BAB V

KESIMPULAN DAN SARAN

A. Kesimpulan

Kesimpulan yang didapatkan dari hasil penelitian dan data-data statistik terhadap uji sifat fisik *orally disintegrating tablet* ibuprofen adalah :

- Kombinasi manitol dan Ac-Di-Sol® berpengaruh terhadap sifat fisik ODT ibuprofen.
- Berdasarkan data *simplex lattice design*, perbandingan 79,31 % manitol dan 20,69 % Ac-Di-Sol® merupakan formula optimum yang dapat menghasilkan *orally disintegrating tablet* ibuprofen dengan sifat fisik yang memenuhi persyaratan serta memberikan rasa yang enak.

B. Saran

1. Perlu dilakukan penelitian lebih lanjut untuk *orally disintegrating tablet* dengan kombinasi bahan pengisi dan penghancur yang berbeda.
2. Perlu dilakukan penelitian dengan metode pembuatan yang berbeda untuk *orally disintegrating tablet* ibuprofen.

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LAMPIRAN

Lampiran 1. Sertifikat 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.

ibiocause 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°C	75.3-76.4°C
	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: [illegible] Checked by: [illegible] Analyst(s): [illegible]

[illegible] Hubei Granules-Biocause pharmaceutical CO.,LTD

122 Yangwan Road China-448000 Jingmen City Hubei Province

Lampiran 2. Foto granul *orally disintegrating tablet* ibuprofen pada berbagai formula

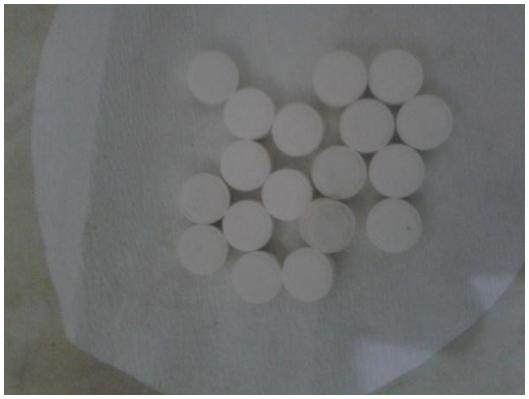
Granul Formula I

Granul formula II

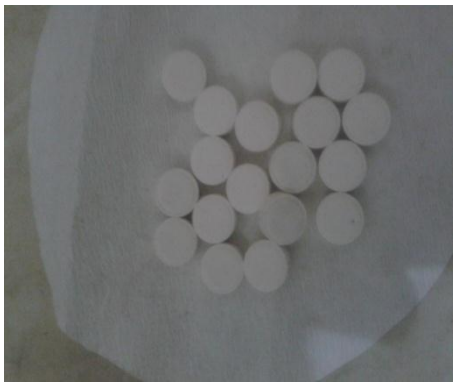
Granul Formula III

Granul Formula Optimum

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

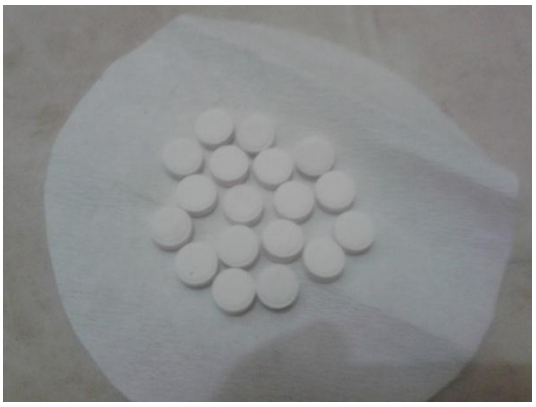


Tablet Formula I



Tablet formula II

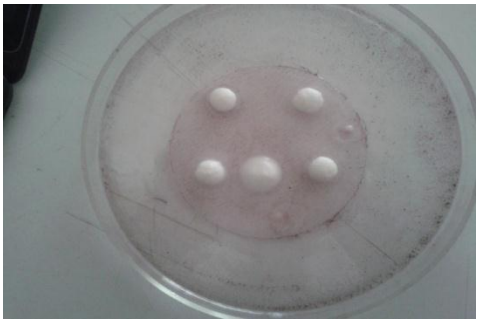
Tablet Formula III



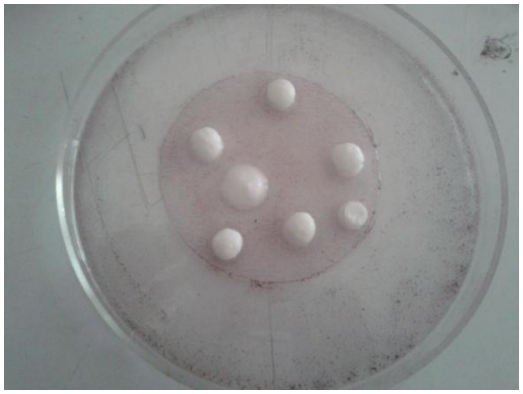
Tablet Formula Optimum

Lampiran 4. Foto uji waktu pembasahan *orally disintegrating tablet* ibuprofen pada berbagai formula

Formula I



Formula II



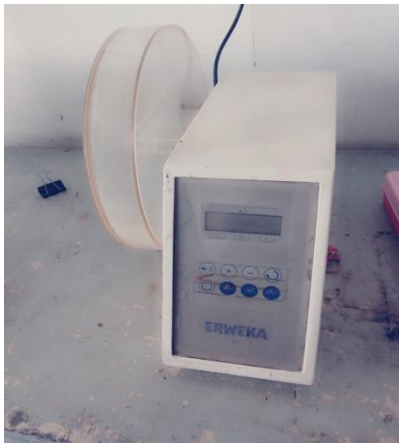
Formula III

Formula Optimum

Lampiran 5. Alat yang digunakan

Alat pencetak tablet

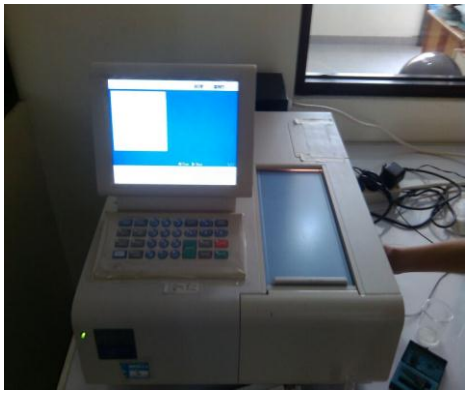
Hardness tester



Friability tester

disintegration tester

Dissolution tester



Spectrofotometer Uv

Neraca analitik

Lampiran 6. Pembuatan dapar fosfat pH 6,4

KH_2PO_4 (0,2 M)

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

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

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

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 7. Penentuan panjang gelombang serapan maksimum dan kurva baku ibuprofen

a. Panjang gelombang maksimum ibuprofen

A	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. Kurva baku ibuprofen

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

Regresi linier :

a = 0.0184
b = 0.0385
r = 0.9945

Persamaan regresi linier y = 0.0184 + 0.0385x

Lampiran 8 . Penentuan dan perhitungan persamaan sifat fisik granul *Orally Disintegrating Tablet* Ibuprofen berdasarkan pendekatan *Simplex Lattice Design* dari campuran Manitol dan Ac-Di-Sol®

Secara teoritis persamaan *simplex lattice design* yaitu :

$$Y = a(A) + b(B) + ab(A)(B)$$

Keterangan :
Y = Respon (hasil percobaan)
A = Kadar komponen Manitol
B = Kadar komponen Ac-Di-Sol®

Lampiran 8.a. Hasil pemeriksaan waktu alir granul

Keterangan:
X = purata percobaan

Waktu alir (detik)					
Formula I		Formula II		Formula III	
20 g	100 g	20 g	100 g	20 g	100 g
1.48	7.4	1.12	5.6	1.02	5.1
1.36	6.8	1.09	5.45	0.98	4.9
1.38	6.9	1.1	5.5	0.97	4.85
X	7.03		5.52		4.95
SD	0.32		0.08		0.13
CV	4.55 %		1.38%		2.63%

SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ $7.03 = a\,(1) + b\,(0) + ab\,(1)\,(0)$

$a = 7.03$

100% Ac-Di-Sol® ⟶ $4.95 = a\,(0) + b\,(1) + ab\,(0)\,(1)$

$b = 4.95$

50% Manitol : 50% Ac-Di-Sol® ⟶ $5.52 = a\,(0.5) + b(0.5) + ab(0.5)(0.5)$

$5.52 = 7.03(0.5) + 4.95(0.5) + ab\,(0.5)(0.5)$

$ab = -1.88$

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

$$Y = 7.03\,(A) + 4.95\,(B) - 1.88\,(A)\,(B)$$

Lampiran 8.b. Hasil pemeriksaan daya serap air

Formula I

	Berat botol timbang + 1 g granul	5 menit	Daya serap air
	20.504	21.246	0.742
	20.495	21.192	0.697
	20.309	21.034	0.725
X			0.721
SD			0.023
CV			3.19%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

Formula II

	Berat botol timbang + 1 g granul	5 menit	Daya serap air
	21.159	22.01	0.851
	21.014	21.826	0.812
	21.302	22.141	0.839
X			0.834
SD			0.020
CV			3.19%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

Formula III

	Berat botol timbang + 1 g granul	5 menit	Daya serap air
	19.677	20.671	0.994
	19.791	20.849	1.058
	19.615	20.646	1.031
X			1.028
SD			0.032
CV			3.11%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ 0.721 = a (1) + b (0) + ab (1) (0)

a = 0.721

100% Ac-Di-Sol® ⟶ 1.028 = a (0) + b (1) + ab (0) (1)

b = 1.028

50% Manitol : 50% Ac-Di-Sol® ⟶ 0.834 = a(0.5)+b(0.5)+ ab(0.5)(0.5)

0.834 =0.721(0.5) +1.028(0.5)+ab (0.5)(0.5)

ab = -0.0405

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

Y = 0.721 (A) + 1.028 (B) – 0.0405 (A) (B)

Lampiran 9. Hasil pemeriksaan keseragaman bobot dan perhitungan *Orally Disintegrating Tablet* Ibuprofen menurut persyaratan FI III

Keseragaman Bobot (mg)		
Formula I	Formula II	Formula III
192	191	198
197	192	199
214	191	195
192	189	198
193	189	197
192	193	199
191	193	196
193	196	198
194	190	189
195	194	196
198	190	200
193	189	197
194	191	198
197	188	194
191	193	199
191	188	196
193	191	197
191	190	196
194	197	195
194	194	198
X 194.6	191.45	196.75
SD 5.66	2.52	2.40
CV 2.91%	1.32%	1.22%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ 194.6= a (1) + b (0) + ab (1) (0)

a = 194.6

100% Ac-Di-Sol® ⟶ 196.75 = a (0) + b (1) + ab (0) (1)

b = 196.75

50% Manitol : 50% Ac-Di-Sol® ⟶ 191.45 =a(0.5)+b(0.5)+ab(0.5)(0.5)

191.45=194.6(0.5)+196.75(0.5)+ab(0.5)(0.5)

ab = - 1.69

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

Y = 194.6 (A) + 196.75 (B) – 16.9 (A) (B)

Perhitungan keseragaman bobot tablet ibuprofen menurut farmakope Indonesia edisi III untuk bobot tablet 200 mg (151 mg – 300 mg) :

1. **Formula I**

   Bobot rata-rata 20 tablet = 194.6 mg

a. Untuk penyimpangan 7.5% = $\frac{7.5}{100}$ x 194.6 mg = 14.60 mg

   Jadi berat tablet ibuprofen 200 ± 14.60 mg (185.4 mg – 214.6 mg)

b. Untuk penyimpangan 15% = $\frac{15}{100}$ x 194.6 mg = 29.19 mg

Jadi berat tablet ibuprofen 200 ± 29.19 mg (170.81 mg – 229.19 mg)

2. Formula II

Bobot rata-rata 20 tablet = 191.45 mg

a. Untuk penyimpangan 7.5% = $\frac{7.5}{100}$ x 191.45 mg = 14.36 mg

   Jadi berat tablet ibuprofen 200 ± 14.36 mg (185.64 mg – 214.36 mg)

b. Untuk penyimpangan 15% = $\frac{15}{100}$ x 191.45 mg = 28.72 mg

   Jadi berat tablet ibuprofen 200 ± 28.72 mg (171.28 mg – 228.72 mg)

3. Formula III

Bobot rata-rata 20 tablet = 196.75 mg

a. Untuk penyimpangan 7.5% = $\frac{7.5}{100}$ x 196.75 mg = 14.76 mg

   Jadi berat tablet ibuprofen 200 ± 14.76 mg (185.24 mg – 214.76 mg)

b. Untuk penyimpangan 15% = $\frac{15}{100}$ x 196.75 mg = 29.51 mg

   Jadi berat tablet ibuprofen 200 ± 29.51 mg (170.49 mg – 229.51 mg)

Lampiran 10. Hasil pemeriksaan kekerasan *Orally Disintegrating Tablet* Ibuprofen

Kekerasan Tablet (Kg)			
replika	Formula I	Formula II	Formula III
1	6.3	7.3	7.4
2	6.9	7.5	8.0
3	6.5	7.2	7.8
X	6.57	7.33	7.73
SD	0.31	0.15	0.31
CV	4.72%	2.05%	4.01%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ $6.57 = a\,(1) + b\,(0) + ab\,(1)\,(0)$

$a = 6.57$

100% Ac-Di-Sol® ⟶ $7.73 = a\,(0) + b\,(1) + ab\,(0)\,(1)$

$b = 7.73$

50% Manitol : 50% Ac-Di-Sol® ⟶ $7.33 = a\,(0.5) + b(0.5) + ab(0.5)(0.5)$

$7.33 = 6.57(0.5) + 7.73(0.5) + ab\,(0.5)(0.5)$

$ab = 0.72$

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

$$Y = 6.57\,(A) + 7.73\,(B) + 0.72\,(A)\,(B)$$

Lampiran 11. Hasil pemeriksaan kerapuhan *Orally Disintegrating Tablet* Ibuprofen

Bobot Tablet	Formula I	Formula II	Formula III
Sebelum	3.894	3.945	3.832
Sesudah	3.860	3.917	3.814
Kerapuhan (%)	0.87%	0.71%	0.47%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ $0.87 = a(1) + b(0) + ab(1)(0)$

$a = 0.87$

100% Ac-Di-Sol® ⟶ $0.47 = a(0) + b(1) + ab(0)(1)$

$b = 0.47$

50% Manitol : 50% Ac-Di-Sol® ⟶ $0.71 = a(0.5) + b(0.5) + ab(0.5)(0.5)$

$0.71 = 0.71(0.5) + 0.47(0.5) + ab(0.5)(0.5)$

$ab = 0.16$

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

$$Y = 0.87(A) + 0.47(B) + 0.16(A)(B)$$

Lampiran 12. Hasil pemeriksaan waktu hancur *Orally Disintegrating Tablet* Ibuprofen

Waktu Hancur Tablet (detik)			
Replika	Formula I	Formula II	Formula III
1	21	44	56
2	19	45	54
3	20	47	58
X	20	45.33	53.67
SD	1	1.53	2.52
CV	5.00%	3.38%	4.70%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ $20 = a(1) + b(0) + ab(1)(0)$

$a = 20$

100% Ac-Di-Sol® ⟶ $53.67 = a(0) + b(1) + ab(0)(1)$

$b = 53.67$

50% Manitol : 50% Ac-Di-Sol® ⟶ $45.33 = a(0.5)+b(0.5)+ ab(0.5)(0.5)$

$45.33 = 20(0.5)+53.67(0.5) + ab(0.5)(0.5)$

$ab = 33.98$

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

$$Y = 20 (A) + 53.67 (B) + 33.98 (A) (B)$$

Lampiran 13. Hasil pemeriksaan waktu pembasahan *Orally Disintegrating Tablet* Ibuprofen

Waktu Pembasahan Tablet (detik)			
Replika	Formula I	Formula II	Formula III
1	21	27	36
2	20	27	38
3	22	29	39
X	21	27.67	37.67
SD	1	1.15	1.53
CV	4.76%	4.16%	4.06%

Keterangan:
X = purata percobaan
SD = simpangan baku
FI : Manitol 100% : Ac-Di-Sol® 0%
FII : Manitol 50% : Ac-Di-Sol® 50%
FIII : Manitol % : Ac-Di-Sol® 100%

100% Manitol ⟶ $21 = a(1) + b(0) + ab(1)(0)$

$a = 21$

100% Ac-Di-Sol® ⟶ $37.67 = a(0) + b(1) + ab(0)(1)$

$b = 37.67$

50% Manitol : 50% Ac-Di-Sol® ⟶ $27.67 = a(0.5)+b(0.5)+ ab(0.5)(0.5)$

$27.67 = 21(0.5)+37.67(0.5) + ab(0.5)(0.5)$

$ab = -6.66$

Dari perhitungan koefisien yang diperoleh, maka didapatkan persamaan sebagai berikut :

$$Y = 21 (A) + 37.67 (B) – 6.66 (A) (B)$$

Lampiran 14. Perhitungan kadar ibuprofen

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

Volum media disolusi : 900 ml

Dosis ibuprofen 1 tablet : 50 mg

Fx : faktor pengenceran

Formula I Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/mL)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.631	0.0159	14.32		28.64
30	0.362	0.0087	40.16	5	80.32
45	0.436	0.0108	48.8	5	97.62
60	0.350	0.0086	38.76	5	77.52

Formula I Replikasi 2

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.624	0.0157	14.16		28.32
30	0.353	0.0087	39.11	5	78.77
45	0.421	0.0105	47.06	5	94.12
60	0.338	0.0083	37.36	5	74.72

Formula I Replikasi 3

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.615	0.0155	13.95		27.90
30	0.344	0.0085	38.06	5	76.12
45	0.419	0.0104	46.82	5	93.64
60	0.321	0.0079	35.37	5	70.74

Rata-rata kadar ibuprofen formula I

Waktu (detik)	Replikasi1	Replikasi 2	Replikasi 3	Rata-rata kadar (%)
15	28.64	28.32	27.90	28.29
30	80.32	78.77	76.12	78.40
45	97.62	94.12	93.64	95.13
60	77.52	74.72	70.74	74.33

Formula II Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.564	0.0142	12.75		25.50
30	0.792	0.0200	18.08		36.16
45	0.361	0.0089	40.04	5	80.08
60	0.421	0.0105	47.06	5	94.12

Formula II Replikasi 2

Waktu (detik)	Absorbansi	Kadar (mg/mL)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.493	0.0123	11.09		22.18
30	0.723	0.0183	16.47		32.94
45	0.349	0.0086	38.64	5	77.28
60	0.406	0.0100	45.30	5	90.60

Formula III Replikasi 3

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.511	0.0128	11.52		23.04
30	0.778	0.0197	17.76		35.52
45	0.355	0.0087	39.34	5	78.68
60	0.411	0.0102	45.89	5	91.78

Rata- rata kadar formula II

Waktu (detik)	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata kadar (%)
15	25.50	22.18	23.04	23.57
30	36.16	32.94	35.52	34.87
45	80.08	77.28	78.68	78.68
60	94.12	90.60	91.78	92.17

Formula III Replikasi 1

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	Fx	Kadar (%)
15	0.438	0.0109	9.81		19.62
30	0.723	0.0183	16.47		32.90
45	0.304	0.0074	33.38	5	66.76
60	0.413	0.0102	46.12	5	92.24

Formula III Replikasi 2

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.452	0.0116	10.44		20.28
30	0.769	0.0195	17,55		35.10
45	0.296	0.0072	32.45	5	64.90
60	0.418	0.0104	46.71	5	93.42

Formula III Replikasi 3

Waktu (detik)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 mL (mg)	fx	Kadar (%)
15	0.421	0.0105	9.41		18.82
30	0.714	0.0181	16.26		32.52
45	0.288	0.0070	31.51	5	63.04
60	0.394	0.0098	43.90	5	87.80

Rata-rata kadar formula III

Waktu (detik)	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata kadar (%)
15	19.62	20.28	18.82	19.57
30	32.90	35.10	32.52	33.51
45	66.76	64.90	63.04	64.90
60	92.24	93.42	87.80	91.15

Persamaan Regresi Linier waktu dan kadar :

Formula	Persamaan regresi linier	r
Formula I	30.325+1.0323	0.6986
Formula II	-9.25+1.6409	0.9897
Formula III	-5.08+1.6641	0.9696

Lampiran 15. Tanggap rasa

Lampiran 15.a. Kuisioner *orally disintegrating tablet* ibuprofen

LEMBAR KUISIONER TANGGAP RASA *ORALLY DISINTEGRATING TABLET* IBUPROFEN

Petunjuk pengisian :

1. Mengisi identitas diri pada tempat yang telah disediakan.
2. Cobalah satu formula *orally disintegrating tablet.* Sebelumnya, berkumurlah dahulu dengan air putih, kemudian masukkan tablet ke dalam mulut dan biarkan tablet larut sendiri setelah bercampur dengan saliva didalam mulut. Kemudian coba formula berikutnya dengan cara yang sama.
3. Isilah penilaian anda pada kolom dibawah ini :

   Identitas responden :

   Nama :

   Umur :

Formula	Manis	Sedang	Pahit	Waktu larut (detik)
Formula I				
Formula II				
Formula III				

4. Berikan Saran untuk ODT ibuprofen

Lampiran 15.b. Data hasil kuisioner tanggap rasa *orally disintegrating tablet* ibuprofen

No.	Nama Responden	Formula I		Formula II		Formula III	
		Rasa	Waktu Larut (detik)	Rasa	Waktu Larut (detik)	Rasa	Waktu Larut (detik)
1.	Arjuna	1	18	1	43	1	48
2.	Daniel	1	18	1	40	1	51
3.	Fajar	1	19	1	40	1	53
4.	Yessi	1	22	1	41	1	50
5.	Nisa'ul	1	20	1	43	1	52
6.	Yeli	1	21	1	45	1	51
7.	Asri	1	18	1	43	1	54
8.	Ily	1	20	1	43	1	52
9.	Nindy	1	19	1	42	1	50
10.	Sicilia	1	20	1	44	1	50
11.	Wiwik	1	23	1	41	2	55
12.	Dyah	1	18	1	44	1	52
13.	Firman	1	19	1	42	1	52
14.	Lutfi	1	20	1	42	1	50
15.	Dewi	1	19	1	45	1	54
16.	Lisa	1	18	1	43	2	51
17.	Siwi	1	22	1	40	1	52
18.	Dewangga	1	19	1	40	1	53
19.	Eva	1	19	1	41	1	52
20.	Sari	1	20	1	42	1	50
	Total respon (%)	100 %		100 %		90 %	

Keterangan : 1 = manis (suka)
2 = sedang
3= pahit

Lampiran 16. Uji anova granul dan tablet ODT Ibuprofen

Lampiran 16.a. Waktu Alir

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Waktu alir	9	5.8333	.94967	4.85	7.40

One-Sample Kolmogorov-Smirnov Test

		Waktu alir
N		9
Normal Parameters[a,,b]	Mean	5.8333
	Std. Deviation	.94967
Most Extreme Differences	Absolute	.264
	Positive	.264
	Negative	-.179
Kolmogorov-Smirnov Z		.791
Asymp. Sig. (2-tailed)		.559

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

Waktu alir

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	7.0333	.32146	.18559	6.2348	7.8319	6.80	7.40
Formula II	3	5.5167	.07638	.04410	5.3269	5.7064	5.45	5.60
Formula III	3	4.9500	.13229	.07638	4.6214	5.2786	4.85	5.10
Total	9	5.8333	.94967	.31656	5.1034	6.5633	4.85	7.40

Test of Homogeneity of Variances

Waktu alir

Levene Statistic	df1	df2	Sig.
5.043	2	6	.052

ANOVA

Waktu alir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.962	2	3.481	82.441	.000
Within Groups	.253	6	.042		
Total	7.215	8			

Post Hoc Tests

Multiple Comparisons

Waktu alir

LSD

(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	1.51667*	.16777	.000	1.1061	1.9272
	Formula III	2.08333*	.16777	.000	1.6728	2.4939
Formula II	Formula I	-1.51667*	.16777	.000	-1.9272	-1.1061
	Formula III	.56667*	.16777	.015	.1561	.9772
Formula III	Formula I	-2.08333*	.16777	.000	-2.4939	-1.6728
	Formula II	-.56667*	.16777	.015	-.9772	-.1561

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

Lampiran 16.b. Daya serap air

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
daya serap air	9	.86100	.135985	.697	1.058

One-Sample Kolmogorov-Smirnov Test

		daya serap air
N		9
Normal Parameters[a.,b]	Mean	.86100
	Std. Deviation	.135985
Most Extreme Differences	Absolute	.196
	Positive	.196
	Negative	-.169
Kolmogorov-Smirnov Z		.588
Asymp. Sig. (2-tailed)		.880

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

daya serap air

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	.72133	.022723	.013119	.66489	.77778	.697	.742
Formula II	3	.83400	.019975	.011533	.78438	.88362	.812	.851
Formula III	3	1.02767	.032130	.018550	.94785	1.10748	.994	1.058
Total	9	.86100	.135985	.045328	.75647	.96553	.697	1.058

Test of Homogeneity of Variances

daya serap air

Levene Statistic	df1	df2	Sig.
.321	2	6	.737

ANOVA

daya serap air

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.144	2	.072	110.933	.000
Within Groups	.004	6	.001		
Total	.148	8			

Post Hoc Tests

Multiple Comparisons

daya serap air

LSD

(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	-.112667*	.020804	.002	-.16357	-.06176
	Formula III	-.306333*	.020804	.000	-.35724	-.25543
Formula II	Formula I	.112667*	.020804	.002	.06176	.16357
	Formula III	-.193667*	.020804	.000	-.24457	-.14276
Formula III	Formula I	.306333*	.020804	.000	.25543	.35724
	Formula II	.193667*	.020804	.000	.14276	.24457

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

Lampiran 16.c. Kekerasan

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Kekerasan (Kg)	9	7.211	.5622	6.3	8.0

One-Sample Kolmogorov-Smirnov Test

		Kekerasan (Kg)
N		9
Normal Parameters[a.,b]	Mean	7.211
	Std. Deviation	.5622
Most Extreme Differences	Absolute	.159
	Positive	.119
	Negative	-.159
Kolmogorov-Smirnov Z		.476
Asymp. Sig. (2-tailed)		.977

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

Kekerasan (Kg)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	6.567	.3055	.1764	5.808	7.326	6.3	6.9
Formula II	3	7.333	.1528	.0882	6.954	7.713	7.2	7.5
Formula III	3	7.733	.3055	.1764	6.974	8.492	7.4	8.0
Total	9	7.211	.5622	.1874	6.779	7.643	6.3	8.0

Test of Homogeneity of Variances

Kekerasan (Kg)

Levene Statistic	df1	df2	Sig.
.855	2	6	.471

ANOVA

Kekerasan (Kg)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.109	2	1.054	15.063	.005
Within Groups	.420	6	.070		
Total	2.529	8			

Post Hoc Tests

Multiple Comparisons

Kekerasan (Kg)

LSD

(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	-.7667*	.2160	.012	-1.295	-.238
	Formula III	-1.1667*	.2160	.002	-1.695	-.638
Formula II	Formula I	.7667*	.2160	.012	.238	1.295
	Formula III	-.4000	.2160	.114	-.929	.129
Formula III	Formula I	1.1667*	.2160	.002	.638	1.695
	Formula II	.4000	.2160	.114	-.129	.929

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

Lampiran 16.d. Waktu Hancur

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Waktu Hancur	9	39.67	15.264	19	56

One-Sample Kolmogorov-Smirnov Test

		Waktu Hancur
N		9
Normal Parameters[a.,b]	Mean	39.67
	Std. Deviation	15.264
Most Extreme Differences	Absolute	.278
	Positive	.223
	Negative	-.278
Kolmogorov-Smirnov Z		.835
Asymp. Sig. (2-tailed)		.488

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

Waktu Hancur

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	20.00	1.000	.577	17.52	22.48	19	21
Formula II	3	45.33	1.528	.882	41.54	49.13	44	47
Formula III	3	53.67	2.517	1.453	47.42	59.92	51	56
Total	9	39.67	15.264	5.088	27.93	51.40	19	56

Test of Homogeneity of Variances

Waktu Hancur

Levene Statistic	df1	df2	Sig.
1.169	2	6	.373

ANOVA

Waktu Hancur

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1844.667	2	922.333	286.241	.000
Within Groups	19.333	6	3.222		
Total	1864.000	8			

Post Hoc Tests

Multiple Comparisons

Waktu Hancur

LSD

(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	-25.333*	1.466	.000	-28.92	-21.75
	Formula III	-33.667*	1.466	.000	-37.25	-30.08
Formula II	Formula I	25.333*	1.466	.000	21.75	28.92
	Formula III	-8.333*	1.466	.001	-11.92	-4.75
Formula III	Formula I	33.667*	1.466	.000	30.08	37.25
	Formula II	8.333*	1.466	.001	4.75	11.92

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

Lampiran 16.e. Waktu pembasahan

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu pembasahan	9	28.7778	7.34469	20.00	39.00

One-Sample Kolmogorov-Smirnov Test

		waktu pembasahan
N		9
Normal Parameters[a.,b]	Mean	28.7778
	Std. Deviation	7.34469
Most Extreme Differences	Absolute	.171
	Positive	.155
	Negative	-.171
Kolmogorov-Smirnov Z		.512
Asymp. Sig. (2-tailed)		.956

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

waktu pembasahan

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	21.0000	1.00000	.57735	18.5159	23.4841	20.00	22.00
Formula II	3	27.6667	1.15470	.66667	24.7982	30.5351	27.00	29.00
Formula III	3	37.6667	1.52753	.88192	33.8721	41.4612	36.00	39.00
Total	9	28.7778	7.34469	2.44823	23.1322	34.4234	20.00	39.00

Test of Homogeneity of Variances

waktu pembasahan

Levene Statistic	df1	df2	Sig.
.462	2	6	.651

ANOVA

waktu pembasahan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	422.222	2	211.111	135.714	.000
Within Groups	9.333	6	1.556		
Total	431.556	8			

Post Hoc Tests

Multiple Comparisons

waktu pembasahan

LSD

(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	-6.66667*	1.01835	.001	-9.1585	-4.1749
	Formula III	-16.66667*	1.01835	.000	-19.1585	-14.1749
Formula II	Formula I	6.66667*	1.01835	.001	4.1749	9.1585
	Formula III	-10.00000*	1.01835	.000	-12.4918	-7.5082
Formula III	Formula I	16.66667*	1.01835	.000	14.1749	19.1585
	Formula II	10.00000*	1.01835	.000	7.5082	12.4918

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

Lampiran 16.f. Disolusi

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Disolusi	9	48.788611	8.5341308	39.5700	61.3350

One-Sample Kolmogorov-Smirnov Test

		Disolusi
N		9
Normal Parameters[a.,b]	Mean	48.788611
	Std. Deviation	8.5341308
Most Extreme Differences	Absolute	.244
	Positive	.244
	Negative	-.200
Kolmogorov-Smirnov Z		.732
Asymp. Sig. (2-tailed)		.658

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

Disolusi

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Formula I	3	59.699167	1.5479106	.8936866	55.853944	63.544390	58.2575	61.3350
Formula II	3	45.777500	1.3500069	.7794269	42.423897	49.131103	44.4250	47.1250
Formula III	3	40.889167	1.1595913	.6694904	38.008582	43.769751	39.5700	41.7475
Total	9	48.788611	8.5341308	2.8447103	42.228698	55.348525	39.5700	61.3350

Test of Homogeneity of Variances

Disolusi

Levene Statistic	df1	df2	Sig.
.087	2	6	.918

ANOVA

Disolusi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	571.525	2	285.762	154.100	.000
Within Groups	11.126	6	1.854		
Total	582.651	8			

Post Hoc Tests

Multiple Comparisons

Disolusi

LSD

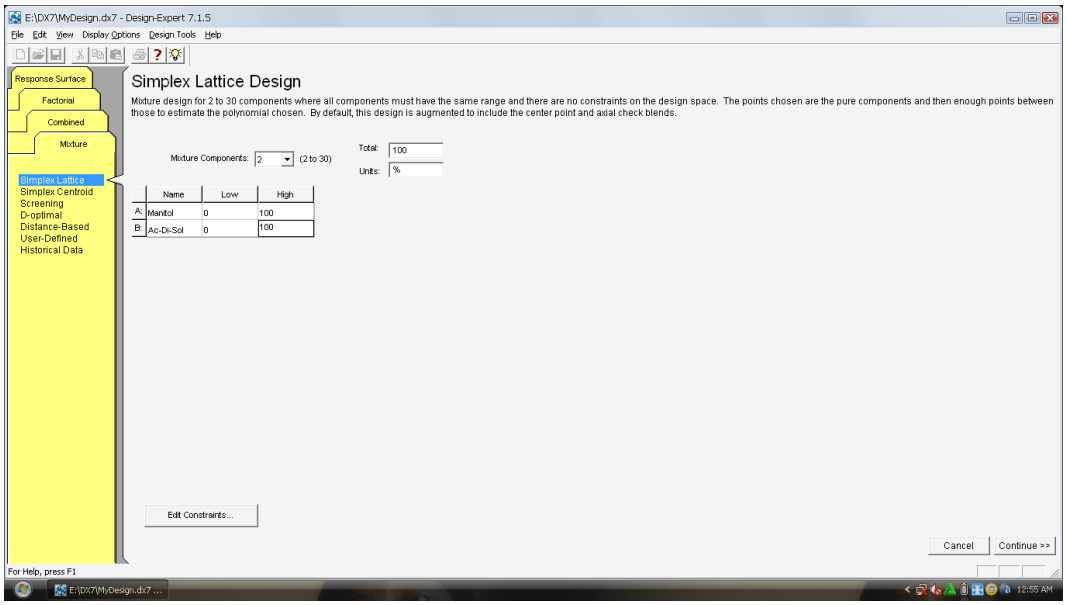
(I) Formula ODT	(J) Formula ODT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula I	Formula II	13.9216667*	1.1118751	.000	11.201006	16.642327
	Formula III	18.8100000*	1.1118751	.000	16.089340	21.530660
Formula II	Formula I	-13.9216667*	1.1118751	.000	-16.642327	-11.201006
	Formula III	4.8883333*	1.1118751	.005	2.167673	7.608994
Formula III	Formula I	-18.8100000*	1.1118751	.000	-21.530660	-16.089340
	Formula II	-4.8883333*	1.1118751	.005	-7.608994	-2.167673

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

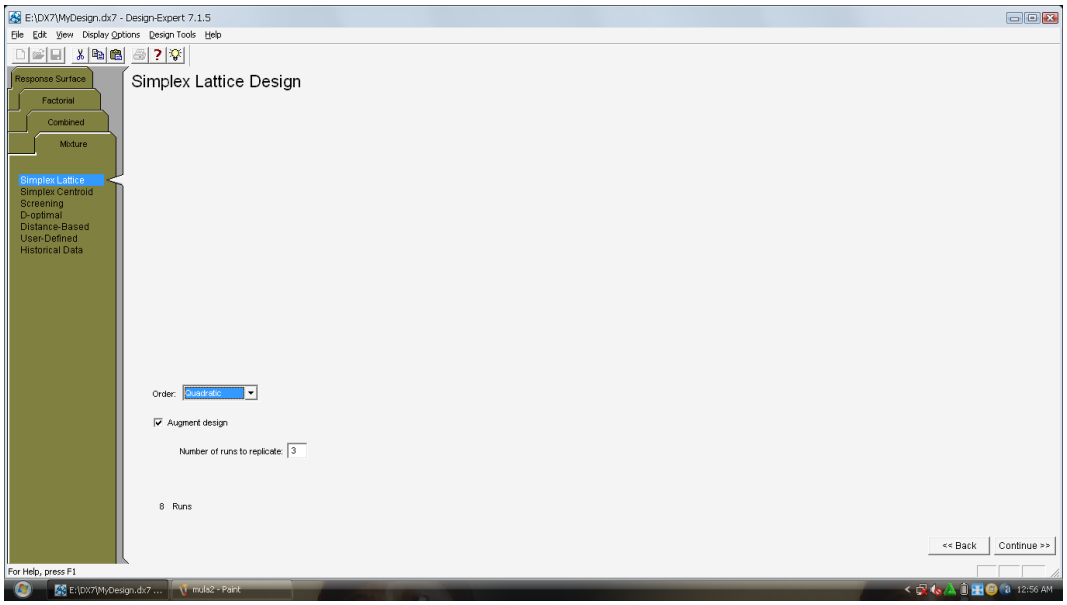
Lampiran 17. Penentuan formula optimum *orally disintegrating tablet* ibuprofen

Penentuan formula optimum

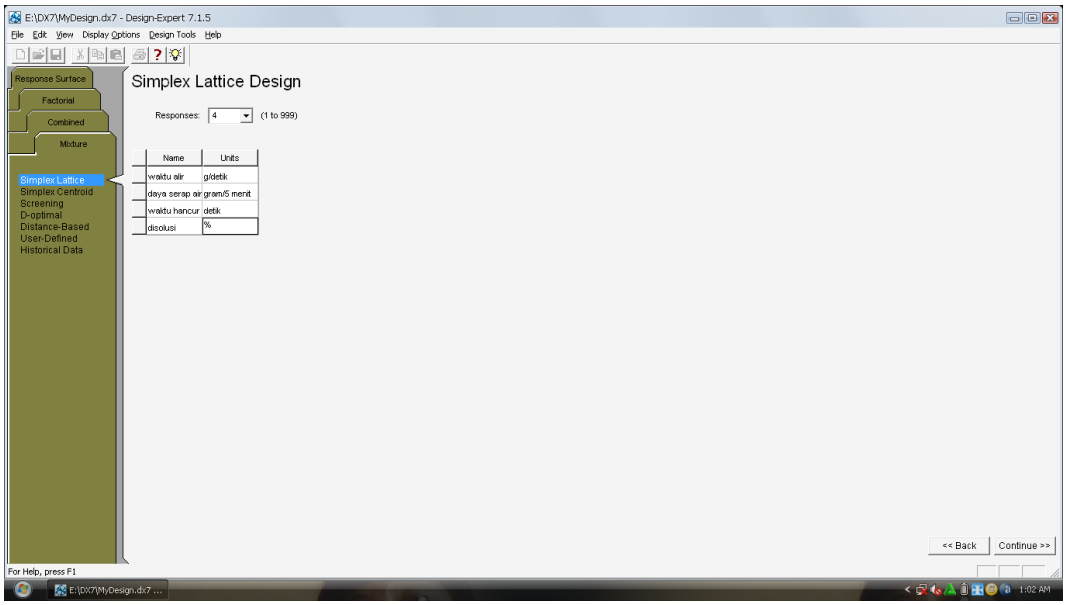
Langkah awal penggunaan aplikasi *design expert* untuk optimasi model *simplex lattice design*, pilih *mixture* → *Simplex Lattice*, tekan *Continue*



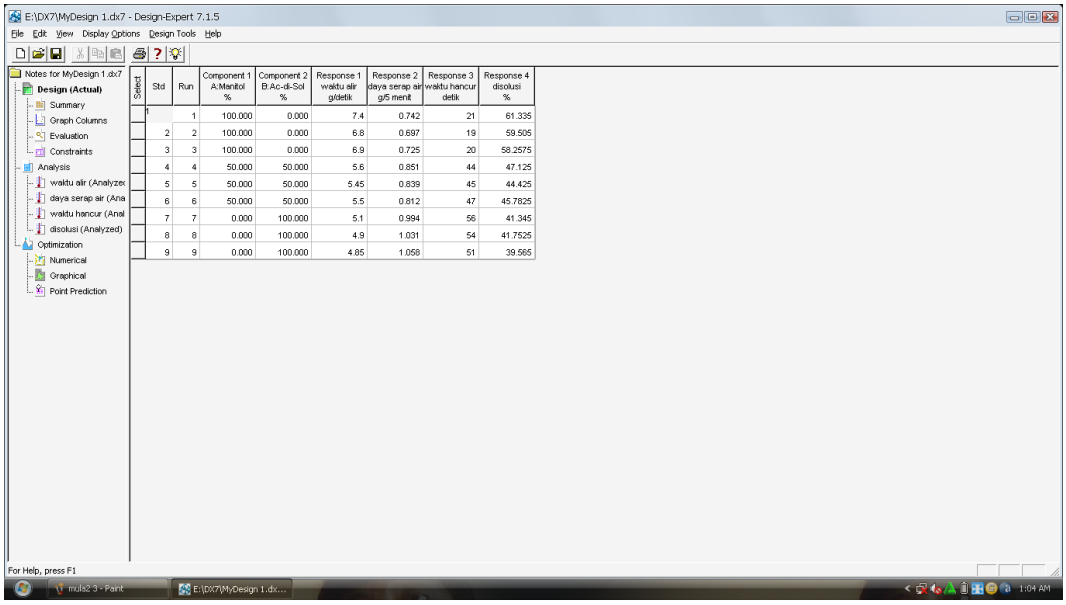
Selanjutnya isi beberapa kolom :
Kolom total → 100, Unit → %
Kolom A → Manitol
Kolom B → Ac-Di-Sol®



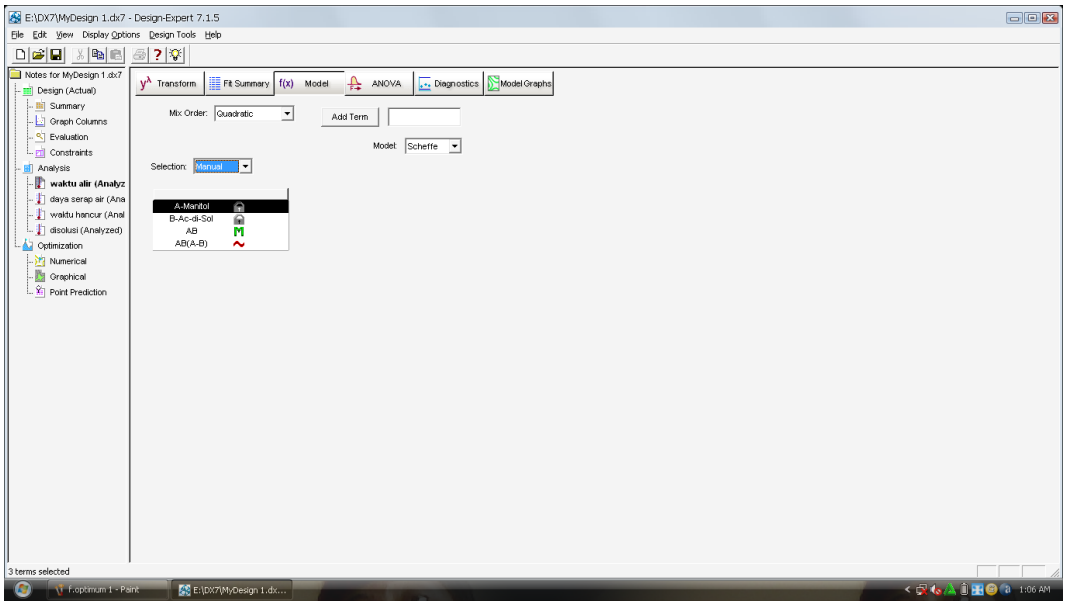
Kolom order dipilih *quadatric*, selanjutnya tekan *Continue*



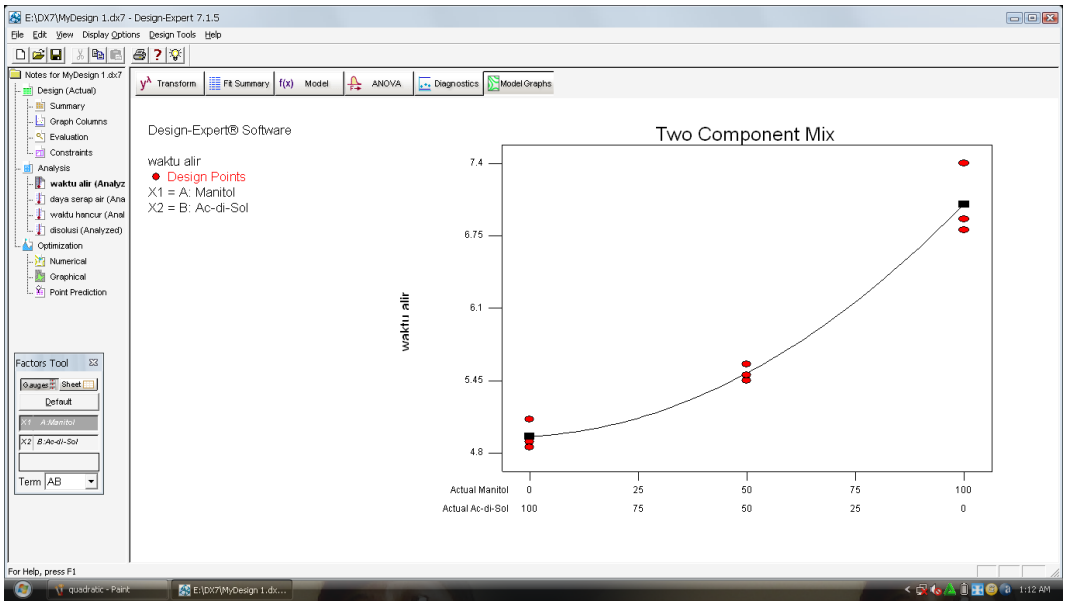
kolom respon diganti angka 4 dan respon beserta satuan ditulis pada kolom yang tersedia (waktu alir, daya serap air, waktu hancur dan disolusi), tekan *Continue*



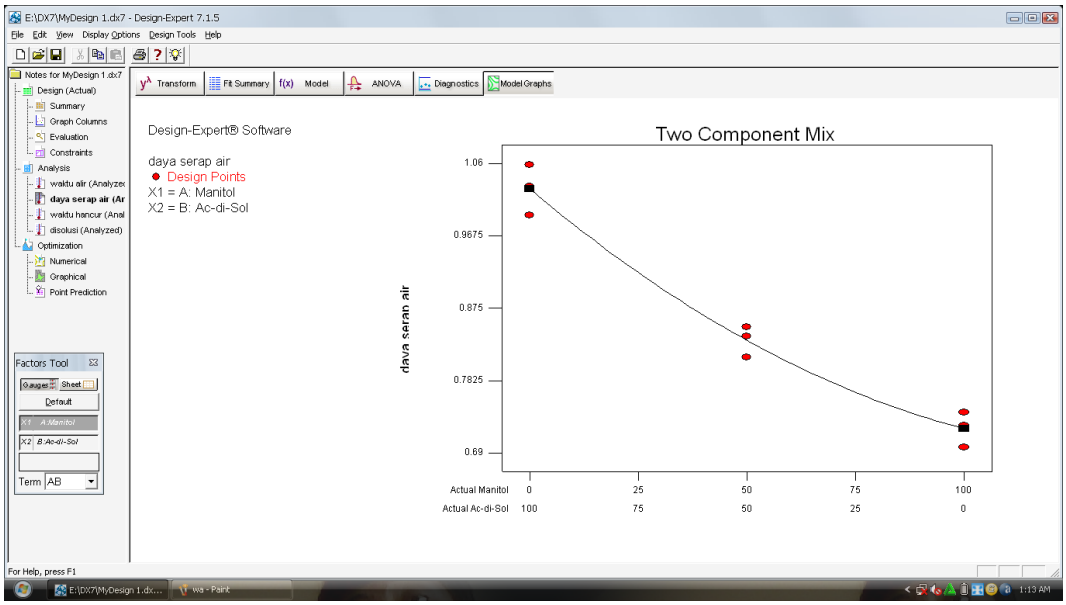
Tampilan diatas menunjukkan 3 formula dengan 4 respon yang kemudian diisi nilai respon dari ketiga formula pada masing-masing kolom.



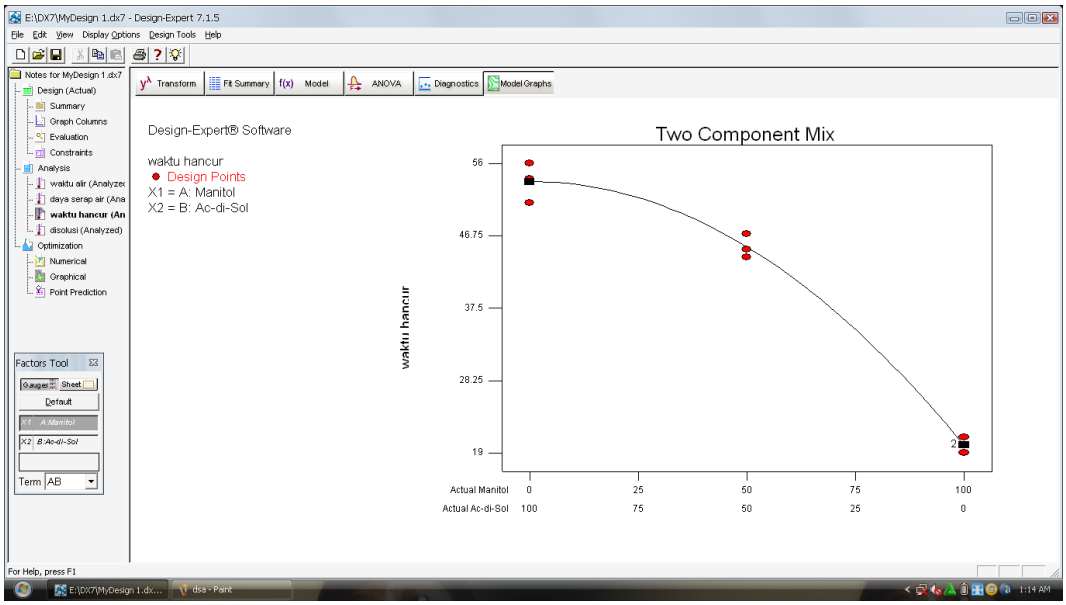
Analisis dari semua respon menggunakan model yang sama yaitu *quadratic*.



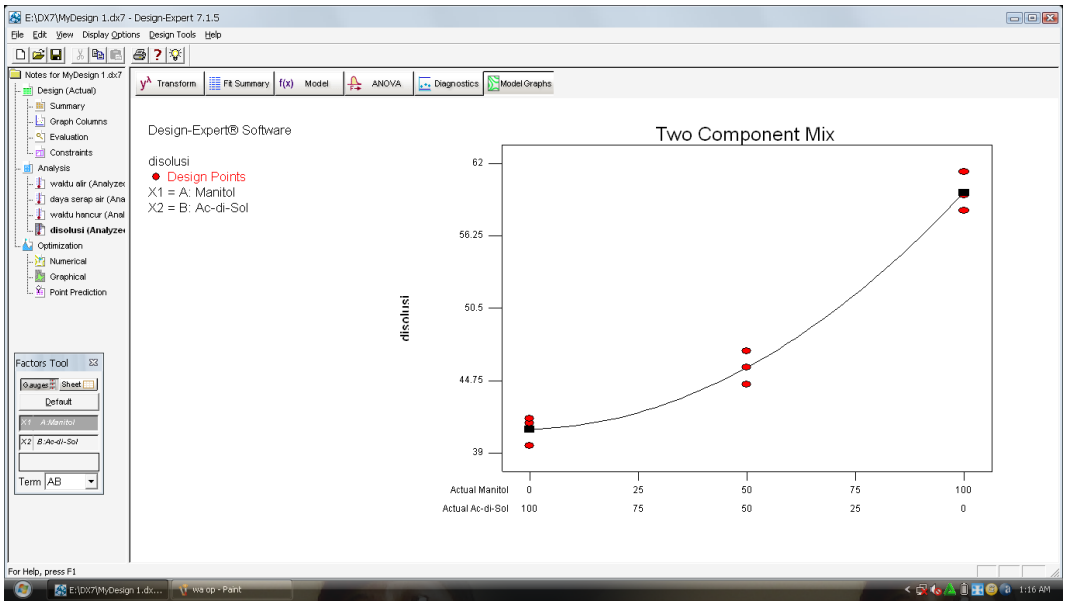
Model grafik untuk respon waktu alir



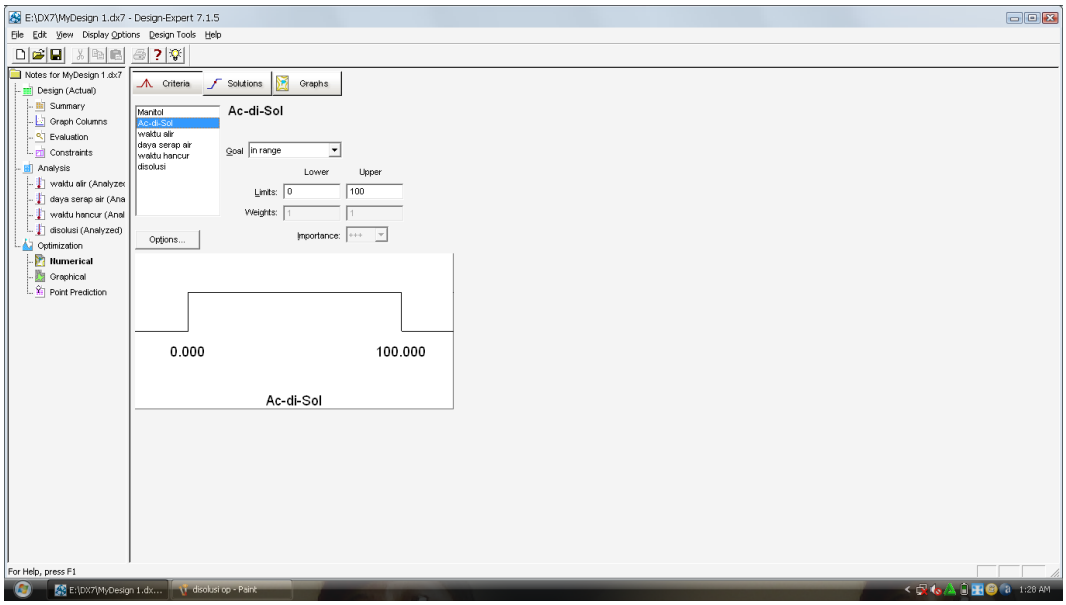
Model grafik untuk respon daya serap air



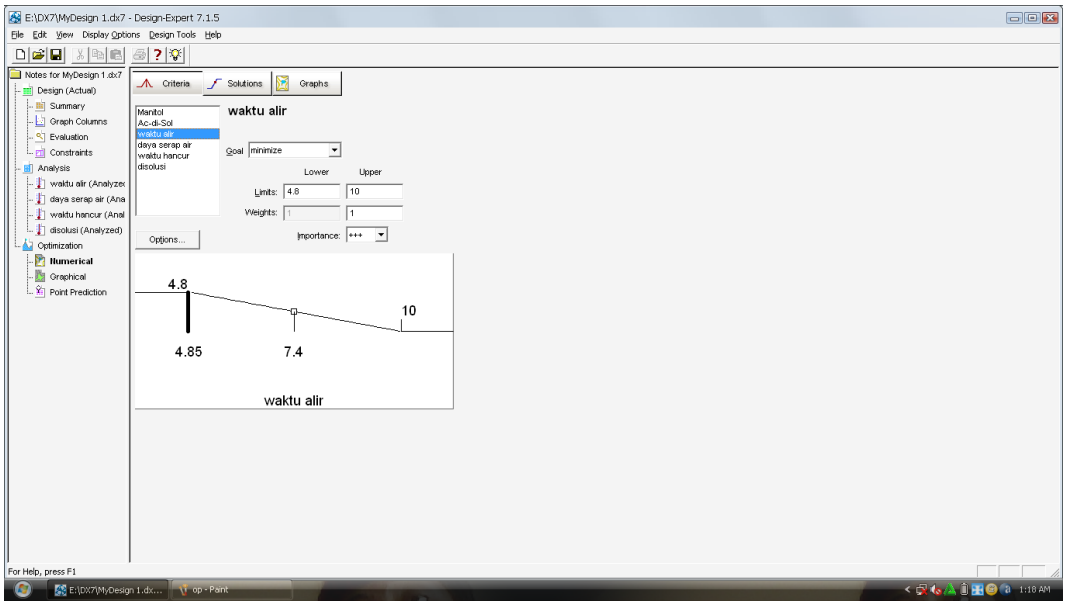
Model grafik untuk respon waktu hancur



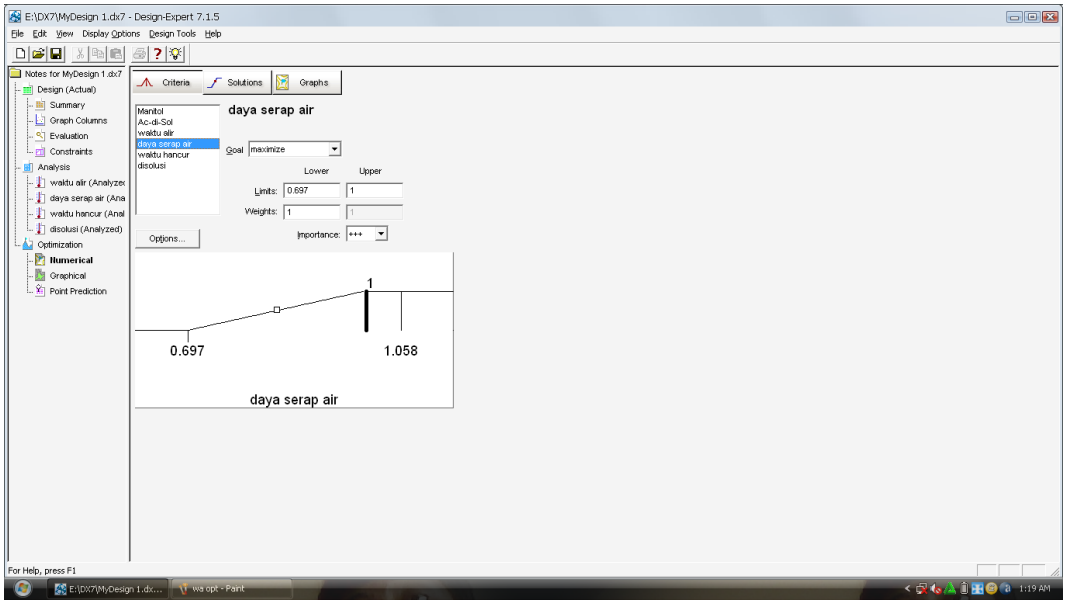
Model grafik untuk respon disolusi



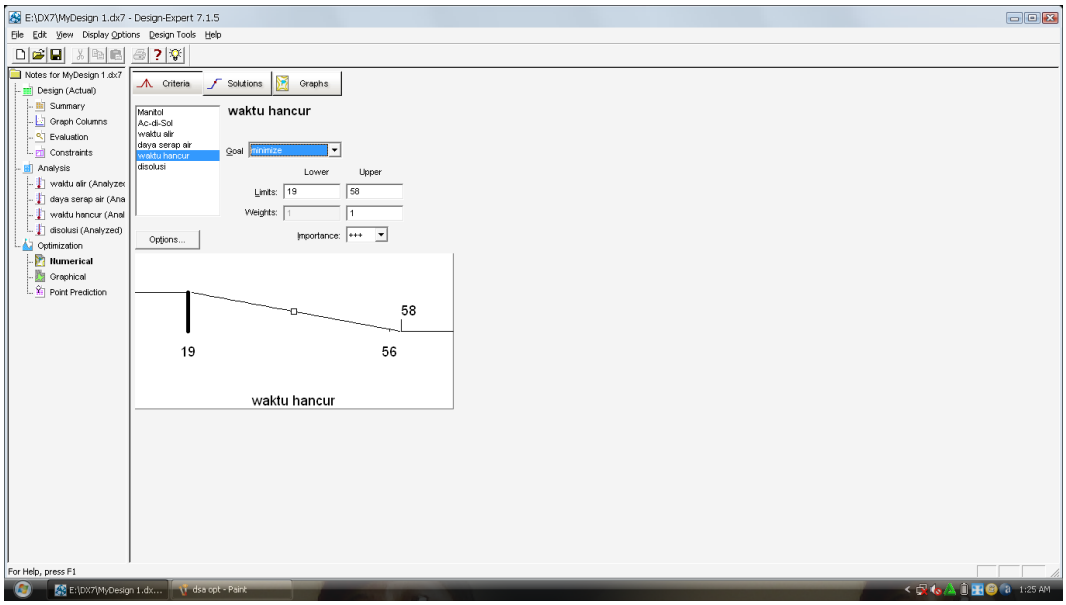
Optimasi Manitol dan Ac-Di-Sol® dibuat *in range*



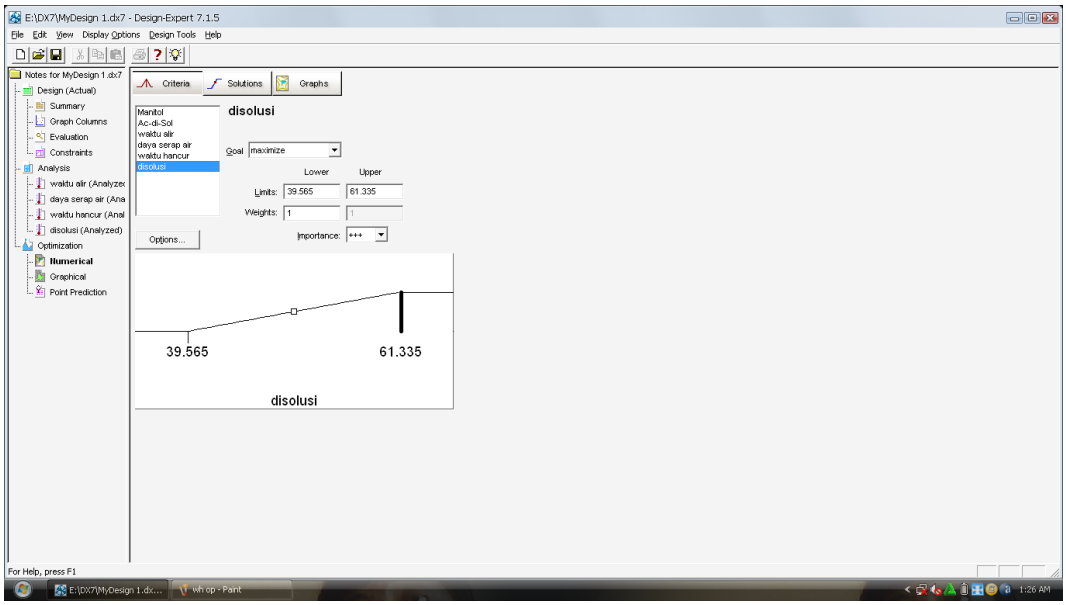
Optimasi waktu alir dibuat *Minimize*



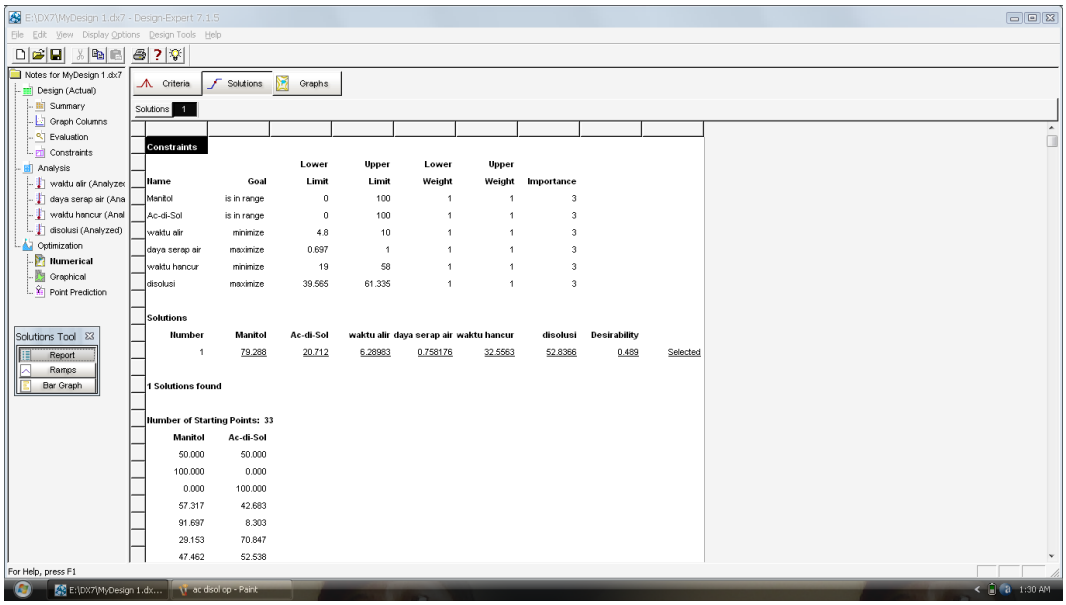
Optimasi daya serap air dibuat *maximize*



Optimasi waktu hancur dibuat *minimize*



Optimasi Disolusi dibuat *maximize*



Constraints

Name	Goal	Lower Limit	Upper Limit	Lower Weight	Upper Weight	Importance
Manitol	is in range	0	100	1	1	3
Ac-di-Sol	is in range	0	100	1	1	3
waktu alir	minimize	4.8	10	1	1	3
daya serap air	maximize	0.697	1	1	1	3
waktu hancur	minimize	19	58	1	1	3
disolusi	maximize	39.565	61.335	1	1	3

Solutions

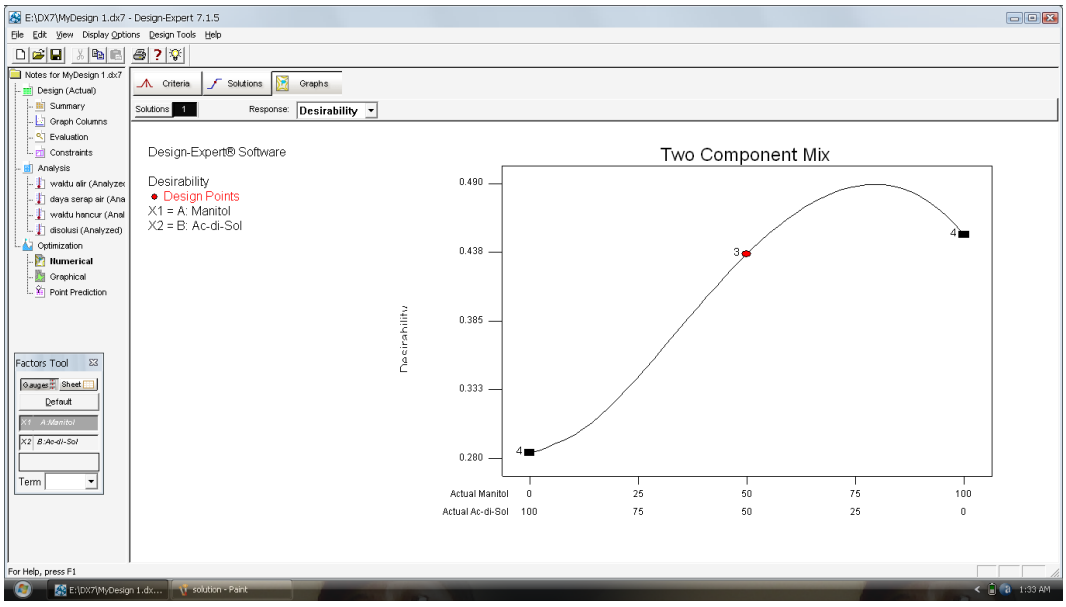
Number	Manitol	Ac-di-Sol	waktu alir	daya serap air	waktu hancur	disolusi	Desirability	
1	79.288	20.712	6.28983	0.758176	32.5563	52.8366	0.489	Selected

1 Solutions found

Number of Starting Points: 33

Manitol	Ac-di-Sol
50.000	50.000
100.000	0.000
0.000	100.000
57.317	42.683
91.697	8.303
29.153	70.847
47.462	52.538

Solusi yang diperoleh



Grafik formula optimum yang diperoleh

Lampiran 18. Uji sifat fisik granul dan tablet formula optimum *orally disintegrating tablet* ibuprofen

Lampiran 18.a. Waktu alir granul formula optimum *orally disintegrating tablet* ibuprofen

Waktu alir (detik)		Waktu alir (detik)	
bobot	waktu	bobot	waktu
20	1,24	100	6,20
20	1,19	100	5,95
20	1,29	100	6,45
X			6,2
SD			0,25

Lampiran 18.b. Daya serap air granul formula optimum *orally disintegrating tablet* ibuprofen

Berat botol timbang + 1 g granul	5 menit	Daya serap air
20.312	21,068	0,756
20.295	21,098	0,803
20.304	21,075	0,771
X		0,780
SD		0,02
CV		2,56%

Lampiran 18.c. Kekerasan formula optimum *orally disintegrating tablet* ibuprofen

Replikasi	Kekerasan (kg)
1	5,2
2	5,2
3	5,0
Rata-rata	5,13
SD	0,12

Lampiran 18.d. Keseragaman bobot formula optimum *orally disintegrating tablet* ibuprofen

Tablet	Bobot (mg)
1	197
2	196
3	198
4	197
5	195
6	194
7	197
8	199
9	191
10	195
11	191
12	198
13	197
14	196
15	92
16	197
17	196
18	198
19	197
20	196
Rata-rata	195,85
SD	2,28
CV	1,16 %

Lampiran 18.e. Kerapuhan formula optimum *orally disintegrating tablet* ibuprofen

Bobot awal = 3,925 gram

Bobot akhir = 3,896 gram

% Kerapuhan = $\frac{3,925-3,896}{3,925}$ $X\ 100\% = 0,74\ \%$

Lampiran 18.f. Waktu hancur formula optimum *orally disintegrating tablet* ibuprofen

Waktu Hancur (detik)	
Replika	Formula Optimum
1	32
2	32
3	34
X	32.67
SD	1.15
CV	3.52%

Lampiran 18.g. Waktu pembasahan formula optimum *orally disintegrating tablet* ibuprofen

Waktu Pembasahan (detik)	
Replika	Formula Optimum
1	5
2	5,2
3	5,4
X	5,2
SD	0,2
CV	3,85%

Lampiran 18.h. Uji disolusi formula optimum *orally disintegrating tablet* ibuprofen

Replikasi 1

Waktu (menit)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml (mg)	fx	Kadar (%)
15	0,537	0.0135	12.12		24.24
30	0,296	0.0072	32.45	5	64.90
45	0,397	0.0095	42.85	5	88.50
60	0,332	0.0081	36.65	5	73.30

Replikasi 2

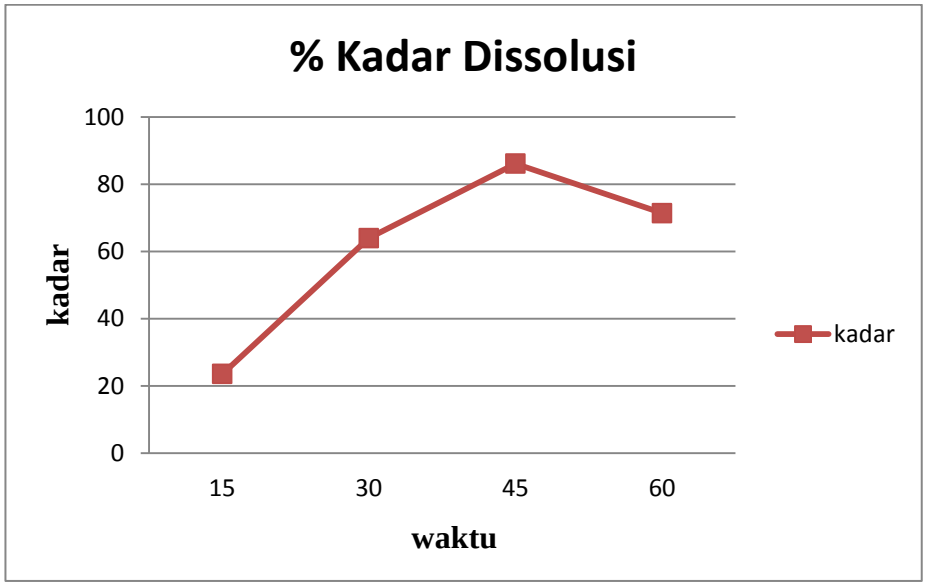
Waktu (menit)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml	fx	Kadar (%)
15	0.512	0.0128	11.54		23.08
30	0.289	0.0070	31.63	5	63.26
45	0.378	0.0093	42.03	5	84.06
60	0.315	0.0077	34.68	5	69.36

Replikasi 3

Waktu (menit)	Absorbansi	Kadar (mg/ml)	Kadar dalam 900 ml	fx	Kadar (%)
15	0.518	0.0130	11.68		23.36
30	0.291	0.0071	31.86	5	63.72
45	0.385	0.0095	42.85	5	85.70
60	0.324	0.0079	35.72	5	71.44

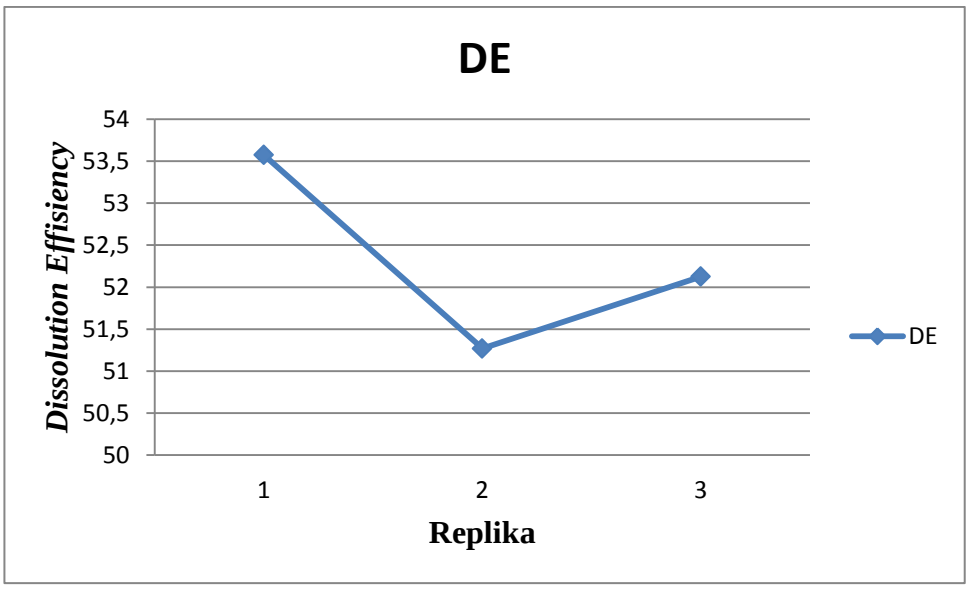
Rata-rata kadar formula optimum

Waktu (menit)	kadar (%)
15	23.56
30	63.96
45	86.09
60	71.37



Dissolution Effisiency Formula Optimum

Replika	DE
1	53.5725
2	51.27
3	52.125
Rata-rata	52.3225



Lampiran 18.i. Tanggap rasa formula optimum *orally disintegrating tablet* ibuprofen

Lampiran 18.i.1.Kuisioner *orally disintegrating tablet* ibuprofen

LEMBAR KUISIONER TANGGAP RASA *ORALLY DISINTEGRATING TABLET* IBUPROFEN

Petunjuk pengisian :

1. Mengisi identitas diri pada tempat yang telah disediakan.
2. Cobalah satu formula *orally disintegrating tablet.* Sebelumnya, berkumurlah dahulu dengan air putih, kemudian masukkan tablet ke dalam mulut dan biarkan tablet larut sendiri setelah bercampur dengan saliva didalam mulut. Kemudian coba formula berikutnya dengan cara yang sama.
3. Isilah penilaian anda pada kolom dibawah ini :

   Identitas responden :

   Nama :

   Umur :

Formula	Manis	Sedang	Pahit	Waktu larut (detik)
Formula Optimum				

4. Berikan Saran untuk ODT ibuprofen

Lampiran 18.i.2. Data hasil kuisioner tanggap rasa formula optimum *orally disintegrating tablet* ibuprofen

No.	Nama Responden	Formula Optimum	
		Rasa	Waktu Larut (detik)
1.	Arjuna	1	25
2.	Daniel	1	25
3.	Fajar	1	27
4.	Yessi	1	25
5.	Nisa'ul	1	26
6.	Yeli	1	27
7.	Asri	1	25
8.	Ily	1	27
9.	Nindy	1	26
10.	Sicilia	1	26
11.	Wiwik	1	27
12.	Dyah	1	26
13.	Firman	1	25
14.	Lutfi	1	25
15.	Dewi	1	25
16.	Lisa	1	25
17.	Siwi	1	27
18.	Dewangga	1	25
19.	Eva	1	26
20.	Sari	1	25
	Total respon (%)	100 %	

Keterangan : 1 = manis
2 = sedang
3 = pahit

Lampiran 19. Analisis Statistik T-Test formula optimum *orally disintegrating tablet* ibuprofen

a. Data hasil uji *t* waktu alir

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Waktu Alir	6	6.245190	.1656821	5.9500	6.4500

One-Sample Kolmogorov-Smirnov Test

		Waktu Alir
N		6
Normal Parameters[a,,b]	Mean	6.245190
	Std. Deviation	.1656821
Most Extreme Differences	Absolute	.274
	Positive	.226
	Negative	-.274
Kolmogorov-Smirnov Z		.672
Asymp. Sig. (2-tailed)		.758

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	Formula ODT	N	Mean	Std. Deviation	Std. Error Mean
Waktu Alir	formula prediksi	3	6.290380	.0000000	.0000000
	formula percobaan	3	6.200000	.2500000	.1443376

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	4.000	.116	.626	4	.565	.0903800	.1443376	-.3103653	.4911253
	Equal variances not assumed			.626	2.000	.595	.0903800	.1443376	-0654	.7114144

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	4.000	.116	.626	4	.565	.0903800	.1443376	-.3103653	.4911253
	Equal variances not assumed			.626	2.000	.595	.0903800	.1443376	-.5306544	.7114144

18.b. Hasil uji *t* daya serap air

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Daya Serap Air	6	.767403	.0182621	.7560	.8030

One-Sample Kolmogorov-Smirnov Test

		Daya Serap Air
N		6
Normal Parameters[a,,b]	Mean	.767403
	Std. Deviation	.0182621
Most Extreme Differences	Absolute	.361
	Positive	.361
	Negative	-.266
Kolmogorov-Smirnov Z		.883
Asymp. Sig. (2-tailed)		.416

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	Formula ODT	N	Mean	Std. Deviation	Std. Error Mean
Daya Serap Air	formula prediksi	3	.758140	.0000000	.0000000
	formula percobaan	3	.776667	.0240069	.0138604

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	8.108	.047	-1.337	4	.252	-.0185267	.0138604	-.0570093	.0199560
	Equal variances not assumed			-1.337	2.000	.313	-.0185267	.0138604	-.0781632	.0411099

18.c. Hasil uji *t* waktu hancur

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Waktu Hancur	6	32.606883	.7332272	32.0000	34.0000

One-Sample Kolmogorov-Smirnov Test

		Waktu Hancur
N		6
Normal Parameters[a,,b]	Mean	32.606883
	Std. Deviation	.7332272
Most Extreme Differences	Absolute	.366
	Positive	.366
	Negative	-.204
Kolmogorov-Smirnov Z		.896
Asymp. Sig. (2-tailed)		.398

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	32.547100	.0000000	.0000000
	Formula Percobaan	3	32.666667	1.1547005	.6666667

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	16.000	.016	-.179	4	.866	-.1195667	.6666667	-1.9705301	1.7313967
	Equal variances not assumed			-.179	2.000	.874	-.1195667	.6666667	-2.9880018	2.7488685

18..d. Hasil uji *t* disolusi

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Dissolusi	6	52.582100	.7891281	51.2700	53.5725

One-Sample Kolmogorov-Smirnov Test

		Dissolusi
N		6
Normal Parameters[a,,b]	Mean	52.582100
	Std. Deviation	.7891281
Most Extreme Differences	Absolute	.296
	Positive	.204
	Negative	-.296
Kolmogorov-Smirnov Z		.724
Asymp. Sig. (2-tailed)		.671

a. Test distribution is Normal.

b. Calculated from data.

T-Test

Group Statistics

	Formula	N	Mean	Std. Deviation	Std. Error Mean
Dissolusi	Formula Prediksi	3	52.841700	.0000000	.0000000
	Formula Percobaan	3	52.322500	1.1638863	.6719701

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
Dissolusi	Equal variances assumed	6.657	.061	.773	4	.483	.5192000	.6719701	-1.3464880	2.3848880
	Equal variances not assumed			.773	2.000	.521	.5192000	.6719701	-2.3720538	3.4104538