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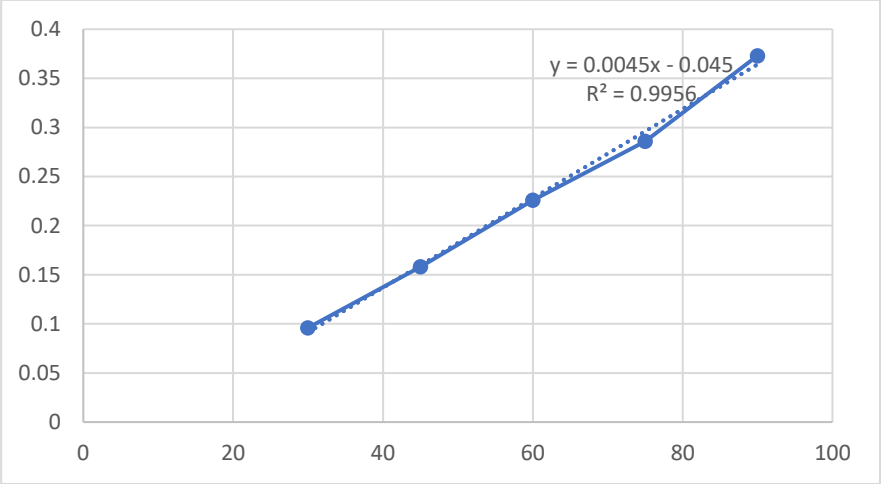
LAMPIRAN

Lampiran 1a. Kurva Standar Pengukuran Kadar Fruktosa



Lampiran 1b. Tabel Pengamatan Pengaruh Konsentrasi Substrat (°brix) terhadap Kadar Fruktosa (%)

Konsentrasi Substrat (°Brix)	Kadar Fruktosa			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
50	21,67	23,60	23,60	22,96
60	26,27	26,07	23,33	25,22
70	28,8	29,4	28,8	29,00
80	24,33	25,40	32,13	27,29

Lampiran 1c. Hasil Uji Lanjut Pengaruh Konsentrasi Substrat (°brix) terhadap Kadar Fruktosa (%)

ANOVA

Kadar fruktosa

Sum of Squares	df	Mean Square	F	Sig.
61.398	3	20.466	3.731	.061
43.880	8	5.485		
105.278	11			

Lampiran 1d. Hasil Uji Lanjut Pengaruh Konsentrasi Substrat (°brix) terhadap Kadar Fruktosa (%)

Kadar fruktosa

Duncan

Brix subs trat	N	Subset for alpha = 0.05	
		1	2
50	3	22.9567	
60	3	25.2233	25.2233
80	3	27.2867	27.2867
70	3		29.0000
Sig.		.062	.095

Means for groups in homogeneous subsets are displayed.

Lampiran 2a. Tabel Pengamatan Pengaruh Konsentrasi Substrat (°brix) terhadap Derajat Konversi (%)

Konsentrasi Substrat (°Brix)	Derajat Konversi (%)			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
50	43,33	47,20	47,20	45,91
60	43,78	43,44	38,89	42,04
70	41,14	42,00	41,14	41,43
80	30,42	31,75	40,17	34,11

Lampiran 2b. Hasil Uji ANOVA Pengaruh Konsentrasi Substrat (°brix) terhadap Derajat Konversi (%)

ANOVA

Derajat konversi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	218.175	3	72.725	7.156	.012
Within Groups	81.297	8	10.162		
Total	299.472	11			

Lampiran 2c. Hasil Uji Lanjut Pengaruh Konsentrasi Substrat (°brix) terhadap Derajat Konversi (%)

Derajat konversi

Duncan

Brix substrat	N	Subset for alpha = 0.05	
		1	2
80	3	34.1133	
70	3		41.4267
60	3		42.0367
50	3		45.9100
Sig.		1.000	.137

Means for groups in homogeneous subsets are displayed.

Lampiran 3a. Tabel Pengamatan Pengaruh Konsentrasi Substrat (°brix) terhadap Viskositas Sirup Fruktosa (%)

Konsentrasi Substrat (°Brix)	Viskositas			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
50	10	10	10,6	10,20
60	101	107	105	104,33
70	408	412	454	424,67
80	3780	3829	3850	3819,67

Lampiran 3b. Hasil Uji ANOVA Pengaruh Konsentrasi Substrat (°brix) terhadap Viskositas Sirup Fruktosa (%)

ANOVA

Viskositas

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.009E7	3	1.003E7	2.059E4	.000
Within Groups	3898.240	8	487.280		
Total	3.010E7	11			

Lampiran 3c. Hasil Uji Lanjut Pengaruh Konsentrasi Substrat (°brix) terhadap Viskositas Sirup Fruktosa (%)

Viskositas

Duncan

Derajat brix	N	Subset for alpha = 0.05			
		1	2	3	4
A1	3	10.2000			
A2	3		1.0433E2		
A3	3			4.2467E2	
A4	3				3.8197E3
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

Lampiran 4a. Tabel Pengamatan Pengaruh Konsentrasi Enzim terhadap Kadar Fruktosa (%)

Konsentrasi enzim (%)	Kadar Fruktosa			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,1	21,67	23,60	23,60	22,96
0,07	23,00	23,00	24,00	23,33
0,04	22,00	20,27	19,73	20,67

Lampiran 4b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim terhadap Kadar Fruktosa (%)

ANOVA

Kadar fruktosa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.497	2	6.249	6.288	.034
Within Groups	5.962	6	.994		
Total	18.459	8			

Lampiran 4c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Kadar Fruktosa (%)

Kadar fruktosa

Duncan

Kons. enzim	N	Subset for alpha = 0.05	
		1	2
0,04	3	20.6667	
0,1	3		22.9567
0,07	3		23.3333
Sig.		1.000	.660

Means for groups in homogeneous subsets are displayed.

Lampiran 5a. Tabel Pengamatan Pengaruh Konsentrasi Enzim terhadap Derajat Konversi (%)

Konsentrasi enzim (%)	Derajat Konversi			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,1	43,33	47,20	47,20	45,91
0,07	46,00	46,00	48,00	46,67
0,04	44,00	40,53	39,47	41,33

Lampiran 5b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim terhadap Derajat Konversi (%)

ANOVA

Derajat konversi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	49.963	2	24.981	6.277	.034
Within Groups	23.880	6	3.980		
Total	73.843	8			

Lampiran 5c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Derajat Konversi (%)

Derajat konversi

Duncan

Kons. enzim	N	Subset for alpha = 0.05	
		1	2
0,04	3	41.3333	
0,1	3		45.9100
0,07	3		46.6667
Sig.		1.000	.659

Means for groups in homogeneous subsets are displayed.

Lampiran 6a. Tabel Pengamatan Pengaruh Konsentrasi Enzim/buffer (mg/ml) terhadap Penurunan Protein Terlarut (%)

Konsentrasi enzim/buffer (mg/ml)	Penurunan protein terlarut (%)			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
7,5	52,51	49,31	51,31	51,07
10	43,89	44,48	53,52	47,2
12,5	64,50	50,27	41,87	52,21

Lampiran 6b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim/buffer (mg/ml) terhadap Penurunan Protein Terlarut (%)

ANOVA

Penurunan protein

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39.539	2	19.770	.365	.709
Within Groups	324.973	6	54.162		
Total	364.513	8			

Lampiran 7a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Kadar Fruktosa (%)

Konsentrasi Enzim Imobil (%)	Kadar fruktosa			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	18,75	18,50	17,92	18,39
0,08	23,25	21,67	20,92	21,94
0,12	24,58	21,83	22,08	22,83

Lampiran 7b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Kadar Fruktosa (%)

ANOVA

Kadar Fruktosa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.144	2	16.572	12.720	.007
Within Groups	7.817	6	1.303		
Total	40.961	8			

Lampiran 7c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim Terimobil terhadap Kadar Fruktosa (%)

Kadar Fruktosa

Duncan

Konsentrasi ...	N	Subset for alpha = 0.05	
		1	2
0,04	3	18.3900	
0,08	3		21.9467
0,12	3		22.8300
Sig.		1.000	.380

Means for groups in homogeneous subsets are displayed.

Lampiran 8a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Derajat Konversi (%)

Konsentrasi Enzim Imobil (%)	Derajat Konversi			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	37,50	37,00	35,83	36,78
0,08	46,50	43,33	41,83	43,89
0,12	49,17	43,67	44,17	45,67

Lampiran 8b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Derajat Konversi (%)

ANOVA

Derajat konversi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	132.824	2	66.412	12.715	.007
Within Groups	31.339	6	5.223		
Total	164.162	8			

Lampiran 8c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Derajat Konversi (%)

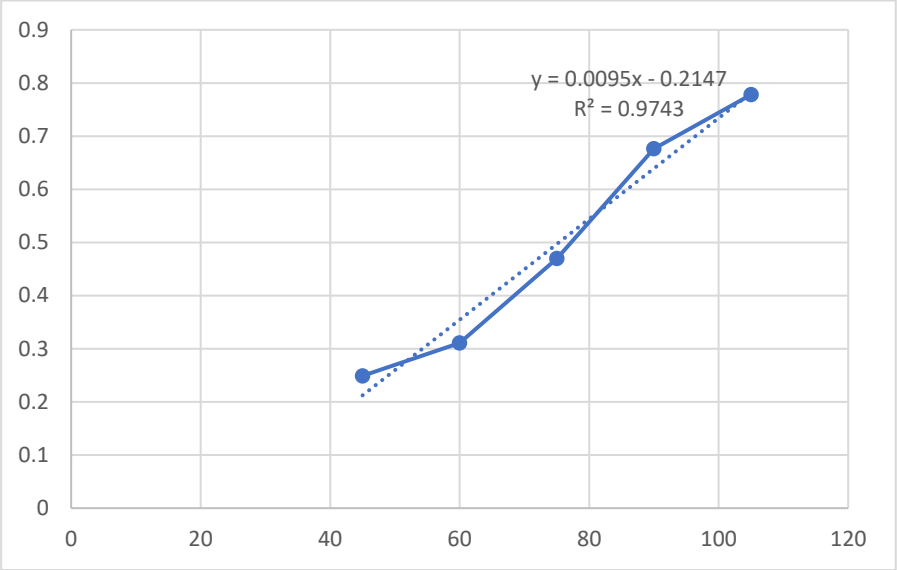
Derajat konversi

Duncan

Konsentrasi ...	N	Subset for alpha = 0.05	
		1	2
0,04	3	36.7767	
0,08	3		43.8867
0,12	3		45.6700
Sig.		1.000	.376

Means for groups in homogeneous subsets are displayed.

Lampiran 9a. Kurva Standar Pengujian Kadar Gula Reduksi



Lampiran 9b. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Gula Reduksi (%)

Konsentrasi Enzim Imobil (%)	Gula reduksi			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	48,53	48,53	48,45	48,50
0,08	48,53	47,34	47,11	47,66
0,12	44,50	44,58	44,19	44,42

Lampiran 9c. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Gula Reduksi (%)

ANOVA

Gula reduksi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.834	2	13.917	66.751	.000
	1.251	6	.208		
	29.085	8			

Lampiran 9d. Hasil Uji Lanjut Konsentrasi Enzim Terimobil (%) terhadap Gula Reduksi (%)

Gula reduksi

Duncan

Konsentrasi...	N	Subset for alpha = 0.05	
		1	2
0,12	3	44.4233	
0,08	3		47.6600
0,04	3		48.5033
Sig.		1.000	.064

Means for groups in homogeneous subsets are displayed.

Lampiran 10a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Total Padatan (%)

Konsentrasi Enzim Imobil (%)	Total padatan			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	50,47	50,28	49,67	50,14
0,08	48,66	50,01	47,29	48,65
0,12	44,97	45,62	45,05	45,21

Lampiran 10b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Total Padatan (%)

ANOVA

Total padatan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	38.936	2	19.468	27.592	.001
Within Groups	4.233	6	.706		
Total	43.169	8			

Lampiran 10c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Total Padatan (%)

Total padatan

Duncan

Konsentrasi ...	N	Subset for alpha = 0.05	
		1	2
0,12	3	45.2000	
0,08	3		48.6667
0,04	3		50.1667
Sig.		1.000	.071

Means for groups in homogeneous subsets are displayed.

Lampiran 11a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Dextrose Equivalent (%)

Konsentrasi Enzim Imobil (%)	Dextrose equivalent			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	96,15	96,51	97,55	96,74
0,08	99,73	94,67	99,61	98,00
0,12	98,95	97,71	98,09	98,25

Lampiran 11b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Dextrose Equivalent (%)

ANOVA

DE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.955	2	1.978	.640	.560
Within Groups	18.538	6	3.090		
Total	22.494	8			

Lampiran 12a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Brix

Konsentrasi Enzim Imobil (%)	Brix			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	49,2	49,9	49,5	49,53
0,08	48,6	49,3	48,5	48,80
0,12	48	47,2	47,1	47,43

Lampiran 12b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Brix

ANOVA

Brix

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.816	2	3.408	18.365	.003
Within Groups	1.113	6	.186		
Total	7.929	8			

Lampiran 12c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Brix

Brix

Duncan

Konsentrasi ...	N	Subset for alpha = 0.05	
		1	2
0,12	3	47.4333	
0,08	3		48.8000
0,04	3		49.5333
Sig.		1.000	.082

Means for groups in homogeneous subsets are displayed.

Lampiran 13a. Tabel Pengamatan Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Glukosa Tersisa (%)

Konsentrasi Enzim Imobil (%)	Glukosa tersisa			Rata-rata
	Ulangan 1	Ulangan 2	Ulangan 3	
0,04	31,25	31,50	32,08	31,61
0,08	26,75	28,33	29,08	28,06
0,12	25,42	28,17	27,92	27,17

Lampiran 13b. Hasil Uji ANOVA Pengaruh Konsentrasi Enzim Terimobil (%) terhadap Glukosa Tersisa (%)

ANOVA

Glukosa sisa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.144	2	16.572	12.720	.007
Within Groups	7.817	6	1.303		
Total	40.961	8			

Lampiran 13c. Hasil Uji Lanjut Pengaruh Konsentrasi Enzim terhadap Glukosa Tersisa (%)

Glukosa sisa

Duncan

Konsentrasi ...	N	Subset for alpha = 0.05	
		1	2
0,12	3	27.1700	
0,08	3	28.0533	
0,04	3		31.6100
Sig.		.380	1.000

Means for groups in homogeneous subsets are displayed.

Lampiran 14a. Tabel Pengamatan Penggunaan Enzim Terimobilisasi Berulang terhadap Kadar Fruktosa (%)

Penggunaan berulang (ke-)	Kadar fruktosa		Rata-rata
	Ulangan 1	Ulangan 2	
1	25,00	23,07	24,03
2	24,33	23,40	23,87
3	24,13	22,33	23,23
4	22,53	23,20	22,87
5	22,73	21,07	21,90
6	20,40	22,53	21,47
7	19,67	22,87	21,27
8	21,27	20,67	20,97
9	20,33	19,73	20,03

Lampiran 14b. Hasil Uji ANOVA Penggunaan Enzim Terimobilisasi Berulang terhadap Kadar Fruktosa (%)

ANOVA

Kadar fruktosa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.724	8	3.840	2.601	.088
Within Groups	13.289	9	1.477		
Total	44.012	17			

Lampiran 14c. Hasil Uji Lanjut Penggunaan Enzim Terimobilisasi Berulang terhadap Kadar Fruktosa (%)

Kadar fruktosa

Duncan

Penggunaan ...	N	Subset for alpha = 0.05		
		1	2	3
U9	2	20.0330		
U8	2	20.9670	20.9670	
U7	2	21.2670	21.2670	21.2670
U6	2	21.4665	21.4665	21.4665
U5	2	21.9000	21.9000	21.9000
U4	2	22.8665	22.8665	22.8665
U3	2		23.2330	23.2330
U2	2		23.8665	23.8665
U1	2			24.0335
Sig.		.062	.058	.068

Means for groups in homogeneous subsets are displayed.

Lampiran 15a. Tabel Pengamatan Penggunaan Enzim Terimobilisasi Berulang terhadap Glukosa Tersisa (%)

Penggunaan berulang (ke-)	Glukosa tersisa		Rata-rata
	Ulangan 1	Ulangan 2	
1	25.00	26.93	25.97
2	25.67	26.60	26.13
3	25.87	27.67	26.77
4	27.47	26.80	27.13
5	27.27	28.93	28.10
6	29.60	27.47	28.53
7	30.33	27.13	28.73
8	28.73	29.33	29.03
	29.67	30.27	29.97

Lampiran 15b. Hasil Uji ANOVA Penggunaan Enzim Terimobilisasi Berulang terhadap Glukosa Tersisa (%)

ANOVA

Glukosa tersisa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.713	8	3.839	2.605	.088
Within Groups	13.266	9	1.474		
Total	43.978	17			

Lampiran 15c. Hasil Uji Lanjut Penggunaan Enzim Terimobilisasi Berulang terhadap Glukosa Tersisa (%)

Glukosa tersisa

Duncan

Penggunaan ...	N	Subset for alpha = 0.05		
		1	2	3
U1	2	25.9650		
U2	2	26.1350	26.1350	
U3	2	26.7700	26.7700	
U4	2	27.1350	27.1350	27.1350
U5	2	28.1000	28.1000	28.1000
U6	2	28.5350	28.5350	28.5350
U7	2	28.7300	28.7300	28.7300
U8	2		29.0300	29.0300
U9	2			29.9700
Sig.		.068	.058	.062

Means for groups in homogeneous subsets are displayed.

Lampiran 16a. Tabel Pengamatan Penggunaan Enzim Terimobilisasi Berulang terhadap Derajat Konversi (%)

Penggunaan berulang (ke-)	Derajat konversi		Rata-rata
	Ulangan 1	Ulangan 2	
	50.00	46.13	48.07
	48.67	46.80	47.73
	48.27	44.67	46.47
	45.07	46.40	45.73
	45.47	42.13	43.80

6	40.80	45.07	42.93
7	39.33	45.73	42.53
8	42.53	41.33	41.93
9	40.67	39.47	40.07

Lampiran 16b. Hasil Uji ANOVA Penggunaan Enzim Terimobilisasi Berulang terhadap Derajat Konversi (%)

ANOVA

Derajat konversi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	122.925	8	15.366	2.599	.088
Within Groups	53.216	9	5.913		
Total	176.140	17			

Lampiran 16c. Hasil Uji Lanjut Penggunaan Enzim Terimobilisasi Berulang terhadap Derajat Konversi (%)

Derajat konversi

Duncan

Penggunaan ...	N	Subset for alpha = 0.05		
		1	2	3
U9	2	40.0700		
U8	2	41.9300	41.9300	
U7	2	42.5300	42.5300	42.5300
U6	2	42.9350	42.9350	42.9350
U5	2	43.8000	43.8000	43.8000
U4	2	45.7350	45.7350	45.7350
U3	2		46.4700	46.4700
U2	2		47.7350	47.7350
U1	2			48.0650
Sig.		.062	.058	.068

Means for groups in homogeneous subsets are displayed.

Lampiran 17a. Tabel Pengamatan Penggunaan Enzim Terimobilisasi Berulang terhadap Gula Reduksi (%)

Penggunaan berulang (ke-)	Gula reduksi		Rata-rata
	Ulangan 1	Ulangan 2	
1	48.69	46.14	47.42
2	48.91	49.23	49.07
3	50.26	48.69	49.48
4	49.88	49.23	49.56
5	49.51	48.04	48.77
6	49.45	49.72	49.59
7	48.85	48.48	48.67
8	49.23	49.18	49.21
9	49.40	48.10	48.75

Lampiran 17b. Hasil Uji ANOVA Penggunaan Enzim Terimobilisasi Berulang terhadap Gula Reduksi (%)

ANOVA

Gula reduksi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.274	8	.909	1.208	.389
Within Groups	6.773	9	.753		
Total	14.047	17			

Lampiran 18a. Tabel Pengamatan Penggunaan Enzim Terimobilisasi Berulang terhadap Dextrose Equivalent

Penggunaan berulang (ke-)	Dextrose equivalent		Rata-rata
	Ulangan 1	Ulangan 2	
1	98.37	93.79	96.08
2	96.09	96.92	96.50
3	98.95	95.85	97.40
4	98.20	96.92	97.56
5	97.64	94.76	96.20
6	97.54	98.07	97.80
7	97.13	96.37	96.75
8	97.88	97.97	97.92
9	97.82	95.81	96.81

Lampiran 18b. Hasil Uji ANOVA Penggunaan Enzim Terimobilisasi Berulang terhadap Dextrose Equivalent

ANOVA

Dextrose equivalent

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.610	8	.951	.371	.911
Within Groups	23.057	9	2.562		
Total	30.668	17			

Lampiran 19a. Dokumentasi

Preparasi sampel

Penyiapan sagu

Proses gelatinisasi

Proses evaporasi

Imobilisasi enzim

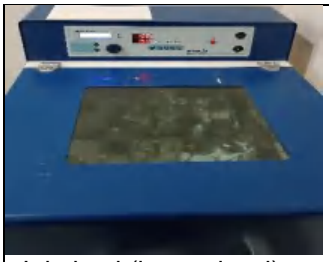
Penambahan NaOH

Penambahan GA

Pengeringan

Penyimpanan di refrigerator

Tahap 1


Inkubasi (isomerisasi)


Produk sirup fruktosa

Tahap 2



Produk sirup fruktosa

Tahap 3

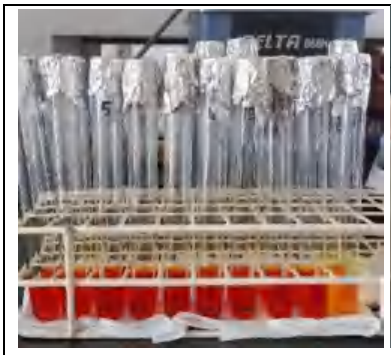


Produk sirup fruktosa

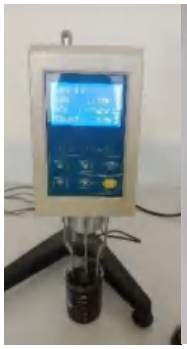
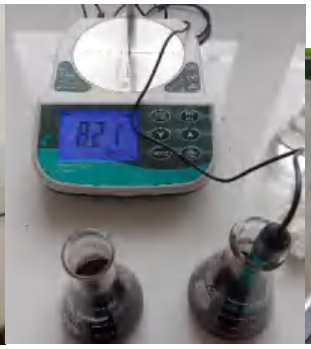
Pengujian




dan pengujian fruktosa dan gula reduksi



Pengujian fruktosa dan gula reduksi

Viskositas pH Brix