BAB V

PENUTUP

A. Kesimpulan

Kesimpulan dari penelitian ini adalah :

1. Meningkatnya jumlah karbopol 940P meningkatkan kekerasan dan menurunkan kerapuhan tablet mukoadhesif salbutamol sulfat.
2. Variasi natrium alginat dan karbopol 940P mempengaruhi kemampuan *swelling* tablet, jumlah variasi dalam perbandingan 15%:15% memiliki kemampuan *swelling* dan kekuatan mukoadhesif yang lebih baik dari sediaan tablet mukoadhesif salbutamol sulfat.
3. Variasi natrium alginat dan karbopol 940P mempengaruhi pelepasan salbutamol sulfat, jumlah variasi dalam perbandingan 15%:15% efektif menghambat pelepasan salbutamol sulfat dari sediaan tablet mukoadhesif salbutamol sulfat.

B. Saran

1. Perlu dilakukan optimasi untuk mengetahui formula optimum dari kombinasi matriks karbopol 940P dan natrium alginat pada tablet mukoadhesif salbutamol sulfat.
2. Perlu dilakukan penelitian lebih lanjut mengenai matriks yang dapat digunakan sebagai mukoadhesif yang mempunyai pengaruh yang lebih efektif terhadap salbutamol sulfat.

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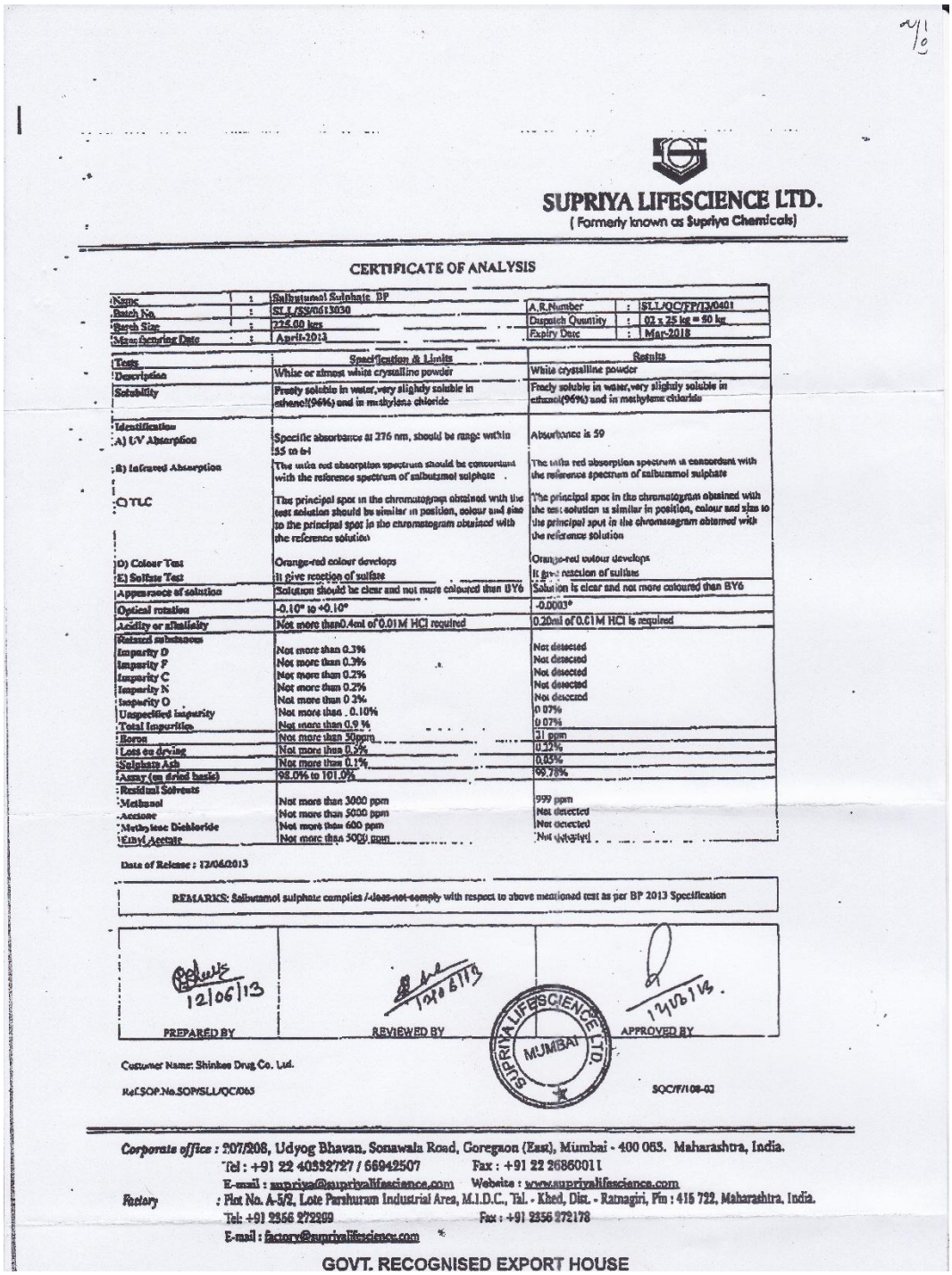
LAMPIRAN

Lampiran 1. Sertifikat CoA salbutamol sulfat



SUPRIYA LIFESCIENCE LTD.
(Formerly known as Supriya Chemicals)

CERTIFICATE OF ANALYSIS

Name	:	Salbutamol Sulphate BP			
Batch No.	:	SLL/SS/0613030	A.R.Number	:	SLL/QC/FP/13/0401
Batch Size	:	2250.00 kgs	Dispatch Quantity	:	02 x 25 kg = 50 kg
Mfg/Sampling Date	:	April-2013	Expiry Date	:	Mar-2018

Tests	Specification & Limits	Results
Description	White or almost white crystalline powder	White crystalline powder
Solubility	Freely soluble in water,very slightly soluble in ethanol(96%) and in methylene chloride	Freely soluble in water,very slightly soluble in ethanol(96%) and in methylene chloride
Identification		
A) UV Absorption	Specific absorbance at 276 nm, should be range within 55 to 61	Absorbance is 59
B) Infrared Absorption	The infra red absorption spectrum should be concordant with the reference spectrum of salbutamol sulphate	The infra red absorption spectrum is concordant with the reference spectrum of salbutamol sulphate
C) TLC	The principal spot in the chromatogram obtained with the test solution should be similar in position, colour and size to the principal spot in the chromatogram obtained with the reference solution	The principal spot in the chromatogram obtained with the test solution is similar in position, colour and size to the principal spot in the chromatogram obtained with the reference solution
D) Colour Test	Orange-red colour develops	Orange-red colour develops
E) Sulfate Test	It give reaction of sulfate	It give reaction of sulfate
Appearance of solution	Solution should be clear and not more coloured than BY6	Solution is clear and not more coloured than BY6
Optical rotation	-0.10° to +0.10°	-0.0003°
Acidity or alkalinity	Not more than0.4ml of 0.01M HCl required	0.20ml of 0.01M HCl is required
Related substances		
Impurity D	Not more than 0.3%	Not detected
Impurity F	Not more than 0.3%	Not detected
Impurity C	Not more than 0.2%	Not detected
Impurity N	Not more than 0.2%	Not detected
Impurity O	Not more than 0.3%	Not detected
Unspecified impurity	Not more than 0.10%	0.07%
Total Impurities	Not more than 0.9 %	0.07%
Boron	Not more than 50ppm	31 ppm
Loss on drying	Not more than 0.5%	0.22%
Sulphate Ash	Not more than 0.1%	0.03%
Assay (on dried basis)	98.0% to 101.0%	99.78%
Residual Solvents		
Methanol	Not more than 3000 ppm	999 ppm
Acetone	Not more than 5000 ppm	Not detected
Methylene Dichloride	Not more than 600 ppm	Not detected
Ethyl Acetate	Not more than 5000 ppm	Not detected

Date of Release : 13/06/2013

REMARKS: Salbutamol sulphate complies /does not comply with respect to above mentioned test as per BP 2013 Specification

12/06/13 — PREPARED BY

REVIEWED BY

APPROVED BY

SUPRIYA LIFESCIENCE LTD. MUMBAI

Customer Name: Shinkoo Drug Co. Ltd.

Ref.SOP.No.SOP/SLL/QC/065

SQC/F/108-02

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E-mail : supriya@supriyalifescience.com Website : www.supriyalifescience.com
Factory : Plot No. A-5/2, Lote Parshuram Industrial Area, M.I.D.C., Tal. - Khed, Dist. - Ratnagiri, Pin : 415 722, Maharashtra, India.
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GOVT. RECOGNISED EXPORT HOUSE

Lampiran 2. Perhitungan dosis salbutamol sulfat dalam tablet

Perhitungan dosis salbutamol tiap tablet adalah sebagai berikut :

Parameter farmakokimia salbutamol adalah sebagai berikut :

Waktu paruh ($t^1/_2$) : 4 jam

Konstanta kecepatan eliminasi (Kel) : 0,17325/jam

Dosis lazim salbutamol sulfat sebesar : 6 - 16 mg

Bioavailabilitas : 50 % berat badan diasumsikan 60 kg

Cp : 0,0179 mg/L (Moffat 2011)

Volume distribusi salbutamol sulfat : 156 L (Morgan 1986)

Rate in (keceparan pelepasan obat dari sediaan) = *Rate out* (kecepatan hilangnya obat dari badan),

Rate in = Kr = Cp x Vd xKel

= 0,0179 mg/L x 156 L x 0,17325/jam

= 0,484 mg/jam

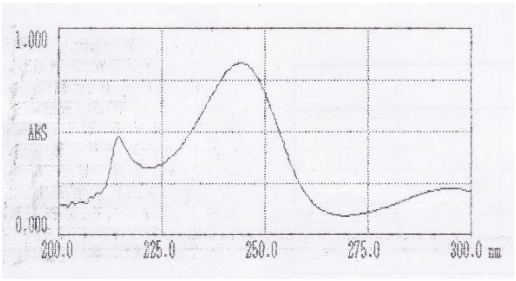
Jumlah salbutamol yang harus dilepaskan dari sediaan (R) dalam waktu 12 jam adalah : **R = $\frac{Kr}{f}$x 12 jam**

= $\frac{0{,}484\ mg/jam}{0{,}5}$ x 12 jam

= 11,616 mg ~ 12 mg

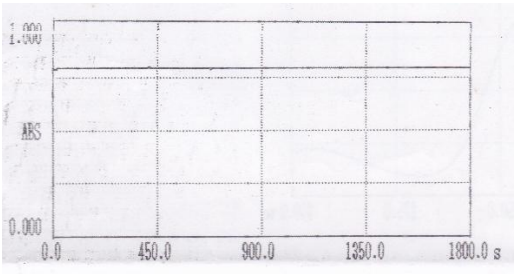
Lampiran 3. Kurva kalibrasi dan validasi metode analisis

a. Panjang gelombang maksimum



Panjang gelombang salbutamol sulfat setelah dilakukan *scanning* menghasilkan serapan tertinggi sebesar 0,834 pada panjang gelombang 244 nm.

b. *Operating time*



Data List (List Interval(s):60.0)

ID	TIME(s)	ABS	ID	TIME(s)	ABS	ID	TIME(s)	ABS
1	0.0	0.795	2	60.0	0.796	3	120.0	0.798
4	180.0	0.797	5	240.0	0.797	6	300.0	0.797
7	360.0	0.796	8	420.0	0.802	9	480.0	0.796
10	540.0	0.796	11	600.0	0.796	12	660.0	0.796
13	720.0	0.795	14	780.0	0.795	15	840.0	0.795
16	900.0	0.795	17	960.0	0.796	18	1020.0	0.796
19	1080.0	0.796	20	1140.0	0.796	21	1200.0	0.796
22	1260.0	0.796	23	1320.0	0.797	24	1380.0	0.796
25	1440.0	0.797	26	1500.0	0.797	27	1560.0	0.797
28	1620.0	0.797	29	1680.0	0.797	30	1740.0	0.797
31	1800.0	0.797						

Hasil *scanning operating time* menunjukan bahwa larutan salbutamol sulfat stabil, hal ini ditandai dengan stabilnya serapan yang terukur,

c. Kurva kalibrasi

Konsentrasi	Serapan		
(ppm atau µg/ml)	Pembacaan 1	Pembacaan 2	Rata-rata
4	0,197	0,199	0,198
6	0,307	0,306	0,307
8	0,418	0,419	0,419
10	0,535	0,538	0,537
12	0,628	0,629	0,629
14	0,744	0,740	0,742

Persamaan regresi linier antara konsentrasi dan serapan menghasilkan nilai :

a : -0,0171

b : 0,0543

r : 0,9996

keterangan: x adalah konsentrasi dan y adalah serapan

d. Penentuan LOD dan LOQ

Konsentrasi	Serapan	ý	|y- ý |	|y- ý |^2
4	0,198	0,2001	-0,0021	0,00000441
6	0,307	0,3087	-0,0017	0,00000289
8	0,419	0,4173	0,0017	0,00000289
10	0,537	0,5259	0,0111	0,00012321
12	0,629	0,6345	-0,0055	0,00003025
14	0,742	0,7431	-0,0011	0,00000121
Jumlah total				0,00016486

Nilai ý diperoleh dengan memasukan konsentrasi ke dalam persamaan y=0,0543,x-0,0171 (dengan x adalah konsentrasi dan y adalah serapan ý),

s x/y : $\sqrt{\frac{\Sigma\,|y-ý|2}{N-2}}$

keterangan :

s x/y : simpangan baku residual

$\Sigma|y-ý|^2$: jumlah total |y- ý |^2

N : jumlah data

s x/y : $\sqrt{\frac{0,00016486}{6-2}}$: 0,00642

LOD : $3,3x\frac{s\ x/y}{b}$

: $3,3\ x\ \frac{0,00642}{0,0543}$

: 0,390 ppm

y : a+bx

y : -0,0171+(0,0543x0,390)

Serapan LOD : 0,041

LOQ : $10\ x\frac{s\ x/y}{b}$

: $10\ x\frac{0,00642}{0,0543}$

: 1,182 ppm

y : a+bx

y : -0,0171+(0,0543x1,182)

Serapan LOQ : 0,047

e. *Recovery* atau perolehan kembali

Penambahan (mg)	Serapan				Kadar (ppm)	Recovery
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata		
9.6	0.392	0.391	0.391	0.391	7.522	97.94
	0.393	0.391	0.392	0.392	7.534	98.10
	0.395	0.396	0.396	0.396	7.602	98.98
12	0.504	0.503	0.502	0.503	9.578	99.77
	0.497	0.500	0.502	0.499	9.505	99.01
	0.501	0.503	0.502	0.502	9.560	99.58
14.4	0.609	0.611	0.610	0.610	11.549	100.25
	0.611	0.612	0.611	0.611	11.573	100.46
	0.608	0.609	0.609	0.609	11.524	100.04
Rata-rata (%)						99.35
Simpangan baku (SD)						0.91
Simpangan baku relatif (RSD) (%)						0.91

Keterangan :

Kadar : $\frac{\text{rata−rata serapan} + 0,0171}{0,0543}$ (satuan ppm atau µg/mL)

Jumlah : $\frac{\text{kadar x faktor pembuatan x faktor pengenceran}}{1000}$ (satuan mg)

Recovery : $\frac{\text{kadar terukur}}{\text{kadar penambahan}}$ x 100%

Lampiran 4. Data kandungan lembab

Replikasi	F I (%)	F II (%)	F III (%)	F IV (%)	F V (%)
1	4,5	5,5	5,5	6,5	6,1
2	4,0	5,0	5,0	6,0	6,0
3	4,5	5,0	5,0	5,5	6,5
Rata-rata	4,33	5,17	5,17	6,00	6,20
SD	0,26	0,29	0,29	0,50	0,26

Keterangan :
F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Lampiran 5. Hasil analisa SPSS kandungan lembab

One-Sample Kolmogorov-Smirnov Test

		kandungan lembab
N		15
Normal Parameters[a,,b]	Mean	5,3733
	Std, Deviation	,74973
Most Extreme Differences	Absolute	,157
	Positive	,157
	Negative	-,132
Kolmogorov-Smirnov Z		,610
Asymp, Sig, (2-tailed)		,851

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

kandungan lembab

Levene Statistic	df1	df2	Sig,
,349	4	10	,839

ANOVA

kandungan lembab

	Sum of Squares	df	Mean Square	F	Sig,
Between Groups	6,729	4	1,682	14,757	,000
Within Groups	1,140	10	,114		
Total	7,869	14			

Multiple Comparisons

kandungan lembab

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std, Error	Sig,	95% Confidence Interval	
					Lower Bound	Upper Bound

1,00	2,00	-,83333*	,27568	,013	-1,4476	-,2191
	3,00	-,83333*	,27568	,013	-1,4476	-,2191
	4,00	-1,66667*	,27568	,000	-2,2809	-1,0524
	5,00	-1,86667*	,27568	,000	-2,4809	-1,2524
2,00	1,00	,83333*	,27568	,013	,2191	1,4476
	3,00	,00000	,27568	1,000	-,6143	,6143
	4,00	-,83333*	,27568	,013	-1,4476	-,2191
	5,00	-1,03333*	,27568	,004	-1,6476	-,4191
3,00	1,00	,83333*	,27568	,013	,2191	1,4476
	2,00	,00000	,27568	1,000	-,6143	,6143
	4,00	-,83333*	,27568	,013	-1,4476	-,2191
	5,00	-1,03333*	,27568	,004	-1,6476	-,4191
4,00	1,00	1,66667*	,27568	,000	1,0524	2,2809
	2,00	,83333*	,27568	,013	,2191	1,4476
	3,00	,83333*	,27568	,013	,2191	1,4476
	5,00	-,20000	,27568	,485	-,8143	,4143
5,00	1,00	1,86667*	,27568	,000	1,2524	2,4809
	2,00	1,03333*	,27568	,004	,4191	1,6476
	3,00	1,03333*	,27568	,004	,4191	1,6476
	4,00	,20000	,27568	,485	-,4143	,8143

*, The mean difference is significant at the 0,05 level,

Lampiran 6. Data uji waktu alir granul

Replikasi	F I (detik)	F II (detik)	F III (detik)	F IV (detik)	F V (detik)
1	3,63	3,81	4,63	4,70	5,74
2	3,63	4,68	4,63	4,51	5,69
3	3,68	4,03	4,73	5,49	5,58
4	3,42	4,61	4,83	4,56	5,80
5	3,63	4,46	4,63	5,07	5,85
Rata-rata	3,60	4,32	4,69	4,87	5,73
SD	0,41	0,09	0,10	0,38	0,10

Keterangan :
F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Lampiran 7. Hasil analisa SPSS uji waktu alir granul

One-Sample Kolmogorov-Smirnov Test

		waktu alir granul
N		25
Normal Parameters[a,,b]	Mean	4,6408
	Std, Deviation	,75141
Most Extreme Differences	Absolute	,133
	Positive	,133
	Negative	-,125
Kolmogorov-Smirnov Z		,664
Asymp, Sig, (2-tailed)		,770

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

waktu alir granul

Levene Statistic	df1	df2	Sig,
8,011	4	20	,001

Tidak memenuhi uji anova dilanjutkan uji kruskal wallis dan mann-whitney

Test Statistics[a,b]

	waktu alir granul
Chi-Square	20.319
df	4
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: formula

Uji kebermaknaan menggunakan mann-whitney (* berbeda nyata)

Formula	F I	F II	F III	F IV	F V
F I	-	0,008*	0,007*	0,008*	0,008*
F II	0,008*	-	0,045*	0,076	0,009*
F III	0,007*	0,045*	-	0,916	0,008*
F IV	0,008*	0,076	0,916	-	0,009*
F V	0,008*	0,009*	0,008*	0,009*	-

Lampiran 8. Data keseragaman ukuran

Tablet ke-	Tebal tablet (cm)				
	F I	F II	F III	F IV	F V
1	0,275	0,280	0,285	0,295	0,300
2	0,280	0,285	0,295	0,295	0,295
3	0,275	0,290	0,290	0,295	0,310
4	0,280	0,290	0,285	0,290	0,300
5	0,275	0,290	0,285	0,295	0,300
6	0,275	0,285	0,290	0,285	0,300
7	0,280	0,285	0,290	0,295	0,310
8	0,275	0,285	0,295	0,290	0,300
9	0,275	0,285	0,295	0,295	0,300
10	0,280	0,295	0,295	0,295	0,300
Tebal rata-rata	0,277	0,287	0,291	0,293	0,302
SD	0,003	0,004	0,004	0,003	0,005

Diamater tablet : 0,8 cm

Keterangan :

F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat

F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat

F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat

F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat

F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat

SD : simpangan baku

Syarat diameter tablet

Formula I

Tablet ke	Tebal tablet	Syarat	
		Maksimal	Minimal
1	0,275	0,825	0,367
2	0,280	0,840	0,373
3	0,275	0,825	0,367
4	0,280	0,840	0,373
5	0,275	0,825	0,367
6	0,275	0,825	0,367
7	0,280	0,840	0,373
8	0,275	0,825	0,367
9	0,275	0,825	0,367
10	0,280	0,840	0,373
Tebal rata-rata	0,277	0,831	0,369
SD	0,003	0,008	0,003

Diamater tablet : 0,8 cm

Formula II

Tablet ke	Tebal tablet	Syarat	
		Maksimal	Minimal
1	0,280	0,840	0,373
2	0,285	0,855	0,380
3	0,290	0,870	0,387
4	0,290	0,870	0,387
5	0,290	0,870	0,387
6	0,285	0,855	0,380
7	0,285	0,855	0,380
8	0,285	0,855	0,380
9	0,285	0,855	0,380
10	0,295	0,885	0,393
Tebal rata-rata	0,287	0,861	0,383
SD	0,004	0,013	0,006

Diamater tablet : 0,8 cm

Formula III

Tablet ke	Tebal tablet	Syarat	
		Maksimal	Minimal
1	0,285	0,855	0,380
2	0,295	0,885	0,393
3	0,290	0,870	0,387
4	0,285	0,855	0,380
5	0,285	0,855	0,380
6	0,290	0,870	0,387
7	0,290	0,870	0,387
8	0,295	0,885	0,393
9	0,295	0,885	0,393
10	0,295	0,885	0,393
Tebal rata-rata	0,291	0,872	0,387
SD	0,004	0,013	0,006

Diamater tablet : 0,8 cm

Formula IV

Tablet ke	Tebal tablet	Syarat	
		Maksimal	Minimal
1	0,295	0,885	0,393
2	0,295	0,885	0,393
3	0,295	0,885	0,393
4	0,290	0,870	0,387
5	0,295	0,885	0,393
6	0,285	0,855	0,380
7	0,295	0,885	0,393
8	0,290	0,870	0,387
9	0,295	0,885	0,393
10	0,295	0,885	0,393
Tebal rata-rata	0,293	0,879	0,391
SD	0,003	0,010	0,005

Diamater tablet : 0,8 cm

Formula V

Tablet ke	Tebal tablet	Syarat	
		Maksimal	Minimal
1	0,300	0,900	0,400
2	0,295	0,885	0,393
3	0,310	0,930	0,413
4	0,300	0,900	0,400
5	0,300	0,900	0,400
6	0,300	0,900	0,400
7	0,310	0,930	0,413
8	0,300	0,900	0,400
9	0,300	0,900	0,400
10	0,300	0,900	0,400
Tebal rata-rata	0,302	0,905	0,402
SD	0,005	0,014	0,006

Diamater tablet : 0,8 cm

Lampiran 9. Data hasil analisis SPSS keseragaman ukuran tablet

One-Sample Kolmogorov-Smirnov Test

		uji keseragaman ukuran
N		50
Normal Parameters[a,,b]	Mean	,28980
	Std, Deviation	,008919
Most Extreme Differences	Absolute	,160
	Positive	,105
	Negative	-,160
Kolmogorov-Smirnov Z		1,132
Asymp, Sig, (2-tailed)		,154

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

uji keseragaman ukuran

Levene Statistic	df1	df2	Sig,
,545	4	45	,704

ANOVA

uji keseragaman ukuran

	Sum of Squares	df	Mean Square	F	Sig,
Between Groups	,003	4	,001	50,952	,000
Within Groups	,001	45	,000		
Total	,004	49			

Multiple Comparisons

uji keseragaman ukuran

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std, Error	Sig,	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-,010000*	,001770	,000	-,01357	-,00643
	3	-,013500*	,001770	,000	-,01707	-,00993
	4	-,016000*	,001770	,000	-,01957	-,01243
	5	-,024500*	,001770	,000	-,02807	-,02093
2	1	,010000*	,001770	,000	,00643	,01357
	3	-,003500	,001770	,054	-,00707	,00007
	4	-,006000*	,001770	,001	-,00957	-,00243
	5	-,014500*	,001770	,000	-,01807	-,01093
3	1	,013500*	,001770	,000	,00993	,01707
	2	,003500	,001770	,054	-,00007	,00707
	4	-,002500	,001770	,165	-,00607	,00107
	5	-,011000*	,001770	,000	-,01457	-,00743
4	1	,016000*	,001770	,000	,01243	,01957
	2	,006000*	,001770	,001	,00243	,00957
	3	,002500	,001770	,165	-,00107	,00607
	5	-,008500*	,001770	,000	-,01207	-,00493
5	1	,024500*	,001770	,000	,02093	,02807
	2	,014500*	,001770	,000	,01093	,01807
	3	,011000*	,001770	,000	,00743	,01457
	4	,008500*	,001770	,000	,00493	,01207

*, The mean difference is significant at the 0,05 level,

Lampiran 10. Data uji keseragaman bobot

Tablet	Bobot tablet (mg)				
	F I	F II	F III	F IV	F V
1	202	201	199	200	198
2	201	200	196	200	201
3	200	203	197	202	200
4	199	200	198	201	197
5	198	203	198	199	199
6	198	200	199	202	200
7	201	202	197	199	199
8	197	203	197	199	200
9	201	201	200	199	199
10	198	203	199	200	199
11	199	201	198	200	199
12	201	201	199	198	200
13	200	202	195	200	200
14	199	199	196	201	200
15	202	202	195	200	199
16	201	202	198	198	200
17	204	199	201	199	197
18	199	202	199	202	197
19	198	199	200	201	200
20	204	199	201	202	201
Bobot rata-rata	200,10	201,10	198,10	200,10	199,25
SD	1,97	1,45	1,77	1,29	1,21
CV (%)	0,98	0,72	0,90	0,65	0,61

Hasil perhitungan rentang keseragaman bobot

Formula	Kolom A		Kolom B	
	Maksimal	Minimal	Maksimal	Minimal
Formula I	215,65	185,56	230,69	170,51
Formula II	216,34	186,16	231,44	171,06
Formula III	215,11	185,09	230,12	170,09
Formula IV	215,59	185,51	230,63	170,47
Formula V	215,43	185,37	230,46	170,34

Keterangan :

Kolom A : penyimpangan 7,5% dari bobot rata-rata

Kolom B : penyimpangan 15% dari bobot rata-rata

Lampiran 11. Data hasil analisis SPSS Keseragaman bobot

One-Sample Kolmogorov-Smirnov Test

		uji keseragaman bobot
N		100
Normal Parameters[a,,b]	Mean	200.58
	Std. Deviation	1.881
Most Extreme Differences	Absolute	.151
	Positive	.151
	Negative	-.100
Kolmogorov-Smirnov Z		1.511
Asymp. Sig. (2-tailed)		.021

a. Test distribution is Normal.

b. Calculated from data.

Tidak memenuhi uji anova dilanjutkan uji Kruskal-Wallis dan Mann-Whitney

Test Statistics[a,b]

	uji keseragaman bobot
Chi-Square	3.993
df	4
Asymp. Sig.	.407

a. Kruskal Wallis Test

b. Grouping Variable: formula

Uji kebermaknaan dengan Mann-Whitney

Formula	F I	F II	F III	F IV	F V
F I	-	0,137	0,556	0,989	0,890
F II	0,137	-	0,143	0,181	0,077
F III	0,556	0,143	-	0,593	0,660
F IV	0,989	0,181	0,593	-	0,889
F V	0,890	0,077	0,660	0,889	-

Lampiran 12. Data Keseragaman kandungan

Formula I

Tablet ke-	Serapan	Kadar (µg/ml)	Jumlah (mg)	Bobot (mg)	Kandungan (mg)	Kandungan (%)
1	0,551	10,46	13,08	204	13,34	109,88
2	0,512	9,74	12,18	198	12,06	99,33
3	0,522	9,93	12,41	200	12,41	102,23
4	0,533	10,13	12,66	202	12,79	105,35
5	0,548	10,41	13,01	201	13,07	107,69
6	0,490	9,34	11,67	203	11,85	97,60
7	0,508	9,67	12,09	199	12,03	99,07
8	0,490	9,34	11,67	200	11,67	96,16
9	0,535	10,17	12,71	199	12,65	104,17
10	0,479	9,14	11,42	198	11,31	93,13
		Rata-rata			12,32	101,46
		SD			0,65	5,33
		CV (%)			5,25	5,25

Formula II

Tablet ke-	Serapan	Kadar (µg/ml)	Jumlah (mg)	Bobot (mg)	Kandungan (mg)	Kandungan (%)
1	0,525	9,98	12,48	204	12,73	105,99
2	0,531	10,09	12,62	200	12,62	105,06
3	0,526	10,00	12,50	203	12,69	105,66
4	0,554	10,52	13,15	199	13,08	108,92
5	0,462	8,82	11,03	202	11,14	92,75
6	0,533	10,13	12,66	201	12,73	105,97
7	0,494	9,41	11,77	199	11,71	97,48
8	0,532	10,11	12,64	200	12,64	105,25
9	0,514	9,78	12,23	201	12,29	102,31
10	0,498	9,49	11,86	199	11,80	98,24
		Rata-rata			12,34	102,76
		SD			0,60	5,03
		CV (%)			4,89	4,89

Formula III

Tablet ke-	Serapan	Kadar (µg/ml)	Jumlah (mg)	Bobot (mg)	Kandungan (mg)	Kandungan (%)
1	0,489	9,32	11,65	195	11,36	99,21
2	0,509	9,69	12,11	200	12,11	105,77
3	0,466	8,90	11,12	203	11,29	98,58
4	0,531	10,09	12,62	199	12,55	109,64
5	0,435	8,33	10,41	202	10,51	91,80
6	0,517	9,84	12,30	199	12,23	106,84
7	0,502	9,56	11,95	200	11,95	104,37
8	0,483	9,21	11,51	201	11,57	101,05
9	0,473	9,03	11,28	203	11,45	100,01
10	0,466	8,90	11,12	199	11,07	96,64
		Rata-rata			11,61	101,39
		SD			0,61	5,32
		CV (%)			5,25	5,25

Formula IV

Tablet ke-	Serapan	Kadar (µg/ml)	Jumlah (mg)	Bobot (mg)	Kandungan (mg)	Kandungan (%)
1	0,498	9,49	11,86	195	11,56	101,33
2	0,496	9,45	11,81	200	11,81	103,52
3	0,438	8,38	10,48	203	10,63	93,20
4	0,495	9,43	11,79	199	11,73	102,80
5	0,435	8,33	10,41	202	10,51	92,13
6	0,458	8,75	10,94	199	10,88	95,37
7	0,476	9,08	11,35	200	11,35	99,49
8	0,473	9,03	11,28	201	11,34	99,37
9	0,446	8,53	10,66	203	10,82	94,83
10	0,481	9,17	11,47	199	11,41	99,99
		Rata-rata			11,20	98,20
		SD			0,46	4,04
		CV (%)			4,11	4,11

Formula V

Tablet ke-	Serapan	Kadar (µg/ml)	Jumlah (mg)	Bobot (mg)	Kandungan (mg)	Kandungan (%)
1	0,396	7,61	9,51	200	9,51	88,38
2	0,415	7,96	9,95	201	10,00	92,91
3	0,383	7,37	9,21	202	9,30	86,45
4	0,421	8,07	10,09	200	10,09	93,73
5	0,406	7,79	9,74	202	9,84	91,42
6	0,413	7,92	9,90	203	10,05	93,40
7	0,393	7,55	9,44	198	9,35	86,86
8	0,386	7,42	9,28	199	9,23	85,81
9	0,383	7,37	9,21	200	9,21	85,60
10	0,381	7,33	9,16	203	9,30	86,45
		Rata-rata			9,59	89,10
		SD			0,36	3,37
		CV (%)			3,79	3,79

Hasil penetapan kadar

Formula I

Replikasi	Serapan	Kadar (ppm)	Jumlah (mg)
1	0,485	9,25	11,56
2	0,534	10,15	12,69
3	0,512	9,74	12,18
	Rata-rata		12,14
	SD		0,56

Formula II

Replikasi	Serapan	Kadar (ppm)	Jumlah (mg)
1	0,509	9,69	12,11
2	0,536	10,19	12,73
3	0,469	8,95	11,19
	Rata-rata		12,01
	SD		0,78

Formula III

Replikasi	Serapan	Kadar (ppm)	Jumlah (mg)
1	0,555	10,54	13,17
2	0,414	7,94	9,92
3	0,472	9,01	11,26
	Rata-rata		11,45
	SD		1,63

Formula IV

Replikasi	Serapan	Kadar (ppm)	Jumlah (mg)
1	0,482	9,19	11,49
2	0,462	8,82	11,03
3	0,492	9,38	11,72
	Rata-rata		11,41
	SD		0,35

Formula V

Replikasi	Serapan	Kadar (ppm)	Jumlah (mg)
1	0,496	9,45	11,81
2	0,457	8,73	10,91
3	0,398	7,64	9,56
	Rata-rata		10,76
	SD		1,14

Contoh perhitungan Formula V replikasi ke-1

y = a + bx; x adalah kadar

x $= \frac{y-a}{b}$

$= \frac{0,396-(-0,0171)}{0,0543}$

= 7,61

Jumlah (mg) $= \frac{kadar\ (ppm) x faktor\ p\text{embuatan x faktor pengenceran}}{1000}$

$= \frac{7,61x50x25}{1000}$

= 9,51 mg

Kandungan (mg) $= \frac{\text{bobot tablet yang digunakan}}{bobot\ tabl\text{et formula}}$ x jumlah (mg)

$= \frac{200\ mg}{200\ mg}$ x 9,51 mg

= 9,51 mg

Kandungan (%) $= \frac{\text{kandungan (mg)}}{kandungan\ (mg) hasil\ p\text{enetapan kadar}}$ x 100%

$= \frac{9,51\ mg}{10,76\ mg}$ x 100%

= 88,38%

Lampiran 13. Data hasil analisa SPSS keseragaman kandungan

One-Sample Kolmogorov-Smirnov Test

		keseragaman kandungan (mg)
N		50
Normal Parameters[a,,b]	Mean	11,3542
	Std, Deviation	1,46057
Most Extreme Differences	Absolute	,183
	Positive	,122
	Negative	-,183
Kolmogorov-Smirnov Z		1,293
Asymp, Sig, (2-tailed)		,071

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

keseragaman kandungan (mg)

Levene Statistic	df1	df2	Sig,
,359	4	45	,836

ANOVA

keseragaman kandungan (mg)

	Sum of Squares	df	Mean Square	F	Sig,
Between Groups	88,929	4	22,232	64,126	,000
Within Groups	15,601	45	,347		
Total	104,530	49			

Multiple Comparisons

keseragaman kandungan (mg)

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std, Error	Sig,	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-,02500	,26332	,925	-,5554	,5054

	3	,70900*	,26332	,010	,1786	1,2394
	4	,57000*	,26332	,036	,0396	1,1004
	5	3,56500*	,26332	,000	3,0346	4,0954
2	1	,02500	,26332	,925	-,5054	,5554
	3	,73400*	,26332	,008	,2036	1,2644
	4	,59500*	,26332	,029	,0646	1,1254
	5	3,59000*	,26332	,000	3,0596	4,1204
3	1	-,70900*	,26332	,010	-1,2394	-,1786
	2	-,73400*	,26332	,008	-1,2644	-,2036
	4	-,13900	,26332	,600	-,6694	,3914
	5	2,85600*	,26332	,000	2,3256	3,3864
4	1	-,57000*	,26332	,036	-1,1004	-,0396
	2	-,59500*	,26332	,029	-1,1254	-,0646
	3	,13900	,26332	,600	-,3914	,6694
	5	2,99500*	,26332	,000	2,4646	3,5254
5	1	-3,56500*	,26332	,000	-4,0954	-3,0346
	2	-3,59000*	,26332	,000	-4,1204	-3,0596
	3	-2,85600*	,26332	,000	-3,3864	-2,3256
	4	-2,99500*	,26332	,000	-3,5254	-2,4646

*, The mean difference is significant at the 0,05 level,

Lampiran 14. Data uji kekerasan tablet

Replikasi	F I (kg)	F II (kg)	F III (kg)	F IV (kg)	F V (kg)
1	10	11	12	13	13
2	9,5	9	11	13	13,5
3	10	12	12	12,5	14
4	9,5	10	11,5	13	13,5
5	11	9,5	12	13,5	14
Rata-rata	10,00	10,30	11,70	13,00	13,60
SD	0,61	1,20	0,45	0,35	0,42

Keterangan :
F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Lampiran 15. Data hasil analisis SPSS uji kekerasan tablet

One-Sample Kolmogorov-Smirnov Test

		uji kekerasan tablet
N		25
Normal Parameters[a,,b]	Mean	11,720
	Std, Deviation	1,5817
Most Extreme Differences	Absolute	,151
	Positive	,142
	Negative	-,151
Kolmogorov-Smirnov Z		,754
Asymp, Sig, (2-tailed)		,620

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

uji kekerasan tablet

Levene Statistic	df1	df2	Sig,
3,457	4	20	,027

Tidak memenuhi uji anova dilanjutkan uji kruskal wallis dan mann-whitney

Test Statistics[a,b]

	uji kekerasan tablet
Chi-Square	20.582
df	4
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: formula

Uji kebermaknaan dengan Mann-Whitney

Formula	F I	F II	F III	F IV	F V
F I	-	0,830	0,010*	0,008*	0,008*
F II	0,830	-	0,066	0,008*	0,009*
F III	0,010*	0,066	-	0,007*	0,008*
F IV	0,008*	0,008*	0,007*	-	0,049*
F V	0,008*	0,009*	0,008*	0,049*	-

Lampiran 16. Data uji kerapuhan

Formula	Replikasi	Bobot awal (g)	Bobot akhir (g)	Kerapuhan (%)
Formula I	1	3,898	3,879	0,487
	2	3,903	3,885	0,461
	3	3,899	3,881	0,462
Formula II	1	3,950	3,936	0,354
	2	3,955	3,940	0,379
	3	3,961	3,948	0,328
Formula III	1	3,951	3,941	0,253
	2	3,967	3,956	0,277
	3	3,948	3,940	0,203
Formula IV	1	3,972	3,968	0,101
	2	3,967	3,956	0,277
	3	3,982	3,973	0,226
Formula V	1	3,977	3,970	0,176
	2	3,968	3,963	0,126
	3	3,970	3,964	0,151

Replikasi	F I (%)	F II (%)	F III (%)	F IV (%)	F V (%)
1	0,487	0,354	0,253	0,101	0,176
2	0,461	0,379	0,277	0,277	0,126
3	0,462	0,328	0,203	0,226	0,151
Rata-rata	0,470	0,354	0,244	0,201	0,151
SD	0,091	0,025	0,038	1,000	0,020

Keterangan :
F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Contoh perhitungan uji kerapuhan Formula I replikasi 1

$$\% \text{ kerapuhan} = \frac{b\text{erat awal} - \text{berat akhir}}{b\text{erat awal}} \times 100$$

$$= \frac{3{,}898 - 3{,}879}{3{,}898} \times 100\%$$

$$= 0{,}487\%$$

Lampiran 17. Data analisa SPSS kerapuhan

One-Sample Kolmogorov-Smirnov Test

		uji kerapuhan tablet
N		15
Normal Parameters[a,,b]	Mean	,28407
	Std, Deviation	,125035
Most Extreme Differences	Absolute	,123
	Positive	,123
	Negative	-,121
Kolmogorov-Smirnov Z		,475
Asymp, Sig, (2-tailed)		,978

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

uji kerapuhan tablet

Levene Statistic	df1	df2	Sig,
3,442	4	10	,051

ANOVA

uji kerapuhan tablet

	Sum of Squares	df	Mean Square	F	Sig,
Between Groups	,197	4	,049	22,108	,000
Within Groups	,022	10	,002		
Total	,219	14			

Multiple Comparisons

uji kerapuhan tablet

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std, Error	Sig,	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-,116333*	,038502	,013	-,20212	-,03055

	3	,109333*	,038502	,018	,02355	,19512
	4	,152333*	,038502	,003	,06655	,23812
	5	,202667*	,038502	,000	,11688	,28845
2	1	,116333*	,038502	,013	,03055	,20212
	3	,225667*	,038502	,000	,13988	,31145
	4	,268667*	,038502	,000	,18288	,35445
	5	,319000*	,038502	,000	,23321	,40479
3	1	-,109333*	,038502	,018	-,19512	-,02355
	2	-,225667*	,038502	,000	-,31145	-,13988
	4	,043000	,038502	,290	-,04279	,12879
	5	,093333*	,038502	,036	,00755	,17912
4	1	-,152333*	,038502	,003	-,23812	-,06655
	2	-,268667*	,038502	,000	-,35445	-,18288
	3	-,043000	,038502	,290	-,12879	,04279
	5	,050333	,038502	,220	-,03545	,13612
5	1	-,202667*	,038502	,000	-,28845	-,11688
	2	-,319000*	,038502	,000	-,40479	-,23321
	3	-,093333*	,038502	,036	-,17912	-,00755
	4	-,050333	,038502	,220	-,13612	,03545

*, The mean difference is significant at the 0,05 level,

Lampiran 18. Data uji indeks *swelling* (%)

Formula I, Replikasi 1

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.275	0.400	0.069	-
30	0.530	0.525	0.229	232.39
60	0.535	0.530	0.236	241.94
90	0.535	0.540	0.245	254.97
120	0.565	0.550	0.268	288.89
150	0.575	0.568	0.291	321.36
180	0.600	0.580	0.317	359.26
210	0.605	0.583	0.322	367.09
240	0.625	0.598	0.350	407.70
300	0.625	0.600	0.353	411.96
360	0.650	0.600	0.367	432.43

Replikasi 2

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.275	0.400	0.069	-
30	0.575	0.515	0.239	247.00
60	0.615	0.525	0.266	285.70
90	0.615	0.540	0.282	308.05
120	0.635	0.560	0.313	353.11
150	0.675	0.580	0.356	416.67
180	0.720	0.583	0.384	455.87
210	0.720	0.585	0.387	460.65
240	0.675	0.598	0.378	448.32
300	0.695	0.600	0.393	469.30
360	0.695	0.605	0.399	478.82

Replikasi 3

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.275	0.400	0.069	-
30	0.460	0.473	0.161	133.67
60	0.505	0.510	0.206	198.87
90	0.555	0.513	0.229	231.69
120	0.600	0.515	0.250	262.09
150	0.605	0.543	0.280	305.14
180	0.625	0.558	0.305	342.00
210	0.635	0.563	0.315	357.16
240	0.675	0.575	0.350	407.80

300	0.675	0.578	0.353	412.22
360	0.655	0.600	0.370	436.53

Formula II, Replikasi 1

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	-
30	0.495	0.468	0.170	132.67
60	0.525	0.510	0.214	193.68
90	0.535	0.525	0.232	217.14
120	0.535	0.563	0.266	264.06
150	0.555	0.565	0.278	281.04
180	0.575	0.590	0.314	330.48
210	0.635	0.600	0.359	391.65
240	0.660	0.618	0.395	441.25
300	0.660	0.623	0.402	450.05
360	0.660	0.633	0.415	467.86

Replikasi 2

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	-
30	0.515	0.478	0.184	152.54
60	0.555	0.488	0.207	183.67
90	0.585	0.500	0.230	214.54
120	0.600	0.560	0.295	304.67
150	0.635	0.563	0.315	332.11
180	0.660	0.565	0.331	353.12
210	0.660	0.573	0.340	365.23
240	0.625	0.575	0.324	344.42
300	0.695	0.588	0.377	415.91
360	0.695	0.600	0.393	438.10

Replikasi 3

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	-
30	0.475	0.478	0.170	132.93
60	0.565	0.495	0.217	197.74
90	0.545	0.505	0.218	198.92
120	0.575	0.540	0.263	260.61
150	0.590	0.550	0.280	283.84
180	0.600	0.568	0.303	315.58

210	0.610	0.578	0.319	337.53
240	0.625	0.588	0.339	363.95
300	0.635	0.600	0.359	391.65
360	0.660	0.623	0.402	450.05

Formula III, Replikasi 1

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.280	0.400	0.070	-
30	0.485	0.473	0.170	142.85
60	0.500	0.488	0.187	166.51
90	0.520	0.500	0.204	191.57
120	0.545	0.525	0.236	236.91
150	0.575	0.550	0.273	290.12
180	0.585	0.593	0.322	360.61
210	0.600	0.600	0.339	384.46
240	0.605	0.615	0.359	413.22
300	0.650	0.618	0.389	455.89
360	0.650	0.633	0.408	483.22

Replikasi 2

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.285	0.400	0.072	-
30	0.485	0.480	0.175	143.66
60	0.525	0.488	0.196	172.07
90	0.575	0.513	0.237	229.32
120	0.590	0.520	0.250	247.88
150	0.620	0.530	0.273	279.76
180	0.625	0.583	0.333	362.42
210	0.625	0.590	0.342	374.41
240	0.625	0.600	0.353	390.63
300	0.675	0.600	0.382	429.88
360	0.675	0.620	0.407	465.79

Replikasi 3

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.285	0.400	0.072	-
30	0.545	0.485	0.201	179.54
60	0.550	0.523	0.236	227.42
90	0.585	0.525	0.253	251.59
120	0.610	0.538	0.277	284.29

150	0.615	0.548	0.289	301.99
180	0.620	0.575	0.322	346.99
210	0.620	0.590	0.339	370.61
240	0.625	0.600	0.353	390.63
300	0.645	0.630	0.402	458.22
360	0.675	0.625	0.414	474.95

Formula IV, Replikasi 1

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.300	0.400	0.075	-
30	0.485	0.465	0.165	119.53
60	0.535	0.480	0.194	158.03
90	0.575	0.488	0.215	186.06
120	0.600	0.500	0.236	214.00
150	0.605	0.525	0.262	249.07
180	0.640	0.528	0.280	272.79
210	0.640	0.563	0.318	323.90
240	0.660	0.575	0.343	356.79
300	0.675	0.600	0.382	408.68
360	0.685	0.608	0.397	429.20

Replikasi 2

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.300	0.400	0.075	-
30	0.490	0.448	0.154	105.41
60	0.585	0.480	0.212	182.15
90	0.585	0.488	0.218	191.03
120	0.590	0.513	0.243	224.40
150	0.595	0.525	0.257	243.30
180	0.610	0.538	0.277	268.91
210	0.650	0.550	0.309	311.60
240	0.650	0.558	0.317	322.90
300	0.675	0.583	0.360	379.44
360	0.675	0.595	0.375	400.24

Replikasi 3

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.300	0.400	0.075	-
30	0.470	0.465	0.160	112.74
60	0.515	0.470	0.179	138.14

90	0.545	0.478	0.195	160.12
120	0.590	0.508	0.239	218.10
150	0.610	0.513	0.252	235.39
180	0.615	0.538	0.279	271.94
210	0.625	0.540	0.286	281.51
240	0.625	0.568	0.316	321.36
300	0.625	0.583	0.333	343.93
360	0.675	0.600	0.382	408.68

Formula V, Replikasi 1

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	
30	0.485	0.468	0.166	127.97
60	0.520	0.485	0.192	163.07
90	0.525	0.500	0.206	182.28
120	0.550	0.523	0.236	222.93
150	0.575	0.540	0.263	260.61
180	0.610	0.575	0.317	333.75
210	0.610	0.575	0.317	333.75
240	0.620	0.575	0.322	340.86
300	0.620	0.593	0.342	368.11
360	0.645	0.600	0.365	399.39

Replikasi 2

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	
30	0.500	0.470	0.173	137.54
60	0.505	0.488	0.188	158.12
90	0.520	0.500	0.204	179.59
120	0.555	0.525	0.240	228.99
150	0.590	0.550	0.280	283.84
180	0.610	0.575	0.317	333.75
210	0.610	0.575	0.317	333.75
240	0.610	0.580	0.322	341.33
300	0.655	0.600	0.370	407.13
360	0.655	0.600	0.370	407.13

Replikasi 3

Waktu	Tebal	Jari-jari	Volum	Indek *swelling*
0	0.290	0.400	0.073	

30	0.495	0.465	0.168	130.19
60	0.520	0.468	0.178	144.42
90	0.545	0.500	0.214	193.03
120	0.560	0.523	0.240	228.80
150	0.570	0.533	0.254	247.61
180	0.575	0.563	0.286	291.28
210	0.590	0.563	0.293	301.49
240	0.590	0.568	0.298	308.66
300	0.605	0.585	0.325	345.29
360	0.610	0.610	0.356	388.16

Data indeks swelling pada menit ke-360

Replikasi	F I	F II	F III	F IV	F V
1	432,43	467,86	483,22	429,20	399,39
2	478,82	438,10	465,79	400,24	407,13
3	436,53	450,05	474,95	408,68	388,16
Rata-rata	449,26	452,00	474,65	412,71	398,23
SD	25,68	14,98	8,72	14,90	9,54

Keterangan :
F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Rata-rata indeks *swelling* selama pengujian

Waktu	rata-rata indek swelling				
	F I	F II	F III	F IV	F V
30	204,36 ± 61,65	139,38 ± 11,40	155,35 ± 20,95	112,56 ± 7,06	131,90 ± 5,01
60	242,17 ± 43,41	191,70 ± 7,24	188,67 ± 33,67	159,44 ± 22,04	155,20 ± 9,66
90	264,90 ± 39,14	210,20 ± 9,85	224,16 ± 30,34	179,07 ± 16,60	184,97 ± 7,11
120	301,36 ± 46,77	276,45 ± 24,51	256,36 ± 24,80	218,83 ± 5,24	226,91 ± 3,45
150	347,72 ± 60,26	299,00 ± 28,71	290,62 ± 11,12	242,59 ± 6,87	264,02 ± 18,36
180	385,71 ± 61,37	333,06 ± 18,90	356,67 ± 8,44	271,21 ± 2,04	319,60 ± 24,52
210	394,97 ± 57,10	364,80 ± 27,06	376,49 ± 7,15	305,67 ± 21,81	323,00 ± 18,63

240	421,27 ± 23,42	383,21 ± 51,20	398,16 ± 13,05	333,68 ± 20,03	330,28 ± 18,73
300	431,16 ± 33,03	419,20 ± 29,34	448,00 ± 15,74	377,35 ± 32,43	373,51 ± 31,27
360	449,26 ± 25,68	452,00 ± 14,98	474,65 ± 8,72	412,71 ± 14,90	398,23 ± 9,54

Contoh perhitungan indeks *swelling* Formula I replikasi 1

Waktu	Tinggi (cm)	Jari-jari (cm)	Volum (cm^2)	Indek *swelling*
0	0,275	0,400	0,069	-
30	0,530	0,525	0,229	232,39
60	0,535	0,530	0,236	241,94
90	0,535	0,540	0,245	254,97
120	0,565	0,550	0,268	288,89
150	0,575	0,568	0,291	321,36
180	0,600	0,580	0,317	359,26
210	0,605	0,583	0,322	367,09
240	0,625	0,598	0,350	407,70
300	0,625	0,600	0,353	411,96
360	0,650	0,600	0,367	432,43

Volume awal $= \frac{3,14xr\text{^}2xt}{2}$

$= \frac{3,14x(0,400)\text{^}2x0,275}{2} = 0,069\ cm^2$

Volume 30’ $= \frac{3,14xr\text{^}2xt}{2}$

$= \frac{3,14x(0,525)\text{^}2x0,530}{2} = 0,229347562\ cm^2$

Indeks *swelling* 30’ $= \frac{volume\ \text{akhir} - \text{volume awal}}{volume\ \text{awal}}$ x 100%

$= \frac{0,229347562 - 0,069}{0,069}$ x 100%

= 232,39 %

Lampiran 19. Data analisis SPSS indeks *swelling*

One-Sample Kolmogorov-Smirnov Test

		uji indeks swelling
N		15
Normal Parameters[a,,b]	Mean	4.3733
	Std. Deviation	.31939
Most Extreme Differences	Absolute	.149
	Positive	.146
	Negative	-.149
Kolmogorov-Smirnov Z		.576
Asymp. Sig. (2-tailed)		.895

a. Test distribution is Normal.

b. Calculated from data.

Test of Homogeneity of Variances

uji indeks swelling

Levene Statistic	df1	df2	Sig.
2.040	4	10	.164

ANOVA

uji indeks swelling

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.173	4	.293	11.468	.001
Within Groups	.256	10	.026		
Total	1.428	14			

Multiple Comparisons

uji indeks swelling

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.02667	.13054	.842	-.3175	.2642
	3	-.25333	.13054	.081	-.5442	.0375
	4	.36667*	.13054	.019	.0758	.6575
	5	.51333*	.13054	.003	.2225	.8042
2	1	.02667	.13054	.842	-.2642	.3175
	3	-.22667	.13054	.113	-.5175	.0642
	4	.39333*	.13054	.013	.1025	.6842
	5	.54000*	.13054	.002	.2491	.8309
3	1	.25333	.13054	.081	-.0375	.5442
	2	.22667	.13054	.113	-.0642	.5175
	4	.62000*	.13054	.001	.3291	.9109
	5	.76667*	.13054	.000	.4758	1.0575
4	1	-.36667*	.13054	.019	-.6575	-.0758
	2	-.39333*	.13054	.013	-.6842	-.1025
	3	-.62000*	.13054	.001	-.9109	-.3291
	5	.14667	.13054	.287	-.1442	.4375
5	1	-.51333*	.13054	.003	-.8042	-.2225
	2	-.54000*	.13054	.002	-.8309	-.2491
	3	-.76667*	.13054	.000	-1.0575	-.4758
	4	-.14667	.13054	.287	-.4375	.1442

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

Lampiran 20. Data uji kekuatan mukoadhesif

Replikasi	F I (menit)	F II (menit)	F III (menit)	F IV (menit)	F V (menit)
I	3,52	6,27	9,18	6,76	6,49
II	4,01	6,00	9,53	5,41	5,44
III	3,26	7,16	8,25	6,06	5,08
Rata-rata	3,60	6,48	8,99	6,08	5,67
SD	0,38	0,61	0,66	0,68	0,73

Keterangan :

F I : kombinasi matriks 5 % karbopol 940P dan 25 % natrium alginat
F II : kombinasi matriks 10 % karbopol 940P dan 20 % natrium alginat
F III : kombinasi matriks 15 % karbopol 940P dan 15 % natrium alginat
F IV : kombinasi matriks 20 % karbopol 940P dan 10 % natrium alginat
F V : kombinasi matriks 25% karbopol 940P dan 5% natrium alginat
SD : simpangan baku

Lampiran 21. Data analisis SPSS kekuatan mukoadhesif

One-Sample Kolmogorov-Smirnov Test

		uji kekuatan mukoadhesif (menit)
N		15
Normal Parameters[a,,b]	Mean	6,1613
	Std, Deviation	1,86340
Most Extreme Differences	Absolute	,107
	Positive	,107
	Negative	-,081
Kolmogorov-Smirnov Z		,416
Asymp, Sig, (2-tailed)		,995

a, Test distribution is Normal,

b, Calculated from data,

Test of Homogeneity of Variances

uji kekuatan mukoadhesif (menit)

Levene Statistic	df1	df2	Sig,
,391	4	10	,811

ANOVA

uji kekuatan mukoadhesif (menit)

	Sum of Squares	df	Mean Square	F	Sig,
Between Groups	44,724	4	11,181	28,763	,000
Within Groups	3,887	10	,389		
Total	48,611	14			

Multiple Comparisons

uji kekuatan mukoadhesif (menit)

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std, Error	Sig,	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-2,88000*	,50907	,000	-4,0143	-1,7457

	3	-5,39000*	,50907	,000	-6,5243	-4,2557
	4	-2,48000*	,50907	,001	-3,6143	-1,3457
	5	-2,07333*	,50907	,002	-3,2076	-,9391
2	1	2,88000*	,50907	,000	1,7457	4,0143
	3	-2,51000*	,50907	,001	-3,6443	-1,3757
	4	,40000	,50907	,450	-,7343	1,5343
	5	,80667	,50907	,144	-,3276	1,9409
3	1	5,39000*	,50907	,000	4,2557	6,5243
	2	2,51000*	,50907	,001	1,3757	3,6443
	4	2,91000*	,50907	,000	1,7757	4,0443
	5	3,31667*	,50907	,000	2,1824	4,4509
4	1	2,48000*	,50907	,001	1,3457	3,6143
	2	-,40000	,50907	,450	-1,5343	,7343
	3	-2,91000*	,50907	,000	-4,0443	-1,7757
	5	,40667	,50907	,443	-,7276	1,5409
5	1	2,07333*	,50907	,002	,9391	3,2076
	2	-,80667	,50907	,144	-1,9409	,3276
	3	-3,31667*	,50907	,000	-4,4509	-2,1824
	4	-,40667	,50907	,443	-1,5409	,7276

*, The mean difference is significant at the 0,05 level,

Lampiran 22. Data uji disolusi

Formula I

Larutan standar adisi		
Replikasi	Serapan	Kadar (ppm)
1	0,342	6,607
2	0,331	6,417
3	0,329	6,374
Rata-rata		6,466

Replikasi I

Bobot tablet = 200 mg (mengandung salbutamol 12,14 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,345	6,669	0,203	5,0	1,013	0,911	0,000	0,000	0,911	7,51
15	0,359	6,926	0,460	5,0	2,302	2,072	0,010	0,010	2,082	17,15
30	0,372	7,166	0,700	5,0	3,499	3,149	0,023	0,033	3,182	26,21
60	0,388	7,460	0,994	5,0	4,972	4,475	0,035	0,058	4,533	37,34
90	0,401	7,700	1,234	5,0	6,169	5,552	0,050	0,085	5,637	46,43
120	0,412	7,902	1,436	5,0	7,182	6,464	0,062	0,111	6,575	54,16
180	0,195	3,906	3,906	2,5	9,765	8,789	0,072	0,134	8,922	73,49
240	0,221	4,385	4,385	2,5	10,962	9,866	0,098	0,169	10,035	82,66
300	0,239	4,716	4,716	2,5	11,791	10,612	0,110	0,207	10,819	89,12
360	0,249	4,901	4,901	2,5	12,251	11,026	0,118	0,228	11,254	92,70

Koefisien korelasi = 0,964

Kecepatan pelepasan = 0,029

Replikasi 2

Bobot tablet = 202 mg (mengandung salbutamol 12,26 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,346	6,687	0,221	5,0	1,105	0,994	0,000	0,000	0,994	8,11
15	0,361	6,963	0,497	5,0	2,486	2,237	0,011	0,011	2,248	18,34
30	0,373	7,184	0,718	5,0	3,591	3,232	0,025	0,036	3,268	26,65
60	0,390	7,497	1,031	5,0	5,156	4,641	0,036	0,061	4,701	38,35
90	0,400	7,681	1,215	5,0	6,077	5,469	0,052	0,087	5,557	45,32
120	0,412	7,902	1,436	5,0	7,182	6,464	0,061	0,112	6,576	53,64
180	0,189	3,796	3,796	2,5	9,489	8,540	0,072	0,133	8,673	70,74
240	0,212	4,219	4,219	2,5	10,548	9,493	0,095	0,167	9,660	78,79
300	0,239	4,716	4,716	2,5	11,791	10,612	0,105	0,200	10,812	88,19
360	0,249	4,901	4,901	2,5	12,251	11,026	0,118	0,223	11,250	91,76

Koefisien korelasi = 0,968

Kecepatan pelepasan = 0,028

Replikasi 3

Bobot tablet = 200 mg (mengandung salbutamol 12,14 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,345	6,669	0,203	5,0	1,013	0,911	0,000	0,000	0,911	7,51
15	0,360	6,945	0,479	5,0	2,394	2,154	0,010	0,010	2,165	17,83
30	0,372	7,166	0,700	5,0	3,499	3,149	0,024	0,034	3,183	26,22
60	0,388	7,460	0,994	5,0	4,972	4,475	0,035	0,059	4,534	37,35
90	0,401	7,700	1,234	5,0	6,169	5,552	0,050	0,085	5,637	46,43
120	0,415	7,958	1,492	5,0	7,458	6,712	0,062	0,111	6,824	56,21
180	0,201	4,017	4,017	2,5	10,041	9,037	0,075	0,136	9,174	75,56
240	0,222	4,403	4,403	2,5	11,008	9,907	0,100	0,175	10,082	83,05
300	0,235	4,643	4,643	2,5	11,607	10,446	0,110	0,210	10,657	87,78
360	0,250	4,919	4,919	2,5	12,297	11,068	0,116	0,226	11,294	93,03

Koefisien korelasi = 0,959

Kecepatan pelepasan = 0,029

Formula II

Larutan standar adisi

Replikasi	Serapan	Kadar (ppm)
1	0,494	9,406
2	0,505	9,609
3	0,499	9,498
Rata-rata		9,505

Replikasi 1

Bobot tablet = 201 mg (mengandung salbutamol 12,07 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,506	9,634	0,129	5,0	0,643	0,578	0,000	0,000	0,578	4,79
15	0,514	9,781	0,276	5,0	1,379	1,241	0,006	0,006	1,248	10,34
30	0,528	10,039	0,534	5,0	2,668	2,402	0,014	0,020	2,422	20,06
60	0,544	10,333	0,828	5,0	4,142	3,728	0,027	0,040	3,768	31,22
90	0,553	10,499	0,994	5,0	4,970	4,473	0,041	0,068	4,541	37,63
120	0,567	10,757	1,252	5,0	6,260	5,634	0,050	0,091	5,725	47,43
180	0,149	3,059	3,059	2,5	7,647	6,883	0,063	0,112	6,995	57,95
240	0,167	3,390	3,390	2,5	8,476	7,628	0,076	0,139	7,768	64,35
300	0,184	3,703	3,703	2,5	9,259	8,333	0,085	0,161	8,494	70,37
360	0,209	4,164	4,164	2,5	10,410	9,369	0,093	0,177	9,546	79,09

Koefisien korelasi = 0,964

Kecepatan pelepasan = 0,024

Replikasi 2
Bobot tablet = 200 mg (mengandung salbutamol 12,01 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,508	9,670	0,165	5,0	0,827	0,744	0,000	0,000	0,744	6,20
15	0,518	9,855	0,350	5,0	1,748	1,573	0,008	0,008	1,581	13,16
30	0,530	10,076	0,571	5,0	2,853	2,567	0,017	0,026	2,593	21,59
60	0,545	10,352	0,847	5,0	4,234	3,810	0,029	0,046	3,856	32,11
90	0,556	10,554	1,049	5,0	5,247	4,722	0,042	0,071	4,793	39,91
120	0,568	10,775	1,270	5,0	6,352	5,716	0,052	0,095	5,811	48,39
180	0,150	3,077	3,077	2,5	7,693	6,924	0,064	0,116	7,040	58,62
240	0,169	3,427	3,427	2,5	8,568	7,711	0,077	0,140	7,852	65,38
300	0,187	3,759	3,759	2,5	9,397	8,457	0,086	0,163	8,620	71,77
360	0,211	4,201	4,201	2,5	10,502	9,452	0,094	0,180	9,631	80,19

Koefisien korelasi = 0,965
Kecepatan pelepasan = 0,024

Replikasi 3
Bobot tablet = 200 mg (mengandung salbutamol 12,01 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,507	9,652	0,147	5,0	0,735	0,661	0,000	0,000	0,661	5,51
15	0,515	9,799	0,294	5,0	1,471	1,324	0,007	0,007	1,332	11,09
30	0,532	10,112	0,607	5,0	3,037	2,733	0,015	0,022	2,755	22,94
60	0,548	10,407	0,902	5,0	4,510	4,059	0,030	0,045	4,104	34,17
90	0,557	10,573	1,068	5,0	5,339	4,805	0,045	0,075	4,880	40,64
120	0,569	10,794	1,289	5,0	6,444	5,799	0,053	0,098	5,898	49,11
180	0,152	3,114	3,114	2,5	7,785	7,007	0,064	0,118	7,125	59,32
240	0,171	3,464	3,464	2,5	8,660	7,794	0,078	0,142	7,936	66,08
300	0,190	3,814	3,814	2,5	9,535	8,581	0,087	0,164	8,746	72,82
360	0,213	4,238	4,238	2,5	10,594	9,535	0,095	0,182	9,716	80,90

Koefisien korelasi = 0,960
Kecepatan pelepasan = 0,024

Formula III

Larutan standar adisi		
Replikasi	Serapan	Kadar (ppm)
1	0,511	9,726
2	0,516	9,818
3	0,513	9,756
Rata-rata		9,767

Replikasi 1
Bobot tablet =200 mg (mengandung salbutamol 11,45 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,521	9,910	0,143	5	0,714	0,642	0,000	0,000	0,642	5,61
15	0,534	10,149	0,382	5	1,911	1,720	0,007	0,007	1,727	15,08
30	0,544	10,333	0,566	5	2,832	2,549	0,019	0,026	2,575	22,49
60	0,556	10,554	0,787	5	3,937	3,543	0,028	0,047	3,590	31,36
90	0,089	1,954	1,954	2,5	4,885	4,396	0,039	0,068	4,464	38,99
120	0,110	2,341	2,341	2,5	5,852	5,267	0,049	0,088	5,355	46,77
180	0,136	2,820	2,820	2,5	7,049	6,344	0,059	0,107	6,451	56,34
240	0,152	3,114	3,114	2,5	7,785	7,007	0,070	0,129	7,136	62,32
300	0,169	3,427	3,427	2,5	8,568	7,711	0,078	0,148	7,860	68,64
360	0,182	3,667	3,667	2,5	9,167	8,250	0,086	0,164	8,414	73,48

Koefisien korelasi = 0,957
Kecepatan pelepasan = 0,020

Replikasi 2
Bobot tablet = 199 mg (mengandung salbutamol 11,39 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,520	9,891	0,124	5	0,622	0,560	0,000	0,000	0,560	4,91
15	0,531	10,094	0,327	5	1,635	1,471	0,006	0,006	1,477	12,97
30	0,540	10,260	0,493	5	2,463	2,217	0,016	0,023	2,240	19,66
60	0,556	10,554	0,787	5	3,937	3,543	0,025	0,041	3,584	31,47
90	0,091	1,991	1,991	2,5	4,977	4,479	0,039	0,064	4,543	39,89
120	0,110	2,341	2,341	2,5	5,852	5,267	0,050	0,089	5,356	47,02
180	0,135	2,801	2,801	2,5	7,003	6,302	0,059	0,108	6,411	56,28
240	0,158	3,225	3,225	2,5	8,062	7,256	0,070	0,129	7,384	64,83
300	0,169	3,427	3,427	2,5	8,568	7,711	0,081	0,151	7,862	69,03
360	0,179	3,611	3,611	2,5	9,029	8,126	0,086	0,166	8,292	72,80

Koefisien korelasi = 0,951
Kecepatan pelepasan = 0,021

Replikasi 3
Bobot tablet = 200 mg (mengandung salbutamol 11,39 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,523	9,947	0,180	5	0,898	0,808	0,000	0,000	0,808	7,10
15	0,534	10,149	0,382	5	1,911	1,720	0,009	0,009	1,729	15,18
30	0,546	10,370	0,603	5	3,016	2,714	0,019	0,028	2,742	24,08
60	0,559	10,610	0,843	5	4,213	3,792	0,030	0,049	3,841	33,72
90	0,096	2,083	2,083	2,5	5,207	4,686	0,042	0,072	4,759	41,78
120	0,110	2,341	2,341	2,5	5,852	5,267	0,052	0,094	5,361	47,07
180	0,138	2,856	2,856	2,5	7,141	6,427	0,059	0,111	6,537	57,40
240	0,163	3,317	3,317	2,5	8,292	7,463	0,071	0,130	7,593	66,66
300	0,172	3,483	3,483	2,5	8,706	7,836	0,083	0,154	7,990	70,15
360	0,176	3,556	3,556	2,5	8,890	8,001	0,087	0,170	8,171	71,74

Koefisien korelasi = 0,946
Kecepatan pelepasan = 0,020

Formula IV

Larutan standar adisi

Replikasi	Serapan	Kadar (ppm)
1	0,466	8,891
2	0,472	9,014
3	0,467	8,915
Rata-rata		8,940

Replikasi 1
Bobot tablet = 204 mg (mengandung salbutamol 11,97 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,478	9,118	0,178	5	0,889	0,800	0,000	0,000	0,800	6,687
15	0,483	9,210	0,270	5	1,350	1,215	0,009	0,009	1,224	10,223
30	0,491	9,357	0,417	5	2,086	1,878	0,013	0,022	1,900	15,874
60	0,505	9,615	0,675	5	3,376	3,038	0,021	0,034	3,072	25,667
90	0,523	9,947	1,007	5	5,033	4,530	0,034	0,055	4,584	38,298
120	0,532	10,112	1,172	5	5,862	5,276	0,050	0,084	5,360	44,775
180	0,156	3,188	3,188	2,5	7,970	7,173	0,059	0,109	7,282	60,832
240	0,186	3,740	3,740	2,5	9,351	8,416	0,080	0,138	8,554	71,462
300	0,209	4,164	4,164	2,5	10,410	9,369	0,094	0,173	9,542	79,716
360	0,214	4,256	4,256	2,5	10,640	9,576	0,104	0,198	9,774	81,651

Koefisien korelasi = 0,974
Kecepatan pelepasan = 0,027

Replikasi 2
Bobot tablet = 202 mg (mengandung salbutamol 11,86 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,475	9,063	0,123	5	0,613	0,552	0,000	0,000	0,552	4,652
15	0,488	9,302	0,362	5	1,810	1,629	0,006	0,006	1,635	13,788
30	0,499	9,505	0,565	5	2,823	2,541	0,018	0,024	2,565	21,627
60	0,508	9,670	0,730	5	3,652	3,287	0,028	0,046	3,333	28,102
90	0,522	9,928	0,988	5	4,941	4,447	0,037	0,065	4,512	38,040
120	0,528	10,039	1,099	5	5,493	4,944	0,049	0,086	5,030	42,411
180	0,143	2,948	2,948	2,5	7,371	6,634	0,055	0,104	6,738	56,816
240	0,182	3,667	3,667	2,5	9,167	8,250	0,074	0,129	8,379	70,646
300	0,199	3,980	3,980	2,5	9,949	8,954	0,092	0,165	9,120	76,895
360	0,214	4,256	4,256	2,5	10,640	9,576	0,099	0,191	9,767	82,354

Koefisien korelasi = 0,979
Kecepatan pelepasan = 0,025

Replikasi 3
Bobot tablet = 202 mg (mengandung salbutamol 11,86 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,476	9,081	0,141	5	0,705	0,635	0,000	0,000	0,635	5,351
15	0,489	9,320	0,380	5	1,902	1,712	0,007	0,007	1,719	14,494
30	0,499	9,505	0,565	5	2,823	2,541	0,019	0,026	2,567	21,642
60	0,514	9,781	0,841	5	4,204	3,784	0,028	0,047	3,831	32,302
90	0,522	9,928	0,988	5	4,941	4,447	0,042	0,070	4,517	38,087
120	0,532	10,112	1,172	5	5,862	5,276	0,049	0,091	5,367	45,253
180	0,149	3,059	3,059	2,5	7,647	6,883	0,059	0,108	6,991	58,943
240	0,182	3,667	3,667	2,5	9,167	8,250	0,076	0,135	8,385	70,701
300	0,204	4,072	4,072	2,5	10,180	9,162	0,092	0,168	9,330	78,666
360	0,218	4,330	4,330	2,5	10,824	9,742	0,102	0,193	9,935	83,770

Koefisien korelasi = 0,977
Kecepatan pelepasan = 0,025

Formula V

Larutan standar adisi

Replikasi	Serapan	Kadar (ppm)
1	0,336	6,495
2	0,329	6,368
3	0,338	6,540
Rata-rata		6,468

Replikasi 1

Bobot tablet = 203 mg (mengandung salbutamol 10,92 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,336	6,503	0,035	5	0,174	0,156	0,000	0,000	0,156	1,433
15	0,348	6,724	0,256	5	1,279	1,151	0,002	0,002	1,153	10,555
30	0,362	6,982	0,514	5	2,568	2,311	0,013	0,015	2,326	21,297
60	0,382	7,350	0,882	5	4,410	3,969	0,026	0,038	4,007	36,695
90	0,389	7,479	1,011	5	5,054	4,549	0,044	0,070	4,618	42,294
120	0,400	7,681	1,205	5	6,027	5,424	0,051	0,095	5,519	50,540
180	0,156	3,188	3,188	2,5	7,970	7,173	0,060	0,111	7,283	66,698
240	0,173	3,501	3,501	2,5	8,752	7,877	0,080	0,140	8,017	73,416
300	0,189	3,796	3,796	2,5	9,489	8,540	0,088	0,167	8,707	79,737
360	0,206	4,109	4,109	2,5	10,272	9,244	0,095	0,182	9,427	86,327

Koefisien korelasi = 0,954

Kecepatan pelepasan = 0,025

Replikasi 2

Bobot tablet = 201 mg (mengandung salbutamol 10,81 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,339	6,558	0,090	5	0,450	0,405	0,000	0,000	0,405	3,747
15	0,353	6,816	0,348	5	1,739	1,565	0,005	0,005	1,570	14,521
30	0,363	7,000	0,532	5	2,660	2,394	0,017	0,022	2,416	22,349
60	0,386	7,424	0,956	5	4,778	4,300	0,027	0,044	4,344	40,186
90	0,391	7,516	1,048	5	5,238	4,714	0,048	0,074	4,789	44,300
120	0,404	7,755	1,279	5	6,395	5,756	0,052	0,100	5,856	54,172
180	0,151	3,096	3,096	2,5	7,739	6,965	0,064	0,116	7,082	65,512
240	0,173	3,501	3,501	2,5	8,752	7,877	0,077	0,141	8,018	74,176
300	0,189	3,796	3,796	2,5	9,489	8,540	0,088	0,165	8,705	80,527
360	0,210	4,182	4,182	2,5	10,456	9,410	0,095	0,182	9,593	88,739

Koefisien korelasi = 0,955

Kecepatan pelepasan = 0,024

Replikasi 3
Bobot tablet = 202 mg (mengandung salbutamol 10,87 mg)

Waktu	Serapan	Kadar	Kadar-Adisi	Fp	Kadar (ppm)	Jumlah (mg)	Koreksi	Total koreksi	Disolusi (mg)	Disolusi (%)
5	0,340	6,576	0,108	5	0,542	0,488	0,000	0,000	0,488	4,489
15	0,349	6,742	0,274	5	1,371	1,234	0,005	0,005	1,239	11,400
30	0,365	7,037	0,569	5	2,844	2,560	0,014	0,019	2,579	23,725
60	0,385	7,405	0,937	5	4,686	4,217	0,028	0,042	4,259	39,184
90	0,394	7,571	1,103	5	5,515	4,963	0,047	0,075	5,038	46,351
120	0,402	7,718	1,242	5	6,211	5,590	0,055	0,102	5,692	52,365
180	0,148	3,041	3,041	2,5	7,601	6,841	0,062	0,117	6,958	64,015
240	0,165	3,354	3,354	2,5	8,384	7,546	0,076	0,138	7,684	70,687
300	0,192	3,851	3,851	2,5	9,627	8,664	0,084	0,160	8,824	81,180
360	0,209	4,164	4,164	2,5	10,410	9,369	0,096	0,180	9,549	87,846

Koefisien korelasi = 0,955
Kecepatan pelepasan = 0,024

Keterangan :

Fp = faktor pengenceran sampel

Kadar sampel = kadar salbutamol sulfat dalam sampel (ppm)

Kadar = kadar salbutamol sulfat dalam larutan disolusi (µg/ml)

Kadar adisi = kadar salbutamol yang terukur dikurangi kadar salbutamol sulfat yang telah diketahui (larutan standar adisi)

Jumlah (mg) = jumlah salbutamol sulfat dalam medium disolusi (900 ml)

Koreksi = jumlah salbutamol sulfat dalam cuplikan sampel (mg)

Total koreksi = jumlah kumulatif koreksi (mg)

Disolusi (mg) = jumlah obat yang terlarut (mg)

Disolusi (%) = persentase jumlah obat yang terlarut (%)

Kecepatan korelasi (r) = regresi linier antara waktu dan jumlah disolusi obat (mg)

Kecepatan pelepasan(b)= regresi linier antara waktu dan jumlah disolusi obat (mg)

Rata-rata terdisolusi

Waktu	Rata-rata terdisolusi (%)				
	F I	F II	F III	F IV	F V
5	7,707	5,497	5,873	5,563	3,470
15	17,772	11,530	14,410	12,835	11,119
30	26,361	21,532	22,075	19,714	22,916
60	37,677	32,500	32,181	28,690	38,355
90	46,063	39,389	40,219	38,142	44,999
120	54,670	48,308	46,951	44,146	51,756
180	73,266	58,631	56,674	58,863	64,909
240	81,502	65,271	64,604	70,936	71,597
300	88,364	71,656	69,273	78,426	80,699
360	92,496	80,062	72,674	82,592	87,637

Simpangan baku jumlah obat yang terdisolusi

Waktu	Rata-rata terdisolusi				
	F I	F II	F III	F IV	F V
5	0,35	0,70	1,11	1,03	1,59
15	0,60	1,46	1,25	2,29	2,09
30	0,25	1,44	2,24	3,33	1,22
60	0,58	1,52	1,33	3,36	1,80
90	0,64	1,57	1,43	0,14	2,03
120	1,36	0,84	0,16	1,52	1,82
180	2,42	0,69	0,63	2,01	1,34
240	2,36	0,87	2,18	0,46	1,83
300	0,69	1,23	0,78	1,43	0,72
360	0,66	0,91	0,88	1,08	1,22

Contoh perhitungan hasil disolusi Formula I replikasi 1 menit ke-5

Kandungan salbutamol dalam tablet = $\frac{bobot\ tablet\ (mg)}{bobot\ tablet\ dalam\ formula}$ x hasil penetapan kadar

$= \frac{200\ mg}{200\ mg}$ x 12,14

= 12,14 mg

y = a + bx; x adalah kadar

x = $\frac{y-a}{b}$

$= \frac{0,345-(-0,0171)}{0,0543}$ = 6,668508287

Kadar – adisi = kadar yang terukur – kadar larutan standar adisi

= 6,668508287 – 6,466

= 0,202508287

Kadar (ppm) = (kadar – adisi) x fator pengenceran

= 0,202508287 x 5,0

= 1,012541436 ppm

Jumlah (mg) =kadar (ppm) x medium disolusi (L)

= $1,012541436\ x\ 0,9\ L$

= 0,911287292 mg

Koreksi = $\frac{\text{volume samping (mL)}}{m\text{edium disolusi (mL)}}$ x jumlah sampel menit sebelumnya (mg)

= $\frac{10\ ml}{900\ ml}$ x 0 mg

= 0,000

Total koreksi = jumlah obat yang terdisolusi (mg) + koreksi

= 0,911287292 mg + 0,000

= 0,911287292 mg

Disolusi (%) = $\frac{\text{disolusi (mg)}}{kandungan\ (mg) hasil\ p\text{enetapan kadar}}$ x 100%

= $\frac{0,911287292\ \text{mg}}{12,14\ mg}$ x 100%

= 7,50648 %

Dissolution efficiency (DE 360)

Waktu	*Area Under Curve* (AUC) (%)					
	F I			F II		
	Replikasi 1	Replikasi 2	Replikasi 3	Replikasi 1	Replikasi 2	Replikasi 3

5	18,77	20,27	18,77	11,98	15,49	13,76
15	123,27	132,24	126,68	75,64	96,80	82,96
30	325,18	337,43	330,36	228,01	260,66	255,20
60	953,23	975,00	953,46	769,23	805,50	856,68
90	1256,55	1255,07	1256,67	1032,66	1080,25	1122,11
120	1508,90	1484,45	1539,62	1275,83	1324,41	1346,14
180	3829,66	3731,34	3953,22	3161,46	3210,14	3252,92
240	4684,76	4485,92	4758,49	3669,20	3719,85	3762,17
300	5153,54	5009,47	5124,98	4041,83	4114,46	4167,14
360	5454,60	5398,50	5424,33	4483,90	4558,98	4611,76
AUC total$_{60}$	1420,45	1464,94	1429,27	1084,87	1178,46	1208,61
DE $_{60}$ (%)	23,67	24,42	23,82	18,08	19,64	20,14
AUC total $_{360}$	23308,47	22829,69	23486,58	18749,74	19186,55	19470,86
DE $_{360}$ (%)	64,75	63,42	65,24	52,08	53,30	54,09

Waktu	*Area Under Curve* (AUC) (% menit)					
	F III			F IV		
	Replikasi 1	Replikasi 2	Replikasi 3	Replikasi 1	Replikasi 2	Replikasi 3
5	14,03	12,28	17,74	16,72	11,63	13,38
15	103,46	89,42	111,37	84,55	92,20	99,23
30	281,77	244,75	294,41	195,72	265,61	271,03
60	807,66	766,93	866,97	623,11	745,93	809,17
90	1055,17	1070,31	1132,52	959,47	992,13	1055,83
120	1286,32	1303,64	1332,69	1246,10	1206,77	1250,09
180	3093,30	3099,16	3133,84	3168,22	2976,80	3125,87
240	3559,97	3633,41	3721,69	3968,84	3823,85	3889,30
300	3928,97	4015,64	4104,28	4535,35	4426,25	4480,99
360	4263,72	4254,77	4256,71	4840,99	4777,47	4873,08
AUC total$_{60}$	1206,92	1113,38	1290,48	920,10	1115,38	1192,80
DE $_{60}$ (%)	20,12	18,56	21,51	15,34	18,59	19,88
AUC total$_{360}$	18394,37	18490,31	18972,22	19639,08	19318,65	19867,97
DE 360 (%)	51,10	51,36	52,70	54,55	53,66	55,19

Waktu	*Area Under Curve* (AUC) (% menit)		
	F V		
	Replikasi 1	Replikasi 2	Replikasi 3
5	3,58	9,37	11,22

15	59,94	91,34	79,44
30	238,89	276,53	263,44
60	869,88	938,02	943,64
90	1184,82	1267,28	1283,03
120	1392,50	1477,07	1480,74
180	3517,14	3590,50	3491,39
240	4203,43	4190,63	4041,06
300	4594,59	4641,09	4556,00
360	4981,91	5077,97	5070,78
AUC $total_{60}$	1172,29	1315,25	1297,74
DE $_{60}$ (%)	19,54	21,92	21,63
AUC $total_{360}$	21046,70	21559,79	21220,74
DE $_{360}$ (%)	58,46	59,89	58,95

Dissolution efficiency (DE) 60 dan 360 (% menit)

Formula	Q_{60}	DE_{60}	Q360	DE360
F I	37,677 ± 0,58	23,97 ± 0,39	92,496 ± 0,66	64,75 ± 0,94
F II	32,5 ± 1,515	19,29 ± 1,07	80,062 ± 0,91	53,15 ± 1,01
F III	32,181 ± 1,335	20,06 ± 1,48	72,674 ± 0,88	51,72 ± 0,86
F IV	28,69 ± 3,357	17,93 ± 2,34	82,592 ± 1,08	54,47 ± 0,77
F V	38,69 ± 1,798	21,03 ± 1,30	87,64 ± 1,22	59,10 ± 0,72

Contoh perhitungan *dissolution efficiency* (DE)(% menit)

AUC $= \frac{alas\ x\ tinggi}{2}$; alas $(t\text{-}t_{n-1})$ t adalah waktu, tinggi $Q\text{-}Q_{n-1}$ (Q adalah jumlah obat terdisolusi dalam %)

DE $= \frac{\text{luas total AUC}}{luas\ total\ kurva}$ x 100%

$AUC_{5'}$ $= \frac{(5-0)\ x\ (7{,}514+0)}{2} = 18{,}775$

$AUC_{15'}$ $= \frac{(15-5)\ x\ (17{,}146+7{,}51)}{2} = 123{,}3$

$AUC_{30'} = \frac{(30-15)\ x\ (26,21+17,146)}{2} = 325,17$

$AUC_{60'} = \frac{(60-30)\ x\ (37,34+26,21)}{2} = 953,25$

$AUC_{90'} = \frac{(90-60)\ x\ (46,43+\ 37,34)}{2} = 1256,55$

$AUC_{120'} = \frac{(120-90)\ x\ (54,16+\ 46,43)}{2} = 1508,9$

$AUC_{180'} = \frac{(180-\ 120)\ x\ (73,49+\ 54,16)}{2} = 3829,5$

$AUC_{240'} = \frac{(240-\ 180)\ x\ (82,66+\ 73,49)}{2} = 4684,5$

$AUC_{300'} = \frac{(300-\ 240)\ x\ (89,12+82,66)}{2} = 5153,4$

$AUC_{360'} = \frac{(360-\ 300)\ x\ (92,70+89,12)}{2} = 5454,6$

Luas AUC_{60} = 18,775+123,3+325,17+953,25 = 1420,495

Luas total kurva 60 = 60 x 100 =6000

$DE_{60} = \frac{\text{luas total AUC60}}{luas\ total\ kurva\ 60}$ x 100%

$= \frac{1420,495}{6000}$ x 100%

= 23,67%

Luas AUC 360 = 18,775+123,3+325,17+953,25+1256,55+1508,9+3829,5+ 4684,5+5153,4+5454,6

= 23307,945

Luas total kurva 360 = 360 x100

=36000

$DE_{360} = \frac{\text{luas total AUC}}{luas\ total\ kurva}$ x 100%

$= \frac{23307,945}{36000}$ x 100% = 64,745%

Lampiran 23. Data analisis SPSS uji disolusi

Hasil analisa SPSS Q_5

One-Sample Kolmogorov-Smirnov Test

		Q5
N		15
Normal Parameters[a,,b]	Mean	5.5740
	Std. Deviation	1.72240
Most Extreme Differences	Absolute	.131
	Positive	.092
	Negative	-.131
Kolmogorov-Smirnov Z		.508
Asymp. Sig. (2-tailed)		.958

a. Test distribution is Normal.

b. Calculated from data.

Test of Homogeneity of Variances

Q5

Levene Statistic	df1	df2	Sig.
1.781	4	10	.209

ANOVA

Q5

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.550	4	7.637	6.954	.006
Within Groups	10.983	10	1.098		
Total	41.533	14			

Multiple Comparisons

Q5

LSD

(I)	(J)	Mean Difference	Std. Error	Sig.	95% Confidence Interval

formula	formula	(I-J)			Lower Bound	Upper Bound
1	2	2.21000*	.85569	.027	.3034	4.1166
	3	1.83667	.85569	.057	-.0699	3.7433
	4	2.14667*	.85569	.031	.2401	4.0533
	5	4.48667*	.85569	.000	2.5801	6.3933
2	1	-2.21000*	.85569	.027	-4.1166	-.3034
	3	-.37333	.85569	.672	-2.2799	1.5333
	4	-.06333	.85569	.942	-1.9699	1.8433
	5	2.27667*	.85569	.024	.3701	4.1833
3	1	-1.83667	.85569	.057	-3.7433	.0699
	2	.37333	.85569	.672	-1.5333	2.2799
	4	.31000	.85569	.725	-1.5966	2.2166
	5	2.65000*	.85569	.011	.7434	4.5566
4	1	-2.14667*	.85569	.031	-4.0533	-.2401
	2	.06333	.85569	.942	-1.8433	1.9699
	3	-.31000	.85569	.725	-2.2166	1.5966
	5	2.34000*	.85569	.021	.4334	4.2466
5	1	-4.48667*	.85569	.000	-6.3933	-2.5801
	2	-2.27667*	.85569	.024	-4.1833	-.3701
	3	-2.65000*	.85569	.011	-4.5566	-.7434
	4	-2.34000*	.85569	.021	-4.2466	-.4334

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

Hasil analisa SPSS Q_{360}

One-Sample Kolmogorov-Smirnov Test

		Q360
N		15
Normal Parameters[a,,b]	Mean	83.0920
	Std. Deviation	7.02420
Most Extreme Differences	Absolute	.114
	Positive	.114

Negative	-.091
Kolmogorov-Smirnov Z	.443
Asymp. Sig. (2-tailed)	.989

a. Test distribution is Normal.

b. Calculated from data.

Test of Homogeneity of Variances

Q360

Levene Statistic	df1	df2	Sig.
.319	4	10	.859

ANOVA

Q360

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	681.377	4	170.344	181.729	.000
Within Groups	9.374	10	.937		
Total	690.751	14			

Multiple Comparisons

Q360

LSD

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	12.43667*	.79051	.000	10.6753	14.1980
	3	19.82333*	.79051	.000	18.0620	21.5847
	4	9.90667*	.79051	.000	8.1453	11.6680
	5	4.85667*	.79051	.000	3.0953	6.6180
2	1	-12.43667*	.79051	.000	-14.1980	-10.6753
	3	7.38667*	.79051	.000	5.6253	9.1480
	4	-2.53000*	.79051	.009	-4.2914	-.7686
	5	-7.58000*	.79051	.000	-9.3414	-5.8186
3	1	-19.82333*	.79051	.000	-21.5847	-18.0620

	2	-7.38667*	.79051	.000	-9.1480	-5.6253
	4	-9.91667*	.79051	.000	-11.6780	-8.1553
	5	-14.96667*	.79051	.000	-16.7280	-13.2053
4	1	-9.90667*	.79051	.000	-11.6680	-8.1453
	2	2.53000*	.79051	.009	.7686	4.2914
	3	9.91667*	.79051	.000	8.1553	11.6780
	5	-5.05000*	.79051	.000	-6.8114	-3.2886
5	1	-4.85667*	.79051	.000	-6.6180	-3.0953
	2	7.58000*	.79051	.000	5.8186	9.3414
	3	14.96667*	.79051	.000	13.2053	16.7280
	4	5.05000*	.79051	.000	3.2886	6.8114

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

Lampiran 24. Kinetika pelepasan dan mekanisme pelepasan

Zero order = regresi linier antara t dengan rata-rata terdisolusi (%)

Waktu	Rata-rata terdisolusi (%)				
	F I	F II	F III	F IV	F V
5	7,707	5,497	5,873	5,563	3,223
15	17,772	11,530	14,410	12,835	12,159
30	26,361	21,532	22,075	19,714	22,457
60	37,677	32,500	32,181	28,690	38,688
90	46,063	39,389	40,219	38,142	44,315
120	54,670	48,308	46,951	44,146	52,359
180	73,266	58,631	56,674	58,863	65,408
240	81,502	65,271	64,604	70,936	72,760
300	88,364	71,656	69,273	78,426	80,481
360	92,496	80,062	72,674	82,592	87,637
r	0,96389	0,96311	0,95195	0,9782	0,95541

First order = regresi linier antara t dengan log rata-rata terdisolusi (%)

Waktu	Rata-rata terdisolusi (%)				
	log F I	log F II	log F III	log FIV	log F V
5	0,887	0,740	0,769	0,745	0,508
15	1,250	1,062	1,159	1,108	1,085
30	1,421	1,333	1,344	1,295	1,351
60	1,576	1,512	1,508	1,458	1,588
90	1,663	1,595	1,604	1,581	1,647
120	1,738	1,684	1,672	1,645	1,719
180	1,865	1,768	1,753	1,770	1,816
240	1,911	1,815	1,810	1,851	1,862
300	1,946	1,855	1,841	1,894	1,906
360	1,966	1,903	1,861	1,917	1,943
r	0,84595	0,82975	0,81954	0,86171	0,77746

Higuchi = regresi linier antara akar t dengan rata-rata terdisolusi (%)

Waktu	Akar waktu	Rata-rata terdisolusi (%)				
		F I	F II	F III	F IV	F V
5	2,236	7,707	5,497	5,873	5,563	3,223
15	3,873	17,772	11,530	14,410	12,835	12,159
30	5,477	26,361	21,532	22,075	19,714	22,457
60	7,746	37,677	32,500	32,181	28,690	38,688
90	9,487	46,063	39,389	40,219	38,142	44,315
120	10,954	54,670	48,308	46,951	44,146	52,359
180	13,416	73,266	58,631	56,674	58,863	65,408
240	15,492	81,502	65,271	64,604	70,936	72,760
300	17,321	88,364	71,656	69,273	78,426	80,481
360	18,974	92,496	80,062	72,674	82,592	87,637
r		0,99632	0,99762	0,99506	0,99796	0,99582

Mekanisme pelepasan koersmeyer-peppas = regresi linier antara log t dengan log rata-rata terdisolusi (%)

log t	Rata-rata terdisolusi (%)				
	log F I	log F II	log F III	log FIV	log F V
0,699	0,887	0,740	0,769	0,745	0,508
1,176	1,250	1,062	1,159	1,108	1,085
1,477	1,421	1,333	1,344	1,295	1,351
1,778	1,576	1,512	1,508	1,458	1,588
1,954	1,663	1,595	1,604	1,581	1,647
2,079	1,738	1,684	1,672	1,645	1,719
2,255	1,865	1,768	1,753	1,770	1,816
2,380	1,911	1,815	1,810	1,851	1,862
2,477	1,946	1,855	1,841	1,894	1,906
2,556	1,966	1,903	1,861	1,917	1,943
r	0,99620	0,99419	0,99212	0,99845	0,97868
n	0,57475	0,62110	0,57494	0,62850	0,72703

Lampiran 25. Perhitungan profil farmakokinetika

Kadar efektif mulai bekerja

Steady steate pemberian oral

Kadar yang dikehendaki

Kadar toksik

Volume distribusi : 156 L (Morgan 1986)

Waktu eliminasi

K el : 0,17325/jam (Moffat 1986)

F (bioavailability) : 0,5 kg/BB (BB: 60 kg) (Moffat 1986)

Kecepatan disolusi (kadar efektif)

Kecepatan disoluisi (kadar toksik)

Kecepatan disolusi (kadar steady state)

Kecepatan disolusi yang dikehendaki

Target kecepatan pelepasan salbutamol sulfat