BAB V

KESIMPULAN DAN SARAN

A. Kesimpulan

Kombinasi proporsi bahan pengisi manitol dan pengikat *microcrystalline cellulose* mempengaruhi sifat fisik granul dan tablet pada *orally disintegrating tablet* ibuprofen.

Campuran bahan pengisi manitol sebesar 67% dan pengikat *microcrystalline cellulose* sebesar 33% memberikan hasil optimal pada sifat fisik granul dan menghasilkan *orally disintegrating tablet* ibuprofen yang memenuhi syarat.

B. Saran

Perlu dilakukan penelitian lebih lanjut dalam optimasi formula *orally disintegrating tablet* ibuprofen dengan menggunakan bahan pengikat lain untuk mengetahui pengaruhnya.

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Lampiran 1. Sertifikat analisis ibuprofen

PT IFARS PHARMACEUTICAL LABORATORIES

Jl. Raya Solo - Sragen Km. 14,9 Karanganyar - Solo 57762 INDONESIA

Telp. (0271) 8200888 (Hunting) Fax. (0271) 656230
email : general@ifars.co.id website : www.ifars.co.id

Nomor : IF/III/2014/21.017/022
Lamp. : 1 lembar
Hal : Bahan baku Ibuprofen

Surakarta, 13 Maret 2014

Kepada Yth. :
Dekan Fakultas Farmasi
Universitas Setia Budi
Jl. Let. Jend. Sutoyo
Solo 57127

Dengan hormat,

Bersama ini kami kirimkan bahan baku Ibuprofen sebanyak 20 g (dua puluh gram) beserta foto copy Certificate of Analysis untuk mahasiswa atas nama Yessy Agustriani P. (16103002 A), Yuli Widyastuti (16103005 A) dan Nisa'ul Budi M. (16103028 A) sebagaimana tercantum dalam surat saudara nomor : 794/A10-4/16.12.2013 pada tanggal 16 Desember 2013.

Demikian agar dapat diterima dan diteruskan kepada mahasiswa yang bersangkutan.

Hormat kami,
PT IFARS Pharmaceutical Laboratories
Penanggung Jawab Produksi

PT IFARS
PHARMACEUTICAL LABORATORIES
SURAKARTA - INDONESIA

Dra. Agustini, Apt.

湖北百科格莱制药有限公司

HUBEI GRANULES-BIOCAUSE PHARMACEUTICAL CO., LTD

Certificate of Analysis

No.:132893

Product: Ibuprofen (45Grade) Test Standard: BP2012

Batch#:C100-1310352M Quantity: 950kg

Manufacturing Date:2013.10.30 Testing Date:2013.10.31

Expiry Date:2018.10.29

Items	Specifications	Results
Characteristics	White Crystalline Powder	Conforms
Solubility	Practically insoluble in water, freely soluble in acetone, in methanol and in methylene chloride. It dissolves in dilute solutions of alkali hydroxides and carbonates	Conforms
Identification	A. Melting Point: 75.0 ~ 78.0℃	75.3-76.4℃
	C. IR Spectral Match	Conforms
Optical Rotation	-0.05° ~ +0.05°	0.00°
Appearance of Solution	Clear and Colorless	Conforms
Related Substances	2-[3-(2-methylpropyl)phenyl]propanoic acid(impurity A): not more than 0.15%	0.02%
	2-[4-(2-methylpropanoyl)phenyl]propanoic acid(impurity J): not more than 0.15%	Not detected
	2-(4-methylphenyl)propanoic acid(impurity D): not more than 0.05%	Not detected
	2-(4-ethylphenyl)propanoic acid(impurity N): not more than 0.15%	0.01%
	2-(4-propylphenyl)propanoic acid: not more than 0.05%	0.01%
	2-(4-butylphenyl)propanoic acid(impurity B): not more than 0.05%	Not detected
	Any unknown impurity: not more than 0.05%	0.03%
	Total impurities: not more than 0.2%	0.07%
Heavy Metals	Not More Than 10ppm	<10ppm
Loss on Drying	Not More Than 0.5%	0.15%
Sulfated Ash	Not More Than 0.1%	0.01%
Assay(Dry Basis)	98.5 ~ 101.0%	99.9%
Residual solvents (Petroleum ether)	Not more than 250ppm	101ppm
ADDITIONAL TESTS		
Bulk Density	0.20-0.50g/ml	0.29g/ml
Tapped Density	0.40-0.70g/ml	0.51g/ml
Median Particle Size	30-60μm	40.1um

Conclusion: The product meets BP2012 specifications.

*Note: The test for impurity F described in the monograph is not necessary since this impurity cannot be present with the route of synthesis used.

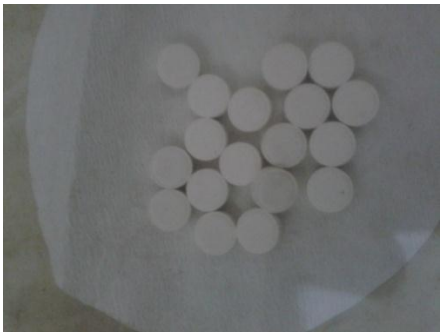
QC supervisor: 曹晓燕 Cao Xiao Yan Checked by: 胡士风 Hu Shi Feng Analyst(s): [illegible] Zeng Meng Jia Ye Jin Meng Ye Jian Fei Gao Guo Ling Tang Shi Fang Yang Jia Chen Kang

Site of production: Hubei Granules-Biocause pharmaceutical CO.,LTD

122 Yangwan Road China-448000 Jingmen City Hubei Province

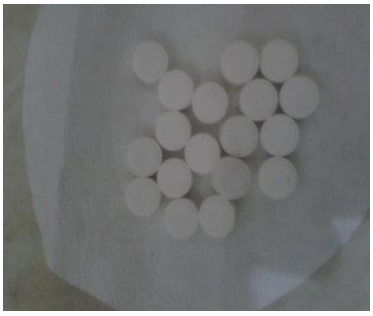
Lampiran 2. Foto granul dan tablet *orally disintegrating tablet* ibuprofen

Granul Formula I



Tablet Formula I

Granul Formula II



Tablet Formula II

Granul Formula III

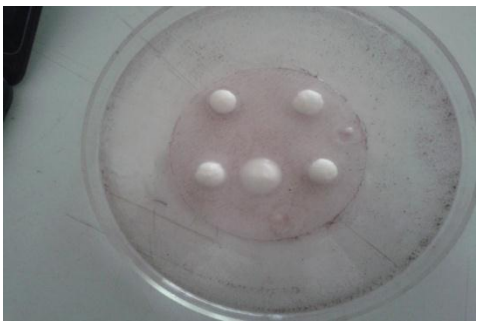
Tablet Formula III

Granul Formula optimum

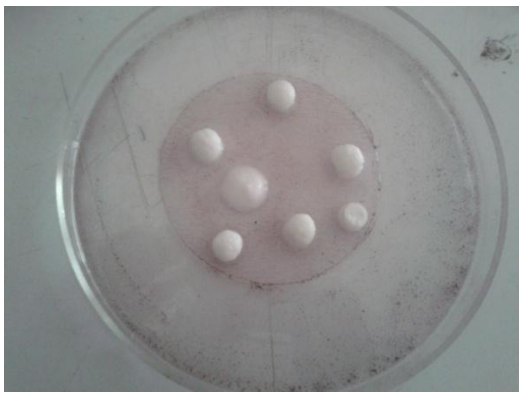
Tablet Formula optimum

Lampiran 3. Foto uji waktu pembasahan *orally disintegrating tablet* ibuprofen pada berbagai formula

Formula I



Formula II



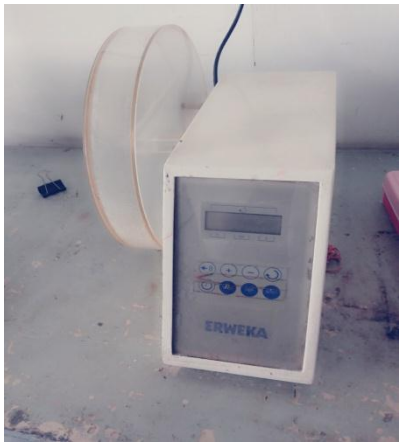
Formula III

Formula Optimum

Lampiran 4. Alat yang digunakan

Alat pencetak tablet

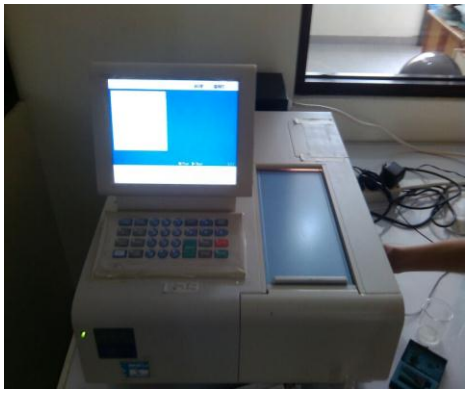
Hardness tester



Friability tester

disintegration tester

Dissolution tester



Spectrofotometer Uv-Vis

Lampiran 5. Hasil uji waktu alir granul

Replikasi	Berat granul (g)	Waktu alir		
		Formula 1	Formula 2	Formula 3
1	100	4.21	5.23	7.21
2	100	4.23	5.37	7.37
3	100	4.35	5.38	7.27
X		4.2633	5.3267	7.2833
SD		0.0757	0.0839	0.0808

Keterangan:
X = purata percobaan
SD = simpangan baku

Lampiran 6. Hasil uji daya serap air

Replikasi	Berat granul (g)	Daya serap air		
		Formula 1	Formula 2	Formula 3
1	100	0.762	0.862	0.982
2	100	0.732	0.845	0.992
3	100	0.754	0.857	0.978
X		0.7493	0.8547	0.984
SD		0.0155	0.0084	0.0072

Keterangan:
X = purata percobaan
SD = simpangan baku

Lampiran 7. Hasil uji kekerasan tablet

Replikasi	Formula 1	Formula 2	Formula 3
1	6.1	7	8
2	6	7.5	7.5
3	6.3	7.3	8
X	6.13	7.267	7.83
SD	0.1527	0.2517	0.2887

Keterangan:
X = purata percobaan
SD = simpangan baku

Lampiran 8. Hasil uji kerapuhan tablet

	Kerapuhan tablet		
	Formula 1	Formula 2	Formula 3
Berat awal (g)	3.932	3.934	3.971
Berat akhir (g)	3.895	3.921	3.945
% Kerapuhan	0.94%	0.74%	0,65%

Keterangan:
X = purata percobaan
SD = simpangan baku

Contoh Perhitungan

$$\% \text{ Kerapuhan} = \frac{Berat\ awal(g) - berat\ akhir(g)}{Berat\ awal\ (g)} \times 100\%$$

$$= \frac{3.932 - 3.895}{3.932} \times 100\%$$

$$= 0.94\%$$

Lampiran 9. Hasil uji keseragaman bobot tablet

No	Keseragaman bobot (mg)		
	Formula 1	Formula 2	Formula 3
1	195	202	202
2	200	203	196
3	196	200	194
4	201	206	195
5	203	201	195
6	214	199	197
7	198	198	201
8	198	199	189
9	199	202	194
10	187	200	192
11	192	201	199
12	194	195	201
13	193	197	197
14	199	199	205
15	198	201	197
16	202	200	199
17	196	199	207
18	199	202	200
19	183	200	197
20	192	205	201
X	196.95	200.45	197.9
SD	6.3534	2.5438	4.3152
CV	3.23%	1.269%	2.18%

Keterangan:
X = purata percobaan
SD = simpangan baku
CV = *coefficient of variation*

Hasil perhitungan rentang keseragaman bobot:

formula	Kolom A	Kolom B
1	190.23 – 219.77	175.46 – 234.54
2	189.97 – 220.03	174.93 – 235.07
3	190.16 – 219.84	175.32 – 234.68
Bobot sebenarnya(205mg)	189.625 – 220.375	174.25 – 235.75

Keterangan:
Kolom A = penyimpangan 7.5% dari bobot rata-ratanya
Kolom B = penyimpangan 15% dari bobot rata-ratanya

Lampiran 10. Waktu hancur tablet

Replikasi	Waktu hancur (s)		
	Formula 1	Formula 2	Formula 3
1	21	42	51
2	22	43	53
3	23	45	55
X	22	43.33	53
SD	1	1.5275	2

Keterangan:
X = purata percobaan
SD = simpangan baku

Lampiran 11. Waktu pembasahan tablet

Replikasi	Waktu pembasahan (s)		
	Formula 1	Formula 2	Formula 3
1	17	16	21
2	14	19	20
3	15	17	23
X	15.33	17.33	21.33
SD	1.5275	1.5275	1.5275

Keterangan:
X = purata percobaan
SD = simpangan baku

Lampiran 12. Pembuatan dapar fosfat pH 6,4

KH_2PO_4 (0,2 N)

$$M = \frac{n}{v}$$

$$0{,}2 = \frac{n}{0{,}05}$$

$$n = 0{,}01\ mol$$

Massa = n x BM

= 0,01 x 136

= 1,36 gram (dalam 200 ml dapar)

Massa dalam 1liter dapar = 1,36 x 5

= 6,8 gram

NaOH (0,2 N)

M = 0,2 x valensi

= 0,2 x 1

= 0,2 mol

n= M x 0,0116

= 0,00232 mol

Massa = n x BM

= 0,00232 x 40

=0,0928 gram (dalam 200 ml dapar)

Massa 1 liter dapar = 0,0928 x 5

= 0.464 gram

Lampiran 13. Penentuan panjang gelombang, pentuan kurva baku

a. Penentuan panjang gelombang maksimum

Panjang gelombang (nm)	Absorbansi
200	1.704
205	0.964
210	0.724
215	0.730
220	0.852
225	**0.856**
230	0.495
235	0.169
240	0.055
245	0.046
250	0.051
255	0.059
260	0.065
265	0.072
270	0.061
275	0.054
280	0.040
285	0.038
290	0.038
295	0.038
300	0.037

Panjang gelombang maksimum ibuprofen adalah 222.2 nm

(Abs = 0.882)

b. Penentuan kurva baku

Kadar (ppm)	Absorbansi
6	0.259
8	0.314
10	0.418
12	0.470
14	0.541
16	0.652

Perhitungan regresi linear :

a = - 0,153

b = 0,2955

r = 0,997504 Persamaan regresi linier : y = 0.0184 + 0.0385x

Lampiran 14. Hasil uji disolusi tablet dan perhitungan kadar ibuprofen pada *orally disintegrating tablet* ibuprofen

Tabel disolusi F1

Formula 1 Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.808	20.50909	18.46	1	36.92
30	0.405	10.04156	45.19	5	90.38
45	0.385	9.522078	42.85	5	85.7
60	0.294	7.158442	32.21	5	64.42

Formula 1 Replikasi 2

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.843	21.41818	19.28	1	38.56
30	0.399	9.885714	44.45	5	88.9
45	0.382	9.444156	42.5	5	85
60	0.281	6.820779	30.69	5	61.38

Formula 1 Replikasi 3

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.820	20.82078	18.74	1	37.48
30	0.409	10.14545	45.65	5	91.3
45	0.380	9.392208	42.26	5	84.52
60	0.288	7.002597	31.51	5	63.02

Perhitungan kadar ibuprofen

Rumus kadar ibuprofen

$$:\frac{\text{kadar (mg/ml)X volume media disolusi X fx}}{\text{dosis ibuprofen dalam 1 tablet}}\ X\ 100\ \%$$

Volume media disolusi : 900 ml

Dosis ibuprofen dalam 1 tablet : 50 mg

Fx : faktor pengenceran

Tabel disolusi F2

Formula 2 Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.773	19.6	17.64	1	35.28
30	0.294	7.158442	32.21	5	64.42
45	0.354	8.716883	39.23	5	78.46
60	0.415	10.3013	46.36	5	92.72

Formula 2 Replikasi 2

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.784	19.88571	17.9	1	35.8
30	0.301	7.34026	33.03	5	66.06
45	0.349	8.587013	38.64	5	77.28
60	0.412	10.22338	45.54	5	91.08

Formula 2 Replikasi 3

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.782	19.83377	17.85	1	35.7
30	0.299	7.288312	32.8	5	65.6
45	0.352	8.664935	38.99	5	77.98
60	0.412	10.22338	46.01	5	92.02

Perhitungan kadar ibuprofen

Rumus kadar ibuprofen

$$:\frac{\text{kadar (mg/ml)X volume media disolusi X fx}}{\text{dosis ibuprofen dalam 1 tablet}}\ X\ 100\ \%$$

Volume media disolusi : 900 ml

Dosis ibuprofen dalam 1 tablet : 50 mg

Fx : faktor pengenceran

Tabel disolusi F3

Formula 3 Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.684	17.28831	15.56	1	31.12
30	0.896	22.79481	20.51	1	41.02
45	0.402	9.963636	44.84	5	89.68
60	0.367	9.054545	40.74	5	81.48

Formula 3 Replikasi 2

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.650	16.40519	14.76	1	29.52
30	0.888	22.58701	20.33	1	40.66
45	0.405	10.04156	45.19	5	90.38
60	0.355	8.742857	39.34	5	78.68

Formula 3 Replikasi 3

Waktu (detik)	Absorbansi	Kadar (g/ml)	Kadar dalam 900 ml(mg/900 ml)	fx	Kadar (%)
15	0.649	16.37922	14.47	1	28.94
30	0.890	22.63896	20.37	1	40.74
45	0.409	10.14545	45.65	5	91.3
60	0.362	8.924675	40.16	5	80.32

Perhitungan kadar ibuprofen

Rumus kadar ibuprofen

$$:\frac{\text{kadar (mg/ml)X volume media disolusi X fx}}{\text{dosis ibuprofen dalam 1 tablet}}\ X\ 100\ \%$$

Volume media disolusi : 900 ml

Dosis ibuprofen dalam 1 tablet : 50 mg

Fx : faktor pengenceran

Lampiran 15. Kuisioner *orally disintegration tablet* ibuprofen

LEMBAR KUISIONER TANGGAPAN RASA *ORALLY DISINTEGRATION TABLET* IBUPROFEN

Pertunjuk pengisian :

1. Mengisi identitas diri pada tempat yang disediakan.
2. Cobalah satu formula *orally disintegration tablet* yang sebelumnya berkumur terlebih dahulu dengan air putih, kemudian masukkan tablet ke dalam mulut dan biarkan tablet larut sendiri dan bercampur dengan saliva di dalam mulut, lalu coba formula berikutnya dengan cara yang sama.
3. Isilah penilaian anda pada kolom dibawah ini:

   Identitas responden :

   Nama :

   Usia :

Formula	Manis	Sedang	Pahit
F1			
F2			
F3			

4. Berikan saran untuk ODT ibuprofen.

Lampiran 16. Data hasil kuisioner tanggap rasa *orally disintegration tablet* ibuprofen

No	Nama responden	F1		F2		F3	
		Tanggap responden	Waktu larut (s)	Tanggap responden	Waktu larut (s)	Tanggap responden	Waktu larut (s)
1	Tyas	1	18	1	27	1	41
2	Wiwik	1	17	1	28	1	40
3	Yona	1	18	1	27	1	41
4	Ajeng	1	18	1	27	1	40
5	Arjuna	1	18	1	27	1	40
6	Daniel	1	18	1	27	1	40
7	Fajar	1	19	1	28	1	40
8	Yeli	1	17	1	28	1	42
9	Nuri	1	18	1	29	1	42
10	Runi	1	18	1	29	1	41
11	Nisa	1	18	1	29	1	40
12	Yuli	1	18	1	27	1	40
13	Kenup	1	18	1	27	1	40
14	Nurma	1	17	1	27	1	40
15	Anjar	1	19	1	28	1	41
16	Yohana	1	18	1	28	1	41
17	Ria	1	18	1	28	1	40
18	Surya	1	18	1	27	1	41
19	Nining	1	19	1	27	1	42
20	Siti	1	17	1	27	1	40
Total dan rata-rata :		100%	17.95	100%	27.6	100%	40.6

Keterangan : 1 = manis

2 = sedang

3 = pahit

Lampiran 17. Data hasil analisa uji anova (*one-way*) granul dan tablet ODT ibuprofen

Lampiran 17a. Data hasil uji anova waktu alir

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Waktu Alir	9	5.6244	1.32845	4.21	7.37

One-Sample Kolmogorov-Smirnov Test

		Waktu Alir
N		9
Normal Parameters[a,,b]	Mean	5.6244
	Std. Deviation	1.32845
Most Extreme Differences	Absolute	.240
	Positive	.240
	Negative	-.217
Kolmogorov-Smirnov Z		.719
Asymp. Sig. (2-tailed)		.679

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

Waktu Alir

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	14.080	2	7.040	1094.271	.000
Within Groups	.039	6	.006		
Total	14.118	8			

Post Hoc Tests

Multiple Comparisons

Waktu Alir

LSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
formula 1	formula 2	-1.06333*	.06549	.000	-1.2236	-.9031
	formula 3	-3.02000*	.06549	.000	-3.1802	-2.8598
formula 2	formula 1	1.06333*	.06549	.000	.9031	1.2236
	formula 3	-1.95667*	.06549	.000	-2.1169	-1.7964
formula 3	formula 1	3.02000*	.06549	.000	2.8598	3.1802
	formula 2	1.95667*	.06549	.000	1.7964	2.1169

*. The mean difference is significant at the 0.05 level.

Lampiran 17b. Data hasil uji anova daya serap air

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
daya serap air	9	.862667	.1022436	.7320	.9920

One-Sample Kolmogorov-Smirnov Test

		daya serap air
N		9
Normal Parameters[a,,b]	Mean	.862667
	Std. Deviation	.1022436
Most Extreme Differences	Absolute	.204
	Positive	.171
	Negative	-.204
Kolmogorov-Smirnov Z		.611
Asymp. Sig. (2-tailed)		.849

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

daya serap air

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.083	2	.041	336.346	.000
Within Groups	.001	6	.000		
Total	.084	8			

Post Hoc Tests

Multiple Comparisons

daya serap air

LSD

					95% Confidence Interval	
(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
formula 1	formula 2	-.1053333*	.0090636	.000	-.127511	-.083156
	formula 3	-.2346667*	.0090636	.000	-.256844	-.212489
formula 2	formula 1	.1053333*	.0090636	.000	.083156	.127511
	formula 3	-.1293333*	.0090636	.000	-.151511	-.107156
formula 3	formula 1	.2346667*	.0090636	.000	.212489	.256844
	formula 2	.1293333*	.0090636	.000	.107156	.151511

*. The mean difference is significant at the 0.05 level.

Lampiran 17c. Data hasil uji anova kekerasan

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
kekerasan	9	7.078	.7775	6.0	8.0

One-Sample Kolmogorov-Smirnov Test

		kekerasan
N		9
Normal Parameters[a,,b]	Mean	7.078
	Std. Deviation	.7775
Most Extreme Differences	Absolute	.175
	Positive	.175
	Negative	-.168
Kolmogorov-Smirnov Z		.524
Asymp. Sig. (2-tailed)		.946

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

Kekerasan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.496	2	2.248	39.667	.000
Within Groups	.340	6	.057		
Total	4.836	8			

Post Hoc Tests

Multiple Comparisons

Kekerasan

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
formula 1	formula 2	-1.1333*	.1944	.001	-1.609	-.658
	formula 3	-1.7000*	.1944	.000	-2.176	-1.224
formula 2	formula 1	1.1333*	.1944	.001	.658	1.609
	formula 3	-.5667*	.1944	.027	-1.042	-.091
formula 3	formula 1	1.7000*	.1944	.000	1.224	2.176
	formula 2	.5667*	.1944	.027	.091	1.042

*. The mean difference is significant at the 0.05 level.

Lampiran 17d. Data hasil uji anova waktu hancur

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu hancur	9	39.44	13.803	21	55

One-Sample Kolmogorov-Smirnov Test

		waktu hancur
N		9
Normal Parameters[a,,b]	Mean	39.44
	Std. Deviation	13.803
Most Extreme Differences	Absolute	.240
	Positive	.217
	Negative	-.240
Kolmogorov-Smirnov Z		.720
Asymp. Sig. (2-tailed)		.677

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

waktu hancur

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1509.556	2	754.778	308.773	.000
Within Groups	14.667	6	2.444		
Total	1524.222	8			

Post Hoc Tests

Multiple Comparisons

waktu hancur

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
formula 1	formula 2	-21.333*	1.277	.000	-24.46	-18.21
	formula 3	-31.000*	1.277	.000	-34.12	-27.88
formula 2	formula 1	21.333*	1.277	.000	18.21	24.46
	formula 3	-9.667*	1.277	.000	-12.79	-6.54
formula 3	formula 1	31.000*	1.277	.000	27.88	34.12
	formula 2	9.667*	1.277	.000	6.54	12.79

*. The mean difference is significant at the 0.05 level.

Lampiran 17e. Data hasil uji anova waktu pembasahan

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu pembasahan	9	18.00	2.958	14	23

One-Sample Kolmogorov-Smirnov Test

		waktu pembasahan
N		9
Normal Parameters[a,,b]	Mean	18.00
	Std. Deviation	2.958
Most Extreme Differences	Absolute	.188
	Positive	.188
	Negative	-.088
Kolmogorov-Smirnov Z		.564
Asymp. Sig. (2-tailed)		.908

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

waktu pembasahan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	56.000	2	28.000	12.000	.008
Within Groups	14.000	6	2.333		
Total	70.000	8			

Post Hoc Tests

Multiple Comparisons

waktu pembasahan

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
formula 1	formula 2	-2.000	1.247	.160	-5.05	1.05
	formula 3	-6.000*	1.247	.003	-9.05	-2.95
formula 2	formula 1	2.000	1.247	.160	-1.05	5.05
	formula 3	-4.000*	1.247	.018	-7.05	-.95
formula 3	formula 1	6.000*	1.247	.003	2.95	9.05
	formula 2	4.000*	1.247	.018	.95	7.05

*. The mean difference is significant at the 0.05 level.

Lampiran 17f. Data hasil uji disolusi

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
disolusi	9	55.868333	4.6875887	49.9750	61.3025

One-Sample Kolmogorov-Smirnov Test

		Disolusi
N		9
Normal Parameters[a,,b]	Mean	55.868333
	Std. Deviation	4.6875887
Most Extreme Differences	Absolute	.201
	Positive	.201
	Negative	-.189
Kolmogorov-Smirnov Z		.603
Asymp. Sig. (2-tailed)		.860

a. Test distribution is Normal.

b. Calculated from data.

Oneway

ANOVA

Disolusi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	175.397	2	87.698	1344.938	.000
Within Groups	.391	6	.065		
Total	175.788	8			

Post Hoc Tests

Multiple Comparisons

Disolusi

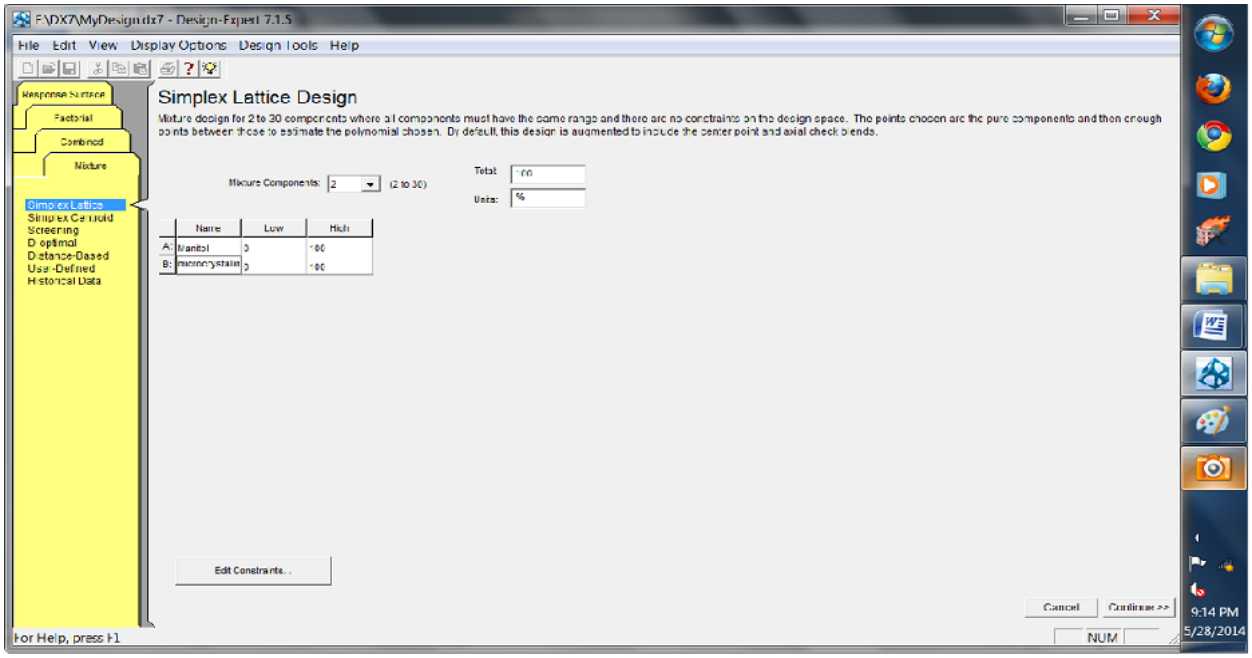
LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
formula1	formula2	4.8900000*	.2084966	.000	4.379827	5.400173
	formula3	10.7975000*	.2084966	.000	10.287327	11.307673
formula2	formula1	-4.8900000*	.2084966	.000	-5.400173	-4.379827
	formula3	5.9075000*	.2084966	.000	5.397327	6.417673
formula3	formula1	-10.7975000*	.2084966	.000	-11.307673	-10.287327
	formula2	-5.9075000*	.2084966	.000	-6.417673	-5.397327

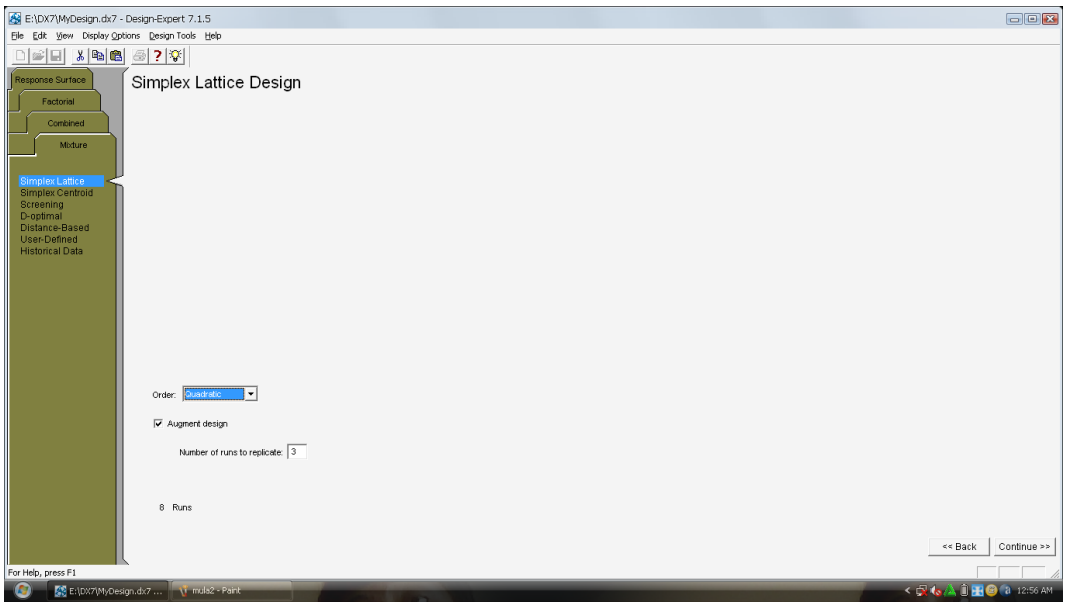
*. The mean difference is significant at the 0.05 level.

Lampiran 18. Penentuan formula optimum *orally disintegrating tablet* ibuprofen

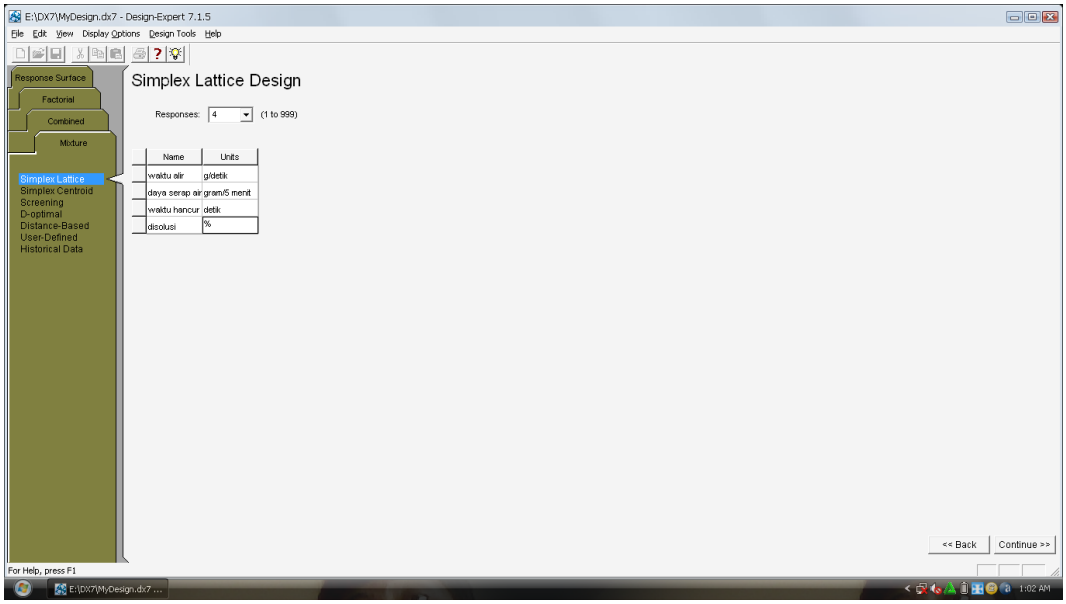
Langkah awal penggunaan aplikasi *design expert* untuk optimasi model *simplex lattice design*, pilih *mixture* → *Simplex Lattice*, tekan *Continue*



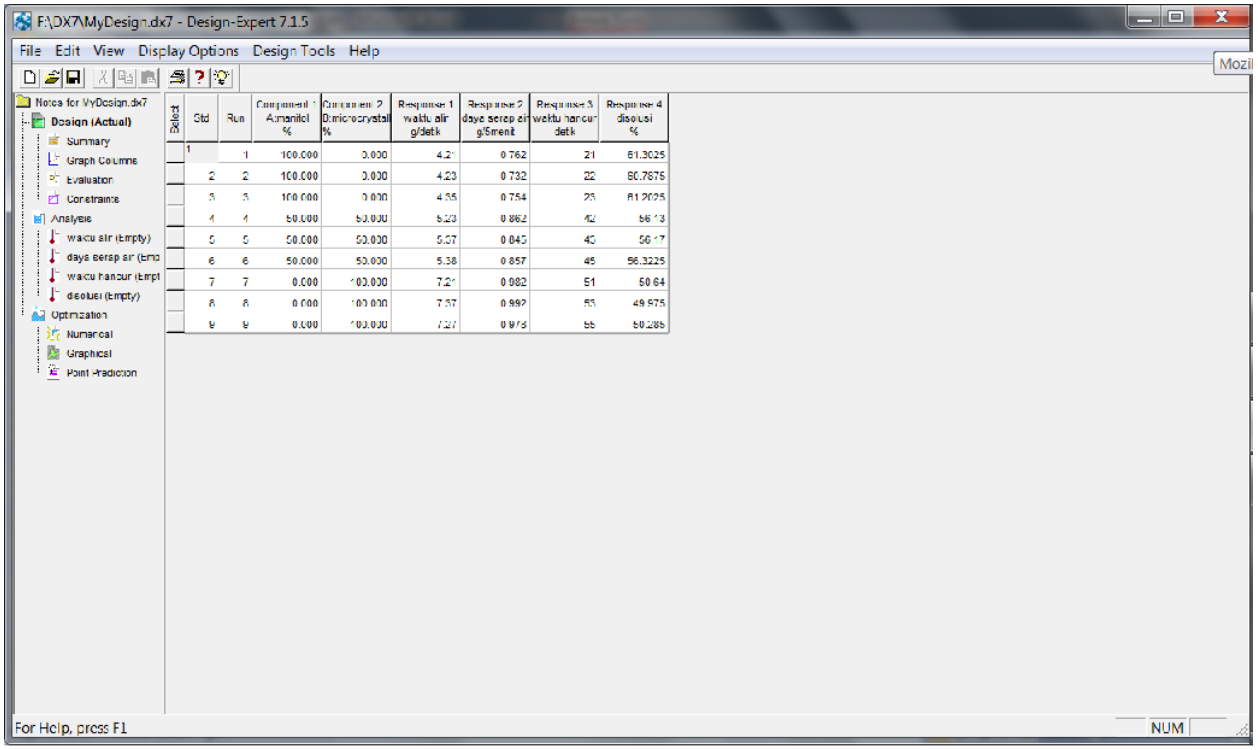
Selanjutnya isi beberapa kolom :
Kolom total → 100, Unit → %
Kolom A → manitol
Kolom B → *microcrystalline cellulose*



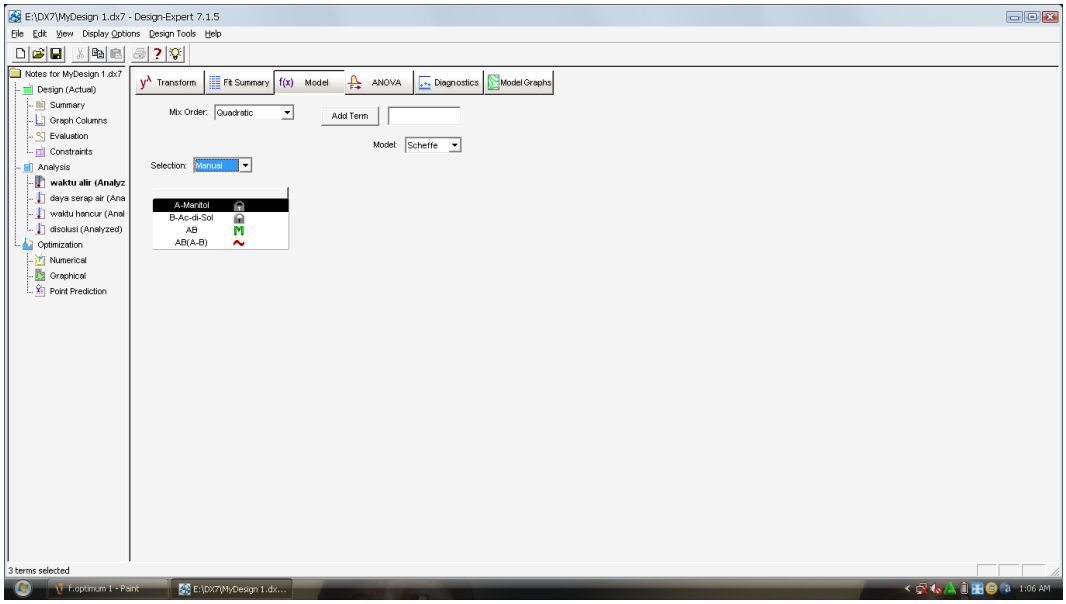
Kolom order dipilih *quadatric*, selanjutnya tekan *Continue*



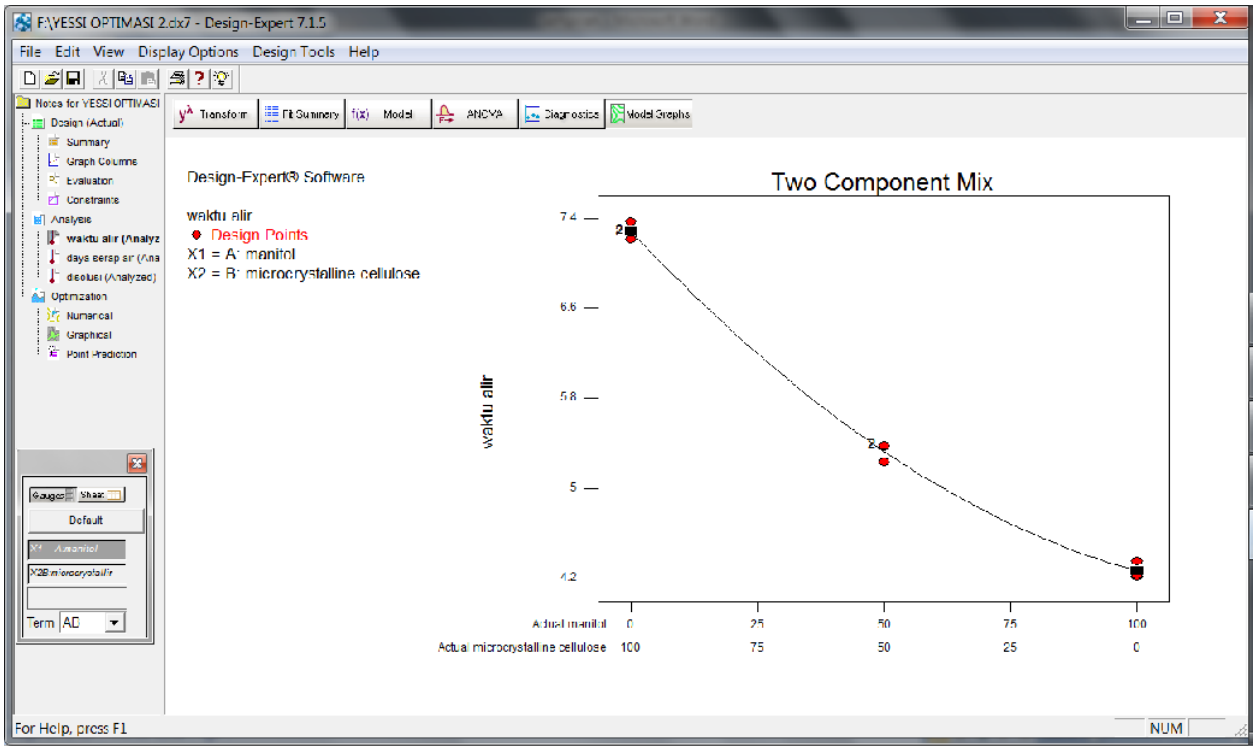
kolom respon diganti angka 4 dan respon beserta satuan ditulis pada kolom yang tersedia (waktu alir, daya serap air, waktu hancur dan disolusi), tekan *Continue*



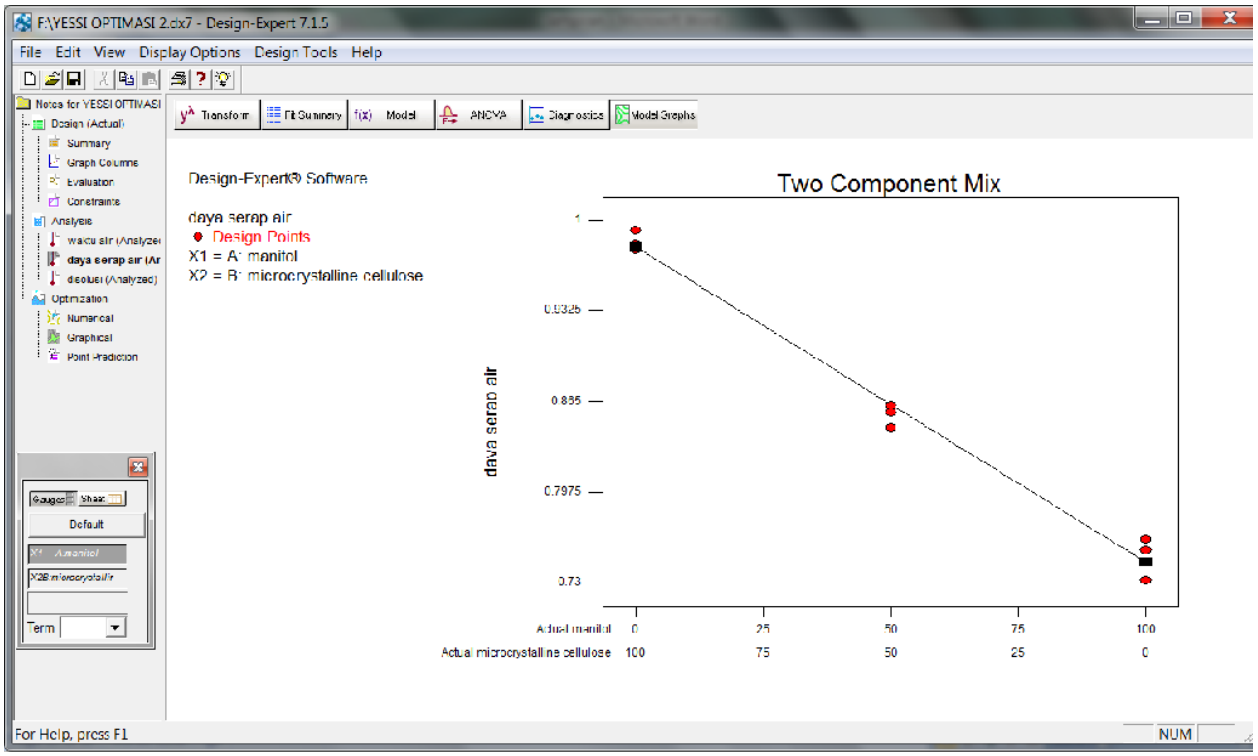
Tampilan diatas menunjukkan 3 formula dengan 4 respon yang kemudian diisi nilai respon dari ketiga formula pada masing-masing kolom.



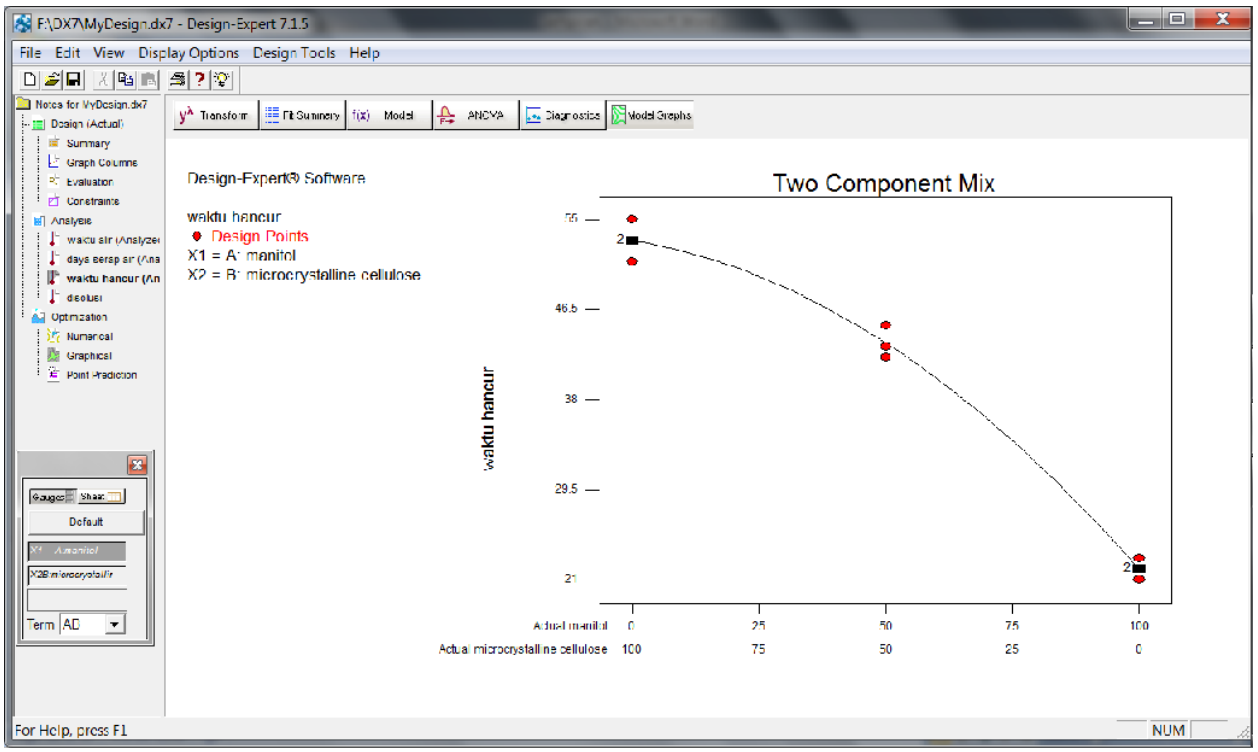
Analisis dari semua respon menggunakan model yang sama yaitu *quadratic*.



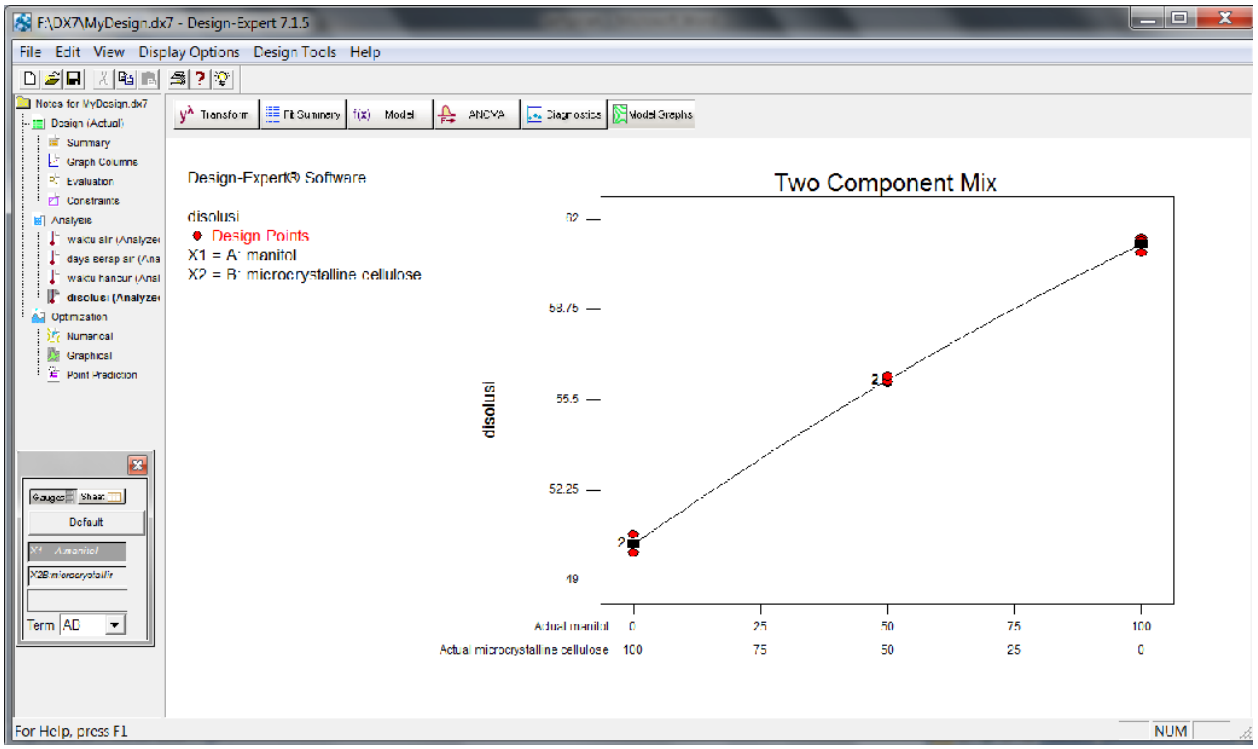
Model grafik untuk respon waktu alir



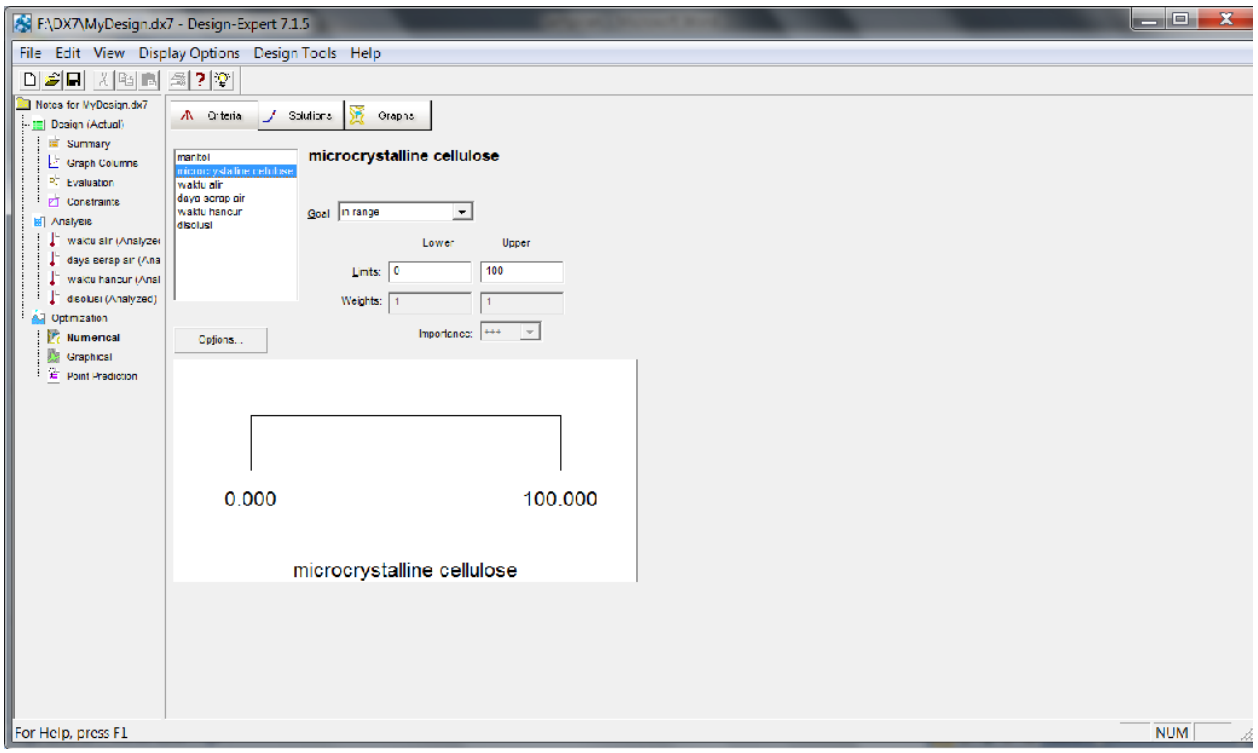
Model grafik untuk respon daya serap air



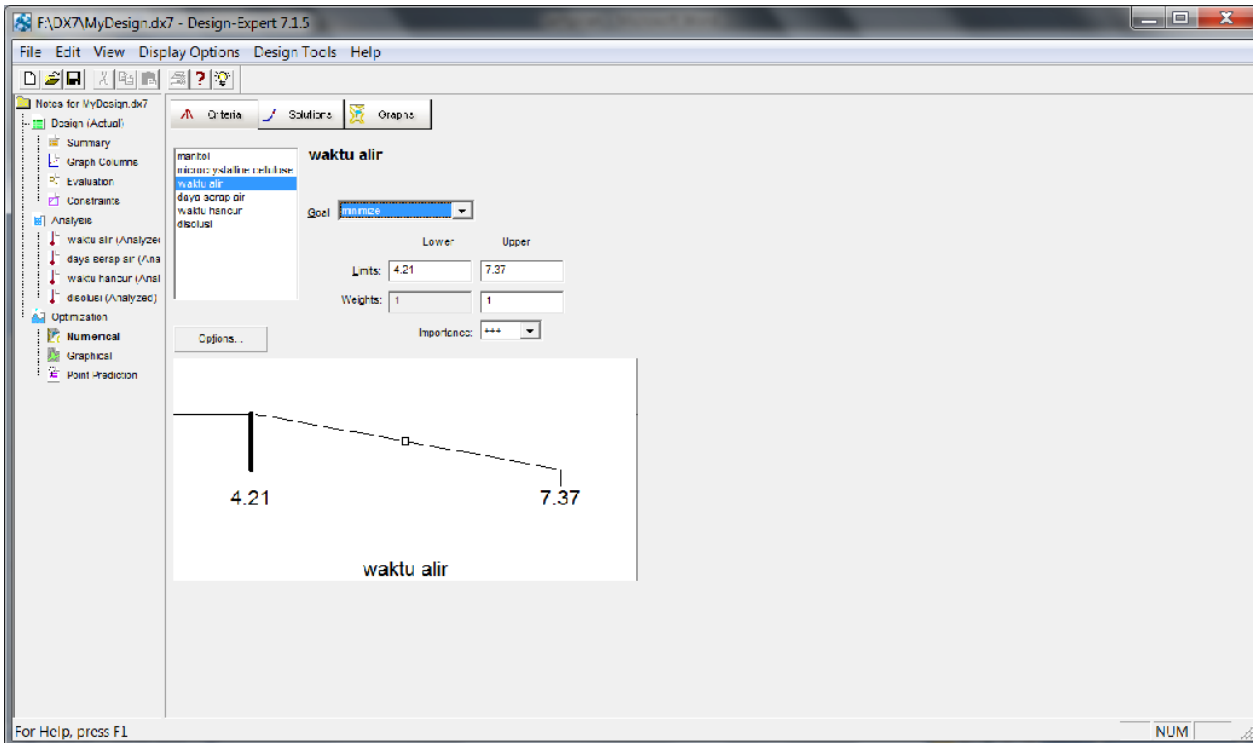
Model grafik untuk respon waktu hancur



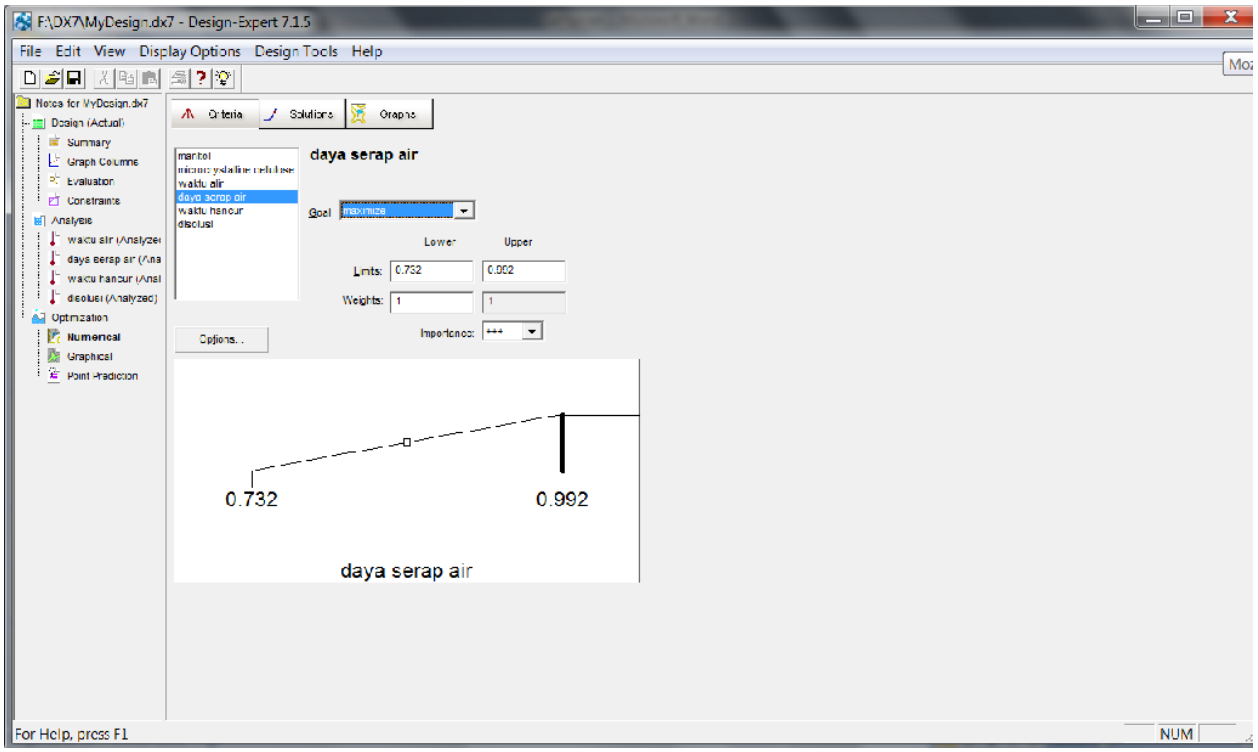
Model grafik untuk respon disolusi



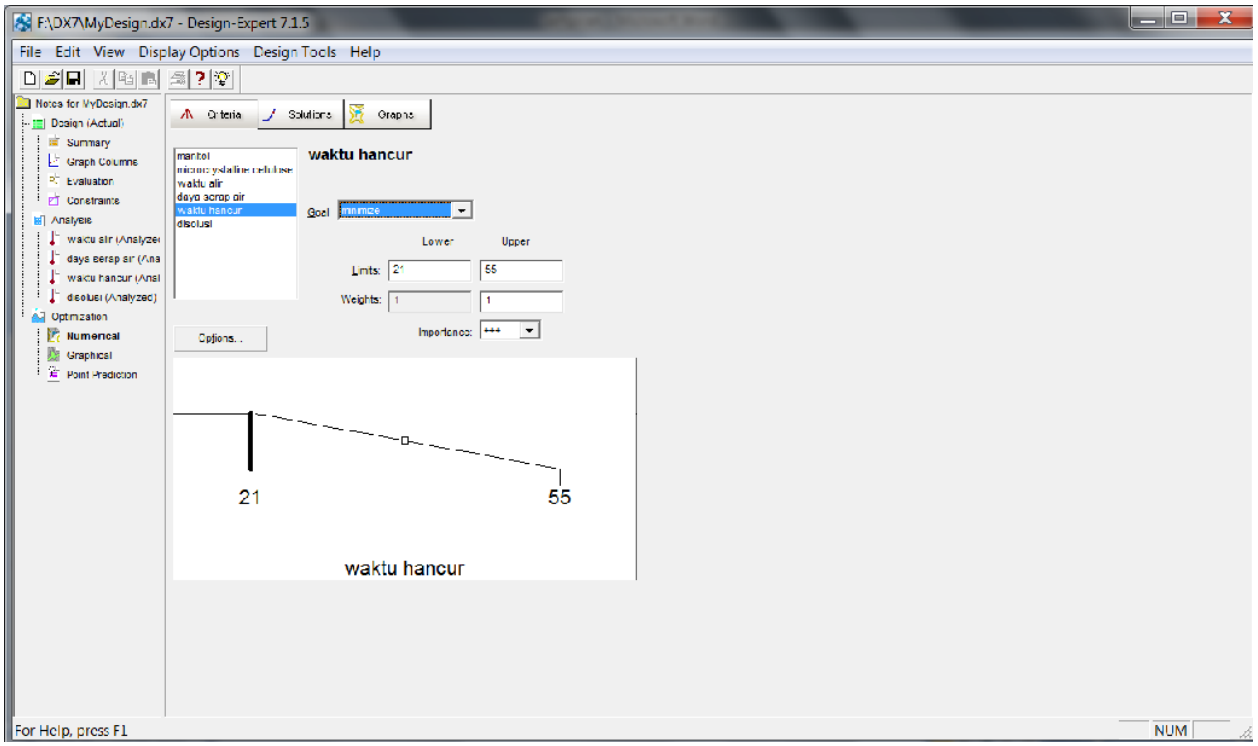
Optimasi Manitol dan *microcrystalline cellulose* dibuat *in range*



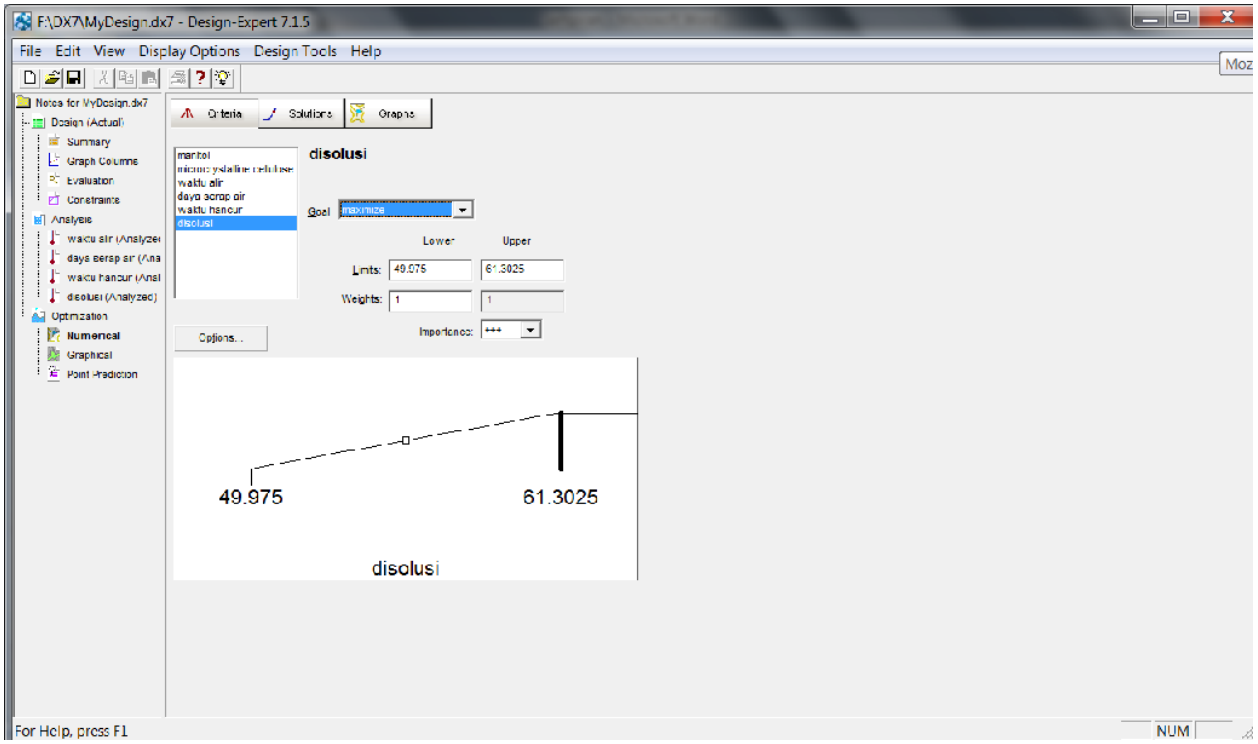
Optimasi waktu alir dibuat *Minimize*



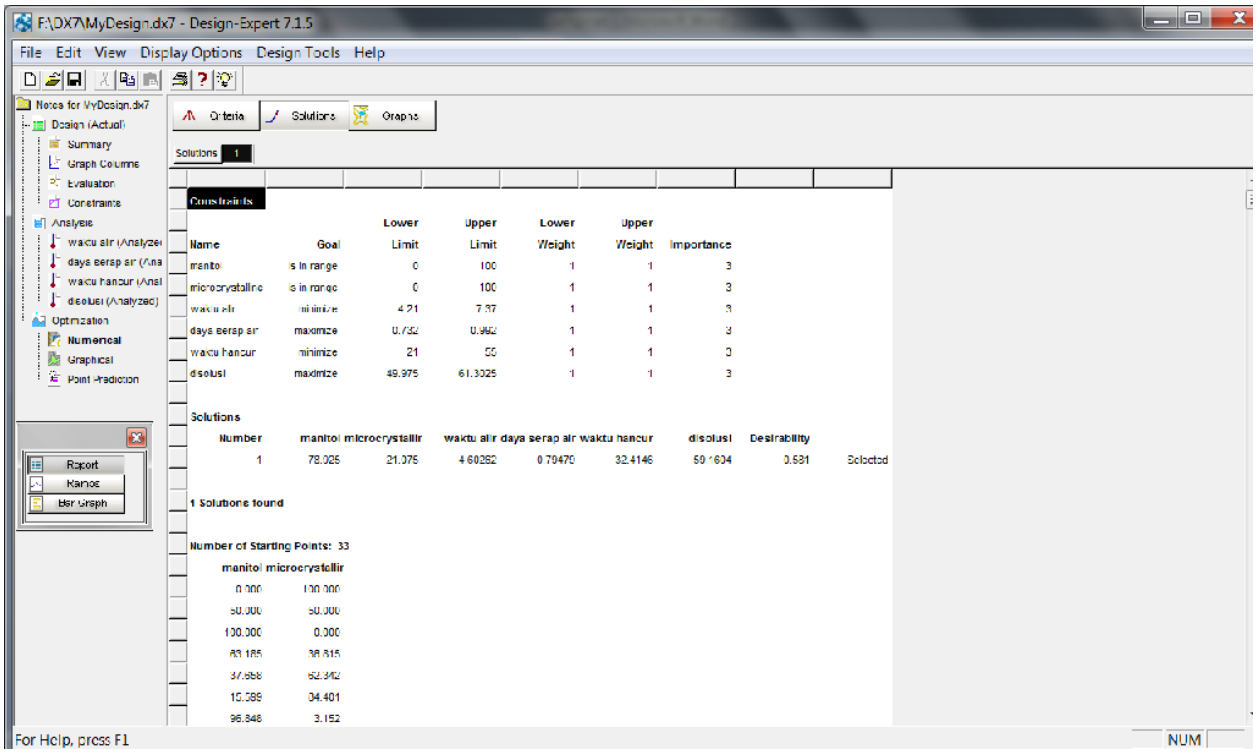
Optimasi daya serap air dibuat *maximize*



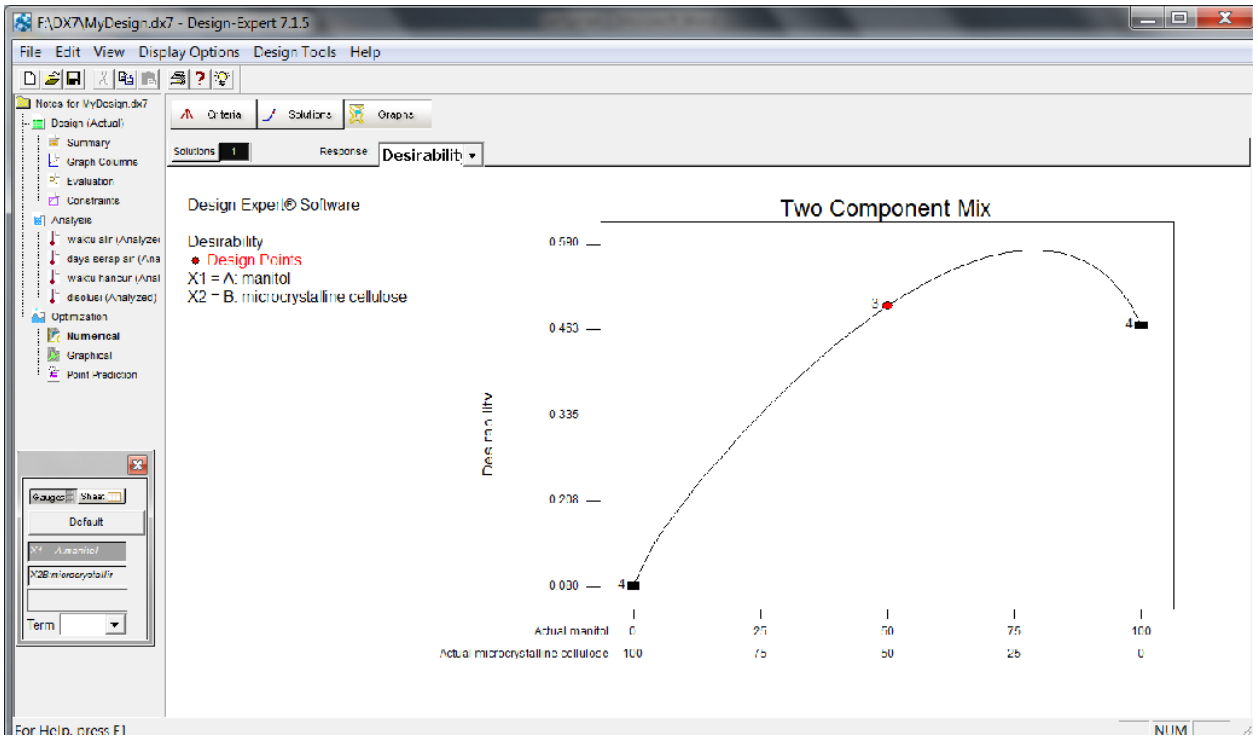
Optimasi waktu hancur dibuat *minimize*



Optimasi Disolusi dibuat *maximize*



Solusi yang diperoleh



Grafik formula optimum yang diperoleh

Lampiran 19. Uji sifat fisik granul dan tablet formula optimum *orally disintegrating tablet* ibuprofen

Lampiran 19a. Waktu alir granul formula optimum *orally disintegrating tablet* ibuprofen

Waktu alir (detik)	
bobot	waktu
100	4.70
100	4.86
100	4.90
X	4.82
SD	0.11

Lampiran 19b. Daya serap air granul formula optimum *orally disintegrating tablet* ibuprofen

Berat botol timbang + 1 g granul	5 menit	Daya serap air
20.312	21.135	0.823
20.295	21.114	0.819
20.304	21.128	0.824
X		0.822
SD		0.0026

Lampiran 19c. Kekerasan formula optimum *orally disintegrating tablet* ibuprofen

Replikasi	Kekerasan (kg)
1	7
2	7
3	7.5
X	7.17
SD	0.289

Lampiran 19d. Keseragaman bobot formula optimum *orally disintegrating tablet* ibuprofen

Tablet	Bobot (mg)
1	202
2	203
3	200
4	206
5	201
6	199
7	198
8	200
9	202
10	200
11	201
12	203
13	197
14	199
15	201
16	200
17	199
18	202
19	200
20	205
X	200.9
SD	2.222
CV	1,11 %

Lampiran 19e. Kerapuhan formula optimum *orally disintegrating tablet* ibuprofen

Bobot awal = 3.925 gram

Bobot akhir = 3.902 gram

% Kerapuhan = $\frac{3.925-3.902}{3.925}$ *X 100% = 0.59 %*

Lampiran 19f. Waktu hancur formula optimum *orally disintegrating tablet* ibuprofen

Waktu Hancur (detik)

Replika	Formula Optimum
1	37
2	36
3	38
X	37
SD	1

Lampiran 19g. Waktu pembasahan formula optimum *orally disintegrating tablet* ibuprofen

Waktu Pembasahan (detik)

Replika	Formula Optimum
1	20
2	19
3	17
X	18.67
SD	1.527

Lampiran 19h. Uji disolusi formula optimum *orally disintegrating tablet* ibuprofen

Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml	fx	Kadar (%)
15	0.202	4.768831	21.45974	5	42.92
30	0.305	7.444156	33.4987	5	66.99
45	0.376	9.288312	41.7974	5	83.59
60	0.342	8.405195	37.82338	5	75.65

Persamaan regresi linier waktu dan % kadar
y = 0.0184 + 0.0385x
r = 0,997504

Replikasi 2

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml	fx	Kadar (%)
15	0.203	4.794805	21.57662	5	43.15
30	0.304	7.418182	33.38182	5	66.76
45	0.377	9.314286	41.91429	5	83.83
60	0.342	8.405195	37.82338	5	75.65

Persamaan regresi linier waktu dan % kadar
y = 0.0184 + 0.0385x
r = 0,997504

Replikasi 3

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml	fx	Kadar (%)
15	0.205	4.846753	21.81039	5	43.62
30	0.306	7.47013	33.61559	5	67.23
45	0.376	9.288312	41.7974	5	83.59
60	0.344	8.457143	38.05714	5	76.11

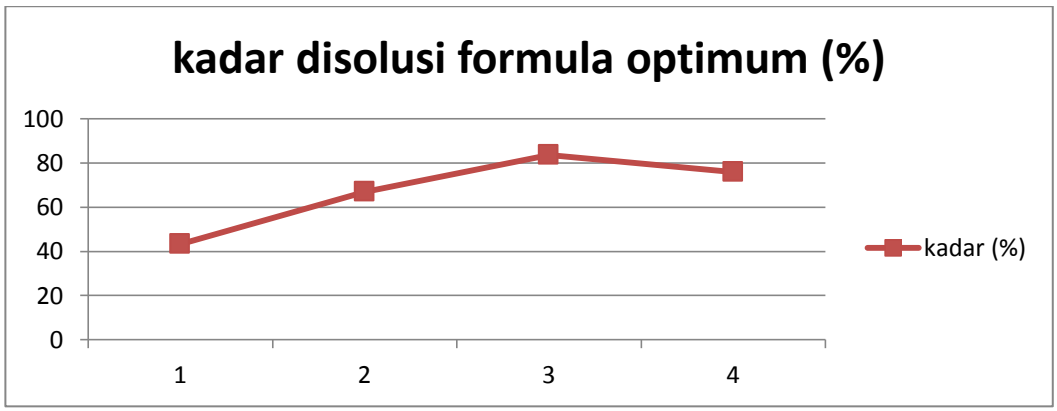
Persamaan regresi linier waktu dan % kadar
y = 0.0184 + 0.0385x
r = 0,997504

Rata-rata kadar formula optimum

Waktu (menit)	kadar (%)
15	43.23
30	66.99
45	83.67
60	75.80

Persamaan regresi linier waktu dan % kadar

Y = 38.825 + 0.7626X
R = 0.8435



Lampiran 20. Kuisioner formula optimum *orally disintegration tablet* ibuprofen

LEMBAR KUISIONER TANGGAPAN RASA FORMULA OPTIMUM *ORALLY DISINTEGRATION TABLET* IBUPROFEN

Pertunjuk pengisian :

1. Mengisi identitas diri pada tempat yang disediakan.
2. Cobalah satu formula *orally disintegration tablet* yang sebelumnya berkumur terlebih dahulu dengan air putih, kemudian masukkan tablet ke dalam mulut dan biarkan tablet larut sendiri dan bercampur dengan saliva di dalam mulut.
3. Isilah penilaian anda pada kolom dibawah ini:

   Identitas responden :

   Nama :

   Usia :

Formula	Manis	Sedang	Pahit
F optimum			

4. Berikan saran untuk ODT ibuprofen.

Lampiran 21. Data hasil kuisioner tanggap rasa formula optimum *orally disintegration tablet* ibuprofen

No	Nama responden	F optimum	
		Tanggap rasa	Waktu larut (s)
1	Tyas	1	31
2	Wiwik	1	32
3	Yona	1	32
4	Ajeng	1	32
5	Arjuna	1	32
6	Daniel	1	33
7	Fajar	1	33
8	Yeli	1	31
9	Nuri	1	32
10	Runi	1	33
11	Nisa	1	33
12	Yuli	1	32
13	Kenup	1	33
14	Nurma	1	33
15	Anjar	1	32
16	Yohana	1	31
17	Ria	1	31
18	Surya	1	32
19	Nining	1	33
20	Siti	1	33
Total responden dan rata-rata :		100%	32.2

Keterangan : 1 = manis

2 = sedang

3 = pahit

Lampiran 22. Analisis Statistik T-Test formula optimum *orally disintegrating tablet* ibuprofen

22a. Data hasil uji *t* waktu alir

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu alir	6	4.8400	.07043	4.70	4.90

One-Sample Kolmogorov-Smirnov Test

		waktu alir
N		6
Normal Parameters[a,,b]	Mean	4.8400
	Std. Deviation	.07043
Most Extreme Differences	Absolute	.445
	Positive	.222
	Negative	-.445
Kolmogorov-Smirnov Z		1.090
Asymp. Sig. (2-tailed)		.185

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	formula	N	Mean	Std. Deviation	Std. Error Mean
waktu alir	formula prediksi	3	4.8600	.00000	.00000
	formula percobaan	3	4.8200	.10583	.06110

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
waktu alir	Equal variances assumed	12.000	.026	.655	4	.548	.04000	.06110	-.12964	.20964
	Equal variances not assumed			.655	2.000	.580	.04000	.06110	-.22290	.30290

22b. Hasil uji *t* daya serap air

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
daya serap air	6	.82250	.001761	.819	.824

One-Sample Kolmogorov-Smirnov Test

		daya serap air
N		6
Normal Parameters[a,b]	Mean	.82250
	Std. Deviation	.001761
Most Extreme Differences	Absolute	.445
	Positive	.222
	Negative	-.445
Kolmogorov-Smirnov Z		1.090
Asymp. Sig. (2-tailed)		.185

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	Formula	N	Mean	Std. Deviation	Std. Error Mean
daya serap air	formula prediksi	3	.82300	.000000	.000000
	formula percobaan	3	.82200	.002646	.001528

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
daya serap air	Equal variances assumed	12.000	.026	.655	4	.548	.001000	.001528	-.003241	.005241
	Equal variances not assumed			.655	2.000	.580	.001000	.001528	-.005572	.007572

22c. Hasil uji *t* waktu hancur

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu hancur	6	37.00	.632	36	38

One-Sample Kolmogorov-Smirnov Test

		waktu hancur
N		6
Normal Parameters[a,,b]	Mean	37.00
	Std. Deviation	.632
Most Extreme Differences	Absolute	.333
	Positive	.333
	Negative	-.333
Kolmogorov-Smirnov Z		.816
Asymp. Sig. (2-tailed)		.518

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	formula	N	Mean	Std. Deviation	Std. Error Mean
waktu hancur	formula prediksi	3	37.00	.000	.000
	formula percobaan	3	37.00	1.000	.577

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
waktu hancur	Equal variances assumed	4.000	.116	.000	4	1.000	.000	.577	-1.603	1.603
	Equal variances not assumed			.000	2.000	1.000	.000	.577	-2.484	2.484

22d. Hasil uji *t* disolusi

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
disolusi	6	57.9694	.10029	57.83	58.12

One-Sample Kolmogorov-Smirnov Test

		Disolusi
N		6
Normal Parameters[a,,b]	Mean	57.9694
	Std. Deviation	.10029
Most Extreme Differences	Absolute	.252
	Positive	.252
	Negative	-.248
Kolmogorov-Smirnov Z		.617
Asymp. Sig. (2-tailed)		.841

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	formula	N	Mean	Std. Deviation	Std. Error Mean
disolusi	formula prediksi	3	57.9900	.00000	.00000
	formula percobaan	3	57.9488	.15450	.08920

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
disolusi	Equal variances assumed	11.829	.026	.462	4	.668	.04125	.08920	-.20640	.28890
	Equal variances not assumed			.462	2.000	.689	.04125	.08920	-.34254	.42504