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LAMPIRAN

Lampiran 1. Diagram Alir Penelitian
Diagram Alir Pengolahan Biji Kakao.

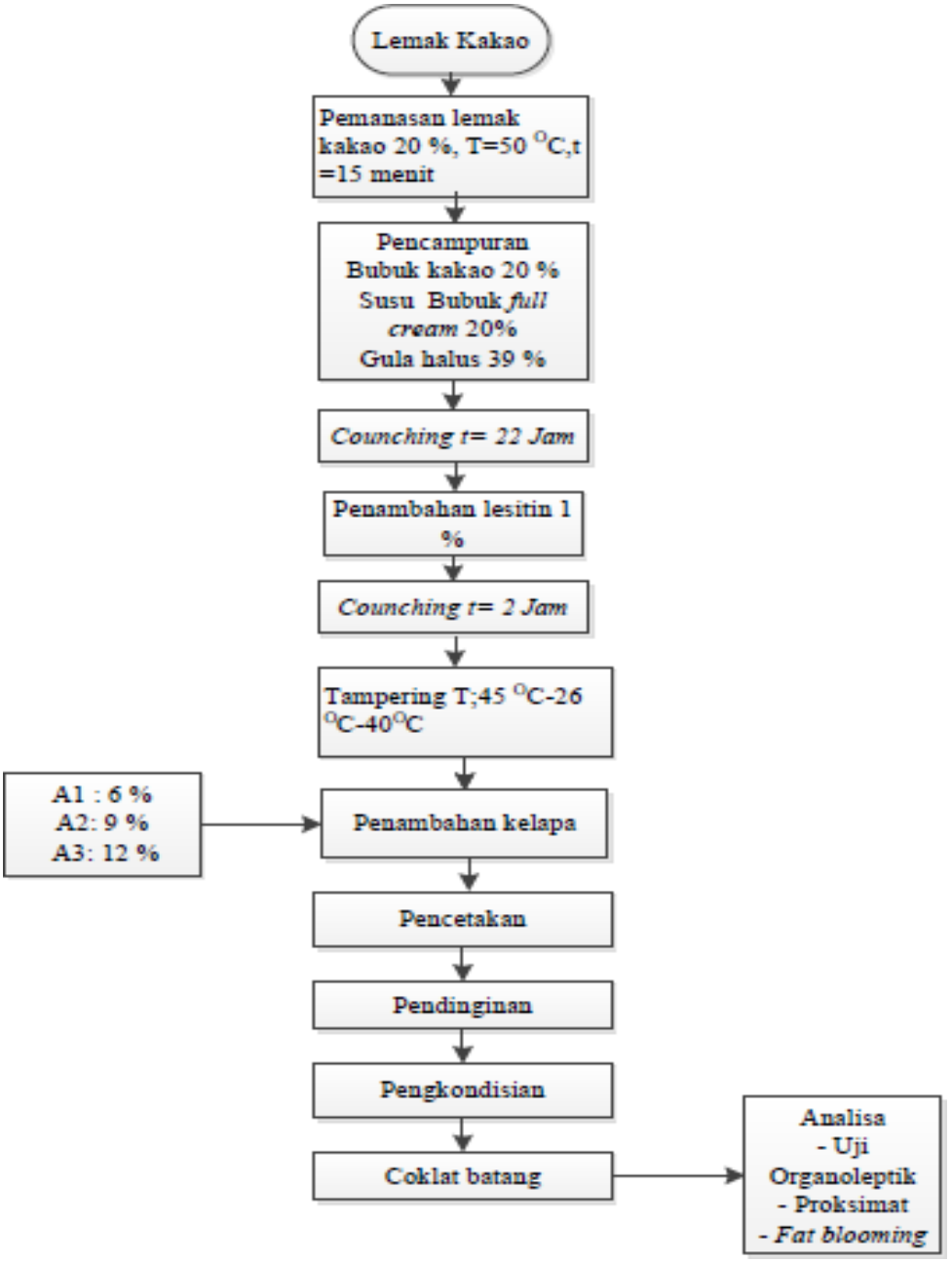


Diagram Alir Pembuatan Buah Kelapa Serut Kering.

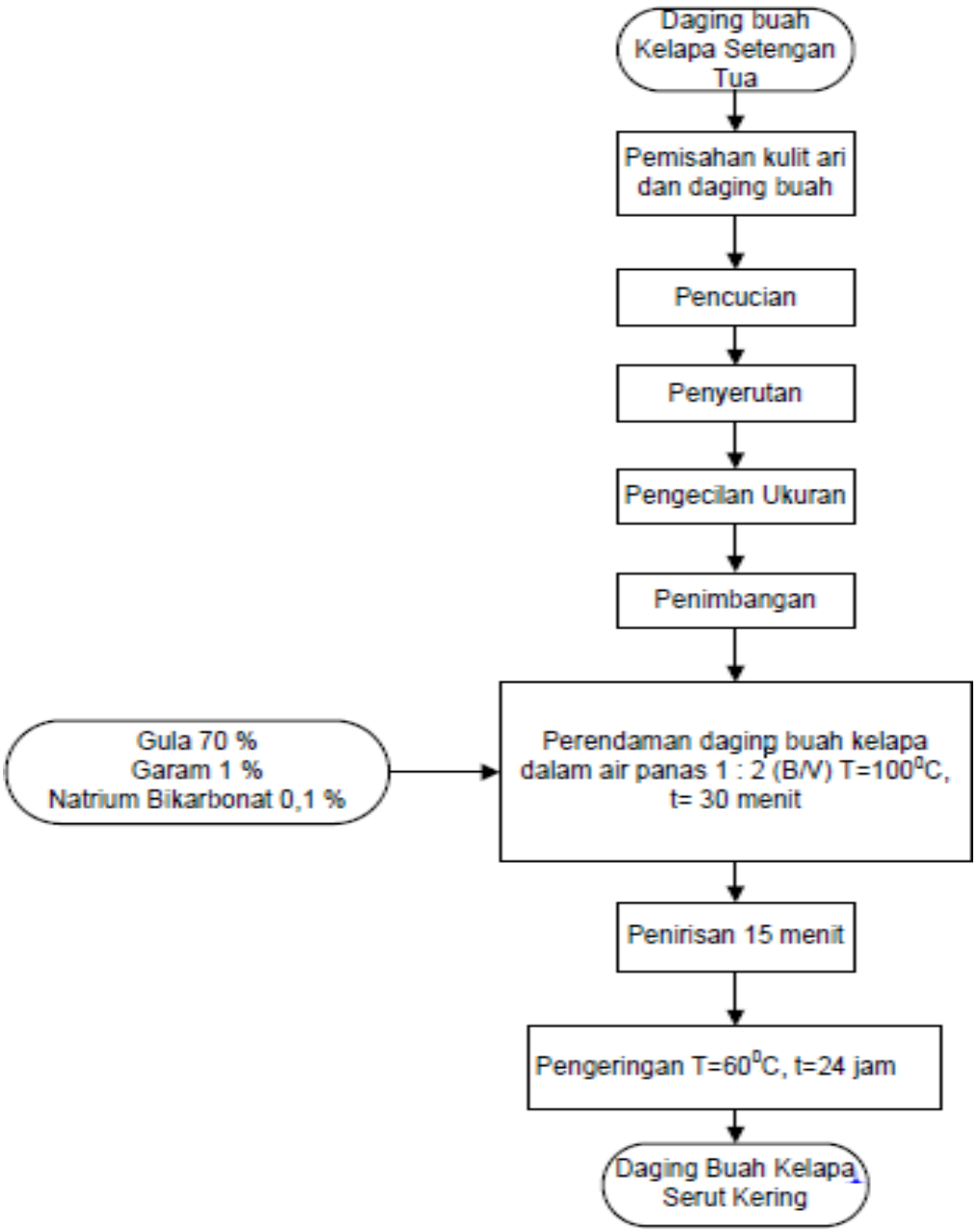
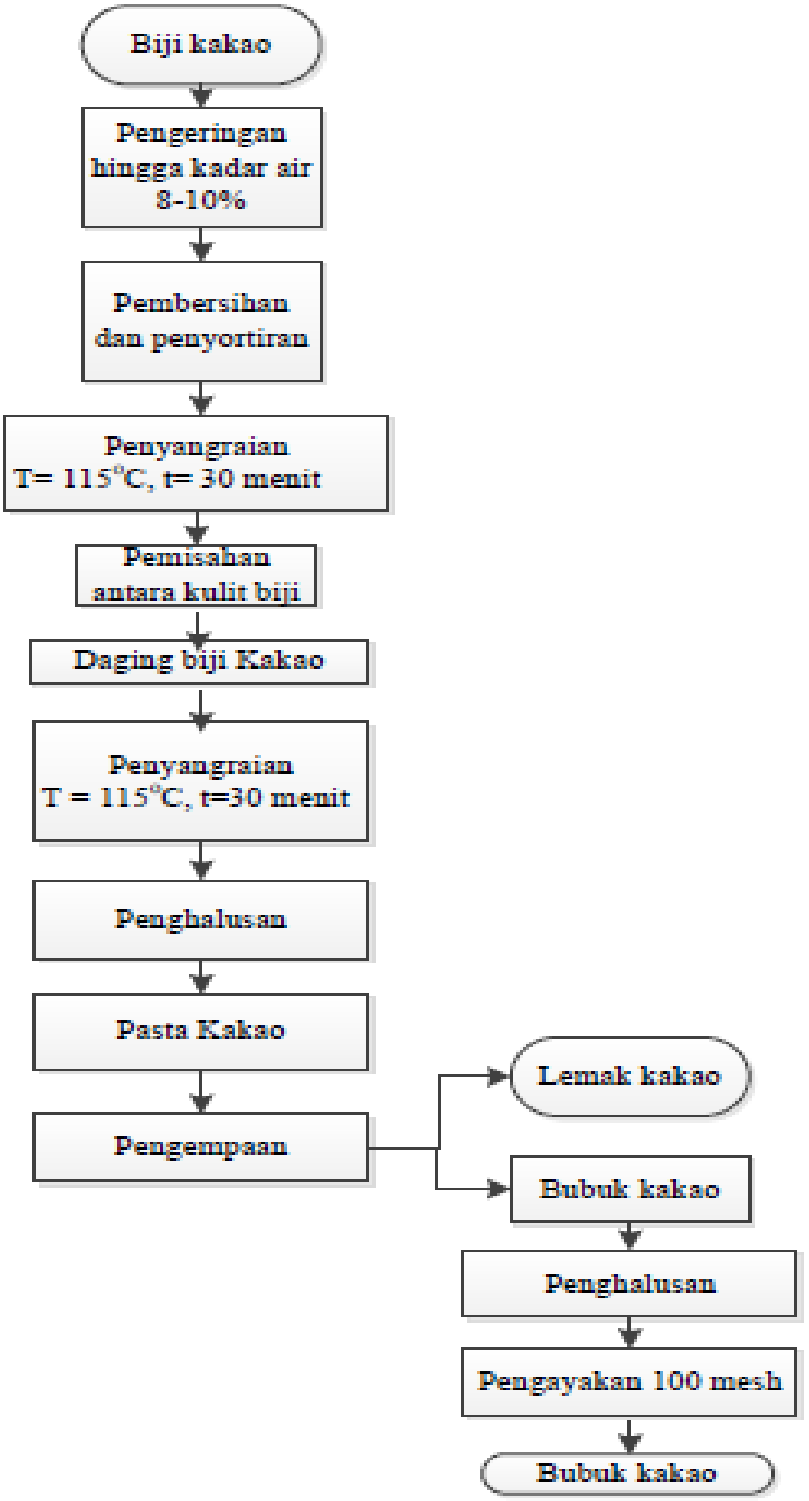
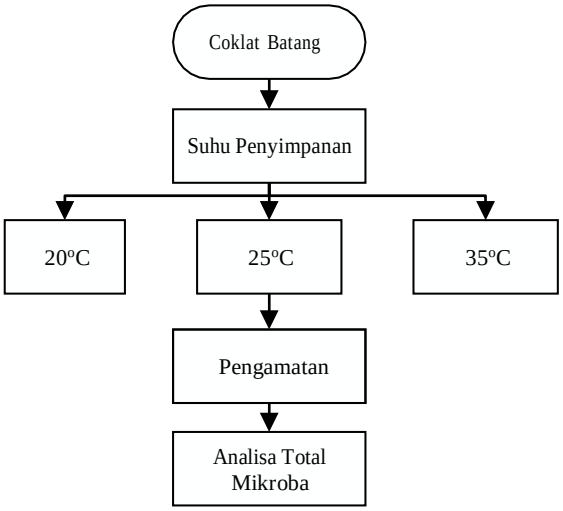


Diagram Alir Pembuatan Cokelat Batang.



Penentuan Lama Penyimpanan Produk Cokelat Batang.



Lampiran 2. Data Pengamatan Kadar Air

1. Hasil Pengukuran Kadar Air Cokelat Batang Selama Penyimpanan Suhu 20ºC, 25ºC dan 35ºC.

Suhu	Lam Penyimpanan (Hari)	Kadar Air			
		Ul1	Ul2	rata-rata	SD
20	0	1.04	1.01	1.03	0.02
	5	1.38	1.41	1.39	0.02
	10	1.89	1.84	1.86	0.03
	15	1.18	1.21	1.20	0.02
	20	6.33	6.39	6.36	0.04
	25	1.89	1.89	1.89	0.00
25	0	1.04	1.01	1.03	0.02
	5	1.49	1.45	1.47	0.03
	10	2.13	2.14	2.14	0.00
	15	1.29	1.27	1.28	0.02
	20	4.53	4.49	4.51	0.03
	25	1.86	1.85	1.86	0.01
35	0	1.04	1.01	1.03	0.02
	5	1.75	1.73	1.74	0.01
	10	2.02	2.04	2.03	0.01
	15	0.81	0.81	0.81	0.00
	20	6.04	6.05	6.04	0.01
	25	1.94	2.17	2.05	0.16

2. Rerataan Hasil Kadar Air Cokelat Batang Selama Penyimpanan Suhu 20^{o}C, 25^{o}C dan 35^{o}C

Lama Penyimpanan (Hari)	Suhu Penyimpanan			Rata-rata
	20 ^{o}C	25 ^{o}C	35 ^{o}C	
0	1.03	1.03	1.03	1.03
5	1.39	1.47	1.74	1.53
10	1.86	2.14	2.03	2.01
15	1.20	1.28	0.81	1.10
20	6.36	4.51	6.04	5.64
25	1.89	1.86	2.05	1.93
Rerata	2.29	2.05	2.28	2.21

3. Hasil Analisis Sidik Ragam

Tests of Between-Subjects Effects

Dependent Variable: Kadar Air

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	94.259[a]	17	5.545	2926.792	.000
Intercept	175.209	1	175.209	92485.871	.000
Suhu	.463	2	.231	122.069	.000
Penyimpanan	89.838	5	17.968	9484.362	.001
Suhu * Penyimpanan	3.958	10	.396	208.951	.060
Error	.034	18	.002		
Total	269.502	36			
Corrected Total	94.293	35			

a. R Squared = 1.000 (Adjusted R Squared = .999)

4. Hasil Uji Lanjut Duncan

Faktor Tunggal Suhu

Kadar Air

Duncan[a,b]

Suhu Penyimpanan	N	Subset 1	Subset 2
25 Derajat	12	2.0458	
35 Derajat	12		2.2842
20 Derajat	12		2.2883
Sig.		1.000	.817

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = .002.

a. Uses Harmonic Mean Sample Size = 12.000.

b. Alpha = .05.

Faktor Tunggal Lama Penyimpanan

Kadar Air

Duncan[a,b]

Lama Penyimpanan	N	Subset 1	2	3	4	5	6
0 Menit	6	1.0250					
15 Menit	6		1.0950				
5 Menit	6			1.5350			
25 Menit	6				1.9333		
10 Menit	6					2.0100	
20 Menit	6						5.6383
Sig.		1.000	1.000	1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = .002.
a. Uses Harmonic Mean Sample Size = 6.000.
b. Alpha = .05.

Lampiran 3. Data Pengamatan Kadar Asam Lemak Bebas

1. Hasil Pengukuran Kadar Asam Lemak Bebas Cokelat Batang Selama Penyimpanan Suhu 20ºC, 25ºC dan 35ºC.

Suhu	Hari	Ulangan 1				Ulangan 2				Rerata ALB
		Berat Sampel	mg	NaOH (ml)	%ALB	Berat Sampel	mg	NaOH (ml)	%ALB	
20	0	5.0074	5007.4	9.95	5.52	5.0051	5005.1	9.90	5.50	5.51
	5	5.0089	5008.9	3.63	2.01	5.0055	5005.5	3.57	1.98	2.00
	10	5.0231	5023.1	4.1	2.27	5.0127	5012.7	4.13	2.29	2.28
	15	5.0176	5017.6	3.2	1.77	5.0318	5031.8	3.20	1.77	1.77
	20	5.1561	5156.1	7.9	4.26	5.0534	5053.4	7.70	4.34	4.30
	25	5.1119	5111.9	4.85	2.44	5.1114	5111.4	4.90	2.66	2.55
25	0	5.0074	5007.4	9.95	5.52	5.0051	5005.1	9.90	5.50	5.51
	5	5.0001	5000.1	4.25	2.36	5.0075	5007.5	4.17	2.32	2.34
	10	5.0068	5006.8	6.05	3.36	5.0276	5027.6	6.00	3.32	3.34
	15	5.0097	5009.7	8.13	4.51	5.0317	50317	8.25	4.46	4.49
	20	5.1839	5183.9	8.6	4.61	5.0765	5076.5	8.55	4.68	4.65
	25	5.0470	5047	4.75	2.50	5.0465	5046.5	4.70	2.59	2.55
35	0	5.0074	5007.4	9.95	5.52	5.0051	5005.1	9.90	5.50	5.51
	5	5.0101	5010.1	5.55	3.08	5.0063	5006.3	5.43	3.02	3.05
	10	5.0092	5009.2	2.37	1.32	5.0394	5039.4	2.35	1.30	1.31
	15	5.0152	5015.2	6.6	3.66	5.0086	5008.6	6.55	3.64	3.65
	20	5.1912	5191.2	6.6	3.53	5.0854	5085.4	6.40	3.50	3.52
	25	5.1744	5174.4	3.70	1.98	5.1760	5176.0	3.60	1.93	1.96

2. Hasil Pengukuran Kadar Asam Lemak Bebas Cokelat Batang Selama Penyimpanan Suhu 20^{o}C, 25^{o}C dan 35^{o}C.

Lama Penyimpanan (Hari)	Suhu Penyimpanan			Rata-rata
	20 ^{o}C	25 ^{o}C	35 ^{o}C	
0	5.51	5.51	5.51	5.51
5	2.00	2.34	3.05	2.46
10	2.28	3.34	1.31	2.31
15	1.77	4.49	3.65	3.30
20	4.30	4.65	3.52	4.16
25	2.55	2.55	1.96	2.35
Rerata	3.07	3.81	3.17	3.35

3. Hasil Analisis Sidik Ragam

Tests of Between-Subjects Effects

Dependent Variable: ALB

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	63.930[a]	17	3.761	1615.520	.000
Intercept	403.474	1	403.474	173330.196	.000
Suhu	3.917	2	1.958	841.276	.031
Penyimpanan	49.104	5	9.821	4218.953	.000
Suhu * Penyimpanan	10.909	10	1.091	468.653	.080
Error	.042	18	.002		
Total	467.446	36			
Corrected Total	63.972	35			

a. R Squared = .999 (Adjusted R Squared = .999)

4. Hasil Uji Lanjut Duncan

Faktor Tunggal Suhu

ALB

Duncan[a,b]

Suhu Penyimpanan	N	Subset 1	Subset 2	Subset 3
20 Derajat	12	3.0675		
35 Derajat	12		3.1650	
25 Derajat	12			3.8108
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = .002.
a. Uses Harmonic Mean Sample Size = 12.000.
b. Alpha = .05.

Faktor Tunggal Lama Penyimpanan

ALB

Duncan[a,b]

Lama Penyimpanan	N	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5
10 Menit	6	2.3100				
25 Menit	6	2.3500				
5 Menit	6		2.4617			
15 Menit	6			3.3017		
20 Menit	6				4.1533	
0 Menit	6					5.5100
Sig.		.168	1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = .002.
a. Uses Harmonic Mean Sample Size = 6.000.
b. Alpha = .05.

Lampiran 4. Data Pengamatan Karakteristik Sensori Warna

SUHU 20C							SUHU 25C							SUHU 35C						
0	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**
8.7	8.0	7.7	8.3	6.3	6.0	7.5	8.7	8.0	7.7	7.7	6.7	6.7	7.6	8.7	8.0	7.7	6.7	7.3	5.7	7.3
8.7	7.3	8.0	8.7	7.0	5.3	7.5	8.7	7.3	8.0	9.0	6.7	7.0	7.8	8.7	7.3	7.3	8.3	7.7	5.0	7.4
8.7	7.3	8.0	7.3	8.0	5.3	7.4	8.7	7.3	8.0	8.3	8.0	7.7	8.0	8.7	7.0	7.0	7.0	8.0	5.7	7.2
8.3	7.7	7.7	5.0	4.7	5.7	6.5	8.3	7.0	7.7	5.0	6.0	6.0	6.7	8.3	7.0	6.7	4.3	8.0	5.0	6.6
8.0	7.3	8.0	5.3	5.0	5.3	6.5	8.0	8.0	8.0	6.3	4.7	5.7	6.8	8.0	7.3	7.3	5.0	8.7	6.0	7.1
8.3	8.0	7.7	6.3	8.0	6.0	7.4	8.3	8.7	7.7	7.0	7.0	6.7	7.6	8.3	6.3	6.3	6.3	6.3	4.7	6.4
8.3	8.0	8.0	7.0	4.3	6.0	6.9	8.3	7.0	8.0	7.0	7.3	5.3	7.2	8.3	7.0	7.7	5.7	5.7	4.7	6.5
9.0	7.0	7.3	3.3	8.7	5.7	6.8	9.0	7.3	7.3	3.3	5.0	7.0	6.5	9.0	6.0	7.7	3.7	7.3	4.0	6.3
8.3	8.7	6.7	4.7	6.0	5.3	6.6	8.3	7.7	6.7	5.3	5.3	6.7	6.7	8.3	6.0	6.0	6.7	8.0	3.7	6.4
8.3	8.0	6.3	7.3	5.0	5.3	6.7	8.3	8.7	6.3	6.7	7.3	7.3	7.4	8.3	7.3	7.3	4.3	8.0	6.3	6.9
8.3	7.7	6.7	5.7	6.7	5.0	6.7	8.3	7.3	6.7	5.0	7.0	7.0	6.9	8.3	7.3	7.3	8.0	7.3	5.3	7.3
8.0	7.7	6.7	5.0	3.3	4.7	5.9	8.0	8.0	6.7	4.0	4.3	3.3	5.7	8.0	7.0	6.3	4.0	3.0	5.3	5.6
9.0	7.0	6.0	5.0	3.7	3.7	5.7	9.0	8.0	6.0	7.0	4.3	4.3	6.4	9.0	6.3	7.3	7.0	5.7	6.0	6.9
9.0	7.7	6.7	6.0	4.3	3.3	6.2	9.0	8.3	6.7	4.3	3.3	5.0	6.1	9.0	6.0	6.3	6.7	6.3	6.0	6.7
8.0	6.7	5.7	4.7	3.3	3.3	5.3	8.0	7.7	5.7	4.7	4.3	4.7	5.8	8.0	6.7	7.0	7.3	5.0	5.0	6.5
Rerata																				
8.5	**7.6**	**7.1**	**6.0**	**5.6**	**5.1**	**6.6**	**8.5**	**7.8**	**7.1**	**6.0**	**5.8**	**6.0**	**6.9**	**8.5**	**6.8**	**7.0**	**6.1**	**6.8**	**5.2**	**6.7**

Lampiran 5. Data Pengamatan Karakteristik Sensori Aroma

SUHU 20C							SUHU 25C							SUHU 35C						
0	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**
8.3	8.3	8.0	7.0	5.0	4.3	6.8	8.3	8.3	8.3	6.7	7.0	6.7	7.6	8.3	8.3	7.3	8.3	8.0	6.0	7.7
8.0	8.0	8.0	8.7	6.7	4.7	7.3	8.0	7.0	8.0	8.3	6.3	6.7	7.4	8.0	7.3	8.0	8.7	7.0	7.3	7.7
8.3	8.0	8.7	5.0	8.0	6.3	7.4	8.3	8.0	7.0	5.7	8.0	9.0	7.7	8.3	7.3	7.7	7.0	8.0	6.7	7.5
8.0	7.7	7.7	6.3	4.0	6.7	6.7	8.0	7.0	6.7	7.0	6.7	6.7	7.0	8.0	7.0	7.3	6.7	8.3	7.3	7.4
8.7	7.3	7.0	7.7	9.0	7.0	7.8	8.7	8.0	8.0	7.3	6.0	6.7	7.4	8.7	7.7	7.0	6.7	6.3	6.3	7.1
8.0	8.0	7.0	6.3	7.7	6.3	7.2	8.0	7.7	7.7	4.7	6.3	6.3	6.8	8.0	8.0	8.0	6.7	4.7	8.3	7.3
8.3	7.3	7.3	7.7	8.0	6.0	7.4	8.3	6.3	7.0	6.3	5.0	7.3	6.7	8.3	6.3	7.7	6.3	6.0	6.0	6.8
9.0	8.3	7.3	5.3	6.0	8.0	7.3	9.0	7.7	7.3	7.0	6.0	6.3	7.2	9.0	7.3	7.0	5.7	7.7	7.0	7.3
8.0	7.0	7.0	5.7	5.7	5.3	6.4	8.0	7.7	7.7	7.0	7.0	5.7	7.2	8.0	8.0	8.0	7.0	5.7	7.0	7.3
8.3	8.0	7.7	5.0	6.7	5.3	6.8	8.3	7.7	7.7	5.0	4.7	7.3	6.8	8.3	8.0	8.0	7.0	7.3	6.3	7.5
8.0	7.7	6.7	7.3	6.7	5.7	7.0	8.0	8.3	7.3	7.0	7.3	8.0	7.7	8.0	7.7	7.0	4.0	8.0	7.0	6.9
8.7	7.7	6.7	8.0	5.0	6.3	7.1	8.7	6.7	6.0	5.0	4.0	5.0	5.9	8.7	7.0	7.0	7.0	4.7	7.0	6.9
9.0	7.3	6.3	6.0	6.3	5.7	6.8	9.0	7.3	7.3	5.7	7.0	4.3	6.8	9.0	6.7	7.0	5.0	5.0	6.3	6.5
8.7	7.7	6.3	7.0	5.0	6.3	6.8	8.7	6.7	6.7	5.3	4.7	5.3	6.2	8.7	6.7	7.0	6.0	6.7	6.7	6.9
8.3	8.0	7.0	6.3	4.3	5.0	6.5	8.3	7.3	7.0	4.7	5.0	5.0	6.2	8.3	6.3	6.3	7.0	5.3	7.3	6.8
Rerata																				
8.4	**7.8**	**7.2**	**6.6**	**6.3**	**5.9**	**7.0**	**8.4**	**7.4**	**7.3**	**6.2**	**6.1**	**6.4**	**7.0**	**8.4**	**7.3**	**7.4**	**6.6**	**6.6**	**6.8**	**7.2**

Lampiran 6. Data Pengamatan Karakteristik Sensori Tekstur

SUHU 20C							SUHU 25C							SUHU 35C						
0	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**
8.7	8.0	9.0	6.0	6.0	6.3	7.3	8.7	7.3	8.0	8.0	6.7	6.3	7.5	8.7	8.7	7.0	5.7	7.0	4.3	6.9
8.7	7.3	7.0	9.0	8.3	6.3	7.8	8.7	7.3	7.0	8.0	8.0	7.3	7.7	8.7	7.3	6.7	8.3	8.7	4.3	7.3
8.3	8.7	7.7	2.3	8.0	7.7	7.1	8.3	7.7	8.0	5.0	8.0	7.0	7.3	8.3	7.7	7.3	7.3	8.0	4.3	7.2
8.7	8.0	8.3	7.3	3.0	7.0	7.1	8.7	7.7	8.0	5.7	4.7	5.0	6.6	8.7	7.0	6.3	7.3	6.7	5.3	6.9
8.3	8.7	8.3	7.0	8.0	6.3	7.8	8.3	7.7	8.0	5.3	7.0	7.0	7.2	8.3	7.7	7.0	4.7	7.0	4.7	6.6
8.3	7.0	8.3	6.0	8.0	5.3	7.2	8.3	8.0	8.0	7.0	6.3	7.7	7.6	8.3	6.7	6.7	8.3	6.3	4.3	6.8
8.3	7.7	6.7	7.0	2.3	7.0	6.5	8.3	8.0	7.7	7.3	7.0	5.0	7.2	8.3	7.7	7.0	4.7	6.3	4.0	6.3
8.7	8.0	7.3	4.7	8.7	5.7	7.2	8.7	8.3	7.3	3.0	6.0	7.7	6.8	8.7	5.7	7.7	3.7	7.3	3.3	6.1
8.0	8.7	6.7	3.0	7.0	6.7	6.7	8.0	8.0	8.0	4.3	5.7	5.7	6.6	8.0	6.7	6.7	6.7	8.0	3.7	6.6
8.0	8.0	6.7	4.3	4.0	5.7	6.1	8.0	8.3	8.3	3.7	3.0	4.7	6.0	8.0	8.3	8.3	8.0	8.0	4.7	7.6
9.0	8.0	7.0	7.0	5.3	5.3	6.9	9.0	8.0	7.3	6.0	6.7	6.7	7.3	9.0	7.0	7.0	7.7	7.0	5.3	7.2
8.3	7.7	6.7	8.0	4.7	5.7	6.8	8.3	7.7	7.0	3.0	6.3	6.3	6.4	8.3	6.7	7.7	7.0	5.0	4.7	6.6
8.7	7.7	6.3	2.0	5.0	6.3	6.0	8.7	7.0	7.0	1.3	5.7	5.7	5.9	8.7	7.0	7.0	5.7	6.0	5.0	6.6
8.7	8.3	6.3	6.3	5.0	6.3	6.8	8.7	7.0	7.0	5.0	3.0	6.0	6.1	8.7	6.7	7.7	7.0	7.7	4.7	7.1
8.3	8.0	6.3	4.7	5.3	5.0	6.3	8.3	7.3	7.0	4.3	5.0	6.0	6.3	8.3	7.0	7.0	8.7	7.3	4.3	7.1
Rerata																				
8.5	**8.0**	**7.2**	**5.6**	**5.9**	**6.2**	**6.9**	**8.5**	**7.7**	**7.6**	**5.1**	**5.9**	**6.3**	**6.8**	**8.5**	**7.2**	**7.1**	**6.7**	**7.1**	**4.5**	**6.8**

Lampiran 7. Data Pengamatan Karakteristik Sensori Rasa

SUHU 20C							SUHU 25C							SUHU 35C						
0	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**	**0**	**5**	**10**	**15**	**20**	**25**	**RATA-RATA**
8.7	8.0	8.0	8.0	8.7	7.0	7.9	8.7	8.0	8.0	7.0	6.3	4.3	7.1	8.7	8.0	7.0	7.3	8.7	7.7	7.9
8.7	7.3	7.0	8.7	8.0	6.7	7.5	8.7	8.7	7.3	8.7	8.3	4.7	7.7	8.7	7.3	8.0	8.3	7.7	7.0	7.8
9.0	8.0	9.0	5.7	7.7	6.0	7.3	9.0	8.3	7.0	5.3	8.0	4.7	7.1	9.0	8.3	7.3	7.3	8.0	7.7	7.9
8.7	8.7	7.0	8.0	6.7	6.0	7.3	8.7	7.3	6.3	7.3	5.3	5.3	6.7	8.7	7.7	7.7	6.7	8.7	6.7	7.7
8.3	7.3	7.7	8.0	8.0	5.0	7.2	8.3	8.7	8.0	7.0	6.7	5.3	7.3	8.3	8.0	7.0	7.0	7.0	7.3	7.4
8.0	7.3	7.3	6.7	8.0	5.0	6.9	8.0	8.0	8.0	7.3	6.7	4.7	7.1	8.0	7.7	7.7	7.3	7.3	6.7	7.4
9.0	8.7	7.3	7.0	5.3	7.0	7.1	9.0	7.7	6.7	7.0	4.7	4.7	6.6	9.0	7.3	6.7	6.3	8.0	7.3	7.4
8.3	6.7	9.0	8.3	8.0	4.7	7.3	8.3	8.0	7.3	3.0	5.7	4.3	6.1	8.3	7.3	6.3	7.3	9.0	7.0	7.6
8.3	7.3	7.3	6.3	6.3	4.7	6.4	8.3	7.7	7.7	5.3	8.0	4.0	6.8	8.3	7.0	7.0	8.0	8.3	6.7	7.6
8.7	8.0	7.7	6.0	7.0	5.0	6.7	8.7	7.3	7.3	6.0	5.0	3.3	6.3	8.7	8.0	8.0	8.0	8.0	7.0	7.9
9.0	7.3	7.0	6.3	5.7	5.3	6.3	9.0	8.0	8.0	7.0	7.7	5.3	7.5	9.0	7.7	6.7	7.3	7.7	7.7	7.7
8.7	7.7	7.3	7.0	4.7	5.7	6.5	8.7	7.7	7.0	6.0	7.7	6.7	7.3	8.7	7.0	6.7	8.0	6.3	6.7	7.2
9.0	7.7	7.3	2.3	5.0	5.0	5.5	9.0	8.0	7.7	2.3	4.7	4.7	6.1	9.0	6.7	6.3	4.0	6.3	7.0	6.6
8.3	6.3	6.3	6.7	5.3	5.7	6.1	8.3	7.3	6.7	7.0	5.3	4.0	6.4	8.3	6.0	7.0	8.3	7.7	6.0	7.2
7.3	7.7	6.3	7.3	3.7	5.7	6.1	7.3	6.3	6.3	5.7	5.0	3.7	5.7	7.3	6.3	7.3	6.7	7.3	6.7	6.9
Rerata																				
7.6	**7.4**	**7.4**	**6.8**	**6.5**	**5.6**	**6.8**	**8.5**	**7.8**	**7.3**	**6.1**	**6.3**	**4.6**	**6.8**	**8.5**	**7.4**	**7.1**	**7.2**	**7.7**	**7.0**	**7.5**

Lampiran 8. Data Pengmatan Total Plate Count

1. Hasil Pengukuran TPC Cokelat Batang Selama Penyimpanan Suhu 20ºC, 25ºC dan 35ºC.

20°C	**10^-1**		**10^-2**		**10^-3**		**N (CFU/mL)**	**Log**
Hari	**simplo**	**Duplo**	**simplo**	**duplo**	**simplo**	**duplo**		
0	14	1	4	5	1	1	1.4 X 10^2	2.13
5	20	9	7	11	2	0	2.8X10^2	2.45
10	4	8	1	2	1	0	TSUD	0.7
15	3	18	6	27	13	10	6 X10^2	2.78
20	1	1	2	1	1	1	TSUD	0
25	1	57	6	3	0	1	5.7X10^2	2.76
25°C	**10^-1**		**10^-2**		**10^-3**		**N (CFU/mL)**	**Log**
Hari	**simplo**	**Duplo**	**simplo**	**duplo**	**simplo**	**duplo**		
0	14	1	4	5	1	1	1.4 X 10^2	2.14
5	11	13	3	1	1	0	1.2 X 10^2	2.08
10	4	6	3	1	3	1	TSUD	0.7
15	5	4	5	6	6	4	TSUD	0.6
20	1	12	1	1	3	1	1.2 X 10^2	2.08
25	1	1	5	9	1	1	TSUD	0.8
35°C	**10^-1**		**10^-2**		**10^-3**		**N (CFU/mL)**	**Log**
Hari	**simplo**	**Duplo**	**simplo**	**duplo**	**simplo**	**duplo**		
0	14	1	4	5	1	1	1.4 X 10^2	2.14
5	14	13	1	3	0	1	1.3 X 10^2	2.11
10	3	14	8	3	0	11	2.4 X 10^2	2.38
15	12	19	18	8	10	9	2.7 X 10^2	2.43
20	14	1	0	1	0	0	1.4 X 10^2	2.14
25	24	28	10	8	0	1	2.9 X 10^2	2.46

2. Rerata Hasil Pengukuran TPC Cokelat Batang Selama Penyimpanan Suhu 20^{o}C, 25^{o}C dan 35^{o}C.

Lama Penyimpanan (Hari)	Suhu Penyimpanan			Rata-rata
	20 ^{o}C	25 ^{o}C	35 ^{o}C	
0	2.13	2.14	2.14	2.14
5	2.45	2.08	2.11	2.21
10	0.7	0.7	2.38	1.26
15	2.78	0.6	2.43	1.94
20	0	2.08	2.14	1.41
25	2.76	0.8	2.46	2.01
Rerata	1.80	1.40	2.28	1.83

3. Hasil Analisis Sidik Ragam

Tests of Between-Subjects Effects

Dependent Variable: TPC

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	24.538[a]	17	1.443	364688045460143700000000000000.000	.000
Intercept	120.122	1	120.122	303490649702616580000000000000000.000	.000
Suhu	4.621	2	2.311	583762839067151300000000000000000.000	.001
Penyimpanan	4.726	5	.945	238794002020393520000000000000000.000	.045
Suhu * Penyimpanan	15.192	10	1.519	383820108458617600000000000000000.000	.090
Error	7.124E-30	18	3.958E-31		
Total	144.660	36			
Corrected Total	24.538	35			

a. R Squared = 1.000 (Adjusted R Squared = 1.000)

4. Hasil Uji Lanjut Duncan

Perlakuan Tunggal Suhu

TPC

Duncan[a,b]

Suhu Likuifikasi	N	Subset 1	Subset 2	Subset 3
25 Derajat	12	1.4000		
20 Derajat	12		1.8033	
35 Derajat	12			2.2767
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 3.958E-31.
a. Uses Harmonic Mean Sample Size = 12.000.
b. Alpha = .05.

Perlakuan Tunggal Lama Penyimpanan

TPC

Duncan[a,b]

Lama Penyimpanan	N	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	Subset 6
10 Menit	6	1.2600					
20 Menit	6		1.4067				
15 Menit	6			1.9367			
25 Menit	6				2.0067		
0 Menit	6					2.1367	
5 Menit	6						2.2133
Sig.		1.000	1.000	1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 3.958E-31.
a. Uses Harmonic Mean Sample Size = 6.000.
b. Alpha = .05.

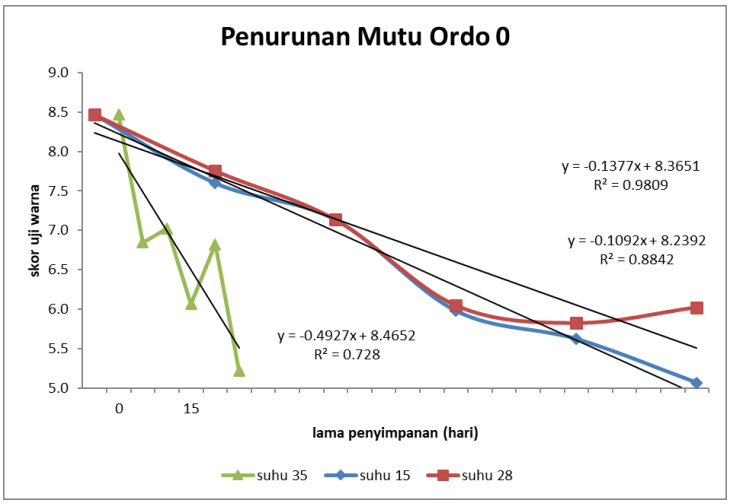
Lampiran 9. Perhitungan Pendugaan Umur Simpan (Orde 0 dan Orde 1)

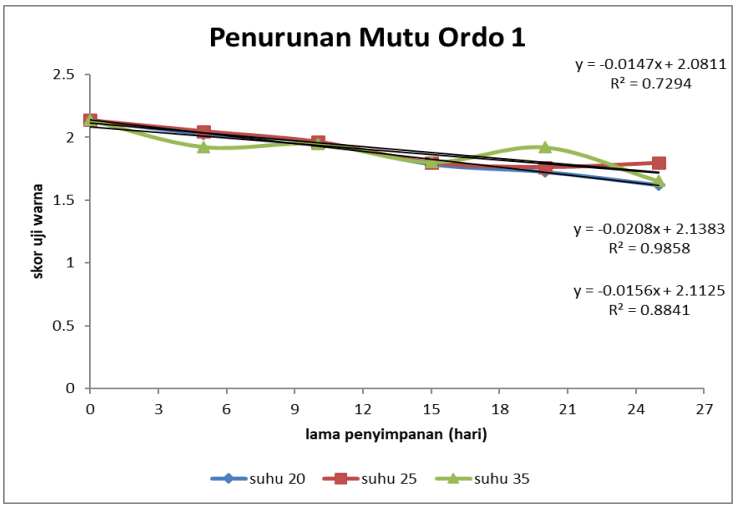
1. Uji Warna

UMUR SIMPAN BERDASARKAN PARAMETER WARNA

ATRIBUT WARNA	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	8.5	2.136136885
SKOR BATAS MUTU	3	1.098612289
UNIT MUTU	5.4666667	1.037524597

HASIL PENGAMATAN PARAMETER WARNA			
SUHU	HARI	SKOR	LN SKOR
20	0	8.5	2.136136885
	5	7.6	2.028148247
	10	7.1	1.964778633
	15	6.0	1.78804889
	20	5.6	1.726726999
	25	5.1	1.622683139
25	0	8.5	2.136136885
	5	7.8	2.048409432
	10	7.1	1.964778633
	15	6.0	1.799139577
	20	5.8	1.761682014
	25	6.0	1.795456331
35	0	8.5	2.136136885
	5	6.8	1.923437293
	10	7.0	1.949079724
	15	6.1	1.802809305
	20	6.8	1.920185258
	25	5.2	1.652923024





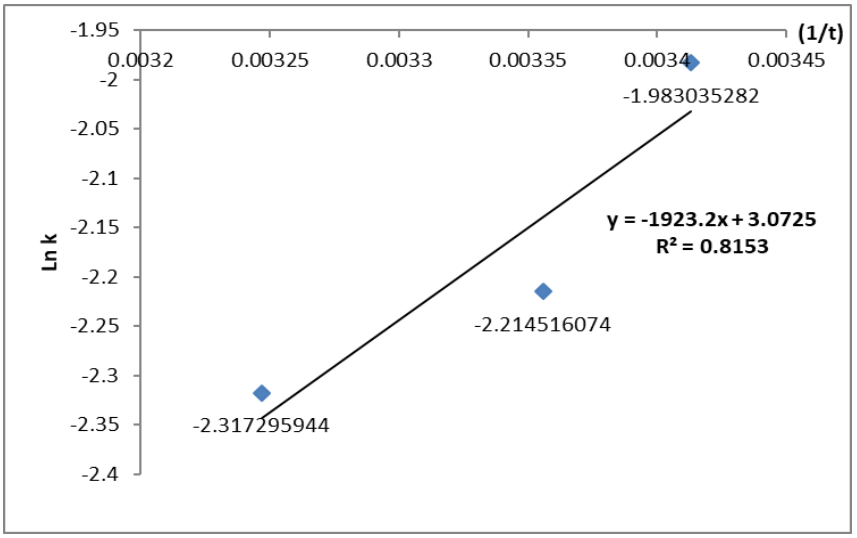
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Warna	20	293	-0.1377	8.3651	0.9809
	25	298	-0.1092	8.2392	0.8842
	35	308	-0.0985	7.9725	0.7280

Suhu Dalam K	**1/T (X)**	**Slope (k)**	**Ln K (Y)**
293	0.003413	-0.1377	-1.983035282
298	0.0033557	-0.1092	-2.214516074
308	0.0032468	-0.0985	-2.317295944

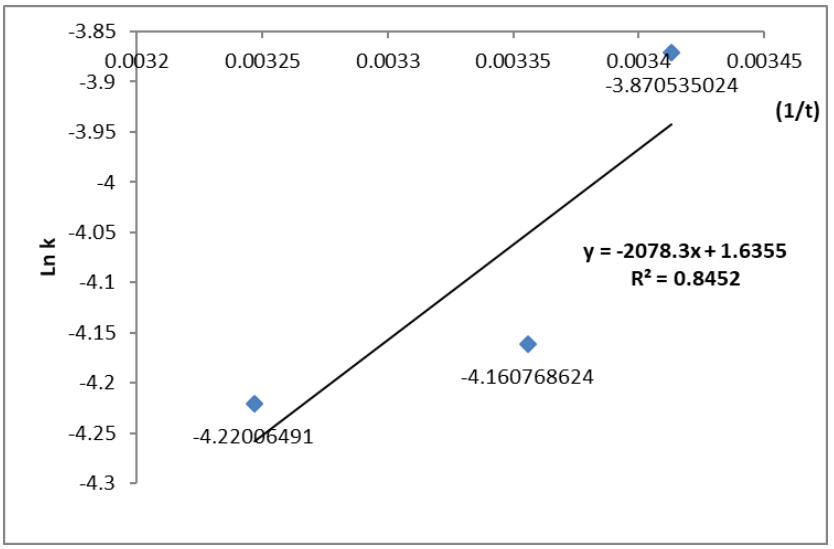
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Warna	15	293	-0.0208	2.1383	0.9858
	28	298	-0.0156	2.1125	0.8841
	35	308	-0.0147	2.0811	0.7294

Suhu Dalam K	**1/T (X)**	**Slope (k)**	**Ln K (Y)**
293	0.003413	-0.0208	-3.870535024
298	0.0033557	-0.0156	-4.160768624
308	0.0032468	-0.0147	-4.22006491

Grafik Orde 0



Grafik Orde 1



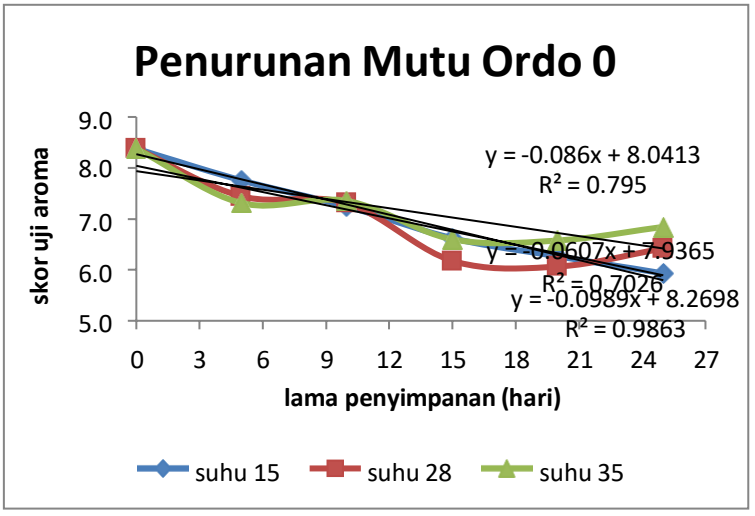
2. Uji Aroma

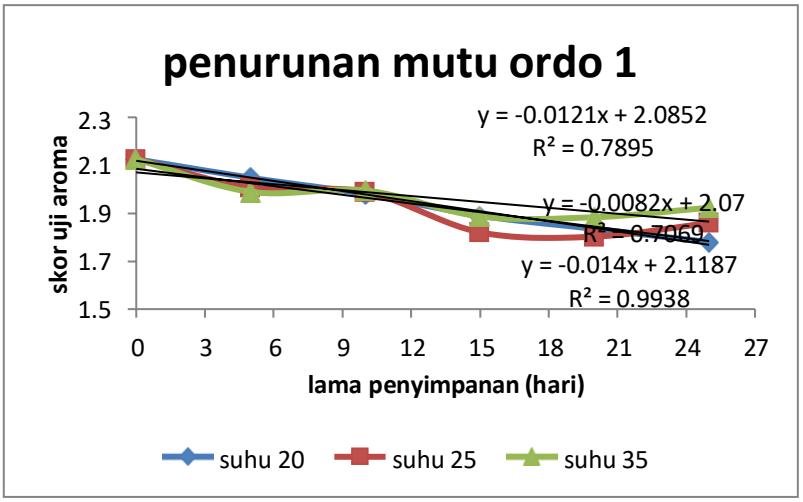
UMUR SIMPAN BERDASARKAN PARAMETER AROMA

ATRIBUT AROMA	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	8.4	2.125583
SKOR BATAS MUTU	3	1.098612
UNIT MUTU	5.377778	1.02697

HASIL PENGAMATAN PARAMETER AROMA

SUHU	HARI	SKOR	LN SKOR
20	0	8.4	2.1255827
	5	7.8	2.04840943
	10	7.2	1.98023489
	15	6.6	1.890431
	20	6.3	1.83524458
	25	5.9	1.78058617
25	0	8.4	2.1255827
	5	7.4	2.00746804
	10	7.3	1.98939526
	15	6.2	1.82095862
	20	6.1	1.80280931
	25	6.4	1.8597642
35	0	8.4	2.1255827
	5	7.3	1.98939526
	10	7.4	1.99545589
	15	6.6	1.88706965
	20	6.6	1.88369696
	25	6.8	1.92343729





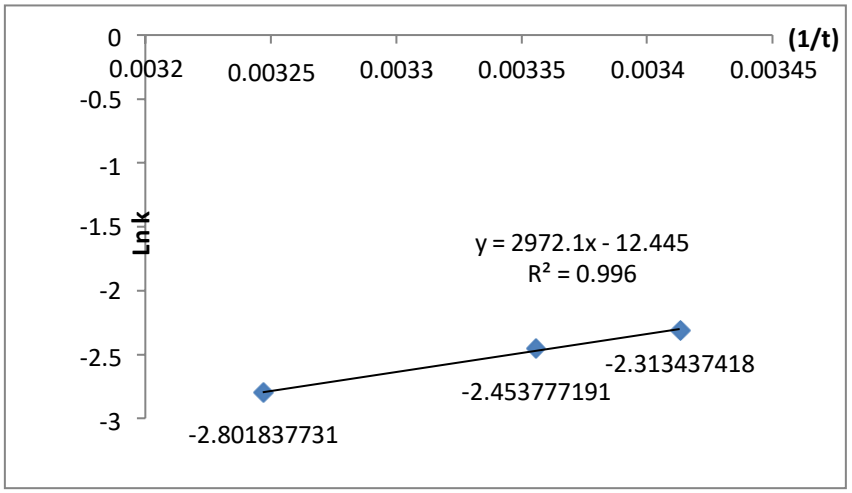
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Aroma	20	293	-0.0989	8.2698	0.9863
	25	298	-0.0860	8.0413	0.7950
	35	308	-0.0607	7.9365	0.7026

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.00341	-0.0989	-2.3134
298	0.00336	-0.0860	-2.4538
308	0.00325	-0.0607	-2.8018

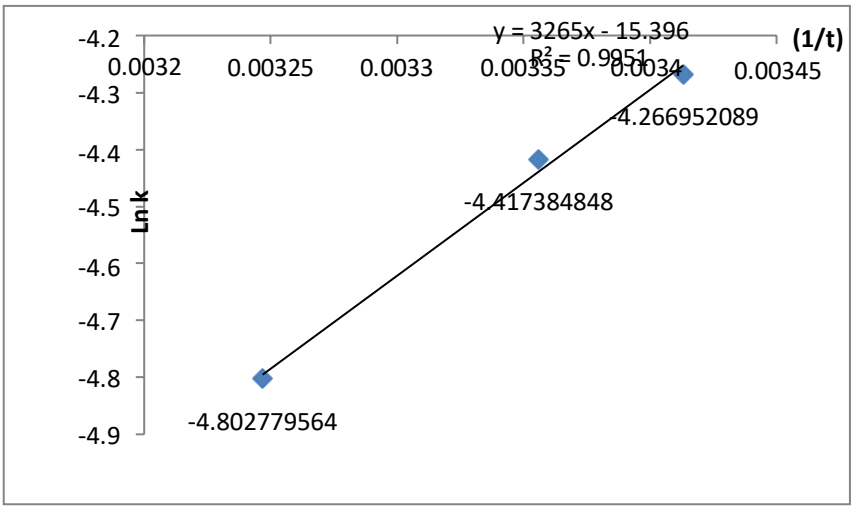
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Aroma	20	293	-0.0140	2.1187	0.9938
	25	298	-0.0121	2.0852	0.7895
	35	308	-0.0082	2.0700	0.7069

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.00341	-0.0140	-4.267
298	0.00336	-0.0121	-4.4174
308	0.00325	-0.0082	-4.8028

Grafik Orde 0



Grafik Orde 1

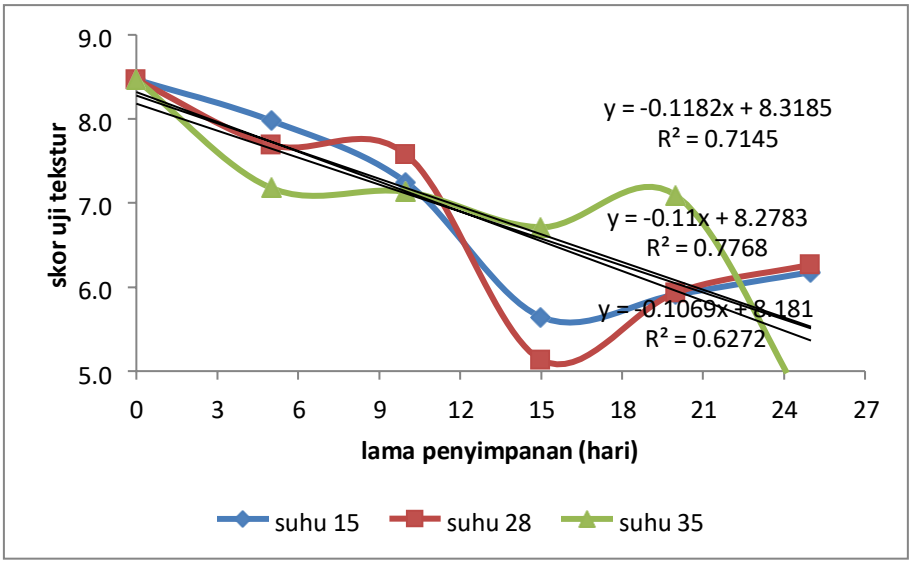


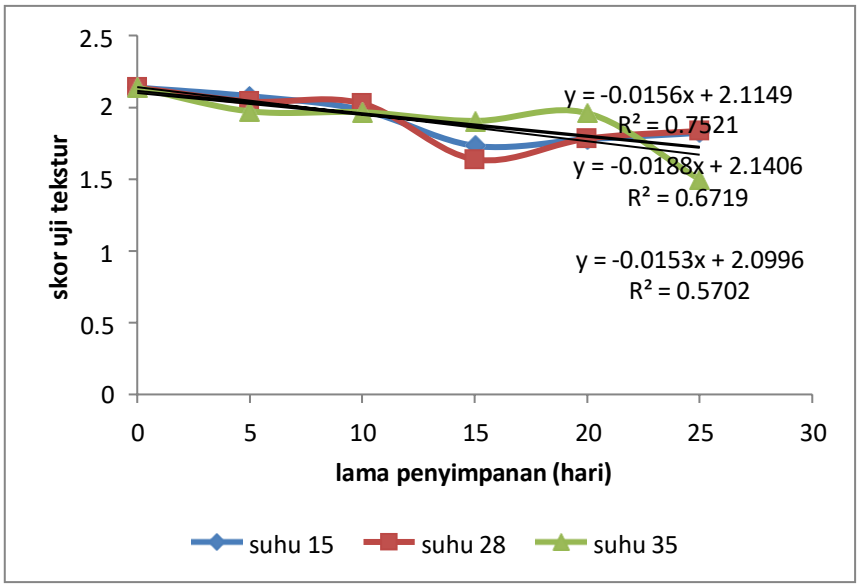
3. Uji Tesktur

UMUR SIMPAN BERDASARKAN PARAMETER TEKSTUR

ATRIBUT TEKSTUR	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	8.5	2.136137
SKOR BATAS MUTU	3	1.098612
UNIT MUTU	5.466667	1.037525

HASIL PENGAMATAN PARAMETER TEKSTUR			
SUHU	HARI	SKOR	LN SKOR
20	0	8.5	2.136136885
	5	8.0	2.076659899
	10	7.2	1.980234892
	15	5.6	1.730671777
	20	5.9	1.776833819
	25	6.2	1.820958624
25	0	8.5	2.136136885
	5	7.7	2.039776285
	10	7.6	2.025219988
	15	5.1	1.635755221
	20	5.9	1.780586169
	25	6.3	1.835244581
35	0	8.5	2.136136885
	5	7.2	1.970989833
	10	7.1	1.964778633
	15	6.7	1.903764528
	20	7.1	1.958528613
	25	4.5	1.496642418





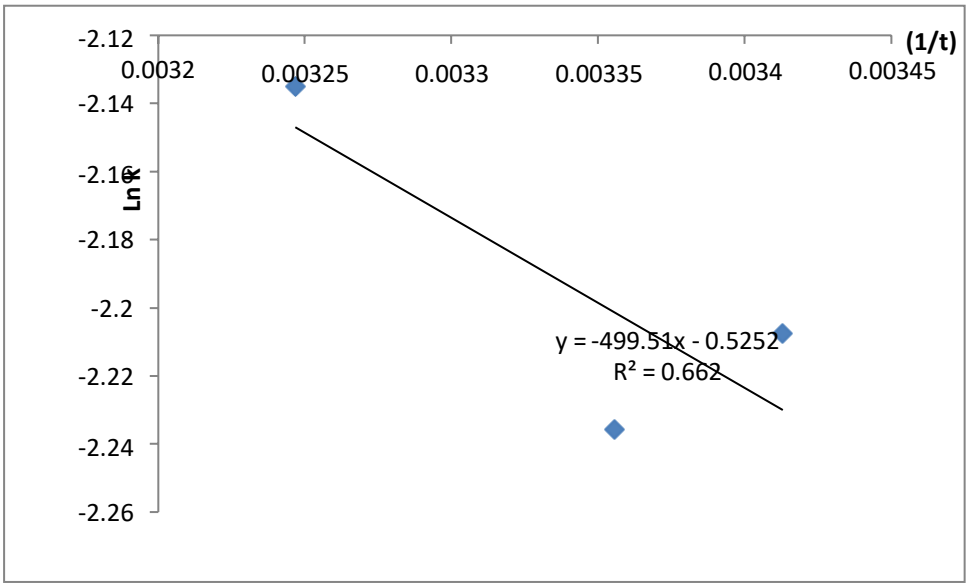
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
W Tekstur	20	293	-0.1100	8.2783	0.7768
	25	298	-0.1069	8.1810	0.6272
	35	308	-0.1182	8.3185	0.7145

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.1100	-2.20756
298	0.003356	-0.1069	-2.23567
308	0.003247	-0.1182	-2.13519

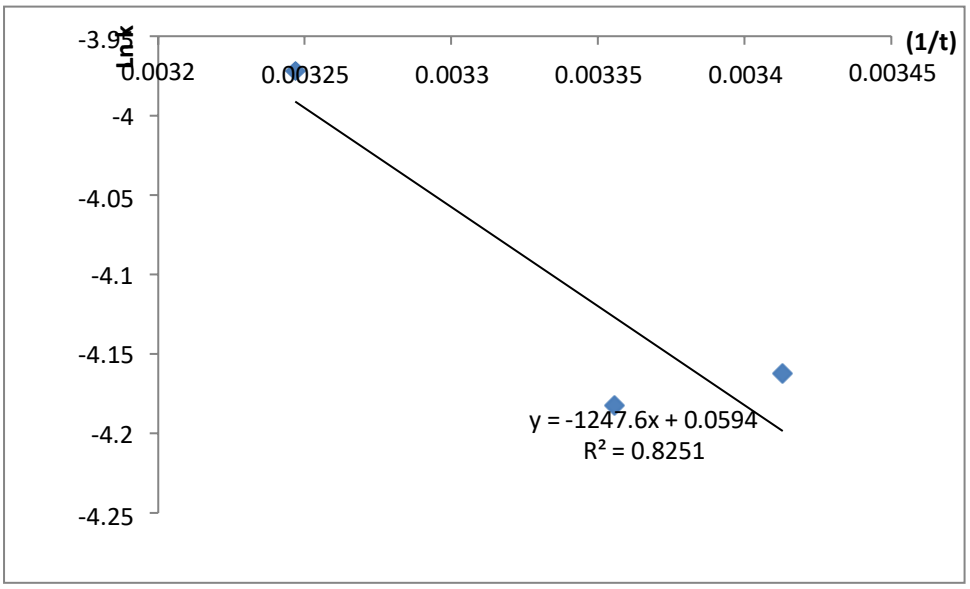
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Wa Tesktur	20	293	-0.0156	2.1149	0.7521
	25	298	-0.0153	2.0996	0.5702
	35	308	-0.0188	2.1406	0.6719

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.0156	-4.16234
298	0.003356	-0.0153	-4.18215
308	0.003247	-0.0188	-3.97212

Grafik Orde 0



Grafik Orde 1

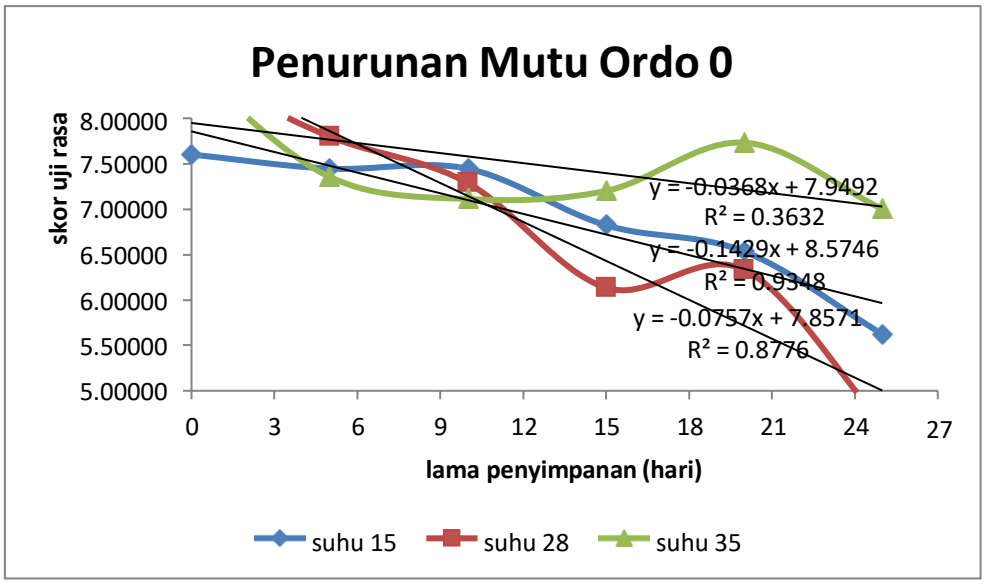


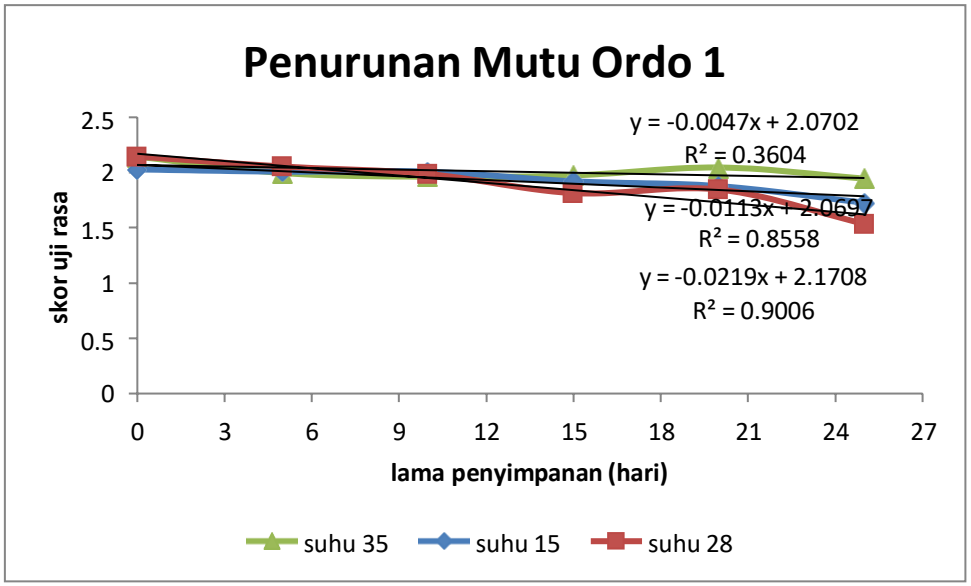
4. Uji Rasa

UMUR SIMPAN BERDASARKAN PARAMETER RASA

ATRIBUT RASA	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	7.6000	2.028148
SKOR BATAS MUTU	3.000	1.098612
UNIT MUTU	4.6000	0.929536

HASIL PENGAMATAN PARAMETER RASA			
SUHU	HARI	SKOR	LN SKOR
20	0	7.60000	2.028148
	5	7.4	2.007468
	10	7.4	2.007468
	15	6.8	1.920185
	20	6.5	1.876917
	25	5.6	1.726727
25	0	8.5	2.14398
	5	7.8	2.054124
	10	7.3	1.986351
	15	6.1	1.813738
	20	6.3	1.845827
	25	4.6	1.535672
35	0	8.5	2.14398
	5	7.4	1.995456
	10	7.1	1.961659
	15	7.2	1.974081
	20	7.7	2.04554
	25	7.0	1.94591





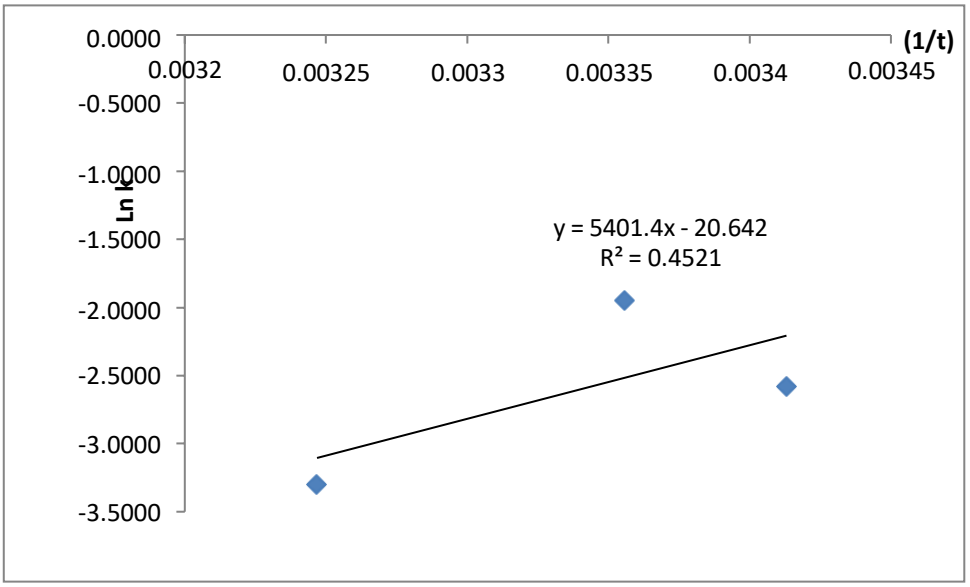
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Rasa	20	293	-0.0757	7.8571	0.8776
	25	298	-0.1429	8.5746	0.9348
	35	308	-0.0368	7.9492	0.3632

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.0757	-2.5812
298	0.003356	-0.1429	-1.9459
308	0.003247	-0.0368	-3.3016

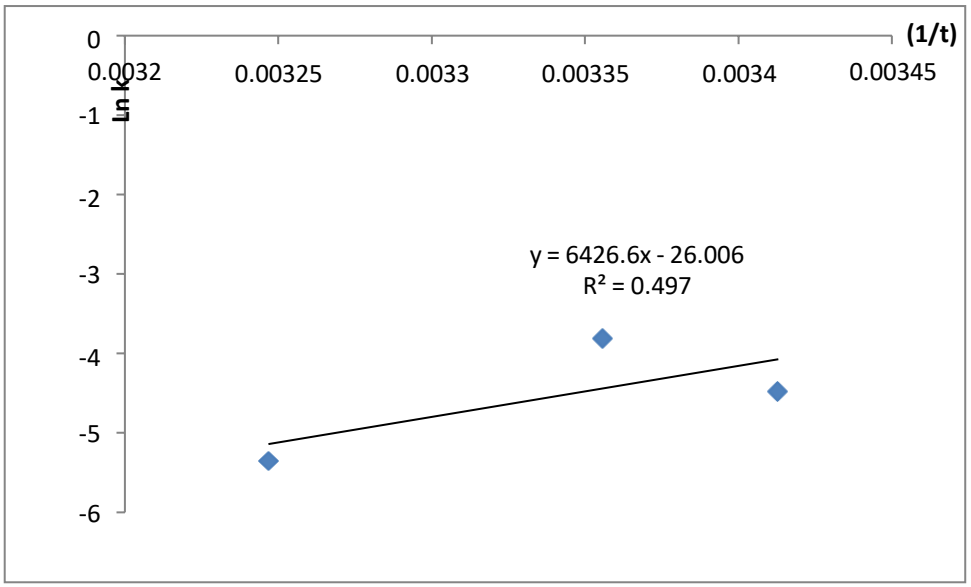
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
Rasa	20	293	-0.0113	2.0697	0.8558
	25	298	-0.0219	2.1708	0.9006
	35	308	-0.0047	2.0702	0.3604

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.0113	-4.47864
298	0.003356	-0.0219	-3.81956
308	0.003247	-0.0047	-5.35392

Grafik Orde 0



Grafik Orde 1

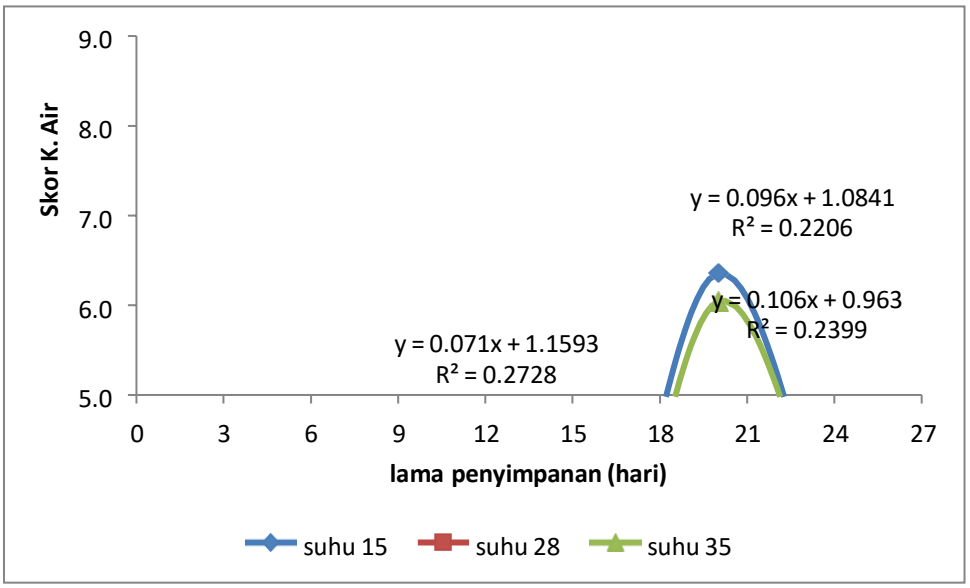


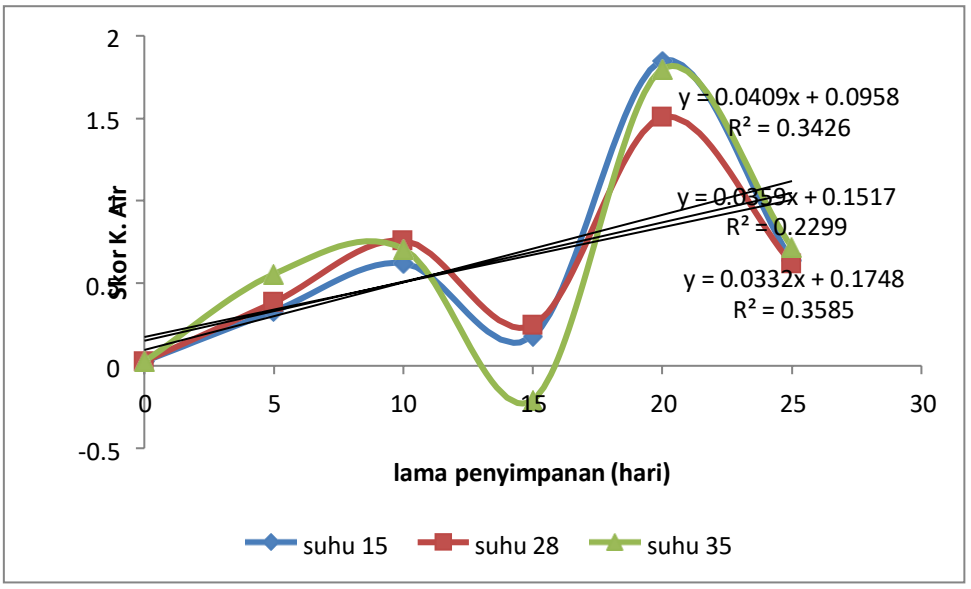
5. Kadar Air

UMUR SIMPAN BERDASARKAN PARAMETER K. AIR

ATRIBUT K. AIR	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	1.0	0.02625
SKOR BATAS MUTU	3	1.098612
UNIT MUTU	-1.9734	-1.07236

HASIL PENGAMATAN PARAMETER TEKSTUR			
SUHU	HARI	SKOR	LN SKOR
20	0	1.0	0.026250215
	5	1.4	0.331324574
	10	1.9	0.621879387
	15	1.2	0.179643323
	20	6.4	1.849577226
	25	1.9	0.636799311
25	0	1.0	0.026250215
	5	1.5	0.384903323
	10	2.1	0.759043488
	15	1.3	0.245586632
	20	4.5	1.506439603
	25	1.9	0.619215563
35	0	1.0	0.026250215
	5	1.7	0.554933894
	10	2.0	0.708916981
	15	0.8	-0.207658762
	20	6.0	1.79862113
	25	2.1	0.718309739





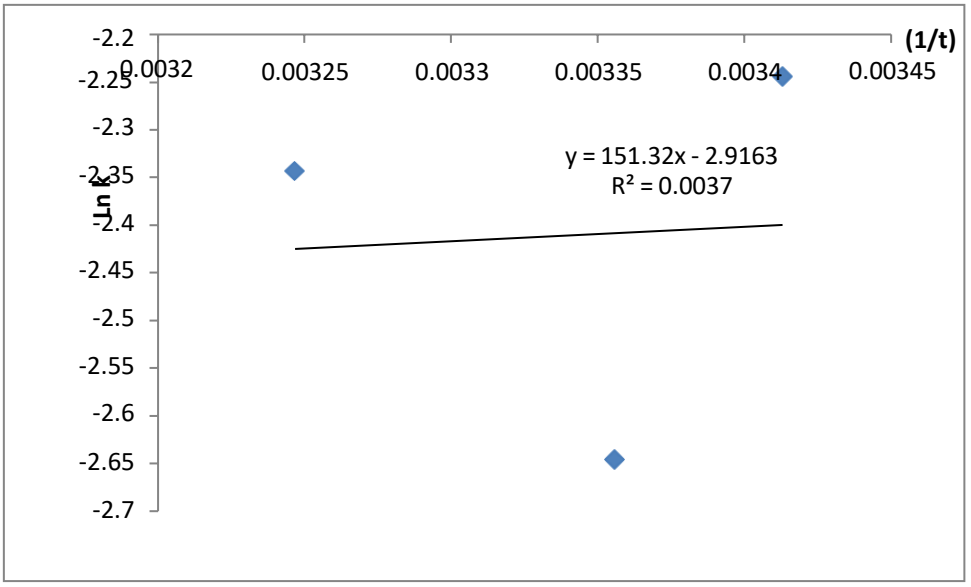
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
K. Air	20	293	0.1060	0.9630	0.2399
	25	298	0.0710	1.1593	0.2728
	35	308	0.0960	1.0841	0.2206

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	0.1060	-2.24451
298	0.003356	0.0710	-2.64548
308	0.003247	0.0960	-2.34335

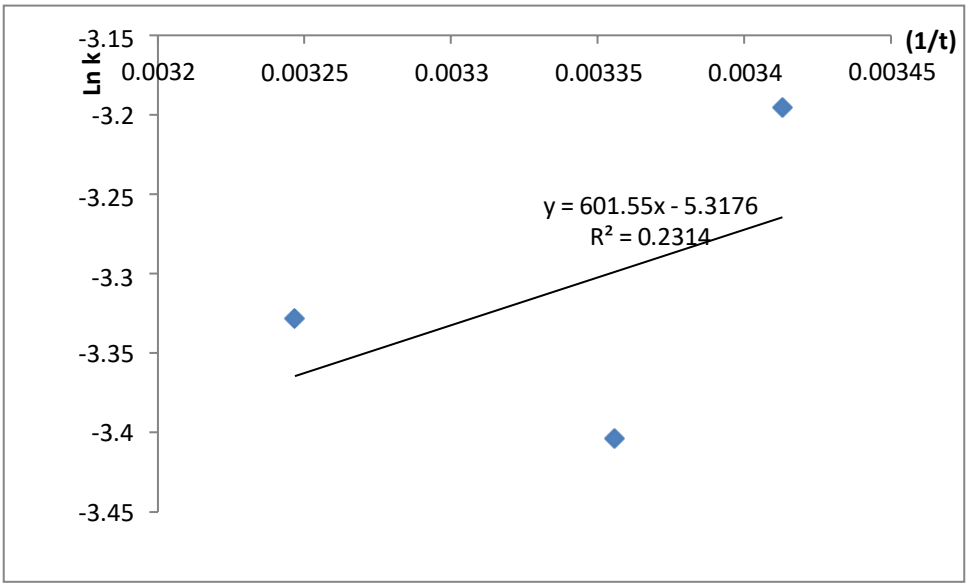
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
K. Air	20	293	0.0409	0.0958	0.3426
	25	298	0.0332	0.1748	0.3585
	35	308	0.0359	0.1517	0.2299

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	0.0409	-3.19554
298	0.003356	0.0332	-3.40418
308	0.003247	0.0359	-3.32825

Grafik Orde 0



Grafik Orde 1

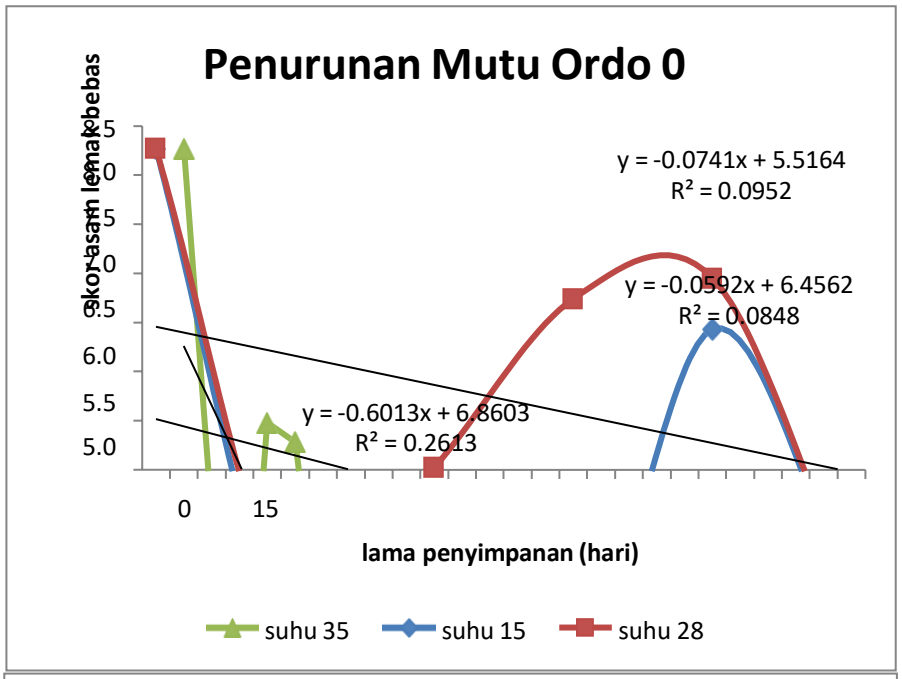


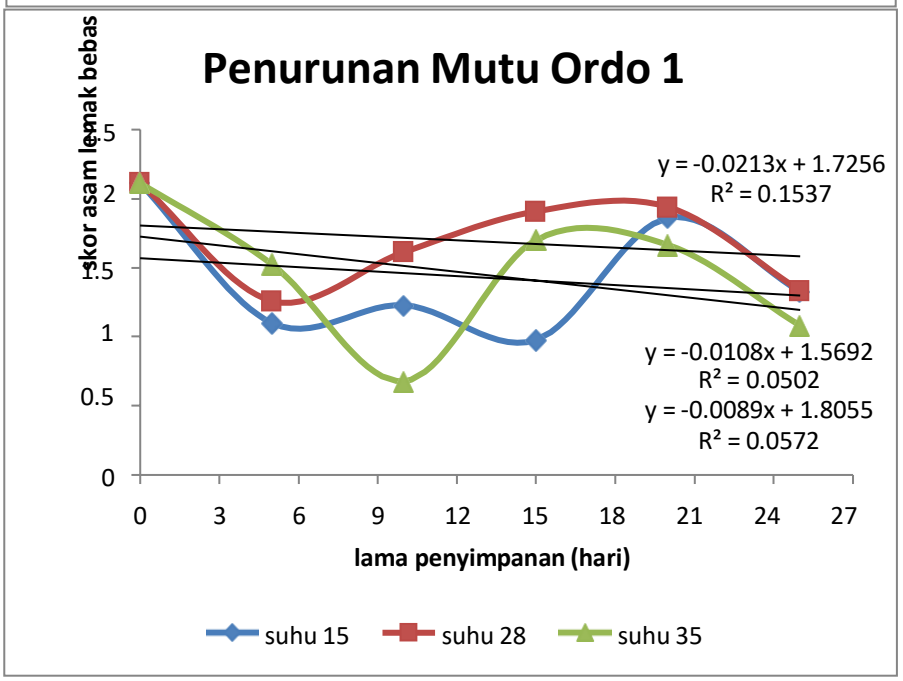
6. Kadar Asam Lemak Bebas

UMUR SIMPAN BERDASARKAN PARAMETER ALB

ATRIBUT ALB	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	8.3	2.112634509
SKOR BATAS MUTU	3	1.098612289
UNIT MUTU	5.3	1.01402222

HASIL PENGAMATAN PARAMETER WARNA			
SUHU	HARI	SKOR	LN SKOR
20	0	8.3	2.112634509
	5	3.0	1.098612289
	10	3.4	1.228177493
	15	2.7	0.976444655
	20	6.4	1.860974538
	25	3.8	1.327075001
25	0	8.3	2.112634509
	5	3.5	1.25846099
	10	5.0	1.613429934
	15	6.7	1.908059925
	20	7.0	1.93874166
	25	3.8	1.333684411
35	0	8.3	2.112634509
	5	4.6	1.523880024
	10	2.0	0.678033543
	15	5.5	1.701105101
	20	5.3	1.663926098
	25	2.9	1.080108817


Penurunan Mutu Ordo 0
skor asam lemak bebas
6.5
6.0
5.5
5.0
0
15
y = -0.0741x + 5.5164
R² = 0.0952
y = -0.0592x + 6.4562
R² = 0.0848
y = -0.6013x + 6.8603
R² = 0.2613
lama penyimpanan (hari)
suhu 35
suhu 15
suhu 28


Penurunan Mutu Ordo 1
skor asam lemak bebas
2.5
2
1.5
1
0.5
0
0
3
6
9
12
15
18
21
24
27
y = -0.0213x + 1.7256
R² = 0.1537
y = -0.0108x + 1.5692
R² = 0.0502
y = -0.0089x + 1.8055
R² = 0.0572
lama penyimpanan (hari)
suhu 15
suhu 28
suhu 35

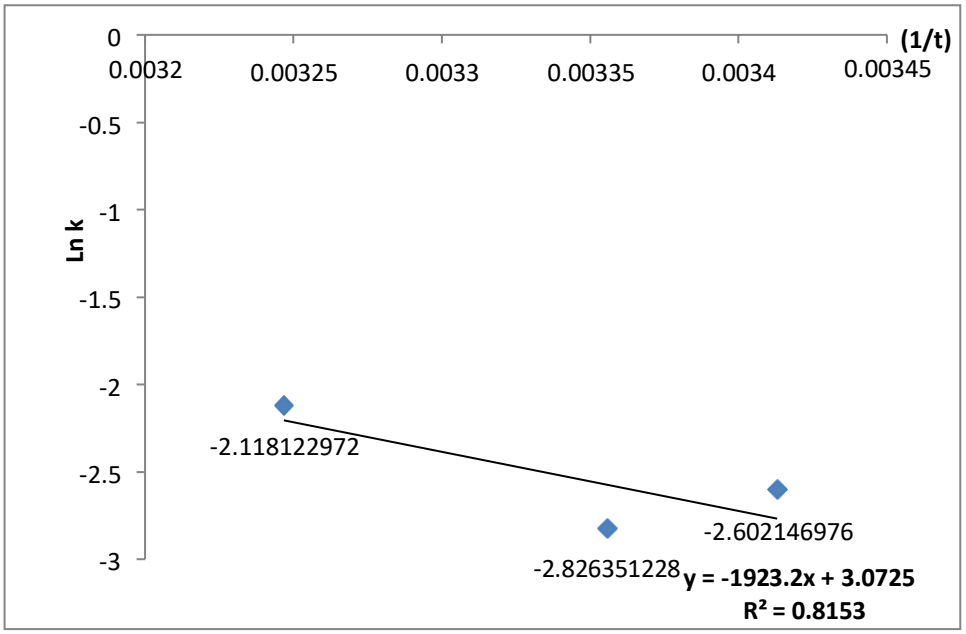
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
ALB	20	293	-0.0741	5.5164	0.0952
	25	298	-0.0592	6.4562	0.0848
	35	308	-0.1203	6.2590	0.2613

Suhu Dalam K	**1/T (X)**	**Slope (k)**	**Ln K (Y)**
293	0.003413	-0.0741	-2.602146976
298	0.0033557	-0.0592	-2.826351228
308	0.0032468	-0.1203	-2.118122972

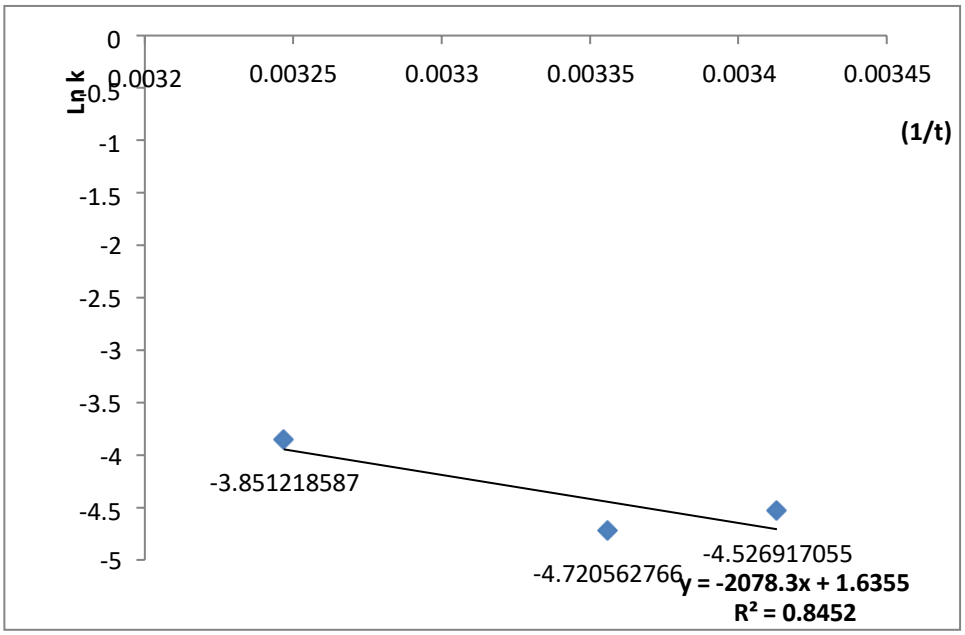
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
ALB	15	293	-0.0108	1.5692	0.0502
	28	298	-0.0089	1.8055	0.0572
	35	308	-0.0213	1.7256	0.1537

Suhu Dalam K	**1/T (X)**	**Slope (k)**	**Ln K (Y)**
293	0.003413	-0.0108	-4.526917055
298	0.0033557	-0.0089	-4.720562766
308	0.0032468	-0.0213	-3.851218587

Grafik Orde 0



Grafik Orde 1

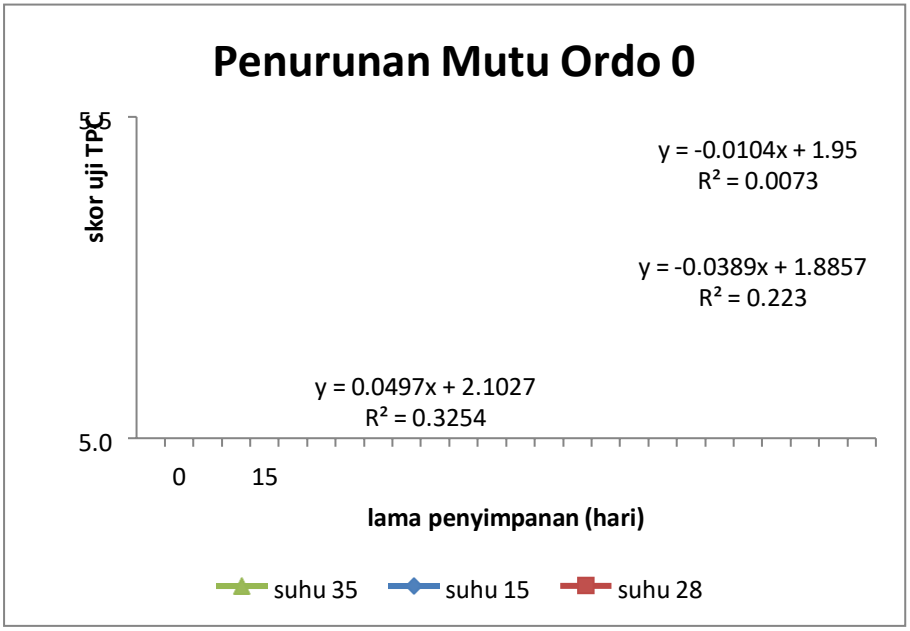


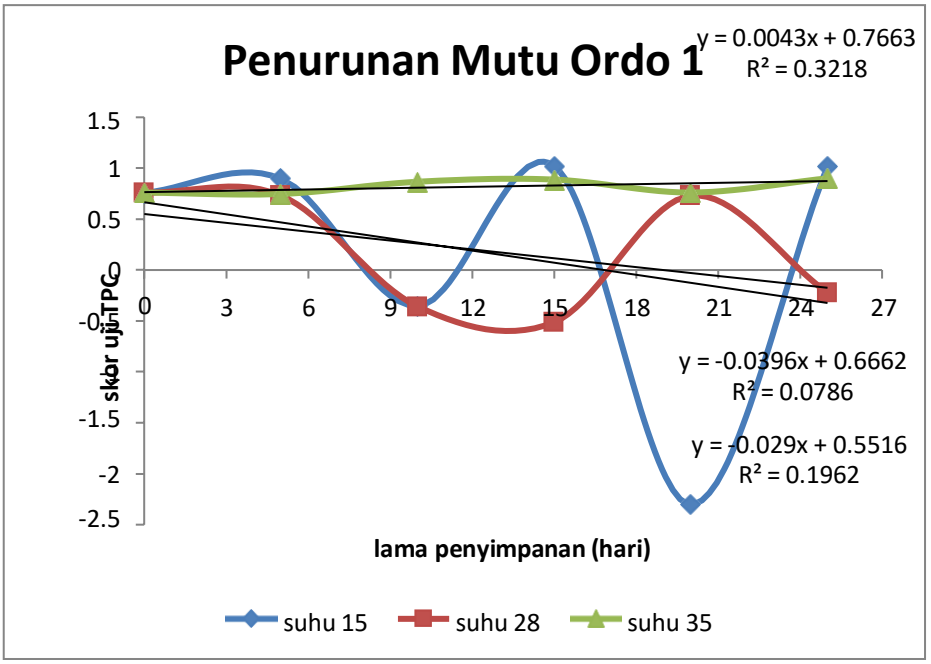
7. Total Plate Count

UMUR SIMPAN BERDASARKAN PARAMETER TPC

ATRIBUT TPC	NILAI	Ln NILAI
SKOR MUTU AWAL (H0)	2.1	0.75612198
SKOR BATAS MUTU	3	1.098612289
UNIT MUTU	-0.87	-0.342490309

HASIL PENGAMATAN PARAMETER WARNA			
SUHU	HARI	SKOR	LN SKOR
20	0	2.1	0.75612198
	5	2.5	0.896088025
	10	0.7	-0.356674944
	15	2.8	1.022450928
	20	0.1	-2.302585093
	25	2.8	1.01523068
25	0	2.1	0.760805829
	5	2.1	0.732367894
	10	0.7	-0.356674944
	15	0.6	-0.510825624
	20	2.1	0.732367894
	25	0.8	-0.223143551
35	0	2.1	0.760805829
	5	2.1	0.746687947
	10	2.4	0.867100488
	15	2.4	0.887891257
	20	2.1	0.760805829
	25	2.5	0.90016135





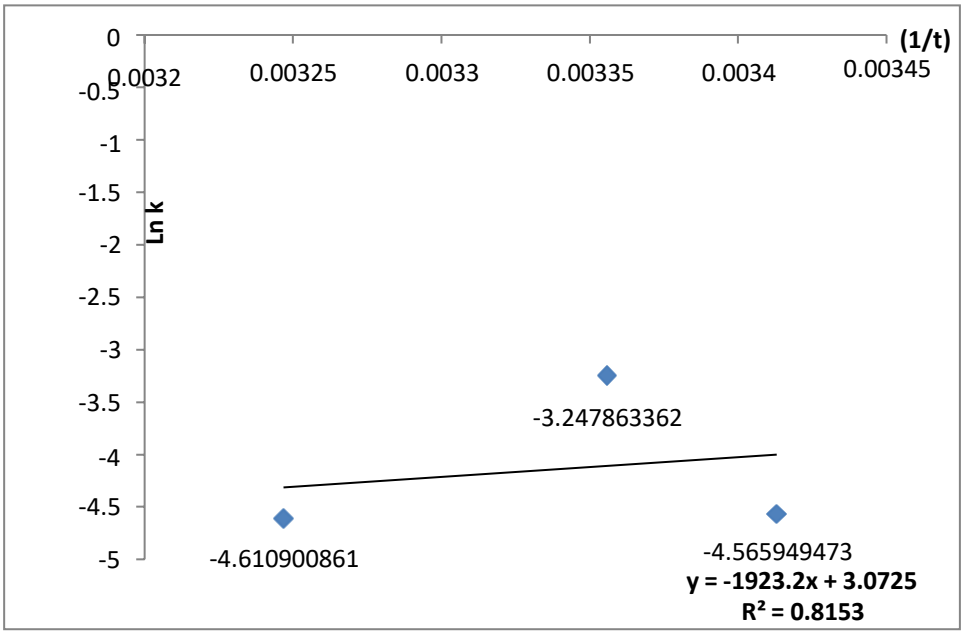
ORDE 0					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
TPC	20	293	-0.0104	1.9500	0.0073
	25	298	-0.0389	1.8857	0.2230
	35	308	0.0099	2.1524	0.3254

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.0104	-4.565949473
298	0.0033557	-0.0389	-3.247863362
308	0.0032468	0.0099	-4.610900861

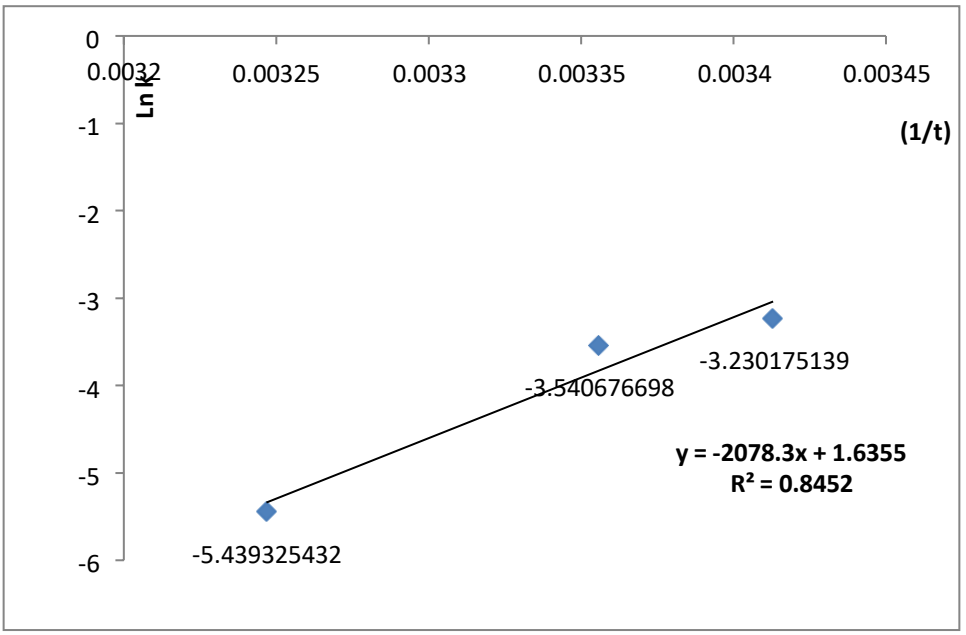
ORDE 1					
Parameter	**Suhu (°C)**	**Suhu (°K)**	**Slope (k)**	**Intercept**	**Korelasi**
TPC	15	293	-0.0396	0.6662	0.0786
	28	298	-0.0290	0.5516	0.1962
	35	308	0.0043	0.7663	0.3218

Suhu Dalam K	1/T (X)	Slope (k)	Ln K (Y)
293	0.003413	-0.0396	-3.230175139
298	0.0033557	-0.0290	-3.540676698
308	0.0032468	0.0043	-5.439325432

Grafik Orde 0



Grafik Orde 1



Lampiran 10. Perhitungan Umur Simpan Paramter Kunci

Penentuan orde terpilih

Paramter	Suhu	Ordo 0 (R^2)	Ordo 1(R^2)	Ordo Terpilih
Warna	20	0.9809	0.9858	1
	25	0.8842	0.8841	
	35	0.728	0.7298	

Ordo reaksi terpilih adalah yang memiliki koefsien determinasi (R^2) terbesar. Perhitungan umur simpan cokelat batang terlebih dahulu dilakukan dengan mencari nilai persamaan regresi linear antara waktu penyimpanan dengan suhu penyimpanan dari parameter yang diuji. Adapun persamaan regresi linear dari parameter warna adalah :

Paramter	Suhu	(R^2)	Persamaan Regresi Linear
Warna	20	0.9858	y = -0.0208x + 2.1383
	25	0.8841	y = -0.0156x + 2.1125
	35	0.7298	y = -0.0147x + 2.0811

Dari masing-masing persamaan tersebut dapat diperoleh nilai k yang dapat digunakan untuk menghitung umur simpan cokelat batang. Nilai k diperoleh dari ln k = ln k_0– (Ea/R) (1/T), dimana ln k_o= intersep, Ea/R = slope. Nilai k yang diperoleh kemudian dimasukkan ke dalam persamaan kinetika reaksi berdasarkan orde reaksinya. Parameter nilai warna dan aroma mengikuti reaksi orde satu, sehingga persamaan umur simpannya yaitu Ln A_t= Ln A_0 + k.t.

Parameter	Suhu Dalam K	1/T (1/K)	Slope (k)	Ln K (Y)
Warna	293	0.003413	-0.0208	-3.8705
	298	0.0033557	-0.0156	-4.1607
	308	0.0032468	-0.0147	-4.2200

Dari tabel di atas, maka didapatkan persamaan linear *Arrhenius* yang dapat digunakan untuk menghitung nilai k yang dapat digunakan untuk menentukan umur simpan produk. Selain itu, nilak k juga dapat digunakan untuk menentukan nilai energi. aktivasi agar dapat memilih parameter kritis untuk menduga umur simpan produk cokelat batang. Persamaan linear dan nilai energi aktivasi kedua parameter di atas dapat dilihat pada Tabel 4 di bawah ini.

Persamaan linear dan nilai energi aktivasi

Parameter	Persamaan Arrhenius	1/T (1/K)	Slope (k)	Ln K (Y)	Ea (kal/mol)
Warna	y = -2078.3x + 1.6355	0.003413	-0.0208	-3.8705	4127.50
		0.0033557	-0.0156	-4.1607	
		0.0032468	-0.0147	-4.2200	

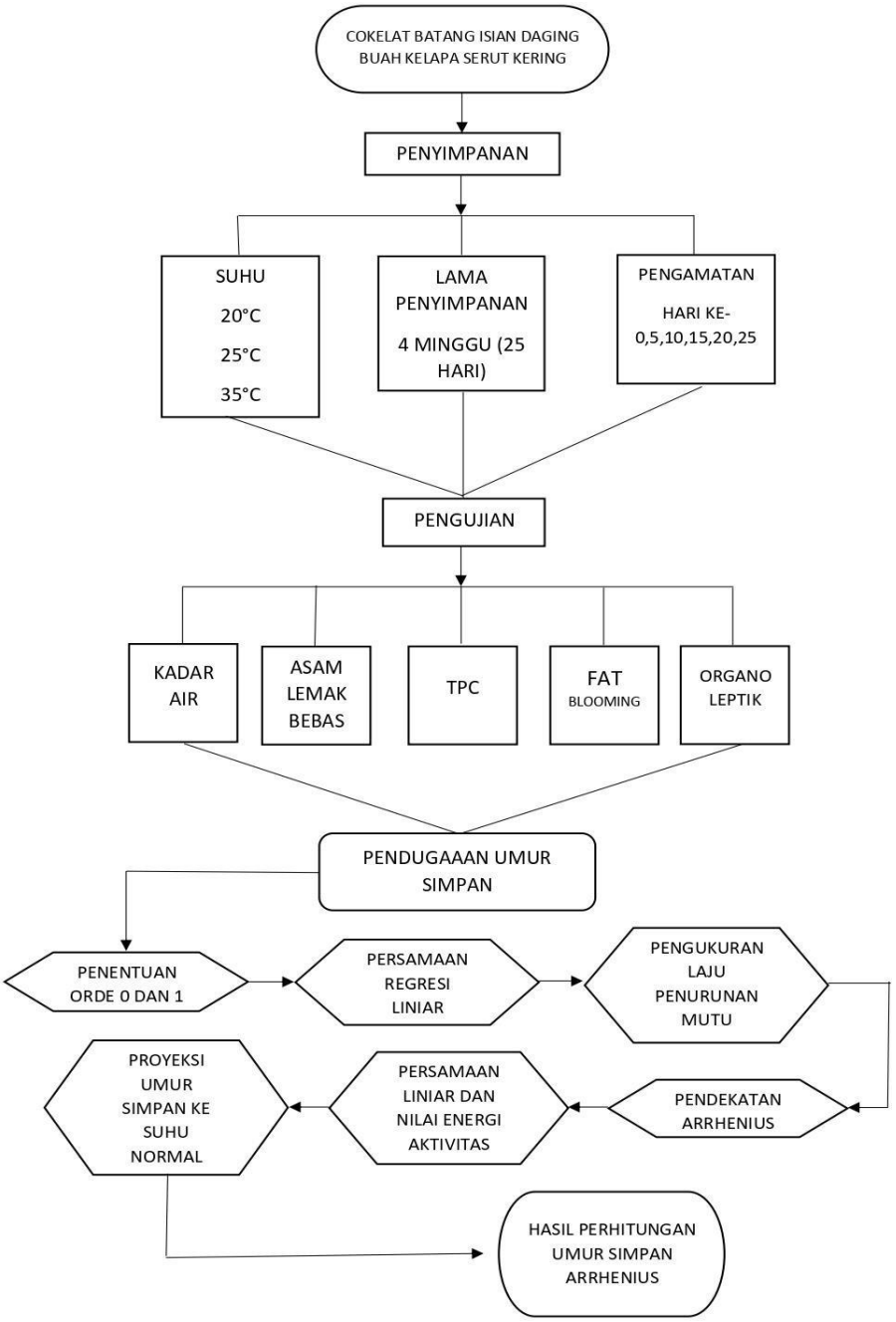
Nilai energi aktivasi (Ea) diperoleh dengan mengalikan nilai Ln ko dengan tetapan R sebesar 1,986. Proyeksi umur simpan dapat dilakukan dari model persamaan *Arrhenius* ke suhu normal penyimpanan. Umur simpan diperoleh dengan rumus sbb.

Hasil perhitungan umur simpan sbb:

$$t = \frac{\ln Ao - \ln At}{ko}$$

Suhu Simpan (^{O}C)	**20**	**25**	**35**
Suhu Simpan (^{O}K)	293	298	308
Ln K	-4.2578	-4.0510	-3.9424
K	0.014152701	0.017403318	0.0194011
Umur Simpan (Hari)	73.3	59.6	53.5
Umur Simpan (Bulan)	2.4	2.0	1.8

Lampiran 11. Diagram Penyimpanan Cokelat Batang Dengan Isian Daging Buah Kelapa Serut Kering Pendekatan Arrhenius



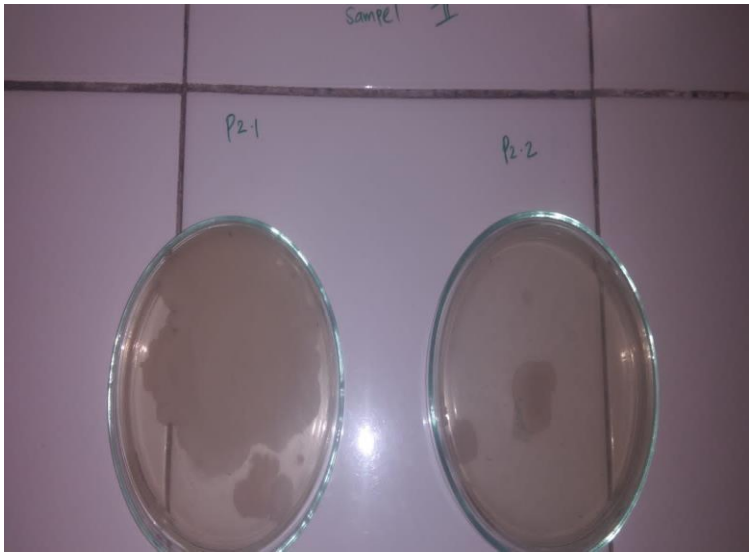
Lampiran 12. Dokumentasi Penelitian

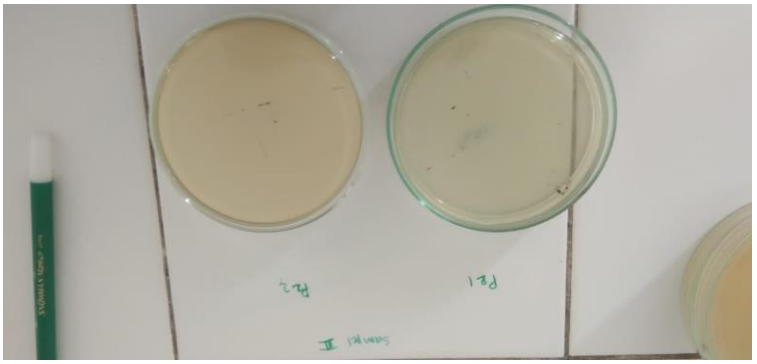
Asam Lemak Bebas

Kadar Air

Suhu penyimpanan

Total Plate Count





Fat Blooming

Sensori

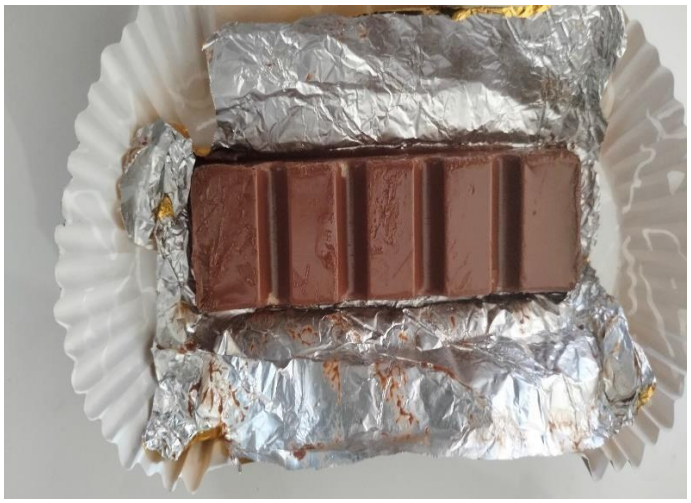
Penyimpanan

H0

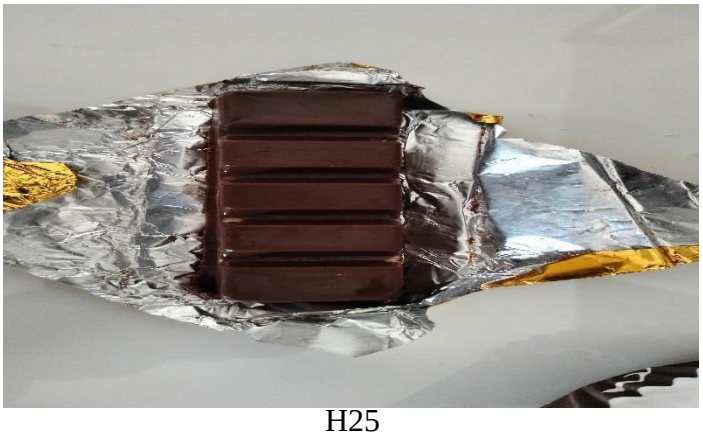
H5

H10

H15



H20



H25

H40