

## LAMPIRAN

### Lampiran 1. Perhitungan Efisiensi Pengasapan

Energi panas yang dihasilkan dari 3000 watt selama 2,5 jam:

$$P = \frac{W}{t}$$

$$3000 \text{ watt} = \frac{W}{2,5 \text{ jam}}$$

$$W = 3000 \text{ watt} \times 9000 \text{ dt} = 2,7 \times 10^7 \text{ Joule}$$

Penentuan Tetapan Kalor:

$$W = m \times c \times \Delta t$$

$$2,7 \times 10^7 \text{ Joule} = 3 \text{ kg} \times c \times (400^\circ \text{C} - 26^\circ \text{C})$$

$$c = \frac{2,7 \times 10^7}{3 \times 374} = 2,406 \times 10^4$$

Energi Panas yang Dibutuhkan Untuk Suhu Pirolisis 300°C:

$$W = m \times c \times \Delta t = 3 \text{ kg} \times (2,406 \times 10^4) \times (300^\circ \text{C} - 26^\circ \text{C}) = 1,977 \times 10^7 \text{ Joule}$$

Energi Panas yang Dibutuhkan Untuk Suhu Pirolisis 400°C:

$$W = m \times c \times \Delta t = 3 \text{ kg} \times (2,406 \times 10^4) \times (400^\circ \text{C} - 26^\circ \text{C}) = 2,699 \times 10^7 \text{ Joule}$$

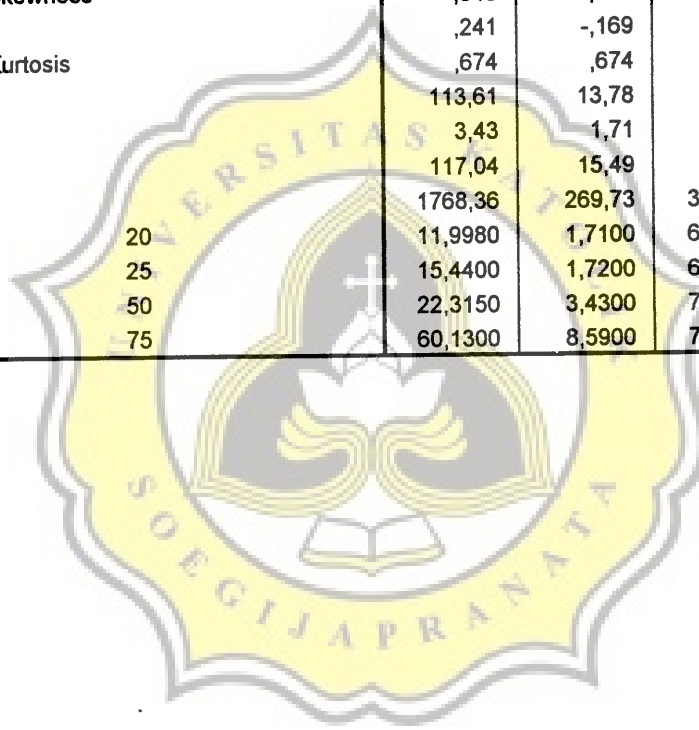
$$\text{Produksi arang suhu pirolisis } 300^\circ \text{C} = \frac{1804 \text{ g}}{3000 \text{ g}} \times 100\% = 60,133\%$$

$$\text{Produksi arang suhu pirolisis } 400^\circ \text{C} = \frac{1461 \text{ g}}{3000 \text{ g}} \times 100\% = 48,7\%$$

**Lampiran 2. Perhitungan Parameter Statistik Hasil Penelitian**

**Statistics**

		TVB	TMA	PHENOL
N	Valid	48	48	48
	Missing	0	0	0
Mean		36,8408	5,6194	72,6185
Std. Error of Mean		4,8814	,6578	,7887
Median		22,3150	3,4300	73,6800
Mode		20,59	3,43	73,68
Std. Deviation		33,8192	4,5575	5,4646
Variance		1143,7386	20,7708	29,8619
Skewness		1,266	1,109	-,392
Std. Error of Skewness		,343	,343	,343
Kurtosis		,241	-,169	-1,159
Std. Error of Kurtosis		,674	,674	,674
Range		113,61	13,78	18,44
Minimum		3,43	1,71	63,14
Maximum		117,04	15,49	81,58
Sum		1768,36	269,73	3485,69
Percentiles	20	11,9980	1,7100	65,7900
	25	15,4400	1,7200	66,3200
	50	22,3150	3,4300	73,6800
	75	60,1300	8,5900	76,8400



Lampiran 3. Analisa Anova 2 Arah Terhadap Nilai TVB

Between-Subjects Factors

		Value Label	N
sh_piro	1,00	400C	24
	2,00	300C	24
	3,00	komersial	12
k_asp_cr	1,00	100%	24
	2,00	50%	24
	3,00	komersial	12
hari	1,00	hari ke 1	15
	2,00	hari ke 3	15
	3,00	hari ke 5	15
	4,00	hari ke 7	15

Tests of Between-Subjects Effects

Dependent Variable: TVB

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	69394,964 <sup>a</sup>	19	3652,367	1727,789	,000
Intercept	83434,307	1	83434,307	39469,435	,000
SH_PIRO	905,846	1	905,846	428,519	,000
K_ASP_CR	1606,147	1	1606,147	759,804	,000
HARI	62743,561	3	20914,520	9893,823	,000
SH_PIRO * K_ASP_CR	18,179	1	18,179	8,600	,006
SH_PIRO * HARI	340,425	3	113,475	53,681	,000
K_ASP_CR * HARI	1303,743	3	434,581	205,583	,000
SH_PIRO * K_ASP_CR * HARI	36,039	3	12,013	5,683	,002
Error	84,556	40	2,114		
Total	155386,916	60			
Corrected Total	69479,520	59			

a. R Squared = ,999 (Adjusted R Squared = ,998)

TVB

Duncan<sup>a,b,c</sup>

sh_piro	N	Subset	
		1	2
400C	24	32,4967	
300C	24		41,1850
komersial	12		41,8317
Sig.		1,000	,190

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 2,114.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

TVB

Duncan<sup>a,b,c</sup>

k_asp_cr	N	Subset	
		1	2
100%	24	31,0563	
komersial	12		41,8317
50%	24		42,6254
Sig.		1,000	,109

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 2,114.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

TVB

Duncan<sup>a,b</sup>

hari	N	Subset			
		1	2	3	4
hari ke 1	15	9,9360			
hari ke 3	15		19,6927		
hari ke 5	15			28,0607	
hari ke 7	15				93,6667
Sig.		1,000	1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 2,114.

a. Uses Harmonic Mean Sample Size = 15,000.

b. Alpha = ,05.



Lampiran 4. Analisa Anova 2 Arah Terhadap TMA

Between-Subjects Factors

		Value Label	N
sh_piro	1,00	400C	24
	2,00	300C	24
	3,00	komersial	12
k_asp_cr	1,00	100%	24
	2,00	50%	24
	3,00	komersial	12
hari	1,00	hari ke 1	15
	2,00	hari ke 3	15
	3,00	hari ke 5	15
	4,00	hari ke 7	15

Tests of Between-Subjects Effects

Dependent Variable: TMA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1208,616 <sup>a</sup>	19	63,611	80,690	,000
Intercept	1843,453	1	1843,453	2338,403	,000
SH_PIRO	17,873	1	17,873	22,672	,000
K_ASP_CR	75,777	1	75,777	96,122	,000
HARI	999,096	3	333,032	422,448	,000
SH_PIRO * K_ASP_CR	3,075	1	3,075	3,901	,055
SH_PIRO * HARI	14,970	3	4,990	6,330	,001
K_ASP_CR * HARI	48,244	3	16,081	20,399	,000
SH_PIRO * K_ASP_CR * HARI	17,940	3	5,980	7,586	,000
Error	31,534	40	,788		
Total	3169,310	60			
Corrected Total	1240,150	59			

a. R Squared = ,975 (Adjusted R Squared = ,962)

TMA

Duncan<sup>a,b,c</sup>

sh_piro	N	Subset	
		1	2
400C	24	5,0092	
komersial	12		5,8742
300C	24		6,2296
Sig.		1,000	,237

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = ,788.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

TMA

Duncan<sup>a,b,c</sup>

k_asp_cr	N	Subset		
		1	2	3
100%	24	4,3629		
komersial	12		5,8742	
50%	24			6,8758
Sig.		1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = ,788.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

TMA

Duncan<sup>a,b</sup>

hari	N	Subset			
		1	2	3	4
hari ke 1	15	2,1687			
hari ke 3	15		2,9767		
hari ke 5	15			4,9247	
hari ke 7	15				12,6113
Sig.		1,000	1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = ,788.

a. Uses Harmonic Mean Sample Size = 15,000.

b. Alpha = ,05.





Lampiran 5. Analisa Anova 2 Arah Terhadap Kadar Fenol

Between-Subjects Factors

		Value Label	N
sh_piro	1,00	400C	24
	2,00	300C	24
	3,00	komersial	12
k_asp_cr	1,00	100%	24
	2,00	50%	24
	3,00	komersial	12
hari	1,00	hari ke 1	15
	2,00	hari ke 3	15
	3,00	hari ke 5	15
	4,00	hari ke 7	15

Tests of Between-Subjects Effects

Dependent Variable: PHENOL

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3284,665 <sup>a</sup>	19	172,877	11,729	,000
Intercept	274922,354	1	274922,354	18652,265	,000
SH_PIRO	381,095	1	381,095	25,856	,000
K_ASP_CR	752,638	1	752,638	51,063	,000
HARI	255,887	3	85,296	5,787	,002
SH_PIRO * K_ASP_CR	30,672	1	30,672	2,081	,157
SH_PIRO * HARI	32,972	3	10,991	,746	,531
K_ASP_CR * HARI	52,839	3	17,613	1,195	,324
SH_PIRO * K_ASP_CR * HARI	26,467	3	8,822	,599	,620
Error	589,574	40	14,739		
Total	302297,956	60			
Corrected Total	3874,240	59			

a. R Squared = ,848 (Adjusted R Squared = ,776)

PHENOL

Duncan<sup>a,b,c</sup>

sh_piro	N	Subset		
		1	2	3
komersial	12	62,1492		
300C	24		69,8008	
400C	24			75,4363
Sig.		1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 14,739.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

PHENOL

Duncan<sup>a,b,c</sup>

k_asp_cr	N	Subset		
		1	2	3
komersial	12	62,1492		
50%	24		68,6588	
100%	24			76,5783
Sig.		1,000	1,000	1,000

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 14,739.

- a. Uses Harmonic Mean Sample Size = 18,000.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- c. Alpha = ,05.

### PHENOL

Duncan<sup>a,b</sup>

hari	N	Subset	
		1	2
hari ke 1	15	68,8773	
hari ke 7	15		69,1893
hari ke 5	15		71,9307
hari ke 3	15		72,1013
Sig.		,825	,055

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 14,739.

a. Uses Harmonic Mean Sample Size = 15,000.

b. Alpha = ,05.



Lampiran 6. Analisa Korelasi antara TVB, TMA, Kadar Fenol, Konsentrasi Asap Cair, dan Suhu Prolisis

Correlations

		sh_piro	k_asp_cr	TMA	TVB	PHENOL
sh_piro	Pearson Correlation	1,000	,643**	,090	,115	-,605**
	Sig. (1-tailed)		,000	,248	,190	,000
	N	60	60	60	60	60
k_asp_cr	Pearson Correlation	,643**	1,000	,166	,138	-,681**
	Sig. (1-tailed)	,000		,103	,147	,000
	N	60	60	60	60	60
TMA	Pearson Correlation	,090	,166	1,000	,948**	-,223*
	Sig. (1-tailed)	,248	,103		,000	,044
	N	60	60	60	60	60
TVB	Pearson Correlation	,115	,138	,948**	1,000	-,222*
	Sig. (1-tailed)	,190	,147	,000		,071
	N	60	60	60	60	60
PHENOL	Pearson Correlation	-,605**	-,681**	-,223*	-,222*	1,000
	Sig. (1-tailed)	,000	,000	,044	,071	
	N	60	60	60	60	60

\*\* . Correlation is significant at the 0.01 level (1-tailed).

\* . Correlation is significant at the 0.05 level (1-tailed).