

Lampiran 1

Tabel Data Hasil Pengujian Asam Lemak di Universitas Airlangga

Tabel Profil Asam Lemak

No	Nama Komponen (metil ester)	kode GC-MS 9-60			kode GC-MS 9-61			kode GC-MS 9-59		
		Waktu Tambat	% Area	Quality*	Waktu Tambat	% Area	Quality	Waktu Tambat	% Area	Quality*
1	Myristic acid	5.075	26.778%	98%	-	-	-	5.059	0.365%	98%
2	palmitic acid	8.291	26.024%	99%	8.275	12.052%	96%	8.292	17.208%	99%
3	8,11-octadecadienoic acid	11.825	12.523%	99%	-	-	-	-	-	-
	linoleic acid	-	-	-	11.931	53.313%	99%	11.939	46.660%	99%
4	Oleic acid	11.996	30.163%	99%	12.061	26.153%	99%	12.069	26.928%	99%
	9,12,15-octadecatrienoic acid	-	-	-	-	-	-	12.312	0.330%	97%
5	stearic acid	12.540	3.890%	99%	12.556	6.119%	99%	12.564	6.663%	99%
6	11-eicosenoic acid	16.983	0.298%	99%	16.983	0.297%	99%	16.983	0.403%	99%
7	arachidic acid	17.852	0.167%	99%	17.860	0.454%	99%	17.860	0.647%	99%
	Docosanoic acid	-	-	-	23.019	1.212%	99%	23.019	0.563%	99%
8	lignoceric acid	25.602	0.156%	99%	25.602	0.400%	99%	25.602	0.234%	99%

ket. Quality = Kesesuaian spektrum MS dengan pustaka Alat

Surabaya, 15 September 2014
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Lampiran 2**Tabel Hasil Pengujian Massa Jenis Uap**

- Minyak Kelapa Mentah

Pengujian	Massa Jenis Uap (gr/20ml)
I	0.056
II	0.06
III	0.058
IV	0.062
V	0.064

Rata Rata Massa Jenis Uap = 0,06 gr/20ml

- Minyak Kelapa non Gliserol

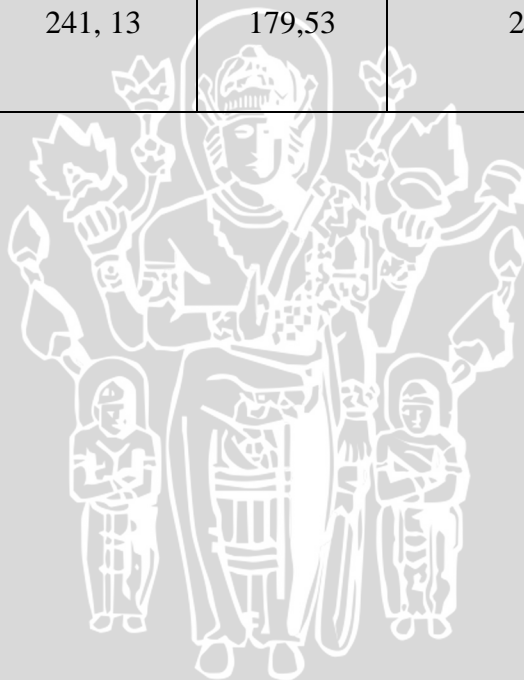
Pengujian	Massa Jenis Uap (gr/20ml)
I	0,114
II	0.11
III	0.113
IV	0.111
V	0.112

Rata Rata Massa Jenis Uap = 0,112 gr/20ml

Lampiran 3

Tabel Hasil Pengujian Massa Alir Bahan Bakar

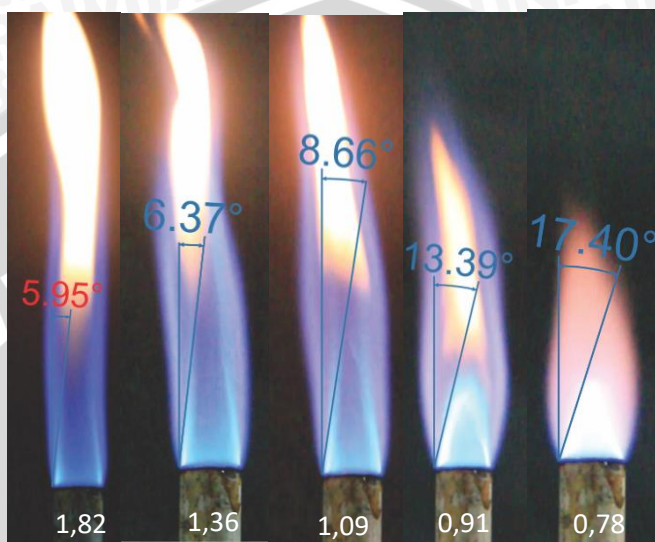
Bahan Bakar	Berat awal (gr)	Berat Akhir (gr)	Waktu penguapan (menit)	Massa Alir (gr/menit)
Minyak Kelapa Mentah	239, 55	188, 27	20	0.2564
Minyak Kelapa non Gliserol	241, 13	179,53	20	0.308



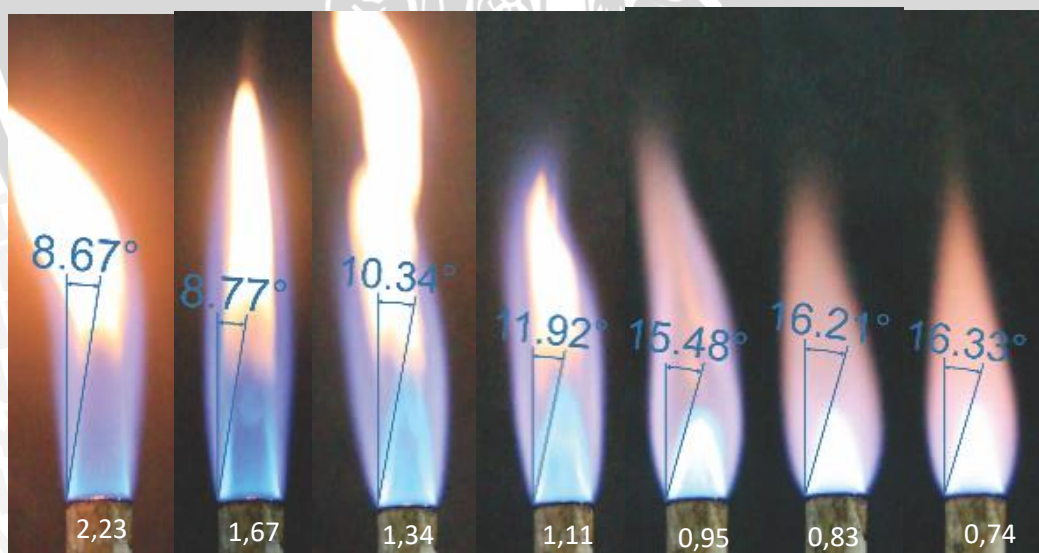
Lampiran 4

Visualisasi Nyala Api

Minyak Kelapa Mentah (*Crude Coconut Oil*)



Minyak Kelapa Non Gliserol



Lampiran 5

Tabel Data Hasil Perhitungan

Data Minyak Kelapa Mentah

debit(Q) udara (l/min)	AFR stoikiometri	AFR aktual	Equivalence Ratio (ϕ)	Sudut api (θ)	$\sin \theta$	V_U (cm/ sec)	S_L (cm/sec)
1.5	12.24507503	7.078783	1.729827679	5.95	0.103660539	47.70961	4.945604
2	12.24507503	9.438378	1.297370759	6.37	0.110948581	62.75553	6.962637
2.5	12.24507503	11.79797	1.037896608	8.66	0.150570685	77.80145	11.71462
3	12.24507503	14.15757	0.86491384	13.39	0.231578119	92.84737	21.50142
3.5	12.24507503	16.51716	0.74135472	17.4	0.299040792	107.89329	32.2645

Data Minyak Kelapa Non Gliserol

debit(Q) udara (l/min)	AFR stoikiometri	AFR aktual	Equivalence Ratio (ϕ)	Sudut api (θ)	$\sin \theta$	V_U (cm/ sec)	S_L (cm/sec)
1.5	12.28199468	5.892857	2.084217279	8.67	0.150743	46.79281	7.053699
2	12.28199468	7.857143	1.563162959	8.77	0.152468	61.83873	9.428451
2.5	12.28199468	9.821429	1.250530367	10.34	0.179489	76.88465	13.79995
3	12.28199468	11.78571	1.04210864	11.92	0.206546	91.93057	18.98787
3.5	12.28199468	13.75	0.893235977	15.48	0.266902	106.9765	28.55224
4	12.28199468	15.71429	0.78158148	16.21	0.279159	122.0224	34.06362
4.5	12.28199468	17.67857	0.694739093	16.33	0.281169	137.0683	38.5394

Lampiran 6

Tabel Data AFR (Air Fuel Ratio)

Data Minyak Kelapa Mentah

Reaktan	Rumus kimia	Mr	Massa (mg)	Mol	mol*C	mol*H	mol*O
Asam Mirstat	C ₁₄ H ₂₈ O ₂	228	2.5923	0.011369754	0.159176561	0.318353123	0.02274
Asam Palmiat	C ₁₆ H ₃₂ O ₂	256	2.5187	0.009838813	0.157421	0.314842	0.019678
Asam 8,11-oktadekadienoat	C ₁₈ H ₃₂ O ₂	280	1.2119	0.004328343	0.077910171	0.138506971	0.008657
Asam Oleat	C ₁₈ H ₃₄ O ₂	282	2.9195	0.010352794	0.186350298	0.351995007	0.020706
Asam Stearat	C ₁₈ H ₃₆ O ₂	284	0.3766	0.001325887	0.023865972	0.047731944	0.002652
Asam 11-eikosenoat	C ₂₀ H ₃₈ O ₂	310	0.0290	9.36774E-05	0.001873548	0.003559742	0.000187
Asam Arachidat	C ₂₀ H ₄₀ O ₂	312	0.1646	0.000527436	0.010548718	0.021097436	0.001055
Asam lignoserat	C ₂₄ H ₄₈ O ₂	368	0.0155	4.2087E-05	0.001010087	0.002020174	8.42E-05
Gliserol	C ₃ H ₈ O ₃	92	0.3200	0.003478261	0.010434783	0.027826087	0.010435
total				0.041357053	0.628591138	1,225932484	0.086192

$$\begin{aligned} \text{Nilai O}_2 \text{ yang dibutuhkan untuk pembakaran} &= \text{Jumlah mol*O produk} - \text{Jumlah mol*O reaktan} / 2 \\ &= (1.870148519 - 0.086192) / 2 \\ &= 0.891978 \end{aligned}$$

Produk	Mol	mol*C	mol*H	mol*O	Mol*N
CO ₂	0.628591138	0.628591138	0	1.257182277	0
H ₂ O	0.612966242	0	1.225932484	0.612966242	0
N ₂	3.353837567	0	0	0	3.353837567
Total		0.628591138	1.225932484	1.870148519	3.353837567

Data Minyak Kelapa Non Gliserol

Asam lemak	Rumus kimia	Mr	Massa (mg)	Mol	mol*C	mol*H	mol*O
Asam Mirstat	C ₁₄ H ₂₈ O ₂	228	2.6780	0.011745614	0.164438596	0.328877193	0.023491
Asam Palmiat	C ₁₆ H ₃₂ O ₂	256	2.6020	0.010164063	0.162625	0.32525	0.020328
Asam 8,11-oktadekadiolat	C ₁₈ H ₃₂ O ₂	280	1.2520	0.004471429	0.080485714	0.143085714	0.008943
Asam Oleat	C ₁₈ H ₃₄ O ₂	282	3.0160	0.010695035	0.192510638	0.363631206	0.02139
Asam Stearat	C ₁₈ H ₃₆ O ₂	284	0.3890	0.001369718	0.02465493	0.049309859	0.002739
Asam 11-eikosenolat	C ₂₀ H ₃₈ O ₂	310	0.0300	9.67742E-05	0.001935484	0.003677419	0.000194
Asam Arachidat	C ₂₀ H ₄₀ O ₂	312	0.0170	5.44872E-05	0.001089744	0.002179487	0.000109
Asam lignoserat	C ₂₄ H ₄₈ O ₂	368	0.0160	4.34783E-05	0.001043478	0.002086957	8.7E-05
total				0.038640599	0.628783584	1,218097835	0.077281

$$\begin{aligned} \text{Nilai O}_2 \text{ yang dibutuhkan untuk pembakaran} &= \text{Jumlah mol*O produk} - \text{Jumlah mol*O reaktan} / 2 \\ &= (1.866616086 - 0.077281) / 2 \\ &= 0.89467 \end{aligned}$$

Produk	Mol	mol*C	mol*H	mol*O	Mol*N
CO ₂	0.628783584	0.628783584	0	1.257567169	0
H ₂ O	0.609048918	0	1.225932484	0.609048918	0
N ₂	3.363949592	0	0	0	3.363949592
Total		0.628591138	1.225932484	1.866616086	3.363949592