

### Lampiran 1. Prosedur kerja analisa kadar air

Cara kerja pengujian kadar air pada bahan pangan adalah sebagai berikut :

- Botol timbang dioven pada suhu  $105^{\circ}\text{C}$  selama 24 jam
- Angkat botol timbang dan dianginkan dalam desikator selama 15 menit dan ditimbang dengan timbangan digital (A)
- Sampel dihaluskan dan ditimbang sebanyak 2 gram (B)
- Sampel dimasukkan pada botol timbang dan di oven pada suhu  $105^{\circ}\text{C}$  selama 3 jam
- Angkat botol timbang dan dinginkan dalam desikator selama 15 menit dan ditimbang beratnya (C)
- Hitung nilai kadar airnya



## Lampiran 2. Prosedur kerja analisa kadar lemak

Cara kerja pengujian kadar lemak pada bahan pangan adalah sebagai berikut :

- Timbang sampel sebanyak 0,3 – 0,5 g (A)
- Masukkan sampel kedalam stainless homogenizer dan ditambahkan 0,6 ml air dan diaduk secara manual
- Tambahkan 10 ml methanol dan aduk dengan alat yang sama selama 1 menit
- Saring dengan top filter paper dan tampung dalam labu pemisah
- Tambahkan 7,5 ml NaCl 0,9 % dan dikocok hingga homogen
- Pindahkan lapisan bawah (lemak dalam larutan chloroform) dan tampung dalam botolevaporator, kemudian uapkan pelarut dengan unit alat evaporator
- Pindahkan lemak kedalam botol dan ditimbang (B)
- Keringkan dengan oven pada suhu 40° C. Dinginkan dalam desikator selama 30 menit dan ditimbang (C)
- Hitung hasilnya

### Lampiran 3. Prosedur kerja analisa kadar protein

Cara kerja pengujian kadar protein pada bahan pangan adalah sebagai berikut :

- Siapkan sampel kering yang sudah dihaluskan dan ditimbang 1 gram (A)
- Masukkan dalam tabung dekstruksi kemudian tambah 1,5 gram katalisator 1 ml  $\text{H}_2\text{SO}_4$  pekat
- Panaskan secara perlahan hingga suhu  $425^\circ\text{C}$  pada unit alat destruksi dalam ruang asam hingga cairan jernih dan dinginkan
- Tambah 50 ml aquadest secara perlahan
- Pasang tabung pada unit alat destilasi dan tambahkan 50 ml larutan NaOH 40 % secara otomatis
- Lakukan destilasi selama 4 menit hingga diperoleh destilat  $\pm 125$  ml dan tampung dalam erlenmeyer yang sudah diisi ml asam borax 4 %
- Titrasi destilat dengan larutan HCL 0,10 N hingga warnanya berubah jingga
- Lakukan blanko dengan hal yang sama tanpa sampel
- Hitung kadar nitrogennya.

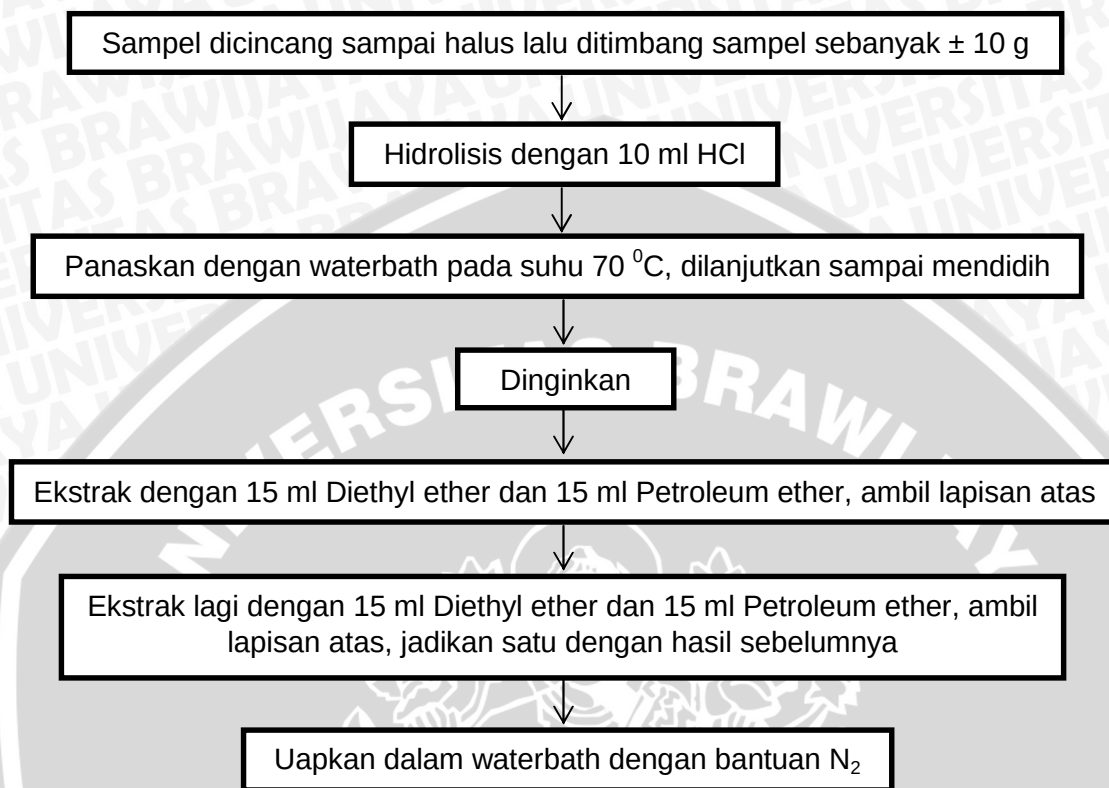


#### Lampiran 4. Prosedur kerja analisa kadar abu

Cara kerja pengujian kadar abu pada bahan pangan adalah sebagai berikut :

- Siapkan sampel dan panaskan cawan porselen kosong dalam tanur pengabuan pada suhu  $600^{\circ}\text{C}$  selama 24 jam
- Angkat cawan porselen dan dinginkan dalam desikator selama 30 menit kemudian ditimbang (A)
- Kemudian timbang sampel 2 gram (B)
- Masukkan sampel pada cawan porselen, kemudian masukkan tanur pengabuan dengan suhu  $600^{\circ}\text{C}$  selama 3 jam.
- Kemudian turunkan suhu tanur sampai  $110^{\circ}\text{C}$ .
- Kemudian cawan diambil dan dinginkan dalam desikator selama 30 menit lalu ditimbang (C)
- Kemudian hitung % kadar abu



**Lampiran 5. Diagram alir Diagram Alir Analisa Asam Lemak****a. Hidrolisis**

## Lampiran 6. Analisa Asam Lemak Jenuh Dan Tidak Jenuh

Diambil 0,5 mL sampel, ditambahkan 1,5 mL larutan Natrium metanolik, tutup dan panaskan pada suhu 70 °C selama 5-10 menit sambil digojok

Dinginkan

Tambahkan 2 mL Boron trifluoride metanoat, panaskan pada suhu 70 °C selama 5-10 menit

Dinginkan

Ekstrak dengan 1 mL Heptan dan 1 mL NaCl jenuh

Ambil lapisan atas dan masukan ke dalam Enppendorf

Injeksi ke GC

Kondisi alat sebagai berikut:

|                 |                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------|
| Jenis alat (GC) | : Shimadzu GC-2010                                                                          |
| Detector        | : FID, Suhu: 260 °C                                                                         |
| Metode          | : Methylester 37 gcm                                                                        |
| Kolom           | : CP Sil 8 CB, Lenght : 30 m                                                                |
| Suhu awal       | : 100 °C, holdtime: 5 menit, suhu dinaikkan 4 °C per menit hingga 240 °C, holdtime 10 menit |



Lampiran 7. Data Analisa Kadar Air *Padina australis*, *Turbinaria ornata*, dan *Sargassum cristaefolium*

| Sampel                   | Ulangan | Berat Botol<br>Timbang (g) | Berat Sampel<br>(g) | Berat Konstan<br>(g) | %<br>Kadar Air |
|--------------------------|---------|----------------------------|---------------------|----------------------|----------------|
| <i>Padina australis</i>  | 1       | 13.4387                    | 2.063               | 15.201               | 14.58          |
|                          | 2       | 14.6131                    | 2.0521              | 16.3552              | 15.11          |
|                          |         |                            |                     | Mean                 | 14.84          |
|                          |         |                            |                     | STDEV                | 0.38           |
| <i>Turbinaria ornata</i> | 1       | 13.4087                    | 2.0573              | 15.201               | 12.88          |
|                          | 2       | 19.8638                    | 2.0067              | 21.6254              | 12.21          |
|                          |         |                            |                     | Mean                 | 12.55          |
|                          |         |                            |                     | STDEV                | 0.47           |
| <i>S. cristaefolium</i>  | 1       | 12.7432                    | 2.0342              | 14.6518              | 6.17           |
|                          | 2       | 13.103                     | 2.0077              | 15.001               | 5.46           |
|                          |         |                            |                     | Mean                 | 5.82           |
|                          |         |                            |                     | STDEV                | 0.50           |

$$\%WB = \frac{(\text{Berat botol timbang} + \text{berat sampel}) - \text{berat konstan}}{\text{berat sampel}} \times 100\%$$



Lampiran 8. Data Analisa Kadar Lemak *Padina australis*, *Turbinaria ornata*, dan *Sargassum cristaefolium*

| Sampel                   | Ulangan | Berat Sampel<br>(g) | Berat Kertas<br>Saring (g) | Berat Akhir<br>(g) | %<br>Kadar<br>Lemak |
|--------------------------|---------|---------------------|----------------------------|--------------------|---------------------|
| <i>Padina australis</i>  | 1       | 1.9483              | 0.6218                     | 2.5519             | 0.65                |
|                          | 2       | 1.9927              | 0.6247                     | 2.5774             | 0.60                |
|                          |         |                     |                            | Mean               | 0.62                |
|                          |         |                     |                            | STDEV              | 0.04                |
| <i>Turbinaria ornata</i> | 1       | 1.9982              | 1.0376                     | 3.0143             | 1.08                |
|                          | 2       | 1.9942              | 1.0552                     | 3.0284             | 1.05                |
|                          |         |                     |                            | Mean               | 1.06                |
|                          |         |                     |                            | STDEV              | 0.02                |
| <i>S. cristaefolium</i>  | 1       | 1.9427              | 1.0437                     | 2.9712             | 1.07                |
|                          | 2       | 1.9644              | 1.0471                     | 3.0197             | 1.01                |
|                          |         |                     |                            | Mean               | 1.04                |
|                          |         |                     |                            | STDEV              | 0.04                |

$$\% \text{ Kadar Lemak} = \frac{(\text{Berat awal sampel} + \text{Berat Kertas Saring}) - \text{Berat Akhir}}{\text{Berat sampel}} \times 100\%$$



Lampiran 9. Data Analisa Kadar Protein *Padina australis*, *Turbinaria ornata*, dan *Sargassum cristaefolium*

| Sampel                   | Ulangan | ml HCl | Berat Sampel (g) |       | %             |
|--------------------------|---------|--------|------------------|-------|---------------|
|                          |         |        |                  |       | Kadar Protein |
| <i>Padina australis</i>  | 1       | 1.5    | 2.126            |       | 4.93          |
|                          | 2       | 1.4    | 2.159            |       | 4.45          |
|                          |         |        |                  | Mean  | 4.69          |
|                          |         |        |                  | STDEV | 0.29          |
| <i>Turbinaria ornata</i> | 1       | 1.3    | 2.004            |       | 5.67          |
|                          | 2       | 1.4    | 2.001            |       | 6.12          |
|                          |         |        |                  | Mean  | 5.90          |
|                          |         |        |                  | STDEV | 0.23          |
| <i>S. cristaefolium</i>  | 1       | 1.3    | 2.036            |       | 5.58          |
|                          | 2       | 1.2    | 2.015            |       | 5.21          |
|                          |         |        |                  | Mean  | 5.40          |
|                          |         |        |                  | STDEV | 0.26          |

$$\% \text{ Kadar Protein} = \frac{(\text{ml titrasix N HCL} \times 14 \times 6,25)}{\text{Berat sampel}} \times 100 \%$$

**Lampiran 10. Data Analisa Kadar Abu *Padina australis*, *Turbinaria ornata*, dan *Sargassum cristaefolium***

| Sampel                   | Ulangan | Berat Akhir<br>(g) | Berat Kurs<br>Porselen (g) | Berat Sampel<br>(g) | % Kadar Abu |
|--------------------------|---------|--------------------|----------------------------|---------------------|-------------|
| <i>Padina australis</i>  | 1       | 43.7126            | 42.9421                    | 2.0817              | 37.01       |
|                          | 2       | 35.6453            | 34.8856                    | 2.0393              | 37.25       |
|                          |         |                    |                            | Mean                | 37.13       |
|                          |         |                    |                            | STDEV               | 0.17        |
| <i>Turbinaria ornata</i> | 1       | 13.28811           | 12.7621                    | 2.0662              | 25.46       |
|                          | 2       | 44.9042            | 44.4005                    | 2.0515              | 24.55       |
|                          |         |                    |                            | Mean                | 25.01       |
|                          |         |                    |                            | STDEV               | 0.64        |
| <i>S. cristaefolium</i>  | 1       | 20.3034            | 19.8018                    | 2.056               | 24.40       |
|                          | 2       | 33.7624            | 33.2963                    | 2.0214              | 23.06       |
|                          |         |                    |                            | Mean                | 23.73       |
|                          |         |                    |                            | STDEV               | 0.95        |

$$\% \text{ Kadar Abu} = \frac{(\text{berat akhir}-\text{berat kurs porselen})}{\text{Berat sampel}} \times 100 \%$$

**Lampiran 11. Data Analisa Kadar Karbohidrat *Padina australis*, *Turbinaria ornata*, dan *Sargassum cristaefolium***

| Sampel                   | Ulangan | Kadar Proksimat (%) |        |            |          |                |
|--------------------------|---------|---------------------|--------|------------|----------|----------------|
|                          |         | K. Air              | K. Abu | K. Protein | K. Lemak | K. Karbohidrat |
| <i>Padina australis</i>  | 1       | 14.58               | 37.01  | 4.93       | 0.65     | 42.83          |
|                          | 2       | 15.11               | 37.25  | 4.45       | 0.6      | 42.59          |
|                          |         |                     |        |            | Mean     | 42.71          |
|                          |         |                     |        |            | STDEV    | 0.17           |
| <i>Turbinaria ornata</i> | 1       | 12.88               | 25.01  | 5.67       | 1.08     | 55.36          |
|                          | 2       | 12.21               | 24.55  | 6.12       | 1.05     | 56.07          |
|                          |         |                     |        |            | Mean     | 55.71          |
|                          |         |                     |        |            | STDEV    | 0.50           |
| <i>S. cristaefolium</i>  | 1       | 6.17                | 24.40  | 5.58       | 1.07     | 62.78          |
|                          | 2       | 5.46                | 23.06  | 5.21       | 1.01     | 65.26          |
|                          |         |                     |        |            | Mean     | 64.02          |
|                          |         |                     |        |            | STDEV    | 1.75           |

% Karbohidrat = 100 %- %(protein+lemak+air+abu)





Lampiran 12. Data Analisa Komposisi Asam Lemak Alga coklat *Padina australis*



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2. Rumput Laut (*Padina australis*)

| No | Parameter Uji                  | Hasil | Satuan | Metode           |
|----|--------------------------------|-------|--------|------------------|
| 1. | Asam Myristat                  | 4,78  | %      | Kromatografi Gas |
| 2. | Asam Palmitat                  | 47,06 | %      | Kromatografi Gas |
| 3. | Asam Oleat                     | 26,67 | %      | Kromatografi Gas |
| 4. | Asam Stearat                   | 0,19  | %      | Kromatografi Gas |
| 5. | Asam Linoleat                  | 17,66 | %      | Kromatografi Gas |
| 6. | Asam Eicosatrinoat             | 2,69  | %      | Kromatografi Gas |
| 7. | Asam Cis Pentadecanoat         | 0,33  | %      | Kromatografi Gas |
| 8. | Asam Cis-8,11,14-Eicosatrionat | 0,61  | %      | Kromatografi Gas |

Yogyakarta, 2 Oktober 2015

Manajer Teknik,

Prof. Dr. Abdul Rohman, M.Si., Apt.

NIP.197701202005011002

Pemutlakan:

1. LPU ini berlaku hanya pada sampel yang diujikan.
2. LPU ini dibuat semata-mata untuk penggunaan pelabuan yang disebutkan dalam LPU ini.
3. LPPT tidak bertanggung jawab atas setiap kerugian, kerusakan atau kehilangan yang dialami oleh pihak ketiga sebagai akibat dari keterbatasan terhadap atau penggunaan laporan ini.
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E-mail : lppt\_info@mail.ugm.ac.id - Website : www.lppt.ugm.ac.id



Lampiran 13. Data Analisa Komposisi Asam Lemak Alga coklat *Sargassum cristaefolium*

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Halaman 1 dari 2

**LAPORAN HASIL UJI**

No. Sertifikat : 01878/01/LPPT/X/2015  
No. Pengujian : 15090101878

**Informasi Customer**

Nama : Eriah Putri  
Alamat : Fakultas Perikanan dan Ilmu Kelautan,  
Universitas Brawijaya Malang

Tanggal Penerimaan : 11 September 2015  
Tanggal Pengujian : 18 September 2015

**Hasil Pengujian**

1. Rumput Laut (*Sargassum cristaefolium*)

| No | Parameter Uji                   | Hasil | Satuan | Metode           |
|----|---------------------------------|-------|--------|------------------|
| 1. | Asam Laurat                     | 0,30  | %      | Kromatografi Gas |
| 2. | Asam Myristat                   | 12,22 | %      | Kromatografi Gas |
| 3. | Asam Palmitat                   | 57,77 | %      | Kromatografi Gas |
| 4. | Asam Palmitoleat                | 0,49  | %      | Kromatografi Gas |
| 5. | Asam Oleat                      | 18,36 | %      | Kromatografi Gas |
| 6. | Asam Stearat                    | 0,67  | %      | Kromatografi Gas |
| 7. | Asam Cis Pentadecanoat          | 1,09  | %      | Kromatografi Gas |
| 8. | Asam Cis-8,11,14-Eicosatrienoat | 9,09  | %      | Kromatografi Gas |

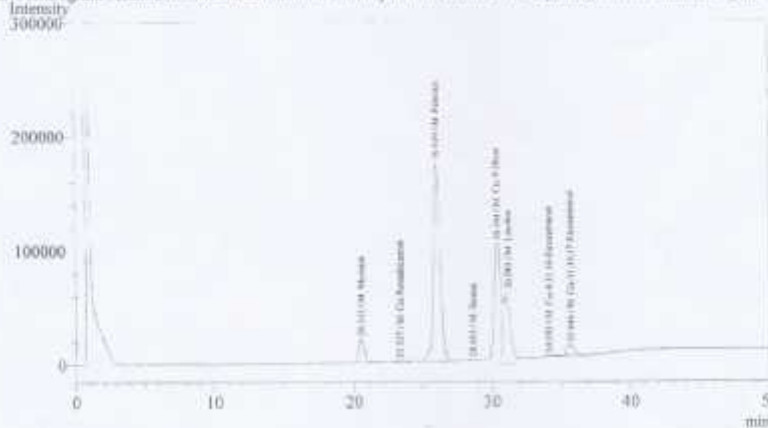
Perhatian :

1. LHU ini berlaku tanpa perlu stempel yang diujikan.  
2. LHU ini dibuat semata-mata untuk penggunaan palangan yang disebutkan dalam LHU ini.  
3. LPPT tidak bertanggung jawab atas setiap kerugian, kerusakan atau tanggung jawab hukum yang timbul oleh pihak ketiga sebagai akibat dari keterbatasan terhadap atau penggunaan laporan ini.  
4. Tidak diperkenankan menggunakan LHU ini tanpa izin dari LPPT UGM

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E-mail : lppt\_info@mail.ugm.ac.id - Website : www.lppt.ugm.ac.id

Analysis Date & Time: 9/30/2015 7:58:03 AM  
 User Name: SHIMADZU-FID  
 Vial#: 3  
 Sample Name: Asam Lemak  
 Sample ID: 1878 Padina 1  
 Sample Type: Unknown  
 Injection Volume: 1.00  
 Multi Injection#: 1  
 Dilution Factor: 1  
 ISTD Amount: 1  
 Sample Amount: 1  
 Level#: 1  
 Data Name: C:\GCsolution\Data\Project1\FID\data 2015\September\1878 Padina 1 e.gcd  
 Original Data Name: C:\GCsolution\Data\Project1\FID\data 2015\September\1878 Padina 1.gcd  
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 Report Name: C:\GCsolution\System\DEFAULT.gcr  
 Batch Name: C:\GCsolution\Data\Project1\FID\data 2015\September\1878 AL.gcd

Chromatogram Asam Lemak C:\GCsolution\Data\Project1\FID\data 2015\September\1878 Padina 1 e.gcd - Channel 1

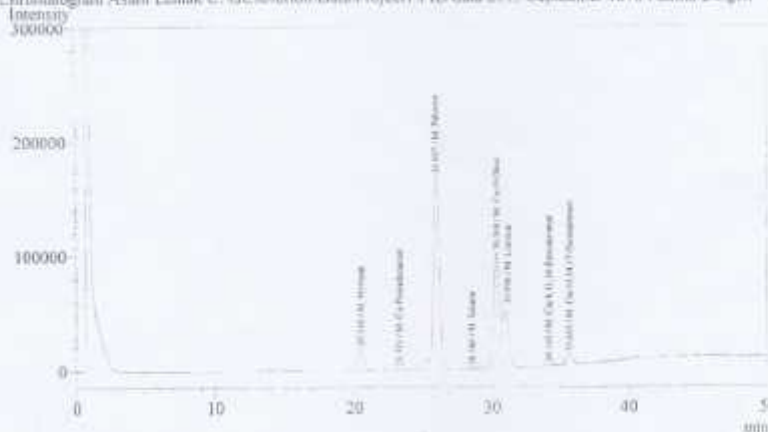


| Peak Table - Channel 1 |          |          |        |         |       |      |                                |
|------------------------|----------|----------|--------|---------|-------|------|--------------------------------|
| Peak#                  | Ret.Time | Area     | Height | Conc.   | Units | Mark | Name                           |
| 1                      | 20.512   | 575835   | 20796  | 4.7486  | %     |      | M. Myristal                    |
| 2                      | 23.327   | 53318    | 1409   | 0.4297  | %     |      | M. Cis Perhidecanoat           |
| 3                      | 26.049   | 5670470  | 173675 | 46.7612 | %     |      | M. Palmitat                    |
| 4                      | 28.601   | 11282    | 744    | 0.0930  | %     |      | M. Stearat                     |
| 5                      | 30.344   | 3202909  | 104134 | 26.4126 | %     |      | M. Cis-9-Oleat                 |
| 6                      | 30.985   | 2246666  | 60415  | 18.5270 | %     |      | M. Linoleat                    |
| 7                      | 34.093   | 65209    | 1465   | 0.5377  | %     |      | M. Cis-8,11,14-Eicosatrienoat  |
| 8                      | 35.646   | 300748   | 9530   | 2.4801  | %     |      | M. Cis-11,14,17-Eicosatrienoat |
| Total                  |          | 12126437 | 372168 |         |       |      |                                |



Analysis Date & Time: 9/30/2015 8:52:08 AM  
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 Vial#: 4  
 Sample Name: Asam Lemak  
 Sample ID: 1878 Padina 2  
 Sample Type: Unknown  
 Injection Volume: 1.00  
 Multi Injections: 1  
 Dilution Factor: 1  
 ISTD Amount: 1  
 Sample Amount: 1  
 Level: 1  
 Data Name: C:\GCsolution\Data\Project1\FID\data 2015-September\1878 Padina 2 e.gcd  
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 Batch Name:

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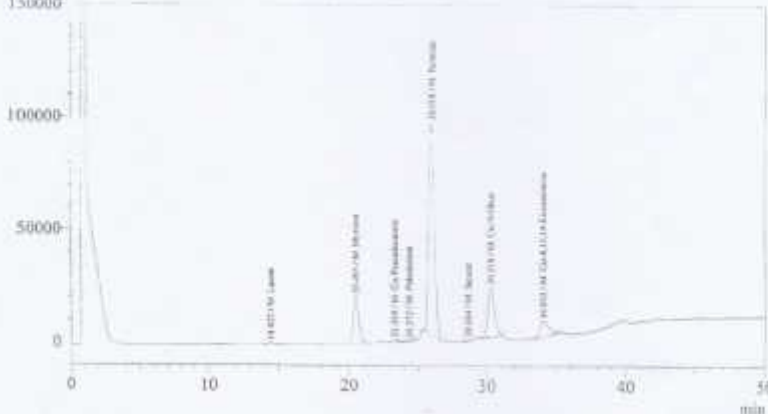


Peak Table - Channel 1

| Peak# | Ret. Time | Area     | Height | Conv.   | Units | Mark | Name                           |
|-------|-----------|----------|--------|---------|-------|------|--------------------------------|
| 1     | 20.510    | 527294   | 19283  | 4.8196  | %     |      | M. Myristat                    |
| 2     | 21.331    | 24444    | 1019   | 0.2134  | %     | V    | M. Cis Pentadecanoat           |
| 3     | 26.007    | 5181667  | 169089 | 47.3616 | %     |      | M. Palmitat                    |
| 4     | 28.586    | 31213    | 954    | 0.2853  | %     |      | M. Stearat                     |
| 5     | 30.368    | 2946313  | 101646 | 26.9299 | %     |      | M. Cis-9-Oleat                 |
| 6     | 30.998    | 1836862  | 52188  | 16.7893 | %     |      | M. Linoleat                    |
| 7     | 34.145    | 74833    | 1518   | 0.6840  | %     |      | M. Cis-8,11,14-Eicosatrienoat  |
| 8     | 35.653    | 318031   | 9305   | 2.9069  | %     |      | M. Cis-11,14,17-Eicosatrienoat |
| Total |           | 10940657 | 335804 |         |       |      |                                |

Analysis Date & Time: 9/30/2015 10:46:24 AM  
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 Sample ID: 1878 Sarga 1  
 Sample Type: Unknown  
 Injection Volume: 1.00  
 Multi Injections: 1  
 Dilution Factor: 1  
 IS/ID Amount: 1  
 Sample Amount: 1  
 Level: 1  
 Data Name: C:\GCsolution\Data\Project\FID\data 2015\September\1878 Sarga 1.e.gcd  
 Original Data Name: C:\GCsolution\Data\Project\FID\data 2015\September\1878 Sarga 1.gcd  
 Baseline Data Name: C:\GCsolution\Data\Project\FID\data 2015\September\1878 Sarga 1.gcd  
 Method Name: C:\GCsolution\Data\Project\FID\method\FID\Methylester-37.gcm  
 Report Name: C:\GCsolution\System\DEFAULT.gcr  
 Batch Name: C:\GCsolution\Data\Project\FID\data 2015\September\1878 AL.gcb

Chromatogram Asam Lemak C:\GCsolution\Data\Project\FID\data 2015\September\1878 Sarga 1.e.gcd - Channel 1  
 Intensity  
 150000

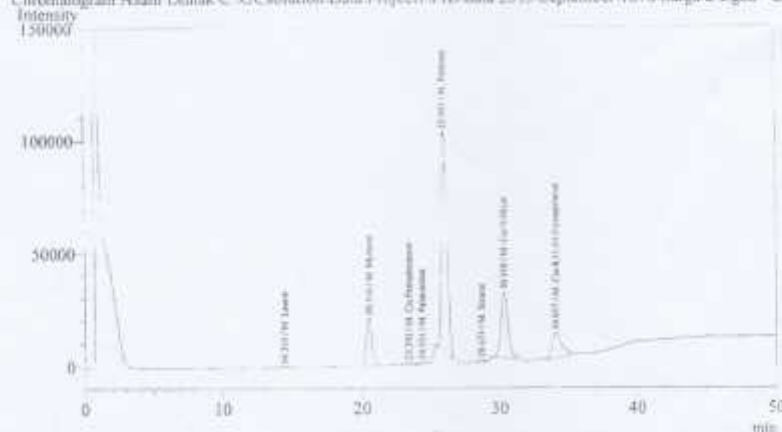


Peak Table - Channel 1

| Peak# | Ret. Time | Area    | Height | Conv.   | Units | Mark | Name                          |
|-------|-----------|---------|--------|---------|-------|------|-------------------------------|
| 1     | 14.422    | 16785   | 598    | 0.3786  | %     |      | M. Laurat                     |
| 2     | 20.493    | 563188  | 20693  | 12.7031 | %     |      | M. Myristat                   |
| 3     | 23.339    | 45803   | 1165   | 1.4021  | %     |      | M. Cis Pentadecanoat          |
| 4     | 24.372    | 20680   | 596    | 0.4664  | %     |      | M. Palmitoleat                |
| 5     | 26.018    | 2682703 | 94313  | 60.5104 | %     |      | M. Palmitat                   |
| 6     | 28.684    | 31397   | 1027   | 0.7127  | %     |      | M. Stearat                    |
| 7     | 30.318    | 750100  | 22051  | 16.9191 | %     |      | M. Cis-9-Oleat                |
| 8     | 34.052    | 322603  | 7160   | 7.2766  | %     |      | M. Cis-8,11,14-Eicosatrienoat |
| Total |           | 4433459 | 147605 |         |       |      |                               |

Analysis Date & Time: 9/30/2015 11:40:27 AM  
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 Sample Name: Asam Lemak  
 Sample ID: 1878 Sarga 2  
 Sample Type: Unknown  
 Injection Volume: 1.00  
 Multi Injection#: 1  
 Dilution Factor: 1  
 STD Amount: 1  
 Sample Amount: 1  
 Level#: 1  
 Data Name: C:\GCsolution\Data\Project1\FID\data 2015-September\1878 Sarga 2 e.gcd  
 Original Data Name: C:\GCsolution\Data\Project1\FID\data 2015-September\1878 Sarga 2.gcd  
 Baseline Data Name: C:\GCsolution\Data\Project1\FID\method FID.Methylester-37.gcm  
 Method Name: C:\GCsolution\System\DEFAULT.gci  
 Report Name: C:\GCsolution\System\DEFAULT.gci  
 Batch Name: C:\GCsolution\Data\Project1\FID\data 2015-September\1878 AL.gch

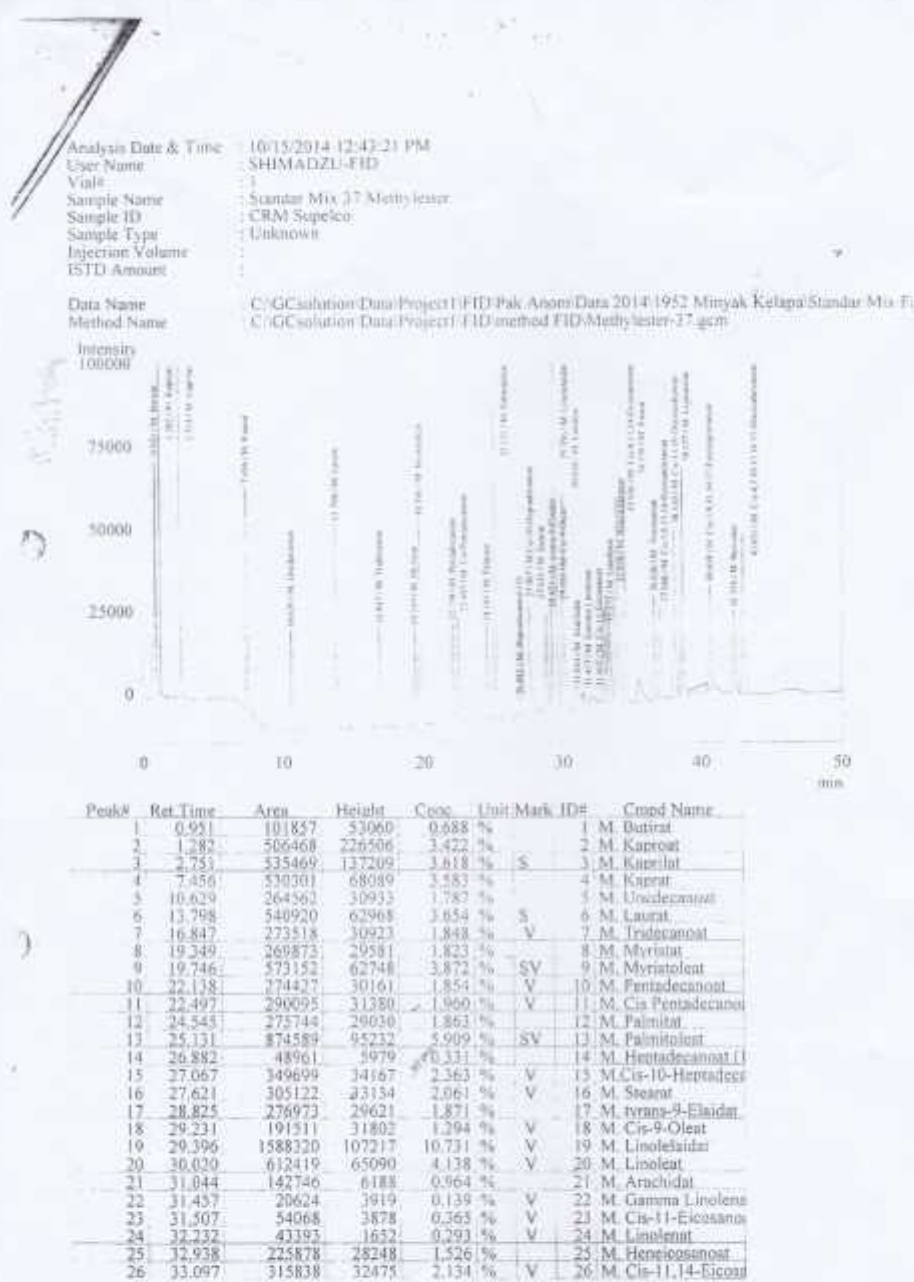
Chromatogram Asam Lemak C:\GCsolution\Data\Project1\FID\data 2015-September\1878 Sarga 2 e.gcd - Channel 1



Peak Table - Channel 1

| Peak# | Ret. Time | Area    | Height | Conc    | Units | Mark | Name                          |
|-------|-----------|---------|--------|---------|-------|------|-------------------------------|
| 1     | 14.395    | 11343   | 495    | 0.2276  | %     |      | M. Laurat                     |
| 2     | 20.516    | 585100  | 21483  | 11.2426 | %     |      | M. Myristat                   |
| 3     | 25.393    | 58006   | 1388   | 1.1642  | %     |      | M. Cis Pentadecanomat         |
| 4     | 25.395    | 25395   | 821    | 0.5097  | %     |      | M. Palmitoleat                |
| 5     | 25.995    | 2742099 | 98102  | 55.8323 | %     |      | M. Palmitat                   |
| 6     | 28.673    | 31300   | 1137   | 0.6282  | %     |      | M. Stearat                    |
| 7     | 30.310    | 986559  | 28988  | 19.7996 | %     |      | M. Cis-9-Oleat                |
| 8     | 34.057    | 542909  | 11604  | 10.8959 | %     |      | M. Cis-8,11,14-Eicosatrinemat |
| Total |           | 4982711 | 164018 |         |       |      |                               |





| Peak# | Ret. Time | Area     | Height  | Conc.   | Unit | Mark | ID# | Compd Name           |
|-------|-----------|----------|---------|---------|------|------|-----|----------------------|
| 27    | 13.166    | 296041   | 28471   | 2.000 % |      | V    | 27  | M. Behenat           |
| 28    | 33.936    | 916706   | 62661   | 6.191 % |      | V    | 28  | M. Cis-8,11,14-Eico  |
| 29    | 34.320    | 632441   | 67328   | 4.271 % |      | V    | 29  | M. Brucat            |
| 30    | 55.507    | 169091   | 7248    | 1.142 % |      | V    | 30  | M. Cis-11,14,17-Eic  |
| 31    | 36.626    | 312065   | 32241   | 2.104 % |      | V    | 31  | M. Tricosanol        |
| 32    | 37.068    | 275447   | 27700   | 1.861 % |      | V    | 32  | M. Cis-5,8,11,14-Eic |
| 33    | 38.110    | 623867   | 50955   | 4.215 % |      | V    | 33  | M. Cis-13,16-Docos   |
| 34    | 38.677    | 766079   | 65823   | 5.176 % |      | SV   | 34  | M. Linocerat         |
| 35    | -0.658    | 350156   | 32038   | 2.366 % |      | V    | 35  | M. Cis-5,8,11,14,17  |
| 36    | -2.356    | 320316   | 25282   | 2.163 % |      | V    | 36  | M. Nervonol          |
| 37    | 43.007    | 652847   | 49146   | 4.411 % |      | V    | 37  | M. C-4-4,7,10,13,16  |
| Total |           | 14801483 | 1723060 |         |      |      |     |                      |



Lampiran 14. Data Analisa Komposisi Asam Lemak Alga coklat *Turbinaria ornata*



**UNIVERSITAS GADJAH MADA**  
LABORATORIUM PENELITIAN DAN PENGUJIAN TERPADU

RDP.16.015.PPT  
Rev. 1  
Halaman 1 dari 1

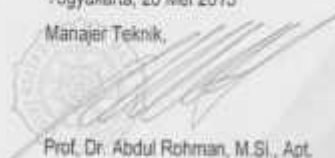
**LAPORAN HASIL UJI**

No. Sertifikat : 00751/01/LPPT/V/2015  
No. Pengujian : 15040100751

**Informasi Customer**  
Nama : Dentya Nastiti  
Alamat : Jl. Kertosentono No. 02 Lowokwaru, Malang  
Tanggal Penerimaan : 17 April 2015  
Tanggal Pengujian : 20 April 2015

**Hasil Pengujian**  
Rumput Laut Cokelat (*Turbinaria ornata*)

| No  | Parameter Uji             | Hasil | Satuan | Metode |
|-----|---------------------------|-------|--------|--------|
| 1.  | Asam Kaprat               | 2,04  | %      | GC     |
| 2.  | Asam Laurat               | 2,29  | %      | GC     |
| 3.  | Asam Myristat             | 4,61  | %      | GC     |
| 4.  | Asam Myristoleat          | 5,30  | %      | GC     |
| 5.  | Asam Palmitat             | 37,99 | %      | GC     |
| 6.  | Asam Oleat                | 15,90 | %      | GC     |
| 7.  | Asam Stearat              | 0,18  | %      | GC     |
| 8.  | Asam Linoleat             | 0,11  | %      | GC     |
| 9.  | Asam Linolenat            | 5,01  | %      | GC     |
| 10. | Asam Aracidat             | 0,65  | %      | GC     |
| 11. | Asam Docosanoat           | 1,74  | %      | GC     |
| 12. | Asam Cis-10-Heptadecanoat | 11,51 | %      | GC     |
| 13. | Asam Linolelaidat         | 5,42  | %      | GC     |
| 14. | Asam cis-11-Eicosanoat    | 7,25  | %      | GC     |

Yogyakarta, 20 Mei 2015  
Manajer Teknik,  
  
Prof. Dr. Abdul Rohman, M.Si., Apt.  
NIP.197701202005011002

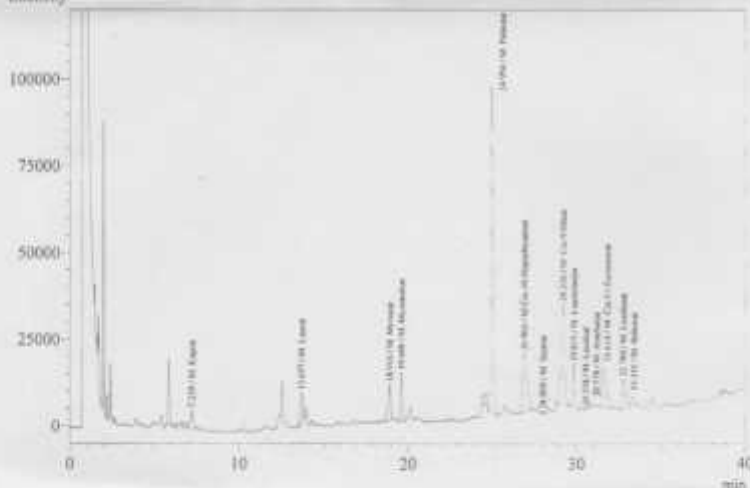
Perhatian :  
1. LRU ini berlaku hanya pada sampel yang diujikan.  
2. LRU ini dibuat sebagai media untuk pengujian penelitian yang diterbitkan dalam LRU/UK.  
3. LRU ini tidak bertanggung jawab atas hasil pengujian, penelitian atau tindakan yang harus diambil berdasarkan hasil pengujian ini.  
Email : lab\_research@ugm.ac.id - Website : www.laborum.ugm.ac.id



Report (Report Editor) Status: Manual Integration

Analysis Date & Time: 5/15/2015 2:14:05 PM  
 User Name: SHIMADZU-FID  
 Vial#: 1  
 Sample Name: 751 RL1 H FA  
 Sample ID: 751 RL1 H FA  
 Sample Type: Unknown  
 Injection Volume: 1  
 Multi Injection#: 1  
 Dilution Factor: 1  
 ISTD Amount: 1  
 Sample Amount: 1  
 Level#: 1  
 Data Name: C:\GCsolution\Data\Project1\FID\data 2015\MEI\751 RL1 H FA ok 2e.gcd  
 Original Data Name: C:\GCsolution\Data\Project1\FID\data 2015\MEI\751 RL1 H FA .gcd  
 Baseline Data Name: C:\GCsolution\Data\Project1\FID\data 2015\MEI\751 RL1 H FA ok 2e.gcd  
 Method Name: C:\GCsolution\System\DEFAULT.gcr  
 Report Name: C:\GCsolution\System\DEFAULT.gcr  
 Batch Name: C:\GCsolution\System\DEFAULT.gcr

Chromatogram: 751 RL1 H FA, C:\GCsolution\Data\Project1\FID\data 2015\MEI\751 RL1 H FA ok 2e.gcd - Channel



| Peak# | Ret. Time | Area   | Height | Conc.  | Units | Mark | Name                    |
|-------|-----------|--------|--------|--------|-------|------|-------------------------|
| 1     | 7.239     | 49872  | 5408   | 2.136  | %     |      | M. Kaprat               |
| 2     | 13.677    | 76073  | 8999   | 3.258  | %     |      | M. Laurat               |
| 3     | 18.916    | 107311 | 10352  | 4.596  | %     |      | M. Myristar             |
| 4     | 19.608    | 127838 | 12976  | 5.476  | %     |      | M. Myristoleat          |
| 5     | 24.994    | 850672 | 94301  | 36.436 | %     |      | M. Palmitat             |
| 6     | 26.904    | 284856 | 17101  | 12.200 | %     |      | M. Cis-10-Heptadecanoat |
| 7     | 28.009    | 4546   | 509    | 0.195  | %     |      | M. Stearat              |
| 8     | 29.216    | 351535 | 29071  | 15.057 | %     |      | M. Cis-9-Oleat          |
| 9     | 29.855    | 127558 | 12569  | 5.464  | %     |      | M. Linolelaidat         |

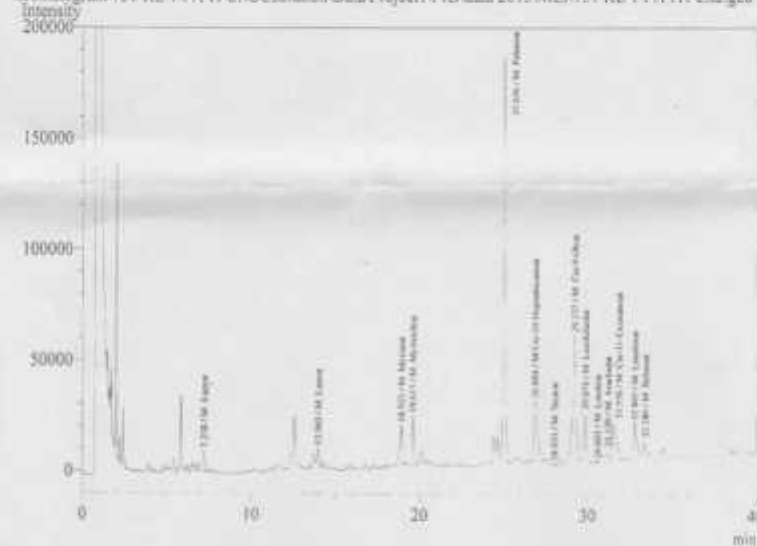
Report (Full) / Status Manual integration

| Peak# | Ret.Time | Area    | Height | Conc. | Units | Mark | Name                   |
|-------|----------|---------|--------|-------|-------|------|------------------------|
| 10    | 30.558   | 3039    | 353    | 0.130 | %     |      | M. Linolenat           |
| 11    | 30.778   | 12777   | 1479   | 0.456 | %     | V    | M. Arachidat           |
| 12    | 31.614   | 191542  | 11154  | 8.208 | %     |      | M. Cis 11: Eransarurat |
| 13    | 32.780   | 109376  | 8609   | 4.711 | %     |      | M. Linolenat           |
| 14    | 33.355   | 17517   | 2768   | 1.607 | %     | V    | M. Behenat             |
| Total |          | 2354982 | 216667 |       |       |      |                        |



User Name : SHIMADZU-FID  
 Vial# : 1  
 Sample Name : 751-RL-1-FA-H  
 Sample ID : 751-RL-1-FA-H  
 Sample Type : Unknown  
 Injection Volume :  
 Multi Injection# :  
 Dilution Factor : 1  
 ISTD Amount :  
 Sample Amount :  
 Level# : 1  
 Data Name : C:\GCsolution\Data\Project\FID\data 2015\MEI\751-RL-1-FA-H1-e.s2.gcd  
 Original Data Name : C:\GCsolution\Data\Project\FID\data 2015\MEI\751-RL-1-FA-H1.gcd  
 Baseline Data Name :  
 Method Name : C:\GCsolution\Data\Project\FID\method\FID\Methylster-37.gcm  
 Report Name : C:\GCsolution\System\DEFAULT.gcr  
 Batch Name :

Chromatogram 751-RL-1-FA-H C:\GCsolution\Data\Project\FID\data 2015\MEI\751-RL-1-FA-H1-e.s2.gcd - Channel:



| Peak# | Ret.Time | Area    | Height | Conc.  | Units | Mark | Name                   |
|-------|----------|---------|--------|--------|-------|------|------------------------|
| 1     | 7.238    | 77875   | 9288   | 1.944  | %     |      | M. Kaprat              |
| 2     | 13.960   | 43051   | 7461   | 1.324  | %     |      | M. Laurat              |
| 3     | 18.923   | 185257  | 17937  | 4.625  | %     |      | M. Myristat            |
| 4     | 19.615   | 203438  | 22791  | 5.129  | %     |      | M. Myristoleat         |
| 5     | 25.026   | 1584464 | 180821 | 39.546 | %     |      | M. Palmirat            |
| 6     | 26.884   | 433777  | 27087  | 10.829 | %     |      | M.Cis-10-Heptadecanoat |
| 7     | 28.031   | 6675    | 859    | 0.167  | %     |      | M. Stearat             |
| 8     | 29.237   | 670241  | 55247  | 16.733 | %     |      | M. Cis-9-Oleat         |
| 9     | 29.874   | 215018  | 20795  | 5.368  | %     | V    | M. Linolelat           |



Report (Report Editor) Status: Manual Integration

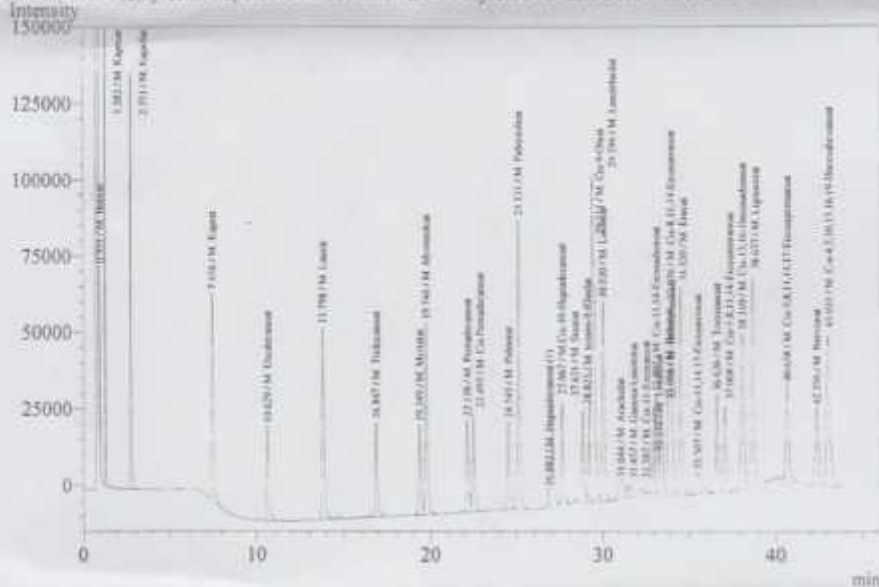
| Peak# | Ret. Time | Area    | Height | Conc.   | Units | Mark | Name                |
|-------|-----------|---------|--------|---------|-------|------|---------------------|
| 10    | 30.601    | 3397    | 248    | 0.085 % |       |      | M. Linoleat         |
| 11    | 31.120    | 31032   | 1972   | 0.775 % |       |      | M. Arachidat        |
| 12    | 31.556    | 252249  | 14835  | 6.297 % | V     |      | M. Cis-11 Eicosanal |
| 13    | 32.805    | 212400  | 16705  | 5.303 % |       |      | M. Linolenat        |
| 14    | 33.380    | 74717   | 5516   | 1.865 % | V     |      | M. Behenat          |
| Total |           | 4005591 | 381182 |         |       |      |                     |



Report (Report Editor) Status: Manual Integration

Sample Information  
 Analysis Date & Time : 10/15/2014 12:43:21 PM  
 User Name : SHIMADZU-FID  
 Vial# : 1  
 Sample Name : Standar Mix Methylester Supelco  
 Sample ID : pachouli alkohol  
 Sample Type : Unknown  
 Injection Volume :  
 Multi Injection# :  
 Dilution Factor : 0  
 ISTD Amount :  
 Sample Amount :  
 Level# : 1  
 Data Name : C:\GCsolution\Data\Project1\FID\data 2015\Maret\Standar Mix Fame Supelco1.D.gcd  
 Original Data Name : C:\GCsolution\Data\Project1\FID\data 2014\september\Oktober\Standar Mix Fame Supelco  
 Baseline Data Name :  
 Method Name : C:\GCsolution\Data\Project1\FID\method FID\Methylester-37.gcm  
 Report Name :  
 Batch Name :

Standar Mix Methylester Supelco C:\GCsolution\Data\Project1\FID\data 2015\Maret\Standar Mix Fame Supelco1.D.gcd



Peak Table - Channel 1

| Peak# | Ret. Time | Area   | Height | Conc. | Units | Mark | Name           |
|-------|-----------|--------|--------|-------|-------|------|----------------|
| 1     | 0.951     | 101857 | 53060  | 0.688 | %     |      | M. Butirat     |
| 2     | 1.282     | 506468 | 226506 | 3.422 | %     |      | M. Kaproat     |
| 3     | 2.751     | 535469 | 137209 | 3.618 | %     | S    | M. Kaprilat    |
| 4     | 7.456     | 530301 | 68089  | 3.583 | %     |      | M. Kaprat      |
| 5     | 10.629    | 264562 | 30933  | 1.787 | %     |      | M. Undecanoat  |
| 6     | 13.798    | 540920 | 62968  | 3.654 | %     | S    | M. Laurat      |
| 7     | 16.847    | 273518 | 30923  | 1.848 | %     | V    | M. Tridecanoat |
| 8     | 19.349    | 269873 | 29581  | 1.823 | %     |      | M. Myristat    |
| 9     | 19.746    | 573152 | 62748  | 3.872 | %     | SV   | M. Myristoleat |

Lampiran 15. Perhitungan (%) Relatif alga coklat *Padina australis* (Ulangan 1)

| No Peak | Nama Senyawa                    | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|---------------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Myristat                   | 20.512        | 575835    | 20796         | 0.05        |
| 2       | Asam Cis Pentadecanoat          | 23.327        | 53318     | 1409          | 0.004       |
| 3       | Asam Palmitat                   | 26.049        | 5670470   | 173675        | 0.4         |
| 4       | Asam Stearat                    | 28.601        | 11282     | 744           | 0.001       |
| 5       | Asam Oleat                      | 30.344        | 3202909   | 104134        | 0.26        |
| 6       | Asam Linoleat                   | 30.985        | 2246666   | 60415         | 0.19        |
| 7       | Asam Cis-8,11,14-Eicosatrinoat  | 34.093        | 65209     | 1465          | 0.01        |
| 8       | Asam Cis-11,14,17-Eicosatrinoat | 35.646        | 300748    | 9530          | 0.02        |
|         | Total                           |               | 12126437  |               | 100         |



**Lampiran 16. Perhitungan % Relatif alga coklat *Padina australis* (Ulangan 2)**

| No Peak | Nama Senyawa                    | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|---------------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Myristat                   | 20.51         | 527294    | 19285         | 0.05        |
| 2       | Asam Cis Pentadecanoat          | 23.331        | 24444     | 1019          | 0.002       |
| 3       | Asam Palmitat                   | 26.007        | 5181667   | 169089        | 0.4         |
| 4       | Asam Stearat                    | 28.586        | 31213     | 954           | 0.003       |
| 5       | Asam Cis-9-Oleat                | 30.368        | 2946313   | 101646        | 0.27        |
| 6       | Asam Linoleat                   | 30.998        | 1836862   | 52188         | 0.17        |
| 7       | Asam Cis-8,11,14-Eicosatrinoat  | 34.145        | 74833     | 1518          | 0.01        |
| 8       | Asam Cis-11,14,17-Eicosatrinoat | 35.653        | 318031    | 9305          | 0.03        |
|         | Total                           |               | 10940657  |               | 100         |

Lampiran 17. Perhitungan (%) Relatif alga coklat *Sargassum cristaefolium* (Ulangan 1)

| No Peak | Nama Senyawa                   | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|--------------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Laurat                    | 14.422        | 16785     | 598           | 0.004       |
| 2       | Asam Myristat                  | 20.495        | 563188    | 20695         | 0.13        |
| 3       | Asam Cis Pentadecanoat         | 23.339        | 45803     | 1165          | 0.01        |
| 4       | Asam Palmitoleat               | 24.372        | 20680     | 596           | 0.005       |
| 5       | Asam Palmitat                  | 26.018        | 2682703   | 94313         | 0.6         |
| 6       | Asam Stearat                   | 28.648        | 31597     | 1027          | 0.01        |
| 7       | Asam Cis-9-Oleat               | 30.318        | 750100    | 22051         | 0.17        |
| 8       | Asam Cis-8,11,14-Eicosatrinoat | 34.052        | 322603    | 7160          | 0.07        |
|         | Total                          |               | 4433459   |               | 100         |

Lampiran 18. Perhitungan (%) Relatif alga coklat *Sargassum cristaefolium* (Ulangan 2)

| No Peak | Nama Senyawa                   | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|--------------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Laurat                    | 14.395        | 11343     | 495           | 0.002       |
| 2       | Asam Myristat                  | 20.516        | 585100    | 21483         | 0.12        |
| 3       | Asam Cis Pentadecanoat         | 23.393        | 58006     | 1388          | 0.01        |
| 4       | Asam Palmitoleat               | 24.351        | 25395     | 821           | 0.01        |
| 5       | Asam Palmitat                  | 25.995        | 2742099   | 98102         | 0.6         |
| 6       | Asam Stearat                   | 28.673        | 31300     | 1137          | 0.01        |
| 7       | Asam Cis-9-Oleat               | 30.31         | 986559    | 28988         | 0.20        |
| 8       | Asam Cis-8,11,14-Eicosatrinoat | 34.057        | 542909    | 11604         | 0.11        |
|         | Total                          |               | 4982711   |               | 100         |



Lampiran 19. Perhitungan (%) Relatif alga coklat *Turbinaria ornata* (Ulangan 1)

| No Peak | Nama Senyawa              | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|---------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Kaprat               | 7.239         | 49872     | 5408          | 0.02        |
| 2       | Asam Laurat               | 13.677        | 76073     | 8999          | 0.03        |
| 3       | Asam Myristat             | 18.916        | 107311    | 10352         | 0.05        |
| 4       | Asam Myristoleat          | 19.608        | 127838    | 13976         | 0.05        |
| 5       | Asam Palmitat             | 24.994        | 850672    | 94301         | 0.4         |
| 6       | Asam Cis-10-Heptadecanoat | 26.904        | 284836    | 17101         | 0.12        |
| 7       | Asam Stearat              | 28.009        | 4546      | 509           | 0.002       |
| 8       | Asam Cis-9-Oleat          | 29.216        | 351535    | 29071         | 0.15        |
| 9       | Asam Linoledat            | 29.855        | 127558    | 12569         | 0.05        |
| 10      | Asam Linoeat              | 30.558        | 3029      | 361           | 0.001       |
| 11      | Asam Arachidat            | 30.778        | 12277     | 1479          | 0.01        |
| 12      | Asam Cis-11-Eicosanoat    | 31.614        | 191642    | 11164         | 0.08        |
| 13      | Asam Linolenat            | 32.78         | 109976    | 8609          | 0.05        |
| 14      | Asam Docosanoat           | 33.355        | 37517     | 2768          | 0.02        |
|         | Total                     |               | 2334682   |               | 100         |

Lampiran 20. Perhitungan (%) Relatif alga coklat *Turbinaria ornata* (Ulangan 2)

| No Peak | Nama Senyawa              | Waktu Retensi | Luas Area | Berat Molekul | (%) Relatif |
|---------|---------------------------|---------------|-----------|---------------|-------------|
| 1       | Asam Kaprat               | 7.238         | 77875     | 9288          | 0.02        |
| 2       | Asam Laurat               | 13.96         | 53051     | 7461          | 0.01        |
| 3       | Asam Myristat             | 18.925        | 185257    | 17937         | 0.05        |
| 4       | Asam Myristoleat          | 19.615        | 205438    | 22791         | 0.05        |
| 5       | Asam Palmitat             | 25.026        | 1584464   | 180821        | 0.4         |
| 6       | Asam Cis-10-Heptadecanoat | 26.884        | 433777    | 27087         | 0.11        |
| 7       | Asam Stearat              | 28.031        | 6675      | 859           | 0.002       |
| 8       | Asam Cis9-Oleat           | 29.237        | 670241    | 55247         | 0.17        |
| 9       | Asam Linoledat            | 29.874        | 215018    | 20395         | 0.05        |
| 10      | Asam Linoeat              | 30.601        | 3397      | 248           | 0.001       |
| 11      | Asam Arachidat            | 31.12         | 31032     | 1972          | 0.01        |
| 12      | Asam Cis-11-Eicosanoat    | 31.556        | 252249    | 14855         | 0.06        |
| 13      | Asam Linolenat            | 32.805        | 212400    | 16705         | 0.05        |
| 14      | Asam Docosanoat           | 33.38         | 74717     | 5516          | 0.02        |
|         | Total                     |               | 4005591   |               | 100         |