7. LAMPIRAN

Lampiran 1. Syarat Mutu Bir Pilsener dan Syarat Mutu Bir (SNI 7388:2009)

Tabel 10. Syarat Mutu Bir Pilsener

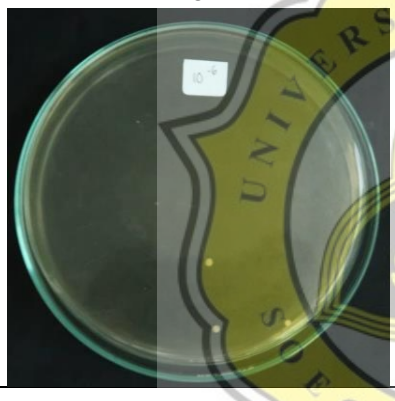
No	Kriteria Uji	Persyaratan
1.	*Original Gravity* (ºPlato)	11,2-14,7
2.	*Apparent Extract/Final Gravity* (ºPlato)	3,1-4,6
3.	*Alcohol* (v/v%)	4,9-6,0
4.	*Hops Bitterness* (*International Bitterness Units* (IBU))	25-40
5.	*Color* (*European Brewery Convention* (EBC))	6-12
6.	*Clarity*	Penampilan bir jernih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

Sumber: Dufour & Mellote (1992)

Tabel 11. Syarat Mutu Bir (SNI 7388:2009)

No	Kriteria Uji	Satuan	Persyaratan
1.	Keadaan : Bau dan Rasa		Normal/khas
2.	Etil alkohol	%v/v	0,5-8
3.	Metil alkohol	%v/v	Maks. 0,01
4.	Cemaran logam	mg/kg	
	a. Arsenik (As)		Maks. 0,10
	b. Timbal (Pb)		Maks. 0,20
	c. Raksa (Hg)		Maks. 0,30
	d. Kadmium (Cd)		Maks. 0,20
5.	Cemaran Mikroba		
	a. Angka Lempeng Total	Koloni/mL	2×10^2
	b. Bakteri *coliform*	APM/mL	20
	c. *Escherichia coli*	APM/mL	<3
	d. *Salmonella sp.*		Negatif/25 mL
	e. *Staphylococcus aureus*		Negatif /mL
	f. Kapang	Koloni/mL	1×10^2
	g. Khamir	Koloni/mL	1×10^2

Lampiran 2. Perhitungan jumlah *yeast* yang digunakan untuk fermentasi melalui metode *Total Plate Count* (TPC) dengan media *Malt Extract Agar* (MEA)

Pengenceran	Jumlah sel
10^{-5} 	$600 \times 10^5 = 6 \times 10^7$
10^{-6} 	$30 \times 10^6 = 3 \times 10^7$

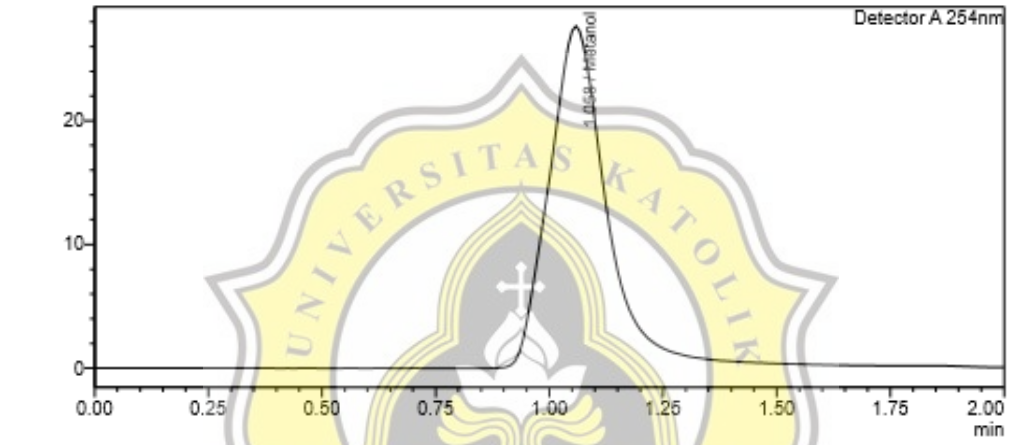
Lampiran 3. Analisa Metanol

SHIMADZU LabSolutions **Analysis Report**

<Sample Information>

Sample Name	: Std metanol 100%		
Sample ID	:		
Data Filename	: Std metanol 100%.lcd		
Method Filename	: methanol - Copy.lcm		
Batch Filename	:		
Vial #	: 1-1	Sample Type	: Standard
Injection Volume	: 20 uL	Level	: 1
Date Acquired	: 17/10/2019 2:19:47 PM	Acquired by	: System Administrator
Date Processed	: 17/10/2019 2:26:55 PM	Processed by	: System Administrator

<Chromatogram>



<Peak Table>

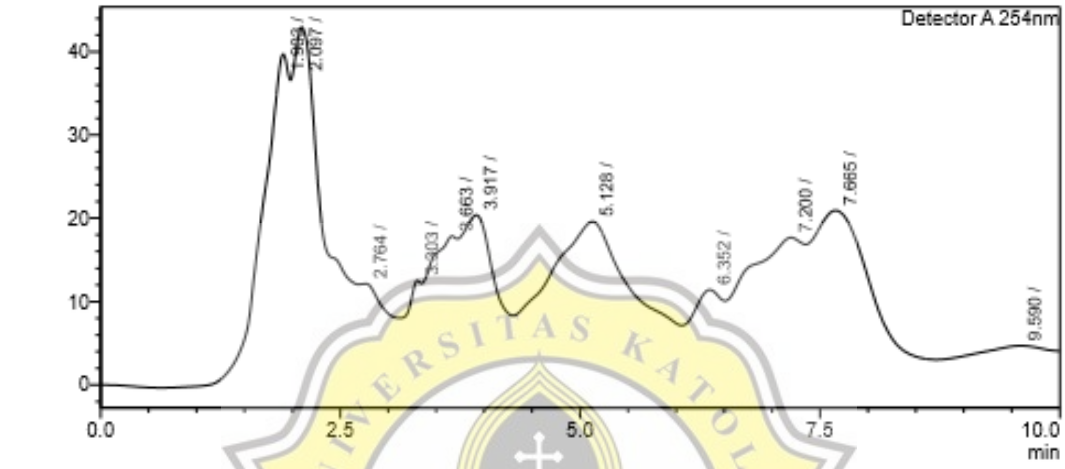
Detector A 254nm

Peak#	Ret. Time	Area	Height	Conc.	Unit	Mark	Name
1	1.058	249273	27648	100.000	%	S	Metanol
Total		249273	27648				

<Sample Information>

Sample Name	: BM 70 S 30		
Sample ID	:		
Data Filename	: BM 70 S 30.lcd		
Method Filename	: methanol - Copy.lcm		
Batch Filename	:		
Vial #	: 1-1	Sample Type	: Unknown
Injection Volume	: 20 uL		
Date Acquired	: 17/10/2019 10:57:10 AM	Acquired by	: System Administrator
Date Processed	: 17/10/2019 2:27:27 PM	Processed by	: System Administrator

<Chromatogram>



<Peak Table>

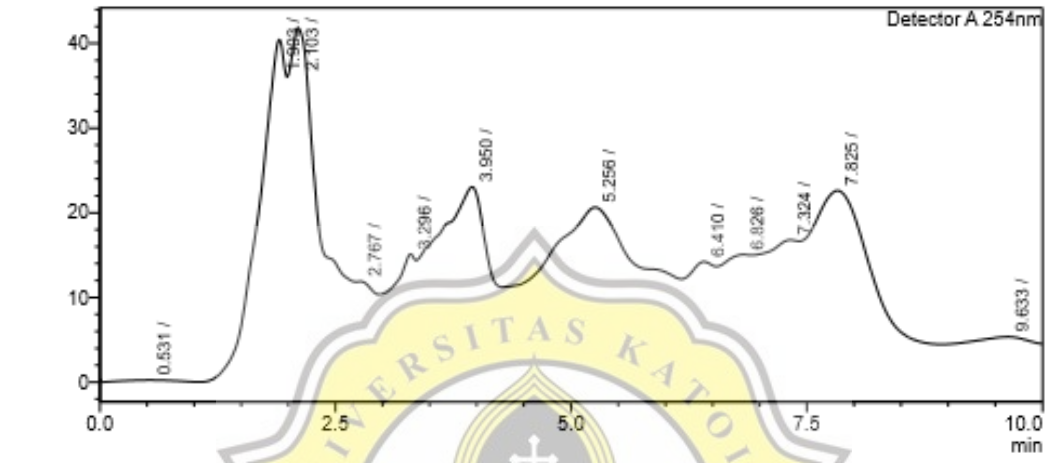
Detector A 254nm

Peak#	Ret. Time	Area	Height	Conc.	Unit	Mark	Name
1	1.903	752727	39506	0.000			
2	2.097	1019404	42679	0.000		V	
3	2.764	241645	11619	0.000		V	
4	3.303	133441	11763	0.000		V	
5	3.663	329307	16936	0.000		V	
6	3.917	497376	19373	0.000		V	
7	5.128	1181273	18060	0.000		V	
8	6.352	209729	9393	0.000		V	
9	7.200	637905	15301	0.000		V	
10	7.665	728890	18355	0.000		V	
11	9.590	35943	938	0.000			
Total		5767640	203924				

<Sample Information>

Sample Name	: BM 80 S 20		
Sample ID	:		
Data Filename	: BM 80 S 20.lcd		
Method Filename	: methanol - Copy.lcm		
Batch Filename	:		
Vial #	: 1-2	Sample Type	: Unknown
Injection Volume	: 20 uL		
Date Acquired	: 17/10/2019 11:21:02 AM	Acquired by	: System Administrator
Date Processed	: 17/10/2019 2:27:23 PM	Processed by	: System Administrator

<Chromatogram>



<Peak Table>

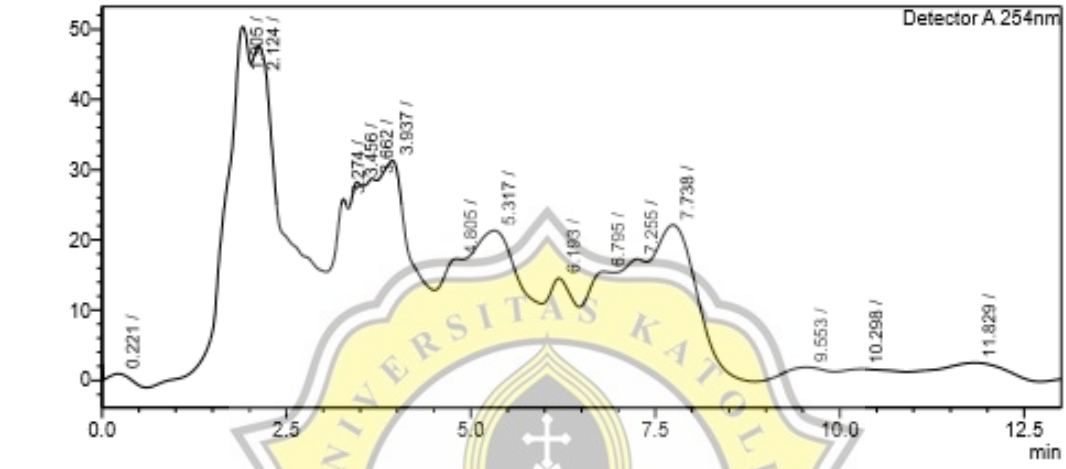
Detector A 254nm

Peak#	Ret. Time	Area	Height	Conc.	Unit	Mark	Name
1	0.531	8316	220	0.000			
2	1.903	780580	39995	0.000			
3	2.103	995499	41298	0.000		V	
4	2.767	150088	10999	0.000		V	
5	3.296	272693	13972	0.000		V	
6	3.950	886838	21571	0.000		V	
7	5.256	1475045	18483	0.000		V	
8	6.410	241284	11467	0.000		V	
9	6.826	262812	12087	0.000		V	
10	7.324	383260	13570	0.000		V	
11	7.825	844855	19137	0.000		V	
12	9.633	38173	946	0.000		V	
Total		6339444	203745				

<Sample Information>

Sample Name	: BM 90 S10		
Sample ID	:		
Data Filename	: BM 90 S10.lcd		
Method Filename	: methanol - Copy.lcm		
Batch Filename	:		
Vial #	: 1-3	Sample Type	: Unknown
Injection Volume	: 20 uL		
Date Acquired	: 17/10/2019 11:36:02 AM	Acquired by	: System Administrator
Date Processed	: 17/10/2019 2:27:14 PM	Processed by	: System Administrator

<Chromatogram>



<Peak Table>

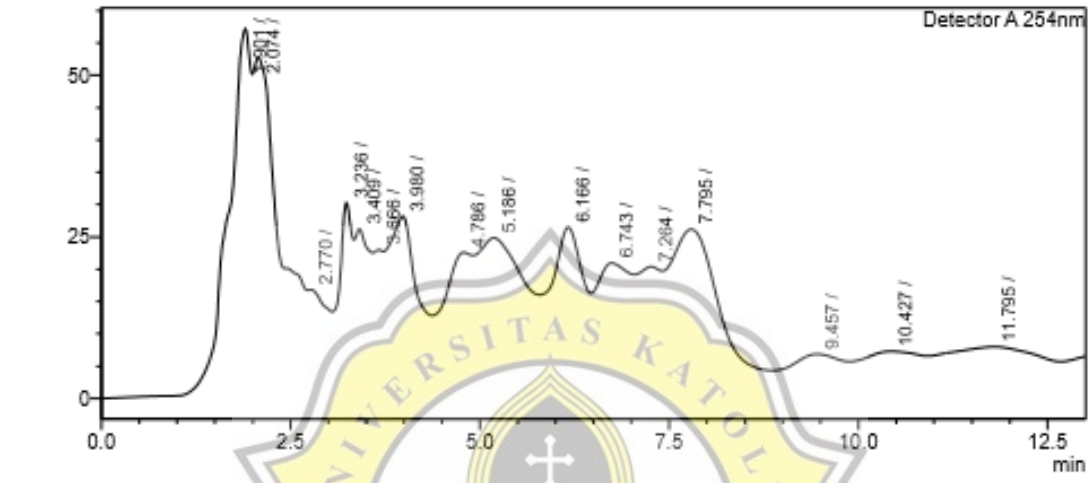
Detector A 254nm

Peak#	Ret. Time	Area	Height	Conc.	Unit	Mark	Name
1	0.221	23160	1252	0.000			
2	1.905	1169650	51277	0.000			
3	2.124	1663958	48637	0.000		V	
4	3.274	377648	26662	0.000		V	
5	3.456	334294	29071	0.000		V	
6	3.662	334911	29560	0.000		V	
7	3.937	1061865	32115	0.000		V	
8	4.805	368944	18047	0.000		V	
9	5.317	1139868	22042	0.000		V	
10	6.193	406880	15180	0.000		V	
11	6.795	400072	16065	0.000		V	
12	7.255	458810	17822	0.000		V	
13	7.738	958554	22669	0.000		V	
14	9.553	99654	2267	0.000		V	
15	10.298	100848	1973	0.000		V	
16	11.829	191189	2747	0.000		V	
Total		9090305	337387				

<Sample Information>

Sample Name	: BM 100		
Sample ID	:		
Data Filename	: BM 100.lcd		
Method Filename	: methanol - Copy.lcm		
Batch Filename	:		
Vial #	: 1-4	Sample Type	: Unknown
Injection Volume	: 20 uL		
Date Acquired	: 17/10/2019 12:07:49 PM	Acquired by	: System Administrator
Date Processed	: 17/10/2019 2:27:33 PM	Processed by	: System Administrator

<Chromatogram>



<Peak Table>

Detector A 254nm

Peak#	Ret. Time	Area	Height	Conc.	Unit	Mark	Name
1	1.901	1148839	56406	0.000			
2	2.074	1309258	51893	0.000		V	
3	2.770	272514	15610	0.000		V	
4	3.236	357807	28853	0.000		V	
5	3.409	342508	24726	0.000		V	
6	3.666	180299	21387	0.000		V	
7	3.980	740234	26438	0.000		V	
8	4.786	535945	20467	0.000		V	
9	5.186	1000467	22550	0.000		V	
10	6.166	721953	23724	0.000		V	
11	6.743	568267	17965	0.000		V	
12	7.264	366851	17152	0.000		V	
13	7.795	971658	22706	0.000		V	
14	9.457	100855	2615	0.000		V	
15	10.427	129278	2622	0.000		V	
16	11.795	196844	2682	0.000		V	
Total		8943375	357793				

Lampiran 4. Analisa Etanol dengan Alkoholmeter

Sampel			
F1	F2	F3	F4
			

Keterangan:

F1 = minuman fermentasi (bir) dengan formulasi 100% *malt* : 0% sorgum
F2 = minuman fermentasi (bir) dengan formulasi 90% *malt* : 10% sorgum
F3 = minuman fermentasi (bir) dengan formulasi 80% *malt* : 20% sorgum
F4 = minuman fermentasi (bir) dengan formulasi 70% *malt* : 30% sorgum

Lampiran 5. Alat Fermentor

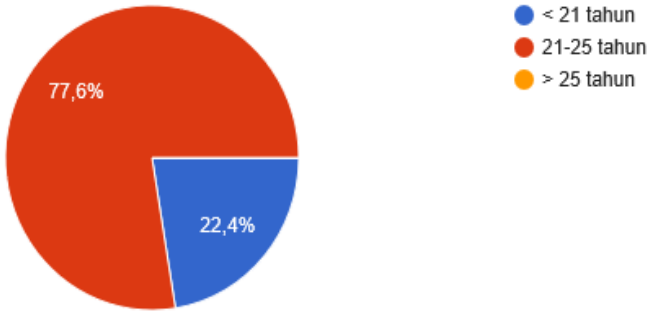
Sampel			
F1	F2	F3	F4
			

Keterangan:

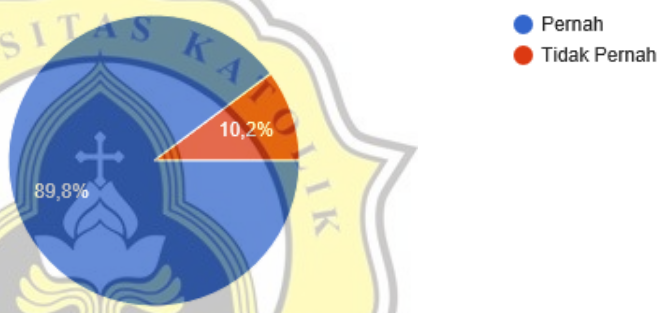
F1 = fermentor berisi minuman fermentasi (bir) dengan formulasi 100% *malt* : 0% sorgum
F2 = fermentor berisi minuman fermentasi (bir) dengan formulasi 90% *malt* : 10% sorgum
F3 = fermentor berisi minuman fermentasi (bir) dengan formulasi 80% *malt* : 20% sorgum
F4 = fermentor berisi minuman fermentasi (bir) dengan formulasi 70% *malt* : 30% sorgum

Lampiran 6. Hasil Seleksi Sensori dari Jawaban Panelis pada *Google Form*

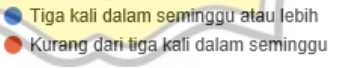
No	Tahap Pertanyaan	Jawaban
1	Berapakah umur anda?	Jawaban dari 147 panelis

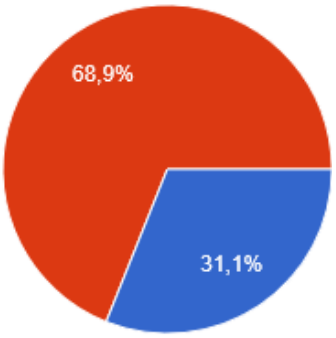


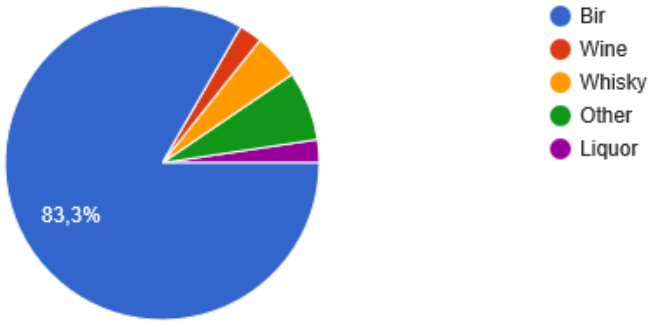
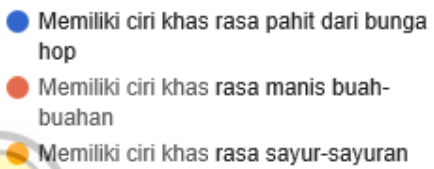
2	Apakah anda pernah mengonsumsi minuman beralkohol?	Jawaban dari 147 panelis



3	Seberapa sering anda meminum minuman beralkohol?	Jawaban dari 132 panelis





4	Apakah jenis minuman beralkohol yang Anda sukai?	Jawaban dari 42 panelis 
5	Apa ciri bir yang Anda ketahui?	Jawaban dari 34 panelis 

Lampiran 7. *Scoresheet* Sensori

UJI RANKING HEDONIK

Nama panelis : Tanggal : __Oktober 2019
Jenis kelamin :
Produk : Bir *malt* dan sorgum
Instruksi:

Berkumur-kumurlah dulu dengan menggunakan air mineral yang telah disediakan sebelum dan sesudah menguji sampel. Dihadapan Anda terdapat sampel bir. Cicipilah setiap sampel lalu berikan nilai sesuai dengan tingkat kesukaan Anda pada parameter warna, aroma, rasa, dan *overall* dari bir tersebut. Penilaian dilakukan mulai dari sisi kiri ke sisi kanan. Berilah nilai dari kisaran 1 (paling tidak disukai) hingga 4 (paling disukai). **NILAI TIDAK BOLEH SAMA** untuk sampel yang berbeda.

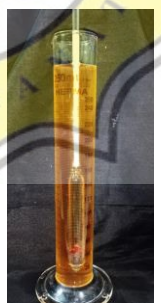
Parameter	Kode Sampel			
Warna				
Aroma				
Rasa				
Overall				

Apa *Aftertaste* yang anda rasakan pada setiap sampel (jika ada)? ***Aftertaste*** **adalah rasa yang tertinggal di mulut setelah mencicipi bir.**

Parameter	Kode Sampel			
Aftertaste				

Lampiran 8. Alat Dosing CO_2

Lampiran 9. Alat Analisa Fisiko-kimiawi dan Mikrobiologi

No.	Analisa		Gambar
1.	**Analisa Fisik**	Warna	 Spectrophotometer Shimadzu UV-1280  Chromameter CR 410 Konica Minolta
		Kekeruhan	 Turbidimeter TB1 Velp Scientifica
2.	**Analisa Kimia**	Kandungan Gula	 Refractometer HI 96801
		Etanol dan pH	 Alla 0560FG000 Alcoholmeter  pH-meter SI Analytics Lab 845
3.	**Mikrobiologi**		 Haemocytometer Assistant

Lampiran 10. Pengolahan Data Analisa Fisik dan Kimia

1. Warna

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
L_warna_chroma	,234	24	,002	,805	24	,000

a. Lilliefors Significance Correction

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
L_warna_chroma	Based on Mean	,396	3	20	,757
	Based on Median	,128	3	20	,942
	Based on Median and with adjusted df	,128	3	15,735	,942
	Based on trimmed mean	,283	3	20	,837

ANOVA

L_warna_chroma

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,381	3	,460	,047	,986
Within Groups	196,314	20	9,816		
Total	197,695	23			

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Turbiditas	,211	15	,072	,862	15	,026

a. Lilliefors Significance Correction

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
a_warnachroma	Based on Mean	,608	3	20	,617
	Based on Median	,246	3	20	,863
	Based on Median and with adjusted df	,246	3	12,672	,862
	Based on trimmed mean	,523	3	20	,672

Duncan[a]

Formulasi	N	Subset for alpha = 0.05 1
Kontrol	6	24,0661
70%	6	24,1106
90%	6	24,3878
80%	6	24,6633
Sig.		,766

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6,000.

ANOVA

a_warnachroma

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,072	3	,024	,437	,729
Within Groups	1,102	20	,055		
Total	1,174	23			

a_warnachroma

Duncan[a]

Formulasi	N	Subset for alpha = 0.05 1
Kontrol	6	,9683
80%	6	,9811
70%	6	1,0450
90%	6	1,1056
Sig.		,365

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6,000.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
b_warnachroma	,138	24	,200*	,974	24	,757

*. This is a lower bound of the true significance.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
b_warnachroma	Based on Mean	1,528	3	20	,238
	Based on Median	,950	3	20	,435
	Based on Median and with adjusted df	,950	3	15,807	,440
	Based on trimmed mean	1,496	3	20	,246

ANOVA

b_warnachroma

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,290	3	,097	,094	,963
Within Groups	20,635	20	1,032		
Total	20,925	23			

b_warnachroma

Duncan[a]

formulasi	N	Subset for alpha = 0.05 1
80%	6	-,7817
90%	6	-,6456
kontrol	6	-,5850
70%	6	-,4772
Sig.		,640

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6,000.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
warna_spektro	,272	24	,100	,798	24	,000

a. Lilliefors Significance Correction

ANOVA

warna_spektro

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	71,884	3	23,961	1693,685	,000
Within Groups	,283	20	,014		
Total	72,167	23			

warna_spektro

Duncan[a]

formulasi	N	Subset for alpha = 0.05			
		1	2	3	4
70%	6	10,0942			
80%	6		10,3154		
90%	6			12,0421	
kontrol	6				14,4146
Sig.		1,000	1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6,000.

Warna Sampel pada Hari ke-9 dibandingkan dengan Bir Komersial

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Warna_Spektro	,207	15	,084	,891	15	,069

a. Lilliefors Significance Correction

Warna_Spektro

Duncan[a]

Sampel	N	Subset for alpha = 0.05				
		1	2	3	4	5
Bir_Komersial	3	8,2083				
70%	3		9,8933			
80%	3			10,3667		
90%	3				12,0375	
Kontrol	3					14,4725
Sig.		1,000	1,000	1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

2. Kekeruhan

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
kekeruhan	,097	108	,014	,977	108	,059

a. Lilliefors Significance Correction

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
kekeruhan	Based on Mean	1,699	3	104	,172
	Based on Median	,626	3	104	,600
	Based on Median and with adjusted df	,626	3	81,729	,600
	Based on trimmed mean	1,532	3	104	,211

ANOVA

kekeruhan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,311	3	,770	,815	,488
Within Groups	98,332	104	,946		
Total	100,643	107			

kekeruhan

Duncan[a]

formulasi	N	Subset for alpha = 0.05 1
90%	27	1,9793
80%	27	2,0748
70%	27	2,2293
kontrol	27	2,3622
Sig.		,192

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 27,000.

Turbiditas Sampel pada Hari ke-9 dibandingkan dengan Bir Komersial

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Turbiditas	,211	15	,072	,862	15	,026

a. Lilliefors Significance Correction

Turbiditas

Duncan[a]

Sampel	N	Subset for alpha = 0.05 1
70%	3	1,1467
80%	3	1,1700
90%	3	1,2567
Bir Komersial	3	1,5700
Kontrol	3	1,6733
Sig.		,297

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

3. Kandungan Gula

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
kandungangula	,166	132	,000	,869	132	,000

a. Lilliefors Significance Correction

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
brix	Based on Mean	,391	3	128	,760
	Based on Median	,643	3	128	,589
	Based on Median and with adjusted df	,643	3	124,055	,589
	Based on trimmed mean	,525	3	128	,666

ANOVA

brix

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42,340	3	14,113	10,915	,000
Within Groups	165,508	128	1,293		
Total	207,848	131			

brix

Duncan[a]

formulasi	N	Subset for alpha = 0.05		
		1	2	3
70%	33	7,8317		
80%	33	8,0621	8,0621	
90%	33		8,5585	
kontrol	33			9,3096
Sig.		,412	,079	1,000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 33,000.

Kandungan Gula Sampel pada Hari ke-9 dibandingkan dengan Bir Komersial

Brix

Duncan[a]

Sampel	N	Subset for alpha = 0.05		
		1	2	3
Bir Komersial	3	4,9667		
70%	3		7,1600	
80%	3		7,2867	
90%	3		7,4767	
Kontrol	3			8,2867
Sig.		1,000	,213	1,000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Brix	,254	15	,010	,828	15	,009

a. Lilliefors Significance Correction

4. pH

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pH	,079	108	,091	,913	108	,000

a. Lilliefors Significance Correction

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
pH	Based on Mean	,905	3	104	,442
	Based on Median	,893	3	104	,448
	Based on Median and with adjusted df	,893	3	72,705	,449
	Based on trimmed mean	,995	3	104	,398

ANOVA

pH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,101	3	,034	,867	,461
Within Groups	4,037	104	,039		
Total	4,138	107			

pH

Duncan[a]

formulasi	N	Subset for alpha = 0.05 1
70%	27	4,9110
80%	27	4,9174
90%	27	4,9400
kontrol	27	4,9889
Sig.		,191

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 27,000.

pH Sampel pada Hari ke-9 dibandingkan dengan Bir Komersial

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Turbiditas	,211	15	,072	,862	15	,026

a. Lilliefors Significance Correction

pH

Duncan[a]

Sampel	N	Subset for alpha = 0.05	
		1	2
Bir Komersial	3	4,3900	
80%	3	4,4967	4,4967
70%	3	4,7633	4,7633
90%	3	4,7767	4,7767
Kontrol	3		4,8800
Sig.		,061	,063

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

5. *Fermentation Speed*

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Fermentation_speed	,171	12	,200*	,935	12	,431

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

Fermentation_speed

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	,052	3	,017	3,016	,094
Within Groups	,046	8	,006		
Total	,098	11			

Fermentation_speed

Duncan[a]

Rasio	N	Subset for alpha = 0.05	
		1	2
100% : 0%	3	,5100	
80% : 20%	3	,6300	,6300
90% : 10%	3	,6533	,6533
70% : 30%	3		,6833
Sig.		,057	,432

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

Lampiran 11. Pengolahan Data Analisa Sensori

ANOVA

Fermentation_speed

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	,052	3	,017	3,016	,094
Within Groups	,046	8	,006		
Total	,098	11			

Ranks

	formulasi	N	Mean Rank
warna	70%	29	48,00
	80%	29	58,00
	90%	29	58,00
	100%	29	70,00
	Total	116	

Test Statistics[a,b]

	warna
Kruskal-Wallis H	6,646
Df	3
Asymp. Sig.	,084

a. Kruskal Wallis Test

b. Grouping Variable: formulasi

Ranks

	formulasi2	N	Mean Rank
aroma	70%	30	53,50
	80%	30	66,50
	90%	30	63,50
	kontrol	30	58,50
	Total	120	

Test Statistics[a,b]

	aroma
Kruskal-Wallis H	2,592
Df	3
Asymp. Sig.	,459

a. Kruskal Wallis Test

b. Grouping Variable: formulasi2

Ranks

	formulasi2	N	Mean Rank
rasa	70%	30	53,07
	80%	30	55,98
	90%	30	69,00
	kontrol	30	63,95
	Total	120	

Test Statistics[a,b]

	rasa
Kruskal-Wallis H	4,226
df	3
Asymp. Sig.	,238

a. Kruskal Wallis Test

b. Grouping Variable: formulasi2

Ranks

	formulasi2	N	Mean Rank
overall	70%	30	52,50
	80%	30	58,50
	90%	30	65,50
	kontrol	30	65,50
	Total	120	

Test Statistics[a,b]

	overall
Kruskal-Wallis H	3,120
df	3
Asymp. Sig.	,373

a. Kruskal Wallis Test

b. Grouping Variable: formulasi2

PLAGIARISM CHECK.ORG

7.73% PLAGIARISM APPROXIMATELY

Report #10266626

PENDAHULUAN Latar BelakangMinuman fermentasi beralkohol yang berada di dunia dihasilkan dalam berbagai bentuk dan rasa dikarenakan peran dari mikroorganisme atau enzim. Minuman fermentasi umumnya berbahan dasar seperti anggur, biji, dan kacang kedelai (Malomo et al., 2011). Proses fermentasi dapat memperbaiki atribut sensori pada produk akhir. Produk akhir yang dihasilkan akan lebih memiliki nilai gizi, mudah dicerna, dan aman secara mikrobiologis. Dalam pembuatan minuman beralkohol, bahan yang digunakan umumnya terdiri atas bahan yang mengandung gula (buah-buahan) atau mengandung pati (biji-bijian atau umbi) yang akan dihidrolisis menjadi gula sederhana sebelum proses fermentasi pada tahap mashing dan boiling. Minuman beralkohol terutama bir dapat dibuat dengan menggunakan bahan sorgum, beras, jagung dan millet. Secara umum, bahan dasar pembuatan bir adalah barley malt, adjunct/bahan tambahan, gula, dan hops. Barley malt dikenal kaya akan protein dan enzim bila dibandingkan dengan biji-bijian lokal. Barley malt memiliki diastatic power yang lebih tinggi dari jagung, sorgum, dan beras, sehingga memiliki kandungan tinggi β-amilase (156-158 IU/mg protein) (Taylor et al., 2013). β-amilase merupakan enzim kunci dalam memecah pati malt. Diastatic power adalah kemampuan bahan baku (barley malt) dalam memecah