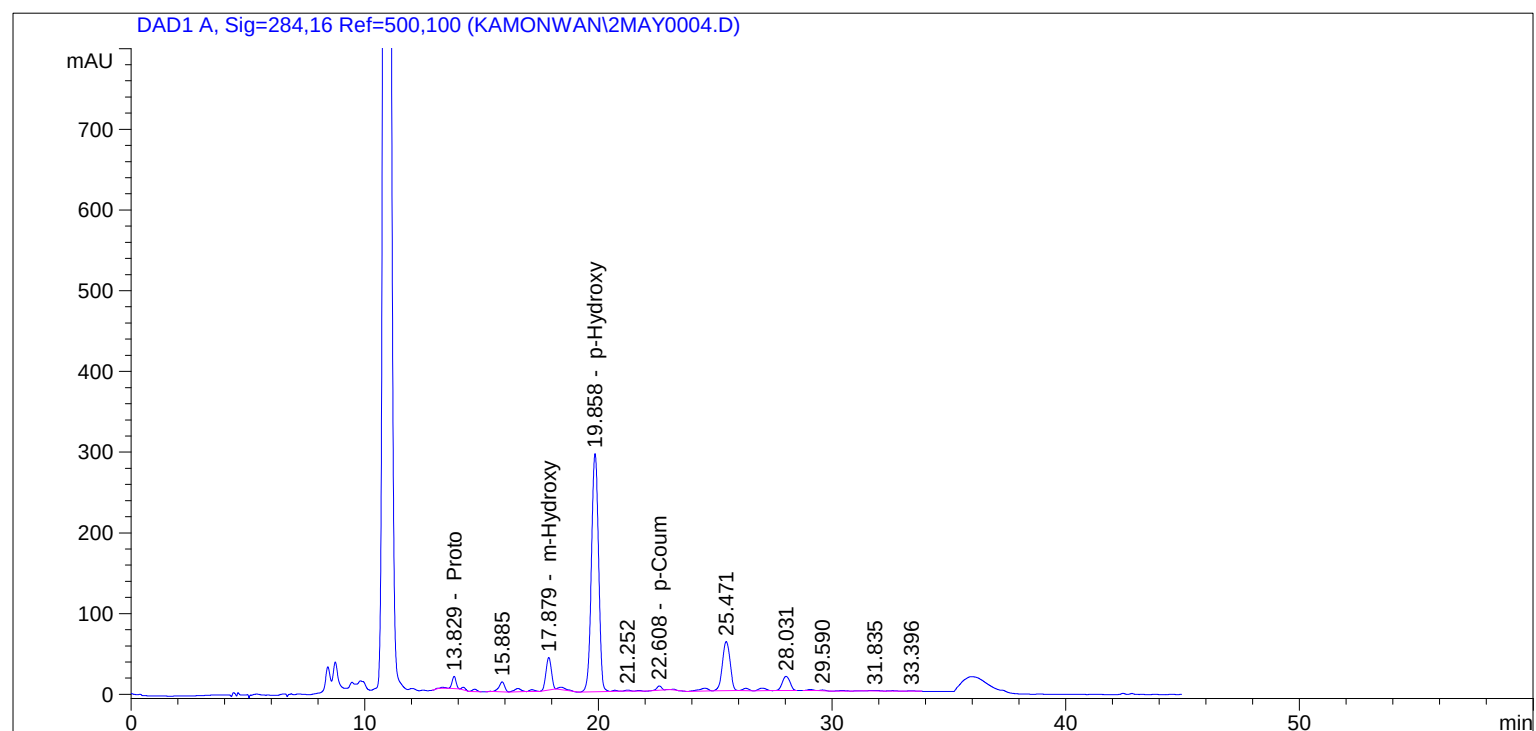
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 5/2/2013 2:07:31 PM      Seq. Line :    4
Sample Name     : MC LIB GLY B              Location  : Vial 4
Acq. Operator   : Kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/2/2013 11:47:14 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/2/2013 2:24:44 PM by Kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.829	BB	177.72012	1.82208e-2	3.23820		Proto
17.879	BB	648.26959	4.63455e-2	30.04439		m-Hydroxy
18.412	BB	66.94459	6.33781e-3	4.24282e-1		Cafeic + Vanilic
19.858	BB	6244.80615	4.84779e-2	302.73500		p-Hydroxy
22.608	BB +	75.81141	5.70136e-3	4.32228e-1		p-Coum
23.215	BB +	7.34509	1.28536e-2	9.44110e-2		Ferulic
23.993		-	-	-		Veratric
27.010	BB +	74.34277	1.20492e-1	8.95773		Benz
32.585	BB +	11.74755	4.04527e-3	4.75221e-2		Cinn

Totals : 345.97376

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

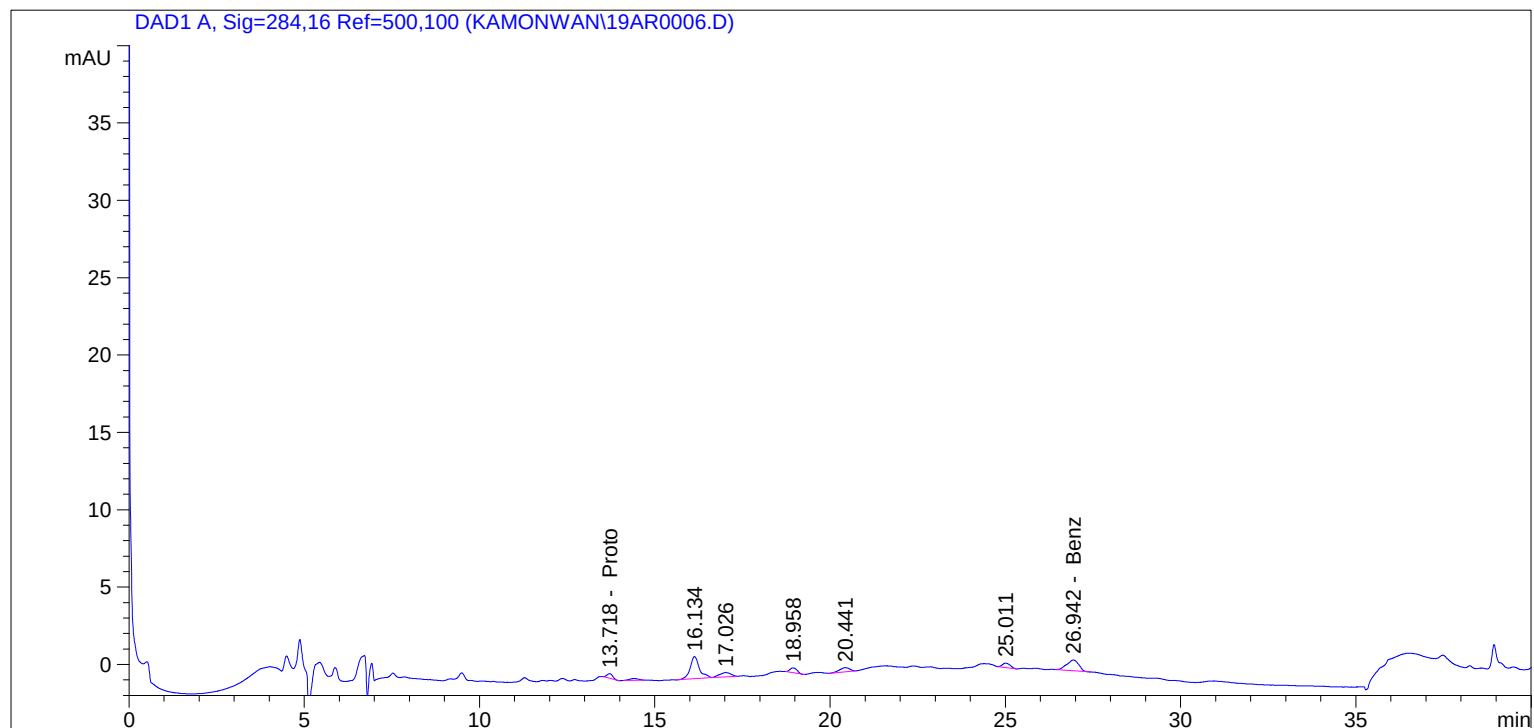
```

=====
*** End of Report ***
=====

```



```
=====
Injection Date   : 4/19/2013 1:27:55 PM      Seq. Line   :    6
Sample Name      : MFA FPA                  Location    : Vial 6
Acq. Operator    : kamonwan                 Inj         :    1
Acq. Instrument  : Instrument 1              Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 11:17:38 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.718	BB	3.26627	1.82208e-2	5.95141e-2		Proto
17.465		-	-	-		m-Hydroxy
18.247		-	-	-		Cafeic + Vanilic
19.480		-	-	-		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
26.942	BB +	16.75460	1.20492e-1	2.01880		Benz
32.718		-	-	-		Cinn

Totals : 2.07831

Results obtained with enhanced integrator!
2 Warnings or Errors :

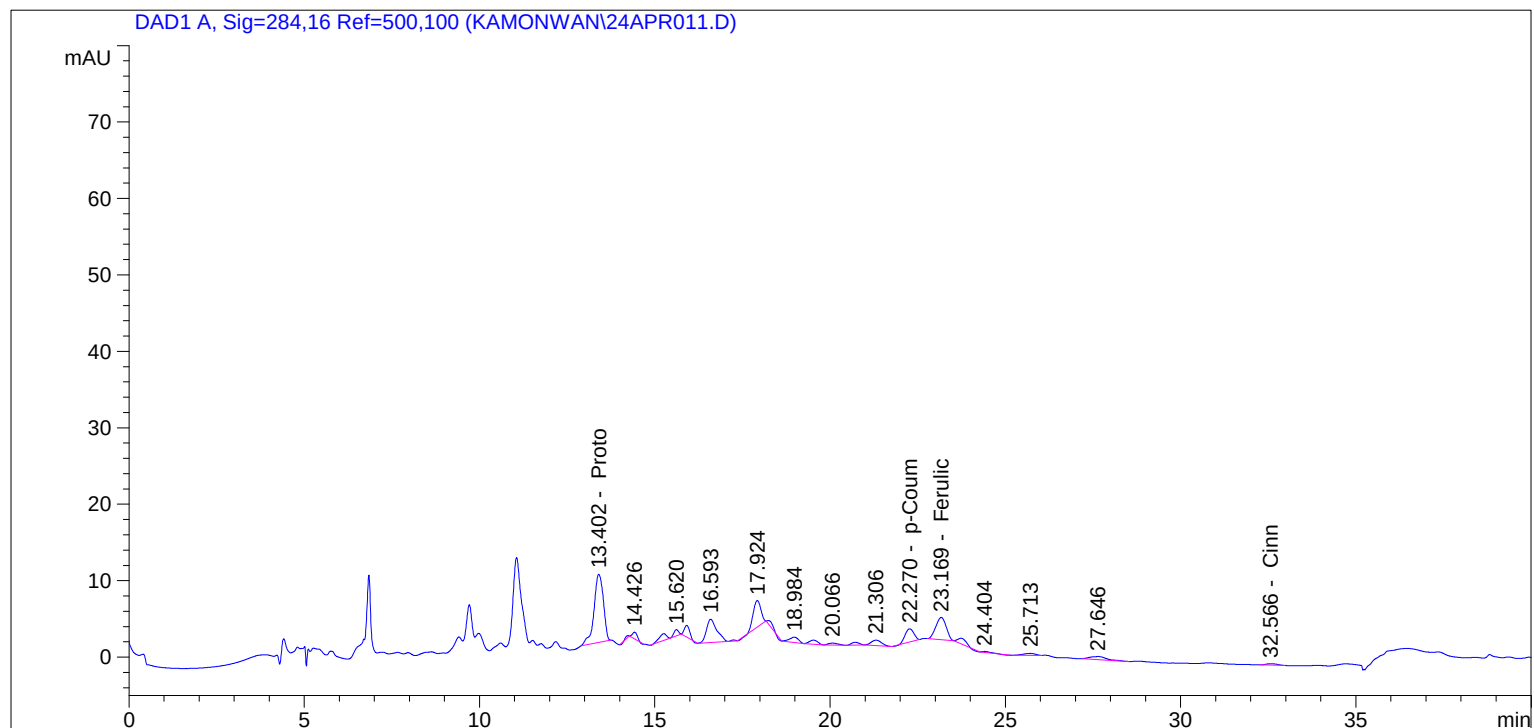
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/24/2013 4:00:53 PM	Seq. Line	: 11
Sample Name	: MFA LIB EST B	Location	: Vial 11
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 4:48:33 PM by kamonwan		
	(modified after loading)		

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.402	BB	165.82800	1.82208e-2	3.02152		Proto
17.248	BB	1.16143	4.63455e-2	5.38269e-2		m-Hydroxy
18.246	BB	4.78589	6.33781e-3	3.03321e-2		Cafeic + Vanilic
19.523	BB	8.83694	4.84779e-2	4.28396e-1		p-Hydroxy
22.270	BB +	29.45783	5.70136e-3	1.67950e-1		p-Coum
23.169	BB +	59.97331	1.28536e-2	7.70874e-1		Ferulic
23.736	BB +	10.23820	7.45529e-2	7.63287e-1		Veratric
27.223		-	-	-		Benz
32.566	BB +	4.37589	4.04527e-3	1.77017e-2		Cinn

Totals : 5.25388

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

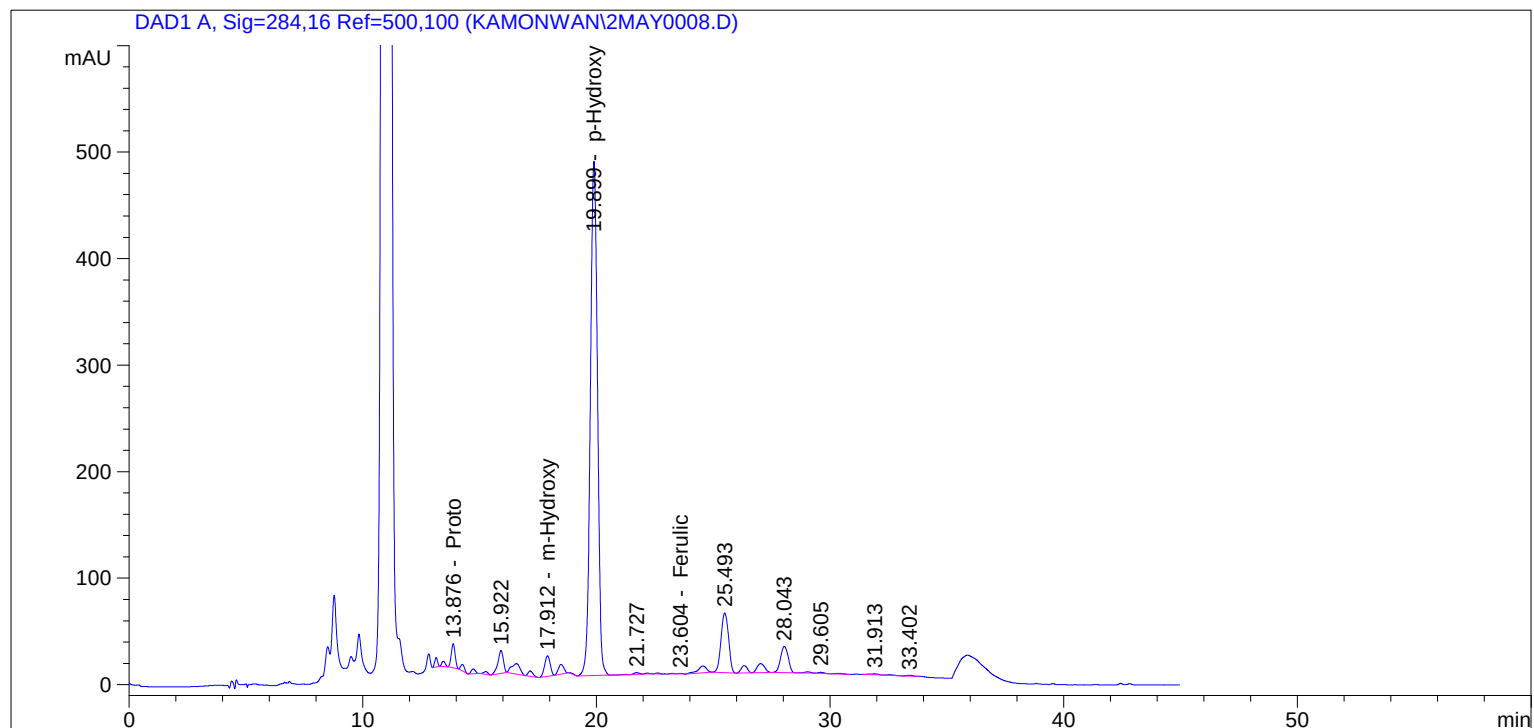
*** End of Report ***

=====

=====

Injection Date	: 5/2/2013 5:12:53 PM	Seq. Line	: 8
Sample Name	: MFA LIB GLY B	Location	: Vial 8
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	5/2/2013 11:47:14 AM by Kamonwan		
Analysis Method	C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	5/2/2013 6:00:11 PM by Kamonwan		
	(modified after loading)		

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.876	BB	262.47562	1.82208e-2	4.78251		Proto
17.912	BB	317.96066	4.63455e-2	14.73605		m-Hydroxy
18.493	BB	147.76578	6.33781e-3	9.36511e-1		Cafeic + Vanilic
19.899	BB	1.02299e4	4.84779e-2	495.92186		p-Hydroxy
22.620	BB +	10.99501	5.70136e-3	6.26864e-2		p-Coum
23.604	BB +	6.68291	1.28536e-2	8.58996e-2		Ferulic
23.993		-	-	-		Veratric
27.030	BB +	193.33282	1.20492e-1	23.29510		Benz
32.558	BB +	11.72352	4.04527e-3	4.74248e-2		Cinn

Totals : 539.86805

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

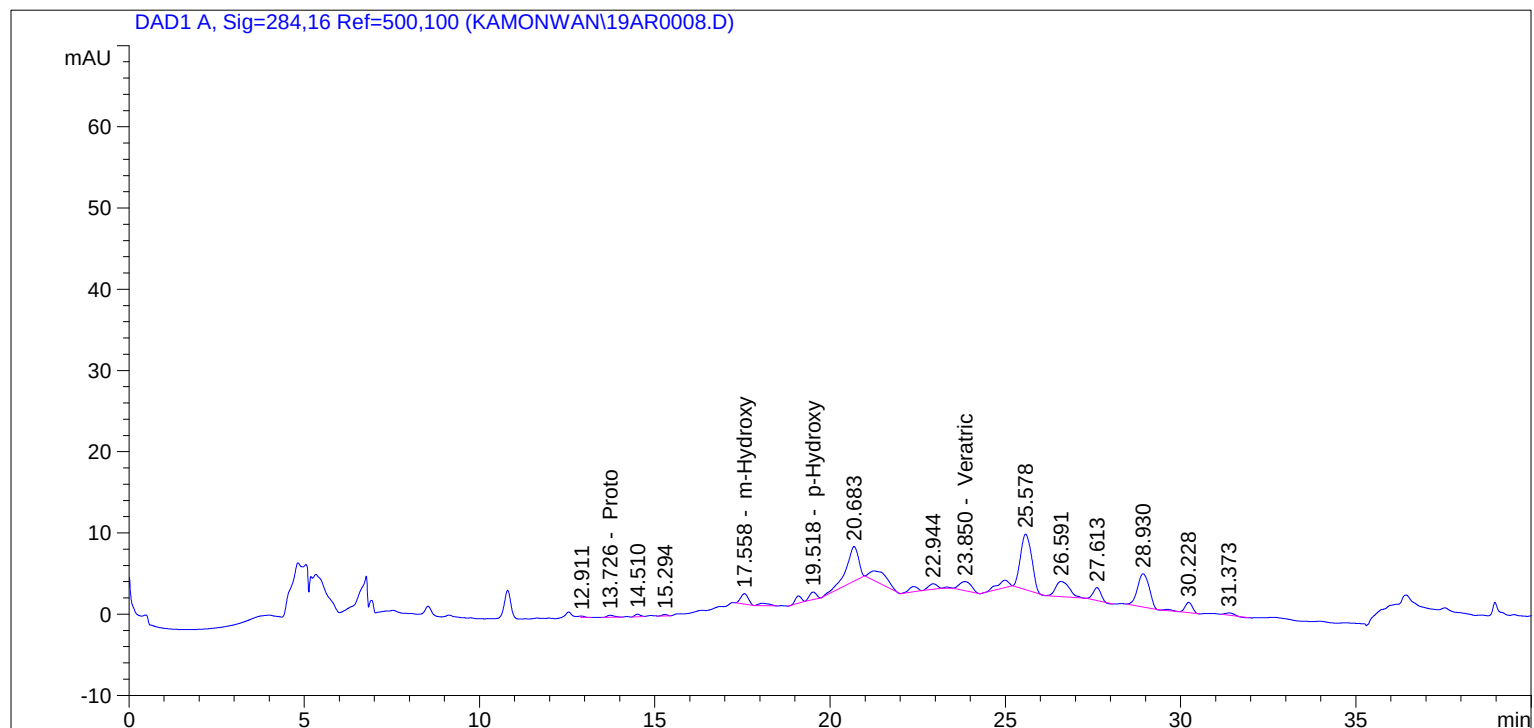
*** End of Report ***

=====

```

=====
Injection Date   : 4/19/2013 3:00:37 PM      Seq. Line   :    8
Sample Name     : MFG FPA                  Location    : Vial 8
Acq. Operator   : kamonwan                 Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 11:22:25 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
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```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.726	BB	3.94323	1.82208e-2	7.18488e-2		Proto
17.558	BB	19.34816	4.63455e-2	8.96700e-1		m-Hydroxy
18.063	BB	6.71627	6.33781e-3	4.25664e-2		Cafeic + Vanilic
19.518	BB	12.90523	4.84779e-2	6.25618e-1		p-Hydroxy
22.389	BB +	10.97620	5.70136e-3	6.25792e-2		p-Coum
23.336	BB +	1.40306	1.28536e-2	1.80344e-2		Ferulic
23.850	BB +	26.31102	7.45529e-2	1.96156		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 3.67891

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

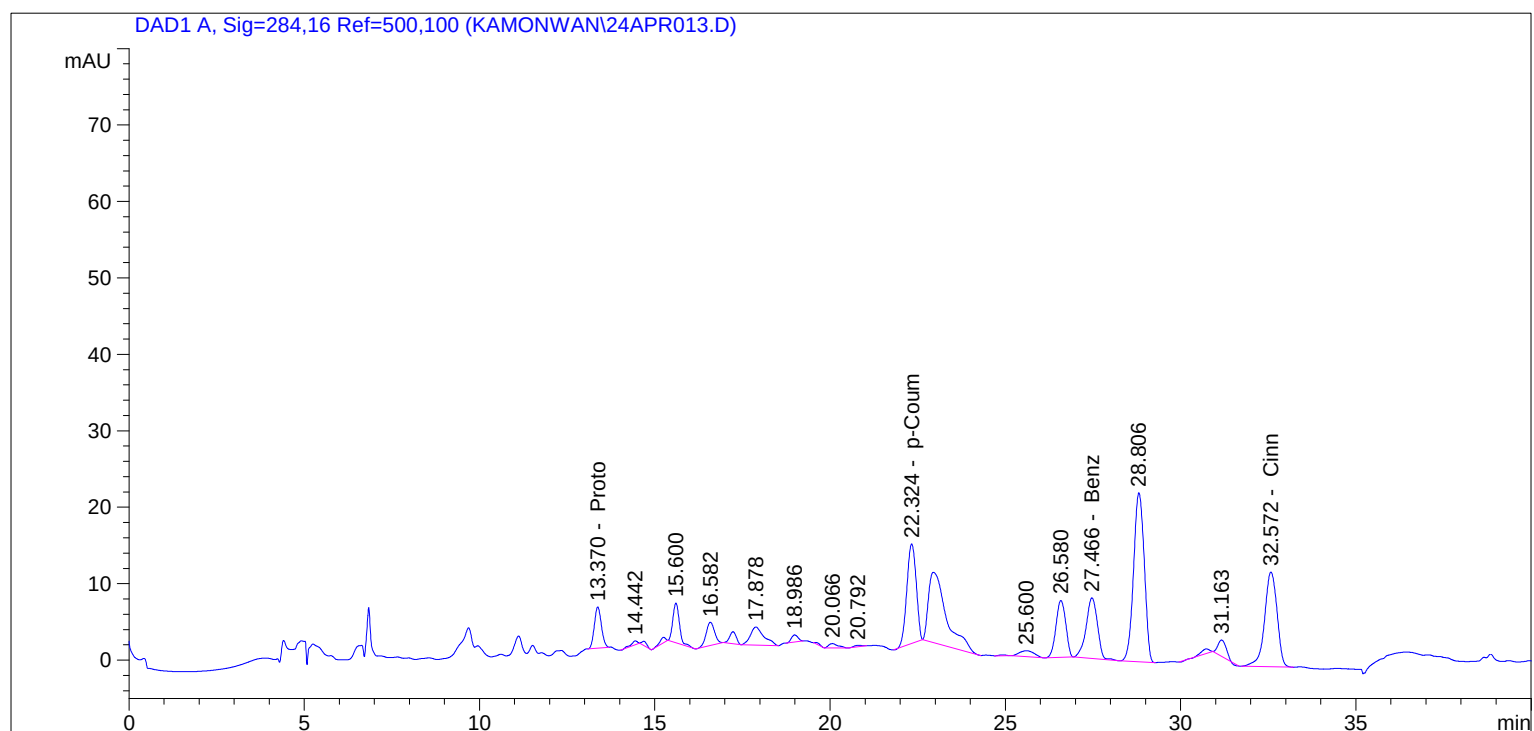
```

=====

Injection Date	: 4/24/2013 5:33:31 PM	Seq. Line	: 13
Sample Name	: MFG LIB EST B	Location	: Vial 13
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 4:48:33 PM by kamonwan		

(modified after loading)

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.370	BB	75.14177	1.82208e-2	1.36914		Proto
17.228	BB	20.38602	4.63455e-2	9.44801e-1		m-Hydroxy
18.294		-	-	-		Cafeic + Vanilic
19.594	BB	1.90212	4.84779e-2	9.22106e-2		p-Hydroxy
22.324	BB +	242.44327	5.70136e-3	1.38226		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.466	BB +	179.86122	1.20492e-1	21.67188		Benz
32.572	BB +	306.93423	4.04527e-3	1.24163		Cinn

Totals : 26.70192

Results obtained with enhanced integrator!
2 Warnings or Errors :

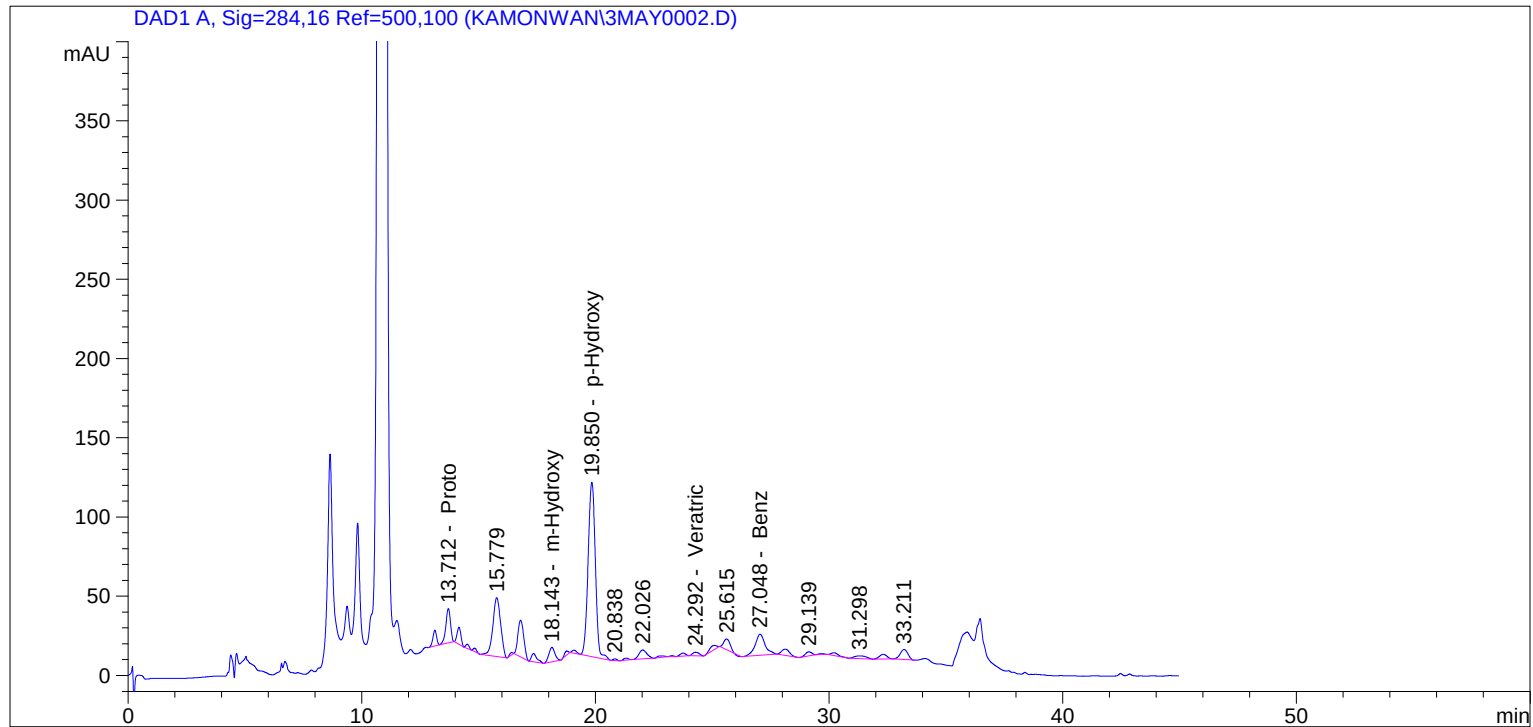
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

=====

```
=====
Injection Date   : 5/3/2013 10:18:06 AM      Seq. Line :    2
Sample Name      : MFG LIB GLY B             Location  : Vial 2
Acq. Operator    : Kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/3/2013 9:29:49 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/3/2013 10:27:09 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.712	BB	298.57556	1.82208e-2	5.44028		Proto
18.143	BB	164.20131	4.63455e-2	7.61000		m-Hydroxy
18.781	BB	28.41149	6.33781e-3	1.80067e-1		Cafeic + Vanilic
19.850	BB	2366.15356	4.84779e-2	114.70612		p-Hydroxy
22.797	BB +	21.02776	5.70136e-3	1.19887e-1		p-Coum
23.275	BB +	6.38764	1.28536e-2	8.21043e-2		Ferulic
24.292	BB +	44.21549	7.45529e-2	3.29639		Veratric
27.048	BB +	397.31116	1.20492e-1	47.87291		Benz
32.318	BB +	65.40668	4.04527e-3	2.64588e-1		Cinn

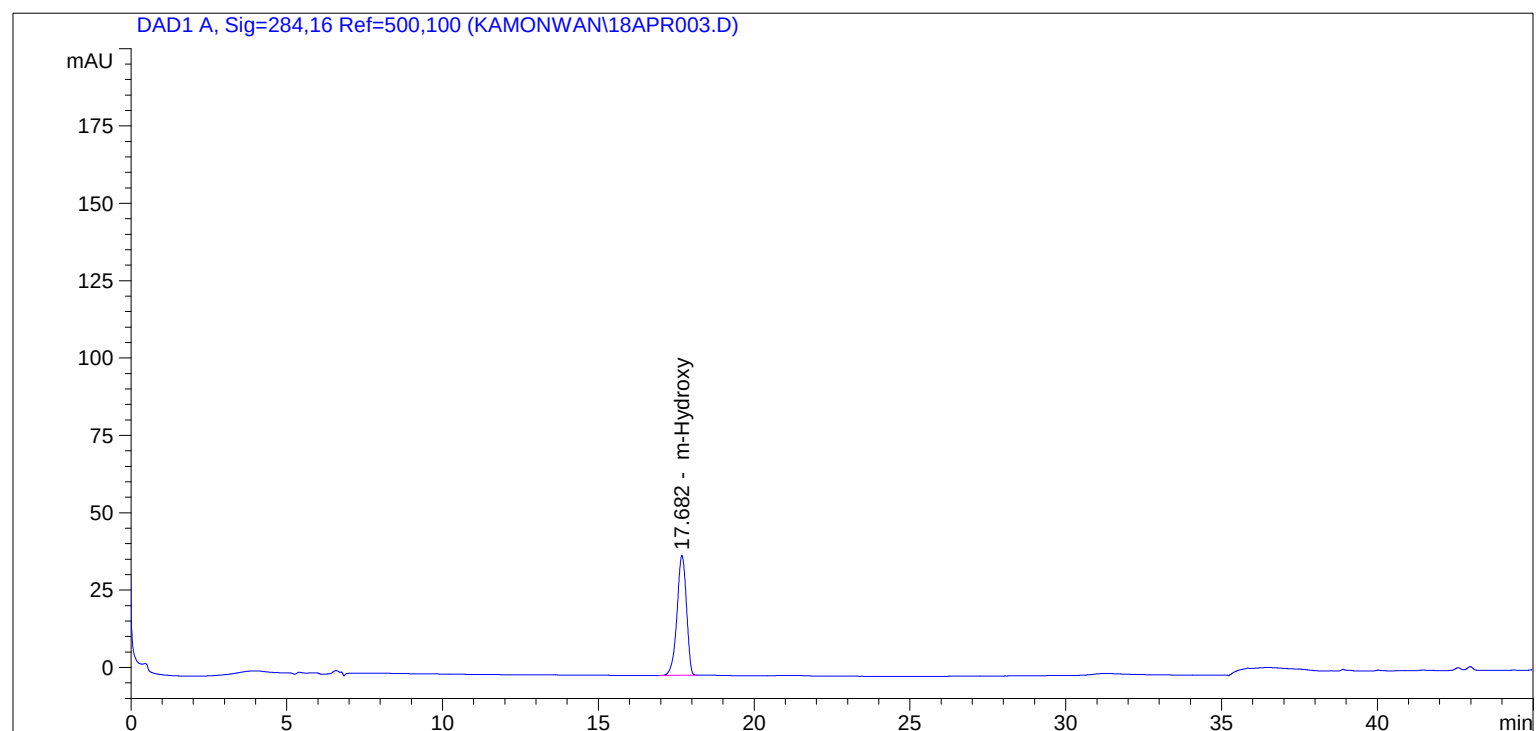
Totals : 179.57234

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/18/2013 1:08:13 PM      Seq. Line :    2
Sample Name     : m-Hydroxy 30 ppm          Location  : Vial 2
Acq. Operator   : kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:36:47 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                        Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618		0.0000	0.00000	0.0000	Proto
2	17.682	BB	0.3320	817.80365	100.0000	m-Hydroxy
3	18.437		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.683		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 817.80365 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

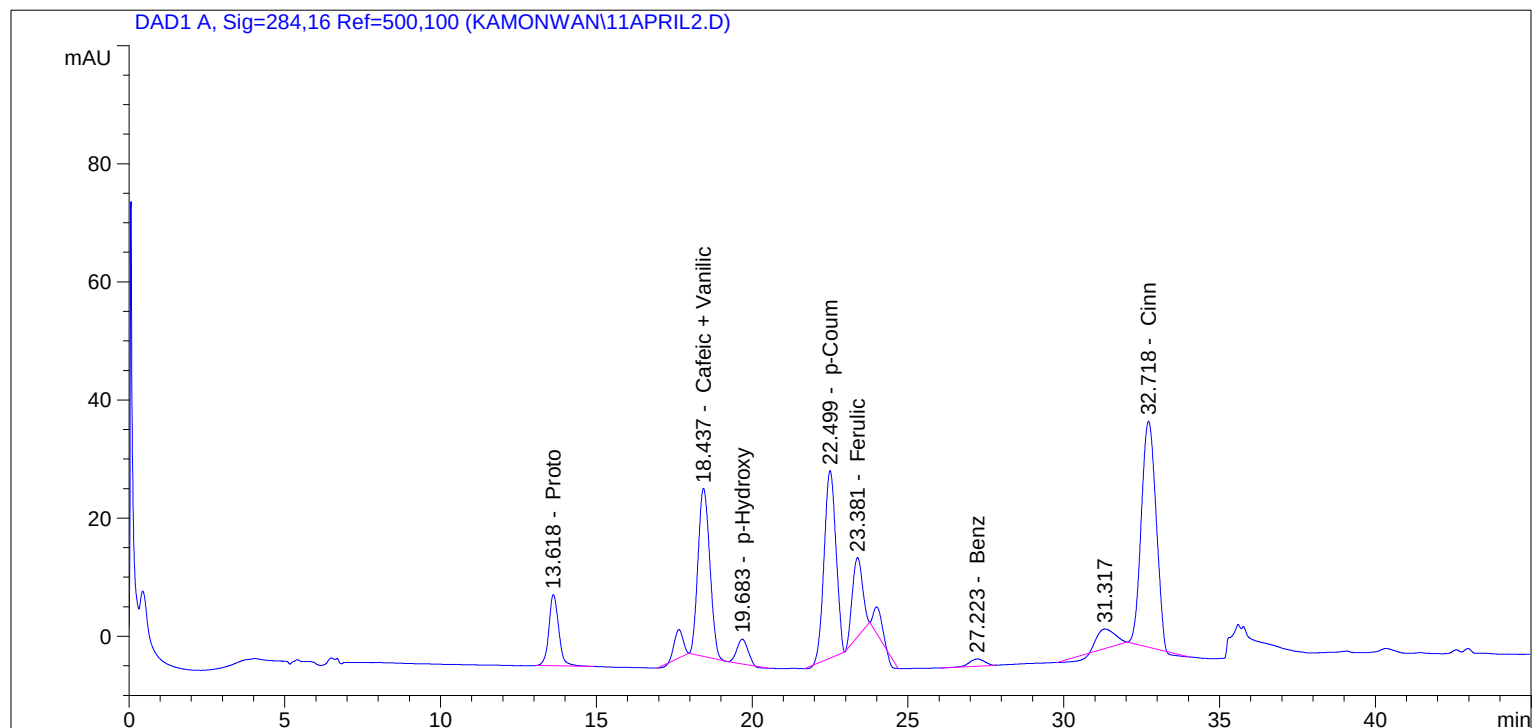
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/11/2013 10:48:45 AM	Seq. Line	: 2
Sample Name	: Mix std. 5 ppm	Location	: Vial 2
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/11/2013 10:01:06 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 10:35:59 AM by kamonwan		
	(modified after loading)		

=====



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Area Percent Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:32:56 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618	BB	0.3377	266.11823	6.9728	Proto
2	17.648	BB	0.3040	90.68826	2.3762	m-Hydroxy
3	18.437	BB	0.4202	751.70490	19.6960	Cafeic + Vanilic
4	19.683	BB	0.3728	100.26305	2.6271	p-Hydroxy
5	22.499	BB +	0.4096	837.30859	21.9390	p-Coum
6	23.381	BB +	0.3645	308.89145	8.0935	Ferulic
7	23.993	BB +	0.2624	65.18927	1.7081	Veratric
8	27.223	BB +	0.4013	40.21669	1.0538	Benz
9	32.718	BBA +	0.5236	1251.59790	32.7942	Cinn

Totals : 3711.97833 97.2606

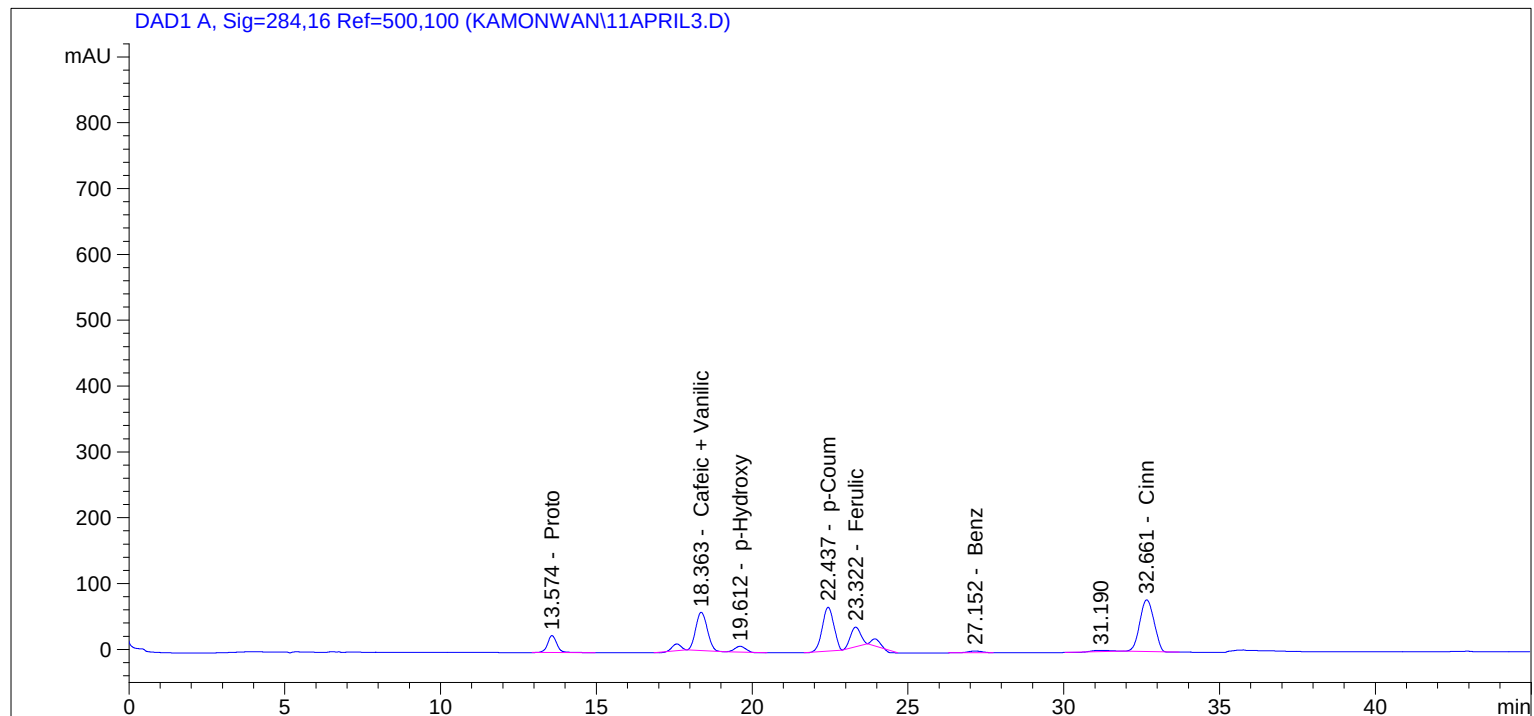
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

=====

*** End of Report ***


```
=====
Injection Date   : 4/11/2013 11:35:05 AM      Seq. Line   :    3
Sample Name      : Mix std. 10 ppm            Location    : Vial 3
Acq. Operator    : kamonwan                   Inj         :    1
Acq. Instrument  : Instrument 1                Inj Volume  : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/11/2013 11:40:31 AM by kamonwan
                  (modified after loading)
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:32:56 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.574	BB	0.3208	538.97455	7.0544	Proto
2	17.581	BB	0.3028	197.55298	2.5857	m-Hydroxy
3	18.363	BB	0.4083	1500.11121	19.6343	Cafeic + Vanilic
4	19.612	BB	0.3761	211.03293	2.7621	p-Hydroxy
5	22.437	BB +	0.3993	1708.05457	22.3559	p-Coum
6	23.322	BB +	0.3637	674.22302	8.8246	Ferulic
7	23.934	BB +	0.2588	151.12791	1.9780	Veratric
8	27.152	BB +	0.4640	82.37465	1.0782	Benz
9	32.661	BB +	0.5055	2493.87500	32.6412	Cinn

Totals : 7557.32681 98.9143

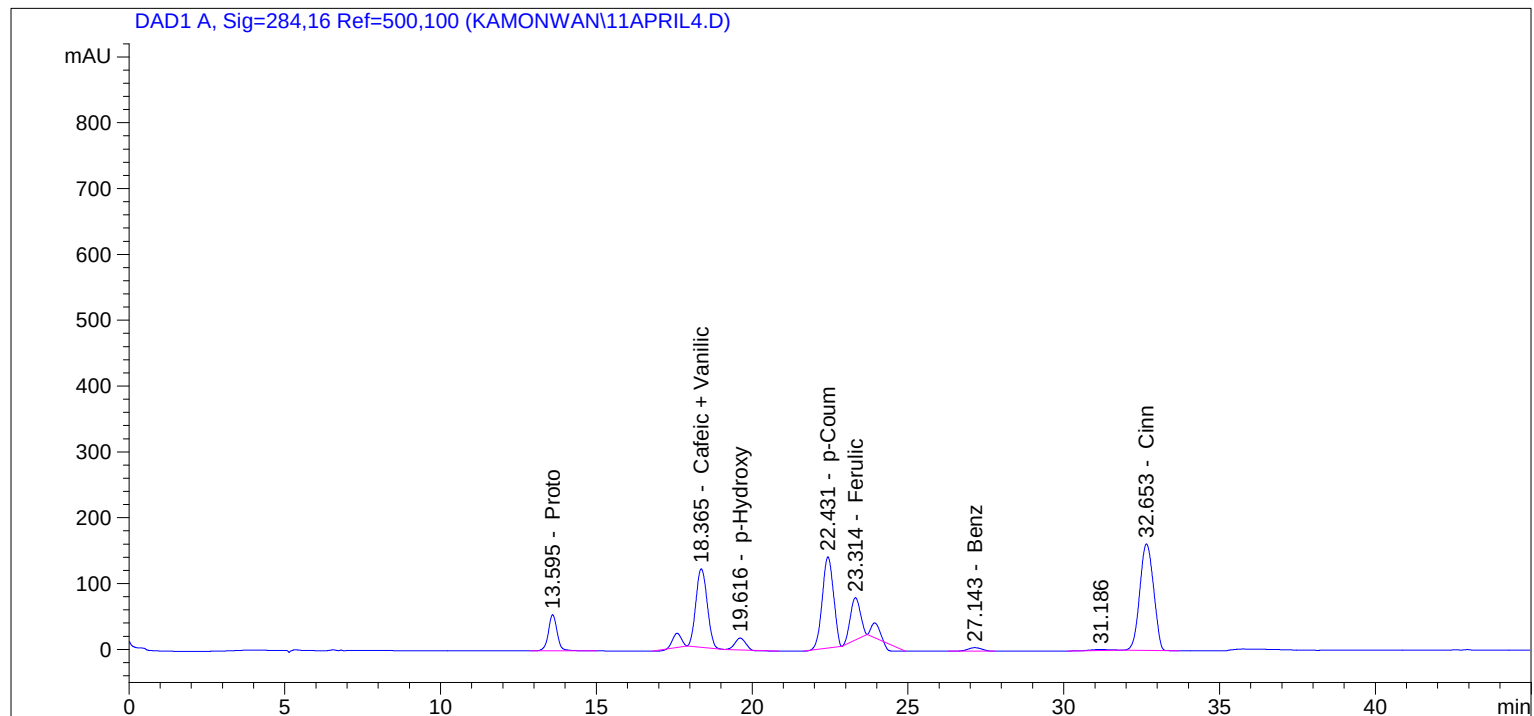
Results obtained with enhanced integrator!

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/11/2013 12:21:24 PM      Seq. Line   :    4
Sample Name      : Mix std. 20 ppm            Location      : Vial 4
Acq. Operator    : kamonwan                   Inj           :    1
Acq. Instrument  : Instrument 1                Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/11/2013 11:40:31 AM by kamonwan
                  (modified after loading)
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:32:56 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier           :      1.0000
Dilution             :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.595	BB	0.3046	1089.22107	7.1750	Proto
2	17.591	BB	0.2934	387.24368	2.5509	m-Hydroxy
3	18.365	BB	0.4004	3005.70020	19.7992	Cafeic + Vanilic
4	19.616	BB	0.3590	403.33032	2.6568	p-Hydroxy
5	22.431	BB +	0.3923	3471.54663	22.8679	p-Coum
6	23.314	BB +	0.3599	1453.70911	9.5759	Ferulic
7	23.931	BB +	0.1914	180.76593	1.1907	Veratric
8	27.143	BB +	0.4675	166.08923	1.0941	Benz
9	32.653	BB +	0.4902	4967.44824	32.7217	Cinn

Totals : 1.51251e4 99.6322

Results obtained with enhanced integrator!

1 Warnings or Errors :

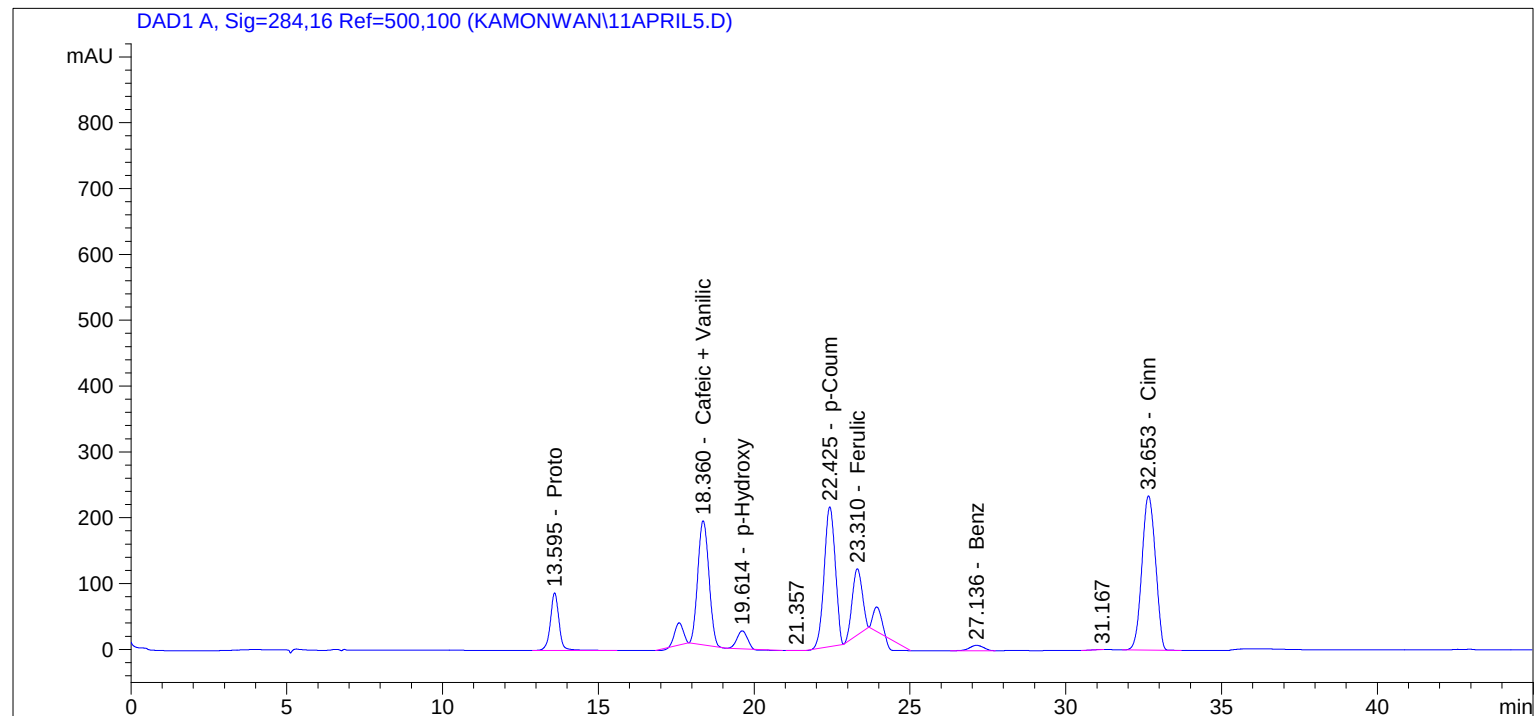
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/11/2013 1:07:44 PM	Seq. Line	: 5
Sample Name	: Mix std. 30 ppm	Location	: Vial 5
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/11/2013 11:40:31 AM by kamonwan		
	(modified after loading)		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 10:32:56 AM by kamonwan		
	(modified after loading)		

=====



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Area Percent Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:32:56 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.595	BB	0.2946	1682.16492	7.3988	Proto
2	17.591	BB	0.2970	626.15314	2.7541	m-Hydroxy
3	18.360	BB	0.3939	4688.96436	20.6239	Cafeic + Vanilic
4	19.614	BB	0.3552	610.56775	2.6855	p-Hydroxy
5	22.425	BB +	0.3907	5250.37354	23.0932	p-Coum
6	23.310	BB +	0.3602	2261.42041	9.9466	Ferulic
7	23.931	BB +	0.1903	283.60303	1.2474	Veratric
8	27.136	BB +	0.4893	249.53493	1.0976	Benz
9	32.653	BB +	0.4861	7075.55371	31.1211	Cinn

Totals : 2.27283e4 99.9683

Results obtained with enhanced integrator!

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

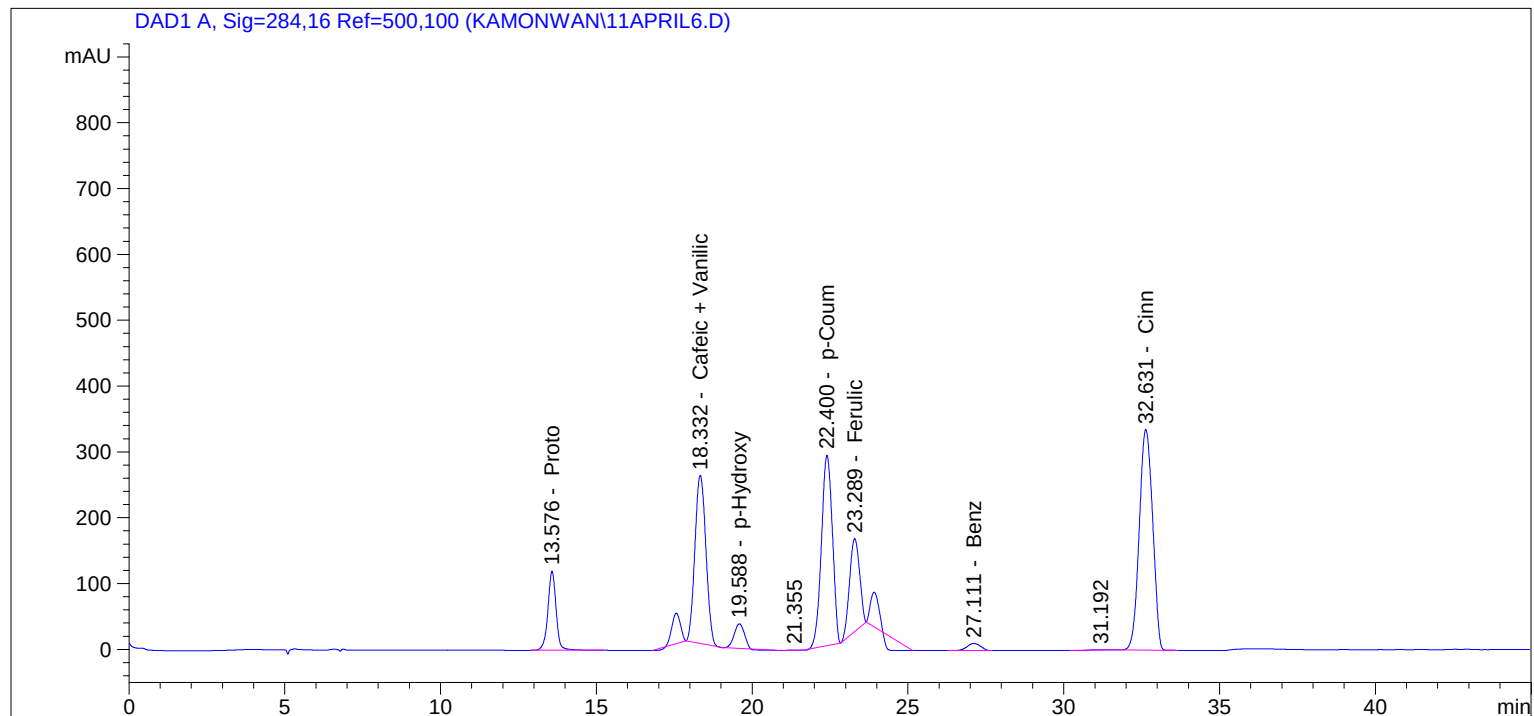
=====

*** End of Report ***

=====

Injection Date	: 4/11/2013 1:54:03 PM	Seq. Line	: 6
Sample Name	: Mix std. 40 ppm	Location	: Vial 6
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/11/2013 11:40:31 AM by kamonwan (modified after loading)		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 10:32:56 AM by kamonwan (modified after loading)		

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Area Percent Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:32:56 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.576	BB	0.2808	2211.64917	7.1154	Proto
2	17.565	BB	0.2971	844.84711	2.7181	m-Hydroxy
3	18.332	BB	0.3910	6282.86084	20.2134	Cafeic + Vanilic
4	19.588	BB	0.3587	828.09027	2.6642	p-Hydroxy
5	22.400	BB +	0.3899	7086.28711	22.7982	p-Coum
6	23.289	BB +	0.3599	3167.96265	10.1920	Ferulic
7	23.914	BB +	0.1785	308.85248	0.9936	Veratric
8	27.111	BB +	0.4768	331.78424	1.0674	Benz
9	32.631	BB +	0.4815	9988.04297	32.1338	Cinn

Totals : 3.10504e4 99.8961

Results obtained with enhanced integrator!

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

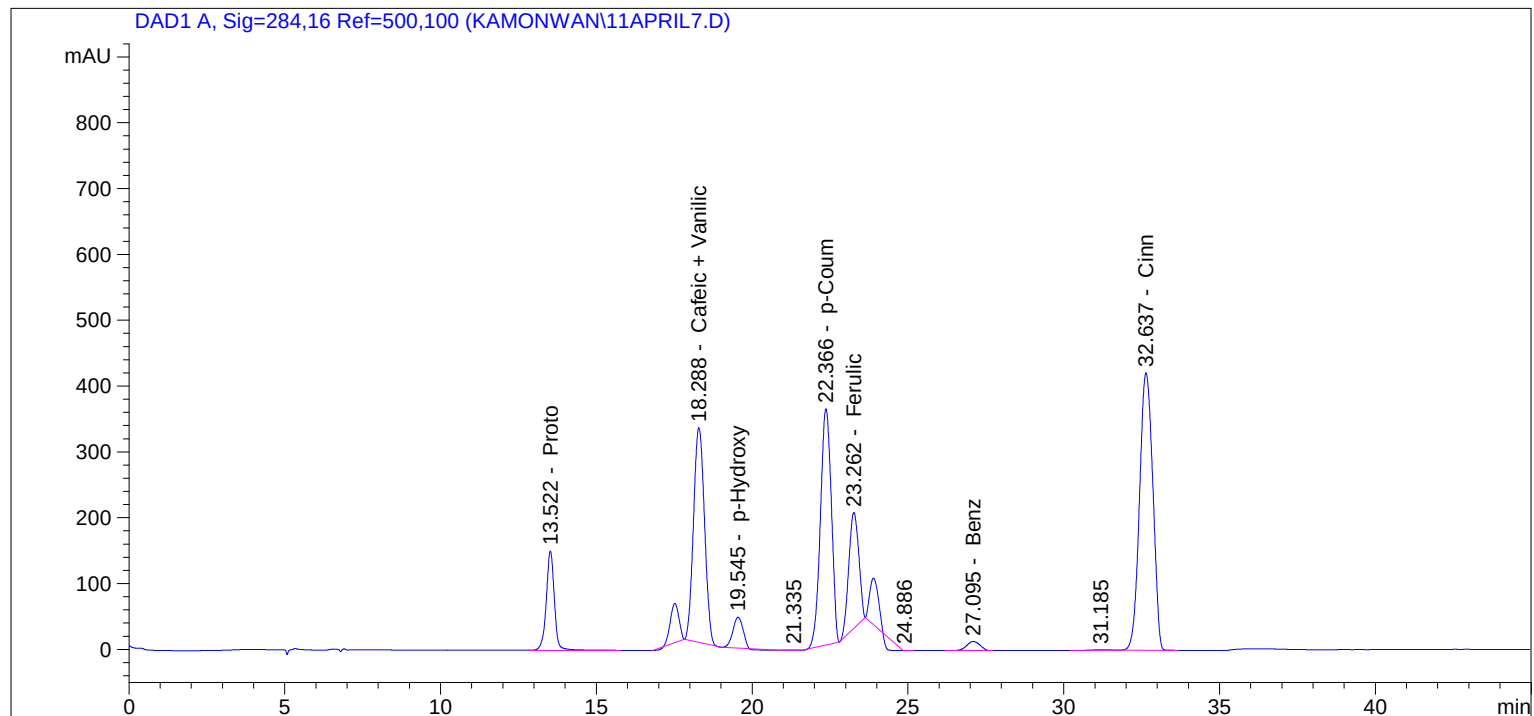
=====

*** End of Report ***

=====

Injection Date	: 4/11/2013 2:40:25 PM	Seq. Line	: 7
Sample Name	: Mix std. 50 ppm	Location	: Vial 7
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/11/2013 11:40:31 AM by kamonwan		
	(modified after loading)		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 10:32:56 AM by kamonwan		
	(modified after loading)		

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Area Percent Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:32:56 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.522	BB	0.2767	2727.60938	6.9072	Proto
2	17.516	BB	0.3044	1129.21838	2.8595	m-Hydroxy
3	18.288	BB	0.3887	8017.90723	20.3038	Cafeic + Vanilic
4	19.545	BB	0.3592	1037.01196	2.6260	p-Hydroxy
5	22.366	BB +	0.3924	8748.14258	22.1530	p-Coum
6	23.262	BB +	0.3645	3958.35864	10.0238	Ferulic
7	23.893	BB +	0.2697	955.87512	2.4206	Veratric
8	27.095	BB +	0.4844	414.99094	1.0509	Benz
9	32.637	BB +	0.4792	1.24728e4	31.5851	Cinn

Totals : 3.94620e4 99.9300

Results obtained with enhanced integrator!

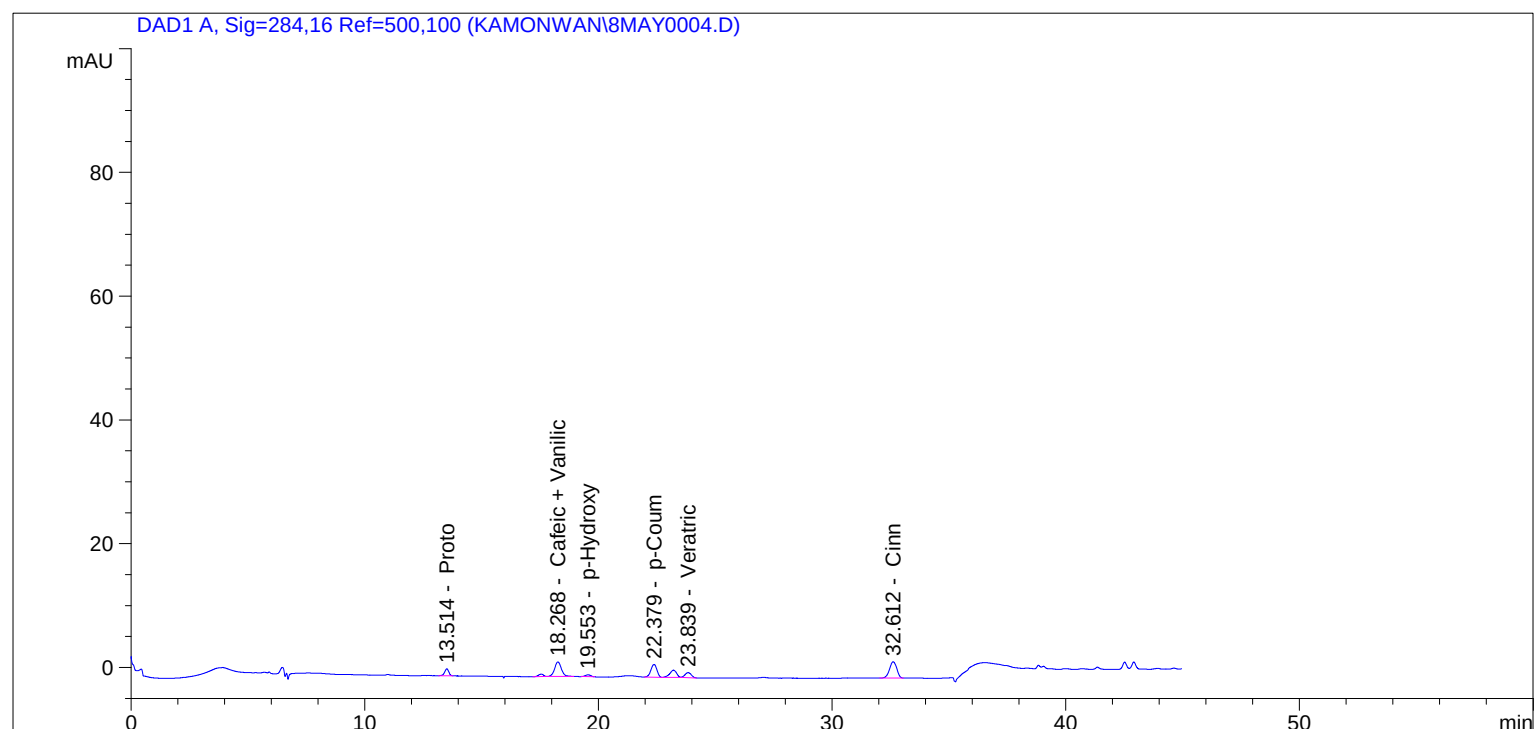
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

=====

*** End of Report ***

```
=====
Injection Date   : 5/8/2013 11:03:31 AM      Seq. Line :    4
Sample Name     : MIXED STD 0.625           Location  : Vial 4
Acq. Operator   : Kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1               Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/8/2013 11:28:44 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
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```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.514	BB	13.65862	1.82208e-2	2.48871e-1		Proto
17.550	BB	6.11820	4.63455e-2	2.83551e-1		m-Hydroxy
18.268	BB	47.82518	6.33781e-3	3.03107e-1		Cafeic + Vanilic
19.553	BB	5.01237	4.84779e-2	2.42989e-1		p-Hydroxy
22.379	BB +	37.03575	5.70136e-3	2.11154e-1		p-Coum
23.214	BB +	22.83669	1.28536e-2	2.93534e-1		Ferulic
23.839	BB +	14.53339	7.45529e-2	1.08351		Veratric
27.223		-	-	-		Benz
32.612	BB +	56.92910	4.04527e-3	2.30294e-1		Cinn

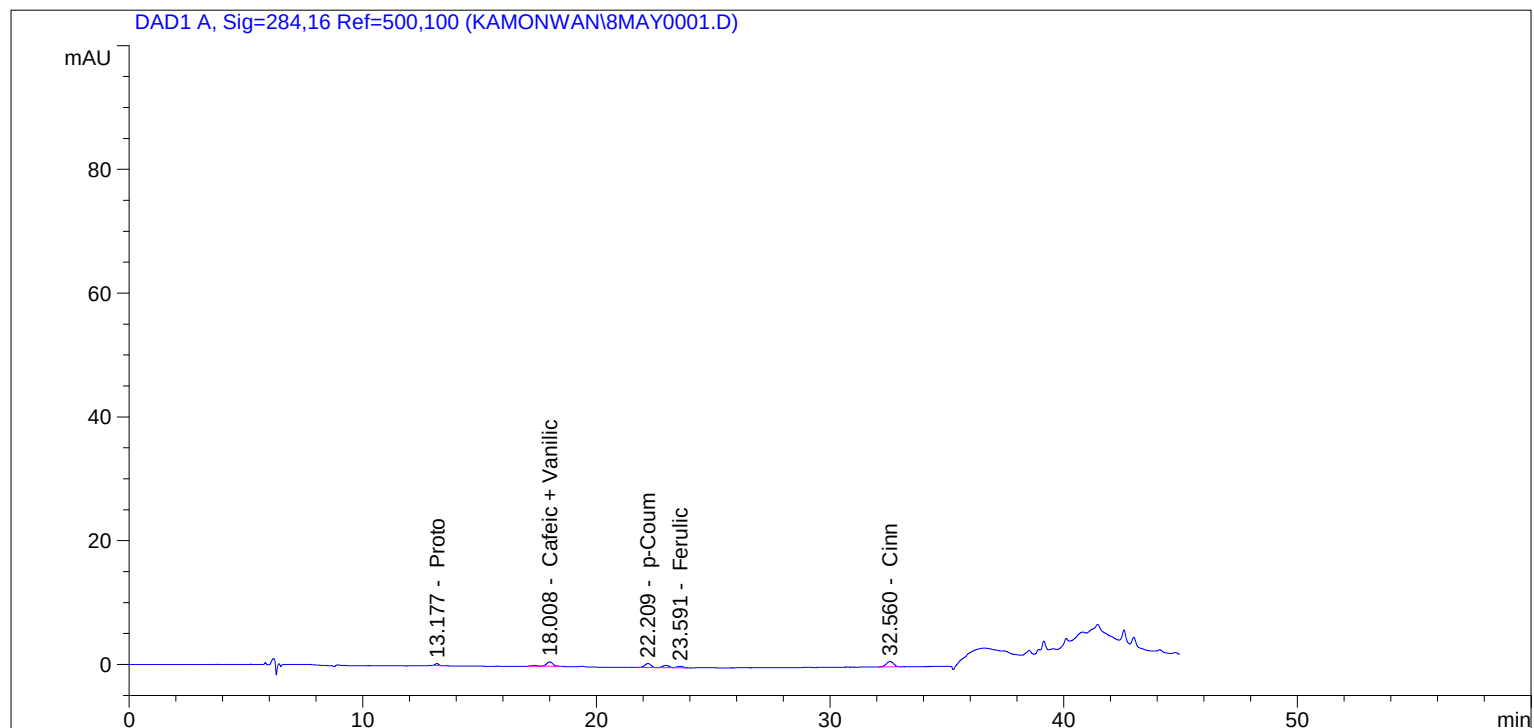
Totals : 2.89701

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/8/2013 8:44:29 AM      Seq. Line :    1
Sample Name     : MIXED STD 0.0781         Location  : Vial 1
Acq. Operator   : Kamonwan                 Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/8/2013 10:16:43 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.177	BB	3.91555	1.82208e-2	7.13444e-2		Proto
17.354	BB	2.05574	4.63455e-2	9.52744e-2		m-Hydroxy
18.008	BB	12.99169	6.33781e-3	8.23388e-2		Cafeic + Vanilic
19.429		-	-	-		p-Hydroxy
22.209	BB +	11.89899	5.70136e-3	6.78404e-2		p-Coum
23.591	BB +	4.17951	1.28536e-2	5.37218e-2		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.560	BB +	18.85606	4.04527e-3	7.62779e-2		Cinn

Totals : 4.46798e-1

Results obtained with enhanced integrator!
2 Warnings or Errors :

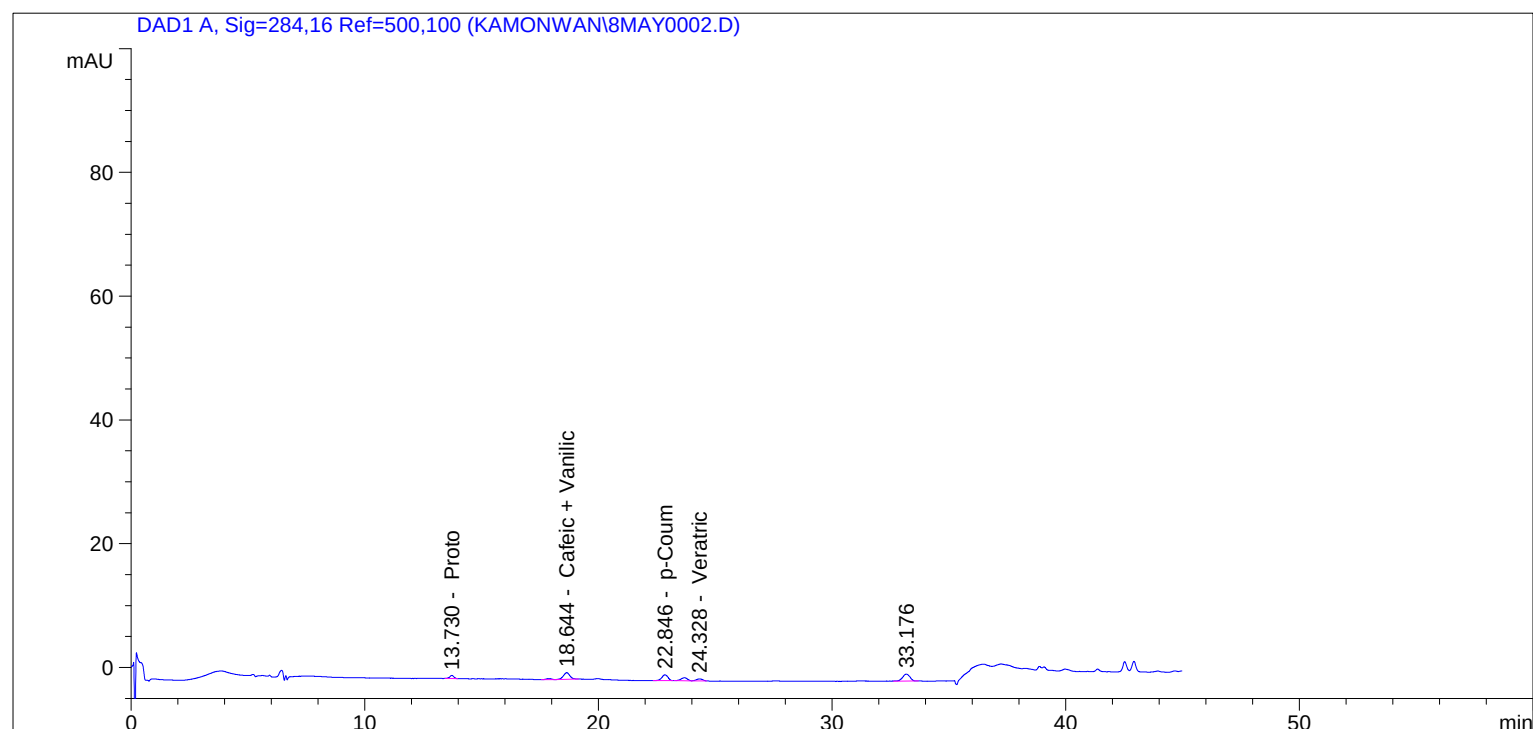
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 5/8/2013 9:30:50 AM      Seq. Line :    2
Sample Name     : MIXED STD 0.1563         Location  : Vial 2
Acq. Operator   : Kamonwan                 Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/8/2013 10:16:43 AM by Kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.730	BB	6.07219	1.82208e-2	1.10640e-1		Proto
17.877	BB	2.51608	4.63455e-2	1.16609e-1		m-Hydroxy
18.644	BB	20.97887	6.33781e-3	1.32960e-1		Cafeic + Vanilic
19.986		-	-	-		p-Hydroxy
22.846	BB +	17.17339	5.70136e-3	9.79116e-2		p-Coum
23.684	BB +	9.12303	1.28536e-2	1.17264e-1		Ferulic
24.328	BB +	5.97086	7.45529e-2	4.45145e-1		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 1.02053

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

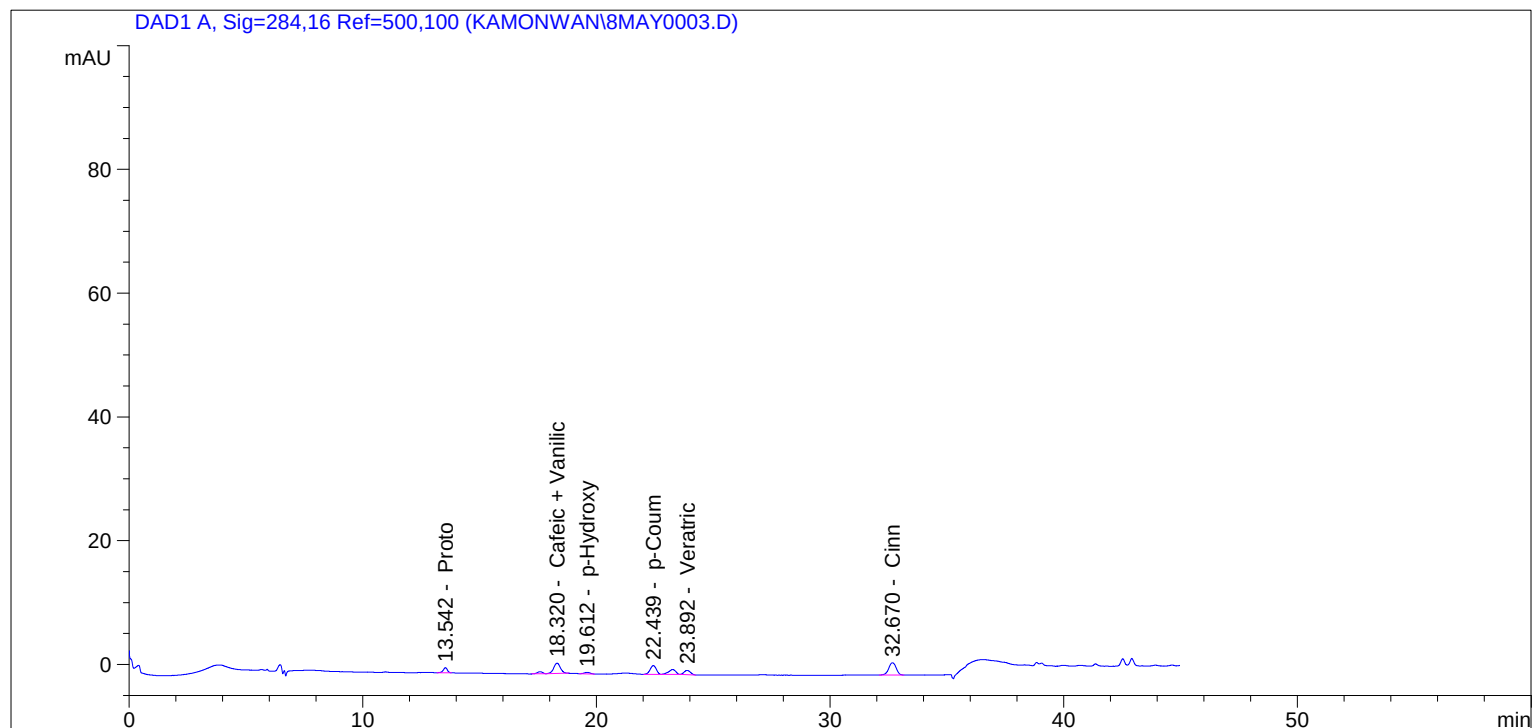
```

=====
*** End of Report ***
=====

```



```
=====
Injection Date   : 5/8/2013 10:17:10 AM      Seq. Line :    3
Sample Name      : MIXED STD 0.3125          Location  : Vial 3
Acq. Operator    : Kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/8/2013 11:28:44 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.542	BB	10.00159	1.82208e-2	1.82237e-1		Proto
17.585	BB	5.30103	4.63455e-2	2.45679e-1		m-Hydroxy
18.320	BB	33.49479	6.33781e-3	2.12284e-1		Cafeic + Vanilic
19.612	BB	4.05159	4.84779e-2	1.96413e-1		p-Hydroxy
22.439	BB +	25.33481	5.70136e-3	1.44443e-1		p-Coum
23.258	BB +	16.34580	1.28536e-2	2.10103e-1		Ferulic
23.892	BB +	12.49993	7.45529e-2	9.31905e-1		Veratric
27.223		-	-	-		Benz
32.670	BB +	43.39304	4.04527e-3	1.75537e-1		Cinn

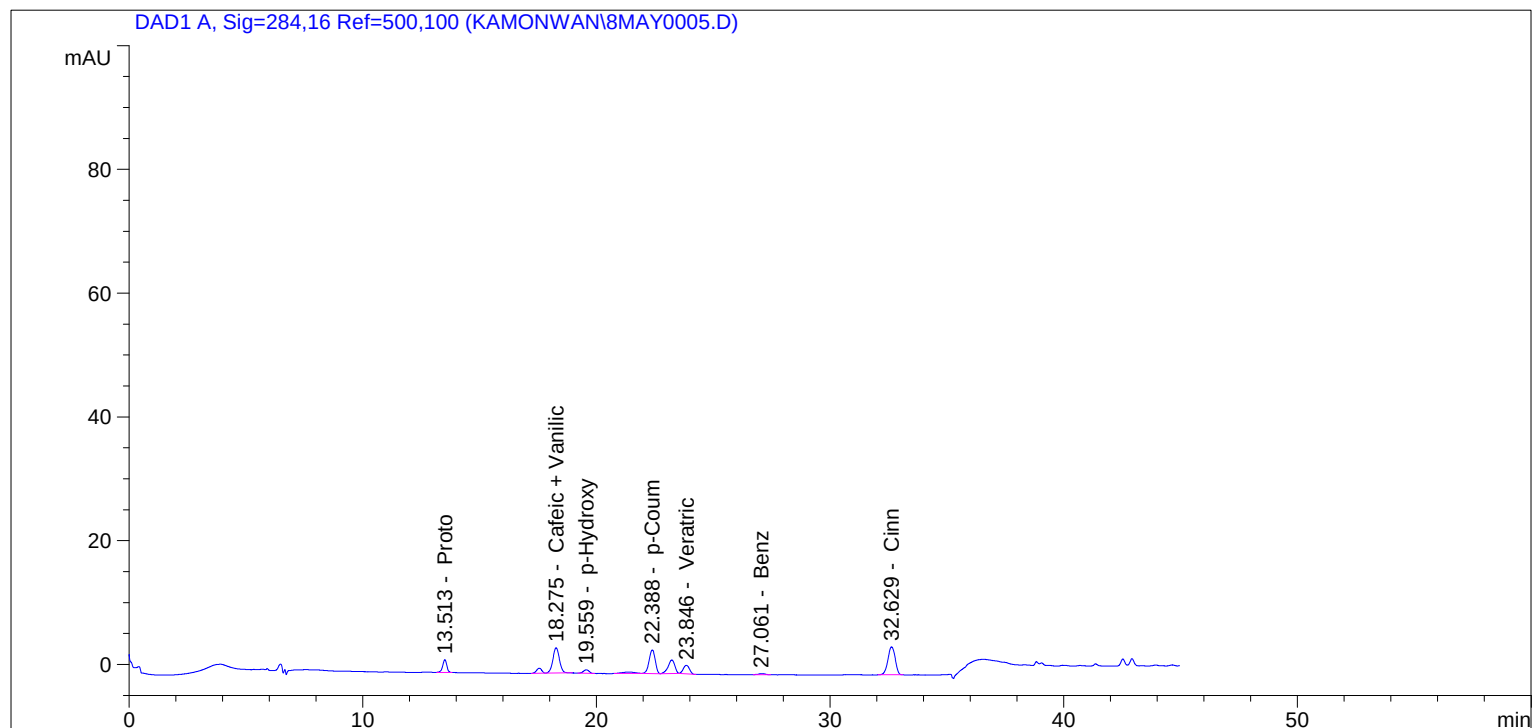
Totals : 2.29860

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 5/8/2013 11:49:50 AM      Seq. Line :    5
Sample Name     : MIXED STD 1.25            Location  : Vial 5
Acq. Operator   : Kamonwan                  Inj       :    1
Acq. Instrument : Instrument 1              Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/4/2013 9:00:35 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/8/2013 11:28:44 AM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.513	BB	24.90083	1.82208e-2	4.53713e-1		Proto
17.556	BB	12.33131	4.63455e-2	5.71501e-1		m-Hydroxy
18.275	BB	79.56999	6.33781e-3	5.04299e-1		Cafeic + Vanilic
19.559	BB	9.82361	4.84779e-2	4.76228e-1		p-Hydroxy
22.388	BB +	68.68882	5.70136e-3	3.91619e-1		p-Coum
23.226	BB +	42.69025	1.28536e-2	5.48724e-1		Ferulic
23.846	BB +	24.92653	7.45529e-2	1.85834		Veratric
27.061	BB +	3.28522	1.20492e-1	3.95843e-1		Benz
32.629	BB +	97.78198	4.04527e-3	3.95555e-1		Cinn

Totals : 5.59583

Results obtained with enhanced integrator!

1 Warnings or Errors :

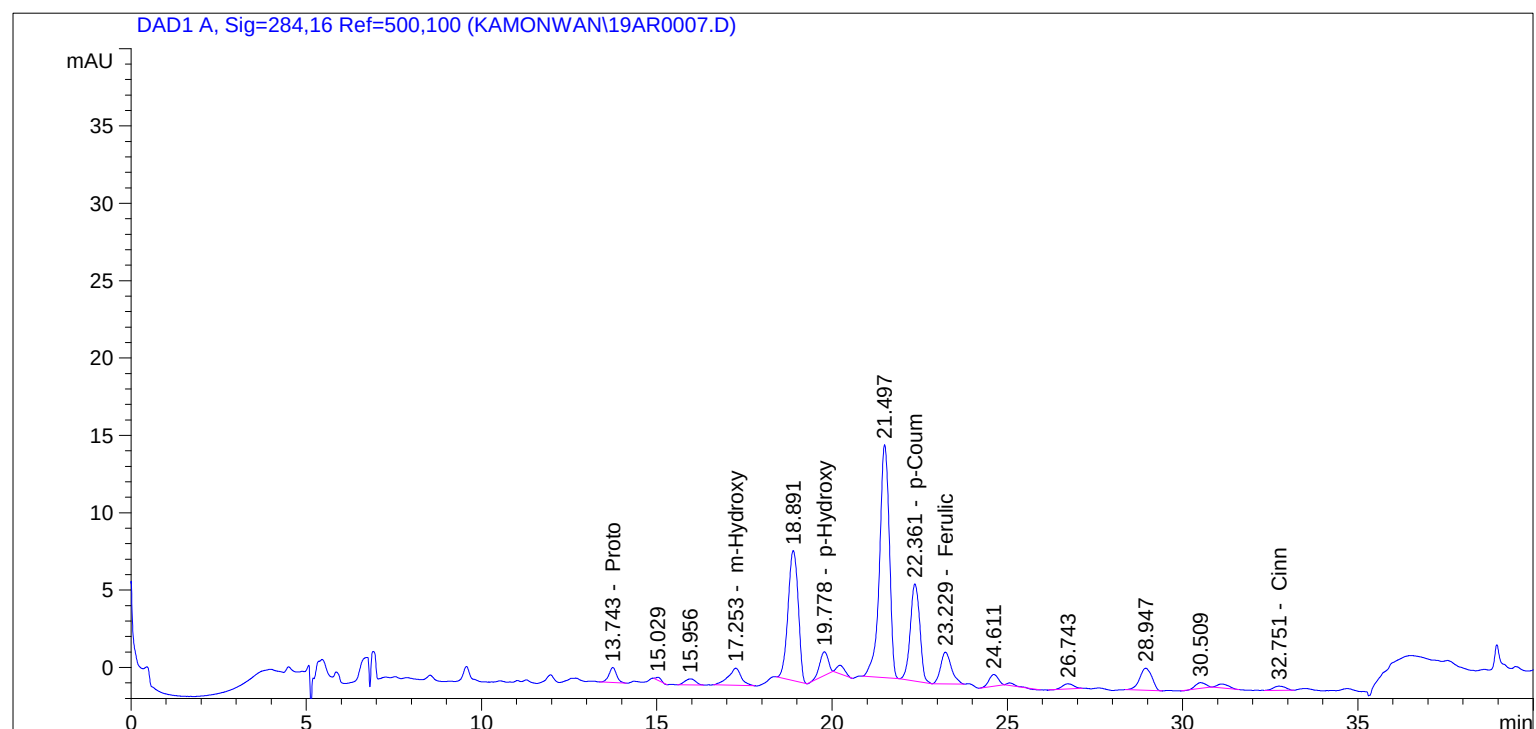
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/19/2013 2:14:16 PM      Seq. Line   :    7
Sample Name     : MMM FPA                  Location    : Vial 7
Acq. Operator   : kamonwan                 Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 11:17:38 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.743	BB	14.79098	1.82208e-2	2.69503e-1		Proto
17.253	BB	28.69003	4.63455e-2	1.32965		m-Hydroxy
18.325		-	-	-		Cafeic + Vanilic
19.778	BB	25.69035	4.84779e-2	1.24541		p-Hydroxy
22.361	BB +	118.68379	5.70136e-3	6.76658e-1		p-Coum
23.229	BB +	43.58466	1.28536e-2	5.60221e-1		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.751	BB +	6.53136	4.04527e-3	2.64211e-2		Cinn

Totals : 4.10787

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

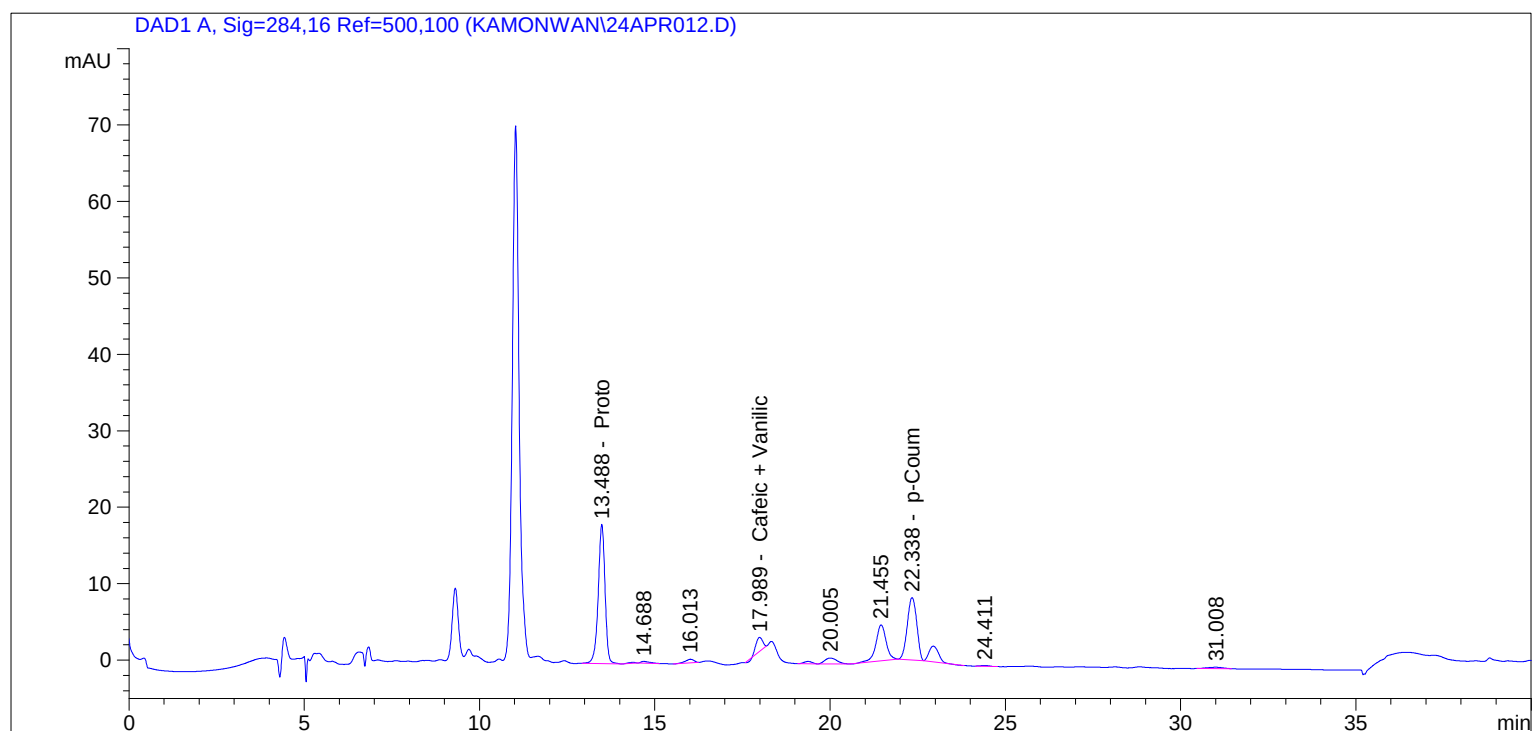
=====
*** End of Report ***
=====

```

=====

Injection Date	: 4/24/2013 4:47:10 PM	Seq. Line	: 12
Sample Name	: MMM LIB EST B	Location	: Vial 12
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 4:48:33 PM by kamonwan		
	(modified after loading)		

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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.488	BB	245.52095	1.82208e-2	4.47358		Proto
17.522		-	-	-		m-Hydroxy
17.989	BB	23.06005	6.33781e-3	1.46150e-1		Cafeic + Vanilic
19.375	BB	5.10397	4.84779e-2	2.47430e-1		p-Hydroxy
22.338	BB +	152.34871	5.70136e-3	8.68594e-1		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 5.73576

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

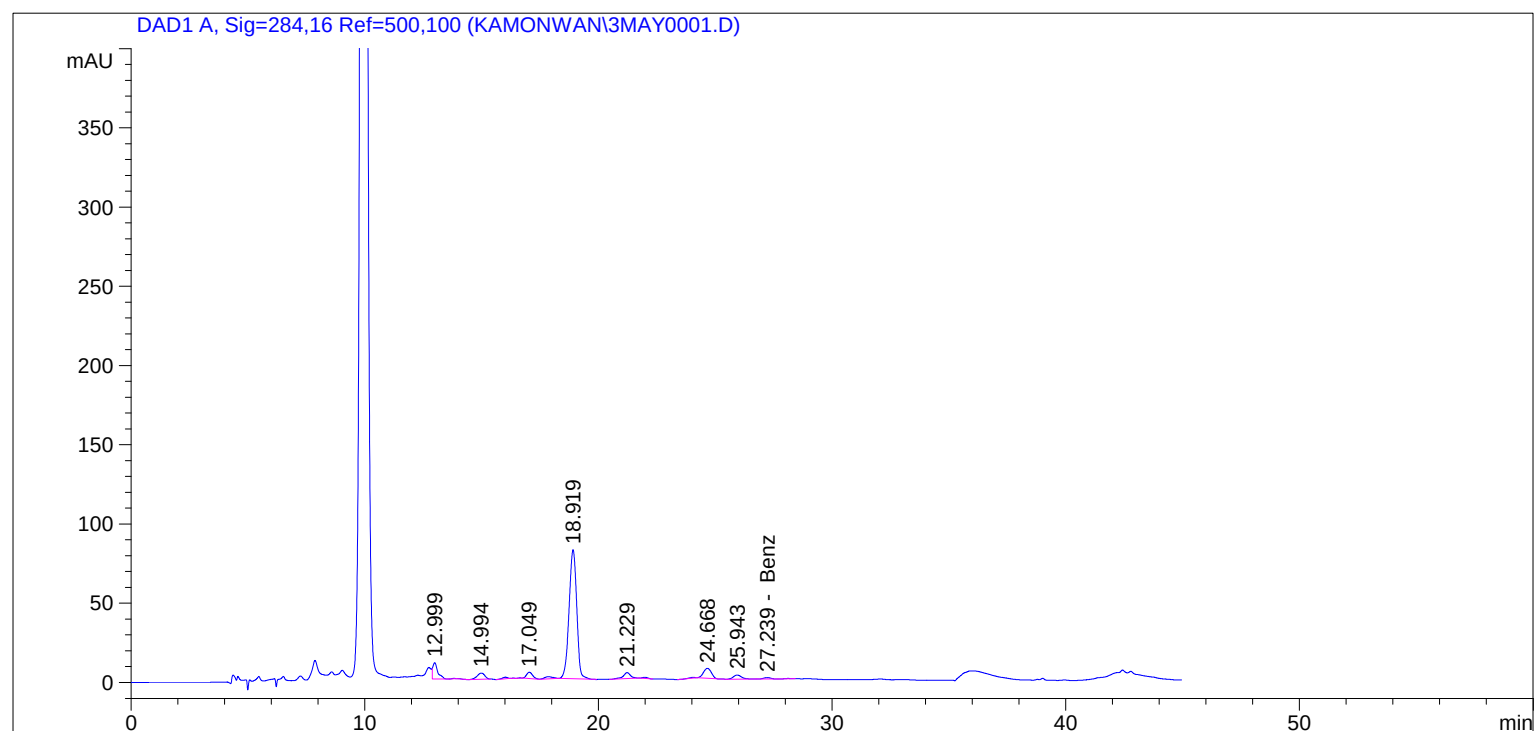
*** End of Report ***

=====

```

=====
Injection Date   : 5/3/2013 9:31:47 AM      Seq. Line :    1
Sample Name     : MMM LIB GLY B           Location  : Vial 1
Acq. Operator   : Kamonwan                Inj       :    1
Acq. Instrument : Instrument 1             Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/3/2013 9:29:49 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/3/2013 10:27:09 AM by Kamonwan
                  (modified after loading)
=====

```



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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.816	BB	1.69670	1.82208e-2	3.09152e-2		Proto
17.857	BB	32.66862	4.63455e-2	1.51404		m-Hydroxy
18.487		-	-	-		Cafeic + Vanilic
19.735		-	-	-		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
24.057	BB +	3.64762	7.45529e-2	2.71940e-1		Veratric
27.239	BB +	20.73507	1.20492e-1	2.49842		Benz
32.718		-	-	-		Cinn

Totals : 4.31532

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

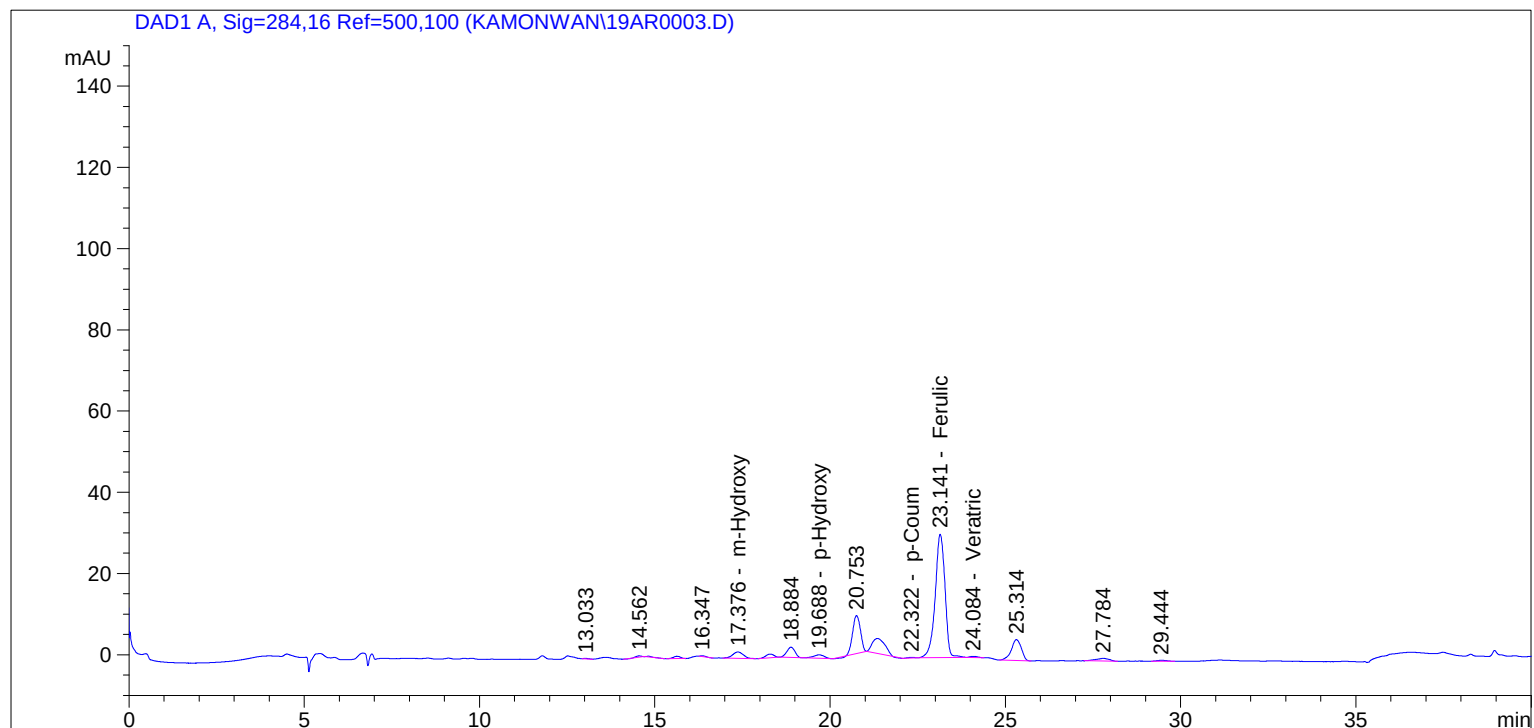
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/19/2013 11:08:55 AM      Seq. Line   :    3
Sample Name     : MMY FPA                    Location    : Vial 3
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                 Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:59:33 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
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```

```

Sorted By       :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier      :      1.0000
Dilution        :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.510		-	-	-		Proto
17.376	BB	33.07307	4.63455e-2	1.53279		m-Hydroxy
18.292	BB	15.09511	6.33781e-3	9.56699e-2		Cafeic + Vanilic
19.688	BB	18.07039	4.84779e-2	8.76014e-1		p-Hydroxy
22.322	BB +	1.78521	5.70136e-3	1.01781e-2		p-Coum
23.141	BB +	587.47113	1.28536e-2	7.55113		Ferulic
24.084	BB +	4.33631	7.45529e-2	3.23284e-1		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 10.38907

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

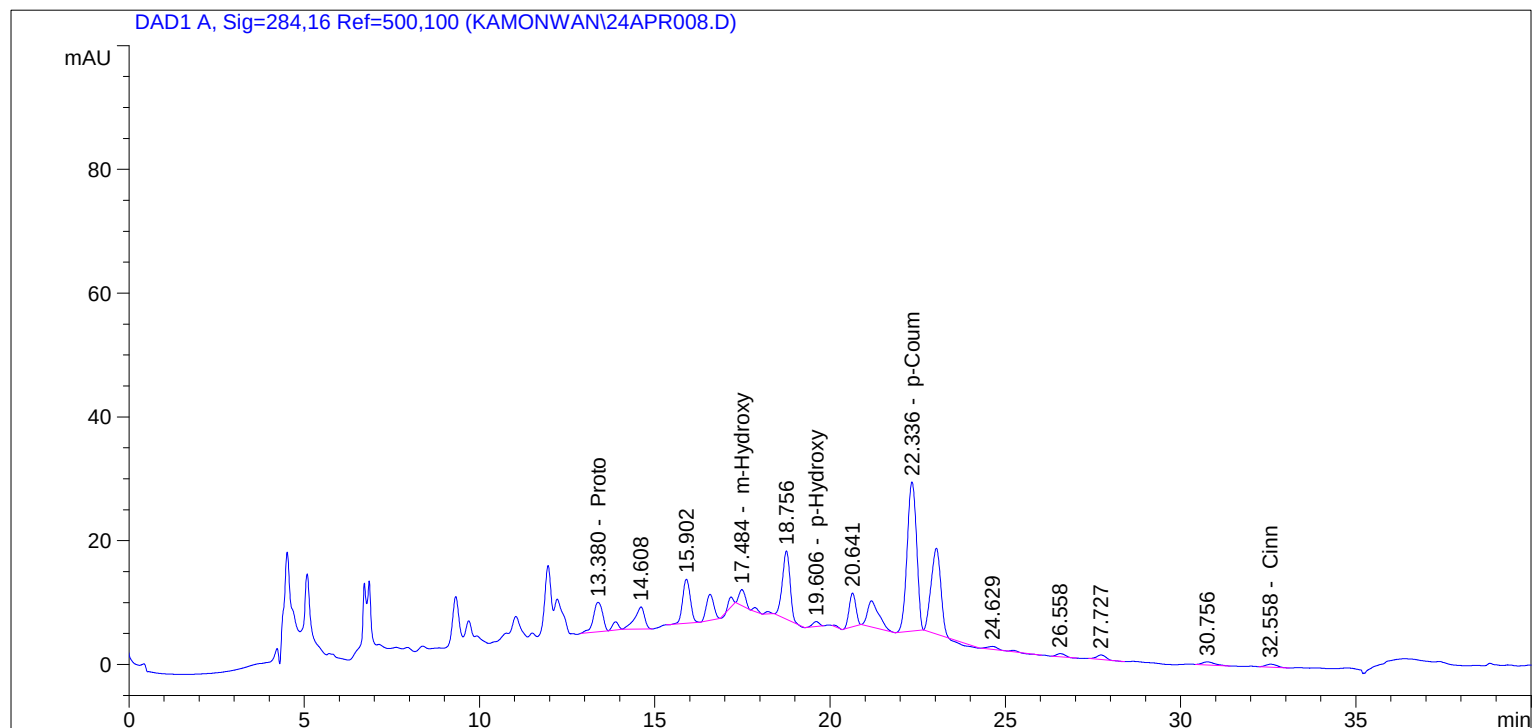
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/24/2013 1:41:44 PM      Seq. Line   :    8
Sample Name     : MMY LIB EST B             Location    : Vial 8
Acq. Operator   : kamonwan                  Inj         :    1
Acq. Instrument : Instrument 1               Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 3:11:13 PM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
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```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.380	BB	86.75217	1.82208e-2	1.58069		Proto
17.484	BB	33.06706	4.63455e-2	1.53251		m-Hydroxy
18.223	BB	3.72751	6.33781e-3	2.36242e-2		Cafeic + Vanilic
19.606	BB	10.42986	4.84779e-2	5.05618e-1		p-Hydroxy
22.336	BB +	451.63126	5.70136e-3	2.57491		p-Coum
23.032	BB +	252.88551	1.28536e-2	3.25049		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.558	BB +	10.08248	4.04527e-3	4.07864e-2		Cinn

Totals : 9.50864

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

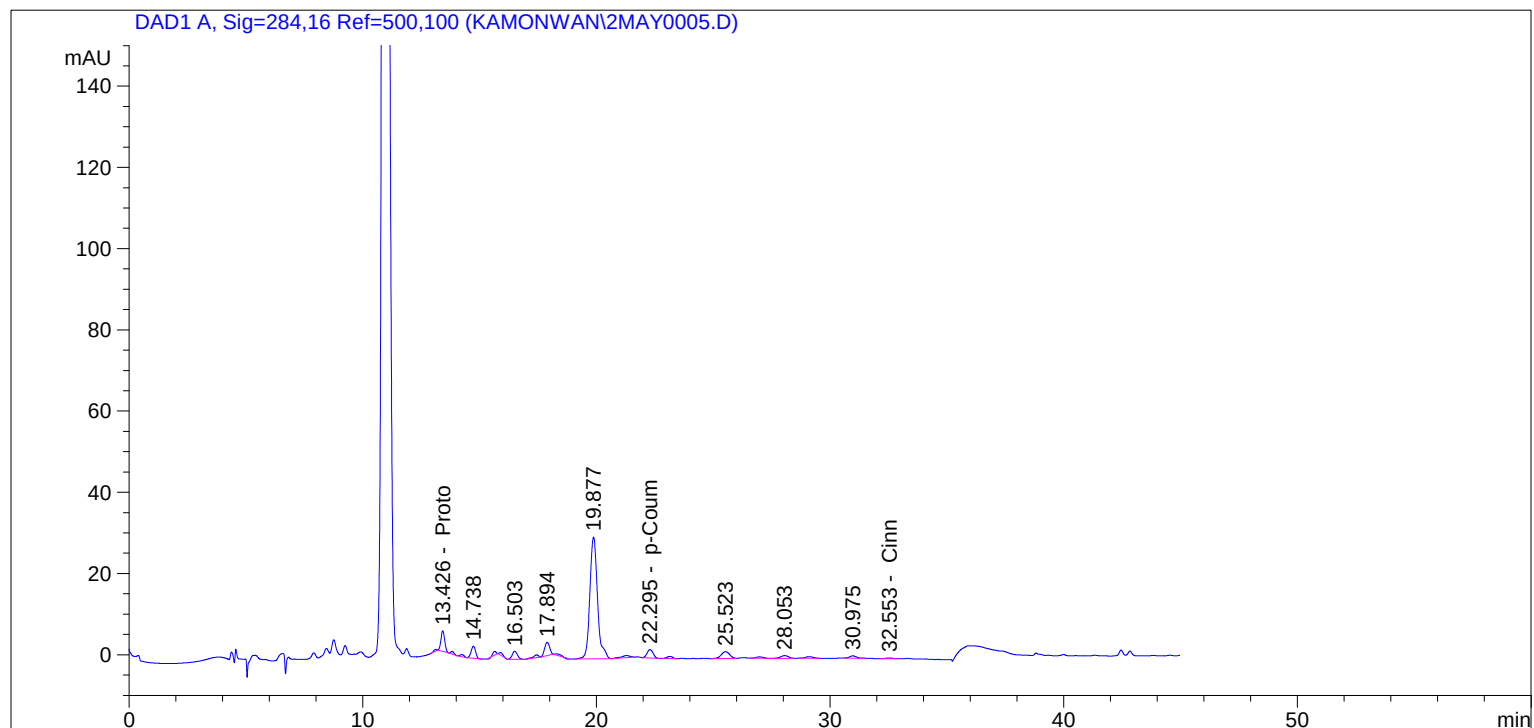
=====
*** End of Report ***
=====

```

=====

Injection Date	: 5/2/2013 2:53:52 PM	Seq. Line	: 5
Sample Name	: MMY LIB GLY B	Location	: Vial 5
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/2/2013 11:47:14 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/2/2013 3:41:11 PM by Kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.426	BB	56.26148	1.82208e-2	1.02513		Proto
17.438	BB	10.08324	4.63455e-2	4.67313e-1		m-Hydroxy
18.262	BB	4.64772	6.33781e-3	2.94564e-2		Cafeic + Vanilic
19.504		-	-	-		p-Hydroxy
22.295	BB +	36.79447	5.70136e-3	2.09778e-1		p-Coum
23.139	BB +	9.33940	1.28536e-2	1.20045e-1		Ferulic
23.993		-	-	-		Veratric
26.993	BB +	7.72400	1.20492e-1	9.30682e-1		Benz
32.553	BB +	4.00906	4.04527e-3	1.62177e-2		Cinn

Totals : 2.79862

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

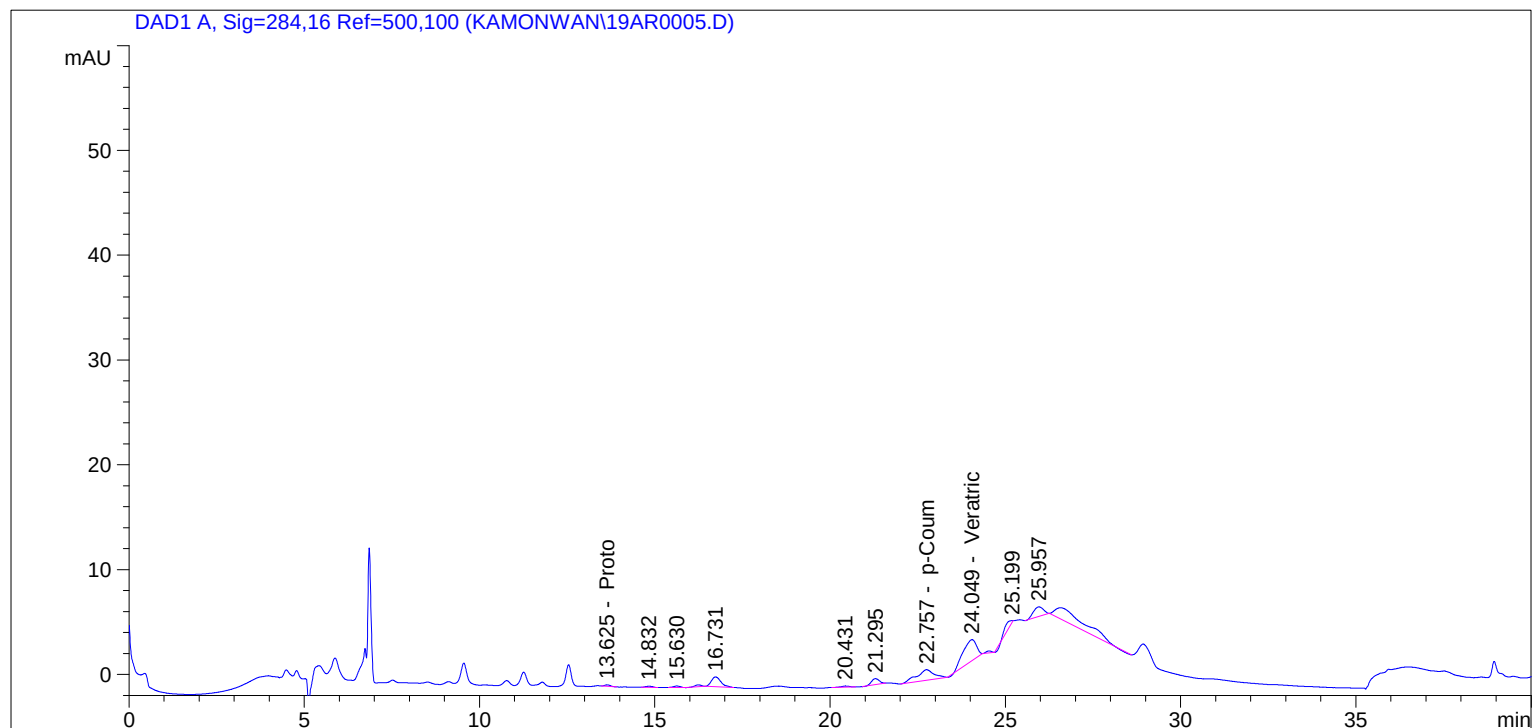
*** End of Report ***

=====


```

=====
Injection Date   : 4/19/2013 12:41:36 PM      Seq. Line   :    5
Sample Name     : MPA FPA                    Location    : Vial 5
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 11:15:42 AM by kamonwan
                  (modified after loading)
=====

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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.625	BB	1.58878	1.82208e-2	2.89488e-2		Proto
17.850		-	-	-		m-Hydroxy
18.649		-	-	-		Cafeic + Vanilic
19.908		-	-	-		p-Hydroxy
22.757	BB +	34.87390	5.70136e-3	1.98828e-1		p-Coum
23.381		-	-	-		Ferulic
24.049	BB +	56.04335	7.45529e-2	4.17819		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 4.40597

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

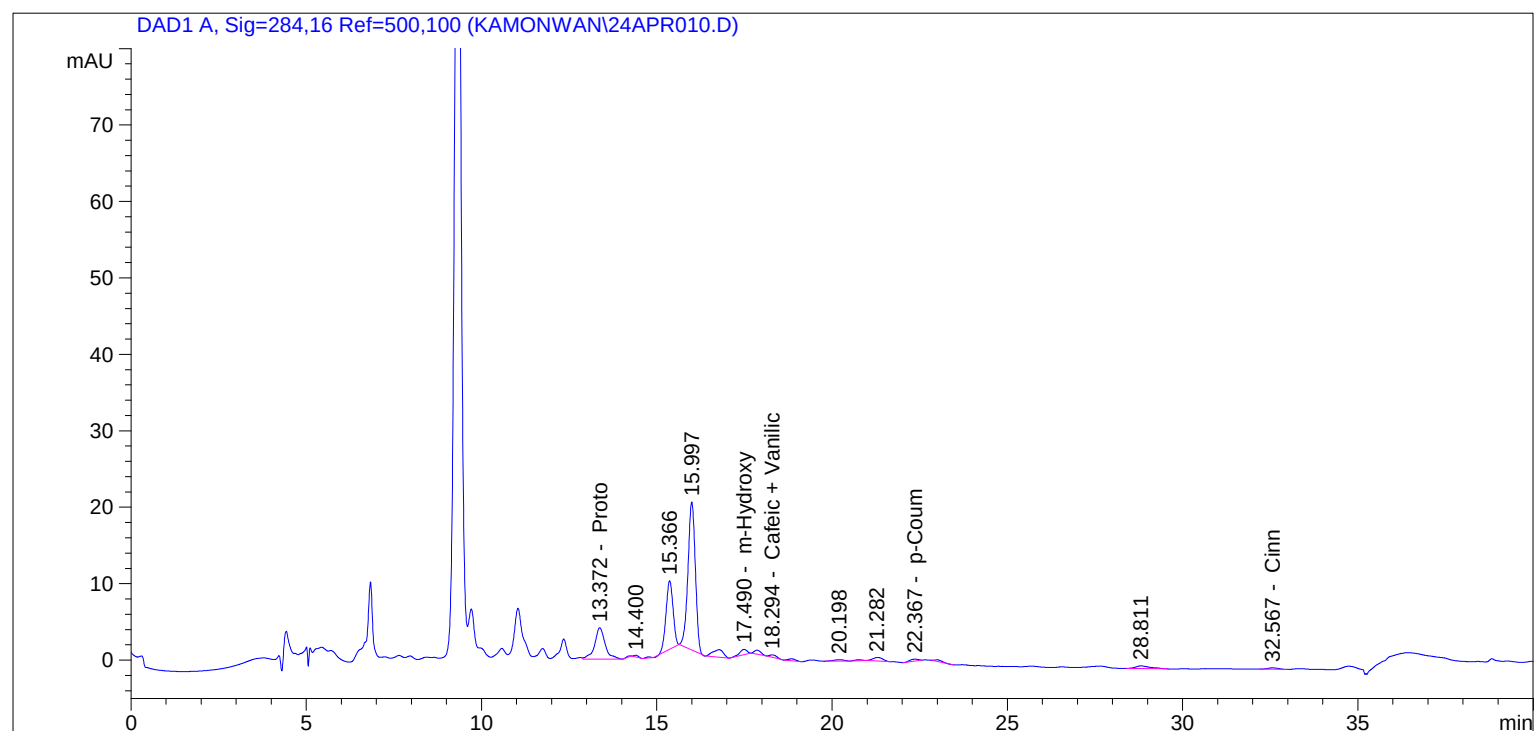
=====
*** End of Report ***
=====

```

=====

Injection Date	: 4/24/2013 3:14:30 PM	Seq. Line	: 10
Sample Name	: MPA LIB EST B	Location	: Vial 10
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 4:05:56 PM by kamonwan		
	(modified after loading)		

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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.372	BB	85.31809	1.82208e-2	1.55456		Proto
17.490	BB	10.12155	4.63455e-2	4.69089e-1		m-Hydroxy
18.294	BB	4.30851	6.33781e-3	2.73065e-2		Cafeic + Vanilic
19.567		-	-	-		p-Hydroxy
22.367	BB +	3.99080	5.70136e-3	2.27530e-2		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.567	BB +	3.98378	4.04527e-3	1.61155e-2		Cinn

Totals : 2.08983

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

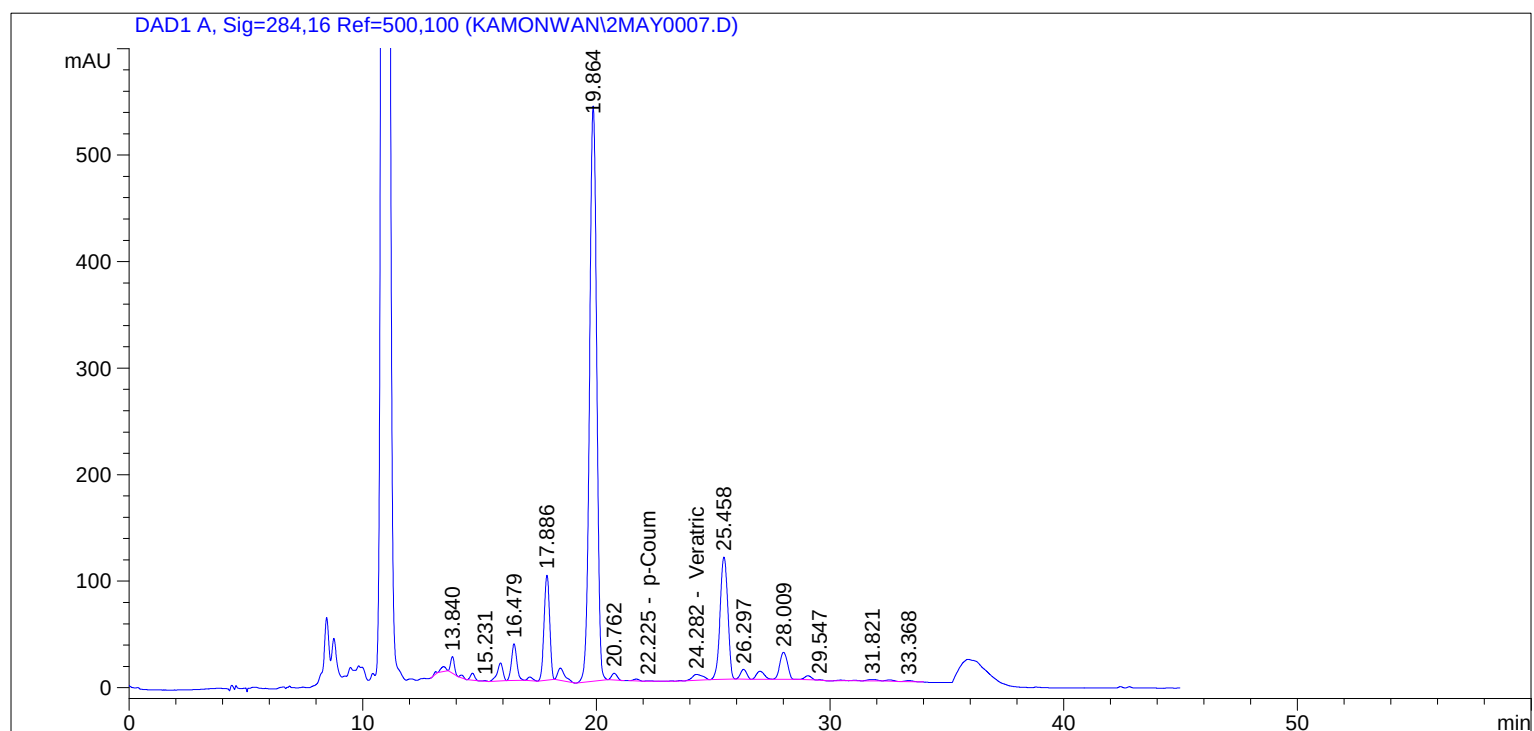
=====

*** End of Report ***

```

=====
Injection Date   : 5/2/2013 4:26:34 PM      Seq. Line :    7
Sample Name     : MPA LIB GLY B           Location  : Vial 7
Acq. Operator   : Kamonwan                Inj       :    1
Acq. Instrument : Instrument 1             Inj Volume: 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 5/2/2013 11:47:14 AM by Kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 5/2/2013 6:00:11 PM by Kamonwan
                  (modified after loading)
=====

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External Standard Report
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```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.465	BB	67.86835	1.82208e-2	1.23661		Proto
17.153	BB	51.26369	4.63455e-2	2.37584		m-Hydroxy
18.460	BB	240.77600	6.33781e-3	1.52599		Cafeic + Vanilic
19.443		-	-	-		p-Hydroxy
22.225	BB +	7.56344	5.70136e-3	4.31218e-2		p-Coum
23.596	BB +	4.10350	1.28536e-2	5.27449e-2		Ferulic
24.282	BB +	176.61359	7.45529e-2	13.16705		Veratric
27.001	BB +	176.43921	1.20492e-1	21.25955		Benz
32.549	BB +	23.50151	4.04527e-3	9.50700e-2		Cinn

Totals : 39.75599

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

```

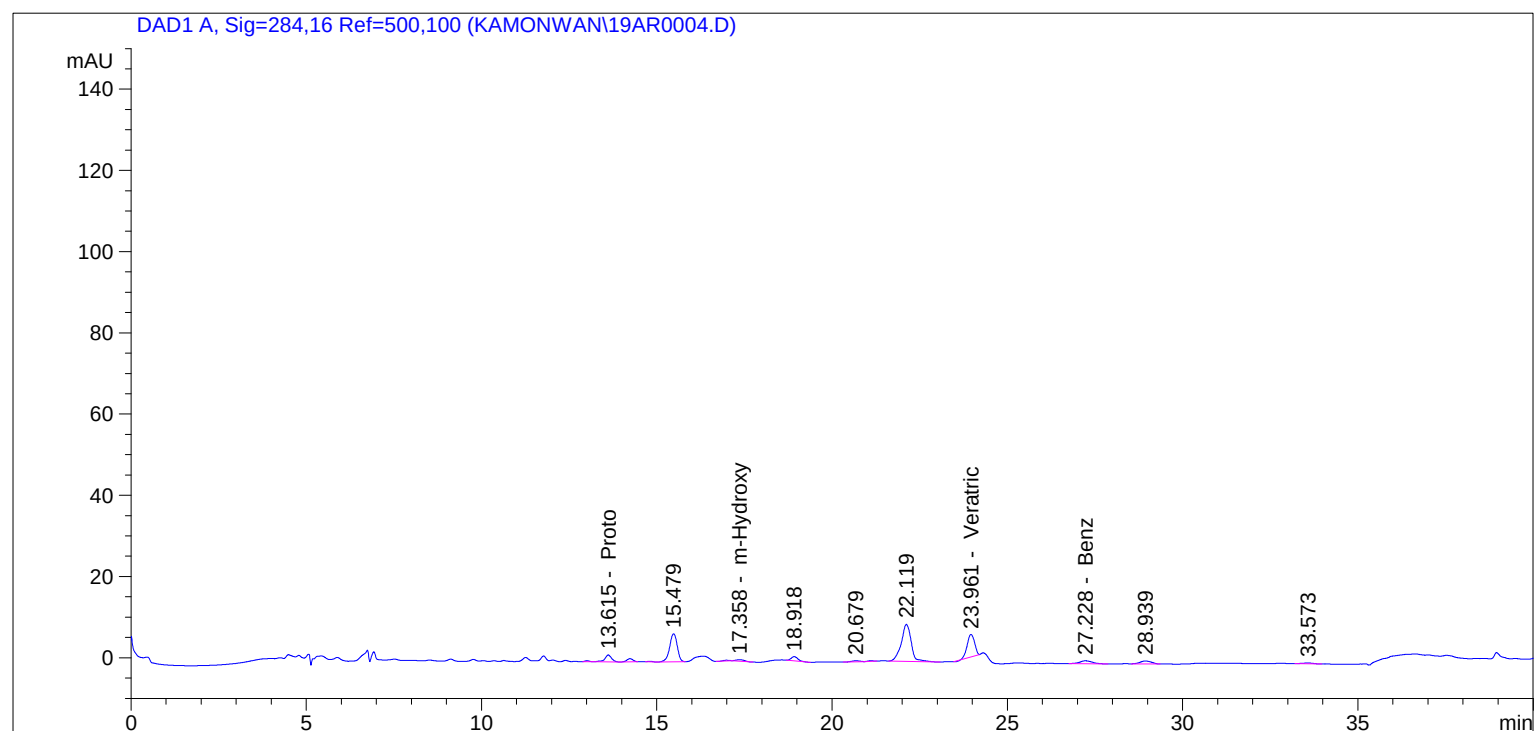
=====
*** End of Report ***
=====

```

```

=====
Injection Date   : 4/19/2013 11:55:16 AM      Seq. Line   :    4
Sample Name     : MSO FPA                    Location    : Vial 4
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:59:33 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
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```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.615	BB	23.36966	1.82208e-2	4.25814e-1		Proto
17.358	BB	5.89376	4.63455e-2	2.73150e-1		m-Hydroxy
18.413		-	-	-		Cafeic + Vanilic
19.657		-	-	-		p-Hydroxy
22.499		-	-	-		p-Coum
23.381		-	-	-		Ferulic
23.961	BB +	80.66637	7.45529e-2	6.01391		Veratric
27.228	BB +	17.99889	1.20492e-1	2.16873		Benz
32.718		-	-	-		Cinn

Totals : 8.88160

Results obtained with enhanced integrator!
 2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

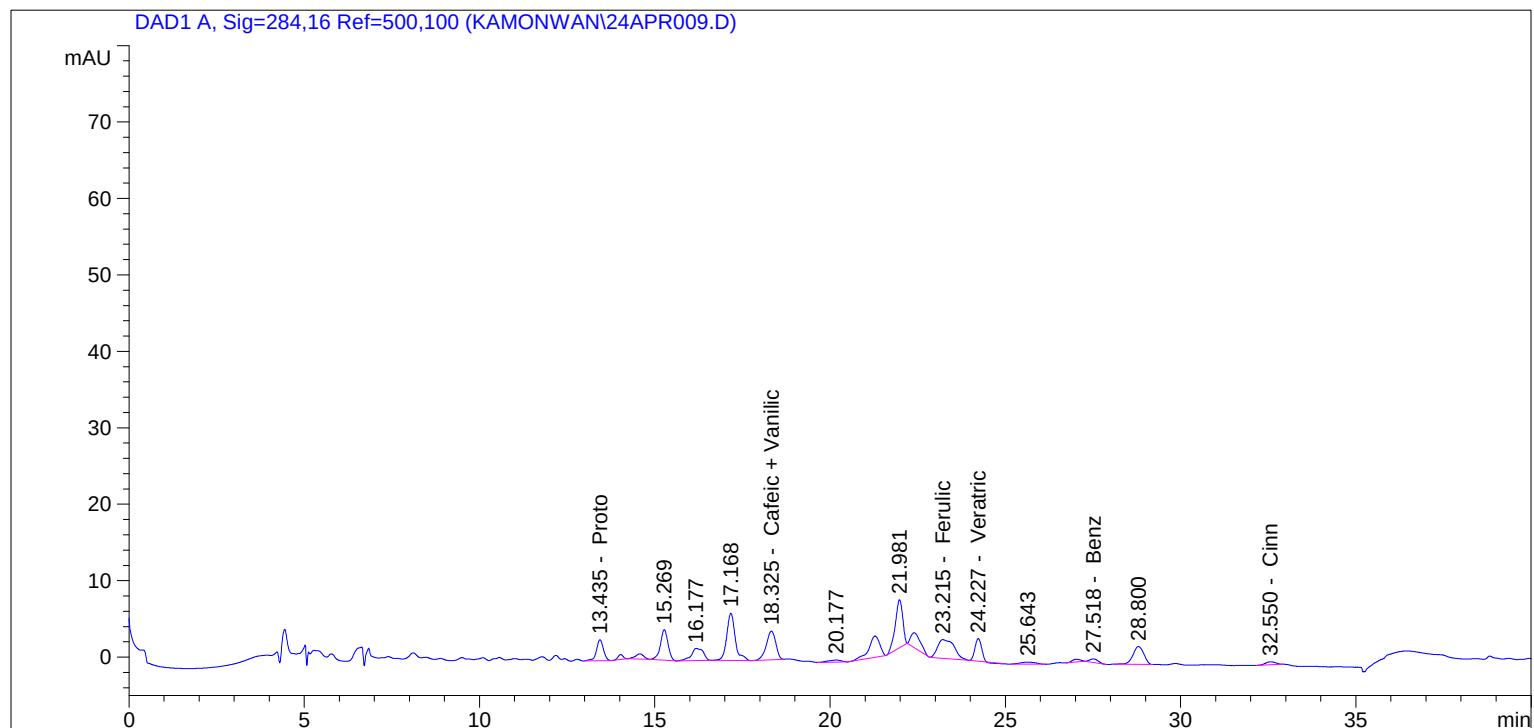
```

=====

Injection Date	: 4/24/2013 2:28:03 PM	Seq. Line	: 9
Sample Name	: MSO LIB EST B	Location	: Vial 9
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/24/2013 8:16:15 AM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/24/2013 3:15:33 PM by kamonwan		

(modified after loading)

=====



=====

External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.435	BB	38.04057	1.82208e-2	6.93129e-1		Proto
17.566		-	-	-		m-Hydroxy
18.325	BB	70.80603	6.33781e-3	4.48755e-1		Cafeic + Vanilic
19.591		-	-	-		p-Hydroxy
22.394	BB +	37.67245	5.70136e-3	2.14784e-1		p-Coum
23.215	BB +	81.42449	1.28536e-2	1.04660		Ferulic
24.227	BB +	38.17682	7.45529e-2	2.84619		Veratric
27.518	BB +	7.55577	1.20492e-1	9.10411e-1		Benz
32.550	BB +	7.50833	4.04527e-3	3.03732e-2		Cinn

Totals : 6.19024

Results obtained with enhanced integrator!
2 Warnings or Errors :

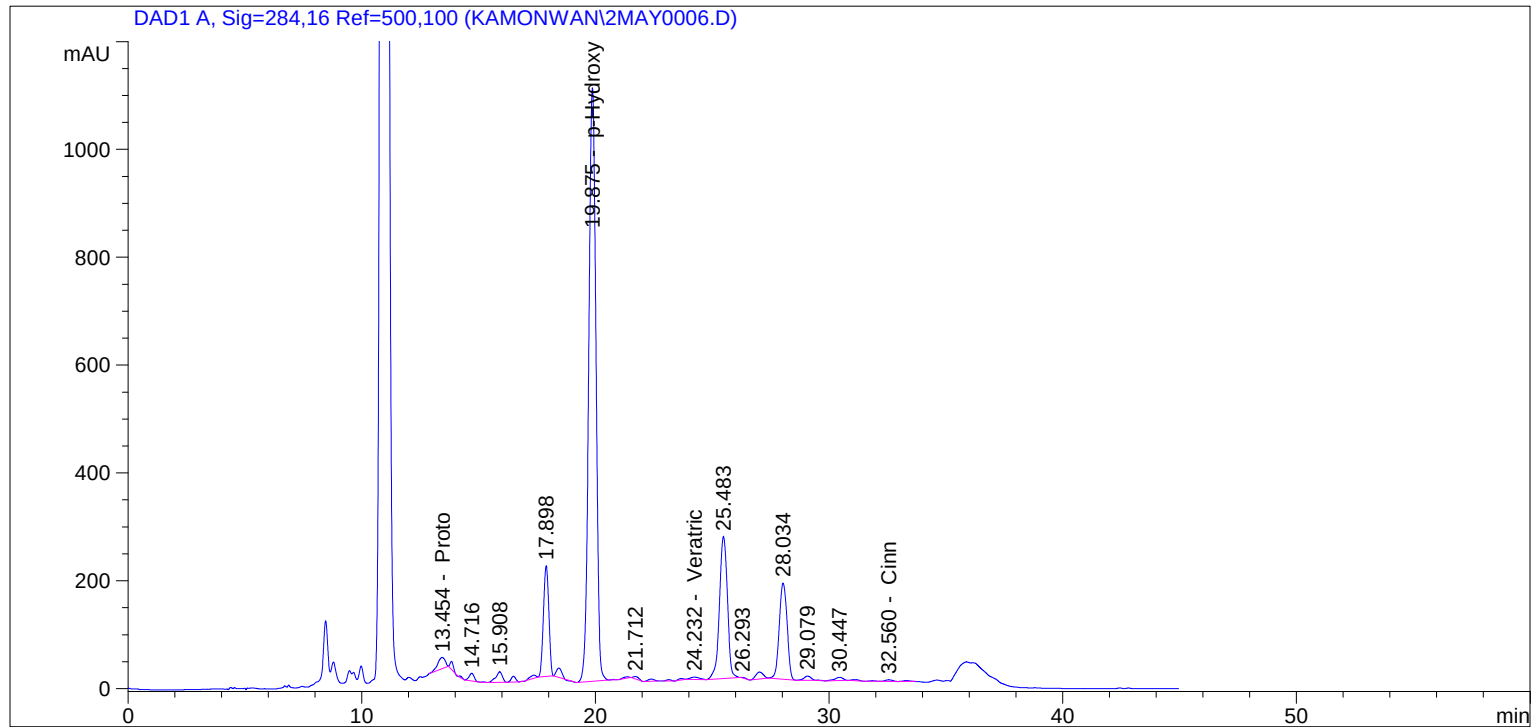
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

*** End of Report ***

=====

```
=====
Injection Date   : 5/2/2013 3:40:14 PM      Seq. Line   :    6
Sample Name      : MSO LIB GLY B           Location    : Vial 6
Acq. Operator    : Kamonwan                Inj         :    1
Acq. Instrument  : Instrument 1             Inj Volume   : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 5/2/2013 11:47:14 AM by Kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 5/2/2013 4:51:49 PM by Kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.454	BB	465.53577	1.82208e-2	8.48243		Proto
17.381	BB	110.64491	4.63455e-2	5.12790		m-Hydroxy
18.440	BB	266.91995	6.33781e-3	1.69169		Cafeic + Vanilic
19.875	BB	2.34604e4	4.84779e-2	1137.30880		p-Hydroxy
22.396	BB +	77.50217	5.70136e-3	4.41867e-1		p-Coum
23.671	BB +	39.30066	1.28536e-2	5.05156e-1		Ferulic
24.232	BB +	112.18050	7.45529e-2	8.36338		Veratric
27.028	BB +	277.19962	1.20492e-1	33.40040		Benz
32.560	BB +	60.43670	4.04527e-3	2.44483e-1		Cinn

Totals : 1195.56610

Results obtained with enhanced integrator!
1 Warnings or Errors :

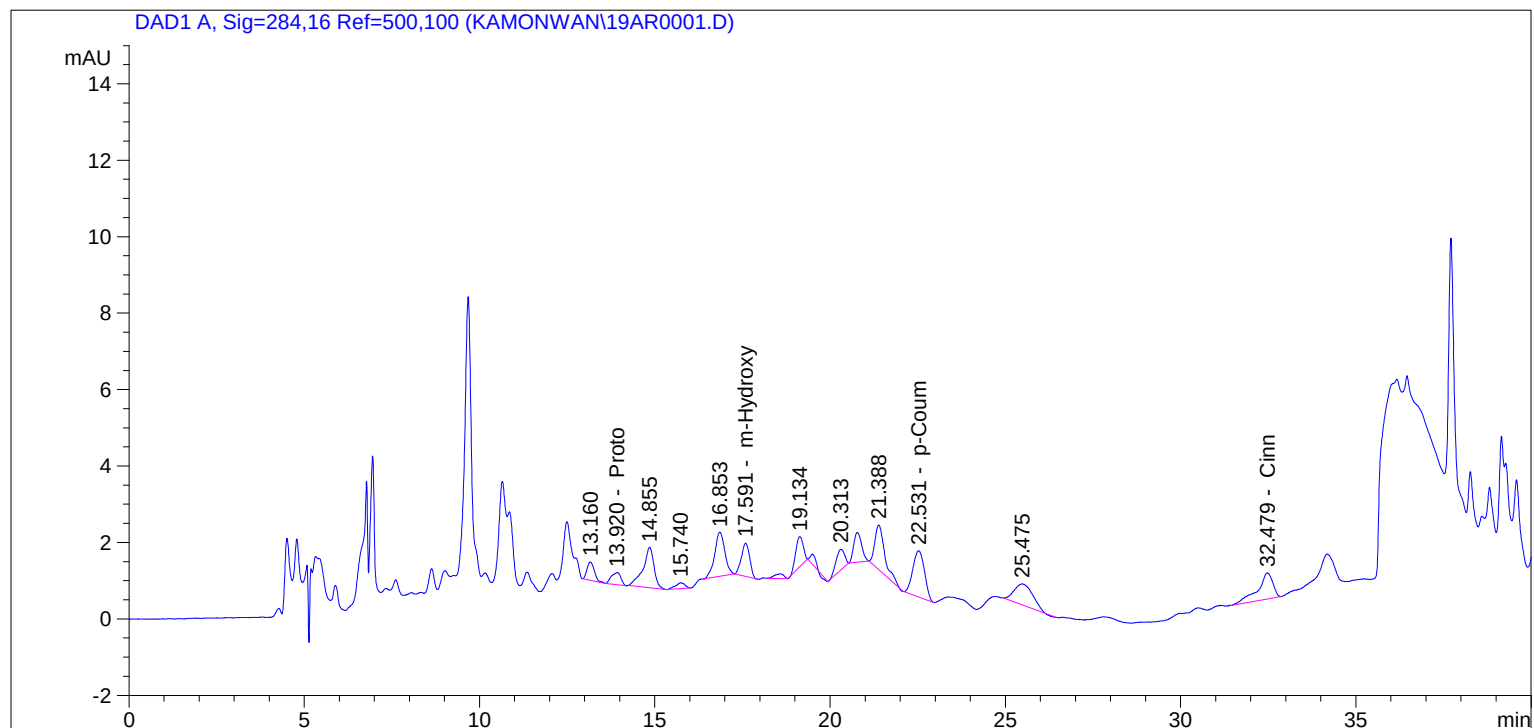
Warning : Calibration warnings (see calibration table listing)

```
=====
*** End of Report ***
=====
```

```

=====
Injection Date   : 4/19/2013 9:36:16 AM      Seq. Line   :    1
Sample Name     : MTK FPA                  Location    : Vial 1
Acq. Operator   : kamonwan                 Inj         :    1
Acq. Instrument : Instrument 1              Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/19/2013 9:35:01 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/23/2013 10:56:40 AM by kamonwan
                  (modified after loading)
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.920	BB	6.08173	1.82208e-2	1.10814e-1		Proto
17.591	BB	14.29168	4.63455e-2	6.62356e-1		m-Hydroxy
18.584	BB	2.26777	6.33781e-3	1.43727e-2		Cafeic + Vanilic
19.503	BB	2.02971	4.84779e-2	9.83958e-2		p-Hydroxy
22.531	BB +	27.85168	5.70136e-3	1.58792e-1		p-Coum
23.381		-	-	-		Ferulic
23.993		-	-	-		Veratric
27.223		-	-	-		Benz
32.479	BB +	20.63768	4.04527e-3	8.34850e-2		Cinn

Totals : 1.12822

Results obtained with enhanced integrator!
 2 Warnings or Errors :

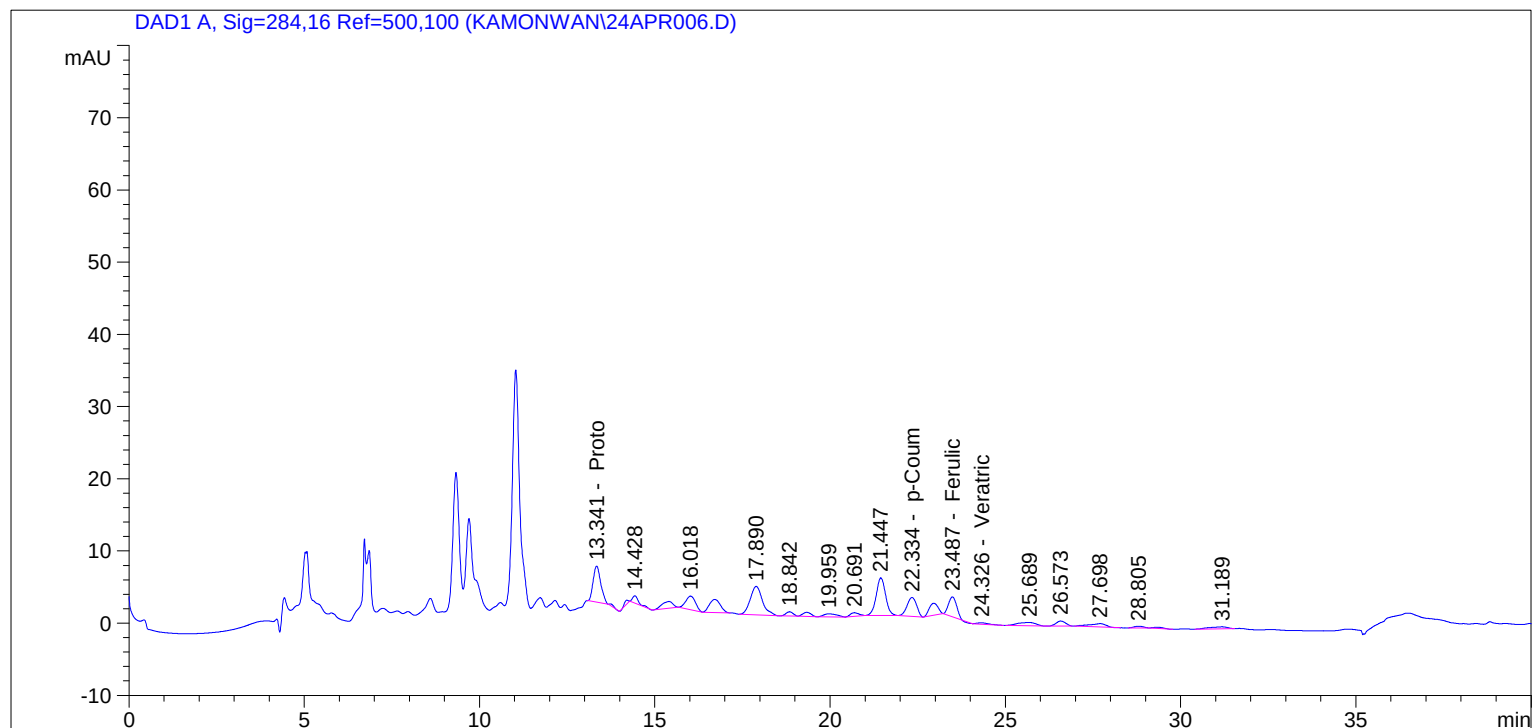
Warning : Calibration warnings (see calibration table listing)
 Warning : Time reference compound(s) not found

```

=====
*** End of Report ***
=====

```

```
=====
Injection Date   : 4/24/2013 12:09:02 PM      Seq. Line   :    6
Sample Name     : MTK LIB EST B              Location    : Vial 6
Acq. Operator   : kamonwan                   Inj         :    1
Acq. Instrument : Instrument 1                Inj Volume  : 20 µl
Acq. Method     : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed    : 4/24/2013 8:16:15 AM by kamonwan
Analysis Method : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed    : 4/24/2013 12:57:22 PM by kamonwan
                  (modified after loading)
=====
```



```
=====
External Standard Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:50:49 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.341	BB	75.79267	1.82208e-2	1.38100		Proto
17.518		-	-	-		m-Hydroxy
18.302		-	-	-		Cafeic + Vanilic
19.333	BB	9.19878	4.84779e-2	4.45937e-1		p-Hydroxy
22.334	BB +	49.38078	5.70136e-3	2.81537e-1		p-Coum
23.487	BB +	42.62664	1.28536e-2	5.47907e-1		Ferulic
24.326	BB +	3.95652	7.45529e-2	2.94970e-1		Veratric
27.223		-	-	-		Benz
32.718		-	-	-		Cinn

Totals : 2.95135

Results obtained with enhanced integrator!
2 Warnings or Errors :

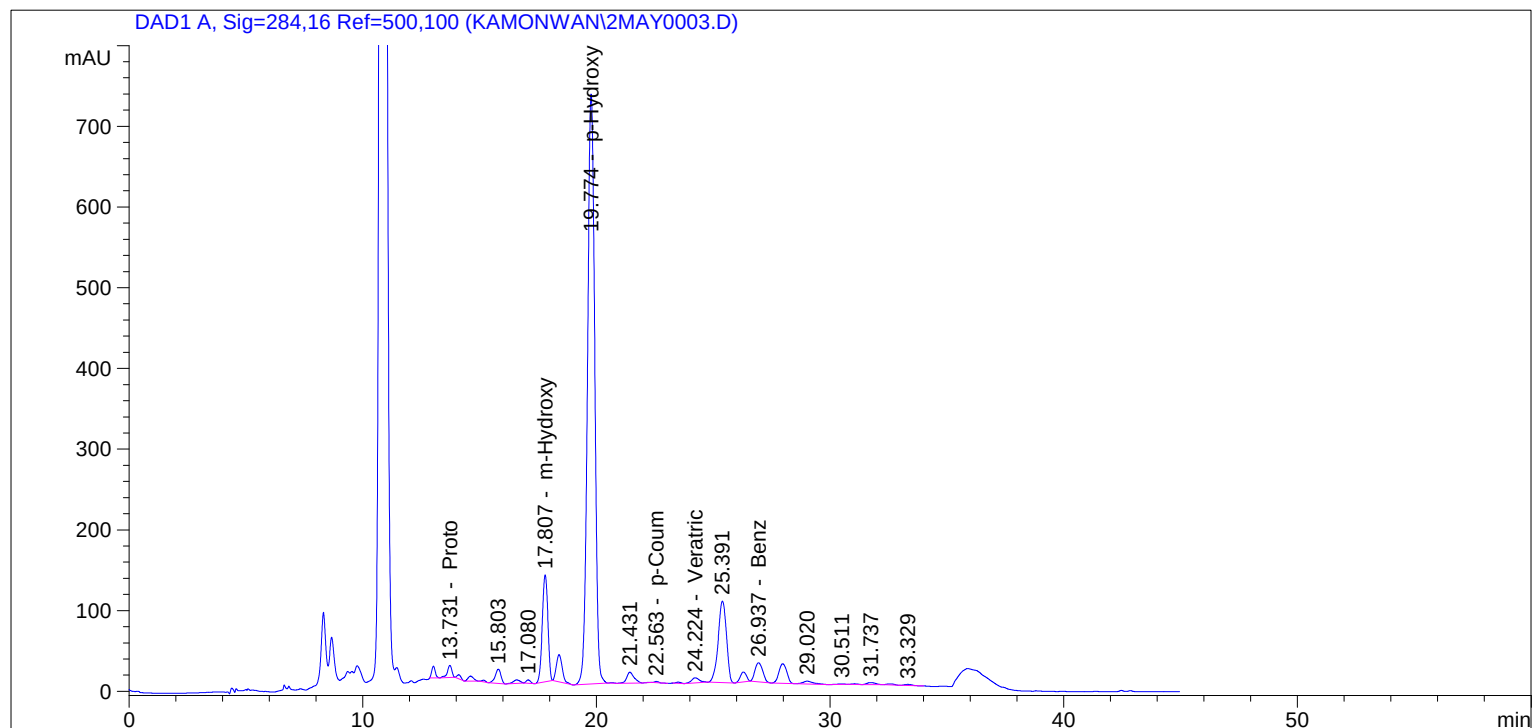
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```


=====

Injection Date	: 5/2/2013 1:21:10 PM	Seq. Line	: 3
Sample Name	: MTK LIB GLY B	Location	: Vial 3
Acq. Operator	: Kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 5/2/2013 11:47:14 AM by Kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 5/2/2013 2:24:44 PM by Kamonwan		
	(modified after loading)		

=====



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External Standard Report

=====

Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:50:49 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
13.731	BB	202.57990	1.82208e-2	3.69116		Proto
17.807	BB	2197.82910	4.63455e-2	101.85954		m-Hydroxy
18.402	BB	586.63562	6.33781e-3	3.71798		Cafeic + Vanilic
19.774	BB	1.56155e4	4.84779e-2	757.00685		p-Hydroxy
22.563	BB +	19.15624	5.70136e-3	1.09217e-1		p-Coum
23.499	BB +	21.34919	1.28536e-2	2.74414e-1		Ferulic
24.224	BB +	150.81187	7.45529e-2	11.24346		Veratric
26.937	BB +	538.62988	1.20492e-1	64.90072		Benz
32.562	BB +	29.06237	4.04527e-3	1.17565e-1		Cinn

Totals : 942.92090

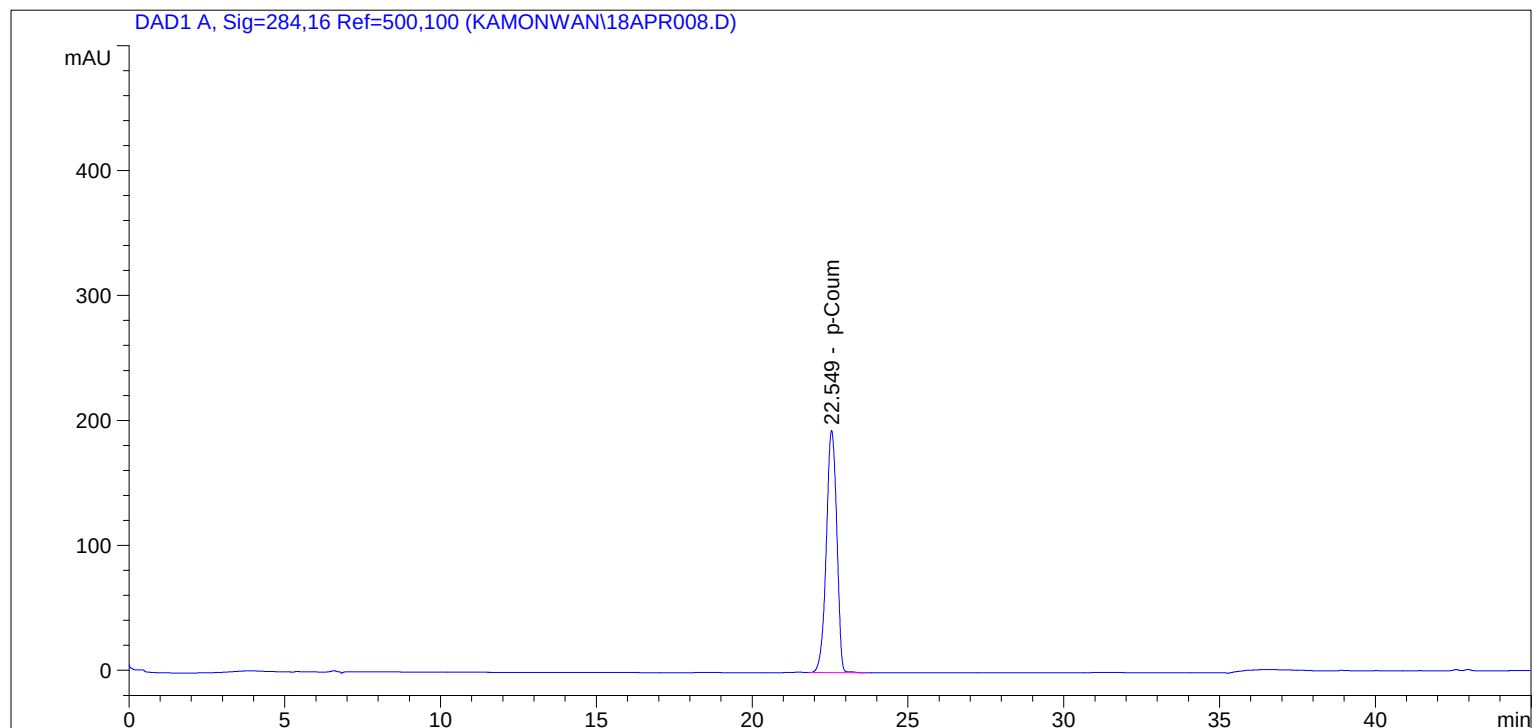
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

=====

*** End of Report ***

```
=====
Injection Date   : 4/18/2013 4:59:55 PM      Seq. Line :    7
Sample Name      : p-Coum 30 ppm             Location  : Vial 7
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1               Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:42:02 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.648		0.0000	0.00000	0.0000	Proto
2	17.687		0.0000	0.00000	0.0000	m-Hydroxy
3	18.478		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.727		0.0000	0.00000	0.0000	p-Hydroxy
5	22.549	BB +	0.3728	4530.40479	100.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

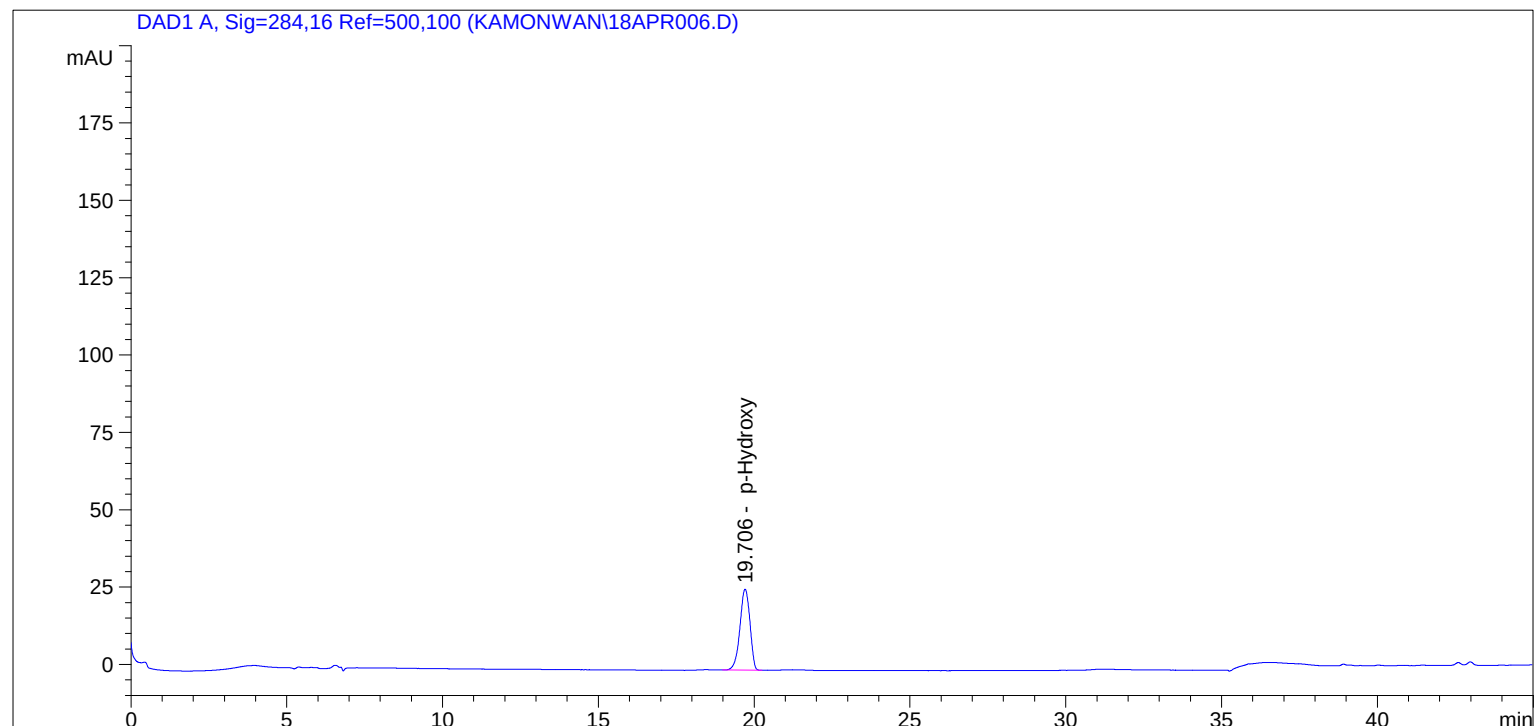
Totals : 4530.40479 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/18/2013 3:27:13 PM      Seq. Line :    5
Sample Name      : p-Hydroxy 30 ppm          Location  : Vial 5
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:40:28 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618		0.0000	0.00000	0.0000	Proto
2	17.648		0.0000	0.00000	0.0000	m-Hydroxy
3	18.437		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.706	BB	0.3548	584.88916	100.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 584.88916 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

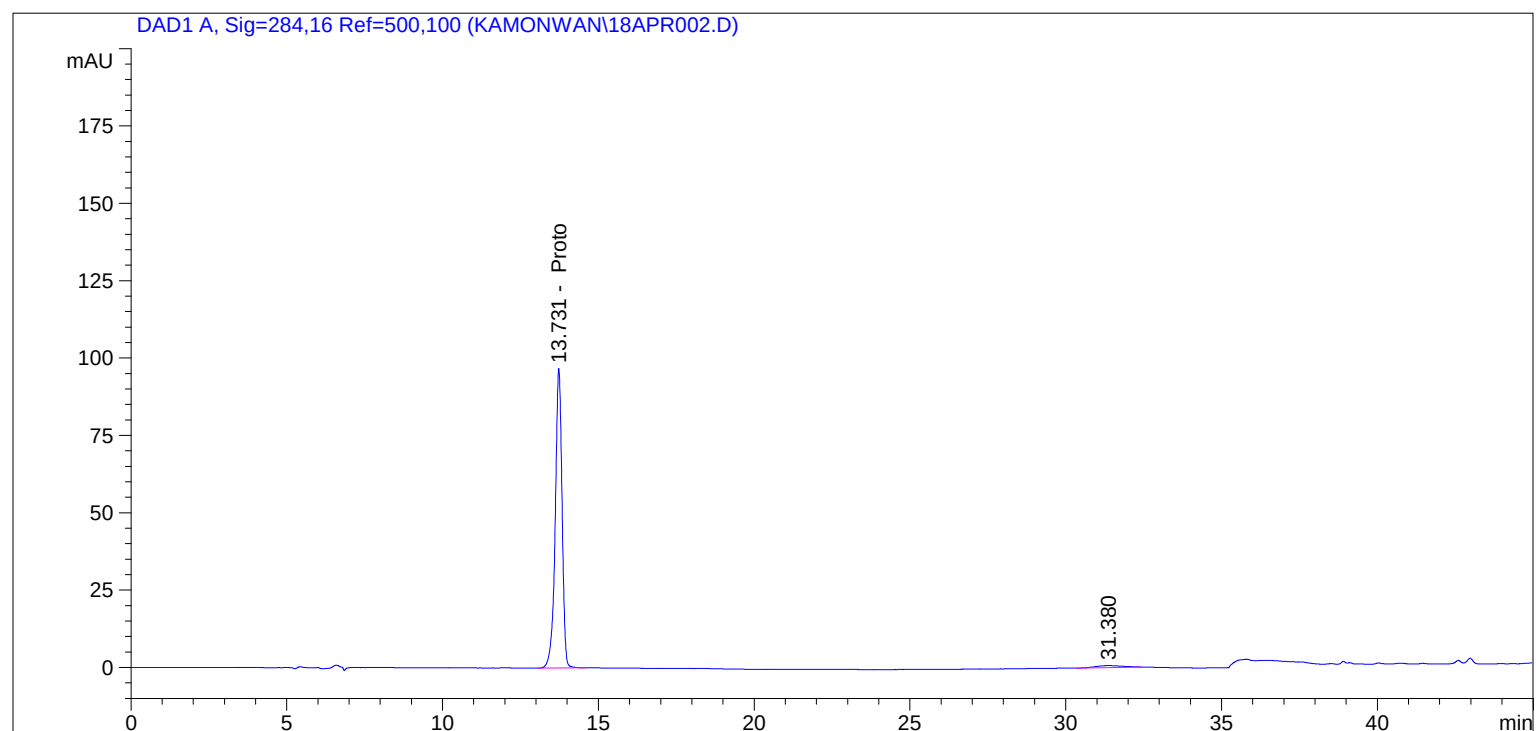
Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

=====

Injection Date	: 4/18/2013 12:21:54 PM	Seq. Line	: 1
Sample Name	: proto 30 ppm	Location	: Vial 1
Acq. Operator	: kamonwan	Inj	: 1
Acq. Instrument	: Instrument 1	Inj Volume	: 20 µl
Acq. Method	: C:\HPCHEM\1\METHODS\KAMONWAN.M		
Last changed	: 4/18/2013 12:19:56 PM by kamonwan		
Analysis Method	: C:\HPCHEM\1\METHODS\KAMON_C1.M		
Last changed	: 4/23/2013 10:36:47 AM by kamonwan		
	(modified after loading)		

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Area Percent Report

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Sorted By : Signal
Calib. Data Modified : Tuesday, April 23, 2013 10:32:56 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.731	BB	0.2316	1473.08130	97.4530	Proto
2	17.648		0.0000	0.00000	0.0000	m-Hydroxy
3	18.437		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.683		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 1473.08130 97.4530

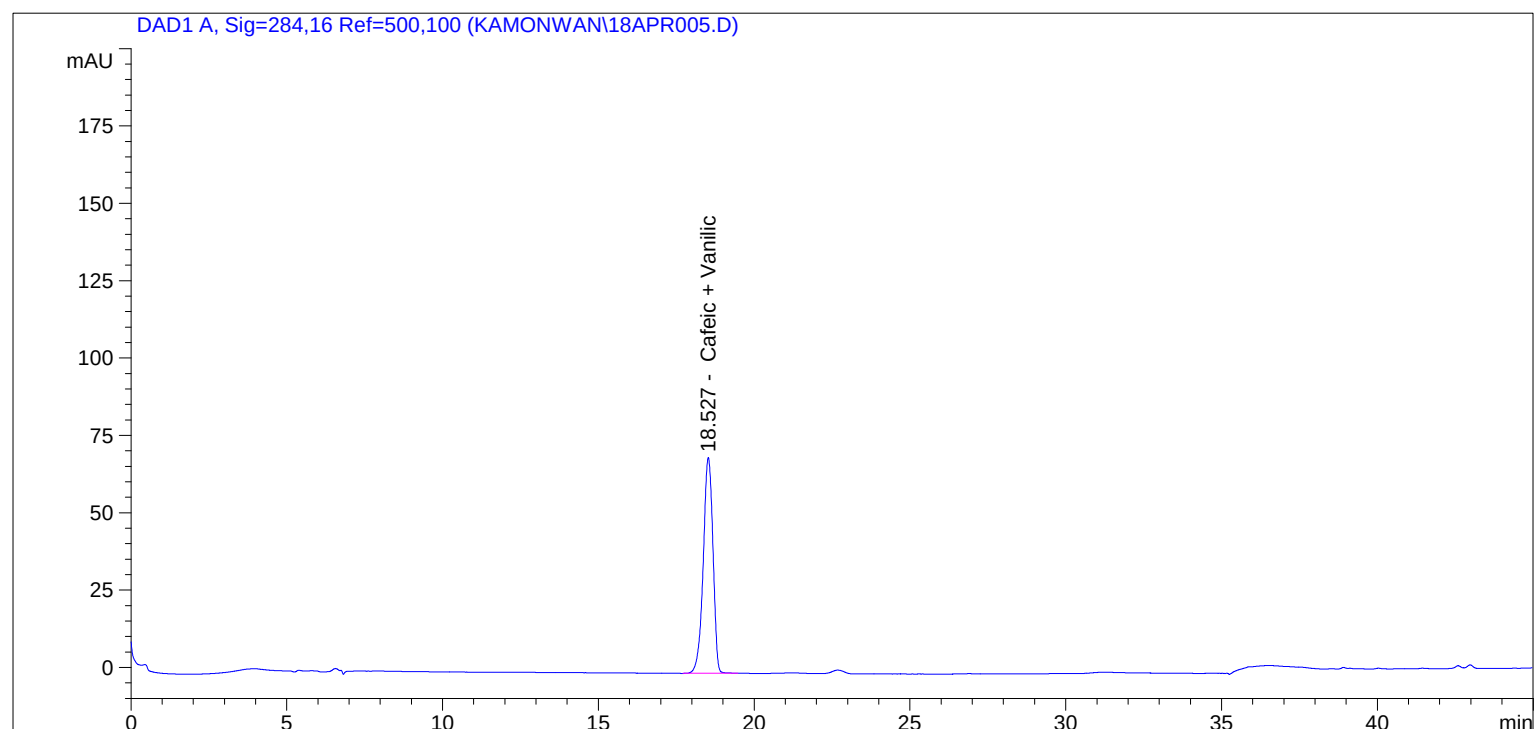
Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

=====

*** End of Report ***

```
=====
Injection Date   : 4/18/2013 2:40:53 PM      Seq. Line :    4
Sample Name      : vanillic 30 ppm           Location  : Vial 4
Acq. Operator    : kamonwan                  Inj       :    1
Acq. Instrument  : Instrument 1              Inj Volume: 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:40:28 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                        Area Percent Report
=====
```

```
Sorted By          :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier         :      1.0000
Dilution           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.618		0.0000	0.00000	0.0000	Proto
2	17.648		0.0000	0.00000	0.0000	m-Hydroxy
3	18.527	BB	0.3410	1512.57190	100.0000	Cafeic + Vanillic
4	19.683		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	23.993	+	0.0000	0.00000	0.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

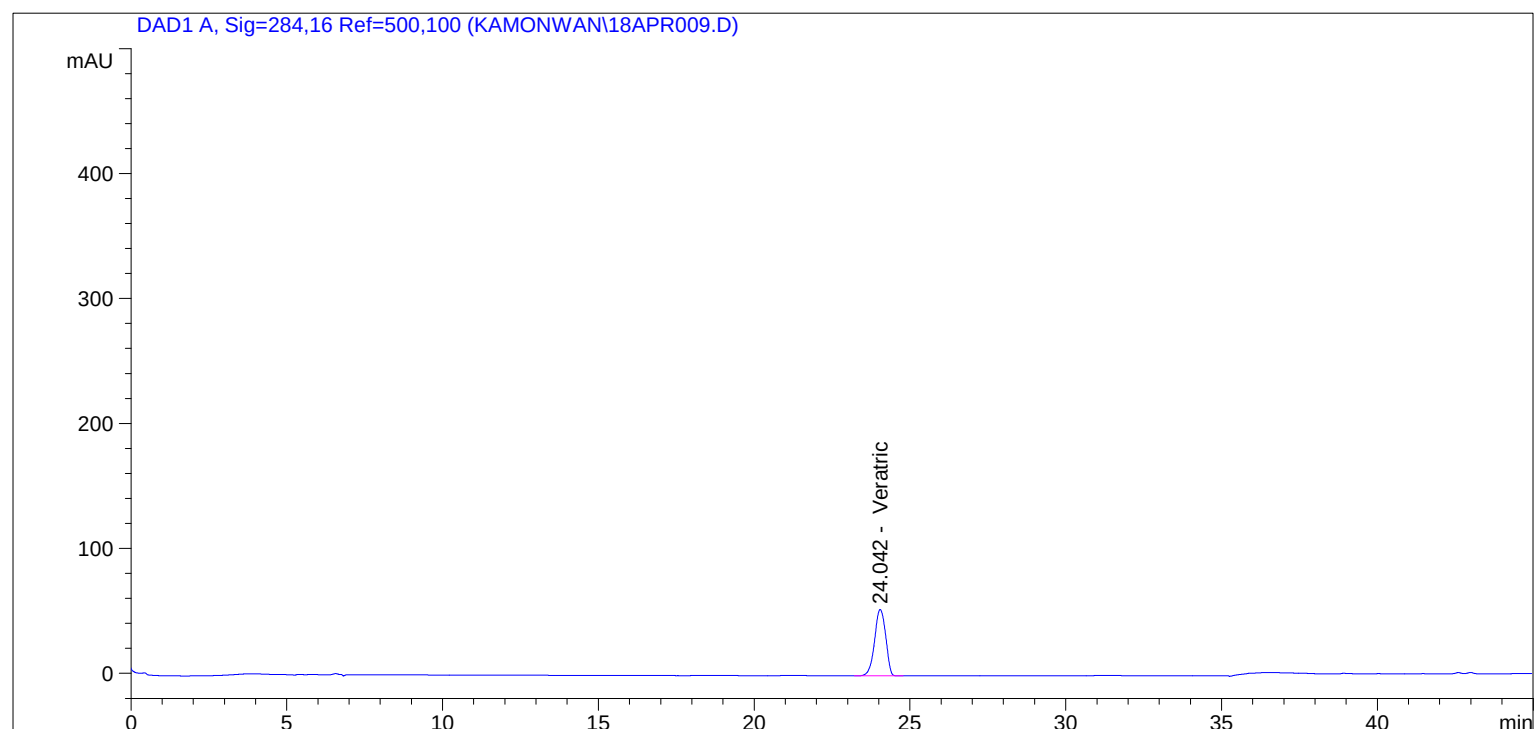
Totals : 1512.57190 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

```
=====
Injection Date   : 4/18/2013 5:46:17 PM      Seq. Line   :    8
Sample Name      : VERATRIC 30 ppm           Location      : Vial 8
Acq. Operator    : kamonwan                  Inj           :    1
Acq. Instrument  : Instrument 1              Inj Volume    : 20 µl
Acq. Method      : C:\HPCHEM\1\METHODS\KAMONWAN.M
Last changed     : 4/18/2013 12:19:56 PM by kamonwan
Analysis Method  : C:\HPCHEM\1\METHODS\KAMON_C1.M
Last changed     : 4/23/2013 10:42:02 AM by kamonwan
                  (modified after loading)
=====
```



```
=====
                          Area Percent Report
=====
```

```
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, April 23, 2013 10:32:56 AM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=284,16 Ref=500,100

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %	Name
1	13.646		0.0000	0.00000	0.0000	Proto
2	17.684		0.0000	0.00000	0.0000	m-Hydroxy
3	18.476		0.0000	0.00000	0.0000	Cafeic + Vanilic
4	19.724		0.0000	0.00000	0.0000	p-Hydroxy
5	22.499	+	0.0000	0.00000	0.0000	p-Coum
6	23.381	+	0.0000	0.00000	0.0000	Ferulic
7	24.042	BB +	0.3993	1317.40063	100.0000	Veratric
8	27.223	+	0.0000	0.00000	0.0000	Benz
9	32.718	+	0.0000	0.00000	0.0000	Cinn

Totals : 1317.40063 100.0000

Results obtained with enhanced integrator!
2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Time reference compound(s) not found

```
=====
*** End of Report ***
=====
```

ภาคผนวก ข.

บทความสำหรับการเผยแพร่
กิจกรรมที่เกี่ยวข้องกับการนำผลจากโครงการไปใช้ประโยชน์
ตารางเปรียบเทียบวัตถุประสงค์ กิจกรรมที่วางแผนไว้ และกิจกรรมที่ดำเนินการมา
และผลที่ได้รับตลอดโครงการ

การนำผลงานไปเผยแพร่

Phenolic acids profiles and antioxidant activity of Malay Apple, Star Fruit, Pomelo and Shogun Orange

Kamonwan Chucheeep and Nattaya Montree

Abstract

The composition of phenolic acids in immature and mature fresh and 60°C dry fruit of Malay apple (*Syzygium malaccense*), star fruit (*Averrhoa carambola* L.), pomelo (*Citrus maxima* Merr.) and Shogun orange (*Citrus reticulata*) was determined by HPLC-DAD detector. Eight phenolic acids were identified in Malay apple and star fruit while seven phenolic acids were identified in pomelo and Shogun orange. p-Hydroxybenzoic acid was a major phenolic acid liberated from glycosidic bonds in mature Malay apple (90.04 µg/ml), mature pomelo (1137.56 µg/ml), immature pomelo (336.44 µg/ml), dry mature pomelo (2853.59 µg/ml) and immature Shogun orange (628.97 µg/ml). Benzoic acid was a major phenolic acid liberated from ester bond (72.74 µg/ml) as well as a major major phenolic acid liberated from glycosidic bonds (130.04 µg/ml) in dry mature star fruit, dry mature Shogun orange (137.18 µg/ml) and dry immature Shogun orange (147.68 µg/ml). Veratric acid was a major phenolic acid liberated from ester bonds in immature Shogun orange (84.05 µg/ml) while Ferulic acid was a major phenolic acid liberated from ester bonds in dry mature Shogun orange (67.04 µg/ml) and dry immature Shogun orange (71.52 µg/ml). Free radical scavenging capacity of the extracts was determined using DPPH assay.

Keyword: phenolic acids, Malay apple (*Syzygium malaccense*), star fruit (*Averrhoa carambola* L.), pomelo (*Citrus maxima* Merr.), Shogun orange (*Citrus reticulata*)



ACCEPTANCE & INVITATION LETTER

2013 International Conference on Life Science & Biological Engineering

Osaka, 7-9 November, 2013

To **Kamonwan - Chucheeep**,

Herewith, LSBE 2013 Committee is pleased to inform you that the peer-reviewed & refereed conference paper ID: **830**, titled as "**Phenolic acids profiles and antioxidant activity of Malay Apple, Star Fruit, Pomelo and**" has been accepted for **Oral presentation** at the conference and publication in the Proceedings of the conference.

We would like to kindly invite you to present your research result at LSBE 2013, Osaka, Japan. Once again, thank for your support and look forward to seeing you in the LSBE Conference.

Thank you for your support of LSBE 2013. With your participation, we are assured to bring a successful academic gathering in the future.

Sincerely Yours,
LSBE Program Committee



Conference Secretariat/Email: lsbe@lsbe.org

Conference Program

November 2013
Osaka, Japan

General Information for Participants

Information and Registration

The Registration and Information Desk will be situated in the **RIHGA Royal Hotel Osaka** on **the sixth floor**, and will be open at the following times:

Wednesday, November 6, 2013 (15:00-17:00)

Thursday, November 7, 2013 (08:15-17:30)

Friday, November 8, 2013 (08:15-16:00)

Parallel Sessions

Parallel Sessions will run on **November 7 and 8**. Sessions are usually 90 minutes in length.

Presentations and Equipment

All presentation rooms are equipped with a screen, an LCD projector, and a laptop computer installed with PowerPoint software. You will be able to insert your USB flash drive into the computer and double click on your presentation to open it in PowerPoint. We recommend that you bring two copies of your presentation in case of one fails. You may also link your own laptop computer to the projector cable, however if you use your own Mac please ensure you have the requisite connector.

A Polite Request to All Participants

Participants are requested to arrive in a timely fashion for all addresses, whether to their own, or to those of other presenters. Presenters are reminded that the time slots should be divided fairly and equally between the number of presentations, and that they should not overrun. The session chair is asked to assume this timekeeping role.



Sandals or Slippers



Tank Top



Shorts

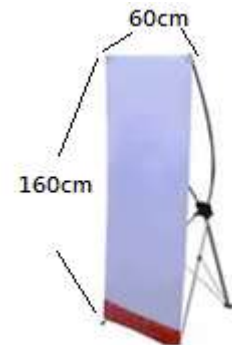
Poster Sessions & Poster Requirements

Materials Provided by the Conference Organizer:

1. X-frame display & Base Fabric Canvases (60cm×160cm)
2. Adhesive Tapes or Clamps

Materials Prepared by the Presenters:

1. Home-made Poster(s)



Requirement for the Posters:

1. Material: not limited, can be posted on the canvases
2. Size: 60cm*160cm

A 60cm*160cm Poster Illustrates the research findings.	1.Wider than 60cm (left) 2.Copy of PowerPoint Slides in A4 papers (right)

Conference Schedule

Wednesday, November 6, 2013

Pre-Registration (15:00-17:00)

RIHGA Royal Hotel Osaka (6F)

Thursday, November 7, 2013

Time	Information
08:15-17:30	Registration
08:45-10:15	Oral Session Suehiro, Education I Oral Session Koubai, Management I Oral Session Hagoromo, Civil Engineering I Oral Session Nishiki, Computer and Information Sciences I Oral Session Takara, Life Sciences I
10:15-10:30	Tea Break
10:30-12:00	Oral Session Suehiro, Keynote Speech Oral Session Koubai, Biomedical Engineering I Oral Session Hagoromo, Environmental Sciences I Oral Session Nishiki, Computer and Information Sciences II Oral Session Takara, Life Sciences II
12:00-13:00	Lunch Time
13:00-14:30	Oral Session Suehiro, Finance Oral Session Koubai, Biological Engineering I Oral Session Hagoromo, Environmental Sciences II Oral Session Nishiki, Computer and Information Sciences III Oral Session Takara, Life Sciences III
14:30-14:45	Tea Break
14:45-16:15	Oral Session Suehiro, Business I Oral Session Koubai, Chemical Engineering I & Fundamental and Applied Science I Oral Session Hagoromo, Environmental Sciences III Oral Session Nishiki, Material Sciences and Engineering I Oral Session Takara, Life Sciences IV

16:15-16:30	Tea Break
16:30-18:00	Oral Session Suehiro, Language I Oral Session Koubai, Economics & Communication Oral Session Hagoromo, Environmental Sciences IV Oral Session Nishiki, Mechanical Engineering I & Electrical and Electronic Engineering I



Poster Session

Time	Information
08:15-17:30	Registration
09:00-10:00	Poster Session Ougi, Life Sciences
10:15-10:30	Tea Break
11:00-12:00	Poster Session Ougi, Chemical Engineering
12:00-13:00	Lunch Time
13:00-14:00	Poster Session Ougi, Education Management Business Finance Computer and Information Sciences
14:30-14:45	Tea Break
15:00-16:00	Poster Session Ougi, Electrical and Electronic Engineering Mechanical Engineering Material Engineering

Time	Information
08:15-17:30	Registration
08:45-10:15	Oral Session Suehiro, Linguistics I
	Oral Session Koubai, Business II
	Oral Session Hagoromo, Environmental Sciences V
	Oral Session Nishiki, Mechanical Engineering II
	Oral Session Takara, Biological Engineering II
10:15-10:30	Tea Break
10:30-12:00	Oral Session Suehiro, Language II & Linguistics II
	Oral Session Koubai, Culture & Psychology & Sociology
	Oral Session Hagoromo, Environmental Sciences VI & Geosciences and Petroleum Engineering
	Oral Session Nishiki, Mechanical Engineering III
	Oral Session Takara, Life Sciences V
12:00-13:00	Lunch Time
13:00-14:30	Oral Session Suehiro, Literature
	Oral Session Koubai, Management II
	Oral Session Hagoromo, Material Sciences and Engineering II
	Oral Session Nishiki, Computer and Information Sciences IV
	Oral Session Takara, Biomedical Engineering II
14:30-14:45	Tea Break
14:45-16:15	Oral Session Suehiro, Education II
	Oral Session Koubai, Chemical Engineering II & Fundamental and Applied Science II
	Oral Session Hagoromo, Electrical and Electronic Engineering II
	Oral Session Nishiki, Compute and Information Sciences V
	Oral Session Takara, Life Sciences VI
16:15-16:30	Tea Break
16:30-18:00	Oral Session Suehiro, Education III
	Oral Session Koubai, Chemical Engineering III
	Oral Session Hagoromo, Civil Engineering II

Poster Session

Time	Information
08:15-17:30	Registration
09:00-10:00	Poster Session Ougi, Biomedical Engineering
10:15-10:30	Tea Break
11:00-12:00	Poster Session Ougi, Biological Engineering Life Sciences Fundamental and Applied Sciences
12:00-13:00	Lunch Time
13:00-14:00	Poster Session Ougi, Life Sciences
14:30-14:45	Tea Break
15:00-16:00	Poster Session Ougi, Civil Engineering Environmental Sciences

Saturday, November 9, 2013

Executive Committee Meeting (Committee Only)

Oral Sessions Agenda

Education I

Suehiro

08:45~10:15

Thursday, November 7

Session Chair: *Prof. Nirattaya Khamsemanan*

ISLLE-202

CESMath: An Intelligent Web-based Application for Mathematical Education with Free-Answer Questions and Personalization

Nirattaya Khamsemanan *Thammasat University*

Cholwich Nattee *Thammasat University*

Pornchai Inchai *IPST*

ISLLE-203

A Development of the Teachers' Sense of Efficacy Scale, Thai version

Natthapol Jaengakorn *Chulalongkorn University*

ISLLE-245

Human Resource Development for Online Reservation of Hotels and Resorts in Thailand

Warrapojn Panrod *Prince of Songkla University*

ISLLE-779

The Appropriacy of Texts in The Last Two Midterm Exams of Dbe/Metu with Respect to Epe Reading Texts

Zeynep Nur İşler *Middle East Technical University*

Nazife Duygu Bagci *Middle East Technical University*

ISBSS-1340

A reading based curriculum for teaching English in Japan's elementary schools

Kenneth Kwan Pang Chan *Doshisha University*

Oral Sessions Agenda

Management I

Koubai

08:45~10:15

Thursday, November 7

Session Chair: *Prof. Shelly Jose*

ISBSS-482

Techniques of Logistics Management Affecting the Logistics Efficiency of the Electronics Parts Industry in Thailand : A Case of Manufacturers in the Industrial Promotion Zone, the Area of Prathumtani and Ayatthaya Province

Phat Pisitkasem

Rangsit University

ISBSS-498

The Contextual influence in Organizational Behavior - A review

Shelly Jose

Rajagiri College of Social Sciences

ISBSS-1362

A Study of the Appropriate Supply Chain Management to Support the Expansion of Oil Palm Plantation in Pakpanang Basin and Adjacent Area in Nakhonsithammarat Thailand.

Boontaree Chanklap

Walailak University

ISBSS-1333

Using volunteered geographic information of social networking website for spatial management of tourism

Meng-Lung Lin

Aletheia University

Chien-Min Chu

Chinese Cultural University

Chiung-Hsu Liu

Aletheia University

ISBSS-1381

The Way to Manage User Resistance toward Social Media

Peng-Ting Chen

National Kaohsiung University of Applied Sciences

Shu-Chen Kuo

I-Shou University

Kuan-Chen Li

National Kaohsiung University of Applied Sciences

Oral Sessions Agenda

Civil Engineering I

Hagoromo

08:45~10:15

Thursday, November 7

Session Chair: *Prof. Hansoo Kim*

ACCMES-1041

A Survey of Malaysian Contractors on Construction Claim Problems

Nor Azmi Bakhary *Universiti Teknologi MARA*

Noor Akmal Adillah Ismail *Universiti Teknologi MARA*

Hamimah Adnan *Universiti Teknologi MARA*

Azmi Ibrahim *Universiti Teknologi MARA*

ACCMES-1038

Sustainable Tourism Management to Adopt the Climate Change with High Resolution Geospatial Data in Alishan, Taiwan

Teng-To Yu *National Cheng Kung University*

Han-Chou Tseng *Alishan National Scenic Administrator Office*

Chao-Shi Chen *National Cheng Kung University*

ACCMES-1109

Structural Methods to Reduce Differential Column Shortening in Tall Buildings

Hansoo Kim *Konkuk University*

Seunghak Shin *Konkuk University*

ACCMES-1005

Environmental Spill and Fire Protection Challenges for Road and Rail Truck – Loading and Unloading Facility

Reynaldo Dimla Velasco *Fluor Corporation-Filinvest Alabang*

Medeline Pangilinan *Fluor Corporation-Filinvest Alabang*

Eric Tanjutco *Fluor Corporation-Filinvest Alabang*

John Russell Ramirez *Fluor Corporation-Filinvest Alabang*

ICEAS-1946

Improvement of alternate wetting/drying in irrigated lowland rice field in Tropical Climate conditions

Aime Severin Kima

National Pintung University of Science and Technology

Wen Guey Chung

National Pintung University of Science and Technology

Wang Yu-Min

National Pintung University of Science and Technology

Oral Sessions Agenda

Computer and Information Sciences I

Nishiki

08:45~10:15

Thursday, November 7

Session Chair: *Prof. Yen-Liang Chen*

ICEAS-1597

Mining Temporal Patterns with Time-Intervals

Yen-Liang Chen

National Central University

ICEAS-1604

Application of a Neural Network and a Regression Model to Predict the Gender of a Crab

Wang Yu Cheng

Feng Chia University

Toly Chen

Feng Chia University

ICEAS-1643

Novel Identity-Based Key-Insulated Strong Designated Verifier Signature Scheme

Han-Yu Lin

National Taiwan Ocean University

Chi-Kuang Yeh

National Taiwan Ocean University

ICEAS-1704

Mining Fuzzy Association Rules from Concept Hierarchy

Wang Chein-Hua

Yuan Ze University

Pang Chin-Tzong

Yuan Ze University

Oral Sessions Agenda

Life Sciences I

Takara

08:45~10:15

Thursday, November 7

Session Chair: *Prof. Supaporn Lamlertthon*

LSBE-570

Effect of Natural and Artificial Light on Human Health

Pushkala Arumugam Pillai *University of Madras*

Purushottam Das Gupta *Manipal University*

LSBE-573

Carthamus tinctorius as a source of potent inhibitors of Human Cytochrome P450 2A13

Aruna Prasopthum *Mahidol University*

Songklod Saraputit *Burapha University*

Pornpimol Rongnoparut *Mahidol University*

LSBE-761

Functional Insights and Engineering of Biosynthetic Pathways of Bioactive Indolocarbazole Glycosides by In Vitro Enzyme Reconstitution

Hsien-Tai Chiu *National Cheng Kung University*

Yi-Lin Chen *National Cheng Kung University*

Chien-Pao Weng *National Cheng Kung University*

LSBE-732

Anti-Candida activity of long pepper (*Piper retrofractum* Vahl) extract

Supaporn Lamlertthon *Naresuan University*

Prankthip Intarapaichit *Naresuan University*

Anan Ounaroorn *Naresuan University*

LSBE-1094

Volumetric Changes of the Temporal Lobes in a Student Population of Cannabis Users Aged 18-30 Years

Jairo Alberto Zamudio-Rodriguez *Universidad Distrital Francisco José de Caldas*

Carmen Helena Moreno Durán *Universidad Distrital Francisco José de Caldas*

Germán Arango *Clínica Palermo*

José Hernando Morales *Clínica Palermo*

Keynote Speech

Suehiro

10:30~12:00

Thursday, November 7

Topic: "Global Challenges for Business and Social Science - Despair or Hope?"

Keynote Speech Summary:

- Economic challenges – Eurozone crisis, China slowdown, US recovery?
- Developments in Japan – ‘Abenomics’ & Constitutional Change?
- War, human rights and social justice – the ‘Arab Spring’ turning to winter? Snowden, Manning, Assange & drones
- Ethical investment and developing economies
- Climate change and sustainable development - Science and technology to the rescue?
- Towards better global governance? Hegemonic rivalry in the Asia-Pacific

Prof. Craig Mark

Associate Professor, School of International Studies
Kwansei Gakuin University, Japan

Associate Professor at the School of International Studies, Kwansei Gakuin University (KGU), teaches and researches in International Security, Foreign Policy and Australian Politics. He also teaches for the School of Law and Politics at KGU, and has previously been a lecturer at Macquarie University, and the University of NSW in Sydney, Australia.

Publications:

Maritime Rivalry in the Asia-Pacific: Prospects for a Regional Arms Control Treaty' (June 2013)
Edward Snowden's flight shows the limits of US power' (June 2013)
Trust in the 2013 Australian Election', (June 2013)
Connectedness, Identity and Alienation and the Japanese 2013 Election', (April 2013)
War and Conflict in Africa' (March 2013)
Geopolitics of the Asia-Pacific: the Fate of Regional Security Institutionalism' (March 2013)

Oral Sessions Agenda

Biomedical Engineering I

Koubai

10:30~12:00

Thursday, November 7

Session Chair: *Prof. Michel Linder*

ICEAS-1709

Effect of heat stress shown in APG signal

Aya Matsuyama

Charles Darwin University

ICEAS-1722

Heat Transfer Analysis of Human Skin during Subjected to Cold Therapy

Teerapot Wessapan

Eastern Asia University

ICEAS-1737

Physicochemical characterization of marine LC- PUFA nanoliposomes: application of this new drug delivery system improving the biomolecules activities

Michel Linder

Université de Lorraine

Elmira Arab Tehrani

Université de Lorraine

ICEAS-1749

Stimulation of Nerve Regeneration using Vitamin D3 Encapsulated Liposomes

Vichuda Charoensaensuk

King Mongkuts University of Technology Thonburi

Kwanchanok Viravaidya-
Pasawat

King Mongkuts University of Technology Thonburi

ICEAS-1755

Contour-Based Facial Symmetry Assessment Method

Yu-Xin Zhang

National Cheng Kung University

Oral Sessions Agenda

Environmental Sciences I

Hagoromo

10:30~12:00

Thursday, November 7

Session Chair: *Prof. Chu-Yang Chou*

ACCMES-1022

The Effectively Natural Reagent for Simultaneous Naked-eye Determination of Cu(II), Pb(II), Fe(III) and Al(III) in Water Sample

Warangkhan Khaoodee

Chulalongkorn University

ACCMES-1123

Applying Dual Microbial Fuel Cells on Electricity Production during Wastewater Treatment

Chu-Yang Chou

National Taiwan University

Yu-Wen Huang

National Taiwan University

Chia-Lin Weng

National Taiwan University

An-Chi Liu

National Taiwan University

ACCMES-1048

Scaling Formation of Re-mineralized Desalinated Seawater in Pipeline System: Effects of Mineral Species

Xu Yang

National University of Singapore

Zhang Jufang

National University of Singapore

Wang Le

National University of Singapore

Hu Jiangyong

National University of Singapore

Xie Rongjin

Public Utilities Board

Mylene Gomez

Public Utilities Board

Choon Nam Ong

National University of Singapore

Avner Adin

The Hebrew University of Jerusalem

ACCMES-1031

Multi-zone Network Airflow Model Calibration Process and Verification

Seul-Ki Han *Hanyang University*

Joon-Young Park *Hanyang University*

Eun-Ji Lee *Hanyang University*

Jae-Weon Jeong *Hanyang University*

Oral Sessions Agenda

Computer and Information Sciences II

Nishiki

10:30~12:00

Thursday, November 7

Session Chair: *Prof. Rong-Chin Lo*

ICEAS-1710

Using Genetic Algorithm to Achieve 3D Stereo Camera Self-Calibration Based on Plane Constraints of Scene

Rong-Chin Lo

National Taipei University of Technology

Chien-Cheng Chen

National Taipei University of Technology

ICEAS-1724

A Machine Learning-Based Method To Model Promoters Of Co-expressed Genes

Yosvany López

The University of Tokyo

Kenta Nakai

The University of Tokyo

ICEAS-1762

Delay Effect on Homogeneous and Heterogeneous Traffic in Optical Burst Switched Network

Suriani Mohd Sam

University Technology Malaysia

Hamdan Sayuti

University Technology Malaysia

Norsheila Fisal

University Technology Malaysia

Norliza Mohamed

University Technology Malaysia

ICEAS-1772

Identification for the Critical Function of Order Management System

Chao-Chen Hsieh

Fortune Institute of Technology

Jun-Zhi Chiu

Kao Fong College of Digital Contents

Oral Sessions Agenda

Life Sciences II

Takara

10:30~12:30

Thursday, November 7

Session Chair: *Prof. Ramdas Dhondiram Bodare*

LSBE-574

Time- and NADPH-dependent inactivation of human CYP2A6 by Averrhoa carambola fruit

Phisit Pouyfung

University of Madras

LSBE-616

Rice and Weedy Rice Competition in Laboratory and Greenhouse Conditions

Nadhirah Abd Aziz

Universiti Sains Malaysia

Mashhor Mansor

Universiti Sains Malaysia

LSBE-683

The role of sublingual and submandibular glands on the testicular functions in mice (*Mus musculus*)

Ramdas Dhondiram Bodare

S. G. M. College

Meena Madhavan Pillai

K. I. T. College of Engineering

Rajan Babanrao More

S. G. M. College

LSBE-718

Screening of ornamental plant seeds for Pb tolerance: a preliminary study

Ing Chia Phang

International Islamic University Malaysia

Noraishah A. Majid

International Islamic University Malaysia

LSBE-738

Association Study of Nostoc Strain CPG8, CPG24, and GIA13a with Roots of Rice (*Oryza sativa* L.) through Scanning Electron Microscopy

Aprilia Nur Fitrianti

Universitas Indonesia

Dian Hendrayanti

Universitas Indonesia

Lestari Rahayu Kusmadji

Universitas Indonesia

Oral Sessions Agenda

Finance

Suehiro

13:00~14:30

Thursday, November 7

Session Chair: *Prof. Chih-Yung Lin*

ISBSS-1353

Defensive Repurchases: The Managerial Entrenchment versus Shareholder Interests

Chia-Wei Huang

Yuan Ze University

Sheng-Syan Chen

National Taiwan University

ISBSS-1354

The Bright Side of Government Banks-Evidence from the Global Financial Crisis

Chih-Yung Lin

Yuan Ze University

Iftexhar Hasan

Fordham University and Bank of Finland

Yehning Chen

National Taiwan University

Yan-Shing Chen

National Taiwan University

ISBSS-1401

Long-run SEO underperformance: An idiosyncratic risk explanation

Po-Hsin Ho

National United University

Chia-Wei Huang

Yuan Ze University

Chih-Yung Lin

Yuan Ze University

Ju-Fang Yen

National Taipei University

ISBSS-1361

CEO Overconfidence and the Long-Term Performance Following Capital Expenditures Increases

Po-Hsin Ho

National United University

ISBSS-1347**Further evidence on bear market predictability: The role of the external finance premium**

Yu-Hsi Chou	<i>Fu-Jen Catholic University</i>
Nan-Kuang Chen	<i>National Taiwan University</i>
Shiu-Sheng Chen	<i>National Taiwan University</i>

ISBSS-1344**Alternative Model for Financing Micro Enterprises in Malaysia**

Mohamed Asmy Mohd Thas Thaker	<i>International Islamic University Malaysia</i>
Mustafa Omar Mohammed	<i>International Islamic University Malaysia</i>
Jarita Duasa	<i>International Islamic University Malaysia</i>
Moha Asri Abdullah	<i>International Islamic University Malaysia</i>

Oral Sessions Agenda

Biological Engineering I

Koubai

13:00~14:30

Thursday, November 7

Session Chair: *Prof. Radhika T S L*

LSBE-669

Identification of peptide-mimetic inhibitors against amyloid-beta peptide aggregation by pharmacophore modeling, virtual screening, molecular docking and molecular dynamics simulations

Zheng-Li Zhou

National Taipei University of Technology

Hsuan-Liang Liu

National Taipei University of Technology

LSBE-724

Pharmacophore modeling, virtual screening, and molecular docking studies for discovery of novel aldose reductase 2 inhibitors

Huang-Sheng Liao

National Taipei University of Technology

Hsuan-Liang Liu

National Taipei University of Technology

LSBE-751

Pulse Transit Time – A Comparison of Values Derived Through Mathematical and Experimental Approaches

Radhika T S L

BITS Pilani, Hyderabad Campus

Srinivas M B

BITS Pilani, Hyderabad Campus

LSBE-796

Genomics of a novel bacteria, as an anti-bacterial candidate in aquaculture

Mohamad Fadjar

University of Brawijaya

Yuni Kilawati

University of Brawijaya

Asep Awaludin Prihananto

University of Brawijaya

LSBE-810**Elasticity of chondrocyte: Experiment with Atomic force microscope**

Teeranoot Chanthasopeephan *University of Brawijaya*

Yuni Kilawati *University of Brawijaya*

Asep Awaludin Prihananto *University of Brawijaya*

LSBE-722**Low-frequency Spectroscopy Analysis of Murine Polyoma Virus-like Particles**

Hidayatul Zakaria *Universiti Malaysia Terengganu*

Robert Falconer *The University of Sheffield*

Anton Middelberg *University Of Queensland*

Oral Sessions Agenda

Environmental Sciences II

Hagoromo

13:00~14:30

Thursday, November 7

Session Chair: *Prof. Jwo-huei Jou*

ACCMES-1002

Enabling a Human-friendly Lighting Environment with Color and Color-temperature Tunable Organic Light-emitting Diodes

Jwo-huei Jou

National Tsing-Hua University

ACCMES-1052

Control Strategies for the Desiccant and Evaporative-Cooling-assisted 100% Outdoor Air System

Min-Hwi Kim

Hanyang University

Hong-Jae Cho

Hanyang University

Sang-Woo Ham

Hanyang University

Jae-Weon Jeong

Hanyang University

ACCMES-1056

Potential Greenhouse Gases Sequestration by *Spirulina Platensis* in Novel Photo-Bioreactor

Panyamee Sachakamol

PTT Research and Technology Institute

Sarintip Vaewhongs

PTT Research and Technology Institute

Kanatip Ratanachoo

PTT Public Company Limited

ACCMES-1051

Modeling the Adsorption of Derivatives of Dioxin Compounds onto Activated Carbon: breakthrough Curves and Isotherm Parameters

Sond Bunsan

Chulalongkorn University

Nurak Grisdanurak

Thammasat University

Ho Wen Chen

Tunghai University

Oral Sessions Agenda

Computer and Information Sciences III

Nishiki

13:00~14:30

Thursday, November 7

Session Chair: *Prof. Nanik Suciati*

ICEAS-1763

Texture Segmentation Based on Morphological Operation for Fringe Pattern Identification on Batik Fabrics

Anny Yuniarti	<i>Institut Teknologi Sepuluh Nopember</i>
Abdul Munif	<i>Institut Teknologi Sepuluh Nopember</i>
Nanik Suciati	<i>Institut Teknologi Sepuluh Nopember</i>
Yoshifumi Chisaki	<i>Kumamoto University</i>

ICEAS-1781

Prediction of Protein Relative Solvent Accessibility Using Conditional Random Fields

Tu-Liang Lin	<i>National Chiayi University</i>
Hong-Yi Chang	<i>National Chiayi University</i>

ICEAS-1802

An Android-based Power Management Mechanism for Location-based Services

Yi-Chun Chang	<i>Hungkuang University</i>
Jian-Wei Li	<i>Chaoyang University of Technology</i>

ICEAS-1822

A Multi-Dimension Cloud Resource Allocation Algorithm Based on a Pre-Classification Catalog

Hong-Yi Chang	<i>National Chiayi University</i>
Cheng-Kai Huang	<i>National Chiayi University</i>
Jen-Yi Pan	<i>National Chung Cheng University</i>
Zih-Huan Hong	<i>National Chiayi University</i>
Hao-Wen Lin	<i>National Chiayi University</i>

Oral Sessions Agenda

Life Sciences III

Takara

13:00~14:30

Thursday, November 7

Session Chair: *Prof. Sudini Ranshaya Fernando*

LSBE-774

Identification of AHL degrading *Bacillus* isolated from the shrimp ponds in East Java of Indonesia

Ating Yuniarti

University of Brawijaya

LSBE-783

The effect of *Lactobacillus paracasei* subsp. *paracasei* NTU101-fermented soy milk on adipogenesis

Meng-Chun Cheng

National Taiwan University

Tsung-Yu Tsai

Fu Jen Catholic University

Tzu-Ming Pan

National Taiwan University

LSBE-786

Bovine gastrointestinal parasitism with special emphasis on cryptosporidiosis in Badulla District of Sri Lanka

Sudini Ranshaya Fernando

Uva Wellassa University

LSBE-791

The taxonomic diversity of zoobenthos in the Abkhazia Republic rivers (Caucasus)

Dina Mingazova

Kazan Federal University

Venera Ivanova

Kazan Federal University

Nafisa Mingazova

Kazan Federal University

Elvira Nabeeva

Kazan Federal University

Dbar Roman

Abkhaz State University

LSBE-842

Isolation and Characterization of Nano Calcium from Freshwater Mussel (*Anodonta woodiana*) using Precipitation Method

Sata Yoshida Srie Rahayu *Pakuan University*

Tri Aminingsih *Pakuan University*

Mira Miranti *Pakuan University*

Oral Sessions Agenda

Business I

Suehiro

14:45~16:15

Thursday, November 7

Session Chair: *Prof. Maya Safira Dewi*

ISBSS-1395

The Existing Skills and the Requirements for Training The Public Sector Officers Towards ASEAN Economic Community

Parrichat Faenphimai

Vongchavalitkul University

ISBSS-1396

Focal projects of private and public sectors' collaboration in Nakhon Ratchasima province, Thailand in preparation for the ASEAN economic community

Nalinthip Ngoensoongnoen

Vongchavalitkul University

ISBSS-1402

Applying an AHP-HOQ to Determine Ready Mixed Concrete Business Strategic in Rural of Thailand: a Preliminary Study

Amonrat Chumphoo

King Mongkuts University of Technology North Bangkok

ISBSS-2061

Tax Law System Analysis in Tax Haven Countries and Relation to International Practice

Maya Safira Dewi

Bina Nusantara University

Desiyana

Bina Nusantara University

ISBSS-2076

A Factor Analysis of Determining Success in Electronic Commerce (e-Commerce) Business in Thailand

Nutthapat Kaewrattanapat

Suan Sunandha Rajabhat University

Oral Sessions Agenda

Chemical Engineering I/ Fundamental and Applied Sciences I

Koubai

14:45~16:15

Thursday, November 7

Session Chair: *Prof. Moustafa Aly Soliman*

ICEAS-1633

Support Effects on Ethane Oxidation Catalyzed by MoVNb Catalyst

Yousef Saleh Al-Zeghayer	<i>King Saud University</i>
Sulaiman Ibrahim Al-Mayman	<i>King Abdulaziz City for Science and Technology</i>
Abdulrhman Saleh Al-Awadi	<i>King Saud University</i>
Moustafa Aly Soliman	<i>The British University in Egypt</i>

ICEAS-1788

The preparation of Cu(In,Al)Se₂ thin films using selenization of sputtering Cu-In-Al metal precursors for solar energy application

Kong-Wei Cheng	<i>Chang Gung University</i>
Kei Hinaro	<i>Chang Gung University</i>
Yi Chiu	<i>Chang Gung University</i>

ICEAS-1693

Slip effect Study of 4:1 Contraction Flow with Rounded Corner Geometry for Newtonian Fluid

Nawalax Thongjub	<i>Chulalongkorn University</i>
Bumroong Puangkird	<i>King Mongkut's Institute of Technology Ladkrabang</i>
Vimolrat Ngamaramvaranggul	<i>Chulalongkorn University</i>

ICEAS-1764

The effect of slip boundary on the unsteady blood flow in 3D tubes

Nathnarong Khajohnsaksumeth	<i>Curtin University</i>
Benchawan Wiwatanapataphee	<i>Mahidol University</i>
Yong Hong Wu	<i>Curtin University</i>

ICEAS-1779

Numerical Approximations of Average Run Length

Sophana Somran	<i>King Mongkut's University of Technology North Bangkok</i>
Saowanit Sukparungsee	<i>King Mongkut's University of Technology North Bangkok</i>
Yupaporn Areepong	<i>King Mongkut's University of Technology North Bangkok</i>

ICEAS-1985

Fuzzy rating score on the Likert scale

Atchanut RATTANALERTNUSORN	<i>Kasetsart University</i>
Ampai THONGTEERAPARP	<i>Kasetsart University</i>
Winai BODHISUWAN	<i>Kasetsart University</i>

Oral Sessions Agenda

Environmental Sciences III

Hagoromo

14:45~16:15

Thursday, November 7

Session Chair: *Prof. Jung-Hua Chou*

ACCMES-1071

Effect of Climate Change on the Environmental Fate, Bioavailability, Bioaccumulation and Toxicity of Bisphenol A in the Marine Environment

Siriporn Borirukwisitsak *University of Strathclyde*

Helen E. Keenan *University of Strathclyde*

Caroline Gauchotte-Lindsay *University of Glasgow*

Peter A. G. Cormack *University of Strathclyde*

ACCMES-1081

Decomposing Composites for Reuse by an Environmentally Friendly Thermo-mechanical Process

Hsing Yuan Yen *Kao Yuan University*

Chih-Hsin Hsueh *National Cheng Kung University*

Jung-Hua Chou *National Cheng Kung University*

ICEAS-1657

Productivity of Wastewater Treatment Plants Considering Undesirable Outputs: A Malmquist-Luenberger Approach

Francesc Hernández-Sancho *University of Valencia*

María Molinos-Senante *University of Valencia*

Ramón Sala-Garrido *University of Valencia*

ICEAS-1769

Validation of Local Exhaust Ventilation (LEV) Performance Model with Analytical, experimental and Computational Fluid Dynamic (CFD)

Nor Halim Bin Hasan *Universiti Teknikal Malaysia Melaka*

M.R Said *Universiti Teknikal Malaysia Melaka*

A.M. Leman *Universiti Tun Hussein Onn Malaysia*

Norzilawati Asmuin *Universiti Tun Hussein Onn Malaysia*

Oral Sessions Agenda

Material Science and Engineering I

Nishiki

14:45~16:15

Thursday, November 7

Session Chair: *Prof. Khairul Anuar Mohamad*

ICEAS-1673

Mixed P3HT/PCBM Organic Thin-Film Transistors: Relation between Morphology and Electrical Characteristics

Khairul Anuar Mohamad

Universiti Malaysia Sabah

ICEAS-1674

Effect of Zinc Doping on the Sol-gel Derived CuGaO₂ Films

Afishah Alias

Universiti Malaysia Sabah

ICEAS-1812

Controlled Formation of FIB Fabricated Au Nanorod System as SERS-active Substrate for Detecting Contaminated Molecules

Sivashanmugan Kundan

National Cheng Kung University

Jiunn-Der Liao

National Cheng Kung University

Bernard Haochih Liu

National Cheng Kung University

Chih-Kai Yao

National Cheng Kung University

Jui-Teng Cheng

National Cheng Kung University

ICEAS-1918

A New Approach for Preparing Bio-hybrid Material of PVA/RS/SF with Special Water Affinity

Pusita Kuchaiyaphun

Niigata University/ Chiang Mai University

Takeshi Yamauchi

Niigata University

Surasak Watanesk

Chiang Mai University

Ruang Sri Watanesk

Chiang Mai University

ICEAS-1776

Printability of UV Curable Polymeric Composite with High Concentrations of Nano and Micron Sized Particles

Ada Ortega

The University of Texas at El Paso

Ha Ryeong Choi

SeoKyeong University

Oral Sessions Agenda

Life Sciences IV

Takara

14:45~16:15

Thursday, November 7

Session Chair: *Prof. Nafisa Mingazova*

LSBE-797

The Biodiversity of Water Objects of Urban Territories (Kazan, Russia)

Nafisa Mingazova	<i>Kazan Federal University</i>
Olga Derevenskaya	<i>Kazan Federal University</i>
Olga Palagushkina	<i>Kazan Federal University</i>
Elvira Nabeeva	<i>Kazan Federal University</i>
Renat Zamaletdinov	<i>Kazan Federal University</i>
Nailya Zaripova	<i>Kazan Federal University</i>

LSBE-830

Phenolic acids profiles and antioxidant activity of Malay Apple, Star Fruit, Pomelo and Shogun Orange

Kamonwan Chucheeep	<i>King Monkuts Institute of Technology Ladkrabang Chumphon campus</i>
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LSBE-834

Rifampicin Enhances the Cyanobacterial Recombinant SmtB Protein Expression, Purification and Yield without Affecting Structural Assembly in T7 RNA Polymerase/promoter Based System in E. coli

Rahul M Shelake	<i>Ehime University</i>
Hidenori Hayashi	<i>Ehime University</i>
Shunnosuke Abe	<i>Ehime University</i>
Eugene Hayato Morita	<i>Ehime University</i>

LSBE-858

Evaluation of a drug delivery generated from *Lactobacillus acidophilus*

Nguyen Tu Hoang Khue	<i>Hochiminh city International University</i>
Doan Vinh Thi Thanh	<i>Hochiminh city International University</i>
Nguyen Huu Ngoc	<i>Hochiminh city International University</i>

Oral Sessions Agenda

Language I

Suehiro

16:30~18:00

Thursday, November 7

Session Chair: *Prof. Hesoeb Kim*

ISLLLE-169

Exploring EFL Teachers' Talk Around Dialogue Texts and Narrative Texts

Lu-Chun Lin

National Chiao Tung University

ISLLLE-177

Community-based Arabic Practicum

Jeremy Palmer

American University of Sharjah

ISLLLE-179

The Focused Input and Output of EAP Formulaic Expressions for Virtual Conferences

Wen-Chun Chen

National Chung-Cheng University

ISLLLE-233

Does the Vertical and the Horizontal Connectivity in the Textbooks Matters in the Japanese Language Teaching in Korea?

Hesoeb Kim

Pukyong National University

Sangsu Lee

Pukyong National University

ISLLLE-237

An Investigation of EFL Engineering Students' Cognitive Styles: Implications for Designing Language Tasks

Urarat Parnrod

King Mongkut's University of Technology Thonburi

Pornapit Darasawang

King Mongkut's University of Technology Thonburi

Wareesiri Singhasiri

King Mongkut's University of Technology Thonburi

Oral Sessions Agenda

Economics/ Communication

Suehiro

16:30~18:00

Thursday, November 7

Session Chair: *Prof. Stephen B. Ryan*

ISBSS-1409

Microfinance and family ties: Challenge to reduce the loan default in urban area in Thailand

Kawin Phupoxsakul

Chulalongkorn University

ISBSS-1398

Microfinance and family ties: Challenge to reduce the loan default in urban area in Thailand

Nath Bunditwattanawong

Chulalongkorn University

ISBSS-1359

How First-Hand Experience Modifies Schema: a Japanese study abroad group in Australia

Stephen B. Ryan

Yamagata University

ISBSS-1406

The Conflicting Interests of the Public Interest Groups and Businesses in Malaysia; the Effect of Misrepresentation in Public Interest Group's Roles and Responsibilities

Shira Haniza Yaakop

Universiti Teknologi MARA

Ismail Sualman

Universiti Teknologi MARA

Siti Zabedah Mohd Shariff

Universiti Teknologi MARA

Oral Sessions Agenda

Environmental Sciences IV

Hagoromo

16:30~18:00

Thursday, November 7

Session Chair: *Prof. Sudjit Karuchit*

ICEAS-1787

A Comparative Study on Lake Depth Profiles of Temengor Reservoir, Perak, Malaysia

Nor Aisyah Omar

Universiti Sains Malaysia

ICEAS-1809

Development Approaches of Emission Inventory in Thailand: Case Study in Nakhon Ratchasima Municipality

Sarid Kotula

Suranaree University of Technology

Nares Chuersuwan

Suranaree University of Technology

Sudjit Karuchit

Suranaree University of Technology

ICEAS-1856

The Effect of Age of Napier Pakchong I on Biogas Yield from the Anaerobic Co-digestion with Cow Dung

Lertluck Saitawee

Rajamangala University of Technology Rattanakosin

ICEAS-1857

Comparative Studies of Biochar Produced from Oil Palm Residues by Hydrothermal Carbonization

Jakaphong Kongpanya

Rajamangala University of Technology Rattanakosin

Oral Sessions Agenda

Mechanical Engineering I/ Electrical and Electronic Engineering I

Nishiki

16:30~18:00

Thursday, November 7

Session Chair: *Prof. Sangamesh G. Sakri*

ICEAS-1818

A new proposed efficient large-scale hydrogen liquefaction plant

Songwut Krasae-in

Rajamangala University of Technology Krungthep

ICEAS-1939

Vibration Suppression of the Shaft using Single-Side Support Four-Pole Active Magnetic Bearing

Nitisak Numanoy

Suranaree University of Technology

Jiraphon Srisertpol

Suranaree University of Technology

Teetut Dolwichai

Suranaree University of Technology

ICEAS-1589

A Simple and Fast Method for Fabricating A Rapid Tooling with High Form Accuracy

Chil-Chyuan Kuo

Ming Chi University of Technology

Hsiu-Ju Hsu

Ming Chi University of Technology

Teng-Sheng Chiang

Ming Chi University of Technology

ICEAS-1684

Study of Consumer Behaviour for Energy Efficiency Programs in India under DSM

Sangamesh G. Sakri

PDA College of Engineering Gulbarga

ICEAS-1735

Signal Processing Method for High Speed Train Environment Based on IEEE 802.15.4

Kanghoon Kim

Sogang University

ICEAS-1761

Optimal Parameters Designed for Zero Voltage Switched Mode Power Supply

Worapong Pairindra

Valaya Alongkorn Rajabhat University

Oral Sessions Agenda

Linguistics I

Suehiro

08:45~10:15

Friday, November 8

Session Chair: *Prof. Sunhee Yae*

ISLLE-95

Online Translation of Proverbs between Availability and Accuracy

Sami Abdullah Hamdi *Jazan University*

Kazuhiko Nakae *Kansai Gaidai University*

Mohamed Okasha *Jazan University*

ISLLE-204

Learner Generated Noticing of Written and Aural L2 Input

Bimali Indrarathne *Lancaster University*

ISLLE-307

Modality in ‘fear’-derived complex expressions in English: A Grammaticalization Perspective

Sunhee Yae *Chung-Ang University*

ISLLE-313

Language Style Promoted by Electronic Text Messaging and its Impact on the Formal Written Expression and Social Behavior of Pakistani Youth

Rafia Bilal *National University of Modern Languages*

ISLLE-316

Direct or Indirect? Critical or Uncritical? Evaluation in Chinese English-major MA Students’ Thesis literature Reviews

Jianping Xie *The Chinese University of Hong Kong*

Oral Sessions Agenda

Business II

Koubai

08:45~10:15

Friday, November 8

Session Chair: *Prof. Chomphak Jantakat*

ISBSS-1393

The Quality of Work Life and The Work Efficiency of Lecturer in Higher Education Institutes, Nakornratchasima, Thailand

Chomphak Jantakat

Vongchavalitkul University

ISBSS-1394

Behavior and Decision for Tourism of Thailand based on population of Muang district, Nakhonratchasima

Ajcharapan Tangjaturason

Vongchavalitkul University

ISBSS-1368

Exploring Creative Collaboration in Museum Industry: from the Perspective of Creative Talent

Wang Wan-Jou

National Cheng Kung University

Chung Hsiao-Ling

National Cheng Kung University

ISBSS-2073

Auditor Rotation in An International under Sarbanes-Oxley Act of 2002 : A critical review of the literature

Thamonwan Pomsanam

Vongchavalitkul University

ISBSS-1390

Islamic Perspective of Human Talent Identification: Evidence from Malaysian Organizations

Idris Osman

Universiti Teknologi Mara

Oral Sessions Agenda

Environmental Science V

Hagoromo

08:45~10:15

Friday, November 8

Session Chair: *Prof. Jiangyong Hu*

ACCMES-1043

Mobility and Sorption of Sewage Chemical Indicators into the Soil

Mahsa Foolad *National University of Singapore*

Ngoc Han Tran *National University of Singapore*

Jiangyong Hu *National University of Singapore*

ACCMES-1046

Investigation of Biodegradation of Polycyclic Aromatic Hydrocarbons (PAHs) in the Contaminated Soil by Using a Soil Microbial Fuel Cell (SMFC)

How Yong Ng *National University of Singapore*

Mohammad Sherafatmand *National University of Singapore*

Lefebvre Olivier Patrick *National University of Singapore*

ACCMES-1059

Heavy Metal Contamination in Soil, Roof Dust, and Dustfall in Nakhon Ratchasima, Thailand

Sudjit Karuchit *Suranaree University of Technology*

Titiphat Hirunkam *Suranaree University of Technology*

ICEAS-1706

Microcosm Experiment for Evaluating Wastewater Treatment Efficiency Using Coconut-Fiber Biofilm Treatment System (COTS) with Synthetic Leachate

Nirmala Kumuduni
Dharmarathne *Saitama University*

Naofumi Sato *Saitama University, Kokusai Kogyo Co., Ltd*

Ken Kawamoto *Saitama University*

Koide Takahiro *Saitama University*

Hiroyasu Satoh *Tokyo University*

Norio Tanaka *Saitama University*

Oral Sessions Agenda

Mechanical Engineering II

Nishiki

08:45~10:15

Friday, November 8

Session Chair: *Prof. Xinli Ma*

ICEAS-1819

Large-scale T-IDF Rebuilding Optimization

Xinli Ma

Jiangsu Frontier Electric Power Technology Co., Ltd.

ICEAS-1873

Examining ABS/PC Gears Abrasion Behaviours

Rıfat Yakut

Selcuk University

Hayrettin Düzcükoğlu

Selcuk University

ICEAS-1881

Design of Punch-Type Swager for Exhaust Pipe Manufacture

Perawat Boonpuek

Suranaree University of Technology

Teetut Dolwichai

Suranaree University of Technology

Wanwanut Boongsood

Suranaree University of Technology

ICEAS-1933

A Study of Plastic Collapse Behavior of Aluminum Cylindrical Thin-Walled Tubes under Axial Impact Load

Supakit Rooppakhun

Suranaree University of Technology

Sarawut Bua-Ngam

Suranaree University of Technology

ICEAS-1938

Design of Linkage Structures for Enhancement of the Transfemoral Prosthesis

Chul-Hee Lee

Inha University

Jeong-Hyeon Bak

Inha University

Kwang-Hee Lee

Inha University

Oral Sessions Agenda

Biological Engineering II

Takara

08:45~10:15

Friday, November 8

Session Chair: *Prof. Fatchiyah Fatchiyah*

LSBE-813

Effect of Capsaicin on Thermally induced Lipid Bilayers

Neha Sharma	<i>Japan Advanced Institute of Science and Technology</i>
Tsuyoshi Yoda	<i>Japan Advanced Institute of Science and Technology</i>
Naofumi Shimokawa	<i>Japan Advanced Institute of Science and Technology</i>
Masahiro Takagi	<i>Japan Advanced Institute of Science and Technology</i>

LSBE-993

Hospital Wastewater Characteristics in Malang City

Prayitno	<i>Brawijaya University</i>
Zaenal Kusuma	<i>Brawijaya University</i>
Bagyo Yanuwadi	<i>Brawijaya University</i>
Rudy W Laksmono	<i>UPN University</i>

LSBE-1006

Mutation on Human Insulin Receptor Gene of Diabetes Melitus Type-2 Patient Reduced the Insulin Receptor Substrate-1 (IRS-1) Activation

Fatchiyah Fatchiyah	<i>Brawijaya University</i>
Nur Christian	<i>Brawijaya University</i>
Djoko Wahono Soeatmadj	<i>Saeful Anwar Hospital</i>

LSBE-1080

Selection of Solutions of Polynomials in Displacement Estimation for a four degrees of freedom capacitive force sensor

Chisato Murakami	<i>Hokkaido University</i>
Makoto Takahashi	<i>Hokkaido University</i>

LSBE-778

Generation of New Hybridoma UTM-Ha Secreting Monoclonal Antibody Specific to Acanthamoeba species Isolated from Corneal Infection.

Hala A.K. Rasheed *Universiti Teknologi Malaysia*

Fadzilah Adibah Abd Majid *Universiti Teknologi Malaysia*

Nakisah Mat Amin *Universiti Malaysia Terengganu*

Oral Sessions Agenda

Language II/ Linguistics II

Suehiro

10:30~12:00

Friday, November 8

Session Chair: *Prof. Othman Ali Almeniei*

ISLLLE-756

EFL Standards in Saudi Arabia: Improving Learning and Teaching

Othman Ali Almeniei

King Saud University

ISLLLE-785

Saudi EFL Students Intercultural Communication Competence and Apprehension

Abdulaziz Ibrahim S. Alnofal

Imam Muhammad Ibn Saud University

ISLLLE-778

On Contextualization of Insecurity and Uncertainty in the Funeral Sermon

Nganga Simon

Bayreuth University

ISLLLE-814

A Critical Analysis of English Language Learning Guidebooks (ELLGs) in Bangladesh

Shuvo Saha

East West University

Oral Sessions Agenda

Culture/ Psychology/ Sociology

Koubai

10:30~12:00

Friday, November 8

Session Chair: *Prof. Kam Yee Law*

ISBSS-1366

Traditional Medicine Practices Among The Orang Asli in Malaysia: Batek Tribe Case at Kuala Koh, Kelantan

Ramle Abdullah	<i>Universiti Sultan Zainal Abidin</i>
Ahmed Amran	<i>Universiti Sultan Zainal Abidin</i>
Pei Lin Lua	<i>Universiti Sultan Zainal Abidin</i>
Aryati Ahmad	<i>Universiti Sultan Zainal Abidin</i>
Asmawi Ibrahim	<i>Universiti Sultan Zainal Abidin</i>

ISBSS-2091

Creative Community: A Role of Campus- Community Partnerships in Culture- Led Urban Regeneration

Araya Santisan	<i>Kasetsart University</i>
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ISBSS-1408

Model Development for Health Promotion in Thai Elderly

Montakarn Chuemchit	<i>Chulalongkorn University</i>
Nattawan Deelertyuenyong	<i>Chulalongkorn University</i>
Jirapun Khiewkhum	<i>Cha-am Hospital, Phetchaburi</i>
Kunpima Chueamchit	<i>Cha-am Hospital, Phetchaburi</i>
Surasak Taneepanichskul	<i>Chulalongkorn University</i>

ISBSS-1337

Policy formulation, social service NGOs and social integration of the South-Asian populations in Hong Kong

Kam Yee Law	<i>The Hong Kong Institute of Education</i>
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ISBSS-1379

Coastal Resources Utilization and Opinion in Effect of Resources Changing for Ecotourism on Lipe Island, Southern of Thailand

Chadarat Boonchan	<i>Prince of Songkla University</i>
Buncha Somboonsuke	<i>Prince of Songkla University</i>
Sayan Sdoodee Sdoodee	<i>Prince of Songkla University</i>
Parichart Visuthismajarn	<i>Prince of Songkla University</i>

Oral Sessions Agenda

Environmental Sciences VI/ Geosciences and Petroleum Engineering

Hagoromo

10:30~12:00

Friday, November 8

Session Chair: *Prof. Hsing Yuan Yen*

ACCMES-1067

Removing of Glycerin from Crude Biodiesel by ZnCl₂-Activated Rice Husk Ash

Nisakorn Saengprachum *Chulalongkorn University*

Somchai Pengprecha *Chulalongkorn University*

ACCMES-1065

Treating Electroplating Rinse Water for Reuse by the Process of Combining PAC Adsorption with H₂O₂/UV Oxidation

Hsing Yuan Yen *Kao Yuan University*

Chen Pei Lin *Kao Yuan University*

ICEAS-1752

Analysis on the Flow and Transport of Nonionic Polymeric Solutions through Reservoirs under Various Wettability Conditions

ByungIn Choi *Hanyang Univerisity*

Kunsang Lee *Hanyang Univerisity*

ICEAS-1753

Effect of Miscibility on the Productivity of CO₂ Flooding in Heterogeneous Reservoirs

MoonSik Jeong *Hanyang Univerisity*

JooSeon Park *Hanyang Univerisity*

KunSang Lee *Hanyang University*

Oral Sessions Agenda

Mechanical Engineering III

Nishiki

10:30~12:00

Friday, November 8

Session Chair: *Prof. Cheng-Hung Huang*

ICEAS-1600

Effects of Bioethanol-Diesel Fuel Blends Containing Beraid ED10 Additive on Engine Emissions

Hasan Aydogan *Selcuk University*

Mustafa Acaroglu *Selcuk University*

Abdullah Engin Ozcelik *Selcuk University*

ICEAS-1678

An Impingement Heat Sink Module Design Problem to Determine Optimal Non-Uniform Fin Heights and Widths

Cheng-Hung Huang *National Cheng Kung University*

ICEAS-1721

Sandwich Structures with Internal Resonators on Elastic Foundation under Moving Loads

Jung-San Chen *National Cheng Kung University*

Song-Mao Tsai *National Cheng Kung University*

ICEAS-1757

Optimizing Circular Parameters using Taguchi Method with Parameter-Range Reduction Algorithm for CNC Machine Tools

Syh-Shiuh Yeh *National Taipei University of Technology*

Wei-Jen Chen *Yeong Chin Machinery Industries Co., Ltd.*

Mao-Pin Wu *Yeong Chin Machinery Industries Co., Ltd.*

Chi-Hsiang Wang *National Taipei University of Technology*

ICEAS-1780

PI Controller plus Adaptive Fuzzy Logic Compensator for Torque Controlled System of DC Motor

Jiraphon Srisertpol

Suranaree University of Technology

Nitisak Numanoy

Suranaree University of Technology

Chalermpon Pewmaikom

Suranaree University of Technology

Oral Sessions Agenda

Life Sciences V

Takara

10:30~12:00

Friday, November 8

Session Chair: *Prof. Chong Kim Wong*

LSBE-650

Electric Field-Enhanced One-Step Visual Detection of PCR Products on A Membrane-Based Lateral Flow

Jui-Chuang Wu

Chung Yuan Christian University

Chih-Hung Chen

Chung Yuan Christian University

Huang-Chin Yang

Chung Yuan Christian University

LSBE-662

A Report of Freshwater sponge (Porifera: Spongillidae) *Ephydatia meyeri* (Carter) from Ramling Near Hatkanangale, Dist- Kolhapur, Maharashtra, India.

Suresh Babasaheb Nikalje

Sangli.Shivaji University

Deepak Vishwanath Muley

Shivaji University

LSBE-664

Zooplankton of water objects of Caucasus Mountain, (Abkchazia)

Olga Yurjevna Derevenskaia

Kazan Federal University

Nafisa Mansurovna Mingazova

Kazan Federal University

LSBE-680

Seasonal and spatial variations in phytoplankton size structure and taxonomic composition in Tolo Harbour, Hong Kong

Chong Kim Wong

The Chinese University of Hong Kong

Charles Chi Hung Tang

The Chinese University of Hong Kong

LSBE-1039

Growth Differentiation Factor-9 (GDF-9) and Bone Morphogenetic Protein Receptor-2 (BMPR-2) Expression in Bovine Granulosa Cells (GCs) during follicular development

Sri Rahayu	<i>Brawijaya University</i>
Tomas J. Acosta	<i>Okayama University</i>
Shin Yoshioka	<i>Okayama University</i>
Tokuyama Sota	<i>Okayama University</i>
Kiyoshi Okuda	<i>Okayama University</i>

Oral Sessions Agenda

Literature

Suehiro

13:00~14:30

Friday, November 8

Session Chair: *Prof. Sujata Chaturvedi*

ISLLE-148

The Effect of Repetition in *Dancing Vanity* (2008) by Yasutaka Tsutsui: Dream Representations after Dreamtree Hill Junction and Paprika

Yuji Obataya

Geneva University

ISLLE-188

Translating the Other on More Equitable Terms - Striving to Transform Sino-British Relations in Timothy Mos An Insular Possession

Rita Olivia Kelly

The University of Hong Kong

ISLLE-251

The Novels in the Early 21st Century in the Philippines: Acknowledging the Sensibility of Popular Culture in the Works of Japanese Novelist Haruki Murakami by the Young Blood Filipino Novelists

Romeo Palustre Peña

University of the Philippines

Vidal Sosito Mendoza, Jr.

New Era University

ISLLE-780

Evoking Environmental Consciousness through Hindi Literature

Sujata Chaturvedi

Christ Church College, Kanpur

ISLLE-838

“Making no attempt to be understood”: Failed Communication in *Miss Lonelyhearts*

Wayne E. Arnold

Kansai Gaidai University

Oral Sessions Agenda

Management II

Suehiro

13:00~14:30

Friday, November 8

Session Chair: *Dr. Eric Kong*

ISBSS-1343

An Age of Crisis in the Non-profit Sector: Facilitating Human Capital and HRM Strategies and Practices for Innovation

Eric Kong

University of Southern Queensland

ISBSS-2094

Awareness on Green Solid Waste Management through 3Rs Based Approach

Nurhafizatul Haswani Binti
Mohd Razak

Universiti Teknologi Malaysia

Khadijah Bt Hussin

Universiti Teknologi Malaysia

ISBSS-2095

The Automatic Classification of Thai news by Similarity Method

Wichuda Kunnu

Suan Sunandha Rajabhat University

Nutthapat Kaewrattanapat

Suan Sunandha Rajabhat University

ISBSS-1411

Exploring the Effects of Transactional and Transformational Leadership on Cyberloafing at Work

Ahmad Said Al-Shuaibi

Universiti Utara Malaysi

Faridahwati Mohd. Shamsudin

Sultan Qaboos University

Chandrakantan Subramaniam

Universiti Utara Malaysia

Oral Sessions Agenda

Material Science and Engineering II

Hagoromo

13:00~14:30

Friday, November 8

Session Chair: *Prof. Hongzhi Cui*

ACCMES-471

Phase Change Energy Storage Concrete Preparation and Its Mechanical Properties

Xian Shi *Shenzhen University*

Yongmin Ye *Shenzhen University*

Hongzhi Cui *Shenzhen University*

ACCMES-472

The Effect of the Vibratory Stress Relief Technique on the Texture in AA 6061 Aluminum Alloy

Jia-Siang Wang *National Chung Hsing University*

Chih-Chun Hsieh *National Chung Hsing University*

Weite Wu *National Chung Hsing University*

ACCMES-1054

Synthesis of Microparticles Embedded with Carbon Nanotubes via Floating Catalyst Chemical Vapor Deposition and Their Environmental Application

Sarttrawut Tulaphol *Thammasat University*

Nurak Grisdanurak *Thammasat University*

Ekkachai Kanchanatip *Chulalongkorn University*

Den Walter *Tunghai University*

ACCMES-1044

Luminescence Study of Rare Earth Doped Cerium Fluoride-CeF₃ Nanophosphors

Mayuri Nalinkumar Gandhi *Indian Institute of Technology*

ACCMES-1024**Effect of Heat Treatment on Microstructure and Hardness Changes of 6xxx Aluminum Alloy**

Masoud Ibrahim Mohamed *Northern Border University*

Talal Mohamed Nour Abo
Mansour *Northern Border University*

Jawdat Abd Allah Aljarah *Northern Border University*

Oral Sessions Agenda

Computer and Information Sciences IV

Nishiki

13:00~14:30

Friday, November 8

Session Chair: *Prof. Hong-Yi Chang*

ICEAS-1803

A Multiple Coordinators Reservation Protocol for Parking Spaces in Vehicular Networks

Hong-Yi Chang	<i>National Chiayi University</i>
Hao-Wen Lin	<i>National Chiayi University</i>
Zih-Huan Hong	<i>National Chiayi University</i>
Tu-Liang Lin	<i>National Chiayi University</i>
Yuan-Wei Lin	<i>Industrial Technology Research Institute</i>

ICEAS-1829

Medoid-based Incremental Clustering for Large Data Streams with MapReduce

Han-joon Kim	<i>University of Seoul</i>
Man Xuan	<i>University of Seoul</i>

ICEAS-1905

Knowledge Acquisition from Cross Level in Using Fuzzy Rough Sets

Wei-Hsuan Lee	<i>Yuan Ze University</i>
Meng-Ying Chou	<i>Yuan Ze University</i>

ICEAS-1932

A Density-based Approach for Discovering User Similarity from GPS Trajectories

Tu-Liang Lin	<i>National Chiayi University</i>
Xian-Qun Zeng	<i>National Chiayi University</i>
Hong-Yi Chang	<i>National Chiayi University</i>

Oral Sessions Agenda

Biomedical Engineering II

Takara

13:00~14:30

Friday, November 8

Session Chair: *Prof. Mohd Zobir Hussein*

ICEAS-1773

Developing Multi Material Extruder System for Bioprinting Application

Yudan Whulanza *Universitas Indonesia*

Jos Istiyanto *Universitas Indonesia*

Taufiq Ramadhan *Universitas Indonesia*

Rendria Arsyian *Universitas Indonesia*

ICEAS-1820

Effect of Light Therapy on an in vitro Alzheimer's Disease Model

Kunthika Mokdara *King Mongkut's University of Technology, Thonburi*

Chaiyong Koaykul *King Mongkut's University of Technology, Thonburi*

Kwanchanok Viravaidya-Pasuwat *King Mongkut's University of Technology, Thonburi*

Anak Khantachawana *King Mongkut's University of Technology, Thonburi*

ICEAS-1911

In Vitro Controlled Release of an Anticancer Drug, Chlorogenic Acid using Magnesium/Aluminium Layered Double Hydroxide as Nanomatrix

Mohd Zobir Hussein *Universiti Putra Malaysia*

Farahnaz Barahuie *Universiti Putra Malaysia*

Zulkarnain Zainal *Universiti Putra Malaysia*

Palanisamy Arulselvan *Universiti Putra Malaysia*

Sharida Fakurazi *Universiti Putra Malaysia*

ICEAS-1913

Analyzing ECG segmentation and the rule of patterns by using Viterbi algorithm(HMMs)

Chaeyun Jung *Hankuk Acedemy of Foreign studies*

Taeseon Yoon *Hankuk Academy of Foreign studies*

ICEAS-1831

Design of a new algorithm to extract retinal blood vessels using combining mathematical morphology and histogram maximum and minimum points

Roya Aramesh

Qazvin Islamic Azad University

Karim Faez

Amirkabir University of Technology

Oral Sessions Agenda

Education II

Suehiro

14:45~16:15

Friday, November 8

Session Chair: *Prof. Showqi Ali Bahumaid*

ISLLLE-289

Revisiting the Use of MCQs in Language Tests

Showqi Ali Bahumaid

University of Sharjah

ISLLLE-328

The educational and linguistic design decisions of a computer game that teaches slang – Slanguage

Amanda Muller

Flinders University

ISLLLE-333

The Influence of Organizational Experiences and Career Satisfaction on Computer Teachers at Siam Business Administration Nonthaburi Technological College (SBAC Nonthaburi): A Case Study

Theerapath Prawatrungruang

North Bangkok University

ISLLLE-783

Improving English Skills by Implementing SRL and CLIL Approaches for Early Adulthood in order to Achieve Higher Academic Record

Swany Chiakrawati

Darma Persada University

Oral Sessions Agenda

Chemical Engineering II/ Fundamental and Applied Sciences II

Koubai

14:45~16:15

Friday, November 8

Session Chair: *Prof. Heru Setyawan*

ICEAS-1744

Preparation of Mesoporous Silicas from Bagasse Ash Using Polyethylene Glycol Templating

Heru Setyawan	<i>Sepuluh Nopember Institute of Technology</i>
Nanik Astuti Rahman	<i>Sepuluh Nopember Institute of Technology</i>
Ika Widhiana	<i>Sepuluh Nopember Institute of Technology</i>
Sri Rachmania Juliastuti	<i>Sepuluh Nopember Institute of Technology</i>
Samsudin Affandi	<i>Sepuluh Nopember Institute of Technology</i>

ICEAS-1785

Photoelectrochemical Properties for Cu-Zn-Sn-Se Thin Films Prepared Using Selenization of Electrodeposited Cu-Zn-Sn Metal Precursors

Lin-Ya Yeh	<i>Chang Gung University</i>
Kong-Wei Cheng	<i>Chang Gung University</i>

ICEAS-1799

Optimal Design Based ANN with Input Variable Selection for Pale Crepe Rubber Processing

Chalisa Pournaw	<i>Prince of Songkla University</i>
Pornsiri Kaewpradit	<i>Prince of Songkla University</i>
Wachira Daosud	<i>Burapha University</i>

ICEAS-1766

Impulsive Vaccination of SPARS Model with Time Delays

Rinrada Thamchai	<i>Curtin University</i>
Yong Hong Wu	<i>Curtin University</i>

ICEAS-1770**The Association between Aquatic Plants and Freshwater Fish Populations with Special Reference to Perak River, Malaysia**

Muzzalifah Abd Hamid *Universiti Sains Malaysia*

Mashhor Mansor *Universiti Sains Malaysia*

ICEAS-1771**The Effect of Utilizing Organic Fertilizers (Combination of Vermicompost with Humic Acid) Versus Chemical Fertilizers on the Growth of Brassica alboglabra L. H. Bailey**

Siti Norasikin Ismail *Universiti Sains Malaysia*

Mashhor Mansor *Universiti Sains Malaysia*

Hasnah Md. Jais *Universiti Sains Malaysia*

Oral Sessions Agenda

Electrical and Electronic Engineering II

Hagoromo

14:45~16:15

Friday, November 8

Session Chair: *Prof. C.J. Tay*

ICEAS-1777

PI Controller Design for Temperature Control System via the Lambert W Function

Terdsak Intachot

Valaya Alongkorn Rajabhat University

ICEAS-1786

Analysis and Design of a Single-Phase Unipolar Inverter Using Fuzzy-Based Complex Sliding Manifold Control

En-Chih Chang

I-Shou University

Yow-Chyi Liu

Kao Yuan University

Masahito Jinno

I-Shou University

ICEAS-1800

Design of Wideband Quasi-Triangle Comb Shaped Element Bowtie Antenna for Biomedical Monitoring Applications

Chumpon Patummakasorn

Valaya Alongkorn Rajabhat University

ICEAS-1835

MISO Current-mode Biquad Filter with Independent Control of Pole Frequency and Quality Factor

Koson Pitaksuttayaprot

Phetchabun Rajabhat University

Kritphon Phanrattanachai

Phetchabun Rajabhat University

Winai Jaikla

King Mongkut's Institute of Technology Ladkrabang

ICEAS-1886

Development of a Renewable Energy Micro Device

C.J. Tay

National University of Singapore

C. Quan

National University of Singapore

C Lee

National University of Singapore

H. Liu

National University of Singapore

Oral Sessions Agenda

Computer and Information Sciences V

Nishiki

14:45~16:15

Friday, November 8

Session Chair: *Prof. Sutheera Puntheeranurak*

ICEAS-1934

A Novel IPTV Channel-Recommendation Mechanism

Hong-Yi Chang	<i>National Chiayi University</i>
Chih-Chun Lai	<i>National Chiayi University</i>
Zih-Huan Hong	<i>National Chiayi University</i>
Tu-Liang Lin	<i>National Chiayi University</i>
Yuan-Wei Lin	<i>Industrial Technology Research Institute</i>

ICEAS-1930

Combing Main Path Analysis, Citation Analysis and Text Mining Techniques to Trace the Conceptual Development Trajectory of a Research Field

Yi-Ning Tu	<i>Fu Jen Catholic University</i>
Shu-Lan Hsu	<i>Fu Jen Catholic University</i>

ICEAS-1945

The Enhanced Trust-based Filtering Recommender System with Review Helpfulness Weighting

Sutheera Puntheeranurak	<i>King Mongkuts Institute of Technology Ladkrabang</i>
Thanaphan Wongkamalasai	<i>King Mongkuts Institute of Technology Ladkrabang</i>

ICEAS-1950

Quality of Service (QoS) for Streaming Service on OpenFlow Network

Sutheera Puntheeranurak	<i>King Mongkuts Institute of Technology Ladkrabang</i>
Nipith Sa-ngarmangkang	<i>King Mongkuts Institute of Technology Ladkrabang</i>

Oral Sessions Agenda

Life Sciences VI

Takara

15:15~16:45

Friday, November 8

Session Chair: *Prof. Ibrahim Faijulla Pailwan*

LSBE-869

Media entrapment of Immobilize-Nitrifying bacteria for effective use in shrimp pond (Tambak) culture

Anik Martinah Hariati *University of Brawijaya*

Ating Yuniarti *University of Brawijaya*

Dewa Gede Raka Wiadnya *University of Brawijaya*

Aulanniam Aulanniam *University of Brawijaya*

LSBE-878

Physiological Evaluation of Mercury Exposure in Capsicum Frutescens L.

Juliana Janet Martin Puzon *University of the Philippines*

Frances Riel Baniqued
Elinzano *University of the Philippines*

William Patrick Buhian *University of the Philippines*

LSBE-893

Characterization of the metabolic network of Chlamydomonas reinhardtii and algae isolated from the United Arab Emirates

David R Nelson *New York University*

L. Ghamsari *New York University*

P. Ng *Cornell University*

H. Cai *New York University*

A. Jaiswal *New York University*

X. Yang *Dana-Farber Cancer Institute and Harvard Medical School*

J.A. Papin *University of Virginia*

H.Yu *Cornell University*

S. Balaji *MRC Laboratory of Molecular Biolog*

K. Salehi-Ashtiani *New York University*

LSBE-1024

Fish species diversity its population dynamics and percent compositon in the commercial catches of fresh water habitats of Wai region (M.S.) India

Ibrahim Faijulla Pailwan

Kisan Veer Mahavidyalaya

Deepak Vshwanath Muley

Shivaji University

Oral Sessions Agenda

Education III

Suehiro

16:30~18:00

Friday, November 8

Session Chair: *Prof. Terry Royce*

ISLLLE-013

Exploration into Reflective Teaching Practices of College Teachers in Indonesia

Umi Tursini

The University of New South Wales

ISLLLE-102

Research Literacies for Researchers: Conceptualising the Literature Review

Terry Royce

University of Technology, Sydney

ISLLLE-168

Teaching Expressive Writing To Students With Learning Disabilities: An Overview Of Russell Baker And Edwards Researched Based Approach

Alheri Franklin Chindaya

Federal College of Education, Kano

ISLLLE-131

Argonauts of the Gentrified Working Class: Reconsidering Transnational Elite Class Theory in Light of Global Ethnographic Research in British Grammar Schools in Barbados

Cameron McCarthy

University of Illinois

Oral Sessions Agenda

Chemical Engineering III

Koubai

16:30-18:00

Friday, November 8

Session Chair: *Prof.*

ICEAS-1596

Removal of Phenol from Water by Crude Laccase-Immobilized Membrane

Karnika Ratanapongleka

Ubon Ratchathani University

ICEAS-1727

Heat Capacity and Electrical Conductivity of Aqueous Mixtures of N-Methyldiethanolamine (MDEA) and Ionic Liquids

Ahmad Shamiri

University of Malaya

Siti Norsamira Muhammad
Burhanuddin

University of Malaya

Rozita Yusoff

University of Malaya

Mohamed Kheireddine Arou

University of Malaya

Roya Aramesh

Qazvin Islamic Azad University

ICEAS-1799

Optimal design based ANN with input variable selection for pale crepe rubber processing

Chalisa Pournaw

Prince of Songkla university

Pornsiri Kaewpradit

Prince of Songkla university

Wachira Daosud

Burapha University

Oral Sessions Agenda

Civil Engineering II

Hagoromo

16:30-18:00

Friday, November 8

Session Chair: *Prof. Vankudothu Bhikshma*

ICEAS-1697

Seismic Vulnerability Assessment of Concrete Pile Foundation

Mohammad Mohinuddin
Ahmed

University of Information Technology & Sciences

Md. Jahangir Alam

University of Information Technology & Sciences

Ing Uwe.E Dorka

University of Information Technology & Sciences

ICEAS-1837

Effect of Gravel Size and Content on Functional Properties of Pervious Concrete

Mongkhon Narmluk

King Mongkuts University of Technology Thonburi

ICEAS-1928

Strength Characteristics of Fly Ash Based Geopolymer Concrete with Addition of Ggbs

Vankudothu Bhikshma

Osmania University

Talapala Naveenkumar

Osmania University

ICEAS-1707

Influence of Fly Ash on Self-healing Performance in Cracked Concrete

Mohamed Zakaria

Muroran Institute of Technology/ Aswan University

Na Seung Hyun

Muroran Institute of Technology

Yukio Hama

Muroran Institute of Technology

ICEAS-1942

Using UAV for Embankment Pavement Nondestructive Test

Chin-Ping Lin	<i>National Pingtung University of Science and Technology</i>
Yu-Min Wang	<i>National Pingtung University of Science and Technology</i>
Kui-Ting Chang	<i>National Pingtung University of Science and Technology</i>
Tung-Chih Chung	<i>National Pingtung University of Science and Technology</i>
Chou-Fu Liang	<i>National Pingtung University of Science and Technology</i>

Poster Session Agenda

Life Sciences

Ougi

09:00-10:00

Thursday, November 7

LSBE-596

A Fraction of Rubus idaeus Extracts Inhibits Invasion and Migration Potential of Human A549 Lung Cancer Cells by Suppression Epithelial-to-Mesenchymal Transition and Akt Pathway

Pei-Ni Chen

Chung Shan Medical University

LSBE -597

Hinokitiol Inhibits Cancer Invasion via Down-regulation of Proteinase and Rho Family Expression in Human Cervical Cancer Cells in Vivo and in Vitro

Meng-hsuan Lin

Chung Shan Medical University

Pei-Ni Chen

Chung Shan Medical University

LSBE -598

Koelreuteria formosana extract Inhibits the Invasion and Migration of Renal Carcinoma 786-O-SI3 Cells In Vitro and In Vivo

Chin-Yin Lin

Chung Shan Medical University

Pei-Ni Chen

Chung Shan Medical University

Yih-Shou Hsieh

Chung Shan Medical University

LSBE -642

MTHFR 677 C>T Polymorphism and Expression of the Angiogenesis Factors in Psoriasis Vulgaris.

Siaw Cheok Liew

International Medical University

Esha Das Gupta

International Medical University

Srikumar Chakravarthi

International Medical University

Shew Fung Wong

International Medical University

Nagarajah Lee

Open University Malaysia

LSBE -649**Co-contamination between Salmonella and Campylobacter on Chicken and Chicken Associated Samples at the Slaughterhouse in Khon Kaen, Northeastern Thailand**

Bongkot - Noppon	<i>Khon Kaen University</i>
Seri - Khaeng-air	<i>Khon Kaen University</i>
Prapansak - Chaveerach	<i>Khon Kaen University</i>
Pimsuree - Ussawingowit	<i>Khon Kaen University</i>
Apiradee - Sopa	<i>Khon Kaen University</i>

LSBE -651**Identification of 16 flower development related MADS genes of Bambusa edulis**

Choun-Sea Lin	<i>Academia Sinica</i>
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LSBE -666**Functional properties of cassava starch microsphere prepared by the emulsion crosslink technique**

Santhanee Pucha-arnon	<i>King Mongkut's University of Technology Thonburi</i>
Wittawat Jiranantakul	<i>King Mongkut's University of Technology Thonburi</i>
Dudsadee Uttapap	<i>King Mongkut's University of Technology Thonburi</i>

LSBE -676**Contents of Ascorbic acid and Citric acid in Sports Drinks**

Yong-Duk Park	<i>Kyung Hee University</i>
Jong-Hwa Jang	<i>Hanseu University</i>
Kyung-Suk Hwang	<i>Shinheung University</i>
Jong-Oh Kang	<i>Shinheung University</i>
Su-Min Yoo	<i>Kyung dong University</i>

LSBE -677**Simultaneous Quantitative Analysis of Bioactive Constituents in Herbal Remedies using Amperometric Detection**

Jung-Eun Park	<i>Kyung Hee University</i>
Ha-Jeong Kwon	<i>Kyung Hee University</i>
Kyung-Suk Hwang	<i>Shinheung University</i>
Su-Min Yoo	<i>Kyung Dong University</i>
Jong-Hwa Jang	<i>Hanseu University</i>

LSBE-689

Tyramine detection using PEDOT:PSS/AuNP/1-methyl-4-mercaptopyridium modified screen printed carbon electrode sensor and molecularly imprinted polymer solid phase extraction

Li-chen Wu	<i>National Chi Nan University</i>
Cheng-hung Hsieh	<i>National Chi Nan University</i>
Yen-Cheng Liao	<i>National Chi Nan University</i>
Hsin-i Chan	<i>National Chi Nan University</i>
Yu-hao Chang	<i>National Chi Nan University</i>

LSBE-690

Alterations in sulfur amino acid metabolism during an early phase of liver regeneration after partial hepatectomy

Young Suk Jung	<i>Seoul National University</i>
Sun Ju Kim	<i>Seoul National University</i>
Young Chul Kim	<i>Seoul National University</i>

LSBE-692

Degradation of rice straw by microbial consortia and its molecular analyses by PCR-DGGE

Khanh Quoc Hoang	<i>Institute of Tropical Biology, Vietnam Academy of Science & Technology</i>
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LSBE -702

The effects of *Lactobacillus plantarum* TWK10 fermented soy milk on improvement of hypertension in spontaneously hypertensive rats

Shih-Yu Zeng	<i>Fu Jen Catholic University</i>
Tsung-Yu Tsai	<i>Fu Jen Catholic University</i>

LSBE -704

The inhibitory effect of soy milk fermented with lactic acid bacteria on melanogenesis in guinea pig

Te-Hua Liu	<i>Fu Jen Catholic University</i>
Ru-Yu Dai	<i>Fu Jen Catholic University</i>
Tsung-Yu Tsai	<i>Fu Jen Catholic University</i>

LSBE -708**The iliac artery lengths in normal and abnormal aortoiliac arteries**

Porntip Boonruangsri	<i>Khon Kaen University</i>
Bussakorn Suwannarong	<i>Khon Kaen University</i>
Somsiri Ratanasuwan	<i>Khon Kaen University</i>
Kowit Chaisiwamongkol	<i>Khon Kaen University</i>
Wiphawi Hipkiao	<i>Khon Kaen University</i>

LSBE -736**The inhibitory effects of genistein on melanogenesis in B16-F0 mouse melanoma cells**

Chia-Ren Chang	<i>Fu Jen Catholic University</i>
Tsung-Yu Tsai	<i>Fu Jen Catholic University</i>

LSBE -740**Water Footprint of Sugarcane Cultivation in Mae Sot District, Tak Province, Thailand**

Nattawut Sareein	<i>Chiang Mai University</i>
Chitchol Phalaraksh	<i>Faculty of Science, Chiang Mai University</i>
Munetsugu Kawashima	<i>Chiang Mai University</i>

LSBE -749**Film Formation and Moisture Properties of Hydrogels Made by Blending NaCMC with Agar and Corn Starch**

Watit Khokthong	<i>Chiang Mai University</i>
Paulo José do Amaral Sobral	<i>University of São Paulo</i>
Sutthathorn Chairuangsi	<i>Chiang Mai University</i>

LSBE -1064**Vascular Cell Adhesion Molecule-1 (VCAM-1) Protein Expression Profile in Biopsied Tissue of Metastatic Osteosarcoma Patient at Post-chemotherapy**

Sharaniza Ab-Rahim	<i>University Teknologi MARA</i>
Zulaika Roslan	<i>University Teknologi MARA</i>
Effat Omar	<i>University Teknologi MARA</i>
Tunku Kamarul	<i>University of Malaya</i>
Azura Mansor	<i>University of Malaya</i>

LSBE -1065**Antiviral Efficacy of a Synthesized Flavanoid-Derived Ligand on DENV2 Protease Gene Copies and Cytoskeleton Redistribution in Vitro**

Mudiana Muhamad *University Teknologi MARA*

Khuzaidatul Azidah Ahmad
Nazri *University Teknologi MARA*

Yean Kee Lee *University of Malaya*

Noorsaadah Abd Rahman *University of Malaya*

Rohana Yusof *University of Malaya*

Poster Session Agenda

Chemical Engineering

Ougi

11:00-12:00

Thursday, November 7

ICEAS-1646

Size Effect of Silver Nanoparticle Melted into Titanium Oxide Film for Photocatalytic Activity

Jung-Jie Huang

MingDao University

ICEAS-1661

Suppression of AKT/NF- κ B-associated signaling by deguelin inhibits cell migration and invasion on human non-small cell lung cancer NCI-H292 cells

Yung-Ting Hsiao

China Medical University

Jing-Gung Chung

China Medical University

ICEAS-1662

Quercetin promotes cell cycle arrest and induction of apoptosis in human oral cancer SAS cells through mitochondria/endoplasmic reticulum mediated signaling pathways

Chien-Ning Yao

China Medical University

Jing-Gung Chung

China Medical University

ICEAS-1663

Demethoxycurcumin induces DNA damage and inhibits DNA repair associated protein expressions in NCI-H460 human lung cancer cells

Yang-Ching Ko

China Medical University

Wu-Huei Hsu

China Medical University Hospital

Jing-Gung Chung

China Medical University

ICEAS-1664

Tetrandrine induced apoptosis in human nasopharyngeal carcinoma NPC-TW 076 cells through endoplasmic reticulum stress pathway

Ya Jing Lin

China Medical University

Jing Gung Chung

China Medical University

ICEAS-1665**Norcantharidin induced apoptosis and inhibited migration/invasion of human gastric cancer AGS cells**

Li Cheng Zheng *China Medical University*

Jing-Gung Chung *China Medical University*

ICEAS-1666**DL-Sulforaphane induce cell cycle arrest and apoptosis in human colon cancer HT 29 and HCT 116 cell lines**

Ting-Ying Shih *China Medical University*

Kuo-Ching Liu *China Medical University*

Jing-Gung Chung *China Medical University*

ICEAS-1667**Tetrandrine inhibits cell migration and invasion in Colon Cancer SW620 cells through the inhibition of MMP-1,-2,-9**

Ta-Kuo Juan *China Medical University*

Jing-Gung Chung *China Medical University*

ICEAS-1686**Synthetic peptides with antibacterial activity against methicillin-resistant *Staphylococcus aureus***

Nuanchawee Wetprasit *Ramkhamhaeng University*

Janthima Jaresitthikunchai *National Science and Technology Development Agency*

Narumon Phaonakrop *National Science and Technology Development Agency*

Wirat Danglad *Ramkhamhaeng University*

Sittiruk Roytrakul *National Science and Technology Development Agency*

ICEAS-1741**Microscopic Analysis of Caragana Korshinskii Kom towards a High Efficient Protein Extraction Process**

Cheng Zhong	<i>Tianjin University of Science and Technology</i>
Zhao Zhou	<i>Tianjin University of Science and Technology</i>
Zhuo Sun	<i>Tianjin University of Science and Technology</i>
Yu-Ming Zhang	<i>Tianjin University of Science and Technology</i>
Shi-Ru Jia	<i>Tianjin University of Science and Technology</i>

ICEAS-1783**Photoelectrochemical Application of Cu-Zn-Sn-S (CZTS) Semiconductor Thin Films Using the Sulfurization of Sputtering Method**

Kong-Wei Cheng	<i>Chang Gung University</i>
Jian Hao Chen	<i>Chang Gung University</i>

ICEAS-1968**Effect of Proteins on Networks of Peroxide Cross-linked Natural Rubber Elucidated by ¹H Double-quantum NMR**

Adun Nimpiboon	<i>Mahidol University</i>
Juan Lopez Valentin	<i>Instituto de Ciencia y Tecnología de Polímeros</i>
Jitladda Sakdapipanich	<i>Mahidol University</i>

Poster Session Agenda

Education

Ougi

13:00-14:00

Thursday, November 7

ISLLLE-174

The Impact of Introduction and Background of the Sport Lottery in Taiwan

Yu-Wei Lin

National Dong Hwa University

ISLLLE-180

Factors Influencing the Career Development of Senior High School Athletes in Taiwan

Chun Chen Chan

National Taiwan Normal University

Su Ching Chen

National Taiwan Normal University

Yu Wei Lin

National Taiwan Normal University

ISLLLE-772

The Study on Promoting Professionalization of Japanese Football

Tsung-Yao Liao

National Taiwan Normal University

Chien-Shing Lee

National Taiwan Normal University

Poster Session Agenda

Management

Ougi

13:00-14:00

Thursday, November 7

ISBSS-1380

The Impact of Implementing Knowledge Management on Firm Performance

Yung-Lung Lai

Feng Chia University

ISBSS-1357

Does Short-Term Orientation Improve Sunk Cost Effect?

Kuo Chih Cheng

National Changhua University of Education

Chung Yuan Lin

National Changhua University of Education

ISBSS-1377

Evaluating Process Performance for Very Low Fraction Defectives

Hung-Chin Lin

Vanung University

ISBSS-1426

The Exploration of Innovation Behavior and Personality on R&D Engineer

Han-Jen Niu

Tamkang University

Poster Session Agenda

Business/ Finance

Ougi

13:00-14:00

Thursday, November 7

ISBSS-1364

Earnings Management in Family Firms and Family Conglomerates-Evidence from Taiwan

Mei-Ling Yang

National Sun Yat-Sen University

Chun-Ming Chen

National Sun Yat-sen University

ISBSS-1338

Celebrity Second-Hand Commodities in Online Auctions: The Effects of Celebrity Attractiveness, Contagion, Auction Motivations, and Commodity Types on Consumer Responses

Hsuan-Yi Chou

National Sun Yat-sen University

ISBSS-1386

Portfolio Optimization with GA-based Fuzzy Mean-VaR Approach

Ping-Chen Lin

National Kaohsiung University of Applied Sciences

Po-Chang Ko

National Kaohsiung University of Applied Sciences

Poster Session Agenda

Computer and Information Sciences

Ougi

13:00-14:00

Thursday, November 7

ICEAS-1668

Comparison of Two Interval Models for Fuzzy-valued Differential Evolution

Hidehiko Okada

Kyoto Sangyo University

ICEAS-1676

Robust Design of Operating Window Experiments with Censored Data

Hsu-Hwa Chang

National Taipei College of Business

Tse-Chieh Lin

Lunghwa University of Science and Technology

Jui-Yen Yen

National Taipei College of Business

ICEAS-1692

A Time-Bound Key Management Scheme with Assured Deletion for Cloud Storage

Iuon-Chang Lin

Asia University

Mu-Ting Lin

National Chung Hsing University

ICEAS-1821

Design and Implementation of High Speed Banknotes Recognition System Based on DSP Architecture

Rong-Chin Lo

National Taipei University of Technology

Chien-Hung Chen

National Taipei University of Technology

ICEAS-1851

Benefit for a closed loop inventory system with price-sensitive return

Po-Chung Yang

St. John's University

X.C. Lai

St. John's University

ICEAS-1951

Functional Requirements for Psychological Factors on Evacuation Modeling and Simulation

Kayo Iizuka

Senshu University

Yasuki Iizuka

Tokai University

Poster Session Agenda

Electrical and Electronic Engineering

Ougi

15:00-16:00

Thursday, November 7

ICEAS-1656

Applying FMEA and QFD for improving packaging processes of Transistor

Hsiu-Wei Kuo *Feng Chia Univeristy*

Abbas Al-Refaie *University of Jordan*

Chao-Hsiung Yeh *Feng Chia University*

ICEAS-1720

Development of a Non-intrusive Load Monitoring System as an Electricity Energy Audit Relevant to Energy-saving Issues

Yu-Hsiu Lin *National Taipei University of Technology*

Men-Shen Tsai *National Taipei University of Technology*

Chiung-Chou Liao *Chien Hsin University of Science and Technology*

ICEAS-1817

Hybrid Intelligent Approaches for Fault Diagnosis of Rotating Machinery

Huo-Ching Sun *Cheng Shiu University*

Yann-Chang Huang *Cheng Shiu University*

Chien-Yuan Liu *Cheng Shiu University*

ICEAS-1838

An Investigation of Wind and Solar Energy in Iran

Misagh Pashakhani *Islamic Azad University*

Mahdi Sobhanipour *Islamic Azad University*

ICEAS-1844

Non-Contact Detection Technique for Triboelectricity Based on Electrostatic Induction

Koichi Kurita *Kinki University*

Poster Session Agenda

Mechanical Engineering

Ougi

15:00-16:00

Thursday, November 7

ICEAS-1732

Design of a piezoelectric micro pump imitating stomach's peristalsis depending on the phase difference

Yeongmin Na

Changwon National University

Hyunseok Lee

Changwon National University

ICEAS-1936

The determination maximal workspace for planar five bar mechanism

Demei Lee

Chang Gung University

Hsiang Hsu

Chang Gung University

Poster Session Agenda

Material Science and Engineering

Ougi

15:00-16:00

Thursday, November 7

ACCMES-1084

Metallurgical Requirements for the Production of Heavy Section Ductile Irons With High Sub-zero Impact Property

Yung-Ning Pan

National Taiwan University

Re-Mo Chang

Metal Industries Research & Development Center

Hsuan-Te Lin

National Taiwan University

ICEAS-1718

Interfacial Microstructure Characteristics of Sn-1Ni and SAC105 alloys using EIC Process in Photovoltaic Ribbon

Tsung Mao Chuang

National Cheng Kung University

Fei Yi Hung

National Cheng Kung University

Truan Sheng Lui

National Cheng Kung University

Dai Wen Qiu

National Cheng Kung University

ICEAS-1719

A Study in Zinc Oxide-Titanium-Silicon Structure Using an Electrical Induced Crystallization (EIC) Method

Yen-Ting Chen

National Cheng Kung University

Fei-Yi Hung

National Cheng Kung University

Truan-Sheng Lui

National Cheng Kung University

Shoou-Jinn Chang

National Cheng Kung University

ICEAS-1728

Preparation and Magnetoelectric Properties of Polymer-Based NiFe₂O₄ Composite for Efficient Wireless Power Transfer

Yi-Hao Pai

National Dong Hwa University

Yu-Juin Chen

National Dong Hwa University

ICEAS-1775**Visible emission related to Si and Ge quantum dots**

Chih-cheng Kao *Southern Taiwan University of Science and Technology*

Wei-Chin Wang *Southern Taiwan University of Science and Technology*

ICEAS-1903**Deodorization of Skim Natural Rubber by Macca Charcoal**

Jitladda Sakdapipanich *Mahidol University*

Phawasoot Rodgerd *Mahidol University*

Poster Session Agenda

Biomedical Engineering

Ougi

9:00-10:00

Friday, November 8

ICEAS-1582

Recovery of potassium chloride from sintering fume of ironmaking works

Bin Pei	<i>University of Science and Technology, Beijing</i>
Guang Zhan	<i>University of Science and Technology, Beijing</i>
Zhancheng Guo	<i>University of Science and Technology, Beijing</i>

ICEAS-1683

A biomechanical study of cervical spinal motion and facet joint force as it relates to articulating surface designs and constrained types of total disc arthroplasty

Chien-Yu Lin	<i>National Taipei University of Technology</i>
Shih-Yeong Chuang	<i>Tri-Service General Hospital</i>
Ching-Lung Tai	<i>Chang Gung University</i>
Weng-Pin Chen	<i>National Taipei University of Technology</i>

ICEAS-1687

An antibacterial of modified peptide; Brucin2, against Staphylococcus epidermidis and Streptococcus pyogenes

Thakorn Sornwatana	<i>Mahidol University</i>
Teerakul Arpornsuwan	<i>Thammasat University</i>
Sittiruk Roytrakul	<i>National Science and Technology Development Agency</i>
Nuanchawee Wetprasit	<i>Ramkhamhaeng University</i>
Sunanta Ratanapo	<i>Kasetsart University</i>

ICEAS-1695

The Effect of Microstructures on the Bio-corrosion Behavior and Biocompatibility of Magnesium alloy

Da-Jun Lin	<i>National Cheng Kung University</i>
Fei-Yi Hung	<i>National Cheng Kung University</i>
Truan-Sheng Lui	<i>National Cheng Kung University</i>
Ming-Long Yeh	<i>National Cheng Kung University</i>

ICEAS-1712

Multimodal image-guided photothermal therapy enhance the delivery of nanomedicine for diagnosis and therapy of cancer

Cheng-Liang Peng	<i>National Taiwan University</i>
Ying-Hsia Shih	<i>National Taiwan University</i>
Pei-Chi Lee	<i>National Taiwan University</i>
Shin-Yu Lee	<i>National Taiwan University</i>
Cheng-Jung Yao	<i>Wan Fang Hospital</i>
Ming-Jium Shieh	<i>National Taiwan University</i>

ICEAS-1716

A Novel Multifunctional Nanomedicine for Magnetic Resonance Imaging and Treatment of Cancer

Shin-Yu Lee	<i>National Taiwan University</i>
Chia-Ying Yang	<i>National Taiwan University</i>
Cheng-Liang Peng	<i>National Taiwan University</i>
Cheng-Jung Yao	<i>Wan Fang Hospital; Taipei Medical University</i>
Pei-Chi Lee	<i>National Taiwan University</i>
Ming-Jium Shieh	<i>National Taiwan University</i>

ICEAS-1730

Biomechanical comparison of different combinations of hook and screw in one spine motion unit- an experiment in porcine model

Ching-Lung Tai	<i>Chang Gung University</i>
Po-Liang Lai	<i>Chang Gung Memorial Hospital</i>
Yi-Ting Chen	<i>Chang Gung University</i>

ICEAS-1754**Fabrication and Characterization of Chitosan/Poly(vinyl alcohol) Composite Electrospun Nanofibrous Scaffold for Skin Substitute**

Oraphan Chaisiri	<i>Mahidol University</i>
Noppavan Chanunpanich	<i>King Mongkut's Institute of Technology North Bangkok</i>
Borisut Sanmano Hanpanich	<i>Mahidol University</i>
Krittayot Phawong	<i>Mahidol University</i>
Siwaj Thirawongsak	<i>Mahidol University</i>

ICEAS-1756**Dried plums Inhibited E. coli Heat-Labile Enterotoxin-Induced Diarrhea through Blocking the Toxin and GM1 Interaction**

Jaw-Chyun Chen	<i>Da-Yeh University</i>
Tin-Yun Ho	<i>Institute of Chinese Medical Science</i>
Jiun-Long Yang	<i>China Medical University</i>
Chien-Yun Hsiang	<i>China Medical University</i>

ICEAS-1805**Study about C5L2; C5as receptor role with bioinformatics**

Kyoungmin Kim	<i>Hankuk Academy of Foreign Studies</i>
Heewon Lee	<i>Hankuk Academy of Foreign Studies</i>
Bin Jang	<i>Hankuk Academy of Foreign Studies</i>
Taeseon Yoon	<i>Hankuk Academy of Foreign Studies</i>

ICEAS-1843**Determining Topology of Transmembrane Protein by Hydrophobicity-based LVQ and K-means**

Yae Eun Hwang	<i>Hankuk Academy of Foreign Studies</i>
Hee Jee Yun	<i>Hankuk Academy of Foreign Studies</i>
Taeseon Yun	<i>Hankuk Academy of Foreign Studies</i>

ICEAS-1883**The Analysis of H5N1 Amino Acid using Artificial Intelligence Neural Network**

Dae Young Kim	<i>Hankuk Academy of Foreign Studies</i>
Jun Hyeok Bae	<i>Hankuk Academy of Foreign Studies</i>
Hye Jun Kim	<i>Hankuk Academy of Foreign Studies</i>
Tae Seon Yoon	<i>Hankuk Academy of Foreign Studies</i>

ICEAS-1902**The effect of necrotic lesion size and orientation of femoral component on the stress distribution for hip resurfacing in femoral head osteonecrosis- a finite element simulation**

Ching-Lung Tai	<i>Chang Gung University</i>
Mu-Yi Liu	<i>Chang Gung University</i>
Yung-Chou Chen	<i>Chang Gung University</i>
Jui-Chien Sun	<i>Chang Gung University</i>
Pang-Hsin Hsieh	<i>Chang Gung Memorial Hospital</i>

ICEAS-1909**DNA Sequence Pattern Algorithm using Rough Set Theory**

Byeongjun Park	<i>Hankuk Academy of Foreign Studies</i>
Hyungkwon Ko	<i>Hankuk Academy of Foreign Studies</i>
Yusin Kim	<i>Hankuk Academy of Foreign Studies</i>
Taeseon Yoon	<i>Hankuk Academy of Foreign Studies</i>

Poster Session Agenda

Biological Engineering

Ougi

11:00-12:00

Friday, November 8

LSBE-663

Biosensor Development based on a Class C Beta-lactamase

Sze Yan Liu

State Key Laboratory of Chirosciences, The Hong Kong Polytechnic University

LSBE-687

Monophasic Synthesis of Phospholipid-Capped Nanoparticles and Their Application in the Measurement of Phospholipase A2 Activity

Si-Han Chen

National Taiwan University

Yen-Pang Hsu

National Taiwan University

Hsin-Yi Lu

National Tsing Hua University

LSBE-721

Industrial Production of Aldehydes from their Corresponding Alcohols by Biotransformation using Gluconobacter Mutant.

Si-Han Chen

National Taiwan University

Yen-Pang Hsu

National Taiwan University

Hsin-Yi Lu

National Tsing Hua University

LSBE-729

Formation of control-shaped silica crystals, using recombinant silicatein and cathepsin of marine sponge *Latrunculia oparinae*

Dmitry Kamenev

Institute of Biology and Soil Science FEB RAS

Galina Veremeichik

Institute of Biology and Soil Science FEB RAS

Svetlana Kovalchuk

Pacific Institute of Bio-Organic Chemistry

Yuri Shkryl

Institute of Biology and Soil Science FEB RAS

Tatiana Gorpenchenko

Institute of Biology and Soil Science FEB RAS

LSBE-730**Changes in antioxidant enzymes activities during in vitro morphogenesis in rolC-transformed *Panax ginseng* cell cultures**

Tatiana Viktorovna Avramenko	<i>Institute of Biology and Soil Sciences</i>
Yuri Nikolaevich Shkryl	<i>Institute of Biology and Soil Sciences</i>
Galina Nikolaevna Veremeichik	<i>Institute of Biology and Soil Sciences</i>
Viktor Pavlovich Bulgakov	<i>Institute of Biology and Soil Sciences</i>

LSBE-807**Three-dimensional β -TCP/PCL scaffold improves osteoblast differentiation in vitro.**

Mi Eun Kim	<i>Chosun University</i>
Ju Hwa Yoon	<i>Chosun University</i>
Dong Hwan Kim	<i>Chosun University</i>
Jaekyeong Oh	<i>Chosun University</i>
Chi Joong Kim	<i>Chosun University</i>
Young Ung Park	<i>Chosun University</i>
Haeng-Nam Lee	<i>Chosun University</i>
Jun Sik Lee	<i>Chosun University</i>

LSBE-819**Development of protein-based and protein nanofibers-based biosensors for in vitro drug screening and bacterial beta-lactamase detection**

Pak-Ho Chan	<i>The Hong Kong Polytechnic University</i>
Lan Zou	<i>The Hong Kong Polytechnic University</i>
Wing-Lam Cheong	<i>The Hong Kong Polytechnic University</i>
Yun-Chung Leung	<i>The Hong Kong Polytechnic University</i>

LSBE-848**Nanovoids embedded in FIB fabricated Au/Ag nanorods arrays as SERS-active substrate for the recognition of abnormal cells**

Jiunn-Der Liao	<i>National Cheng Kung University</i>
Sivashanmugan Kundan	<i>National Cheng Kung University</i>
Chih-Kai Yao	<i>National Cheng Kung University</i>
Minh-Hien Ngo Thi	<i>National Cheng Kung University</i>
Pei-Lin Shao	<i>National Cheng Kung University</i>

LSBE-1000**In Vitro Seed Germination and Micropropagation of Taraxacum Kok-Saghyz Rodin**

Kairat Uteulin	<i>Institute of Plant Biology and Biotechnology</i>
Serik Mukhambetzhano	<i>Institute of Plant Biology and Biotechnology</i>
Izbasar Rakhimbaev	<i>Institute of Plant Biology and Biotechnology</i>

LSBE-1057**Application of Novel Methylcalix[4]resorcinarene-based Chiral Stationary Phases in Enantioseparation**

Wang Xiaochong	<i>National University of Singapore</i>
Zhao Jia	<i>National University of Singapore</i>
Soh Shu Fang	<i>National University of Singapore</i>
Gong Yinhan	<i>National University of Singapore</i>

LSBE-775**Preparation and Characterization of Nano-oilbodies for EGFR Overexpression Tumor Cell Targeting**

Chia-Pei Wu	<i>China Medical University</i>
Chung-Jen Chiang	<i>China Medical University</i>
Yun-Peng Chao	<i>Feng Chia University</i>

LSBE-1015**Polybutylcyanoacrylate Nanoparticles for Delivering Hormone Response Element-Conjugated Neurotrophin-3 to the Brain of Intracerebral Hemorrhagic Rats**

Yung-Chih Kuo	<i>National Chung Cheng University</i>
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Poster Session Agenda

Life Sciences

Ougi

11:00-12:00

Friday, November 8

LSBE-769

Antipsychotic Drugs Modulate RhoA-mediated Protein Expression Changes of ARHGDIA Signaling Pathway in C6 Glial Cells

Maoliang Chen

Taipei Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation.

LSBE-788

Novel Chitosan/PVP Hydrogel Loaded with Rhus Coriaria L (Sumac) Extract: Collaboration of Iranian Traditional Medicine and Novel Drug Delivery Systems in Wound Healing

Seyed Hossein Hajimiri

Tehran University of Medical Sciences

Mir Hamed Hajimiri

Tehran University of Medical Sciences

Mohammadamin Esfandiyari

Tehran University of Medical Sciences

Ahmadreza Dehpour

Tehran University of Medical Sciences

Rassoul Dinarvand

Tehran University of Medical Sciences

LSBE-790

Genistein Inhibited the PMA-induced Mast Cell Activation through the Regulation of ERK Pathway

Dong Hwan Kim

Chosun University

Mi Eun Kim

Chosun University

Ju Hwa Yoon

Chosun University

Jae Kyeong Oh

Chosun University

Young Ung Park

Chosun University

Chi Joong Kim

Chosun University

Haeng-Nam Lee

Chosun University

Jun Sik Lee

Chosun University

LSBE-686**Role of Tunicamycin for Mechanism of Action and Cellular Localization of Multi-drug Resistance Proteins Especially for P-gp and BCRP**

Karolina Wojtowicz *Poznań University of Medical Sciences*

Radosław Januchowski *Poznań University of Medical Sciences*

Michał Nowicki *Poznań University of Medical Sciences*

LSBE-696**Molecular Changes in MIF Gene in Children with Idiopathic Nephrotic Syndrome**

Monika Świerczewska *Poznań University of Medical Sciences*

Katarzyna Zaorska *Poznań University of Medical Sciences*

Poster Session Agenda

Fundamental and Applied Sciences

Ougi

11:00-12:00

Friday, November 8

ICEAS-1672

Solvation of RhB in some Solvents

Amit Sharma

Bharati Vidyapeeth's College of Engineering

ICEAS-1863

Effect of Extender on Preservation of Native Chicken “Luang hang kao” Spermatozoa

Thipsuda Boonmatan

*Institute of Agricultural Technology Suranaree
University of Technology*

Samorn Ponchunchoovong

*Institute of Agricultural Technology Suranaree
University of Technology*

Theerachai Chormai

Krabinburi Livestock Research and Development Center

Thevin Vongpralub

Khon Kaen University

Poster Session Agenda

Life Sciences

Ougi

13:00-14:00

Friday, November 8

LSBE-795

Galangin Suppresses Inflammatory Response: A Potential Adjuvant for a New Scaffold Coating Material

Ju Hwa Yoon	<i>Chosun University</i>
Mi Eun Kim	<i>Chosun University</i>
Dong Hwan Kim	<i>Chosun University</i>
Jae Kyeong Oh	<i>Chosun University</i>
Chi Joong Kim	<i>Chosun University</i>
Young Ung Park	<i>Chosun University</i>
Haeng-Nam Lee	<i>Chosun University</i>
Jun Sik Lee	<i>Chosun University</i>

LSBE-799

Growth and Productivity of Planted Space Flown Tomato Seed

Rizkita Rachmi Esyanti	<i>Institute Technology Bandung</i>
Maria-Almeida	<i>Institute Technology Bandung</i>
Feny Martha Dwivany	<i>Institute Technology Bandung</i>

LSBE-809

The Effect of B7-H3 on CD4+ T Lymphocyte Activation in Vitro

Mi Eun Kim	<i>Chosun University</i>
Dong Hwan Kim	<i>Chosun University</i>
Ju Hwa Yoon	<i>Chosun University</i>
Jun Sik Lee	<i>Chosun University</i>

LSBE-811**The Dietary Flavonoids Quercetin and luteolin Inhibit EMT Transition by Depleting E2EPF Expression**

Tsung-Han Lin	<i>National Taiwan University</i>
Pei-Hsun Tsai	<i>Academia Sinica</i>
Chun-Yu Lin	<i>Academia Sinica</i>
Ming-Ting Lee	<i>Academia Sinica</i>
Chia-Hsiung Cheng	<i>Taipei Medical University</i>

LSBE-815**Two Dietary Flavonoids Inhibit Stemness, Vasculogenic Mimicry and Metastasis of Highly Invasive Prostate Cancer Subline**

Pei-Hsun Tsai	<i>Academia Sinica</i>
Chia-Hsiung Cheng	<i>Taipei Medical University</i>
Chun-Yu Lin	<i>Academia Sinica</i>
Tsung-Han Lin	<i>National Taiwan University</i>
Yo-Chuen Lin	<i>National Taiwan University</i>
Ming-Ting Lee	<i>Academia Sinica</i>

LSBE-828**Effect of Menthol on Thermo-Induced Cell Membrane**

Pooja Gusain	<i>Japan Advanced Institute of Science and Technology</i>
Tsuyoshi Yoda	<i>Japan Advanced Institute of Science and Technology</i>
Naofumi Shimokawa	<i>Japan Advanced Institute of Science and Technology</i>
Masahiro Takagi	<i>Japan Advanced Institute of Science and Technology</i>

LSBE-849**The Function of Forest Margin in Lore Lindu National Park by Using Rousettus (Pteropodidae, Chiroptera) as Indicator Species**

Sheherazade	<i>University of Indonesia</i>
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LSBE-852**The Effect of Anthropogenic Activity on Mangrove Area in Panjang Island, Banten, Indonesia**

Primanda Rizki Arsyitamiyanti	<i>Institute Technology Bandung</i>
Devi Nandita Choesin	<i>Institute Technology Bandung</i>

LSBE-883**The Antidepressant-like Activity of *Antidesma velutinsum* Blume. in Depressive Mice Model**

Yaowared Chulikhit	<i>Khonkaen University</i>
Chantana Boonyarat	<i>Khonkaen University</i>
Suphawadee Daodee	<i>Khonkaen University</i>

LSBE-885**Neuroprotective Effect of Thai Herb *Alternanthera Sessilis* on Ovariectomized Mice**

Orawan Monthakantirat	<i>Khonkaen University</i>
Charinya Khamphukdee	<i>Khonkaen University</i>
Pattanan Pattraeattamrong	<i>Khonkaen University</i>
Yaowared Chulikhit	<i>Khonkaen University</i>

LSBE-886**Determination of β -carotene in *Bouea Macrophylla* Griffith and *Antidesma Velutinsum* Blume**

Supawadee Daodee	<i>Khonkaen University</i>
Chompun Puchongmas	<i>Khonkaen University</i>
Yaowares Chulikhit	<i>Khonkaen University</i>
Chantana Boonyarat	<i>Khonkaen University</i>

LSBE-1002**Function of Chromokinesin KIF4A in Interphase**

Zi Jia Khong	<i>Nanyang Technological University</i>
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LSBE-1031**The Behavioral Model of the Cancer Screening Utilizer Based on Theory of Reasoned Action**

Fen Fen Huang	<i>Oriental Institute of Technology</i>
Chih-Dao Chen	<i>Far Eastern Memorial Hospital</i>
Yi-Horng Lai	<i>Oriental Institute of Technology</i>
Hsieh-Hua Yang	<i>Oriental Institute of Technology</i>

LSBE-1108**Risk Assessment In Terms of Campylobacter Concentration at the Slaughterhouse in Khon Kaen Province, Northeastern Thailand**

Pimsuree-Ussawingowit	<i>Khonkaen University</i>
Chih-Dao Chen	<i>Khonkaen University</i>
Chaiyaporn Soikum	<i>Khonkaen University</i>
Nirapan Vongsahi	<i>Khonkaen University</i>
Bongkot Noppon	<i>Khonkaen University</i>
Prapansak Chaveerach	<i>Khonkaen University</i>

LSBE-1117**Risk Assessment In Terms of Campylobacter Concentration at the Slaughterhouse in Khon Kaen Province, Northeastern Thailand**

Pimsuree-Ussawingowit	<i>Khonkaen University</i>
Chih-Dao Chen	<i>Khonkaen University</i>
Chaiyaporn Soikum	<i>Khonkaen University</i>
Nirapan Vongsahi	<i>Khonkaen University</i>
Bongkot Noppon	<i>Khonkaen University</i>
Prapansak Chaveerach	<i>Khonkaen University</i>

LSBE-756**Autophagy Is The Preferred Pathway of Niclosamide-Induced Programmed Cell Death in Human Non-Small Cell Lung Cancer**

Yi-Rong Li	<i>National Chung Hsing University</i>
Zhao Ya-Xuan	<i>National Chung Hsing University</i>
Chi Chen Lin	<i>National Chung Hsing University</i>

LSBE-1027**The Behavioral Model of the Cancer Screening Utilizer Based on Theory of Reasoned Action**

Kyaimon Myint	<i>University of Malaya</i>
R Jayakumar	<i>University of Malaya</i>
See-Ziau Hoe	<i>University of Malaya</i>
M S Kanthimathi	<i>University of Malaya</i>
Sau-Kuen Lam	<i>University of Malaya</i>

LSBE-1052**Determination of Androgens and Estrogens in Prostate Cells by Liquid Chromatography Tandem Mass Spectrometry and Reporter-gene Bioassays**

Shu Fang Soh	<i>National University of Singapore</i>
Hui Hoon Yeo	<i>Nanyang Technological University</i>
Chong Hui Tiew	<i>Nanyang Technological University</i>
Yinhan Gong	<i>National University of Singapore</i>

LSBE-997**Tacrine-heptaphylline Hybrid: a Potential Multifunctional Agent for the Treatment of Alzheimer's Disease**

Chantana Boonyarat	<i>Khon Kaen University</i>
Supatra Thiratmatrakul	<i>Khon Kaen University</i>
Chavi Yenjai	<i>Khon Kaen University</i>
Pornthip Waiwut	<i>Ubon Rachathani University</i>
Michihisa Tohda	<i>University of Toyama</i>

Poster Session Agenda

Civil Engineering

Ougi

15:00-16:00

Friday, November 8

ACCMES-1029

Unconfined Lap Splice Tests Using High-Strength Headed Bars

Sung-Chul Chun

Mokpo National University

ACCMES-1042

Efficient Vibration Analysis of Stadium Structure

Gee-Cheol Kim

Seoil University

Joo-Won Kang

Yeungnam University

ACCMES-1077

A Crack Bridging Model for Fibre Reinforced Cementitious Composites with Slip-Hardening Interface

Ting Huang

University of New South Wales

Y.X. Zhang

University of New South Wales

ACCMES-1015

Effect of Pozzolanic Additive on Concrete Durability – A review

Payam Khalaj

Islamic Azad University

ICEAS-1861

Probabilistic Sensitivity Assessment of Composite Steel Beam Exposed to Fire

Okorie Austine Uche

Bayero University

Idris Haruna Muhammad

Jigawa Polytechnic

Poster Session Agenda

Environmental Sciences

Ougi

15:00-16:00

Friday, November 8

ACCMES-1000

Degradation of the organic compounds in water by using the Calcium Bismuthate - Bismuth Oxide Photocatalyst Composition

Dmitry Sergeevich Shtarev *Far Eastern State Transport University*

Anna Vladimirovna Shtareva *Far Eastern State Transport University*

Svetlana Anatol'evna
Malinovskaya *Far Eastern State Transport University*

ICEAS-1574

Developing an AHP-Based Model for Prioritizing Drivers of Sustainable Competitive Advantages in Green Supply Chain Management: Resource-Based and Relational Views

Nisakorn Somsuk *Eastern Asia University*

Pongtiwa Pongpanich *Eastern Asia University*

Sombat Teekasap *Eastern Asia University*

ICEAS-1677

Kinetics Study of the Accelerated Carbon Dioxide Dissolution with Limestone

Yu-Shao Chen *Chung Yuan University*

Pei-Shan Hsieh *Industrial Technology Research Institute*

Ming-Hui Chang *Industrial Technology Research Institute*

ICEAS-1796

Higher Accumulations of Cadmium (Cd) in Thai Cadavers with History of Higher Frequent Consumption of Offal Foods

Tansita Arnanteerakul *Khonkaen university*

Wilaiwan Mothong *Khonkaen university*

Atthapon Pidasaya *Khonkaen university*

Amnart Chaichun *Khonkaen university*

Vitoon Prasongwatana *Khonkaen university*

ICEAS-1798**Higher Level of Cadmium (Cd)-accumulation in the Liver of Cadavers with History of Liver Diseases**

Tansita Arnanteerakul *Khonkaen university*

Atthapon Pidasaya *Khonkaen university*

Amnart Chaichun *Khonkaen university*

Vitoon Prasongwatana *Khonkaen university*

Wilaiwan Mothon *Khonkaen university*

ICEAS-1807**Using Butterfly Pea Anthocyanin Extract as pH Indicator**

Nalin Sittitoon *Suranaree University of Technology*

Information

Payment Information

Title: Phenolic acids profiles and antioxidant activity of Malay Apple, Star Fruit and Pomelo
Payment Received **\$400** Author(s) Registration : **1** Author(s) with outstanding payment :

0 Participants: **0**

Name	Position	Department	Affiliation	Country	Email	Attendant
Kamonwan - Chucheeep	Lecturer	Science	King Monkuts Institute of Technology Ladkrabang Chumphon campus	THAILAND	chkamonwan@hotmail.com	☐

Update

ตารางเปรียบเทียบวัตถุประสงค์ กิจกรรมที่วางแผนไว้ และกิจกรรมที่ดำเนินการมาและผลที่ได้รับตลอดโครงการตามวัตถุประสงค์ของโครงการวิจัย และ ผลที่คาดว่าจะได้รับ ดังต่อไปนี้

วัตถุประสงค์ของโครงการวิจัย

1. เพื่อให้ได้ข้อมูลของสาร phenolic acids ทั้งชนิดและปริมาณในผลไม้เขตร้อนบางชนิดที่มีในประเทศที่ส่งผลต่อการมีสุขภาพดี
2. เพื่อให้ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนที่มีในประเทศ

ผลที่คาดว่าจะได้รับ

1. ทราบชนิดและปริมาณของสาร phenolic acids ที่ส่งผลต่อสุขภาพจากผลมะยม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และส้มโชกุน
2. ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนดังกล่าวซึ่งมีในประเทศ ส่งผลทางอ้อมในการช่วยให้สวนผลไม้ไทยยังคงเป็นทางเลือกอาชีพที่มั่นคงของเกษตรกรได้

วัตถุประสงค์	กิจกรรมหลัก	กิจกรรมรอง	ผลที่ได้รับ
1. เพื่อให้ได้ข้อมูลของสาร phenolic acids ทั้งชนิดและปริมาณในผลไม้เขตร้อนบางชนิดที่มีในประเทศที่ส่งผลต่อการมีสุขภาพ	1. ติดต่อประสานงานเพื่อจัดซื้อผลไม้ในจังหวัดชุมพรและจังหวัดใกล้เคียง	1.1 ขนส่งมายังห้องปฏิบัติการสจล. วิทยาเขตชุมพร	ทราบข้อมูลทั้งชนิดและปริมาณสาร phenolic acids ที่มีในผลไม้ทั้ง 8 ชนิด ที่ศึกษา ได้แก่ ผลมะยม ชมพู่มะเหมี่ยว ชมพู่พันธุ์ทุลเกล้า มะเฟือง มะไฟ มะปรางเปรี้ยว ส้มโอ และส้มโชกุน สอดคล้องกับวัตถุประสงค์ของการวิจัยและผลที่คาดว่าจะได้รับ
	2. คัดผล (แยกผลอ่อน ผลแก่) ล้าง แยกผลที่ต้องอบแห้ง	2.1 วิเคราะห์ชนิดและปริมาณสาร phenolic acids จากผล	
2. เพื่อให้ได้หลักฐานทางวิทยาศาสตร์ประกอบการส่งเสริมการบริโภคผลไม้เขตร้อนต่างๆ เหล่านี้ที่มีในประเทศ	1. วิเคราะห์ข้อมูลเปรียบเทียบชนิดและปริมาณสาร phenolic acids ที่พบในผลไม้เหล่านี้		

ตารางเปรียบเทียบวัตถุประสงค์ กิจกรรมที่วางแผนไว้ และกิจกรรมที่ดำเนินการมาและผลที่ได้รับตลอดโครงการ

วัตถุประสงค์	กิจกรรมหลัก	กิจกรรมรอง	ผลที่ได้รับ
3. สรุปผลการดำเนินงาน ทำรายงานฉบับ สมบูรณ์และเผยแพร่ ข้อมูล	1. เตรียมข้อมูลเพื่อ การเผยแพร่ใน รูปแบบต่างๆ	1.1 เสนองานวิจัย เพื่อรับการ พิจารณาตีพิมพ์ ลงในวารสาร ระดับนานาชาติ 1.2 นำเสนอผลงาน ในการประชุม ทางวิชาการ 1.3 เผยแพร่ข้อมูลไป ยังหน่วยงานที่ เกี่ยวข้อง	1. อยู่ในช่วงการเขียน papers เพื่อส่งวารสารทาง วิชาการระดับนานาชาติ คาดว่าจะได้รับการตีพิมพ์ ใน International Food Research Journal หรือ Agricultural and Food Science หรือ Natural Product Communication 2. นำเสนอผลงานในการ ประชุมทางวิชาการ นานาชาติ ณ เมือง Osaka ประเทศญี่ปุ่น ระหว่างวันที่ 7-9 พฤศจิกายน 2556 3. เมื่อผ่านการนำเสนอ ผลงานในการประชุมทาง วิชาการนานาชาติ และ papers ได้รับการตีพิมพ์ แล้ว จะเผยแพร่ข้อมูลไปยัง หน่วยงานที่เกี่ยวข้องต่อไป

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ขอขอบพระคุณ ศาสตราจารย์ ดร. นันทวัน บุญยะประภัศร ผู้ประสานงานชุดโครงการ “Thai Fruits-Functional Fruits” และคณะกรรมการผู้ทรงคุณวุฒิ ที่ได้เสียสละเวลาตรวจทาน เสนอแนะ ชี้แนะ ขั้นตอนการดำเนินการโครงการวิจัย จนสามารถดำเนินการวิจัยและแก้ไขรูปเล่มรายงานวิจัยฉบับสมบูรณ์จนแล้วเสร็จ

ขอขอบพระคุณ น้องๆ ผู้ประสานงานในโครงการทุกท่าน ที่ช่วยประสานงานโครงการฯ จนโครงการวิจัยสำเร็จด้วยดี