

## LAMPIRAN

### Lampiran 1. Dokumentasi Foto Kegiatan Penelitian

- ⇒ Foto kegiatan Penelitian
  - Preparasi sampel



Sampel Mikroalga  
*Dunaliella* sp. 15 g

- Proses pembuatan saturasi garam



Proses pembuatan Saturasi garam

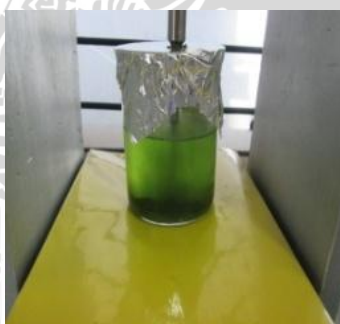
- Proses Ekstraksi Ultrasonik



Di tambahkan pelarut n- Heksan

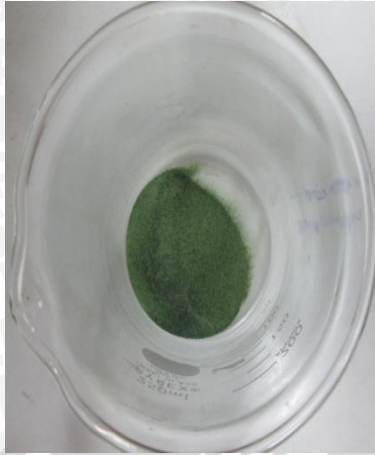


E ekstraksi Ultrasonik





- Proses Maserasi



Mikroalga *Dunaliella* sp. 15 g



Di tambahkan pelarut n- heksan



Ekstraksi maserasi

- Proses Ekstraksi pigmen



Proses sentrifuge





Proses filtrasi ekstrak



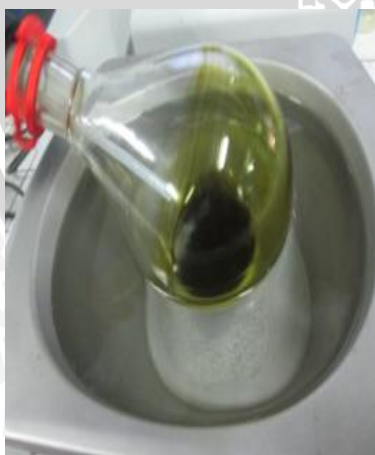
Proses fraksinasi (partisi)



Dyethyl ether dan Saturasi



Fase bawah di buang



Proses evaporasi



Fase atas di tampung







proses penguapan sisa pelarut dengan nitrogen



Di timbang 30 g ekstrak untuk isolasi

- Preparasi Kromatografi Kolom



Penimbangan silika gel 60 mesh



Di tambahkan Petroleum ether dan Aceton (1:10)



Pemasukan Silika Gel kedalam Kolom Kromatografi

- Isolasi Beta Karoten



Isolasi  $\beta$  karoten dengan kolom kromatografi







Isolat beta karoten



Proses penguapan dengan (N<sub>2</sub>)

- Uji Spektrofotometer Uv-Vis



Isolat standart  $\beta$  karoten

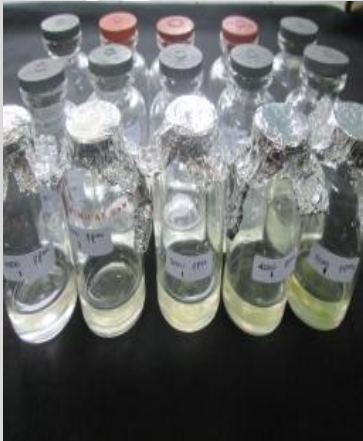


Dimasukkan kedalam Labu ukur 25 mL





Dilakukan pengenceran ( 8 ppm, 4 ppm, 2ppm, 1ppm, 0,5ppm, 0,25 ppm, 0,125 ppm)



Preparasi Spektrofotometri UV-Vis





Lampiran 2. Rata Rata Kadar air *Dunaliella* sp.

	U1	U2	U3	Rerata Kadar air
Berat sampel (g)	2,004	2,025	2,0019	
Berat Botol Timbang (g)	21,8482	22,9183	20,4568	
Berat Botol Timbang+Sampel Akhir (g)	23,6859	24,7743	22,2937	8,34
Kadar Air (%)	8,31	8,45	8,25	

$$\text{Kadar air (\%)} = \frac{(A + B) - (C)}{B} \times 100\%$$

$$\text{Kadar air U1} = \frac{(21,8482 + 2,004) - (23,6859)}{2,004} \times 100\% = 8,31\%$$

$$\text{Kadar air U2} = \frac{(22,9183 + 2,025) - (24,7743)}{2,025} \times 100\% = 8,45\%$$

$$\text{Kadar air U3} = \frac{(20,4568 + 2,0019) - (22,2937)}{2,0019} \times 100\% = 8,25\%$$

Lampiran 3. Data dan Analisis Ragam Ektrak *Dunaliella* Sp.

Perlakuan	Total Ekstrak Kasar			Total	STDEV	Rata-rata	
	U1	U2	U3				
U	U+K8	0,56	0,59	0,55	1,70	0,02	0,57
	U+K10	0,38	0,34	0,39	1,11	0,03	0,37
	U+K12	0,81	0,76	0,87	2,44	0,06	0,81
M	M+K8	0,38	0,31	0,32	1,01	0,04	0,34
	M+K10	0,43	0,48	0,46	1,37	0,03	0,46
	M+K12	0,45	0,48	0,51	1,44	0,03	0,48
<b>Total</b>		3,01	2,96	3,10	9,07		

**One-Sample Kolmogorov-Smirnov Test**

		Metode	Konsentrasi	Hasil
<b>N</b>		18	18	18
<b>Normal Parameters<sup>a</sup></b>	<b>Mean</b>	1,50	2,00	0,6661
	<b>Std. Deviation</b>	0,514	0,840	0,70909
<b>Most Extreme Differences</b>	<b>Absolute</b>	0,334	0,216	0,331
	<b>Positive</b>	0,334	0,216	0,331
	<b>Negative</b>	-0,334	-0,216	-0,308
<b>Kolmogorov-Smirnov Z</b>		1,419	0,918	1,406
<b>Asymp. Sig. (2-tailed)</b>		0,036	0,368	0,038
<b>a. Test distribution is Normal.</b>				

**Tests of Between-Subjects Effects**

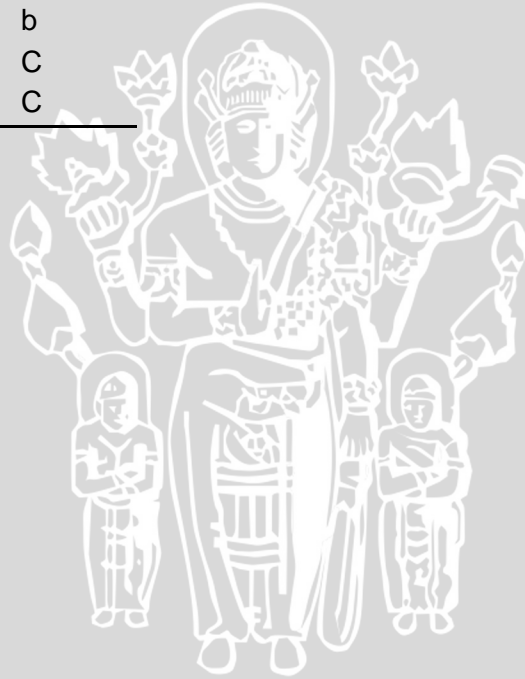
<b>Dependent Variable: Hasil</b>					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
<b>Corrected Model</b>	0,445 <sup>a</sup>	5	0,089	74.887	0,000
<b>Intercept</b>	4,570	1	4,570	3.844E3	0,000
<b>Metode</b>	0,114	1	0,114	95.556	0,000
<b>Konsentrasi</b>	0,188	2	0,094	79.014	0,000
<b>Metode * Konsentrasi</b>	0,144	2	0,072	60.425	0,000
<b>Error</b>	0,014	12	0,001		
<b>Total</b>	5,030	18			
<b>Corrected Total</b>	0,459	17			



$$UJD_{0,05} = \sqrt{\frac{KT \text{ Galat}}{\text{Ulangan}}} = \sqrt{\frac{0,001}{3}} = 0,019$$

Banyaknya perlakuan	Selangan	UJD <sub>0,05</sub>
2	0	3,635 x 0,019 = 0,068
3	1	3,749 x 0,019 = 0,070
4	2	3,796 x 0,019 = 0,071
5	3	3,814 x 0,019 = 0,071
6	4	3,814 x 0,019 = 0,071

Perlakuan	Rata rata	Notasi
M+K8	0,34	a
U+K10	0,37	a
M+K10	0,46	b
M+K12	0,48	b
U+K8	0,57	C
U+K12	0,81	C



Lampiran 4. Data dan Analisis Ragam Yield Ekstrak *Dunaliella* Sp.

Perlakuan	Berat sampel awal (g)	Ekstrak Kasar (g)			Yield Ekstrak Kasar (%)			Total	Rata-rata
		U1	U2	U3	U1	U2	U3		
U+K8	17	0,38	0,34	0,39	2,24	2,00	2,29	6,53	2,18
U+K10	17	0,56	0,59	0,55	3,29	3,47	3,24	10,00	3,33
U+K12	17	0,81	0,76	0,87	4,76	4,47	5,12	14,35	4,78
M+K8	17	0,38	0,31	0,32	2,24	1,82	1,88	5,94	1,98
M+K10	17	0,43	0,48	0,46	2,53	2,82	2,71	8,06	2,69
M+K12	17	0,45	0,48	0,51	2,65	2,82	3,00	8,47	2,82

**One-Sample Kolmogorov-Smirnov Test**

		Konsentrasi	Metode	Hasil
<b>N</b>		18	18	18
<b>Normal Parameters<sup>a</sup></b>	<b>Mean</b>	2.00	1.50	2.96
	<b>Std. Deviation</b>	0,840	0,514	0,966
<b>Most Extreme Differences</b>	<b>Absolute</b>	0,216	0,334	0,166
	<b>Positive</b>	0,216	0,334	0,166
	<b>Negative</b>	-0,216	-0,334	-0,118
<b>Kolmogorov-Smirnov Z</b>		0,918	1,419	0,706
<b>Asymp. Sig. (2-tailed)</b>		0,368	0,036	0,701
<b>a. Test distribution is Normal.</b>				

**Tests of Between-Subjects Effects**

**Dependent Variable: Hasil**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
<b>Corrected Model</b>	15,388	5	3,078	73,942	.000
<b>Intercept</b>	158,183	1	158,183	3.803	.000
<b>Konsentrasi</b>	8,947	2	4,473	107,478	.000
<b>Metode</b>	3,920	1	3,920	94,180	.000
<b>Konsentrasi * Metode</b>	2,521	2	1,261	30,287	.000
<b>Error</b>	0,499	12	0,042		
<b>Total</b>	174,070	18			
<b>Corrected Total</b>	15,888	17			



$$UJD_{0,05} = \sqrt{\frac{KT \text{ Galat}}{\text{Ulangan}}} = \sqrt{\frac{0,042}{3}} = 0,118$$

Banyaknya perlakuan	Selangan	UJD 0,05
2	0	$3,635 \times 0,118 = 0,430$
3	1	$3,749 \times 0,118 = 0,444$
4	2	$3,796 \times 0,118 = 0,449$
5	3	$3,814 \times 0,118 = 0,451$
6	4	$3,814 \times 0,118 = 0,451$

Perlakuan	Rata-rata	Notasi
M+K8	1,98	a
U+K8	2,18	a
M+K10	2,69	b
M+K12	2,82	b
U+k10	3,33	c
U+K12	4,78	d



Lampiran 5. Data dan Analisis Ragam Total Karotenoid *Dunaliella* Sp.

Perlakuan	Nilai Absorbansi			Berat ekstrak (g)			Total Karotenoid ekuivalen dengan standar $\beta$ -karoten/gram ekstrak			STD EV	Rata Rata	
	U1	U2	U3	U1	U2	U3	U1	U2	U3			
U	U+K8	0,208	0,210	0,198	0,21	0,21	0,22	5,62	5,67	5,13	0,30	5,47
	U+K10	0,235	0,250	0,233	0,22	0,21	0,20	5,99	6,64	6,54	0,35	6,39
	U+K12	0,285	0,301	0,294	0,22	0,21	0,23	7,16	7,89	7,05	0,46	7,36
M	M+K8	0,112	0,114	0,118	0,22	0,21	0,21	3,12	3,32	3,42	0,15	3,29
	M+K10	0,125	0,123	0,126	0,21	0,22	0,22	3,59	3,38	3,45	0,11	3,47
	M+K12	0,135	0,131	0,132	0,22	0,23	0,23	3,66	3,41	3,43	0,14	3,50

**One-Sample Kolmogorov-Smirnov Test**

	Metode	Konsentrasi	Hasil
<b>N</b>	18	18	18
<b>Normal Parameters<sup>a</sup></b>	<b>Mean</b>	1,50	2,00
	<b>Std. Deviation</b>	0,514	0,840
<b>Most Extreme Differences</b>	<b>Absolute</b>	0,334	0,216
	<b>Positive</b>	0,334	0,216
	<b>Negative</b>	-0,334	-0,216
<b>Kolmogorov-Smirnov Z</b>	1,419	0,918	1,167
<b>Asymp. Sig. (2-tailed)</b>	0,036	0,368	0,131

a. Test distribution is Normal.

**Tests of Between-Subjects Effects**

<b>Dependent Variable: Hasil</b>						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
<b>Corrected Model</b>	4,821	5	9,164	119,707	0,000	
<b>Intercept</b>	434,437	1	434,437	5,675	0,000	
<b>Konsentrasi</b>	3,374	2	1,687	22,036	0,000	
<b>Metode</b>	40,350	1	40,350	527,070	0,000	
<b>Konsentrasi * Metode</b>	2,097	2	1,048	13,696	0,001	
<b>Error</b>	0,919	12	0,077			
<b>Total</b>	481,177	18				
<b>Corrected Total</b>	46,740	17				



$$UJD_{0,05} = \sqrt{\frac{KT \text{ Galat}}{\text{Ulangan}}} = \sqrt{\frac{0,077}{3}} = 0,160$$

Banyaknya perlakuan	Selangan	UJD <sub>0,05</sub>
2	0	3,635 x 0,160 = 0,582
3	1	3,749 x 0,160 = 0,601
4	2	3,796 x 0,160 = 0,608
5	3	3,814 x 0,160 = 0,611
6	4	3,814 x 0,160 = 0,611

Perlakuan	Rata-rata	Notasi
M+K8	3,29	a
M+K10	3,47	a
M+K12	3,50	a
U+K8	5,47	b
U+k10	6,39	c
U+K12	7,36	d



## Lampiran 6. Data dan Analisis Ragam Yield $\beta$ -karoten *Dunaliella* Sp.

Perlakuan		Nilai Absorbansi			Berat $\beta$ -karoten (g)			Total $\beta$ -karoten(g)			Total $\beta$ -karoten ( $\mu$ g)ekuivalen dengan standar $\beta$ -karoten/gram ekstrak			Rata rata
		U1	U2	U3	U1	U2	U3	U1	U2	U3	U1	U2	U3	
U+K8	Botol 1	1,125	1,108	1,112	5,882	5,795	5,815	11,80	11,68	11,75	39,33	38,94	39,18	39,15
	Botol 2	1,132	1,126	1,136	5,918	5,887	5,938							
U+K10	Botol 1	1,206	1,218	1,207	6,297	6,359	6,303	12,26	12,36	12,15	61,31	61,82	60,77	61,30
	Botol 2	1,141	1,149	1,119	5,964	6,005	5,851							
U+K12	Botol 1	1,236	1,247	1,244	6,451	6,508	6,492	19,35	19,34	19,24	64,50	64,48	64,14	64,37
	Botol 2	1,232	1,222	1,214	6,431	6,379	6,338							
	Botol 3	1,239	1,237	1,228	6,467	6,456	6,410							
M+K8	Botol 1	1,543	1,552	1,574	8,026	8,072	8,185	8,03	8,07	8,18	26,75	26,91	27,28	26,98
M+K10	Botol 1	1,457	1,452	1,449	7,585	7,559	7,544	13,65	13,72	13,82	45,50	45,73	46,07	45,77
	Botol 2	0,543	0,563	0,583	2,897	3,000	3,103							
	Botol 3	0,596	0,594	0,597	3,169	3,159	3,174							
M+K12	Botol 1	1,824	1,828	1,838	9,467	9,487	9,538	20,51	20,65	20,53	68,38	68,82	68,44	68,55
	Botol 2	2,132	2,154	2,122	11,05	11,16	11							

### One-Sample Kolmogorov-Smirnov Test

	Metode	Konsentrasi	Hasil
<b>N</b>		18	18
<b>Normal Parameters<sup>a</sup></b>	<b>Mean</b>	1,50	2,00
	<b>Std. Deviation</b>	0,514	0,840
<b>Most Extreme Differences</b>	<b>Absolute</b>	0,334	0,216
	<b>Positive</b>	0,334	0,216
	<b>Negative</b>	-0,334	-0,216
<b>Kolmogorov-Smirnov Z</b>		1,419	0,918
<b>Asymp. Sig. (2-tailed)</b>		0,036	0,368
<b>a. Test distribution is Normal.</b>			



Tests of Between-Subjects Effects

Dependent Variable: Hasil

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	401,770	5	802,554	8,4723	0,000
Intercept	46853,707	1	46853,707	4,9465	0,000
Metode	276,830	1	276,830	2,9223	0,000
Konsentrasi	3402,555	2	1701,277	1,7964	0,000
Metode *	333,385	2	166,692	1,7603	0,000
Konsentrasi					
Error	1,137	12	0,095		
Total	50867,614	18			
Corrected Total	4013,907	17			

$$UJD_{0,05} = \sqrt{\frac{KT \text{ Galat}}{\text{Ulangan}}} = \sqrt{\frac{0,095}{3}} = 0,178$$

Banyaknya perlakuan	Selangan	UJD <sub>0,05</sub>
2	0	3,635 x 0,178 = 0,647
3	1	3,749 x 0,178 = 0,667
4	2	3,796 x 0,178 = 0,676
5	3	3,814 x 0,178 = 0,679
6	4	3,814 x 0,178 = 0,679

Perlakuan	Rata-rata	Notasi
M+K8	26,98	a
U+K8	39,15	b
M+K10	45,77	c
U+K10	61,30	d
U+K12	64,37	e
M+K12	68,55	f



Lampiran 7 Kurva Regresi Linier Standart  $\beta$ -Karoten

