

7. LAMPIRAN

Lampiran 1. Syarat Mutu Bir *Pilsener* menurut *Brewers Association* (2019) dan Syarat Mutu Bir *Pilsener* menurut SNI (01-3773-1995)

Tabel 17. Syarat Mutu Bir *Pilsener* menurut *Brewers Association* (2019)

No.	Kriteria Uji	Satuan	Persyaratan
1.	<i>Original Gravity</i>	°Plato	11,2-14,7
2.	<i>Apparent Extract/Final Gravity</i>	°Plato	3,1-4,6
3.	<i>Alcohol</i>	% v/v	4,9-6,0
4.	<i>Hops Bitterness</i>	IBU (<i>International Bitterness Unit</i>)	25-40
5.	<i>Color Beer</i>	EBC (<i>European Brewery Convention</i>)	6-12
6.	<i>Clarity</i>	-	Penampilan bir jernih
7.	Aroma dan <i>Flavor</i>	-	Medium
8.	Karakteristik Fermentasi	-	<i>Dimethyl Sulfide</i> (DMS), <i>fruity esters</i> dan tidak boleh ada <i>diacetyl</i>

(Sumber: Gatza, *et al.*, 2019)

Tabel 18. Syarat Mutu Bir *Pilsener* menurut SNI (01-3773-1995)

No.	Kriteria Uji	Satuan	Persyaratan
1.	Keadaan:		
	- Bau	-	Normal
	- Rasa	-	Normal
2.	Kadar etil alkohol	% v/v	3-5
3.	Kadar metil alkohol	% v/v	Maks. 0,1
4.	Kepahitan (<i>bitterness</i>)	EBU	Min. 10
5.	CO ₂	% b/b	Min. 0,46
6.	Sari (ekstrak asal)	% b/b	Min. 9
7.	pH	-	3-5
8.	Bahan tambahan makanan pengawet (SO ₂)	mg/L	Maks. 25
9.	Cemaran logam:		
	- Timbal (Pb)	mg/kg	Maks. 0,2
	- Tembaga (Cu)	mg/kg	Maks. 2,0
	- Seng (Zn)	mg/kg	Maks. 2,0
	- Timah (Sn)	mg/kg	Maks. 40,0
	- Raksa (Hg)	mg/kg	Maks. 0,03
10.	Cemaran arsen (As)	mg/kg	Maks. 0,1

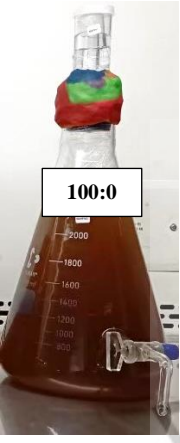
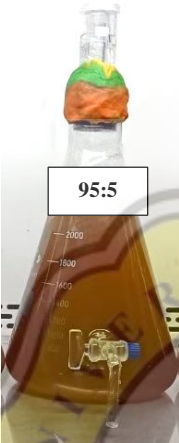

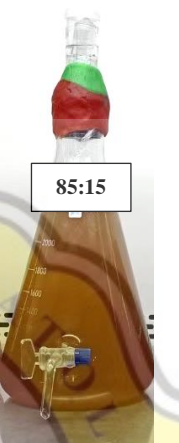
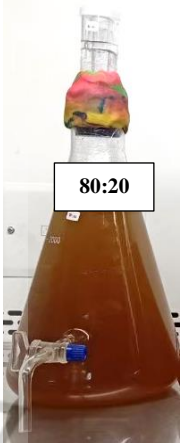
(Sumber: BSN, 1995)

Lampiran 2. Tabel Hubungan antara Kadar Alkohol (% isi) pada 15,56°C dengan Berat Jenis pada Berbagai Suhu

Berat jenis	15/56	20/20	22/22	24/24	25/25	26/26	28/28	30/30	32/32	34/34	35/35	36/36
1 0000	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
0 9999	0 7	0 7	0 7	0 7	0 7	0 7	0 7	0 7	0 7	0 7	0 7	0 7
98	13	13	13	13	13	13	13	13	13	13	13	13
97	20	20	20	20	20	20	20	20	20	20	20	20
96	27	26	26	26	26	26	26	26	26	26	26	26
95	33	33	33	33	33	33	33	33	33	33	33	33
94	40	40	40	40	40	40	40	40	40	40	40	40
93	47	46	46	46	46	46	46	46	46	46	46	46
92	53	53	53	53	53	53	53	53	53	53	53	53
91	60	60	60	60	60	60	60	60	60	60	60	60
90	67	66	66	66	66	66	66	66	66	66	66	66
89	73	73	73	73	73	73	73	73	73	73	73	73
88	80	80	80	80	80	80	79	79	79	79	79	79
87	87	87	87	87	87	87	86	86	86	86	86	86
86	93	93	93	93	93	93	93	93	93	93	93	93
85	1 03	1 00	1 00	1 00	1 00	1 00	99	99	99	99	99	99
84	07	07	07	07	07	07	1 06	1 06	1 06	1 06	1 06	1 06
83	14	14	14	13	13	13	13	13	13	13	13	13
82	20	20	20	20	20	20	20	19	19	19	19	19
81	27	27	27	27	27	27	26	26	26	26	26	26
80	34	34	34	34	34	33	33	32	32	32	32	32
79	41	41	41	40	40	40	40	39	39	39	39	39
78	48	48	48	47	47	47	47	46	46	46	46	46
77	54	54	54	54	54	53	53	53	53	53	52	52
76	61	61	61	60	60	60	60	59	59	59	59	59
75	68	68	68	67	67	67	67	66	66	66	66	66
74	75	75	75	74	74	74	73	73	73	72	72	72
73	82	81	81	81	81	80	80	80	80	79	79	79
72	88	88	88	87	87	87	86	86	86	85	85	85
71	95	95	95	94	94	94	93	93	93	92	92	92
70	2 02	2 02	2 02	2 01	2 01	2 01	2 00	2 00	2 00	99	99	99
69	09	09	09	09	08	08	07	07	06	2 05	2 05	2 05
68	16	15	15	14	14	14	14	14	13	12	12	12
67	23	22	22	21	21	21	20	20	20	19	19	19
66	30	29	29	28	28	28	27	27	27	26	26	26
65	37	36	36	35	35	35	34	34	33	32	32	32
64	43	43	43	42	42	42	41	41	40	39	39	39
63	50	50	50	49	49	49	48	48	47	46	46	46
62	57	57	57	56	56	56	55	54	54	53	53	53
61	64	64	64	63	63	63	62	61	60	60	59	59
60	71	70	70	70	70	70	69	68	67	67	66	66
59	78	77	77	77	77	77	76	75	74	74	73	73
58	85	84	84	83	83	83	82	82	81	81	80	80
57	92	91	91	90	90	90	89	88	87	87	86	86
56	99	98	98	97	97	97	96	95	94	94	93	93
55	3 05	3 05	3 05	3 04	3 04	3 04	3 03	3 02	3 01	3 01	3 00	3 00
54	13	12	12	11	11	11	10	09	08	08	07	07
53	20	19	19	18	18	18	17	16	15	15	14	14
52	27	26	26	25	25	25	24	23	22	22	21	21
51	34	33	33	32	32	32	31	30	29	28	27	27
50	41	40	40	39	39	39	38	37	36	35	34	34
49	49	47	47	46	46	46	45	44	43	42	41	41
48	56	54	54	53	53	53	52	51	50	49	48	48
47	63	61	61	60	60	60	59	58	57	56	55	55
46	70	68	68	67	67	67	66	65	64	63	62	62
45	77	76	75	74	74	74	73	72	70	69	68	68
44	84	83	82	81	81	81	79	78	77	76	75	75
43	91	90	89	88	88	88	86	85	84	83	82	82
42	99	97	96	95	95	95	93	92	91	90	89	89
41	4 05	4 04	4 03	4 02	4 02	4 02	4 00	99	98	97	96	96

Lampiran 3. Fermentor Fermentasi Pendahuluan Bir Rasio *Grits* Jagung dan *Extract Malt Barley*

Tabel 19. Alat Fermentasi Pendahuluan Bir

Bir Rasio <i>Grits</i> Jagung dan <i>Extract Malt Barley</i> Penelitian Pendahuluan				
B1	B2	B3	B4	B5
				

Keterangan:

B1 = minuman fermentasi (bir) dengan formulasi 100% *malt* : 0% jagung

B2 = minuman fermentasi (bir) dengan formulasi 95% *malt* : 5% jagung

B3 = minuman fermentasi (bir) dengan formulasi 90% *malt* : 10% jagung

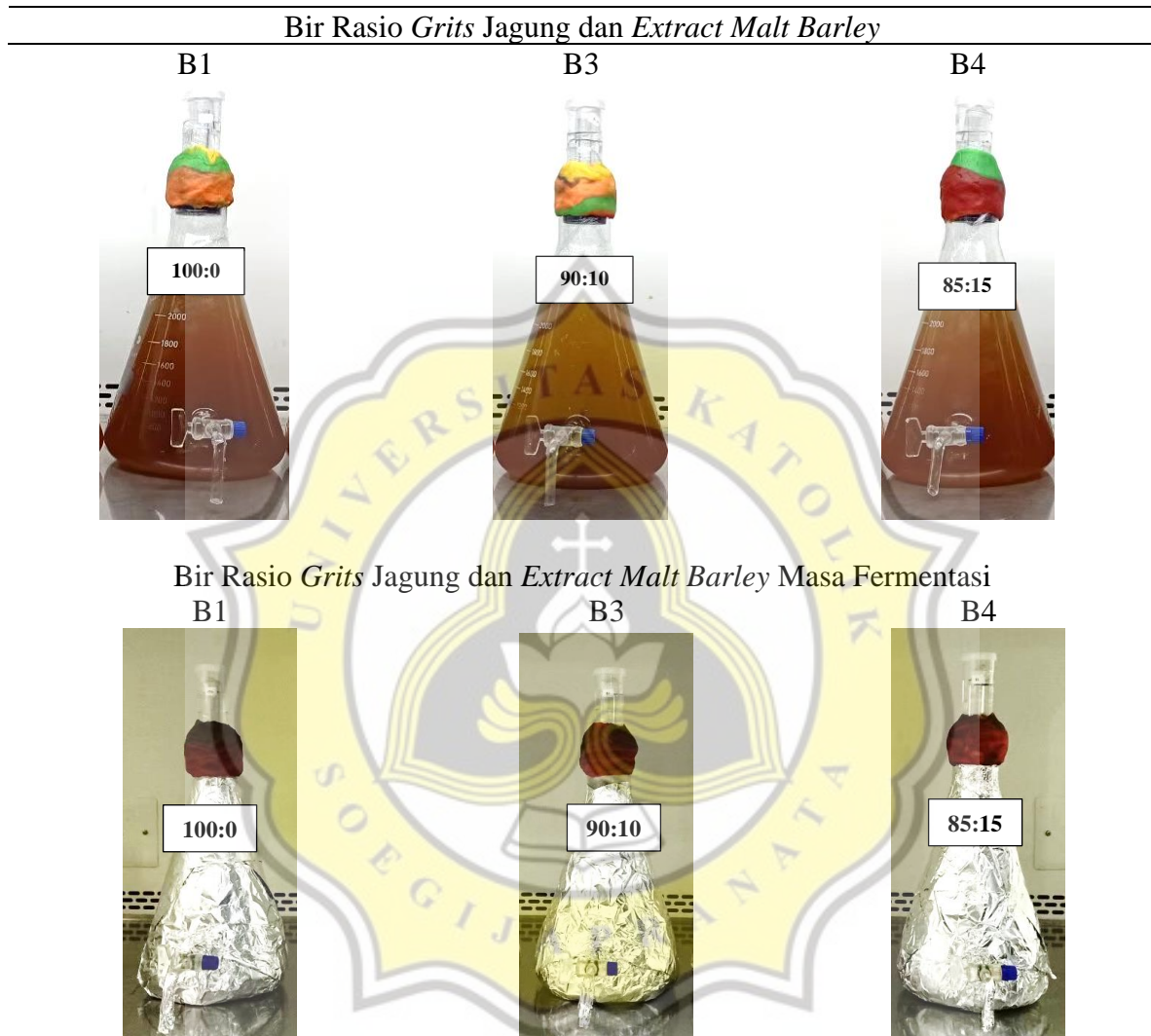
B4 = minuman fermentasi (bir) dengan formulasi 85% *malt* : 15% jagung

B5 = minuman fermentasi (bir) dengan formulasi 80% *malt* : 20% jagung

(Sumber Gambar: Dokumentasi Penulis)

Lampiran 4. Fermentor Fermentasi Bir Rasio *Grits* Jagung dan *Extract Malt Barley*

Tabel 20. Alat Fermentasi Bir



Keterangan:

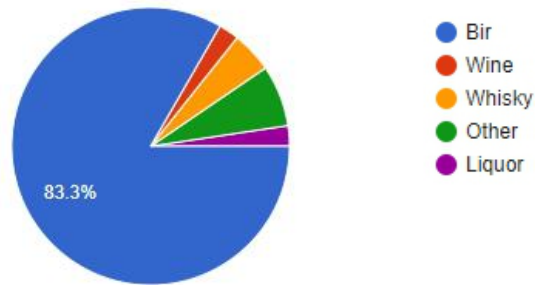
B1 = minuman fermentasi (bir) dengan formulasi 100% *malt* : 0% jagungB3 = minuman fermentasi (bir) dengan formulasi 90% *malt* : 10% jagungB4 = minuman fermentasi (bir) dengan formulasi 85% *malt* : 15% jagung

(Sumber Gambar: Dokumentasi pribadi)

Lampiran 5. Hasil Seleksi Panelis menggunakan *Google Form*Tabel 21. Respon Partisipan Panelis Bir *Grits* Jagung dan Rasio *Extract Malt Barley*

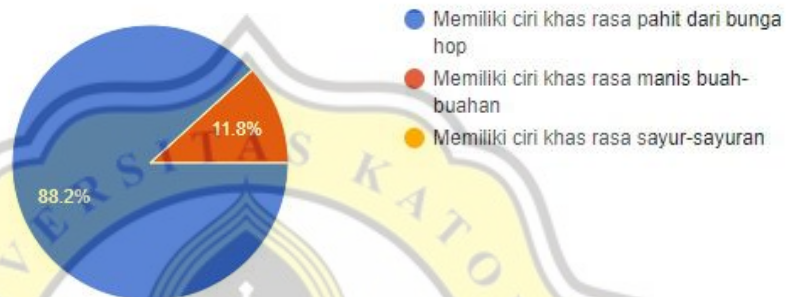
No	Tahapan Pertanyaan	Respon Panelis
1.	Berapakah umur anda?	<p> ● < 21 tahun ● 21-25 tahun ● > 25 tahun </p>
2.	Apakah anda pernah mengonsumsi minuman beralkohol?	<p>Jumlah Responden: 147 orang</p> <p> ● Pernah ● Tidak Pernah </p>
3.	Seberapa sering anda mengonsumsi minuman beralkohol?	<p>Jumlah Responden: 147 orang</p> <p> ● Tiga kali dalam seminggu atau lebih ● Kurang dari tiga kali dalam seminggu </p> <p>Jumlah Responden: 132</p>

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4. Apakah jenis minuman beralkohol yang anda sukai?



Jumlah Responden: 42

5. Apa ciri bir yang anda ketahui?



Jumlah Responden: 34

(Sumber: https://docs.google.com/forms/d/1Sj6Q1icqkTa7P7GEGgaErH3N4k_I0sh_KlYlmVPlXR0)

Lampiran 6. *Scoresheet* Sensori Pendahuluan Bir Rasio *Grits* Jagung dan *Extract Malt Barley***UJI RATING HEDONIK**

Nama : _____ Tanggal : _____

Produk : Bir *adjuncts* jagung Line ID/WA : _____**Instruksi**

Di depan Anda tersedia sampel Bir *adjuncts* jagung. Cicipilah setiap sampel lalu amati dan beri nilai sesuai dengan tingkat kesukaan Anda terhadap parameter **warna, aroma, rasa, bitterness, overall (keseluruhan) dan aftertaste** Bir *adjuncts* jagung tersebut secara **berurutan dari kiri ke kanan**. Berkumurlah menggunakan air mineral terlebih dahulu sebelum Anda menguji tiap sampel. **NILAI BOLEH SAMA** untuk sampel yang berbeda.

Keterangan:

1 = Sangat tidak suka 4 = Agak suka 7 = Amat sangat suka
 2 = Tidak suka 5 = Suka
 3 = Agak tidak suka 6 = Sangat suka

Atribut	Kode Sampel				
Warna					
Aroma					
Rasa					
<i>Bitterness</i>					
<i>Overall</i>					
<i>Aftertaste</i>					

TERIMAKASIH ☺

Lampiran 7. *Scoresheet* Sensori Bir Rasio *Grits* Jagung dan *Extract Malt Barley***UJI RANKING HEDONIK**

Nama : _____ Tanggal : _____
 Produk : Bir *adjuncts* jagung Line ID/ WA : _____

Instruksi :

Didepan Anda tersedia sampel bir *adjuncts* jagung. Cicipilah setiap sampel lalu amati dan beri nilai sesuai dengan tingkat kesukaan Anda terhadap **parameter warna, aroma, rasa, bitterness, overall (keseluruhan) dan aftertaste** bir *adjuncts* jagung tersebut secara **berurutan dari kiri ke kanan**. Berkumurlah menggunakan air mineral terlebih dahulu sebelum Anda menguji tiap sampel. **NILAI TIDAK BOLEH SAMA** untuk sampel yang berbeda.

Keterangan :





1 = Sangat tidak suka 4 = Agak suka 7 = Amat sangat suka
 2 = Tidak suka 5 = Suka
 3 = Agak tidak suka 6 = Sangat suka

Atribut	Kode Sampel		
Warna			
Aroma			
Rasa			
<i>Bitterness</i>			
<i>Overall</i>			

<i>Aftertaste</i>			
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TERIMAKASIH 😊

Lampiran 8. Instrumen Penelitian Bir Rasio *Grits Jagung dan Extract Malt Barley*

No.	Analisis	Instrumen
1.	Analisis Fisik Warna	 Spektrofotometer (<i>Shimadzu UV-Vis</i>)
	Kekeruhan	 Turbidimeter (<i>VELP Scientifica TB 1</i>)
2.	Analisis Kimia Kandungan Gula	 Brix Refractometer (<i>H196801 Refractometer 0 to 85%</i>)
	Derajat Keasaman	 pH Meter (<i>pH 210 Microprocessor</i>)

3. **Analisis** *Total Plate*
Mikrobiologi *Count*



Colony Counter
(Stuart SC6)



Haemocytometer Assistant



Mikroskop Trinokuler

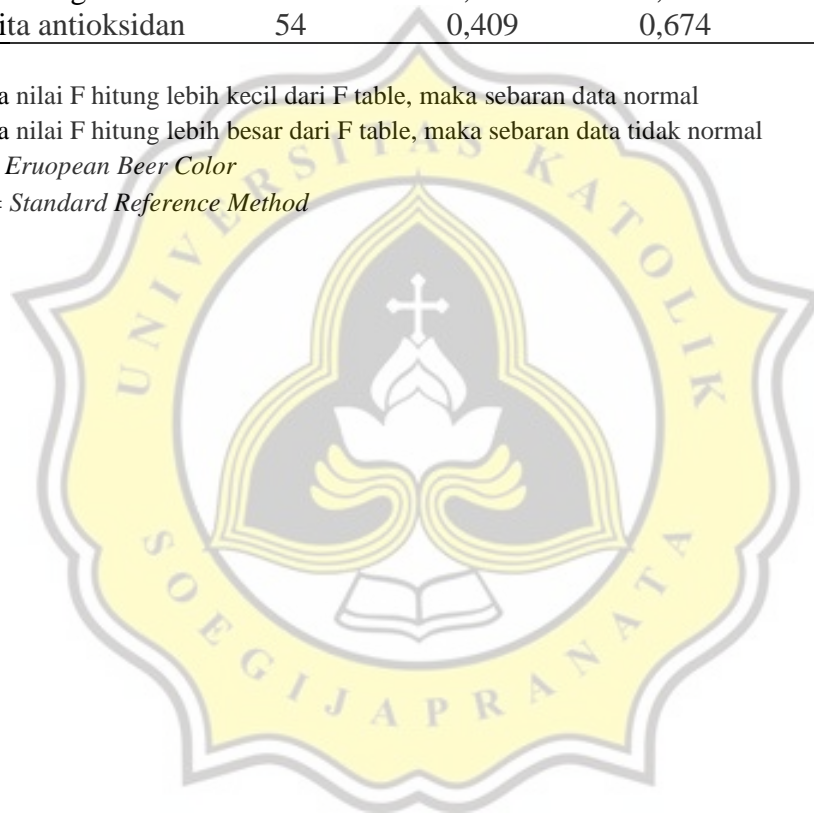
Lampiran 9. Perhitungan Normalitas Analisis Sampel

Tabel 22. Hasil Nilai Normalitas (Nilai F hitung dan Nilai F Tabel)

No.	Parameter Pengujian	Jumlah data	Nilai F Hitung	Nilai F Tabel	Keterangan
1.	EBC	108	0,426	0,476	Normal
2.	SRM	108	0,426	0,476	Normal
3.	Turbiditas	108	0,913	0,476	Tidak Normal
4.	pH	108	0,443	0,476	Normal
5.	Kadar gula	108	0,450	0,476	Normal
6.	Aktivita antioksidan	54	0,409	0,674	Normal

Keterangan :

- Apabila nilai F hitung lebih kecil dari F table, maka sebaran data normal
- Apabila nilai F hitung lebih besar dari F table, maka sebaran data tidak normal
- EBC = *Eruopean Beer Color*
- SRM = *Standard Reference Method*



Lampiran 10. *Output SPSS (Parametric Test)***Uji Normalitas****Tests of Normality**

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pH	.240	108	.000	.843	108	.000
Kadar_Gula	.288	108	.000	.745	108	.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
EBC	.131	108	.000	.912	108	.000
SRM	.130	108	.000	.912	108	.000
Turbiditas	.216	108	.000	.850	108	.000

a. Lilliefors Significance Correction

Uji Homogenitas (Hari Fermentasi)**Test of Homogeneity of Variance**

		Levene Statistic	df1	df2	Sig.
pH	Based on Mean	15.570	3	104	.000
	Based on Median	14.874	3	104	.000
	Based on Median and with adjusted df	14.874	3	59.168	.000
	Based on trimmed mean	15.558	3	104	.000
Kadar_Gula	Based on Mean	3.269	3	104	.024
	Based on Median	2.863	3	104	.040
	Based on Median and with adjusted df	2.863	3	89.550	.041
	Based on trimmed mean	3.264	3	104	.024

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
EBC	Based on Mean	21.607	3	104	.000
	Based on Median	3.520	3	104	.018
	Based on Median and with adjusted df	3.520	3	67.813	.020
	Based on trimmed mean	18.752	3	104	.000
SRM	Based on Mean	21.604	3	104	.000
	Based on Median	3.515	3	104	.018
	Based on Median and with adjusted df	3.515	3	67.814	.020
	Based on trimmed mean	18.754	3	104	.000
Turbiditas	Based on Mean	27.838	3	104	.000
	Based on Median	15.372	3	104	.000
	Based on Median and with adjusted df	15.372	3	72.709	.000
	Based on trimmed mean	27.344	3	104	.000

Uji Homogenitas (Formulasi)

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
pH	Based on Mean	.276	2	105	.759
	Based on Median	.209	2	105	.811
	Based on Median and with adjusted df	.209	2	103.262	.811
	Based on trimmed mean	.276	2	105	.760
Kadar_Gula	Based on Mean	4.628	2	105	.012
	Based on Median	3.288	2	105	.041
	Based on Median and with adjusted df	3.288	2	103.933	.041
	Based on trimmed mean	4.600	2	105	.012

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
EBC	Based on Mean	17.533	2	105	.000
	Based on Median	15.007	2	105	.000
	Based on Median and with adjusted df	15.007	2	56.485	.000
	Based on trimmed mean	17.443	2	105	.000
SRM	Based on Mean	17.628	2	105	.000
	Based on Median	15.085	2	105	.000
	Based on Median and with adjusted df	15.085	2	56.434	.000
	Based on trimmed mean	17.538	2	105	.000
Turbiditas	Based on Mean	.636	2	105	.532
	Based on Median	.509	2	105	.603
	Based on Median and with adjusted df	.509	2	91.993	.603
	Based on trimmed mean	.635	2	105	.532

Uji Statistik Two Way ANOVA

Tests of Between-Subjects Effects

Dependent Variable: pH

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.311 ^a	11	2.028	2536.808	.000
Intercept	2736.623	1	2736.623	3422759.959	.000
Hari	22.180	3	7.393	9247.035	.000
Formulasi	.111	2	.055	69.187	.000
Hari * Formulasi	.020	6	.003	4.234	.001
Error	.077	96	.001		
Total	2759.011	108			
Corrected Total	22.388	107			

a. R Squared = .997 (Adjusted R Squared = .996)

pH

Duncan

Hari	N	Subset			
		1	2	3	4
Finish Product Beer	27	4.5348			
Hari ke - 9 Fermentasi	27		4.6867		
Hari ke - 0 Fermentasi	27			5.2400	
Cold Wort	27				5.6737
Sig.		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) = .001.

a. Uses Harmonic Mean Sample Size = 27.000.

b. Alpha = .05.

pH

Duncan

Formulasi	N	Subset		
		1	2	3
85% Extract Malt : 15% Grits Jagung	36	4.9956		
90% Extract Malt : 10% Grits Jagung	36		5.0319	
100% Extract Malt : 0% Grits Jagung	36			5.0739
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) = .001.

a. Uses Harmonic Mean Sample Size = 36.000.

b. Alpha = .05.

Tests of Between-Subjects Effects

Dependent Variable: Kadar_Gula

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	844.971 ^a	11	76.816	7541.883	.000
Intercept	15386.841	1	15386.841	1510708.009	.000
Hari	834.630	3	278.177	27311.888	.000
Formulasi	10.002	2	5.001	491.018	.000
Hari * Formulasi	.439	6	.073	7.168	.000
Error	.978	96	.010		
Total	16232.750	108			
Corrected Total	845.949	107			

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

Kadar_Gula

Duncan

Hari	N	Subset		
		1	2	3
Finish Product Beer	27	9.1444		
Hari ke - 9 Fermentasi	27	9.1778		
Hari ke - 0 Fermentasi	27		14.4815	
Cold Wort	27			14.9407
Sig.		.228	1.000	1.000

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = .010.

a. Uses Harmonic Mean Sample Size = 27.000.

b. Alpha = .05.

Kadar_Gula

Duncan

Formulasi	N	Subset		
		1	2	3
85% Extract Malt : 15% Grits Jagung	36	11.5528		
90% Extract Malt : 10% Grits Jagung	36		11.9583	
100% Extract Malt : 0% Grits Jagung	36			12.2972
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) = .010.

a. Uses Harmonic Mean Sample Size = 36.000.

b. Alpha = .05.

Tests of Between-Subjects Effects

Dependent Variable: EBC

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4098.507 ^a	11	372.592	1102.646	.000
Intercept	39421.639	1	39421.639	116664.267	.000
Formulasi	1029.531	2	514.766	1523.396	.000
Hari	2872.251	3	957.417	2833.376	.000
Formulasi * Hari	196.725	6	32.788	97.031	.000
Error	32.439	96	.338		
Total	43552.585	108			
Corrected Total	4130.946	107			

a. R Squared = .992 (Adjusted R Squared = .991)

EBC

Duncan

Formulasi	N	Subset		
		1	2	3
85% Extract Malt : 15% Grits Jagung	36	16.0894		
90% Extract Malt : 10% Grits Jagung	36		17.8789	
100% Extract Malt : 0% Grits Jagung	36			23.3478
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) = .338.

- a. Uses Harmonic Mean Sample Size = 36.000.
- b. Alpha = .05.

EBC

Duncan

Hari	N	Subset			
		1	2	3	4
Finish Product Beer	27	12.0833			
Hari ke - 9 Fermentasi	27		16.2489		
Hari ke - 0 Fermentasi	27			23.8011	
Cold Wort	27				24.2881
Sig.		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) = .338.

- a. Uses Harmonic Mean Sample Size = 27.000.
- b. Alpha = .05.

Tests of Between-Subjects Effects

Dependent Variable: SRM

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1055.854 ^a	11	95.987	1096.608	.000
Intercept	10153.951	1	10153.951	116004.754	.000
Formulasi	265.013	2	132.507	1513.832	.000
Hari	740.166	3	246.722	2818.692	.000
Formulasi * Hari	50.675	6	8.446	96.491	.000
Error	8.403	96	.088		
Total	11218.218	108			
Corrected Total	1064.257	107			

a. R Squared = .992 (Adjusted R Squared = .991)

SRM

Duncan

Formulasi	N	Subset		
		1	2	3
85% Extract Malt : 15% Grits Jagung	36	8.1658		
90% Extract Malt : 10% Grits Jagung	36		9.0744	
100% Extract Malt : 0% Grits Jagung	36			11.8486
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) = .088.

a. Uses Harmonic Mean Sample Size = 36.000.

b. Alpha = .05.

SRM

Duncan

Hari	N	Subset			
		1	2	3	4
Finish Product Beer	27	6.1325			
Hari ke - 9 Fermentasi	27		8.2448		
Hari ke - 0 Fermentasi	27			12.0800	
Cold Wort	27				12.3278
Sig.		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) = .088.

a. Uses Harmonic Mean Sample Size = 27.000.

b. Alpha = .05.

Tests of Between-Subjects Effects

Dependent Variable: Turbiditas

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	205490.358 ^a	11	18680.942	2109.914	.000
Intercept	440810.334	1	440810.334	49787.197	.000
Formulasi	4220.762	2	2110.381	238.356	.000
Hari	200222.270	3	66740.757	7538.016	.000
Formulasi * Hari	1047.327	6	174.554	19.715	.000
Error	849.973	96	8.854		
Total	647150.666	108			
Corrected Total	206340.333	107			

a. R Squared = .996 (Adjusted R Squared = .995)

Turbiditas

Duncan

Formulasi	N	Subset		
		1	2	3
85% Extract Malt : 15% Grits Jagung	36	56.1967		
90% Extract Malt : 10% Grits Jagung	36		63.9558	
100% Extract Malt : 0% Grits Jagung	36			71.5092
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) = 8.854.

a. Uses Harmonic Mean Sample Size = 36.000.

b. Alpha = .05.

Turbiditas

Duncan

Hari	N	Subset			
		1	2	3	4
Finish Product Beer	27	4.7633			
Hari ke -9 Fermentasi	27		41.0537		
Cold Wort	27			100.3867	
Hari ke -0 Fermentasi	27				109.3462
Sig.		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) = 8.854.

a. Uses Harmonic Mean Sample Size = 27.000.

b. Alpha = .05.

**FINISH PRODUCT – FISIK – EBC
(ONE WAY ANOVA)**

ANOVA

EBC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	139.781	3	46.594	109.432	.000
Within Groups	13.625	32	.426		
Total	153.406	35			

EBC

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	8.0978			
85% Extract Malt : 15% Grits Jagung	9		10.6156		
90% Extract Malt : 10% Grits Jagung	9			12.3778	
100% Extract Malt : 0% Grits Jagung	9				13.2567
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.

**FINISH PRODUCT – FISIK – SRM
(ONE WAY ANOVA)**

ANOVA

SRM

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	36.026	3	12.009	108.819	.000
Within Groups	3.531	32	.110		
Total	39.558	35			

SRM

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	4.1089			
85% Extract Malt : 15% Grits Jagung	9		5.3878		
90% Extract Malt : 10% Grits Jagung	9			6.2822	
100% Extract Malt : 0% Grits Jagung	9				6.7278
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.

**FINISH PRODUCT – FISIK – TURBDITAS
(ONE WAY ANOVA)**

ANOVA

Turbiditas

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	136.086	3	45.362	937.363	.000
Within Groups	1.549	32	.048		
Total	137.634	35			

Turbiditas

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	1.0300			
85% Extract Malt : 15% Grits Jagung	9		3.3011		
90% Extract Malt : 10% Grits Jagung	9			4.6400	
100% Extract Malt : 0% Grits Jagung	9				6.3489
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.

**FINISH PRODUCT – KIMIWI – PH
(ONE WAY ANOVA)**

ANOVA

pH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.578	3	.859	17426.103	.000
Within Groups	.002	32	.000		
Total	2.579	35			

pH

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	3.9178			
85% Extract Malt : 15% Grits Jagung	9		4.5133		
90% Extract Malt : 10% Grits Jagung	9			4.5367	
100% Extract Malt : 0% Grits Jagung	9				4.5544
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.

**FINISH PRODUCT – KIMIWI – GULA
(ONE WAY ANOVA)**

ANOVA

Kadar_Gula

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	130.194	3	43.398	10244.787	.000
Within Groups	.136	32	.004		
Total	130.330	35			

Kadar_Gula

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	4.7778			
85% Extract Malt : 15% Grits Jagung	9		8.8333		
90% Extract Malt : 10% Grits Jagung	9			9.2000	
100% Extract Malt : 0% Grits Jagung	9				9.4000
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.

**FINISH PRODUCT – KIMIAWI – ANTIOKSIDAN
(ONE WAY ANOVA)**

ANOVA

Aktivitas_Antioksidan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6179.866	3	2059.955	11658.155	.000
Within Groups	5.654	32	.177		
Total	6185.521	35			

Aktivitas_Antioksidan

Duncan

Formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
Bir Komersial Merk A	9	9.6411			
85% Extract Malt : 15% Grits Jagung	9		31.0422		
90% Extract Malt : 10% Grits Jagung	9			33.0889	
100% Extract Malt : 0% Grits Jagung	9				46.1722
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.



Lampiran 11. Output SPSS (Non-Parametric Test)

Uji Normalitas**Tests of Normality**

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Warna	.172	84	.000	.918	84	.000
Aroma	.163	84	.000	.915	84	.000
Rasa	.167	84	.000	.927	84	.000
Bitterness	.175	84	.000	.930	84	.000
Overall	.150	84	.000	.925	84	.000

a. Lilliefors Significance Correction

Uji Homogenitas**Test of Homogeneity of Variance**

		Levene Statistic	df1	df2	Sig.
Warna	Based on Mean	1.698	2	81	.189
	Based on Median	1.064	2	81	.350
	Based on Median and with adjusted df	1.064	2	68.211	.351
	Based on trimmed mean	1.485	2	81	.233
Aroma	Based on Mean	1.291	2	81	.281
	Based on Median	1.243	2	81	.294
	Based on Median and with adjusted df	1.243	2	80.523	.294
	Based on trimmed mean	1.309	2	81	.276
Rasa	Based on Mean	.527	2	81	.592
	Based on Median	.518	2	81	.598
	Based on Median and with adjusted df	.518	2	76.690	.598
	Based on trimmed mean	.548	2	81	.580
Bitterness	Based on Mean	1.583	2	81	.212
	Based on Median	1.830	2	81	.167
	Based on Median and with adjusted df	1.830	2	79.847	.167
	Based on trimmed mean	1.713	2	81	.187
Overall	Based on Mean	4.421	2	81	.015
	Based on Median	3.497	2	81	.035
	Based on Median and with adjusted df	3.497	2	70.401	.036
	Based on trimmed mean	4.365	2	81	.016

Uji Statistik Kruskal-Wallis

Ranks

	Formulasi	N	Mean Rank
Warna	100% Malt	28	39.34
	90% Malt : 10% Grits Jagung	28	36.66
	85% Malt : 15% Grits Jagung	28	51.50
	Total	84	
Aroma	100% Malt	28	38.07
	90% Malt : 10% Grits Jagung	28	48.39
	85% Malt : 15% Grits Jagung	28	41.04
	Total	84	
Rasa	100% Malt	28	45.70
	90% Malt : 10% Grits Jagung	28	44.00
	85% Malt : 15% Grits Jagung	28	37.80
	Total	84	
Bitterness	100% Malt	28	41.63
	90% Malt : 10% Grits Jagung	28	47.88
	85% Malt : 15% Grits Jagung	28	38.00
	Total	84	
Overall	100% Malt	28	43.07
	90% Malt : 10% Grits Jagung	28	45.48
	85% Malt : 15% Grits Jagung	28	38.95
	Total	84	

Test Statistics^{a,b}

	Warna	Aroma	Rasa	Bitterness	Overall
Chi-Square	6.342	2.819	1.723	2.463	1.080
df	2	2	2	2	2
Asymp. Sig.	.042	.244	.423	.292	.583

a. Kruskal Wallis Test

b. Grouping Variable: Formulasi

Uji Mann-Whitney (Nonparametric Test)

Ranks

	Formulasi	N	Mean Rank	Sum of Ranks
Warna	100% Malt	28	29.63	829.50
	90% Malt : 10% Grits Jagung	28	27.38	766.50
	Total	56		

Test Statistics^a

	Warna
Mann-Whitney U	360.500
Wilcoxon W	766.500
Z	-.541
Asymp. Sig. (2-tailed)	.589

a. Grouping Variable: Formulasi

Ranks

	Formulasi	N	Mean Rank	Sum of Ranks
Warna	100% Malt	28	24.21	678.00
	85% Malt : 15% Grits Jagung	28	32.79	918.00
	Total	56		

Test Statistics^a

	Warna
Mann-Whitney U	272.000
Wilcoxon W	678.000
Z	-2.049
Asymp. Sig. (2-tailed)	.040

a. Grouping Variable: Formulasi

Ranks

	Formulasi	N	Mean Rank	Sum of Ranks
Warna	90% Malt : 10% Grits Jagung	28	23.79	666.00
	85% Malt : 15% Grits Jagung	28	33.21	930.00
	Total	56		

Test Statistics^a

	Warna
Mann-Whitney U	260.000
Wilcoxon W	666.000
Z	-2.231
Asymp. Sig. (2-tailed)	.026

a. Grouping Variable: Formulasi

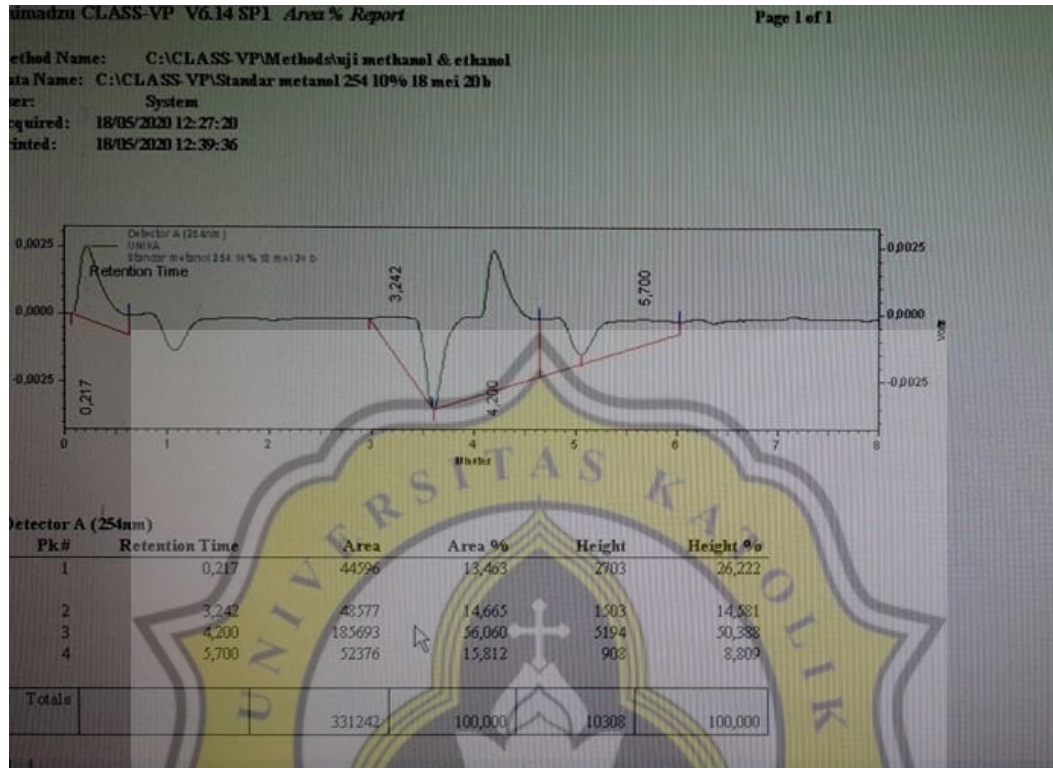
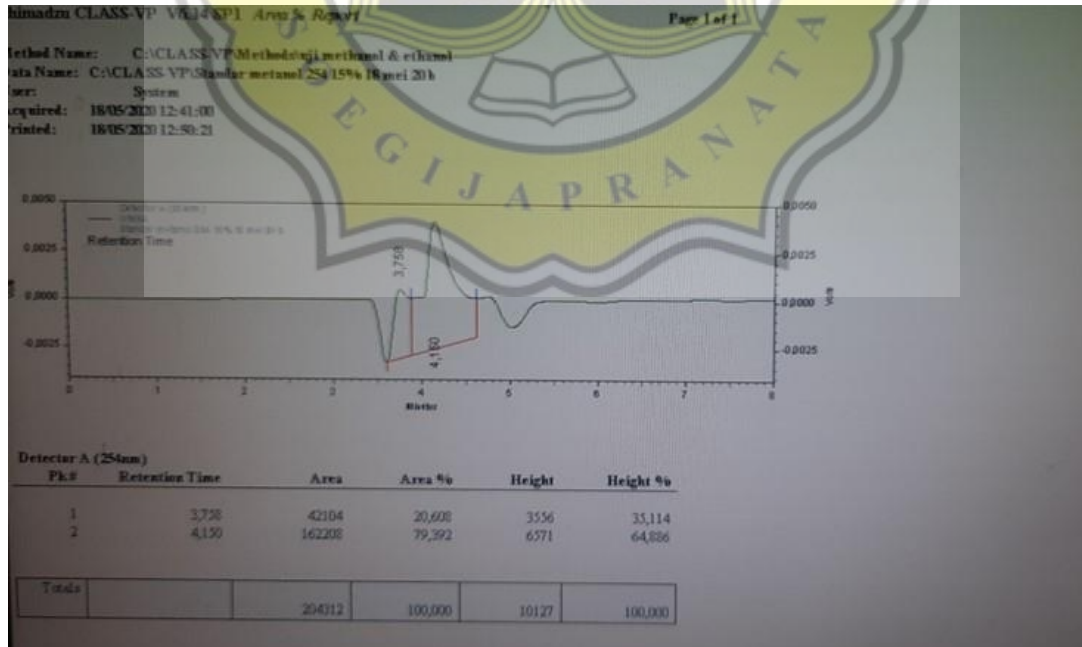
Lampiran 12. Output SPSS (Uji Hubungan/Uji Korelasi)

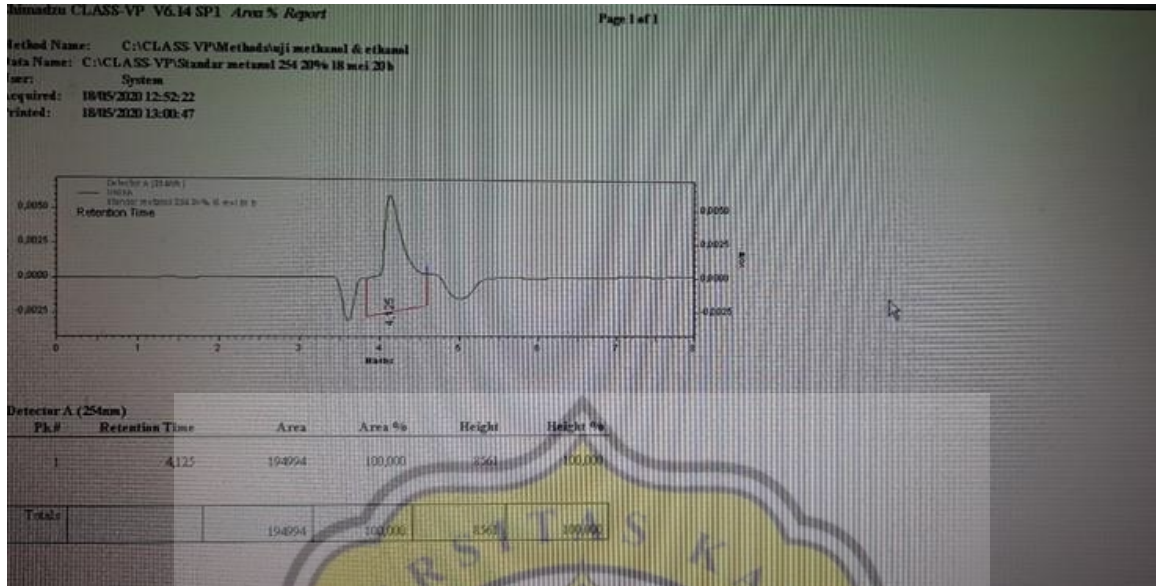
Correlations

		EBC	SRM	Turbiditas	pH	Kadar_gula	Antioksidan
EBC	Pearson Correlation	1	1.000**	.958**	.861**	.885**	.926**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	36	36	36	36	36	36
SRM	Pearson Correlation	1.000**	1	.957**	.861**	.885**	.925**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	36	36	36	36	36	36
Turbiditas	Pearson Correlation	.958**	.957**	1	.856**	.881**	.975**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	36	36	36	36	36	36
pH	Pearson Correlation	.861**	.861**	.856**	1	.998**	.916**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	36	36	36	36	36	36
Kadar_gula	Pearson Correlation	.885**	.885**	.881**	.998**	1	.931**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	36	36	36	36	36	36
Antioksidan	Pearson Correlation	.926**	.925**	.975**	.916**	.931**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	36	36	36	36	36	36

** . Correlation is significant at the 0.01 level (2-tailed).

Lampiran 13. HPLC Larutan Standar Metanol

LARUTAN STANDAR METANOL 10%**LARUTAN STANDAR METANOL 15%**

LARUTAN STANDAR METANOL 20%

Lampiran 14. HPLC Metanol Bir Rasio 0% *Grits Jagung* : 100% *Extract Malt Barley*Shimadzu CLASS-VP V6.14 SP1 *Area % Report*

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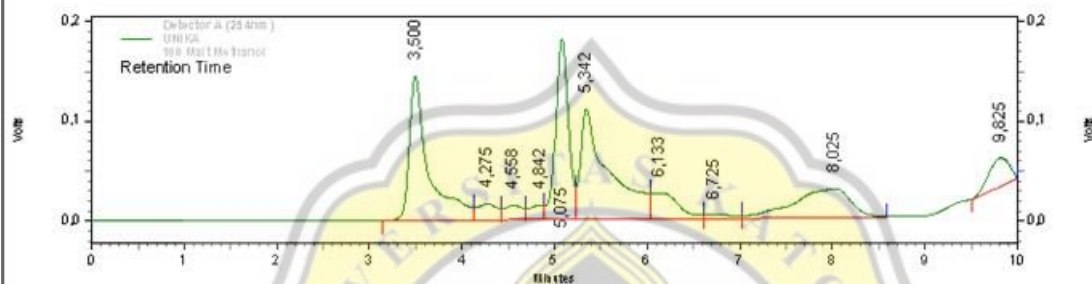
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Data Name: C:\CLASS-VP\100 Malt Methanol

User: System

Acquired: 19/05/2020 9:16:54

Printed: 19/05/2020 13:49:23



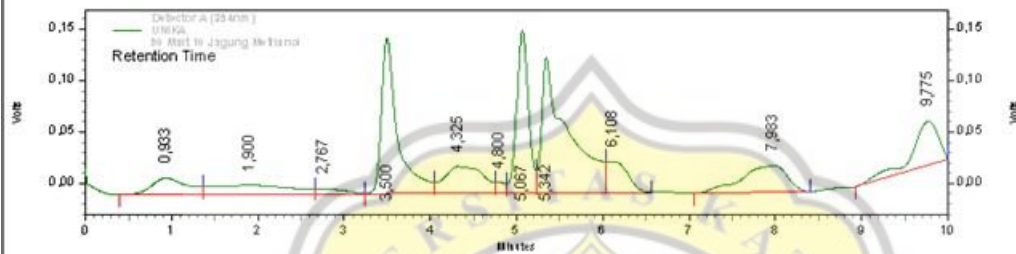
Detector A (254nm)

Pk#	Retention Time	Area	Area %	Height	Height %
1	3,500	2129999	23,389	144389	25,459
2	4,275	245155	2,692	16709	2,936
3	4,558	205159	2,253	14621	2,569
4	4,842	158134	1,736	14589	2,564
5	5,075	1740284	19,110	181300	31,857
6	5,342	2370622	26,031	110706	19,453

Lampiran 15. HPLC Metanol Bir Rasio 10% *Grits Jagung* : 90% *Extract Malt Barley*Shimadzu CLASS-VP V6.14 SP1 *Area % Report*

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Method Name: C:\CLASS-VP\Methods\uji methanol & ethanol
 Data Name: C:\CLASS-VP\90 Malt 10 Jagung Methanol
 User: System
 Acquired: 19/05/2020 9:29:45
 Printed: 19/05/2020 13:46:51



Detector A (254nm)

Pk#	Retention Time	Area	Area %	Height	Height %
1	0,933	466630	4,311	16143	2,643
2	1,900	574114	5,304	8876	1,453
3	2,767	122960	1,136	5036	0,825
4	3,500	2009600	18,566	151818	24,857
5	4,325	847171	7,827	26623	4,359
6	4,800	84135	0,777	11037	1,807
7	5,067	1488121	13,748	159146	26,056

Lampiran 16. HPLC Metanol Bir Rasio 15% *Grits Jagung* : 85% *Extract Malt Barley*Shimadzu CLASS-VP V6.14 SP1 *Area % Report*

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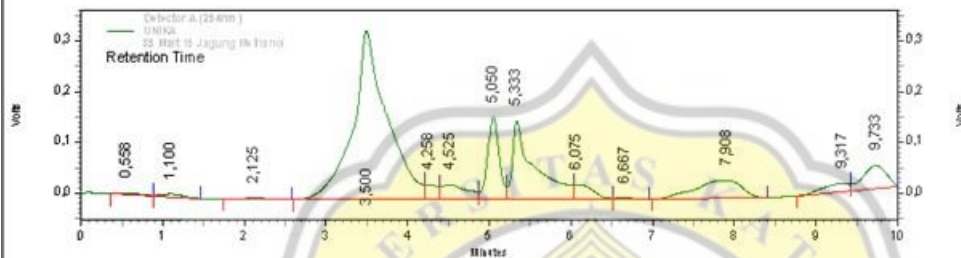
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Data Name: C:\CLASS-VP\85 Malt 15 Jagung Methanol

User: System

Acquired: 19/05/2020 9:41:22

Printed: 19/05/2020 13:44:07



Detector A (254nm)

Pk#	Retention Time	Area	Area %	Height	Height %
1	0,558	51501	0,279	2539	0,302
2	1,100	94362	0,511	5488	0,653
3	2,125	53478	0,290	2081	0,248
4	3,500	9693132	52,532	332327	39,547
5	4,258	290499	1,574	29031	3,455
6	4,525	640194	3,470	28725	3,418

Lampiran 17. Hasil Plagiasi



4.58% PLAGIARISM
APPROXIMATELY

Report #13488645

PENDAHULUAN Latar Belakang Fermentasi merupakan proses yang melibatkan kinerja mikroorganisme seperti bakteri maupun yeast, dimana proses ini bertujuan untuk mengawetkan, mengubah tekstur hingga memperbaiki atribut sensori suatu produk pangan. Proses fermentasi dapat diterapkan pada produk makanan maupun produk minuman. Pembuatan minuman fermentasi beralkohol dapat berlangsung apabila terdapat gula yang difermentasikan oleh yeast menjadi etanol dan karbondioksida (CO₂) (Gunam, et al., 2009). Sumber gula didapatkan pada buah-buahan, biji-bijian maupun umbi-umbian dengan kandungan pati. Pati yang terkandung dalam bahan pangan tersebut akan dihidrolisis menjadi gula-gula sederhana melalui proses yang melibatkan pemanasan, seperti pada proses mashing, boiling maupun pasteurisasi sehingga proses fermentasi dapat berlangsung. Bir merupakan salah satu jenis minuman fermentasi beralkohol. Proses pembuatannya tergantung bahan baku utama yaitu barley. Selama proses fermentasi bir, perlu adanya proses germinasi barley menjadi malt sebelum

REPORT CHECKED AUTHOR
#1348864510 AUG 2021, 12:52 PM ANDRE KURNIAWAN

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