LAMPIRAN

Lampiran 1. Determinasi Tanaman Rumput Laut *Kappaphycus alvarezii* Doty.

DEPARTEMEN BIOLOGI FARMASI
FAKULTAS FARMASI
UNIVERSITAS GADJAH MADA YOGYAKARTA
Alamat: Sekip Utara Jl. Kaliurang Km 4, Yogyakarta 55281
Telp. , 0274.649.2568 Fax. +274-543120

SURAT KETERANGAN
No.: BF/18 / Ident /IV/2016

Kepada Yth. :
Sdri/Sdr. Luh Ade Dyah Tantri Lestari
NIM . 1208505032
Fakultas MIPA Univ. UDAYANA
Di Bali

Dengan hormat,

Bersama ini kami sampaikan hasil identifikasi sampel alga yang Saudara kirimkan ke Departemen Biologi Farmasi, Fakultas Farmasi UGM, adalah :

No.Pendaftaran	Jenis	Suku
118	*Kappaphycus alvarezii* (Doty) Doty ex Silva Sinonim : *Eucheuma cottonii* Weber- van Bosse	Solieriaceae

Demikian, semoga dapat digunakan sebagaimana mestinya.

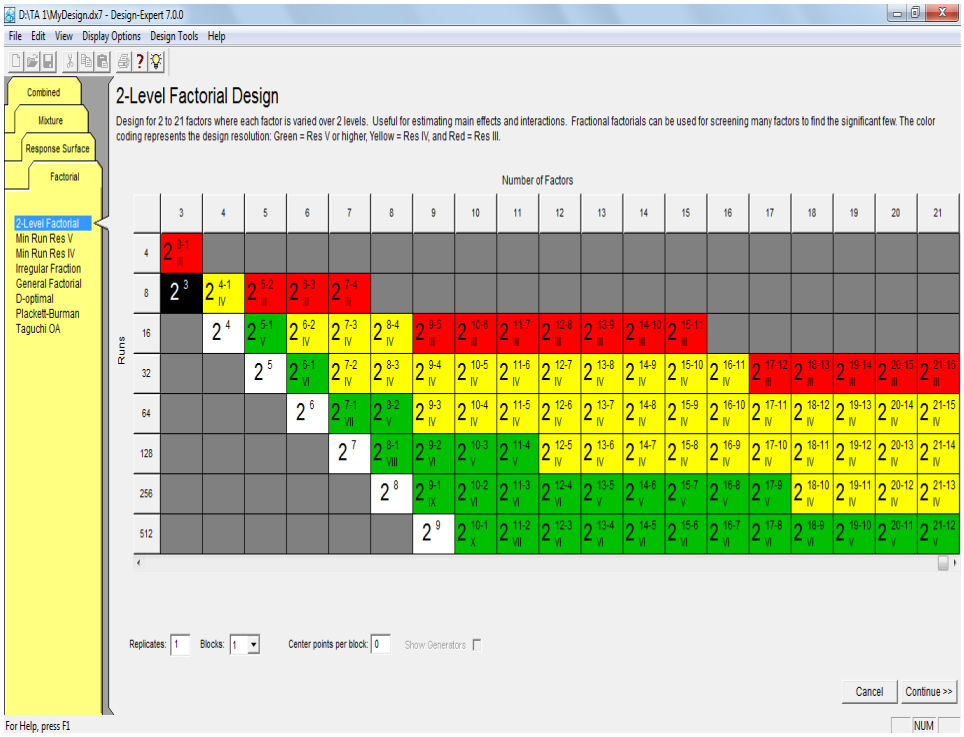
Yogyakarta, 25 April 2016
Ketua

Dr.rer.nat. Triana Hertiani, M.Si., Apt.
NIP. 197306091998032003

Lampiran 2. Tahapan Pengolahan Data dalam Design Expert Version 7.0.0

Tahapan input faktor dalam software Design Expert Version 7.0.0 adalah sebagai berikut:

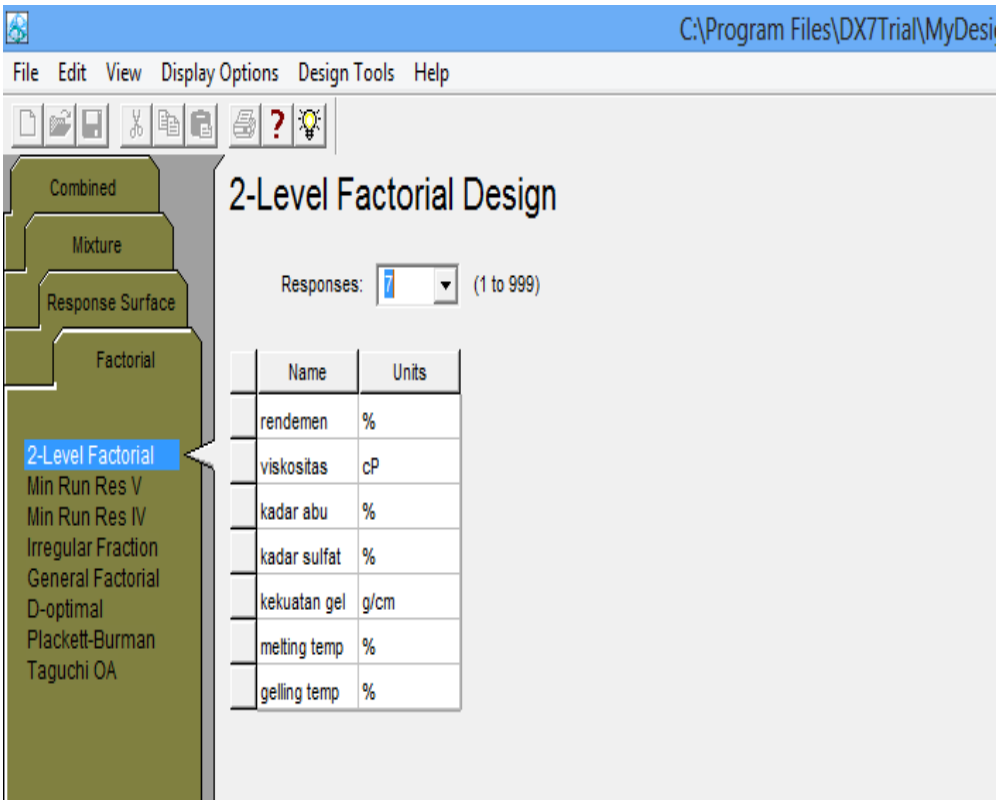
1. Dibuka aplikasi Design Expert Version 7.0.0, hingga muncul homepage berikut ini. Dipilih level factorial 2^3 karena variabel yang digunakan sebanyak tiga jenis



2. Diinput variabel yang divariasikan dalam penelitian ini (konsentrasi KOH, waktu ekstraksi, waktu presipitasi dengan KCl 5%)

Std	Run	Block	Factor 1 A:konsentrasi	Factor 2 B:waktu ekstra	Factor 3 C:waktu presip	Response 1 Rendemen %	Respons Viskosit cP
5	1	Block 1	5.00	1.00	1.00		
7	2	Block 1	5.00	3.00	1.00		
1	3	Block 1	5.00	1.00	0.50		
2	4	Block 1	10.00	1.00	0.50		
8	5	Block 1	10.00	3.00	1.00		
3	6	Block 1	5.00	3.00	0.50		
4	7	Block 1	10.00	3.00	0.50		
6	8	Block 1	10.00	1.00	1.00		

3. Diinput respon yang akan dianalisis dalam penelitian ini



4. Akan muncul optimasi formula seperti dibawah ini

Solutions

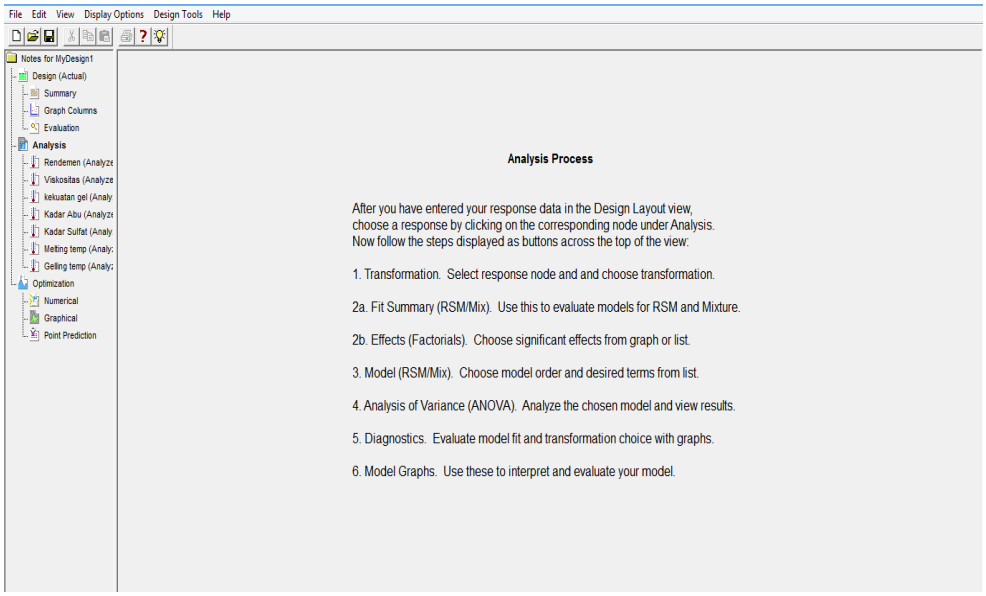
Number	konsentrasi K	waktu ekstrak	waktu presipit	Rendemen	Viskositas	kekuatan gel	Kadar Abu	Kadar Sulfat	Melting temp	Gelling temp	Desirability	
1	5.13	1.65	0.96	25.0001	5.3349	568.67	15	33.8466	90.6	46.8579	0.715	Selected
2	5.14	1.65	0.96	25.0845	5.33601	568.48	15.0023	33.8462	90.6	46.8485	0.715	
3	5.14	1.64	0.96	25.0002	5.3381	568.379	15.0346	33.8532	90.6	46.8482	0.715	

5. Dimasukkan nilai hasil evaluasi fisika dan kimia karagenan

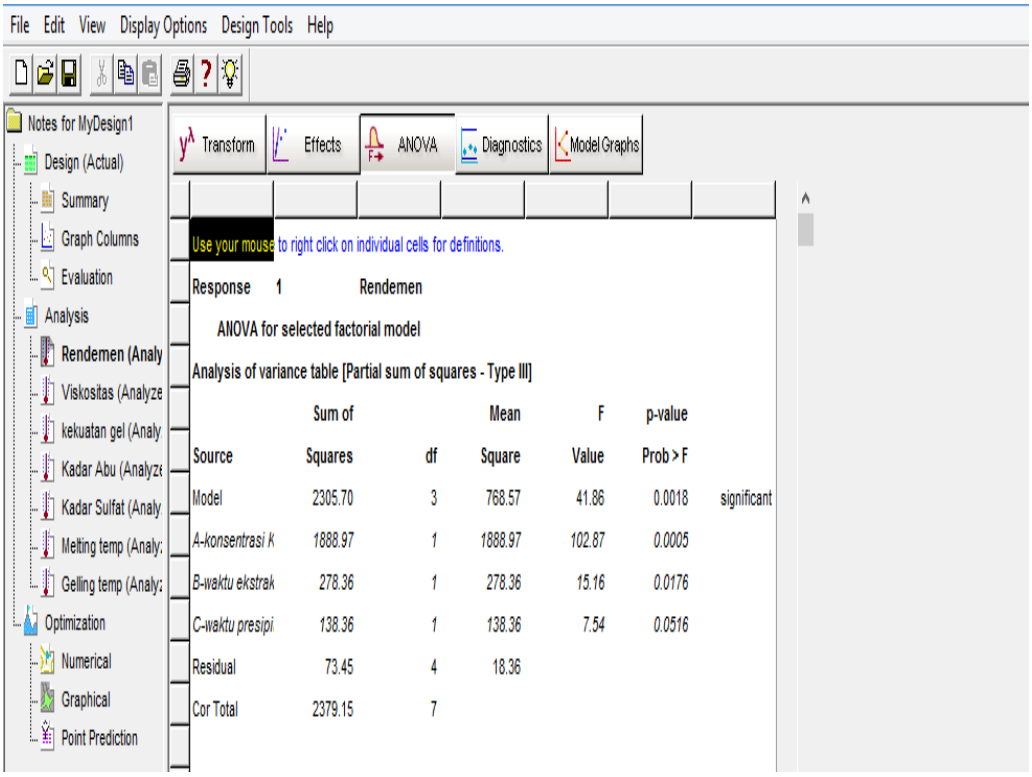
Notes for MyDesign1
- Design (Actual)
  - Summary
  - Graph Columns
  - Evaluation
- Analysis
  - Rendemen (Analyze
  - Viskositas (Analyze
  - kekuatan gel (Analy
  - Kadar Abu (Analyze
  - Kadar Sulfat (Analy
  - Melting temp (Analy:
  - Gelling temp (Analy:
- Optimization
  - Numerical
  - Graphical
  - Point Prediction

Std	Run	Block	Factor 1 A:konsentrasi	Factor 2 B:waktu ekstra	Factor 3 C:waktu presip	Response 1 Rendemen %	Response 2 Viskositas cP	Response 3 kekuatan gel g/cm2	Response 4 Kadar Abu %	Response 5 Kadar Sulfat %	Response 6 Melting temp C	Response 7 Gelling temp C
5	1	Block 1	5.00	1.00	1.00	20.92	5.8	536.14	18.89	34.71	90.1	46
7	2	Block 1	5.00	3.00	1.00	28.92	4.2	742.82	6.98	32.16	90.6	52
1	3	Block 1	5.00	1.00	0.50	15.03	6.6	362.01	21	34.92	90	40
2	4	Block 1	10.00	1.00	0.50	37.71	9.18	142.8	48.89	39.15	78.5	32
8	5	Block 1	10.00	3.00	1.00	64.05	7.46	212.03	24.26	35.14	89.6	34
3	6	Block 1	5.00	3.00	0.50	26.34	4.6	642.61	11.47	33.26	90.4	50
4	7	Block 1	10.00	3.00	0.50	56.96	8.22	194.16	32	35.76	80.1	32
6	8	Block 1	10.00	1.00	1.00	55.42	8.38	174.12	39.17	37.08	79.4	32

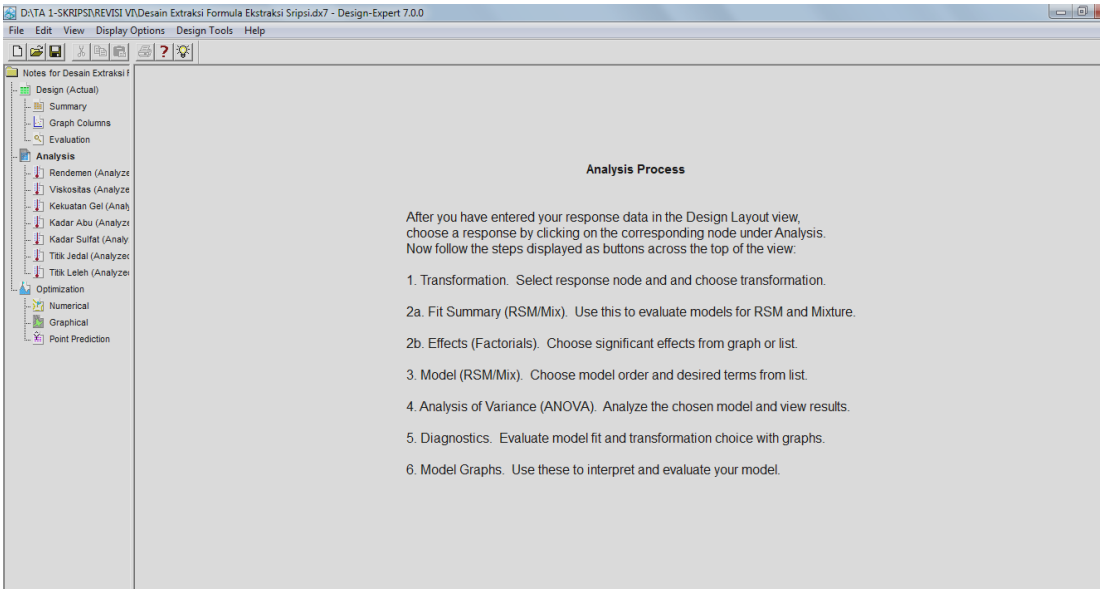
6. Dilakukan analisa ANOVA tiap respon



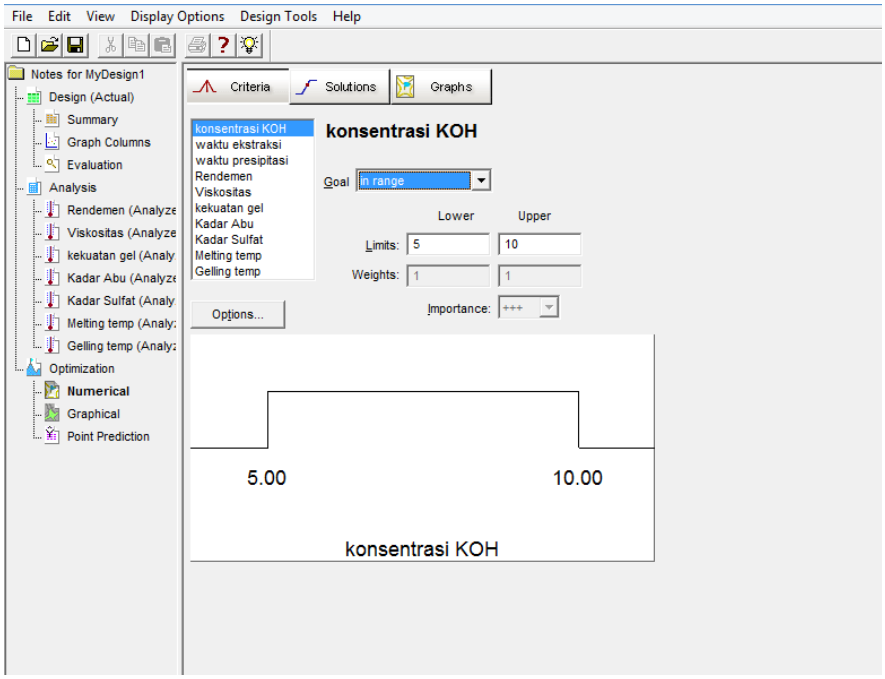
7. Hasil analisa ANOVA one way salah satu respon



8. Menentukan formula optimum



9. Memasukkan nilai respon yang diharapkan



10. Hasil formula Optimum

Solutions

Number	konsentrasi K	waktu ekstrak	waktu presipit	Rendemen	Viskositas	kekuatan gel	Kadar Abu	Kadar Sulfat	Melting temp	Gelling temp	Desirability	
1	5.13	1.65	0.96	25.0001	5.3349	568.67	15	33.8466	90.6	46.8579	0.715	Selected
2	5.14	1.65	0.96	25.0845	5.33601	568.48	15.0023	33.8462	90.6	46.8485	0.715	
3	5.14	1.64	0.96	25.0002	5.3381	568.379	15.0346	33.8532	90.6	46.8482	0.715	

Lampiran 3. Hasil Evaluasi Optimasi Metode Isolasi Karagenan dari Rumput Laut *Kappaphycus alvarezii* Doty.

a. Rendemen

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Rendemen (%)
F1	5	1	1	20,92
F2	5	3	1	28,92
F3	5	1	0,5	15,03
F4	10	1	0,5	37,71
F5	10	3	1,0	64,05
F6	5	3	0,5	26,34
F7	10	3	0,5	56,96
F8	10	1	1,0	55,42

b. Viskositas

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Viskositas (Cp)
F1	5	1	1	5,8
F2	5	3	1	4,2
F3	5	1	0,5	6,6
F4	10	1	0,5	9,18
F5	10	3	1,0	7,46
F6	5	3	0,5	4,6
F7	10	3	0,5	8,22
F8	10	1	1,0	8,38

c. Kekuatan Gel

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Kkekuatan Gel (g/cm^2)
F1	5	1	1	536,14
F2	5	3	1	742,82
F3	5	1	0,5	362,01
F4	10	1	0,5	142,8
F5	10	3	1,0	212,03
F6	5	3	0,5	642,61
F7	10	3	0,5	194,16
F8	10	1	1,0	174,12

d. Kadar Abu

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Kadar Abu (%)
F1	5	1	1	18,89
F2	5	3	1	6,98
F3	5	1	0,5	21
F4	10	1	0,5	48,89
F5	10	3	1,0	24,26
F6	5	3	0,5	11,47
F7	10	3	0,5	32
F8	10	1	1,0	39,17

e. Kadar Sulfat

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Kadar Sulfat (%)
F1	5	1	1	34,71
F2	5	3	1	32,16
F3	5	1	0,5	34,92
F4	10	1	0,5	39,15
F5	10	3	1,0	35,14
F6	5	3	0,5	33,26
F7	10	3	0,5	35,76
F8	10	1	1,0	37,08

f. Melting temperature

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Melting temp. (^{0}C)
F1	5	1	1	90,1
F2	5	3	1	90,6
F3	5	1	0,5	90
F4	10	1	0,5	78,5
F5	10	3	1,0	89,6
F6	5	3	0,5	90,4
F7	10	3	0,5	80,1
F8	10	1	1,0	79,4

g. Gelling temperature

Formula	Konsentrasi KOH (%)	Waktu Ekstraksi (jam)	Waktu Presipitasi (jam)	Gelling temp. (^{0}C)
F1	5	1	1	46
F2	5	3	1	52
F3	5	1	0,5	40
F4	10	1	0,5	32
F5	10	3	1,0	34
F6	5	3	0,5	50
F7	10	3	0,5	32
F8	10	1	1,0	32

Lampiran 4. Output ANOVA *One Way* pada Program *Design Expert* 7.0.0 untuk Hasil Evaluasi Optimasi Metode Isolasi Karagenan

a. Rendemen

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 1 Rendemen

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	2305.70	3	768.57	41.86	0.0018	significant
A-konsentrasi K	*1888.97*	*1*	*1888.97*	*102.87*	*0.0005*	
B-waktu ekstrak	*278.36*	*1*	*278.36*	*15.16*	*0.0176*	
C-waktu presipi	*138.36*	*1*	*138.36*	*7.54*	*0.0516*	
Residual	73.45	4	18.36			
Cor Total	2379.15	7				

The Model F-value of 41.86 implies the model is significant. There is only a 0.18% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant. In this case A, B are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	4.29	R-Squared	0.9691
Mean	38.17	Adj R-Squared	0.9460
C.V. %	11.23	Pred R-Squared	0.8765
PRESS	293.80	Adeq Precision	16.781

b. Viskositas

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 2 Viskositas

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	22.83	3	7.61	71.38	0.0006	significant
A-konsentrasi K	*18.12*	*1*	*18.12*	*169.98*	*0.0002*	
B-waktu ekstrak	*3.75*	*1*	*3.75*	*35.21*	*0.0040*	
C-waktu presipi	*0.95*	*1*	*0.95*	*8.93*	*0.0404*	
Residual	0.43	4	0.11			
Cor Total	23.25	7				

The Model F-value of 71.38 implies the model is significant. There is only a 0.06% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant. In this case A, B, C are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	0.33	R-Squared	0.9817
Mean	6.81	Adj R-Squared	0.9679
C.V. %	4.80	Pred R-Squared	0.9266
PRESS	1.71	Adeq Precision	21.961

c. Kekuatan Gel

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 3 kekuatan gel

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	3.590E+005	3	1.197E+005	17.38	0.0093	significant
A-konsentrasi K	*3.044E+005*	*1*	*3.044E+005*	*44.19*	*0.0027*	
B-waktu ekstrak	*41551.24*	*1*	*41551.24*	*6.03*	*0.0700*	
C-waktu presipi	*13083.96*	*1*	*13083.96*	*1.90*	*0.2402*	
Residual	27549.33	4	6887.33			
Cor Total	3.866E+005	7				

The Model F-value of 17.38 implies the model is significant. There is only a 0.93% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant. In this case A are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	82.99	R-Squared	0.9287
Mean	375.84	Adj R-Squared	0.8753
C.V. %	22.08	Pred R-Squared	0.7149
PRESS	1.102E+005	Adeq Precision	10.482

d. Kadar Abu

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 4 Kadar Abu

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	1350.74	3	450.25	58.94	0.0009	significant
A-konsentrasi K	*924.07*	*1*	*924.07*	*120.97*	*0.0004*	
B-waktu ekstrak	*354.31*	*1*	*354.31*	*46.38*	*0.0024*	
C-waktu presipi	*72.36*	*1*	*72.36*	*9.47*	*0.0370*	
Residual	30.55	4	7.64			
Cor Total	1381.30	7				

The Model F-value of 58.94 implies the model is significant. There is only a 0.09% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant. In this case A, B, C are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	2.76	R-Squared	0.9779
Mean	25.33	Adj R-Squared	0.9613
C.V. %	10.91	Pred R-Squared	0.9115
PRESS	122.22	Adeq Precision	20.887

e. Kadar sulfat

Use your mouse to right click on individual cells for definitions.

Response 5 Kadar Sulfat

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	31.62	3	10.54	37.69	0.0022	significant
A-konsentrasi K	*18.24*	*1*	*18.24*	*65.23*	*0.0013*	
B-waktu ekstrak	*11.38*	*1*	*11.38*	*40.68*	*0.0031*	
C-waktu presipi	*2.00*	*1*	*2.00*	*7.15*	*0.0556*	
Residual	1.12	4	0.28			
Cor Total	32.74	7				

The Model F-value of 37.69 implies the model is significant. There is only a 0.22% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.
In this case A, B are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	0.53	R-Squared	0.9658
Mean	35.27	Adj R-Squared	0.9402
C.V. %	1.50	Pred R-Squared	0.8633
PRESS	4.47	Adeq Precision	17.130

f. Melting temperature

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 6 Melting temp

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	174.75	3	58.25	5.05	0.0758	not significant
A-konsentrasi K	*140.28*	*1*	*140.28*	*12.17*	*0.0251*	
B-waktu ekstrak	*20.16*	*1*	*20.16*	*1.75*	*0.2565*	
C-waktu presipi	*14.31*	*1*	*14.31*	*1.24*	*0.3275*	
Residual	46.10	4	11.52			
Cor Total	220.85	7				

The Model F-value of 5.05 implies there is a 7.58% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.
In this case A are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	3.39	R-Squared	0.7913
Mean	86.09	Adj R-Squared	0.6347
C.V. %	3.94	Pred R-Squared	0.1651
PRESS	184.38	Adeq Precision	5.926

g. Gelling temperature

Transform | Effects | ANOVA | Diagnostics | Model Graphs

Use your mouse to right click on individual cells for definitions.

Response 7 Gelling temp

ANOVA for selected factorial model

Analysis of variance table [Partial sum of squares - Type III]

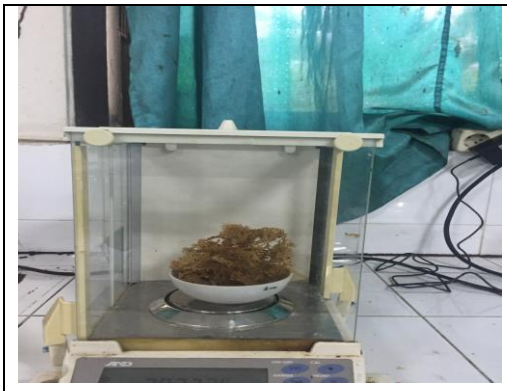
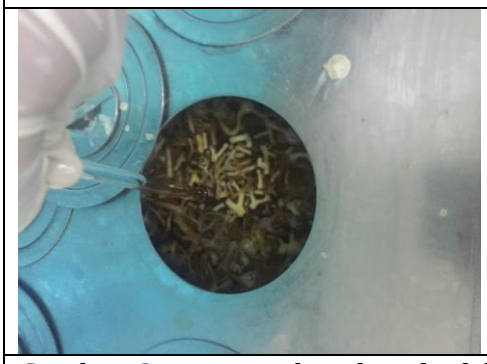
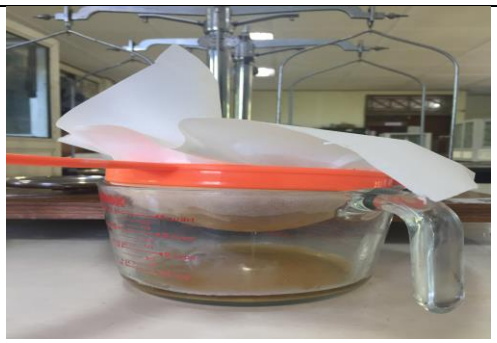
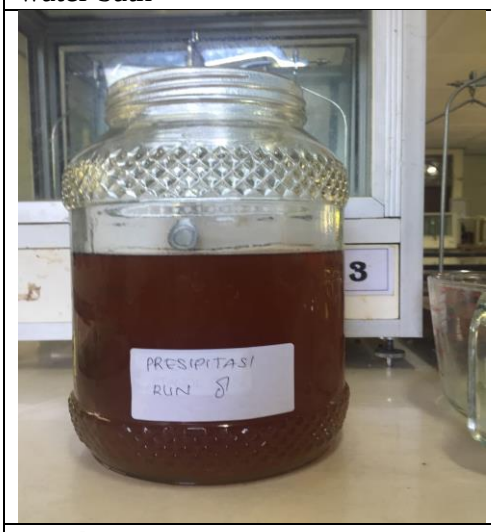
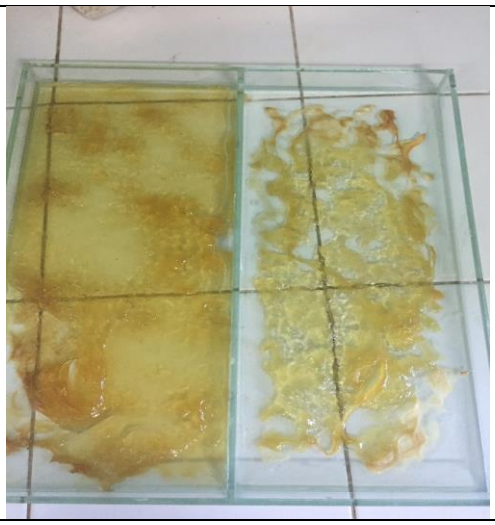
Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	473.50	3	157.83	18.57	0.0082	significant
A-konsentrasi K	*420.50*	*1*	*420.50*	*49.47*	*0.0022*	
B-waktu ekstrak	*40.50*	*1*	*40.50*	*4.76*	*0.0944*	
C-waktu presipi	*12.50*	*1*	*12.50*	*1.47*	*0.2920*	
Residual	34.00	4	8.50			
Cor Total	507.50	7				

The Model F-value of 18.57 implies the model is significant. There is only a 0.82% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.
In this case A are significant model terms.
Values greater than 0.1000 indicate the model terms are not significant.
If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	2.92	R-Squared	0.9330
Mean	39.75	Adj R-Squared	0.8828
C.V. %	7.33	Pred R-Squared	0.7320
PRESS	136.00	Adeq Precision	10.429

Lampiran 5. Gambar Proses Isolasi Karagenan dari *Kappaphycus alvarezii* Doty.

	
Gambar 1. Proses penimbangan rumput laut	Gambar 2. Proses perendaman rumput laut menggunakan aquades selama 30 menit
	
Gambar 3. Proses ekstraksi di dalam water bath	Gambar 4. Proses penyaringan setelah ekstraksi
	
Gambar 5. Proses presipitasi	Gambar 6. Hasil presipitasi yang siap dikeringkan di dalam oven

Gambar 7. Serat karagenan hasil pengeringan

Gambar 8. Serbuk karagenan

Gambar 9. Uji Kadar air serbuk karagenan

Gambar.10 Proses penimbangan hasil rendemen

Gambar 11. Proses uji viskositas

Gambar 12. Uji Kekuatan Gel

Gambar 13. Uji Gelling Temperature	Gambar 14. Uji Melting Temperature
Gambar 15. Uji Kadar Abu	Gambar 16. Uji Kadar Sulfat