

BAB 5

SIMPULAN

5.1. Simpulan

Konsentrasi *guar gum* sebagai polimer lepas lambat, konsentrasi bahan eferfesen yang terdiri dari asam sitrat dan natrium bikarbonat yang membantu dalam mempercepat proses pengapungan karena dapat melepas CO₂ ketika kontak dengan cairan lambung maupun interaksinya antara konsentrasi *guar gum* dan konsentrasi bahan eferfesen berpengaruh signifikan terhadap sifat mutu fisik dan disolusi metformin hidroklorida dalam sediaan tablet *floating*. Berdasarkan *Design-Expert*, konsentrasi *guar gum* memberikan efek yang signifikan terhadap *floating lag time* dan konstanta laju disolusi tetapi tidak memberikan efek yang signifikan terhadap kekerasan tablet. Sedangkan konsentrasi komponen eferfesen tidak memberikan efek yang signifikan terhadap kekerasan tablet dan konstanta laju disolusi tetapi memberikan efek yang signifikan terhadap *floating lag time*. Interaksi antara konsentrasi *guar gum* dan konsentrasi komponen eferfesen tidak memberikan efek yang signifikan terhadap kekerasan tablet, *floating lag time* dan konstanta laju disolusi.

Formula optimum yang terpilih adalah formula dengan kombinasi *guar gum* yang memiliki konsentrasi sebesar 19,5% dan komponen eferfesen yaitu asam sitrat dan natrium bikarbonat dengan perbandingan 1:1 yang memiliki konsentrasi sebesar 5,5% yang menghasilkan kekerasan 11,43 Kp, *floating lag time* 8,69 menit dan K disolusi 0,324 mg/menit.

5.2. Alur Penelitian Selanjutnya

Dapat dilakukan penelitian lebih lanjut mengenai tablet *floating* metformin hidroklorida menggunakan polimer alam yaitu *guar gum* yang

dapat dikombinasikan dengan polimer alam lainnya maupun sintetik dan ditambahkan komponen eferfesen namun dengan kondisi penyimpanan yang terjaga hingga didapat formula optimum dan dicari korelasi *invivo* – *invitro* yang diharapkan memberikan hasil yang baik.

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LAMPIRAN A

HASIL UJI MUTU FISIK MASSA TABLET *FLOATING*
METFORMIN HIDROKLORIDA

Mutu fisik yang diuji	Batch	Formula Tablet Metformin Hidroklorida				Persyaratan
		FA	FB	FC	FD	
Kadar Air (%)	I	3,70	3,20	3,00	3,50	3 – 5 % (Voight, 1995)
	II	3,10	3,30	2,90	3,24	
	III	3,08	3,12	3,20	3,40	
	\bar{X}	3,29	3,21	3,03	3,38	
	SD	0,35	0,09	0,15	0,13	
Waktu Alir (Detik)	I	7,60	7,80	7,40	8,20	Tidak lebih dari 10 detik (Fudholi, 1985)
	II	7,30	8,00	6,70	7,35	
	III	7,50	8,00	7,80	7,50	
	\bar{X}	7,47	7,93	7,30	7,68	
	SD	0,15	0,12	0,56	0,45	
Sudut Diam (Derajat)	I	25,17	26,92	23,75	26,57	<25 (Sangat baik) 25 – 30 (Baik) (Wells, 1988)
	II	23,27	25,29	21,31	25,31	
	III	23,75	23,27	22,78	24,23	
	\bar{X}	24,06	25,16	22,61	25,37	
	SD	0,99	1,83	1,23	1,17	
Carr's Index (%)	I	15,58	13,92	12,31	14,71	11 – 15 (Baik) (Siregar, 1992)
	II	13,04	13,04	13,85	13,23	
	III	14,71	14,35	11,59	12,68	
	\bar{X}	14,44	13,77	12,58	13,54	
	SD	1,29	0,67	1,15	1,05	
Hausner Ratio	I	1,18	1,16	1,14	1,17	1,12 – 1,18 (Baik) (Anonim, 2006)
	II	1,15	1,15	1,16	1,15	
	III	1,17	1,17	1,13	1,15	
	\bar{X}	1,17	1,16	1,14	1,16	
	SD	0,02	0,01	0,02	0,01	

LAMPIRAN B

**HASIL UJI KERAGAMAN BOBOT TABLET *FLOATING*
METFORMIN HIDROKLORIDA**

Hasil Uji Keragaman Bobot Tablet Formula A

No.	<i>Batch I</i>		<i>Batch II</i>		<i>Batch III</i>	
	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)
1	788,2	98,73	797,5	101,99	802,8	101,58
2	792,5	99,26	785,6	100,47	797,4	100,90
3	785,5	98,39	801,2	102,47	792,1	100,22
4	797,8	99,93	802,1	102,58	784,7	99,29
5	786,8	98,55	793,3	101,45	789,6	99,91
6	789,7	98,91	786,5	100,59	798,5	101,03
7	802,6	100,53	789,7	100,99	801,5	101,41
8	792,8	99,30	803,5	102,76	802,8	101,58
9	802,3	100,49	791,9	101,28	787,6	99,66
10	801,6	100,40	786,8	100,62	796,8	100,82
\bar{X}	793,98	99,45	793,81	101,52	795,38	100,64
PK (%)	99,45		101,52		100,64	
SD	0,83		0,88		0,82	

Hasil Uji Keragaman Bobot Tablet Formula B

No.	<i>Batch I</i>		<i>Batch II</i>		<i>Batch III</i>	
	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)
1	801,2	101,88	802,6	102,70	798,2	100,49
2	797,3	101,39	789,3	101,00	791,6	99,66
3	793,8	100,94	795,7	101,82	801,5	100,90
4	786,5	100,01	801,6	102,57	787,9	99,19
5	789,8	100,43	793,5	101,54	802,3	101,01
6	802,6	102,06	803,3	102,79	790,8	99,56
7	803,5	102,17	786,4	100,63	802,8	101,07
8	788,6	100,28	795,3	101,77	803,6	101,17
9	795,8	101,20	801,8	102,60	789,4	99,38
10	801,6	101,93	798,6	102,19	792,5	99,77
\bar{X}	796,07	101,23	796,81	101,96	796,06	100,22
PK (%)	101,23		101,96		100,22	
SD	0,79		0,75		0,78	

Hasil Uji Keragaman Bobot Tablet Formula C

No.	<i>Batch I</i>		<i>Batch II</i>		<i>Batch III</i>	
	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)
1	787,9	99,62	792,5	100,72	800,7	102,35
2	794,5	100,45	795,8	101,14	801,5	102,45
3	785,9	99,36	788,7	100,24	785,7	100,43
4	801,6	101,35	784,6	99,72	789,2	100,88
5	802,1	101,41	801,6	101,88	793,8	101,47
6	794,9	100,50	800,9	101,79	802,3	102,55
7	783,7	99,09	802,5	101,99	796,6	101,82
8	798,2	100,92	786,7	99,99	787,3	100,64
9	800,6	101,22	800,4	101,73	784,9	100,33
10	800,3	101,18	789,2	100,30	800,2	102,28
\bar{X}	794,97	100,51	794,29	100,95	794,22	101,52
PK (%)	100,51		100,95		101,52	
SD	0,87		0,86		0,89	

Hasil Uji Keragaman Bobot Tablet Formula D

No.	<i>Batch I</i>		<i>Batch II</i>		<i>Batch III</i>	
	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)	Bobot Tablet (mg)	Y (%)
1	798,2	101,52	797,5	102,14	801,5	100,62
2	792,4	100,79	800,4	102,52	793,6	99,63
3	784,7	99,81	795,7	101,91	785,7	98,64
4	785,6	99,92	783,5	100,35	800,4	100,49
5	793,6	100,94	786,8	100,77	802,6	100,76
6	800,9	101,87	800,7	102,55	789,4	99,11
7	801,5	101,94	801,6	102,67	796,7	100,02
8	802,6	102,08	800,6	102,54	792,5	99,50
9	788,7	100,32	785,8	100,65	783,6	98,38
10	800,5	101,82	796,3	101,99	800,9	100,55
\bar{X}	794,87	101,10	794,89	101,81	794,69	99,77
PK (%)	101,10		101,81		99,77	
SD	0,87		0,88		0,86	

LAMPIRAN C

**HASIL UJI KEKERASAN TABLET *FLOATING*
METFORMIN HIDROKLORIDA**

Batch I

No.	Kekerasan Tablet Metformin Hidroklorida (Kp)			
	FA	FB	FC	FD
1	12,0	11,2	10,8	10,8
2	11,9	10,5	10,5	11,2
3	11,5	10,1	11,5	12,8
4	11,0	12,1	11,8	10,5
5	12,2	11,8	11,0	13,3
6	13,7	12,8	10,9	11,8
7	11,3	10,7	12,1	10,6
8	11,6	10,9	12,3	10,3
9	12,2	13,4	10,7	11,5
10	12,2	12,5	11,8	12,6
$\bar{X} \pm SD$	11,96±0,74	11,60±1,09	11,34±0,64	11,54±1,06

Batch II

No.	Kekerasan Tablet Metformin Hidroklorida (Kp)			
	FA	FB	FC	FD
1	10,8	11,4	11,3	10,8
2	11,5	10,4	10,9	11,2
3	10,5	11,2	10,3	10,5
4	12,5	13,2	11,5	10,9
5	11,8	12,5	10,7	12,4
6	11,2	10,7	10,2	11,8
7	12,4	12,3	10,5	10,7
8	10,2	10,6	12,4	13,4
9	10,9	10,8	11,5	11,5
10	10,7	11,7	10,9	10,8
$\bar{X} \pm SD$	11,25±0,78	11,48±0,93	11,02±0,67	11,40±0,91

Batch III

No.	Kekerasan Tablet Metformin Hidroklorida (Kp)			
	FA	FB	FC	FD
1	11,2	10,8	10,8	11,2
2	10,9	11,3	10,5	10,7
3	10,8	10,5	11,7	10,5
4	11,7	11,5	12,3	12,6
5	10,5	12,2	11,2	12,1
6	12,7	12,7	10,8	10,9
7	12,1	10,4	10,3	10,2
8	11,3	10,9	11,6	11,5
9	10,6	11,2	10,9	11,2
10	10,3	10,6	11,1	10,8
$\bar{X} \pm SD$	11,21±0,76	11,21±0,75	11,12±0,60	11,17±0,73

LAMPIRAN D
HASIL UJI KERAPUHAN TABLET *FLOATING*
METFORMIN HIDROKLORIDA

Formula	Batch	Berat awal (gram)	Berat akhir (gram)	Kerapuhan (%)	$\bar{X} \pm SD$
A	I	16,04	16,02	0,12	0,21±0,10
	II	15,98	15,95	0,19	
	III	16,03	15,98	0,31	
B	I	15,88	15,84	0,25	0,27±0,03
	II	15,90	15,86	0,25	
	III	16,04	15,99	0,31	
C	I	16,07	16,03	0,25	0,29±0,08
	II	15,90	15,84	0,38	
	III	15,96	15,92	0,25	
D	I	16,10	16,07	0,19	0,25±0,06
	II	16,12	16,08	0,25	
	III	16,06	16,01	0,31	

LAMPIRAN E

**HASIL PENETAPAN KADAR TABLET *FLOATING*
METFORMIN HIDROKLORIDA**

Formula	Batch	W (mg)	Abs.	C Obs. (ppm)	C Teo. (ppm)	Kadar (%)	\bar{X} \pm SD	KV
A	I	800,3	0,668	8,95	9,00	99,45	100,54	1,03
	II	800,4	0,682	9,14	9,00	101,52	\pm	
	III	800,3	0,676	9,06	9,00	100,64	1,04	
B	I	800,4	0,680	9,11	9,00	101,23	101,13	0,86
	II	800,5	0,685	9,18	9,01	101,96	\pm	
	III	800,1	0,673	9,02	9,00	100,22	0,87	
C	I	800,2	0,675	9,05	9,00	100,51	100,99	0,50
	II	800,2	0,678	9,09	9,00	100,95	\pm	
	III	800,4	0,682	9,14	9,00	101,52	0,51	
D	I	800,2	0,679	9,10	9,00	101,10	100,90	1,02
	II	800,5	0,684	9,17	9,01	101,81	\pm	
	III	800,1	0,670	8,98	9,00	99,77	1,03	

Hasil Uji Disolusi Formula C

<i>Batch</i>	t (menit)	Abs.	C Sampel ($\mu\text{g/mL}$)	Wt (mg)	% Obat Terlepas	AUC
	0	0	0	0	0	0
	30	0,481	402,57	362,32	71,75	5434,73
	60	0,501	419,28	377,35	74,73	11095,02
	90	0,491	410,93	369,83	73,24	11207,80
	120	0,486	406,75	366,07	72,49	11038,63
	180	0,485	405,91	365,32	72,35	21941,93
I	240	0,498	416,77	375,10	74,28	22212,60
	300	0,484	405,08	364,57	72,20	22190,04
	360	0,493	412,60	371,34	73,54	22077,27
	420	0,492	411,76	370,59	73,39	22257,71
	480	0,503	420,95	378,86	75,03	22483,26
	540	0,507	424,29	381,86	75,62	22821,60
	600	0,513	429,31	386,37	76,51	23047,15
						217807,76
<i>Batch</i>	t (menit)	Abs.	C Sampel ($\mu\text{g/mL}$)	Wt (mg)	% Obat Terlepas	AUC
	0	0	0	0	0	0
	30	0,476	398,40	358,56	71,01	5378,35
	60	0,485	405,91	365,32	72,35	10858,19
	90	0,489	409,26	368,33	72,94	11004,80
	120	0,491	410,93	369,83	73,24	11072,47
	180	0,488	408,42	367,58	72,79	22122,38
	240	0,492	411,76	370,59	73,39	22144,93
II	300	0,490	410,09	369,08	73,09	22190,04
	360	0,502	420,12	378,10	74,88	22415,60
	420	0,506	423,46	381,11	75,47	22776,49
	480	0,508	425,13	382,62	75,77	22911,82
	540	0,519	434,32	390,89	77,41	23205,04
	600	0,529	442,67	398,40	78,90	23678,70
						219758,80

Hasil Uji Disolusi Formula D

<i>Batch</i>	t (menit)	Abs.	C Sampel ($\mu\text{g/mL}$)	Wt (mg)	% Obat Terlepas	AUC
	0	0	0	0	0	0
	30	0,293	163,68	147,31	29,20	2209,68
	60	0,432	241,09	216,98	43,01	5464,43
	90	0,478	266,71	240,04	47,58	6855,35
	120	0,506	282,31	254,07	50,36	7411,72
	180	0,601	335,21	301,69	59,80	16672,98
I	240	0,678	378,10	340,29	67,45	19259,34
	300	0,669	373,08	335,78	66,56	20281,85
	360	0,701	390,91	351,81	69,74	20627,70
	420	0,707	394,25	354,82	70,33	21199,11
	480	0,723	403,16	362,84	71,92	21529,92
	540	0,746	415,97	374,37	74,21	22116,36
	600	0,767	427,66	384,90	76,30	22777,99
						186406,45
<i>Batch</i>	t (menit)	Abs.	C Sampel ($\mu\text{g/mL}$)	Wt (mg)	% Obat Terlepas	AUC
	0	0	0	0	0	0
	30	0,302	168,69	151,82	30,10	2277,35
	60	0,424	236,64	212,97	42,22	5471,95
	90	0,501	279,52	251,57	49,87	6968,13
	120	0,497	277,29	249,56	49,47	7516,98
	180	0,622	346,91	312,22	61,89	16853,43
	240	0,690	384,78	346,30	68,65	19755,56
II	300	0,703	392,02	352,82	69,94	20973,55
	360	0,717	399,82	359,83	71,33	21379,55
	420	0,706	393,69	354,32	70,24	21424,66
	480	0,712	397,03	357,33	70,83	21349,48
	540	0,753	419,87	377,88	74,91	22056,22
	600	0,764	425,99	383,39	76,00	22838,14
						188864,99

LAMPIRAN G
HASIL UJI DISOLUSI BERDASARKAN K DISOLUSI

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Orde Nol	I	r: 0,8672	r: 0,8585	r: 0,4843	r: 0,8185
		k: 0,0512	k: 0,3382	k: 0,0268	k: 0,3442
	II	r: 0,7425	r: 0,8374	r: 0,8969	r: 0,7788
		k: 0,0513	k: 0,3976	k: 0,0556	k: 0,3371
	III	r: 0,8709	r: 0,8665	r: 0,8660	r: 0,7966
		k: 0,0738	k: 0,3269	k: 0,0790	k: 0,3445
	Rata-rata r	0,8268	0,8541	0,7490	0,7979
		±	±	±	±
	SD	0,0730	0,0150	0,2298	0,0198
Rata-rata k	0,0587	0,3542	0,0538	0,3419	
	±	±	±	±	
	0,0130	0,0379	0,0261	0,0041	
	SD				

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Orde Satu	I	r: 0,8449	r: 0,9426	r: 0,4896	r: 0,9049
		k: -0,0004	k: -0,0017	k: -0,0002	k: -0,0017
	II	r: 0,7635	r: 0,9107	r: 0,8845	r: 0,8571
		k: -0,0004	k: -0,0018	k: -0,0004	k: -0,0017
	III	r: 0,8938	r: 0,9427	r: 0,8925	r: 0,8792
		k: -0,0006	k: -0,0017	k: -0,0006	k: -0,0018
	Rata-rata r	0,8341	0,9320	0,7555	0,8804
		±	±	±	±
	SD	0,0658	0,0184	0,2303	0,0239
Rata-rata k	-0,0005	-0,0017	-0,0004	-0,0017	
	±	±	±	±	
	0,0001	0,00005	0,0002	0,00005	
	SD				

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Higuchi	I	r: 0,7885 k: 1,5028	r: 0,9446 k: 10,9251	r: 0,4061 k: 0,7552	r: 0,9213 k: 11,2465
	II	r: 0,8262 k: 1,6672	r: 0,9363 k: 12,9464	r: 0,8330 k: 1,6509	r: 0,8915 k: 11,1076
	III	r: 0,9278 k: 2,3449	r: 0,9511 k: 10,5479	r: 0,9236 k: 2,5123	r: 0,9098 k: 11,3369
	Rata-rata r	0,8475	0,9440	0,7209	0,9075
	±	±	±	±	±
	SD	0,0720	0,0074	0,2763	0,0150
	Rata-rata k	1,8383	11,4731	1,6394	11,2303
	±	±	±	±	±
	SD	0,4463	1,2897	0,8786	0,1155

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Hixon Crowell	I	r: 0,8528 k: -0,0004	r: 0,9189 k: -0,0019	r: 0,4879 k: -0,0002	r: 0,8791 k: -0,0019
	II	r: 0,7569 k: -0,0004	r: 0,8885 k: -0,0021	r: 0,8891 k: -0,0004	r: 0,8332 k: -0,0019
	III	r: 0,8867 k: -0,0006	r: 0,9209 k: -0,0019	r: 0,8843 k: -0,0006	r: 0,8539 k: -0,0020
	Rata-rata r	0,8321	0,9094	0,7537	0,8554
	±	±	±	±	±
	SD	0,0673	0,0181	0,2302	0,0229
	Rata-rata k	-0,0004	-0,0019	-0,0004	-0,0019
	±	±	±	±	±
	SD	0,0001	0,0001	0,0002	0,00005

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Korsmeyer Peppas	I	r: 0,6851	r: 0,9596	r: 0,3249	r: 0,9545
		k: 0,6677	k: 0,1371	k: 0,6917	k: 0,1212
	II	r: 0,8920	r: 0,9713	r: 0,7404	r: 0,9418
		k: 0,6346	k: 0,0799	k: 0,6417	k: 0,1257
	III	r: 0,9363	r: 0,9714	r: 0,9239	r: 0,9583
		k: 0,6017	k: 0,1508	k: 0,5963	k: 0,1284
	Rata-rata r	0,8378	0,9674	0,6630	0,9515
		±	±	±	±
	± SD	0,1340	0,0067	0,3068	0,0086
Rata-rata k	0,6347	0,1226	0,6432	0,1251	
	±	±	±	±	
± SD	0,0330	0,0376	0,0477	0,0036	

Metode yang diuji	Batch	FORMULA			
		A	B	C	D
Weibull	I	r: 0,6625	r: 0,9812	r: 0,3239	r: 0,9779
		k: 0,0541	k: 0,4272	k: 0,0254	k: 0,4502
	II	r: 0,8884	r: 0,9851	r: 0,7216	r: 0,9628
		k: 0,0656	k: 0,5286	k: 0,0586	k: 0,4460
	III	r: 0,9316	r: 0,9861	r: 0,9225	r: 0,9796
		k: 0,0897	k: 0,4070	k: 0,0957	k: 0,4516
	Rata-rata r	0,8275	0,9841	0,6560	0,9734
		±	±	±	±
	± SD	0,1445	0,0025	0,3046	0,0092
Rata-rata k	0,0698	0,4542	0,0599	0,4492	
	±	±	±	±	
± SD	0,0181	0,0651	0,0351	0,0029	

LAMPIRAN H

CONTOH PERHITUNGAN

Contoh perhitungan sudut diam:

Formula A

$$W \text{ persegi panjang} = 4,66 \text{ g}$$

$$W \text{ lingkaran} = 1,32 \text{ g}$$

$$\text{Luas persegi panjang} = 626,67 \text{ cm}^2$$

$$\begin{aligned} \text{Luas lingkaran} &= \frac{1,32 \text{ g}}{4,66 \text{ g}} \times 626,67 \text{ cm}^2 \\ &= 177,51 \text{ cm}^2 \end{aligned}$$

$$r = \sqrt{\frac{177,51}{3,14}} = 7,52 \text{ cm}$$

$$\text{tg } \alpha = \frac{h}{r} = \frac{3,5 \text{ cm}}{7,52 \text{ cm}} = 0,47$$

$$\begin{aligned} \text{Sudut diam } (\alpha) &= \text{inv. tg } \alpha \\ &= 25,17^\circ \end{aligned}$$

Contoh perhitungan indeks kompresibilitas:

Formula A

$$\text{Berat gelas ukur} = 121,76 \text{ g } (W_1)$$

$$\text{Berat gelas ukur + massa tablet} = 186,28 \text{ g } (W_2)$$

$$V_1 = 100 \text{ mL}$$

$$V_2 = 84 \text{ mL}$$

$$\text{Bobot jenis nyata } (\rho_{\text{bulk}}) = \frac{(W_2 - W_1)}{V_1} = \frac{(186,28 - 121,76)}{100} = 0,65 \text{ g/mL}$$

$$\text{Bobot jenis mampat } (\rho_{\text{tapped}}) = \frac{(W_2 - W_1)}{V_2} = \frac{(186,28 - 121,76)}{84} = 0,77$$

g/mL

$$\% \text{ kompresibilitas} = \left(1 - \frac{B_{j.\text{nyata}}}{B_{j.\text{mampat}}} \right) \times 100\% = 15,58 \%$$

$$\text{Hausner Ratio} = \frac{b_{j.\text{mampat}}}{b_{j.\text{nyata}}} = 1,18$$

Contoh perhitungan akurasi dan presisi :

%	Bahan Aktif (mg)	Matriks (mg)	Aquades (mL)	Pipet (mL)	Aquades (mL)	Kons. ($\mu\text{g/mL}$)
100	500	300	100,0	0,045	25,0	9,0

$$\text{Absorbansi} = 0,676 \rightarrow Y = 0,0746X - 0,0001$$

$$\text{Konsentrasi sampel} = 9,06 \mu\text{g/mL}$$

$$\text{Konsentrasi teoritis} = 9,01 \mu\text{g/mL}$$

$$\begin{aligned} \% \text{ Perolehan kembali} &= (\text{konsentrasi sampel} / \text{konsentrasi teoritis}) \times 100\% \\ &= (9,06 / 9,01) \times 100\% \\ &= 100,54\% \end{aligned}$$

$$\begin{aligned} \text{Untuk menghitung \% KV} &= \frac{SD}{\bar{X}} \times 100\% \\ &= \frac{0,92}{100,35} \times 100\% \\ &= 0,91\% \end{aligned}$$

Contoh perhitungan % obat terlepas :

$$\% \text{ Obat Terlepas} = \frac{Wt}{\frac{PK}{100} \times \text{dosis}} \times 100\%$$

Formula A *batch* I pada t = 30 menit

$$\begin{aligned} \% \text{ Obat Terlepas} &= \frac{368,36}{\frac{100,54}{100} \times 500} \\ &= 0,7328 \times 100\% \\ &= 73,28\% \end{aligned}$$

Contoh perhitungan AUC pada disolusi:

Rumus:

Formula A *batch* I

$$W_{tn-1} = 368,36$$

$$W_{tn} = 371,86$$

$$t_n = 60 \text{ menit}$$

$$t_{n-1} = 30 \text{ menit}$$

$$\begin{aligned} \text{AUC} &= \frac{371,86 + 368,36}{2} \times (60 - 30) \\ &= 11103,3 \end{aligned}$$

$$\text{Luas } \square = 600 \times \text{penetapan kadar} \times \text{dosis}$$

$$= 600 \times 100,54\% \times 500 \text{ mg}$$

$$= 301620$$

$$\begin{aligned} \% \text{ ED Formula A } \textit{batch} \text{ I} &= \left(\frac{\sum \text{AUC}}{\text{luas } \square} \right) \times 100\% \\ &= \left(\frac{223615,41}{301620} \right) \times 100\% \\ &= 74,14\% \end{aligned}$$

LAMPIRAN I

HASIL UJI STATISTIK KERAGAMAN BOBOT TABLET ANTAR FORMULA

Anova : *One Way*

Descriptives

Keragaman Bobot

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	100.5367	1.03886	.59979	97.9560	103.1173	99.45	101.52
B	3	101.1367	.87375	.50446	98.9662	103.3072	100.22	101.96
C	3	100.9933	.50639	.29237	99.7354	102.2513	100.51	101.52
D	3	100.8933	1.03558	.59789	98.3208	103.4659	99.77	101.81
Total	12	100.8900	.79385	.22917	100.3856	101.3944	99.45	101.96

Test of Homogeneity of Variances

Keragaman Bobot

Levene Statistic	df1	df2	Sig.
.498	3	8	.694

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.589	3	.196	.248	.861
Within Groups	6.343	8	.793		
Total	6.932	11			

Multiple Comparisons

PostHoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-.60000	.72704	.433	-2.2766	1.0766
	C	-.45667	.72704	.547	-2.1332	1.2199
	D	-.35667	.72704	.637	-2.0332	1.3199
B	A	.60000	.72704	.433	-1.0766	2.2766
	C	.14333	.72704	.849	-1.5332	1.8199
	D	.24333	.72704	.746	-1.4332	1.9199
C	A	.45667	.72704	.547	-1.2199	2.1332
	B	-.14333	.72704	.849	-1.8199	1.5332
	D	.10000	.72704	.894	-1.5766	1.7766
D	A	.35667	.72704	.637	-1.3199	2.0332
	B	-.24333	.72704	.746	-1.9199	1.4332
	C	-.10000	.72704	.894	-1.7766	1.5766

LAMPIRAN J

**HASIL UJI STATISTIK KEKERASAN TABLET
ANTAR FORMULA**

Anova : *One Way*

Descriptives

Kekerasan Tablet

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	11.4733	.42194	.24361	10.4252	12.5215	11.21	11.96
B	3	11.4300	.19975	.11533	10.9338	11.9262	11.21	11.60
C	3	11.1600	.16371	.09452	10.7533	11.5667	11.02	11.34
D	3	11.3700	.18682	.10786	10.9059	11.8341	11.17	11.54
Total	12	11.3583	.25810	.07451	11.1943	11.5223	11.02	11.96
			Sum of Squares	df	Mean Square	F	Sig.	
Between Groups			.174	3	.058	.827	.515	
Within Groups			.559	8	.070			
Total			.733	11				

Multiple Comparisons

Post Hoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	.04333	.21588	.846	-.4545	.5412
	C	.31333	.21588	.185	-.1845	.8112
	D	.10333	.21588	.645	-.3945	.6012
B	A	-.04333	.21588	.846	-.5412	.4545
	C	.27000	.21588	.246	-.2278	.7678
	D	.06000	.21588	.788	-.4378	.5578
C	A	-.31333	.21588	.185	-.8112	.1845
	B	-.27000	.21588	.246	-.7678	.2278
	D	-.21000	.21588	.359	-.7078	.2878
D	A	-.10333	.21588	.645	-.6012	.3945
	B	-.06000	.21588	.788	-.5578	.4378
	C	.21000	.21588	.359	-.2878	.7078

LAMPIRAN K

**HASIL UJI STATISTIK KERAPUHAN TABLET
ANTAR FORMULA**

Anova : *One Way*

Descriptives

Kerapuhan Tablet

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	.2533	.06506	.03756	.0917	.4150	.19	.32
B	3	.3700	.12000	.06928	.0719	.6681	.25	.49
C	3	.3133	.10970	.06333	.0408	.5858	.25	.44
D	3	.2500	.06000	.03464	.1010	.3990	.19	.31
Total	12	.2967	.09423	.02720	.2368	.3565	.19	.49

Test of Homogeneity of Variances

Kerapuhan Tablet

Levene Statistic	df1	df2	Sig.
.753	3	8	.551

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.029	3	.010	1.134	.392
Within Groups	.069	8	.009		
Total	.098	11			

Multiple Comparisons

Post Hoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-.11667	.07557	.161	-.2909	.0576
	C	-.06000	.07557	.450	-.2343	.1143
	D	.00333	.07557	.966	-.1709	.1776
B	A	.11667	.07557	.161	-.0576	.2909
	C	.05667	.07557	.475	-.1176	.2309
	D	.12000	.07557	.151	-.0543	.2943
C	A	.06000	.07557	.450	-.1143	.2343
	B	-.05667	.07557	.475	-.2309	.1176
	D	.06333	.07557	.426	-.1109	.2376
D	A	-.00333	.07557	.966	-.1776	.1709
	B	-.12000	.07557	.151	-.2943	.0543
	C	-.06333	.07557	.426	-.2376	.1109

LAMPIRAN L

**HASIL UJI STATISTIK *FLOATING LAG TIME* TABLET
ANTAR FORMULA**

Anova : *One Way*

Descriptives

Floating Lag Time

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	13.2067	.64470	.37222	11.6052	14.8082	12.80	13.95
B	3	8.4267	.15503	.08950	8.0416	8.8118	8.27	8.58
C	3	11.2067	.74272	.42881	9.3616	13.0517	10.35	11.67
D	3	6.2833	.70550	.40732	4.5308	8.0359	5.47	6.73
Total	12	9.7808	2.80397	.80944	7.9993	11.5624	5.47	13.95

Test of Homogeneity of Variances

Floating Lag Time

Levene Statistic	df1	df2	Sig.
3.281	3	8	.079

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	83.507	3	27.836	74.775	.000
Within Groups	2.978	8	.372		
Total	86.485	11			

Multiple Comparisons

Post Hoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	4.78000*	.49817	.000	3.6312	5.9288
	C	2.00000*	.49817	.004	.8512	3.1488
	D	6.92333*	.49817	.000	5.7746	8.0721
B	A	-4.78000*	.49817	.000	-5.9288	-3.6312
	C	-2.78000*	.49817	.001	-3.9288	-1.6312
	D	2.14333*	.49817	.003	.9946	3.2921
C	A	-2.00000*	.49817	.004	-3.1488	-.8512
	B	2.78000*	.49817	.001	1.6312	3.9288
	D	4.92333*	.49817	.000	3.7746	6.0721
D	A	-6.92333*	.49817	.000	-8.0721	-5.7746
	B	-2.14333*	.49817	.003	-3.2921	-.9946
	C	-4.92333*	.49817	.000	-6.0721	-3.7746

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

LAMPIRAN M

HASIL UJI STATISTIK PENETAPAN KADAR TABLET ANTAR FORMULA

Anova : *One Way*

Descriptives

% kadar

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	100.5367	1.03886	.59979	97.9560	103.1173	99.45	101.52
B	3	101.1367	.87375	.50446	98.9662	103.3072	100.22	101.96
C	3	100.9933	.50639	.29237	99.7354	102.2513	100.51	101.52
D	3	100.8933	1.03558	.59789	98.3208	103.4659	99.77	101.81
Total	12	100.8900	.79385	.22917	100.3856	101.3944	99.45	101.96

Test of Homogeneity of Variances

% kadar

Levene Statistic	df1	df2	Sig.
.498	3	8	.694

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.589	3	.196	.248	.861
Within Groups	6.343	8	.793		
Total	6.932	11			

Multiple Comparisons

Post Hoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-.60000	.72704	.433	-2.2766	1.0766
	C	-.45667	.72704	.547	-2.1332	1.2199
	D	-.35667	.72704	.637	-2.0332	1.3199
B	A	.60000	.72704	.433	-1.0766	2.2766
	C	.14333	.72704	.849	-1.5332	1.8199
	D	.24333	.72704	.746	-1.4332	1.9199
C	A	.45667	.72704	.547	-1.2199	2.1332
	B	-.14333	.72704	.849	-1.8199	1.5332
	D	.10000	.72704	.894	-1.5766	1.7766
D	A	.35667	.72704	.637	-1.3199	2.0332
	B	-.24333	.72704	.746	-1.9199	1.4332
	C	-.10000	.72704	.894	-1.7766	1.5766

LAMPIRAN N

HASIL UJI STATISTIK PERSEN EFISIENSI DISOLUSI TABLET ANTAR FORMULA

Anova : *One Way*

Descriptives

ED

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	73.7733	.39209	.22637	72.7993	74.7473	73.36	74.14
B	3	61.0833	1.71553	.99046	56.8217	65.3449	59.11	62.22
C	3	72.8867	1.21492	.70144	69.8686	75.9047	71.89	74.24
D	3	62.4767	.94299	.54444	60.1341	64.8192	61.58	63.46
Total	12	67.5550	6.14390	1.77359	63.6514	71.4586	59.11	74.24

Test of Homogeneity of Variances

ED

Levene Statistic	df1	df2	Sig.
2.579	3	8	.126

ANOVA

ED

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	404.299	3	134.766	98.693	.000
Within Groups	10.924	8	1.366		
Total	415.223	11			

Post Hoc Tests

Multiple Comparisons

ED
LSD

(i) formula	(j) formula	Mean Difference (i-j)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	12.69000*	.95412	.000	10.4898	14.8902
	C	.88667	.95412	.380	-1.3135	3.0869
	D	11.29667*	.95412	.000	9.0965	13.4969
B	A	-12.69000*	.95412	.000	-14.8902	-10.4898
	C	-11.80333*	.95412	.000	-14.0035	-9.6031
	D	-1.39333	.95412	.182	-3.5935	.8069
C	A	-.88667	.95412	.380	-3.0869	1.3135
	B	11.80333*	.95412	.000	9.6031	14.0035
	D	10.41000*	.95412	.000	8.2098	12.6102
D	A	-11.29667*	.95412	.000	-13.4969	-9.0965
	B	1.39333	.95412	.182	-.8069	3.5935
	C	-10.41000*	.95412	.000	-12.6102	-8.2098

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

LAMPIRAN O

HASIL UJI STATISTIK KONSTANTA LAJU DISOLUSI TABLET ANTAR FORMULA

Anova : *One Way*

Descriptives

Konstanta Laju Disolusi

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	3	.058767	.0130193	.0075167	.026425	.091109	.0512	.0738
B	3	.354233	.0379792	.0219273	.259888	.448579	.3269	.3976
C	3	.053800	.0261465	.0150957	-.011152	.118752	.0268	.0790
D	3	.341933	.0041885	.0024182	.331529	.352338	.3371	.3445
Total	12	.202183	.1538393	.0444096	.104438	.299928	.0268	.3976

Test of Homogeneity of Variances

Konstanta Laju Disolusi

Levene Statistic	df1	df2	Sig.
3.596	3	8	.066

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.256	3	.085	147.395	.000
Within Groups	.005	8	.001		
Total	.260	11			

Multiple Comparisons

Post Hoc Tests

LSD

(I) Replikasi	(J) Replikasi	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-.2954667 [*]	.0196346	.000	-.340744	-.250189
	C	.0049667	.0196346	.807	-.040311	.050244
	D	-.2831667 [*]	.0196346	.000	-.328444	-.237889
B	A	.2954667 [*]	.0196346	.000	.250189	.340744
	C	.3004333 [*]	.0196346	.000	.255156	.345711
	D	.0123000	.0196346	.548	-.032978	.057578
C	A	-.0049667	.0196346	.807	-.050244	.040311
	B	-.3004333 [*]	.0196346	.000	-.345711	-.255156
	D	-.2881333 [*]	.0196346	.000	-.333411	-.242856
D	A	.2831667 [*]	.0196346	.000	.237889	.328444
	B	-.0123000	.0196346	.548	-.057578	.032978
	C	.2881333 [*]	.0196346	.000	.242856	.333411

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

LAMPIRAN P

DESIGN SUMMARY DARI PROGRAM DESIGN – EXPERT

Design Summary											
File Version 8.0.7.1											
Study Type	Factorial	Runs	12								
Design Type	2 Level Factorial	Blocks	No Blocks								
Center Point 0											
Design Mode	2FI	Build Time	(r)33.04								
Factor	Name	Units	Type	Subtype	Minimum	Maximum	Coded Values	Mean	Std. Dev.		
A	Konst. Guar g.		Numeric	Continuous	-1.00	1.00	-1.000=-1.001.000=1.00	0.00	1.00		
B	Konst. kompon		Numeric	Continuous	-1.00	1.00	-1.000=-1.001.000=1.00	0.00	1.00		
Response	Name	Units	Obs	Analysis	Minimum	Maximum	Mean	Std. Dev.	Ratio	Trans	Model
Y1	Kekerasan	Kp	12	Factorial	11.02	11.96	11.3583	0.258099	1.0853	None	2FI
Y2	Floating lag tim ment		12	Factorial	5.47	13.95	9.78083	2.80397	2.55027	None	2FI
Y3	K disolusi	mg/ment	12	Factorial	0.0268	0.3976	0.202183	0.153839	14.8358	None	2FI

LAMPIRAN Q

**HASIL UJI ANAVA KEKERASAN TABLET
DENGAN DESIGN – EXPERT**

Response 1 Kekerasan						
ANOVA for selected factorial model						
Analysis of variance table	[Partial sum of squares - Type III]	Mean Square	F Value	p-value Prob > F		
Source	Sum of Squares	df	Mean Square	F Value	Prob > F	
Model	0.17	3	0.058	0.83	0.515	not significant
A-Konst. Guar gum	0.021	1	0.021	0.30	0.6000	
B-Konst. komponen eferfesesen	0.10	1	0.10	1.50	0.2562	
AB	0.048	1	0.048	0.69	0.4307	
Pure Error	0.56	8	0.070			
Cor Total	0.73	11				

The "Model F-value" of 0.83 implies the model is not significant relative to the noise. There is a 51.50 % chance that a "Model F-value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.

In this case there are no significant model terms.

Values greater than 0.1000 indicate the model terms are not significant.

If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	0.26	R-Squared	0.2368
Mean	11.36	Adj R-Squared	-0.0494
C.V. %	2.33	Pred R-Squared	-0.7173
PRESS	1.26	Adeq Precision	2.053

A negative "Pred R-Squared" implies that the overall mean is a better predictor of your response than the current model.

"Adeq Precision" measures the signal to noise ratio. A ratio of 2.05 indicates an inadequate signal and we should not use this model to navigate the design space.

Factor	Coefficient		Standard Error	95% CI		95% CI High	VIF
	Estimate	df		Low	High		
Intercept	11.36	1	0.076	11.18	11.53		
A-Konst. Guar gum	0.042	1	0.076	-0.13	0.22	1.00	
B-Konst. komponen eferfesesen	-0.093	1	0.076	-0.27	0.083	1.00	
AB	0.063	1	0.076	-0.11	0.24	1.00	

Final Equation in Terms of Coded Factors:

$$\begin{aligned} \text{Kekerasan} &= \\ &+11.36 \\ &+0.042 *A \\ &-0.093 *B \\ &+0.063 * A * B \end{aligned}$$

Final Equation in Terms of Actual Factors:

$$\begin{aligned} \text{Kekerasan} &= \\ &+11.35833 \\ &+0.041667 * \text{Konst. Guar gum} \\ &-0.093333 * \text{Konst. komponen eferfesen} \\ &+0.063333 * \text{Konst. Guar gum} * \text{Konst. komponen eferfesen} \end{aligned}$$

The Diagnostics Case Statistics Report has been moved to the Diagnostics Node. In the Diagnostics Node, Select Case Statistics from the View Menu.

Proceed to Diagnostic Plots (the next icon in progression). Be sure to look at the:

- 1) Normal probability plot of the studentized residuals to check for normality of residuals.
- 2) Studentized residuals versus predicted values to check for constant error.
- 3) Externally Studentized Residuals to look for outliers, i.e., influential values.
- 4) Box-Cox plot for power transformations.

If all the model statistics and diagnostic plots are OK, finish up with the Model Graphs icon.

LAMPIRAN R

**HASIL UJI ANAVA *FLOATING LAG TIME* TABLET
DENGAN *DESIGN – EXPERT***

Response 2 Floating lag time

ANOVA for selected factorial model

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

Source	Sum of Squares	df	Mean Square	F	p-value	
					Value	Prob > F
Model	83.51	3	27.84	74.77	< 0.0001	significant
<i>A-Konst. Guar gum</i>	70.62	1	70.62	189.70	< 0.0001	
<i>B-Konst. komponen eferfesesen</i>	12.88	1	12.88	34.59	0.0004	
<i>AB</i>	0.015	1	0.015	0.041	0.8439	
Pure Error	2.98	8	0.37			
Cor Total	86.48	11				

The Model F-value of 74.77 implies the model is significant. There is only a 0.01% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.

In this case A, B are significant model terms.

Values greater than 0.1000 indicate the model terms are not significant.

If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	0.61	R-Squared	0.9656
Mean	9.78	Adj R-Squared	0.9527
C.V. %	6.24	Pred R-Squared	0.9225
PRESS	6.70	Adeq Precision	19.654

The "Pred R-Squared" of 0.9225 is in reasonable agreement with the "Adj R-Squared" of 0.9527.

"Adeq Precision" measures the signal to noise ratio. A ratio greater than 4 is desirable. Your ratio of 19.654 indicates an adequate signal. This model can be used to navigate the design space.

Factor	Coefficient		Standard Error	95% CI		95% CI	VIF
	Estimate	df		Low	High		
Intercept	9.78	1	0.18	9.37	10.19		
<i>A-Konst. Guar gum</i>	-2.43	1	0.18	-2.83	-2.02	1.00	
<i>B-Konst. komponen eferfesesen</i>	-1.04	1	0.18	-1.44	-0.63	1.00	
<i>AB</i>	-0.036	1	0.18	-0.44	0.37	1.00	

Final Equation in Terms of Coded Factors:

$$\begin{aligned} \text{Floating lag time} &= \\ &+9.78 \\ &-2.43 *A \\ &-1.04 *B \\ &-0.036 * A * B \end{aligned}$$

Final Equation in Terms of Actual Factors:

$$\begin{aligned} \text{Floating lag time} &= \\ &+9.78083 \\ &-2.42583 * \text{Konst.Guar gum} \\ &-1.03583 * \text{Konst.komponen eferfesen} \\ &-0.035833 * \text{Konst.Guar gum} * \text{Konst.komponen eferfesen} \end{aligned}$$

The Diagnostics Case Statistics Report has been moved to the Diagnostics Node. In the Diagnostics Node, Select Case Statistics from the View Menu.

Proceed to Diagnostic Plots (the next icon in progression). Be sure to look at the:

- 1) Normal probability plot of the studentized residuals to check for normality of residuals.
- 2) Studentized residuals versus predicted values to check for constant error.
- 3) Externally Studentized Residuals to look for outliers, i.e., influential values.
- 4) Box-Cox plot for power transformations.

If all the model statistics and diagnostic plots are OK, finish up with the Model Graphs icon.

LAMPIRAN S

**HASIL UJI ANAVA KONSTANTA LAJU DISOLUSI TABLET
DENGAN DESIGN – EXPERT**

Response 3 K disolusi
ANOVA for selected factorial model
Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	p-value	
Model	0.26	3	0.085	147.40	<0.0001 significant
A-Konst. Guar gum	0.26	1	0.26	441.73	<0.0001
B-Konst. komponen eferfesen	2.236E-004	1	2.236E-004	0.39	0.5514
AB	4.033E-005	1	4.033E-005	0.070	0.7984
Pure Error	4.626E-003	8	5.783E-004		
Cor Total	0.26	11			

The Model F-value of 147.40 implies the model is significant. There is only a 0.01% chance that a "Model F-Value" this large could occur due to noise.

Values of "Prob > F" less than 0.0500 indicate model terms are significant.

In this case A are significant model terms.

Values greater than 0.1000 indicate the model terms are not significant.

If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Std. Dev.	0.024	R-Squared	0.9822
Mean	0.20	Adj R-Squared	0.9756
C.V. %	11.89	Pred R-Squared	0.9600
PRESS	0.010	Adeq Precision	21.639

The "Pred R-Squared" of 0.9600 is in reasonable agreement with the "Adj R-Squared" of 0.9756.

"Adeq Precision" measures the signal to noise ratio. A ratio greater than 4 is desirable. Your ratio of 21.639 indicates an adequate signal. This model can be used to navigate the design space.

Factor	Coefficient		Standard Error	95% CI		95% CI	VIF
	Estimate	df		Low	High		
Intercept	0.20	1	6.942E-003	0.19	0.22		
A-Konst. Guar gum	0.15	1	6.942E-003	0.13	0.16	1.00	
B-Konst. komponen eferfesen	-4.317E-003	1	6.942E-003	-0.020	0.012	1.00	
AB	-1.833E-003	1	6.942E-003	-0.018	0.014	1.00	

Final Equation in Terms of Coded Factors:

$$\begin{aligned}
 \text{K disolusi} &= \\
 &+0.20 \\
 &+0.15 \quad *A \\
 &-4.317E-003 \quad *B \\
 &-1.833E-003 \quad *A * B
 \end{aligned}$$

Final Equation in Terms of Actual Factors:

$$\begin{aligned}
 \text{K disolusi} &= \\
 &+0.20218 \\
 &+0.14590 \quad * \text{Konst. Guar gum} \\
 &-4.31667E-003 \quad * \text{Konst. komponen eferfesen} \\
 &-1.83333E-003 \quad * \text{Konst. Guar gum} * \text{Konst. komponen eferfesen}
 \end{aligned}$$

The Diagnostics Case Statistics Report has been moved to the Diagnostics Node. In the Diagnostics Node, Select Case Statistics from the View Menu.

Proceed to Diagnostic Plots (the next icon in progression). Be sure to look at the:

- 1) Normal probability plot of the studentized residuals to check for normality of residuals.
- 2) Studentized residuals versus predicted values to check for constant error.
- 3) Externally Studentized Residuals to look for outliers, i.e., influential values.
- 4) Box-Cox plot for power transformations.

If all the model statistics and diagnostic plots are OK, finish up with the Model Graphs icon.

LAMPIRAN T

**HASIL PILIHAN KONSENTRASI OPTIMUM
DENGAN *DESIGN – EXPERT***

Constraints

Name	Goal	Lower	Upper	Lower	Upper	Importance
		Limit	Limit	Weight	Weight	
A Konst. Guar	is in range	-1	1	1	1	3
B Konst. komp	is in range	-1	1	1	1	3
Kekerasan	is in range	11	11.8	1	1	3
Floating lag tim	is in range	6	10	1	1	3
K disolusi	is in range	0.3	0.35	1	1	3

Solutions

Number	Konst. Guar	gum Konst. komponen eferfesen	Kekerasan	Floating lag time	K disolusi	Desirability	
1	<u>0.80</u>		<u>-0.80</u>	<u>11.4258</u>	<u>8.69177</u>	<u>0.32353</u>	<u>1.000</u> Selected
2	0.73		-0.62	11.4182	8.68574	0.311489	1.000
3	0.79		0.81	11.3561	7.00544	0.312643	1.000
4	1.00		1.00	11.37	6.28333	0.341933	1.000
5	0.98		0.02	11.3987	7.38308	0.345236	1.000
6	0.85		-0.64	11.4192	8.4091	0.329735	1.000
7	0.94		0.01	11.397	7.49043	0.33902	1.000
8	0.87		-0.78	11.4245	8.49498	0.334389	1.000
9	0.73		-0.24	11.4002	8.28021	0.309432	1.000
10	0.74		-0.32	11.404	8.32006	0.312225	1.000
11	0.77		-0.39	11.4078	8.33653	0.316327	1.000
12	0.97		0.25	11.3906	7.17228	0.341603	1.000
13	0.78		-0.42	11.4093	8.34213	0.318138	1.000
14	0.75		-0.44	11.41	8.42084	0.314862	1.000

15	0.77	0.89	11.3509	6.96067	0.309687	1.000
16	0.80	-0.27	11.403	8.12966	0.320083	1.000
17	0.83	-0.08	11.3961	7.83796	0.324294	1.000
18	0.90	0.93	11.3623	6.60074	0.328219	1.000
19	0.93	-0.23	11.4051	7.76996	0.339482	1.000
20	0.67	-0.65	11.4191	8.83805	0.303635	1.000
21	0.92	0.69	11.3725	6.81248	0.332226	1.000
22	0.73	-0.77	11.4251	8.83156	0.312858	1.000
23	0.88	0.59	11.3724	7.01746	0.326666	1.000
24	0.85	0.19	11.3862	7.51002	0.325308	1.000
25	0.81	0.50	11.3708	7.28193	0.317307	1.000
26	0.89	-0.37	11.409	8.00967	0.334482	1.000
27	0.87	0.43	11.3781	7.22257	0.326188	1.000
28	0.90	0.65	11.3719	6.91939	0.328928	1.000
29	0.77	0.25	11.3794	7.64903	0.31313	1.000
30	0.76	0.01	11.3894	7.91809	0.313227	1.000
31	0.96	0.47	11.3831	6.95451	0.339272	1.000
32	0.88	0.82	11.3644	6.76525	0.326077	1.000
33	0.96	-0.81	11.4247	8.31872	0.347342	1.000
34	0.90	0.51	11.3776	7.04488	0.330955	1.000

LAMPIRAN U

HASIL PERBANDINGAN ANTARA HASIL PERCOBAAN DAN HASIL TEORITIS

T-Test

[DataSet0]

Group Statistics

hasil	N	Mean	Std. Deviation	Std. Error Mean	
kekerasan	hasil percobaan	4	11.3575	.13793	.06897
	hasil teoritis	4	11.3575	.13793	.06897
floatinglagtime	hasil percobaan	4	9.7825	3.04862	1.52431
	hasil teoritis	4	9.7800	3.05245	1.52623
kdisolusi	hasil percobaan	4	.202150	.1685575	.0842787
	hasil teoritis	4	.200000	.1732887	.0866443

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
kekerasan	Equal variances assumed	.000	1.000	.000	6	1.000	.00000	.09753	-.23865	.23865
	Equal variances not assumed			.000	6.000	1.000	.00000	.09753	-.23865	.23865
floatinglagtime	Equal variances assumed	.000	.999	.001	6	.999	.00250	2.15706	-5.27563	5.28063
	Equal variances not assumed			.001	6.000	.999	.00250	2.15706	-5.27563	5.28063
kdisolusi	Equal variances assumed	1.156	.324	.018	6	.986	.0021500	1.208725	-.2936142	.2979142
	Equal variances not assumed			.018	5.995	.986	.0021500	1.208725	-.2936692	.2979692

LAMPIRAN V

HASIL UJI F KURVA BAKU DALAM AKUADES

UJI KESAMAAN ANTAR SLOPE DALAM AKUADES

Kurva Baku 1

x	y	x ²	y ²	xy
2,982	0,164	8,892324	0,026896	0,489048
5,964	0,490	35,5693	0,2401	2,92236
8,946	0,711	80,03092	0,505521	6,360606
11,928	0,901	142,2772	0,811801	10,74713
14,910	1,071	222,3081	1,147041	15,96861
Σ	44,73	489,0778	2,731359	36,48775

Kurva Baku 2

x	y	x ²	y ²	xy
2,982	0,168	8,892324	0,028224	0,500976
5,964	0,501	35,5693	0,251001	2,987964
8,946	0,705	80,03092	0,497025	6,30693
11,928	0,878	142,2772	0,770884	10,47278
14,91	1,063	222,3081	1,129969	15,84933
Σ	44,73	489,0778	2,677103	36,11798

Kurva Baku 3

x	y	x ²	y ²	xy
2,976	0,168	8,856576	0,028224	0,499968
5,952	0,512	35,4263	0,262144	3,047424
8,928	0,707	79,70918	0,499849	6,312096
11,904	0,860	141,7052	0,7396	10,23744
14,88	1,052	221,4144	1,106704	15,65376
Σ	44,64	487,1117	2,636521	35,75069

Kurva Baku	Σx^2	Σxy	Σy^2	N	Residual SS	Residual DF
baku 1	489,0778	36,48775	2,731359	5	0,009183	3
baku 2	489,0778	36,11798	2,677103	5	0,00982	3
baku 3	487,1117	35,75069	2,636521	5	0,012663	3
pooled regression					0,031666	9
common regression	1465,267	108,3564	8,044983		0,032032	

Fhitung = 0,0520 < Ftable 0,05 (2:9) = 4,26

LAMPIRAN W

HASIL UJI F KURVA BAKU DALAM HCl 0,1 N

UJI KESAMAAN ANTAR SLOPE DALAM HCl 0,1N

Kurva Baku 1

x	y	x ²	y ²	xy
12,096	0,250	146,3132	0,0625	3,024
24,192	0,442	585,2529	0,195364	10,69286
36,288	0,645	1316,819	0,416025	23,40576
48,384	0,852	2341,011	0,725904	41,22317
60,48	1,093	3657,83	1,194649	66,10464
Σ	181,44	8047,227	2,594442	144,4504

Kurva Baku 2

x	y	x ²	y ²	xy
12,168	0,248	148,0602	0,061504	3,017664
24,336	0,43	592,2409	0,1849	10,46448
36,504	0,648	1332,542	0,419904	23,65459
48,672	0,86	2368,964	0,7396	41,85792
60,84	1,092	3701,506	1,192464	66,43728
Σ	182,52	8143,312	2,598372	145,4319

Kurva Baku 3

x	y	x ²	y ²	xy
12,024	0,227	144,5766	0,051529	2,729448
24,048	0,428	578,3063	0,183184	10,29254
36,072	0,636	1301,189	0,404496	22,94179
48,096	0,845	2313,225	0,714025	40,64112
60,12	1,098	3614,414	1,205604	66,01176
Σ 180,36	3,234	7951,712	2,558838	142,6167

Kurva Baku	Σx^2	Σxy	Σy^2	N	Residual SS	Residual DF
baku 1	8047,227	144,4504	2,594442	5	0,001509	3
baku 2	8143,312	145,4319	2,598372	5	0,001095	3
baku 3	7951,712	142,6167	2,558838	5	0,000958	3
pooled regression					0,003562	9
common regression	24142,25	432,499	7,7516		0,003601	

Fhitung = 0,049031 < Ftable 0,05 (2:9) = 4,26

LAMPIRAN X

TABEL UJI R

DEGREES OF FREEDOM (DF)	5 PERCENT	1 PERCENT	DEGREES OF FREEDOM (DF)	5 PERCENT	1 PERCENT
1	.997	1.000	24	.388	.496
2	.950	.990	25	.381	.487
3	.878	.959	26	.374	.478
4	.811	.917	27	.367	.470
5	.754	.874	28	.361	.463
6	.707	.834	29	.355	.456
7	.666	.798	30	.349	.449
8	.632	.765	35	.325	.418
9	.602	.735	40	.304	.393
10	.576	.708	48	.288	.372
11	.553	.684	50	.273	.354
12	.532	.661	60	.250	.325
13	.514	.641	70	.232	.302
14	.497	.623	80	.217	.283
15	.482	.606	90	.205	.267
16	.468	.590	100	.195	.254
17	.456	.575	125	.174	.228
18	.444	.561	150	.159	.208
19	.433	.549	200	.138	.181
20	.423	.537	300	.113	.148
21	.413	.526	400	.098	.128
22	.404	.515	500	.088	.115
23	.396	.505	1000	.062	.081

LAMPIRAN Y

TABEL F DAN TABEL T

TABEL DISTRIBUSI F UNTUK 5% DAN 1%

Baris atas untuk taraf signifikan 5%
Baris bawah untuk taraf signifikan 1%

$V_2 = dk$ penyebut	$V_1 = dk$ pembilang																									
	1	2	3	4	5	6	7	8	9	10	11	12	14	16	20	24	30	40	50	75	100	200	500	∞		
1	161	200	216	225	230	234	237	239	241	242	243	244	245	246	248	249	250	251	252	253	253	254	254	254	4052	
2	18,51	19,00	19,16	19,25	19,30	19,33	19,36	19,37	19,38	19,39	19,40	19,41	19,42	19,43	19,44	19,45	19,46	19,47	19,47	19,48	19,49	19,49	19,50	19,50	98,49	
3	10,13	9,55	9,28	9,12	9,01	8,94	8,88	8,84	8,81	8,78	8,76	8,74	8,71	8,69	8,66	8,64	8,62	8,60	8,58	8,57	8,56	8,54	8,54	8,53	34,12	
4	7,71	6,94	6,59	6,39	6,26	6,16	6,09	6,04	6,00	5,96	5,93	5,91	5,87	5,84	5,80	5,77	5,74	5,71	5,70	5,68	5,66	5,65	5,64	5,63	21,20	
5	6,61	5,79	5,41	5,19	5,05	4,95	4,88	4,82	4,78	4,74	4,70	4,68	4,64	4,60	4,56	4,53	4,50	4,46	4,44	4,42	4,40	4,38	4,37	4,36	16,26	
6	5,99	5,14	4,76	4,53	4,39	4,28	4,21	4,15	4,10	4,06	4,03	4,00	3,96	3,92	3,87	3,84	3,81	3,77	3,75	3,72	3,71	3,69	3,68	3,67	13,74	
7	5,59	4,74	4,35	4,12	3,97	3,87	3,79	3,73	3,68	3,63	3,60	3,57	3,52	3,49	3,44	3,41	3,38	3,34	3,32	3,29	3,28	3,25	3,24	3,23	12,25	
8	5,32	4,46	4,07	3,84	3,69	3,58	3,50	3,44	3,39	3,34	3,31	3,28	3,23	3,20	3,15	3,12	3,08	3,05	3,03	3,00	2,98	2,96	2,94	2,93	11,26	
9	5,12	4,26	3,86	3,63	3,48	3,37	3,29	3,23	3,18	3,13	3,10	3,07	3,02	2,98	2,93	2,90	2,86	2,82	2,80	2,77	2,76	2,73	2,72	2,71	10,56	

$V_1 = dk$ penyebut	$V_1 = dk$ pembilang																																															
	1	2	3	4	5	6	7	8	9	10	11	12	14	16	20	24	30	40	50	75	100	200	500	\bar{x}																								
10	4,96	4,10	3,71	3,48	3,33	3,22	3,14	3,07	3,02	2,97	2,94	2,91	2,86	2,82	2,77	2,74	2,70	2,67	2,64	2,61	2,59	2,56	2,55	2,54	10,04	7,58	6,55	5,99	5,64	5,39	5,21	5,06	4,95	4,85	4,78	4,71	4,60	4,52	4,41	4,33	4,25	4,17	4,12	4,05	4,01	3,96	3,93	3,91
11	4,84	3,98	3,59	3,36	3,20	3,09	3,01	2,95	2,90	2,86	2,82	2,79	2,74	2,70	2,65	2,61	2,57	2,53	2,50	2,47	2,45	2,42	2,41	2,40	9,65	7,20	6,22	5,67	5,32	5,07	4,88	4,74	4,63	4,54	4,46	4,40	4,29	4,21	4,10	4,02	3,94	3,86	3,80	3,74	3,70	3,66	3,62	3,60
12	4,75	3,88	3,49	3,26	3,11	3,00	2,92	2,85	2,80	2,76	2,72	2,69	2,64	2,60	2,54	2,50	2,46	2,42	2,40	2,36	2,35	2,32	2,31	2,30	9,33	6,93	5,95	5,41	5,06	4,82	4,65	4,50	4,39	4,30	4,22	4,16	4,05	3,98	3,86	3,78	3,70	3,61	3,56	3,49	3,46	3,41	3,38	3,36
13	4,67	3,80	3,41	3,18	3,02	2,92	2,84	2,77	2,72	2,67	2,63	2,60	2,55	2,51	2,46	2,42	2,38	2,34	2,32	2,28	2,26	2,24	2,22	2,21	9,01	6,70	5,74	5,20	4,86	4,62	4,44	4,30	4,19	4,10	4,02	3,96	3,85	3,78	3,67	3,59	3,51	3,42	3,37	3,30	3,27	3,21	3,18	3,16
14	4,61	3,74	3,34	3,11	2,96	2,85	2,77	2,70	2,65	2,60	2,56	2,53	2,48	2,44	2,39	2,35	2,31	2,27	2,24	2,21	2,19	2,16	2,14	2,13	8,68	6,51	5,56	5,03	4,69	4,46	4,28	4,14	4,03	3,94	3,86	3,80	3,70	3,62	3,51	3,43	3,34	3,26	3,21	3,14	3,11	3,06	3,02	3,00
15	4,54	3,68	3,29	3,06	2,90	2,79	2,70	2,64	2,59	2,55	2,51	2,48	2,43	2,39	2,33	2,29	2,25	2,21	2,18	2,15	2,12	2,10	2,08	2,07	8,36	6,36	5,42	4,89	4,56	4,32	4,14	4,00	3,89	3,80	3,73	3,67	3,56	3,48	3,36	3,29	3,20	3,12	3,07	3,00	2,97	2,92	2,89	2,87
16	4,49	3,63	3,24	3,01	2,85	2,74	2,66	2,59	2,54	2,49	2,45	2,42	2,37	2,33	2,28	2,24	2,20	2,16	2,13	2,09	2,07	2,04	2,02	2,01	8,05	6,23	5,29	4,77	4,44	4,20	4,03	3,89	3,78	3,69	3,61	3,55	3,45	3,37	3,25	3,18	3,10	3,01	2,96	2,89	2,86	2,80	2,77	2,75
17	4,45	3,59	3,20	2,96	2,81	2,70	2,62	2,55	2,50	2,45	2,41	2,38	2,33	2,29	2,23	2,19	2,15	2,11	2,08	2,04	2,02	1,99	1,97	1,96	7,71	6,11	5,18	4,67	4,34	4,10	3,93	3,79	3,68	3,59	3,52	3,45	3,35	3,27	3,16	3,08	3,00	2,92	2,86	2,79	2,76	2,70	2,67	2,65
18	4,41	3,55	3,16	2,93	2,77	2,66	2,58	2,51	2,46	2,41	2,37	2,34	2,29	2,25	2,19	2,15	2,11	2,07	2,04	2,00	1,98	1,95	1,93	1,92	7,38	6,01	5,09	4,58	4,25	4,01	3,85	3,71	3,60	3,51	3,44	3,37	3,27	3,19	3,07	3,00	2,91	2,83	2,78	2,71	2,68	2,62	2,59	2,57
19	4,38	3,52	3,13	2,90	2,74	2,63	2,55	2,48	2,43	2,38	2,34	2,31	2,26	2,21	2,15	2,11	2,07	2,02	2,00	1,96	1,94	1,91	1,90	1,88	7,06	5,93	5,01	4,50	4,17	3,94	3,77	3,63	3,52	3,43	3,36	3,30	3,19	3,12	3,00	2,92	2,84	2,76	2,70	2,63	2,60	2,54	2,51	2,49
20	4,35	3,49	3,10	2,87	2,71	2,60	2,52	2,45	2,40	2,35	2,31	2,26	2,23	2,18	2,12	2,08	2,04	1,99	1,96	1,92	1,90	1,87	1,85	1,84	6,74	5,85	4,94	4,43	4,10	3,87	3,71	3,56	3,45	3,37	3,30	3,23	3,13	3,05	2,94	2,86	2,77	2,69	2,63	2,56	2,53	2,47	2,44	2,42
21	4,32	3,47	3,07	2,84	2,68	2,57	2,49	2,42	2,37	2,32	2,28	2,25	2,20	2,15	2,09	2,05	2,00	1,96	1,93	1,89	1,87	1,84	1,82	1,81	6,42	5,78	4,87	4,37	4,04	3,81	3,65	3,51	3,40	3,31	3,24	3,17	3,07	2,99	2,88	2,80	2,72	2,63	2,56	2,51	2,47	2,42	2,38	2,36
22	4,30	3,44	3,05	2,82	2,66	2,55	2,47	2,40	2,35	2,30	2,26	2,23	2,18	2,13	2,07	2,03	1,98	1,93	1,91	1,87	1,84	1,81	1,80	1,78	6,10	5,72	4,82	4,31	3,99	3,76	3,59	3,45	3,35	3,26	3,18	3,12	3,02	2,94	2,83	2,75	2,67	2,58	2,53	2,46	2,42	2,37	2,33	2,31
23	4,28	3,42	3,03	2,80	2,64	2,53	2,45	2,38	2,32	2,28	2,24	2,20	2,14	2,10	2,04	2,00	1,96	1,91	1,88	1,84	1,82	1,79	1,77	1,76	5,78	5,66	4,76	4,26	3,94	3,71	3,54	3,41	3,30	3,21	3,14	3,07	2,97	2,89	2,78	2,70	2,62	2,53	2,48	2,41	2,37	2,32	2,28	2,26

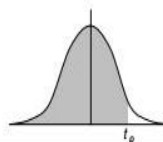
TABEL T

Sebaran t-Student

Nilai persentil untuk distribusi t

$v = dk$

(Bilangan dalam badan tabel menyatakan t_p)



v	t												
	0.9995	0.995	0.99	0.975	0.95	0.9	0.8	0.75	0.7	0.75	0.6	0.55	0.5
1	636.619	63.657	31.821	12.706	6.314	3.078	1.376	1.000	0.727	1.000	0.325	0.158	0.000
2	31.599	9.925	6.965	4.303	2.920	1.886	1.061	0.816	0.617	0.816	0.289	0.142	0.000
3	12.924	5.841	4.541	3.182	2.353	1.638	0.978	0.765	0.584	0.765	0.277	0.137	0.000
4	8.610	4.604	3.747	2.776	2.132	1.533	0.941	0.741	0.569	0.741	0.271	0.134	0.000
5	6.869	4.032	3.365	2.571	2.015	1.476	0.920	0.727	0.559	0.727	0.267	0.132	0.000
6	5.959	3.707	3.143	2.447	1.943	1.440	0.906	0.718	0.553	0.718	0.265	0.131	0.000
7	5.408	3.499	2.998	2.365	1.895	1.415	0.896	0.711	0.549	0.711	0.263	0.130	0.000
8	5.041	3.355	2.896	2.306	1.860	1.397	0.889	0.706	0.546	0.706	0.262	0.130	0.000
9	4.781	3.250	2.821	2.262	1.833	1.383	0.883	0.703	0.543	0.703	0.261	0.129	0.000
10	4.587	3.169	2.764	2.228	1.812	1.372	0.879	0.700	0.542	0.700	0.260	0.129	0.000
11	4.437	3.106	2.718	2.201	1.796	1.363	0.876	0.697	0.540	0.697	0.260	0.129	0.000
12	4.318	3.055	2.681	2.179	1.782	1.356	0.873	0.695	0.539	0.695	0.259	0.128	0.000
13	4.221	3.012	2.650	2.160	1.771	1.350	0.870	0.694	0.538	0.694	0.259	0.128	0.000
14	4.140	2.977	2.624	2.145	1.761	1.345	0.868	0.692	0.537	0.692	0.258	0.128	0.000
15	4.073	2.947	2.602	2.131	1.753	1.341	0.866	0.691	0.536	0.691	0.258	0.128	0.000
16	4.015	2.921	2.583	2.120	1.746	1.337	0.865	0.690	0.535	0.690	0.258	0.128	0.000
17	3.965	2.898	2.567	2.110	1.740	1.333	0.863	0.689	0.534	0.689	0.257	0.128	0.000
18	3.922	2.878	2.552	2.101	1.734	1.330	0.862	0.688	0.534	0.688	0.257	0.127	0.000
19	3.883	2.861	2.539	2.093	1.729	1.328	0.861	0.688	0.533	0.688	0.257	0.127	0.000
20	3.850	2.845	2.528	2.086	1.725	1.325	0.860	0.687	0.533	0.687	0.257	0.127	0.000
21	3.819	2.831	2.518	2.080	1.721	1.323	0.859	0.686	0.532	0.686	0.257	0.127	0.000
22	3.792	2.819	2.508	2.074	1.717	1.321	0.858	0.686	0.532	0.686	0.256	0.127	0.000
23	3.768	2.807	2.500	2.069	1.714	1.319	0.858	0.685	0.532	0.685	0.256	0.127	0.000
24	3.745	2.797	2.492	2.064	1.711	1.318	0.857	0.685	0.531	0.685	0.256	0.127	0.000
25	3.725	2.787	2.485	2.060	1.708	1.316	0.856	0.684	0.531	0.684	0.256	0.127	0.000
26	3.707	2.779	2.479	2.056	1.706	1.315	0.856	0.684	0.531	0.684	0.256	0.127	0.000
27	3.690	2.771	2.473	2.052	1.703	1.314	0.855	0.684	0.531	0.684	0.256	0.127	0.000
28	3.674	2.763	2.467	2.048	1.701	1.313	0.855	0.683	0.530	0.683	0.256	0.127	0.000
29	3.659	2.756	2.462	2.045	1.699	1.311	0.854	0.683	0.530	0.683	0.256	0.127	0.000
30	3.646	2.750	2.457	2.042	1.697	1.310	0.854	0.683	0.530	0.683	0.256	0.127	0.000
40	3.551	2.704	2.423	2.021	1.684	1.303	0.851	0.681	0.529	0.681	0.255	0.126	0.000
60	3.460	2.660	2.390	2.000	1.671	1.296	0.848	0.679	0.527	0.679	0.254	0.126	0.000
120	3.373	2.617	2.358	1.980	1.658	1.289	0.845	0.677	0.526	0.677	0.254	0.126	0.000
∞	2.581	2.330	1.962	1.646	1.282	1.282	1.282	1.282	0.842	0.675	0.525	0.253	0.126

LAMPIRAN Z

SERTIFIKAT BAHAN

GUAR GUM

Mfg. & Exporter of : Textile Printing Thickeners & Auxiliaries

41, Chancham Estate, Margis Farm, Rm Shreeji-clarium, Bazaruagar, Ahmedabad - 380024 (India)



CERTIFICATE OF ANALYSIS

ORIGINAL

PRODUCT NAME	: GUAR POWDER 5000 CPS.	LOT NO.: 235/E LOT NO.: 235/F	BAG NO.: 401 to 500 BAG NO.: 501 to 600
INVOICE NO.	: S-206/1112	LOT NO.: 235/G	BAG NO.: 601 to 700
INVOICE DATE	: 29.02.2012	LOT NO.: 235/H	BAG NO.: 701 to 840
QUANTITY	: 21 Mt.		
MFG. DATE	: 02.03.2012		
EXPIRY DATE	: 01.02.2013		

PARAMETERS	GUAR POWDER 5000 CPS				SPECIFICATION
	235/E	235/F	235/G	235/H	
APPEARANCE	White to Off White	White to Off White	White to Off White	White to Off White	White to Off White
ODOUR	NATURAL	NATURAL	NATURAL	NATURAL	NATURAL
TASTE	NATURAL	NATURAL	NATURAL	NATURAL	NATURAL
CONSISTENCY	IN ORDER	IN ORDER	IN ORDER	IN ORDER	IN ORDER
pH	6.98	6.95	6.94	6.97	6.0 TO 7.5
MOISTURE PERCENT	9.80	9.85	9.75	9.80	12 (MAX.)
GUM CONTENT PERCENT	82.5	81.5	81.0	83.0	80 (MIN.)
PROTIN PERCENT	4.30	4.20	4.30	4.25	5 (MAX.)
ASH PERCENT	0.59	0.62	0.57	0.58	1 (MAX.)
VISCOSITY 2 hrs.	5150	5100	5200	5150	5000 CPS.
(in CPS.) 24 hrs.	5300	5250	5350	5350	
PARTICAL SIZE	99.20	99.50	99.40	99.20	IN 200 MESH 95 PERCENT PARSING
TYPE OF GOODS	POWDER	POWDER	POWDER	POWDER	POWDER

PACKING : 25 KG. IN HDPE LAMINATED PAPER BAG WITH INNER LINER IN STANDARD EXPORT PACKING.

VISCOSITY METHOD : VISCOSITY MEASURED IN 1 PERCENT SOLUTION ON BROOKFIELD VISCOMETER MODEL RVT, 20 RPM SPINDEL NO.: 4 AT 25°C

megAsetia
PT. MEGASETIA AGUNG KIMIA

FOR, SHREEJI INDUSTRIES



PROPRIETOR

AVICEL PH 102

ASAHI KASEI CHEMICALS CORPORATION

Date: 21-JUN-20
Issued by manufacturer

1-105 Kanda Jinzoh-cho, Chiyoda-ku, TOKYO 104-8101, JAPAN
TEL: +81-(0)3-3298-9381 FAX: +81-(0)3-3298-3467
Manufacturing site: 304, Mizusaki-machi, Nabeoka-city, Miyazaki 882-0015, Japan

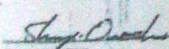
YOUR NO.: B7AIE-10-5298-0080 1701 / 656 / VII / 10

CERTIFICATE OF ANALYSIS

Compendial name: Microcrystalline Cellulose, NF, Ph. Eur., JP
Trade name : CEOLUS®
Grade : PH-102 Lot No. 2034 (20bags)
Manufacturing Date: 22-MAR-2010
Re-evaluation Date: 22-MAR-2013
Organic Solvent: not used in our process

Compendial Standards	Specifications	Lot Analysis
Description	Passes	Passes
Identification	Passes	Passes
Degree of polymerization	100 - 300	Passes
Loss on drying (%)	2.0 - 5.0	3.6
Water-soluble substances (mg)	NMT 12.5	5.6
Ether-soluble substances (mg)	NMT 5.0	0.8
Conductivity (μ S/cm)	NMT 75	25
Heavy metals (ppm)	NMT 10	NMT 10
Solubility	Passes	Passes
Residue on ignition (%)	NMT 0.1	0.02
Bulk density (g/cm ³)	0.28 - 0.33	0.314
pH	5.0 - 7.5	5.7
Total aerobic microbial count (cfu/g)	NMT 1000	Passes
Total combined molds and yeasts count (cfu/g)	NMT 100	Passes
<i>Escherichia coli</i>	None Present	None Present
<i>Salmonella</i> species	None Present	None Present
<i>Pseudomonas Aeruginosa</i>	None Present	None Present
<i>Staphylococcus Aureus</i>	None Present	None Present
ASAHI Standards		
Particle size, wt. % >250 μ m (60 mesh)	LT 8.0	0.4
Particle size, wt. % >150 μ m (100 mesh)	20 - 40	25

NMT --Not More Than; LT --Less Than
We certify that the product complies with the standards of the NF, Ph. Eur., JP.
Storage conditions: Store at ambient conditions. Keep containers sealed; material is hygroscopic.
Re-evaluation Date: Three years after manufacturing, if stored as recommended.
Asahi Kasei Chemicals recommends that the customer's quality control unit may re-evaluate the quality of this material at the given time e.g. for loss on drying and extend the shelf life of this lot on its own responsibility.

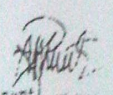

Shuji OISHI
Manager
Quality Assurance Section
CEOLUS Production Department

ASAM SITRAT

Sertifikat analisa asam sitrat
CERTIFICATE OF ANALYSIS
 04/07/2011

Nama Produk: **Asam Asid Anhydrous**
 Merek: **BRITALU**
 Nama Produsen: **PT. BRITAMU (PURA GEMUKA) POWER**
 No. Lot: **101101**
 Jumlah Berat: **2500,00**
 Berat Bersih: **2500,00**
 Berat Kas: **2500,00**
 Berat Sack: **2500,00**
 No. Sack: **340**

No.	Deskripsi	SP STANDARD	TEST RESULT
1	Color Of Crystal	White Or White	White
2	Assay (Purity)	99.5 - 101	100,0
3	Water Content	1.0 Max	0,01
4	Iron	50 Max	1,3
5	Barium	Not Detectable	Passes Test
6	Calcium	200 Max	Passes Test
7	Heavy Metal (Pb)	10 Max	Passes Test
8	Arsenic	3 max	0
9	Sulfate	150 Max	1,2
10	Chloride	50 Max	Passes Test
11	Cholic Acid	350 Max	Passes Test
12	Sulphated Ash	0.1 Max	Passes Test
13	Readily Oxidizable Substance	Pass Test	Passes Test

Dated: November 20, 2011
 Signed By: 
 Department:
 PT. BRITAMU (PURA GEMUKA) POWER
 BRITAMU
 PT. BRITAMU (PURA GEMUKA) POWER
 DISTRIBUTOR

NATRIUM BIKARBONAT

CERTIFICATE OF ANALYSIS

0331

26-Jun-89

SODIUM BICARBONATE (NaHCO₃)

COMODITY : SODIUM BICARBONATE
 INVOICE NO. : A9166-01
 QUANTITY : 10 TON
 ORIGIN : CILIK FORT, JAKARTA

ORIGINAL

ITEM	SPEC.	RESULTS			
		990622	990624	990625	
Batch No.					
(as NaHCO ₃)	Min 99.5%	99.84	99.76	99.80	
soluble in Water	Max 0.01%	0.003	0.002	0.002	
as Chloride (as NaCl)	Max 0.02%	0.026	0.020	0.020	
(as SO ₄)	Max 0.04%	0.0004	0.0002	0.0004	
as Fe ₂ O ₃	Max 10.0(ppm)	3.0	3.0	3.0	
arsenic	Max 1.06%	Not more than 1.06	Not more than 1.06	Not more than 1.06	
ammonia	None	None	None	None	
(as As ₂ S ₃)	Max 2.0(ppm)	0.6	0.7	0.8	
Metals (as Pb)	Max 10.0(ppm)	0.7	0.7	0.9	

BRATACO
 IMPORTER
 MANUFACTURER
 DISTRIBUTOR

OCI CORPORATION

S. H. PARK

S. H. PARK MANAGER

MAGNESIUM STEARAT

GREVEN
QUALITÄTSMANAGEMENT

CERTIFICATE OF ANALYSIS

customer: PT BRATACO

contact person:

FAX:

your order-number: PT80735V1104 our order-number: 4011748

delivered on: 04 08 2004 quantity: 9000

brand: LIGA MAGNESIUM STEARATE MF-2-V VEGETABLE charge-no. C447170

manufacturing date: 2004-07-19 expiry date: 2006-07-19

product is in accordance with the USP27/NF22/BP2003/Ph.Eur 4rd ed./DAB10/UP 14th ed./FCC 5th ed.

parameter	unit	method	result
impurities A	eC	Ph.Eur	59
color	metal reaction	USP/NF	passes test
refractive index	refraction time QC	USP/NF	refractive match
acidity	ml 0,01N HCl	Ph.Eur	<0,6
alkalinity	ml 0,01 N NaOH	Ph.Eur	<0,5
heavy metals as Pb	ppm	JP	<20
lead	ppm	BAE 300-B	<1
cadmium	ppm	BAE 300-B	<1
copper	ppm	BAE 300-B	<1
arsenic	%	Ph.Eur	<0,1
barium	%	Ph.Eur	<0,5
acid value of the fatty acid	mg KOH/g	Ph.Eur	204,8
relative content of stearic acid	%	USP/NF	85,1
total content of stearic and palmitic acid	%	USP/NF	98,9
microbial count	cfu/g	USP/NF	<10
yeast & fungi	cfu/g	USP/NF	105
colony count	cfu/g	USP/NF	absent
Staphylococcus	cfu/g	USP/NF	absent
Gram negative bacteria	cfu/g	USP/NF	meets USP/NF
organic volatile impurities	%	BAE 600	3,9
loss on drying	%	BAE 200 c	4,7
magnesium content	%	BAE 400	0,6
free fatty acid	%	BAE 605	0,2
acid residue at 200 mesh	%	BAE 611a	0,32
bulk density tapped	g/ml	USP/NF	10,8
specific surface area BET	qm/g	BAE 601	in accordance
contamination			

Venlo, 27 08 04

data of the above mentioned delivery are based upon careful test according to the guidelines of our quality assurance system. They do not release the customer from entry control. Besides we do not guarantee the properties for concrete applications.

This certificate was issued by EDV and does not bear a signature.

BRATACO
LIGA MAGNESIUM STEARATE MF-2-V VEGETABLE