LEMBAR LAMPIRAN

Tabel 1. Tegangan terhadap Konsentrasi Minyak Sisa

Tegangan (volt)	[Ms]1 (g/L)	[Ms]2 (g/L)	[Ms]3 (g/L)	[Ms]r (g/L)
0	73,07	73,07	73,07	73,07
3	58,274	52,488	53,483	54,74833
5	37,08	48,101	64,795	49,992
7	35,434	31,23	57,27	41,31133
9	27,446	34,003	30,725	30,72467
11	30,844	30,403	30,164	30,47033
15	18,257	13,524	14,312	15,36433

Keterangan:
[Ms]1,2,3= Konsentrasi Minyak Sisa 1,2,3
[Ms]r = Konsentrasi Minyak Sisa rata-rata

Tabel 2. Tegangan Terhadap Massa Besi Deposit

Tegangan (volt)	(MB)1 (g)	(MB)2 (g)	(MB)3 (g)	(MB)r (g)
0	0	0	0	0
3	0,0219	0,029	0,197	0,082633
5	0,065	0,1032	0,054	0,074067
7	0,143	0,1032	0,1081	0,1181
9	0,1496	0,1881	0,1206	0,152767
11	0,2357	0,3168	0,2502	0,267567
15	0,3532	0,4315	0,3967	0,3938

Keterangan:
(MB)1,2,3= Massa Besi Deposit 1,2,3
(MB)r = Massa Besi Deposit rata-rata

Nilai Massa Minyak yang teradsorpsi dari Konsentrasi Minyak Sisa

Massa minyak yang teradsorpsi diperoleh dengan persamaan sebagai berikut:

$$\text{Massa minyak yang teradsorpsi} = \frac{([\text{Minyak Awal}] - [\text{Minyak Sisa}]) \times 100\ \text{mL}}{1000}$$

Contoh

Apabila diketahui bahwa100 mL limbah minyak memiliki konsentrasi minyak awal sebesar 73,07 g/L dan konsentrasi minyak sisa sebesar 54,7483 g/L maka massa minyak yang diperoleh:

$$\text{Massa Minyak yang Teradsorpsi} = \frac{(73{,}07\ \text{g/L} - 54{,}7483)\ \text{g/ L} \times 100\ \text{mL}}{1000}$$

Massa Minyak yang Teradsorpsi = 1,8322 g

Tabel 3. Massa Minyak yang Teradsorpsi

Voltase (volt)	[Ms]1 (g/L)	[Ms]2 (g/L)	[Ms]3 (g/L)	[Ms]r (g/L)	MMr (g)	MM1 (g)	MM2 (g)	MM3 (g)
0	73,07	73,07	73,07	73,0700	7,3070	7,307	7,307	7,307
3	58,274	52,488	53,483	54,7483	1,8322	1,4796	2,0582	1,9587
5	37,08	48,101	64,795	49,9920	2,3078	3,599	2,4969	0,8275
7	35,434	31,23	57,27	41,3113	3,1759	3,7636	4,184	1,58
9	27,446	34,003	30,725	30,7247	4,2345	4,5624	3,9067	4,2345
11	30,844	30,403	30,164	30,4703	4,2600	4,2226	4,2667	4,2906
15	18,257	13,524	14,312	15,3643	5,7706	5,4813	5,9546	5,8758

Keterangan:
[Ms]1,2,3= Konsentrasi Minyak Sisa 1, 2, 3
[Ms]r = Konsentrasi Minyak Sisa rata-rata
MM1,2,3= Massa Minyak yang teradsorpsi 1, 2, 3
MMr = Massa Minyak yang teradsorspsi rata-rata

Tabel 4. Minyak yang Teradsorpsi oleh Massa Deposit Besi

Voltase	MM1	MM2	MM3	MMr	(MB)1	(MB)2	(MB)3	(MB)r	Ads(1)	Ads(2)	Ads(3)	Ads(r)
3	1.4796	2.0582	1.9587	1.8321	0.0219	0.029	0.197	0.0826	67.562	70.972	9.943	49.492
5	3.599	2.4969	0.8275	2.3078	0.065	0.1032	0.054	0.0740	55.369	24.195	42.737	40.767
7	3.7636	4.184	1.58	3.1758	0.143	0.1032	0.1081	0.1181	26.319	40.543	29.379	32.080
9	4.5624	3.9067	4.2345	4.2345	0.1496	0.1881	0.1206	0.1527	30.497	20.769	35.112	28.793
11	4.22260	4.2667	4.2906	4.2599	0.2357	0.3168	0.2502	0.2676	17.915	13.468	17.026	16.1365
15	5.48130	5.9546	5.8758	5.7705	0.3532	0.4315	0.3967	0.3938	15.519	13.800	14.546	14.621

Keterangan:

(MB)1,2,3= Massa Besi Deposit 1,2,3

(MB)r = Massa Besi Deposit rata-rata

MM1,2,3 = Massa Minyak Sisa 1,2,3

MMr = Massa Minyak Sisa rata-rata

Ads 1,2,3 = Minyak yang teradsorpsi oleh massa deposit besi

Ads (r) = Minyak yang teradsorpsi oleh massa deposit besi rata-rata

Tabel 5. Konsentrasi Minyak Sisa terhadap Massa Deposit Besi

(MB)1 (g)	(MB)2 (g)	(MB)3 (g)	(MB)r (g)	[Ms]r (g/L)	[Ms]1 (g/L)	[Ms]2 (g/L)	[Ms]3 (g/L)
0	0	0	0	73,0700	73,07	73,07	73,07
0,0219	0,029	0,197	0,0826	54,7483	58,274	52,488	53,483
0,065	0,1032	0,054	0,0741	49,9920	37,08	48,101	64,795
0,143	0,1032	0,1081	0,1181	41,3113	35,434	31,23	57,27
0,1496	0,1881	0,1206	0,1528	30,7247	27,446	34,003	30,725
0,2357	0,3168	0,2502	0,2676	30,4703	30,844	30,403	30,164
0,3532	0,4315	0,3967	0,3938	15,3643	18,257	13,524	14,312

Tabel 6. Konsentrasi Minyak Sisa beserta perubahan pH terhadap Waktu

Waktu (Menit)	[Ms]1 (g/L)	[Ms]2 (g/L)	[Ms]3 (g/L)	[Ms]r (g/L)	pH (r)	pH (1)	pH (2)	pH (3)
0	73,07	73,07	73,07	73,0700	4	4	4	4
2,5	52,0841	55,9981	51,8571	53,3131	5	5	5	5
5	46,1630	42,696	40,63	43,1630	6,3	6	6	5
10	36,7992	37,7392	32,8592	35,7992	7	7	7	7
15	24,8781	27,1431	22,6131	24,8781	8	8	8	8
25	19,6667	23,3467	18,9867	20,6667	8,3	8	8	7

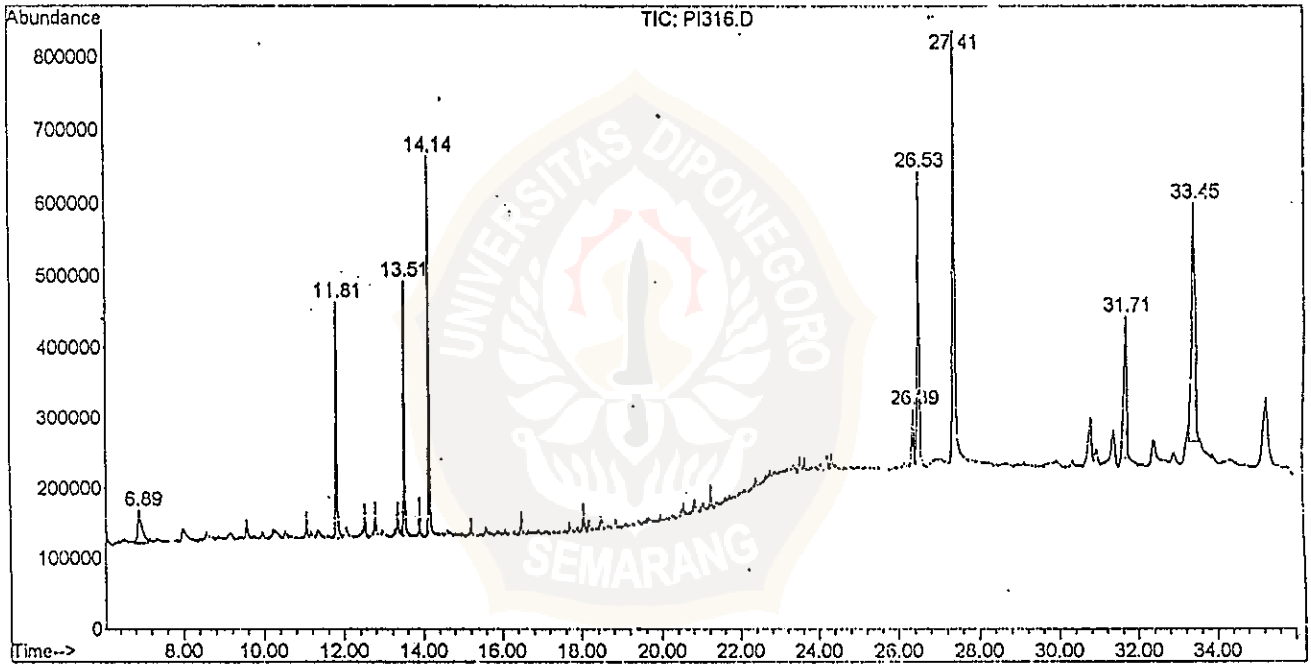
Tabel 7. Database Minyak Sebelum Elektroflokulasi

Summary Library Search Report

Information from Data File:
File : D:\DATA\PI316.D
Operator : Aris
Acquired : 10 Oct 2002 5:18 pm using AcqMethod LEMAK
Sample Name: Minyak
Misc Info : Penelitian UNDIP
Vial Number: 1

Search Libraries: D:\DATABASE\WILEY275.L Minimum Quality: 0

Unknown Spectrum: Apex minus start of peak
Integration Params: current RTEINT parameters



Pk#	RT	Area%	Library/ID	Ref#	CAS#	Qual
1	6.89	3.42	D:\DATABASE\WILEY275.L			
			2-Heptenal, (E)- (CAS) $$ trans-2-	10665	018829-55-5	98
			heptenal	10900	000000-00-0	91
			2-Heptenal, (Z)- (CAS) $$ CIS-HEPT	10660	057266-86-1	80
2	11.81	8.39	D:\DATABASE\WILEY275.L			
			2-Decenal, (E)- (CAS) $$ trans-2-D	39932	003913-81-3	90
			2-Decenal, (Z)- (CAS) $$ CIS-DEC-2	39927	002497-25-8	86
			2-Heptenal, (E)- (CAS) $$ trans-2-	10665	018829-55-5	70
3	13.51	7.52	D:\DATABASE\WILEY275.L			
			2,4-Decadienal, (E,Z)- (CAS) $$ tr	37657	025152-83-4	91
			2,4-Decadienal	38145	002363-88-4	90
			2,4-Decadienal, (E,E)- (CAS) $$ tr	37660	025152-84-5	90

		Area%	Library/ID	Ref#	CAS#	Qual
	14.14	11.24	D:\DATABASE\WILEY275.L			
			TRANS,TRANS-2,4-DECADIENAL	38104	000000-00-0	94
			TRANS,TRANS-2,4-DECADIENAL	37960	025152-84-5	91
			2,4 DECADIENAL $$ HEPTENYL ACROLEI	37947	002363-88-4	83
5	26.39	2.43	D:\DATABASE\WILEY275.L			
			Dodecanedioic acid (CAS) $$ 1,12-D	115847	000693-23-2	43
			2-Oxecanone, 10-methyl-, (.+-.)- (	55362	065371-24-6	38
			HEXADECANEDIOYLCARNITINE $$ 1-Prop	244769	055570-92-8	35
6	26.53	14.39	D:\DATABASE\WILEY275.L			
			Undecanedioic acid (CAS) $$ 1,9-No	101095	001852-04-6	35
			2-Propenoic acid, 3-(dimethylamino	20025	000999-59-7	35
			Carbazic acid, 3-pentylidene-, met	43542	014702-36-4	25
7	27.41	21.89	D:\DATABASE\WILEY275.L			
			Hexadecanoic acid (CAS) $$ Palmiti	141013	000057-10-3	99
			Tetradecanoic acid (CAS) $$ Myrist	114430	000544-63-8	95
			Tridecanoic acid (CAS) $$ Tridecyl	99772	000638-53-9	94
8	31.71	10.46	D:\DATABASE\WILEY275.L			
			9-Octadecenoic acid (Z)-, 2-hydrox	214838	003443-84-3	53
			9-Octadecenal, (Z)- (CAS) $$ CIS-O	150204	002423-10-1	49
			13-Octadecenal, (Z)- $$ cis-13-Oct	150230	058594-45-9	43
9	33.45	20.26	D:\DATABASE\WILEY275.L			
			9-Octadecenoic acid (Z)- (CAS) $$	163703	000112-80-1	99
			HEPTADECENE-(8)-CARBONIC ACID-(1)	163698	000000-00-0	99
			14-Pentadecenoic acid (CAS)	126201	017351-34-7	91

Tabel 8. Database Luas Area Minyak Sebelum Elektroflokulasi

Area Percent Report -- Sorted by Signal

Information from Data File:
File : D:\DATA\PI316.D
Operator : Aris
Acquired : 10 Oct 2002 5:18 pm using AcqMethod LEMAK
Sample Name: Minyak
Misc Info : Penelitian UNDIP
Vial Number: 1
CurrentMeth: C:\HPCHEM\1\METHODS\CYPQUAN.M

Retention Time	Area	Area %	Ratio %	Type	Width
Total Ion Chromatogram					
11.908	869845	8.912	38.333	rBV	0.204
13.514	779946	7.991	34.372	rVB	0.213
14.144	1165113	11.938	51.346	rBV	0.155
26.532	1491956	15.286	65.749	rVB	0.213
27.415	2269153	23.249	100.000	rVB	0.262
31.709	1083930	11.106	47.768	rVB	0.213
33.454	2100148	21.518	92.552	rVB	0.242

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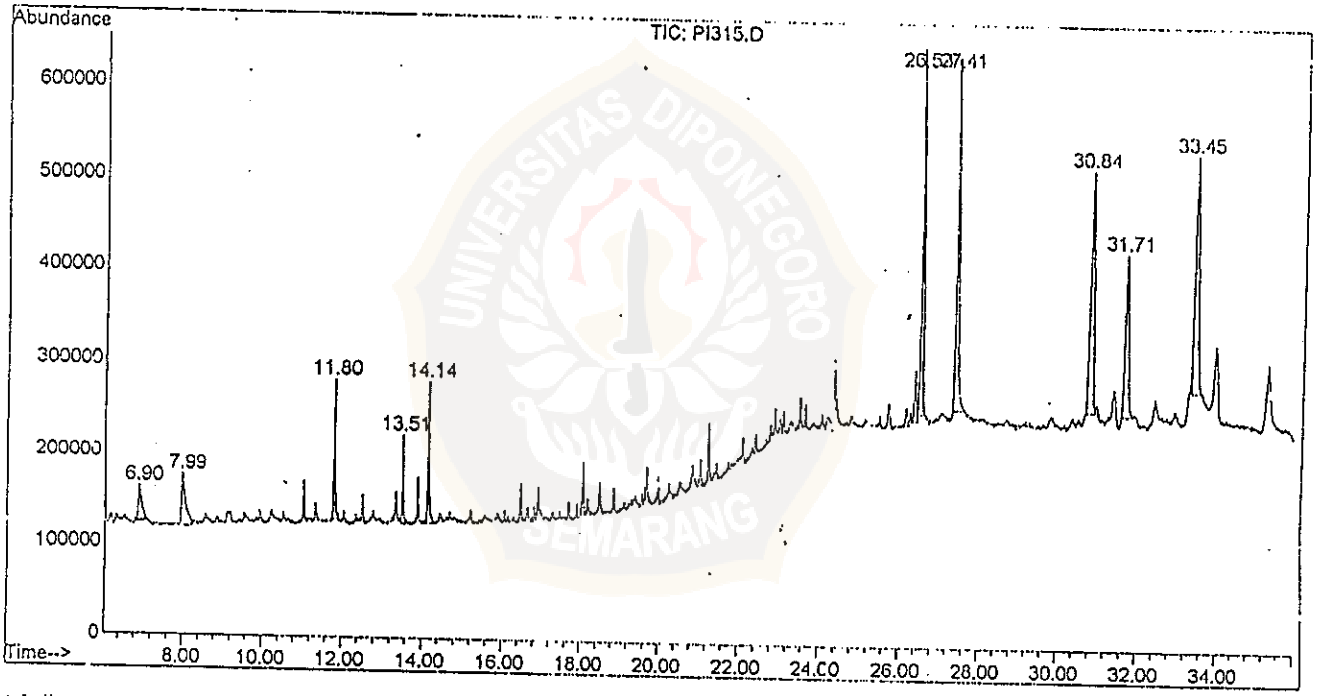
Tabel 9. Database Minyak Sesudah Elektroflokulasi

Summary Library Search Report

Information from Data File:
File : D:\DATA\PI315.D
Operator : Aris
Acquired : 10 Oct 2002 4:27 pm using AcqMethod LEMAK
Sample Name: Fe-Minyak
Misc Info : Penelitian UNDIP
Vial Number: 1

Search Libraries: D:\DATABASE\WILEY275.L Minimum Quality: 0

Unknown Spectrum: Apex minus start of peak
Integration Params: current RTEINT parameters



Pk#	RT	Area%	Library/ID	Ref#	CAS#	Qual
1	6.90	2.58	D:\DATABASE\WILEY275.L			
			2-Heptenal, (E)- (CAS) $$ trans-2-	10664	018829-55-5	80
			2-heptenal (Z and E)	10662	057266-86-1	72
			4-Pentenal, 2-ethyl- (CAS) $$ 2-ET	10680	005204-80-8	70
2	7.99	4.88	D:\DATABASE\WILEY275.L			
			NONANAL	29971	000000-00-0	86
			NONYL ALDEHYDE	29954	000124-19-6	83
			Cyclopentane, 1,2-dimethyl-, trans	6082	000822-50-4	38
3	11.80	4.71	D:\DATABASE\WILEY275.L			
			2-Decenal, (E)- (CAS) $$ trans-2-D	39933	003913-81-3	90
			2-Decenal, (Z)- (CAS) $$ CIS-DEC-2	39927	002497-25-8	80
			2-Heptenal, (E)- (CAS) $$ trans-2-	10665	018829-55-5	70

	RT	Area%	Library/ID	Ref#	CAS#	Qual
4	13.51	2.49	D:\DATABASE\WILEY275.L			
			2,4-Decadienal, (E,E)- (CAS) $$ tr	37662	025152-84-5	87
			2,4 DECADIENAL $$ HEPTENYL ACROLEI	37947	002363-88-4	81
			TRANS,TRANS-2,4-DECADIENAL	38104	000000-00-0	74
5	14.14	4.91	D:\DATABASE\WILEY275.L			
			TRANS,TRANS-2,4-DECADIENAL	38104	000000-00-0	94
			TRANS,TRANS-2,4-DECADIENAL	37960	025152-84-5	91
			2,4-Decadienal, (E,Z)- (CAS) $$ tr	37659	025152-83-4	78
6	26.53	15.91	D:\DATABASE\WILEY275.L			
			Undecanedioic acid (CAS) $$ 1,9-No	101095	001852-04-6	38
			Hexadecanoic acid (CAS) $$ Palmiti	141011	000057-10-3	27
			Oxacyclotetradecane-2,11-dione, 13	125999	074685-36-2	22
7	27.41	17.72	D:\DATABASE\WILEY275.L			
			Hexadecanoic acid (CAS) $$ Palmiti	141012	000057-10-3	99
			Tetradecanoic acid (CAS) $$ Myrist	114435	000544-63-8	94
			MYRISTIC ACID $$ TETRADECANOIC ACI	114506	000000-00-0	93
8	30.84	17.21	D:\DATABASE\WILEY275.L			
			2,6,10,14,18,22-Tetracosahexaene,	238653	007683-64-9	91
			10-DEMETHYLSQUALENE $$ 2,6,10,14,1	233354	059681-06-0	90
			1,5-Heptadiene, 3,3,6-trimethyl- (	26697	035387-63-4	58
9	31.71	11.25	D:\DATABASE\WILEY275.L			
			9-Octadecenoic acid (Z)-, 2-hydrox	214838	003443-84-3	60
			9-Octadecenal, (Z)- (CAS) $$ CIS-O	150204	002423-10-1	49
			9-Octadecenal (CAS) $$ Octadecenyl	150205	005090-41-5	43
10	33.45	18.34	D:\DATABASE\WILEY275.L			
			9-Octadecenoic acid (Z)- (CAS) $$	163703	000112-80-1	99
			HEPTADECENE-(8)-CARBONIC ACID-(1)	163698	000000-00-0	99
			ETHYL 9-HEXADECANOATE	163729	000000-00-0	58

Tabel 10. Database Luas Area Minyak Sesudah Elektroflokulasi

Area Percent Report -- Sorted by Signal

Information from Data File:
File : D:\DATA\PI315.D
Operator : Aris
Acquired : 10 Oct 2002 4:27 pm using AcqMethod LEMAK
Sample Name: Fe-Minyak
Misc Info : Penelitian UNDIP
Vial Number: 1
CurrentMeth: C:\HPCHEM\1\METHODS\CYPQUAN.M

Retention Time	Area	Area %	Ratio %	Type	Width
Total Ion Chromatogram					
7.986	416659	5.144	26.622	rBV	0.330
11.795	402161	4.965	25.696	rBV	0.145
14.141	418554	5.168	26.743	rVB	0.242
26.530	1357087	16.756	86.710	rBV	0.145
27.412	1512031	18.669	96.610	rBV	0.271
30.843	1468107	18.126	93.804	rVB	0.194
31.706	959556	11.847	61.310	rVB	0.252
33.451	1565080	19.324	100.000	rVB	0.252

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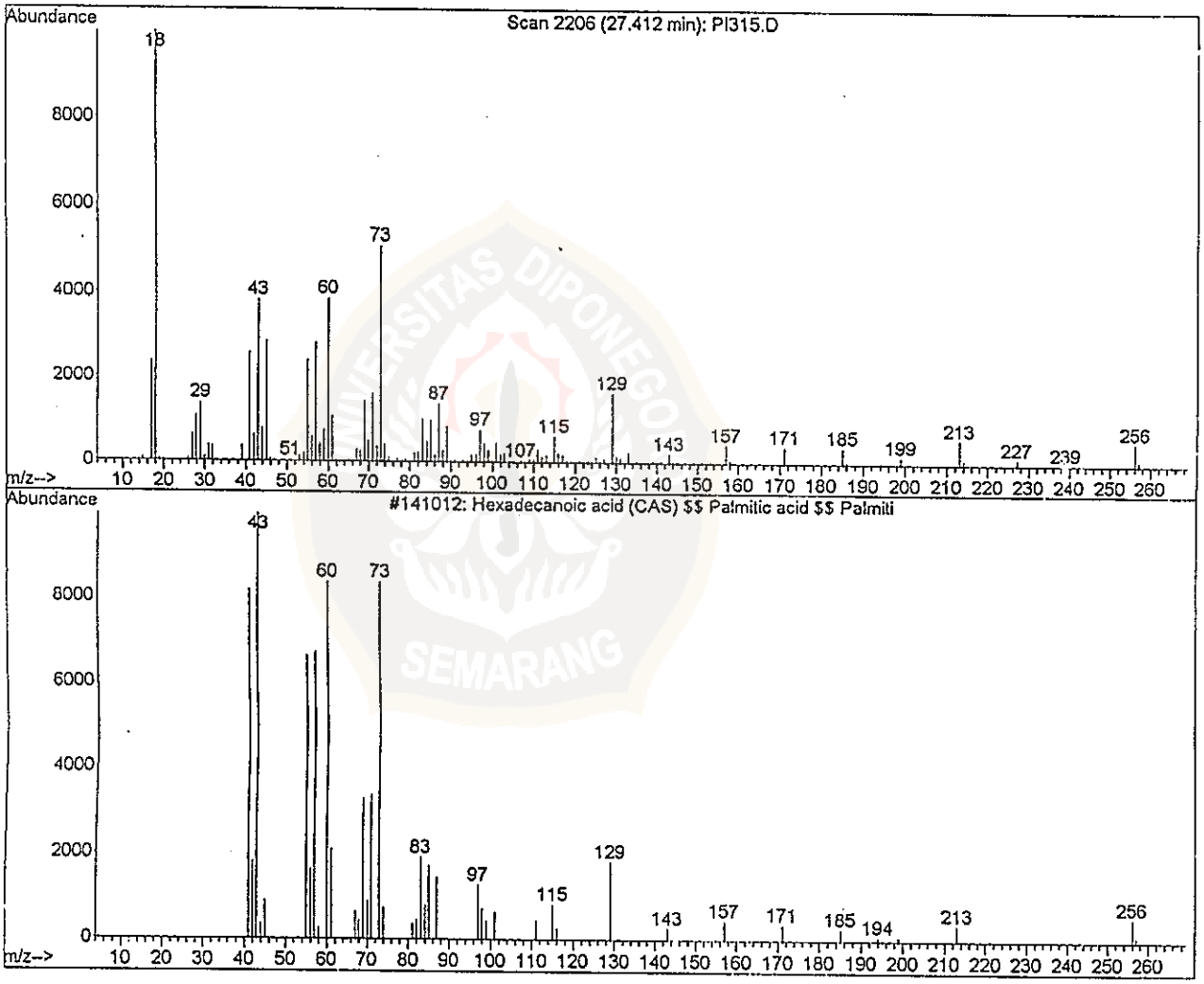
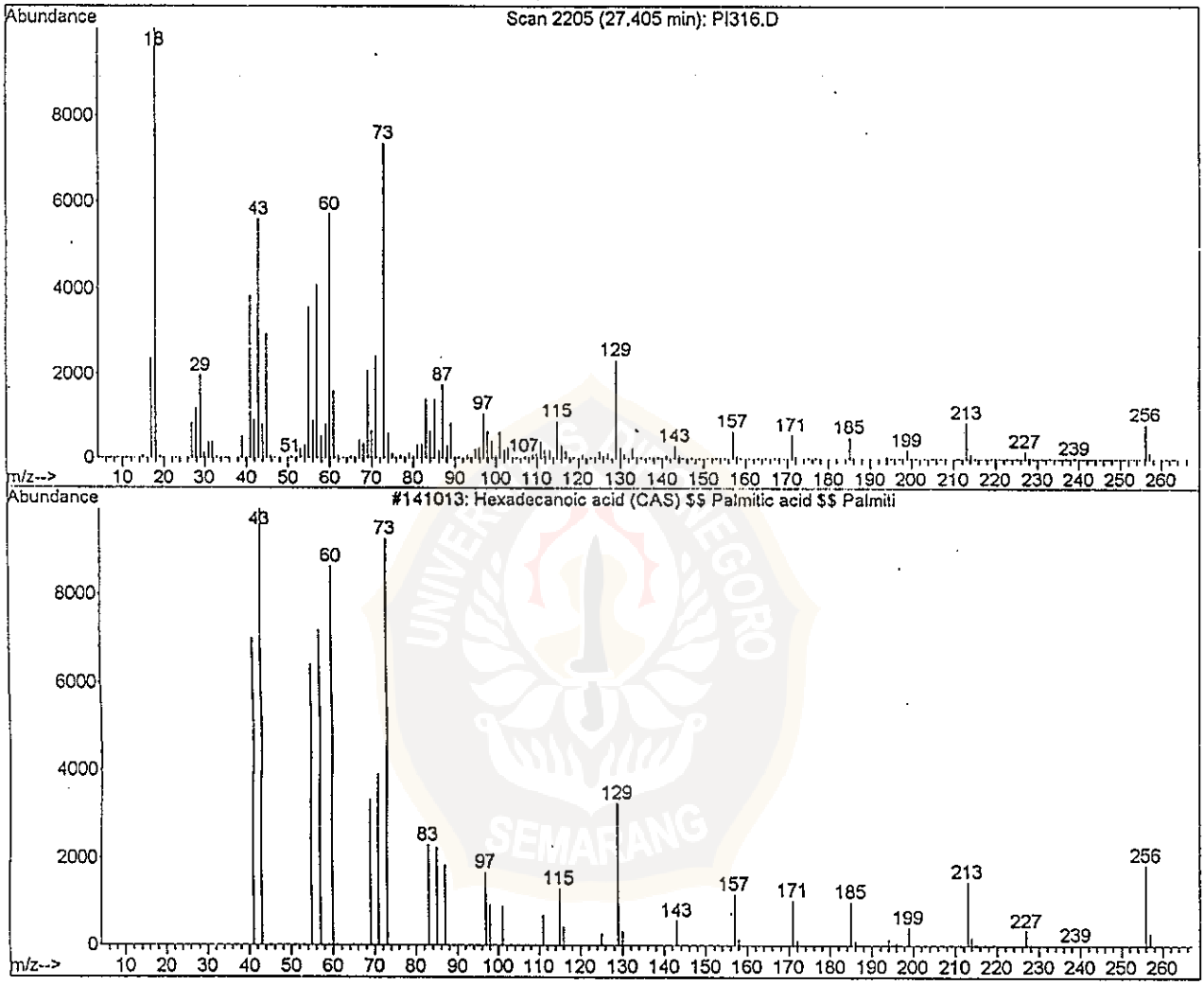
Spektra MS Pada Waktu Retensi GC – MS 27,41

```
Library Searched : D:\DATABASE\WILEY275.L
Quality          : 98
ID               : Hexadecanoic acid (CAS) $$ Palmitic acid $$ Palmitinic
                    acid $$ n-Hexadecoic acid $$ n-Hexadecanoic acid $$ P
                   entadecanecarboxylic aci
```

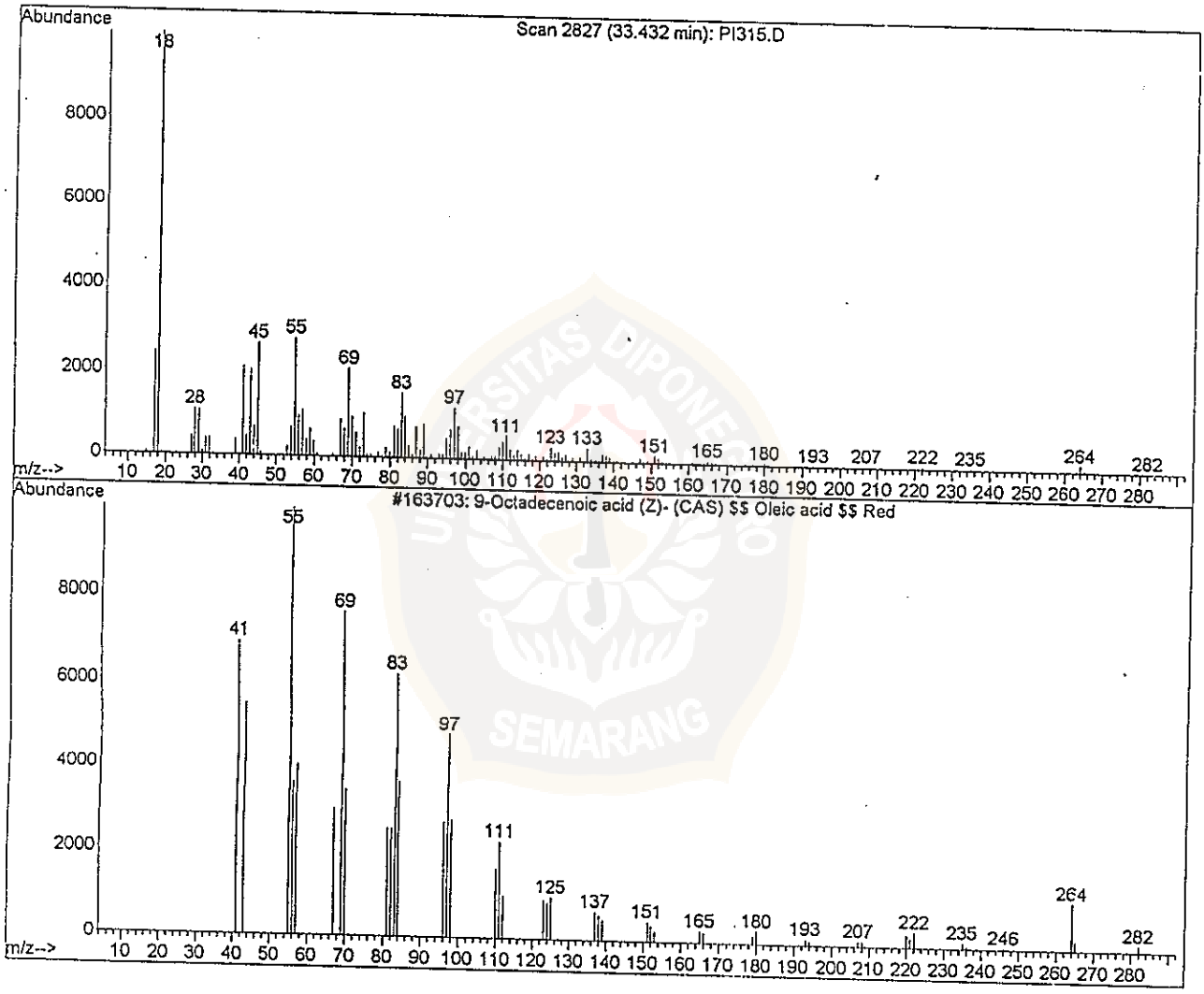


Library Searched : D:\DATABASE\WILEY275.L
Quality : 99
ID : Hexadecanoic acid (CAS) $$ Palmitic acid $$ Palmitinic acid $$ n-Hexadecoic acid $$ n-Hexadecanoic acid $$ Pentadecanecarboxylic aci



Spektra MS Pada Waktu Retensi GC – MS 33,45

```
Library Searched : D:\DATABASE\WILEY275.L
Quality          : 97
ID               : 9-Octadecenoic acid (Z)- (CAS) $$ Oleic acid $$ Red oi
                   l $$ Oelsauere $$ Oleine 7503 $$ Pamolyn 100 $$ Emerso
                   l 211 $$ Vopcolene 27 $$
```

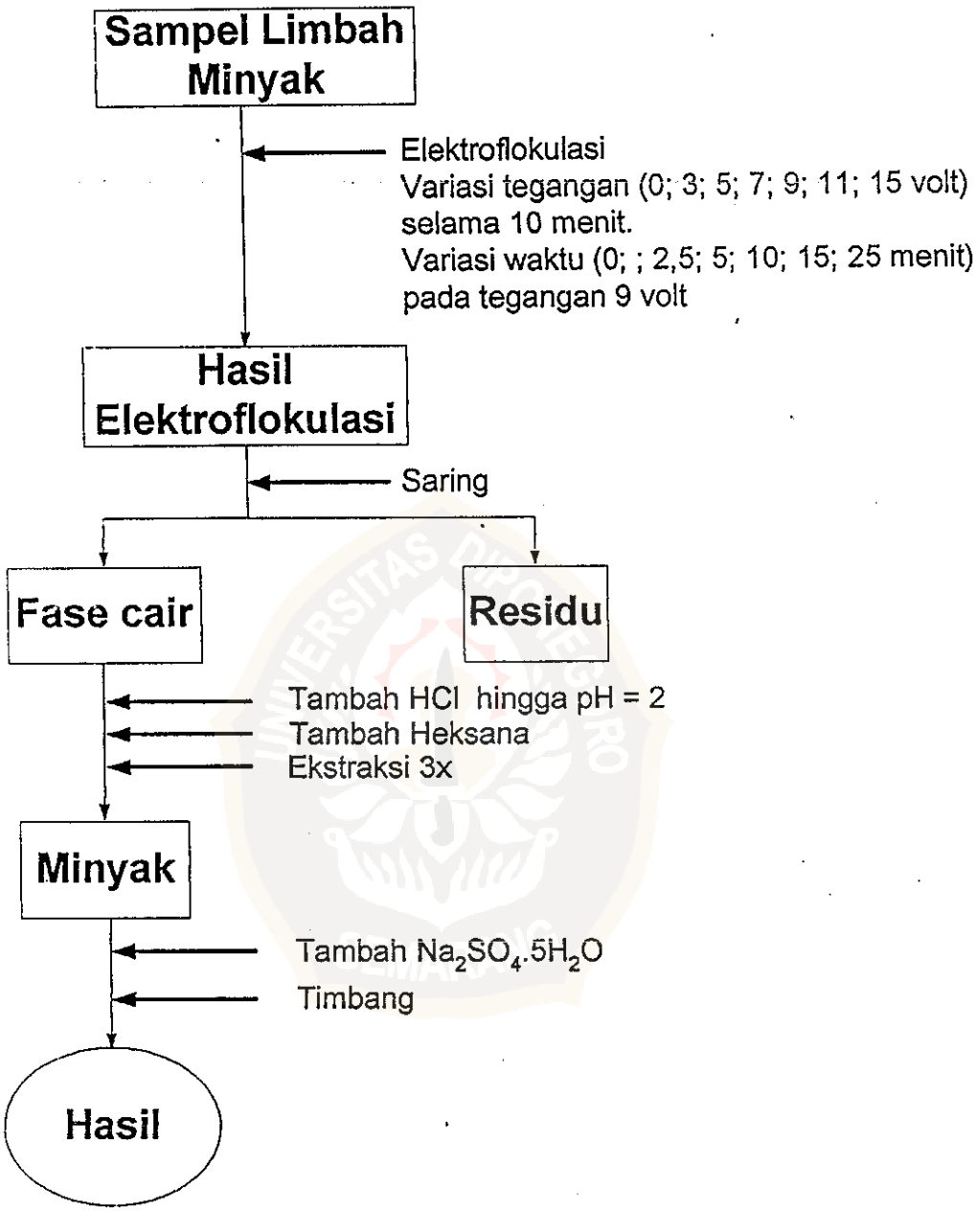


Potensial Elektrode Standar, E^o (volt)

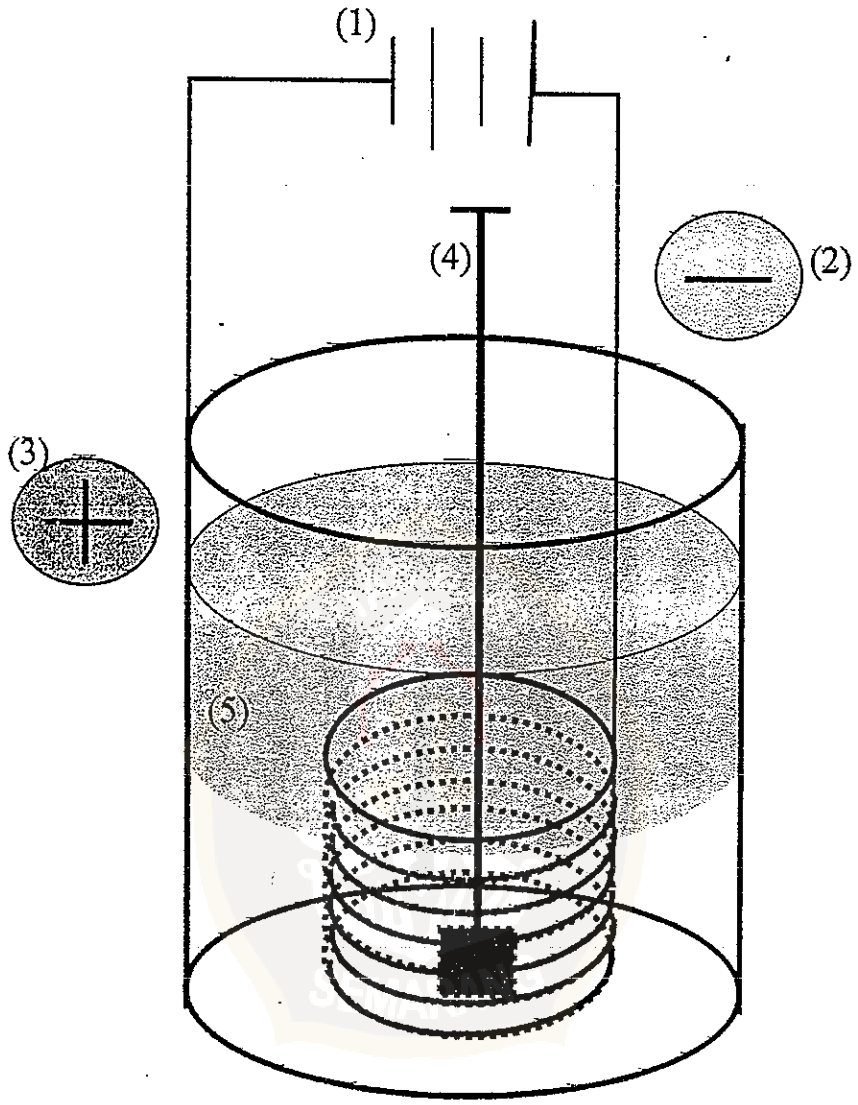
Reaksi Elektroda	Potensial standar, E^o (volt)
$Li^+(aq) + e \Leftrightarrow Li(s)$	-3,04
$K^+(aq) + e \Leftrightarrow K(s)$	-2,92
$Ba^{2+}(aq) + 2e \Leftrightarrow Ba(a)$	-2,90
$Ca^{2+}(aq) + 2e \Leftrightarrow Ca(s)$	-2,87
$Na^+(aq) + e \Leftrightarrow Na(s)$	-2,71
$Mg^{2+}(aq) + 2e \Leftrightarrow Mg(s)$	-2,37
$Al^{3+}(aq) + 3e \Leftrightarrow Al(s)$	-1,66
$Mn^{2+}(aq) + 2e \Leftrightarrow Mn(s)$	-1,18
$2\ H_2O(l) + 2e \Leftrightarrow H_2(g) + 2OH^-$	**-0,83**
$Zn^{2+}(aq) + 2e \Leftrightarrow Zn(s)$	-0,76
$Cr^{3+}(aq) + 3e \Leftrightarrow Cr(s)$	-,0,74
$Fe^{2+}(aq) + 2e \Leftrightarrow Fe(s)$	-0,44
$Cd^{3+}(aq) + 3e \Leftrightarrow Cd(s)$	-0,40
$Ni^{2+}(aq) + 2e \Leftrightarrow Ni(s)$	-0,28
$Co^{2+}(aq) + 2e \Leftrightarrow Co(s)$	-0,28
$Sn^{2+}(aq) + 2e \Leftrightarrow Sn(s)$	-0,14
$Pb^{2+}(aq) + 2e \Leftrightarrow Pb(s)$	-0,13
$2H^+(aq) + 2e \Leftrightarrow H_2(q)$	**0,00**
$Cu^{2+}(aq) + 2e \Leftrightarrow Cu(s)$	0,34
$O_2(g) + 2H_2O(l) + 4e \Leftrightarrow 4OH^-$	**0,40**
$I_2(s) + 2e \Leftrightarrow 2I^-(aq)$	0,54
$Hg_2^{2+}(aq) + 2e \Leftrightarrow Hg(l)$	0,79
$Ag^+(aq) + e \Leftrightarrow Ag(s)$	0,80
$Hg^{2+}(aq) + 2e \Leftrightarrow Hg(l)$	0,85

$NO^{3-}(aq)+4H^{+}(aq)+3e \Leftrightarrow NO(g)+2H_2O$	0,96
$Br_2(l) + 2e \Leftrightarrow 2Br^{-}(aq)$	1,07
$O_2(g)+ 4H^{+}(aq) + 4e \Leftrightarrow 2H_2O(l)$	**1,23**
$Cl_2(g) + 2e \Leftrightarrow 2Cl^{-}(aq)$	1,36
$F_2(g) + 2e \Leftrightarrow 2F^{-}(aq)$	2,87

DIAGRAM KERJA



Gambar Sel Elektroflokulasi[4,5]



Keterangan gambar:
(1) Power Supply
(2) Katoda (Kaleng aluminium)
(3) Anoda (Kawat besi)
(4) Sumber gelembung udara
(5) Larutan sampel