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## Lampiran 1. Surat Keterangan Determinasi Tumbuhan



**KEMENTERIAN KESEHATAN REPUBLIK INDONESIA**  
**BADAN PENELITIAN DAN PENGEMBANGAN KESEHATAN**  
 BALAI BESAR PENELITIAN DAN PENGEMBANGAN  
 TANAMAN OBAT DAN OBAT TRADISIONAL  
 Jalan Lawu No.11 Tawangmangu, Karanganyar, Jawa Tengah 57792  
 Telepon (0271) 697 010 Faksimile (0271) 697 451  
 Laman [b2p2toot.litbang.kemkes.go.id](http://b2p2toot.litbang.kemkes.go.id) Surat Elektronik [b2p2toot@litbang.kemkes.go.id](mailto:b2p2toot@litbang.kemkes.go.id)

Nomor : KM.04.02/2/2674/2021 21 November 2021  
 Lampiran : -  
 Hal : Keterangan Determinasi

Yth. Dekan Fakultas Farmasi Universitas Setia Budi  
 Jalan Letjend. Sutoyo Solo 57127

Merujuk surat Saudara nomor: 468/H6-04/10.09.2021 tanggal 10 September 2021 hal permohonan determinasi, dengan ini kami sampaikan bahwa hasil determinasi sampel tanaman sebagai berikut:

Nama Pemohon : Devi Ayu Romitta  
 Nama Sampel : Delima Merah  
 Sampel : Segar  
 Spesies : *Punica granatum* L.  
 Sinonim : *Punica nana* L.  
 Familia : Lythraceae  
 Penanggung Jawab : Isna Jati Asiyah, M.Sc.

Hasil determinasi tersebut hanya mencakup sampel tanaman yang telah dikirimkan ke B2P2TOOT.

Atas perhatian Saudara, kami sampaikan terima kasih.

Kepala Balai Besar Penelitian  
 dan Pengembangan Tanaman Obat  
 dan Obat Tradisional  
 Tawangmangu,



**Akhmad Saikhu, S.K.M.,**  
**M.Sc.PH.**  
 NIP 196805251992031004

Tembusan :

**Lampiran 2. Perhitungan dan hasil presentase randemen bobot kering**

<b>Bobot Basah (kg)</b>	<b>Bobot Kering (kg)</b>	<b>Randemen (%b/b)</b>
10	1,8	18

Perhitungan :

$$\begin{aligned}\% \text{ randemen kering} &= \frac{\text{Berat kering}}{\text{Berat basah}} \times 100 \\ &= \frac{1,8}{10} \times 100 \\ &= 18\%\end{aligned}$$

**Lampiran 3. Perhitungan dan hasil penetapan kadar air serbuk**

No	Bobot serbuk (g)	Volume air (mL)	Kadar air (%v/b)
1	10,074	0,8	7,94
2	10,0118	0,7	6,99
3	10,0495	0,9	8,95
<b>Rata – rata ± SD</b>			<b>7,96 ± 0,98</b>

Perhitungan :

Kadar air serbuk 1

- Bobot kertas kosong = 4,8551 gram
- Bobot kertas + serbuk = 15 gram
- Bobot kertas + sisa = 4,9260 gram
- Bobot serbuk (15 g – 4,9260 g) = 10,074 gram
- Volume air = 0,8 mL

$$= \frac{0,8}{10,074} \times 100$$

$$= 7,94\%$$

Kadar air serbuk 2

- Bobot kertas kosong = 4,8501 gram
- Bobot kertas + serbuk = 15 gram
- Bobot kertas + sisa = 4,9882 gram
- Bobot serbuk (15 g – 4,9260 g) = 10,0118 gram
- Volume air = 0,7 mL

$$= \frac{0,7}{10,0118} \times 100$$

$$= 6,99\%$$

Kadar air serbuk 3

- Bobot kertas kosong = 4,8624 gram
- Bobot kertas + serbuk = 15 gram
- Bobot kertas + sisa = 4,9505 gram
- Bobot serbuk (15 g – 4,9260 g) = 10,0495 gram

- Volume air = 0,9 mL

$$= \frac{0,9}{10,0495} \times 100$$

$$= 8,95\%$$

$$\text{Rata – rata kadar air serbuk kulit buah delima merah} = \frac{7,94\% + 6,99\% + 8,95\%}{3}$$
$$= 7,96\%$$

**Lampiran 4. Perhitungan dan hasil penetapan susut kering serbuk**

No	Bobot serbuk (g)	Susut pengeringan (%)	Pustaka (%)
1	2	7,1	
2	2	7,4	< 10%
3	2	7,6	
<b>Rata – rata ± SD</b>		<b>7,36 ± 0,25</b>	

Perhitungan

Susut pengeringan I = 7,1%

Susut pengeringan II = 7,4%

Susut pengeringan III = 7,6%

$$\begin{aligned} \text{Rata-rata susut pengeringan} &= \frac{7,1\%+7,4\%+7,6\%}{3} \\ &= 7,36\% \end{aligned}$$

**Lampiran 5. Proses ekstraksi kulit buah delima merah**

**Lampiran 6. Perhitungan dan hasil randemen ekstrak**

<b>Bobot serbuk (g)</b>	<b>Bobot ekstrak (g)</b>	<b>Randemen (%b/b)</b>
<b>700</b>	155	22,14

Perhitungan

$$\begin{aligned}\% \text{ randemen ekstrak} &= \frac{\text{Bobot ekstrak}}{\text{Bobot serbuk}} \\ &= \frac{155}{700} \times 100 \\ &= 22,14\%\end{aligned}$$



**Lampiran 7. Hasil penetapan susut pengeringan ekstrak**

No	Bobot serbuk (g)	Susut pengeringan (%)	Pustaka (%)
1	2	6,3	
2	2	6,0	< 10%
3	2	6,1	
<b>Rata – rata ± SD</b>		<b>6,13 ± 0,15</b>	

### Lampiran 8. Perhitungan dan hasil penetapan bobot jenis ekstrak

Pengujian	Hasil (g/mL)			Rerata ± SD
	I	II	III	
Bobot jenis	1,0173	1,0176	1,0173	1,0174 ± 0,0001

#### Perhitungan

##### Bobot jenis 1

- Bobot piknometer 50 ml kosong = 27,785 gram
  - Bobot piknometer + air = 78,0580 gram
  - Bobot piknometer + ekstrak = 78,9315 gram
  - Bobot ekstrak = 78,9315-27,785 = 51,1465 gram
  - Bobot air = 78,0580-27,785 = 50,273 gram
- $$= \frac{51,1465}{50,273}$$
- $$= 1,0173 \text{ g/mL}$$

##### Bobot jenis 2

- Bobot piknometer 50 ml kosong = 27,785 gram
  - Bobot piknometer + air = 78,0580 gram
  - Bobot piknometer + ekstrak = 78,9410 gram
  - Bobot ekstrak = 78,9410-27,785 = 51,156 gram
  - Bobot air = 78,0580-27,785 = 50,273 gram
- $$= \frac{51,156}{50,273}$$
- $$= 1,0176 \text{ g/mL}$$

##### Bobot jenis 3

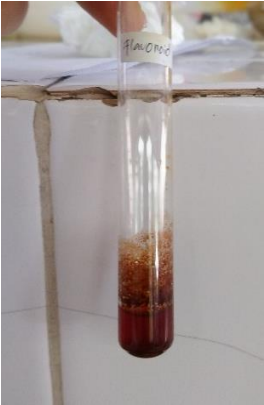




- Bobot piknometer 50 ml kosong = 27,785 gram
- Bobot piknometer + air = 78,0580 gram
- Bobot piknometer + ekstrak = 78,9310 gram
- Bobot ekstrak = 78,9310-27,785 = 51,146 gram
- Bobot air = 78,0580-27,785 = 50,273 gram

$$= \frac{51,146}{50,271}$$
$$= 1,0173 \text{ g/mL}$$

Rata-rata bobot jenis

$$= \frac{1,0173+1,076\%+1,073}{3}$$
$$= 1,0174 \text{ g/mL}$$

**Lampiran 8. Hasil identifikasi senyawa kimia ekstrak**

<p style="text-align: center;">Flavonoid</p> 	<p style="text-align: center;">Saponin</p> 
<p style="text-align: center;">Polifenol dan tannin</p> 	<p style="text-align: center;">Steroid atau triterpenoid</p> 
<p style="text-align: center;">Alkaloid (Mayer dan Dragendorf)</p> 	

**Lampiran 9. Hasil formulasi dan pengujian mutu fisik emulgel ekstrak kulit buah delima merah**



**Lampiran 10. Hasil uji pH emulgel ekstrak kulit buah delima merah**

Waktu	Formula	Uji pH			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	1	5,88	5,88	5,94	5,90	0,03
	2	5,6	5,59	5,64	5,61	0,03
	3	5,49	5,48	5,49	5,49	0,01
	4	5,25	5,26	5,33	5,28	0,04
Hari ke-21	1	5,89	5,9	5,86	5,88	0,02
	2	5,62	5,55	5,58	5,58	0,04
	3	5,5	5,43	5,44	5,46	0,04
	4	5,3	5,18	5,13	5,20	0,09

### Hasil statistik pH menggunakan *One Way Anova*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pH hari ke-1	.156	12	.200*	.922	12	.307
pH hari ke-21	.147	12	.200*	.938	12	.475

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

a. Lilliefors Significance Correction

#### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
pH hari ke-1	Based on Mean	3.906	3	8	.055
	Based on Median	.373	3	8	.775
	Based on Median and with adjusted df	.373	3	5.218	.777
	Based on trimmed mean	3.247	3	8	.081
pH hari ke-21	Based on Mean	2.776	3	8	.110
	Based on Median	.806	3	8	.525
	Based on Median and with adjusted df	.806	3	3.920	.553
	Based on trimmed mean	2.578	3	8	.126

#### ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
pH hari ke-1	Between Groups	.605	3	.202	210.304	.000
	Within Groups	.008	8	.001		
	Total	.612	11			
pH hari ke-21	Between Groups	.719	3	.240	89.354	.000
	Within Groups	.021	8	.003		
	Total	.741	11			

### Multiple Comparisons

Tukey HSD

Dependent Variable	(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
pH hari ke-1	F1	F2	.29000*	.02528	.000	.2091	.3709
		F3	.41333*	.02528	.000	.3324	.4943
		F4	.62000*	.02528	.000	.5391	.7009
	F2	F1	-.29000*	.02528	.000	-.3709	-.2091
		F3	.12333*	.02528	.005	.0424	.2043
		F4	.33000*	.02528	.000	.2491	.4109
	F3	F1	-.41333*	.02528	.000	-.4943	-.3324
		F2	-.12333*	.02528	.005	-.2043	-.0424
		F4	.20667*	.02528	.000	.1257	.2876
	F4	F1	-.62000*	.02528	.000	-.7009	-.5391
		F2	-.33000*	.02528	.000	-.4109	-.2491
		F3	-.20667*	.02528	.000	-.2876	-.1257
pH hari ke-21	F1	F2	.30000*	.04230	.000	.1646	.4354
		F3	.42667*	.04230	.000	.2912	.5621
		F4	.68000*	.04230	.000	.5446	.8154
	F2	F1	-.30000*	.04230	.000	-.4354	-.1646
		F3	.12667	.04230	.067	-.0088	.2621
		F4	.38000*	.04230	.000	.2446	.5154
	F3	F1	-.42667*	.04230	.000	-.5621	-.2912
		F2	-.12667	.04230	.067	-.2621	.0088
		F4	.25333*	.04230	.001	.1179	.3888
	F4	F1	-.68000*	.04230	.000	-.8154	-.5446
		F2	-.38000*	.04230	.000	-.5154	-.2446
		F3	-.25333*	.04230	.001	-.3888	-.1179

\*. The mean difference is significant at the 0.05 level.

### pH hari ke-1

Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05			
		1	2	3	4
F4	3	5.2800			
F3	3		5.4867		
F2	3			5.6100	
F1	3				5.9000
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

### pH hari ke-21

Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05		
		1	2	3
F4	3	5.2033		
F3	3		5.4567	
F2	3		5.5833	
F1	3			5.8833
Sig.		1.000	.067	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

### Hasil statistik pH hari ke-1 dan hari ke-21 menggunakan *Paired T-Test*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pH hari ke-1	.156	12	.200*	.922	12	.307
pH hari ke-21	.147	12	.200*	.938	12	.475

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

a. Lilliefors Significance Correction

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pH hari ke-1	5.5692	12	.23593	.06811
	pH hari ke-21	5.5317	12	.25950	.07491

#### Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pH hari ke-1 & pH hari ke-21	12	.968	.000

#### Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
		n	n	Mean	Lower	Upper			
Pair 1	pH hari ke-1 - pH hari ke-21	50	50	.037	-.00518	.08018	1.934	11	.079



### Lampiran 11. Hasil uji viskositas emulgel ekstrak kulit buah delima merah

Waktu	Formula	Uji viskositas			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	1	240	250	240	243.33	5.77
	2	230	230	220	226.67	5.77
	3	210	210	220	213.33	5.77
	4	190	200	190	193.33	5.77
Hari ke-21	1	230	250	230	236.67	11.55
	2	230	220	220	220.00	10.00
	3	210	210	210	210.00	0.00
	4	190	180	200	190.00	10.00

### Hasil statistik uji viskositas menggunakan *One Way Anova*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Viskositas hari ke-1	.125	12	.200 <sup>*</sup>	.951	12	.650
Viskositas hari ke-21	.169	12	.200 <sup>*</sup>	.963	12	.821

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

a. Lilliefors Significance Correction

#### Test of Homogeneity of Variances

		Levene	df1	df2	Sig.
		Statistic			
Viskositas hari ke-1	Based on Mean	.000	3	8	1.000
	Based on Median	.000	3	8	1.000
	Based on Median and with adjusted df	.000	3	8.000	1.000
	Based on trimmed mean	.000	3	8	1.000
Viskositas hari ke-21	Based on Mean	2.182	3	8	.168
	Based on Median	.667	3	8	.596
	Based on Median and with adjusted df	.667	3	4.000	.615
	Based on trimmed mean	2.054	3	8	.185

#### ANOVA

		Sum of	df	Mean	F	Sig.
		Squares		Square		
Viskositas hari ke-1	Between Groups	4025.000	3	1341.667	40.250	.000
	Within Groups	266.667	8	33.333		
	Total	4291.667	11			
Viskositas hari ke-21	Between Groups	3425.000	3	1141.667	13.700	.002
	Within Groups	666.667	8	83.333		
	Total	4091.667	11			

**Viskositas hari ke-1**Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05		
		1	2	3
F4	3	193.3333		
F3	3		213.3333	
F2	3		226.6667	
F1	3			243.3333
Sig.		1.000	.085	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

**Viskositas hari ke-21**Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05		
		1	2	3
F4	3	190.0000		
F3	3	210.0000	210.0000	
F2	3		220.0000	220.0000
F1	3			236.6667
Sig.		.104	.565	.193

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

**Hasil statistic uji viskositas menggunakan Paired t-test****Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Viskositas hari ke-1	.125	12	.200*	.951	12	.650
Viskositas hari ke-21	.169	12	.200*	.963	12	.821

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

a. Lilliefors Significance Correction

**Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Viskositas hari ke-1	219.1667	12	19.75225	5.70198
	Viskositas hari ke-21	214.1667	12	19.28652	5.56754

**Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	Viskositas hari ke-1 & Viskositas hari ke-21	12	.893	.000

**Paired Samples Test**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Viskositas hari ke-1 - Viskositas hari ke-21	5.00000	9.04534	2.61116	-.74714	10.74714	1.915	11	.082

### Lampiran 12. Hasil uji daya lekat emulgel ekstrak kulit buah delima merah

Waktu	Formula	Daya lekat			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	1	02.26	02.24	02.18	2,23	0,04
	2	01.76	01.87	01.82	1,82	0,06
	3	01.52	01.49	01.50	1,50	0,02
	4	01.33	01.37	01.34	1,35	0,02
Hari ke-21	1	02.21	02.23	02.23	2,22	0,01
	2	01.78	01.82	01.80	1,80	0,02
	3	01.47	01.51	01.50	1,49	0,02
	4	01.20	01.34	01.32	1,29	0,08

### Hasil statistic uji daya lekat menggunakan *One Way Anova*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Daya lekat ke-1	.218	12	.121	.878	12	.082
Daya lekat ke-21	.211	12	.147	.867	12	.059

a. Lilliefors Significance Correction

#### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Daya lekat ke-1	Based on Mean	1.479	3	8	.292
	Based on Median	.792	3	8	.532
	Based on Median and with adjusted df	.792	3	5.281	.546
	Based on trimmed mean	1.430	3	8	.304
Daya lekat ke-21	Based on Mean	.267	3	8	.848
	Based on Median	.211	3	8	.886
	Based on Median and with adjusted df	.211	3	7.443	.886
	Based on trimmed mean	.263	3	8	.850

#### ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Daya lekat ke-1	Between Groups	1.357	3	.452	333.006	.000
	Within Groups	.011	8	.001		
	Total	1.368	11			
Daya lekat ke-21	Between Groups	1.412	3	.471	1377.520	.000
	Within Groups	.003	8	.000		
	Total	1.415	11			

#### Daya lekat ke-1

Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05			
		1	2	3	4
F4	3	1.3467			
F3	3		1.5033		
F2	3			1.8167	
F1	3				2.2267
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

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

### Daya lekat ke-21

Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05			
		1	2	3	4
F4	3	1.3200			
F3	3		1.4933		
F2	3			1.8000	
F1	3				2.2233
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

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

### Hasil statistic uji daya lekat menggunakan *Paired t-test*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Daya lekat ke-1	.218	12	.121	.878	12	.082
Daya lekat ke-21	.211	12	.147	.867	12	.059

a. Lilliefors Significance Correction

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Daya lekat ke-1	1.7233	12	.35264	.10180
	Daya lekat ke-21	1.7092	12	.35862	.10352

#### Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Daya lekat ke-1 & Daya lekat ke-21	12	.997	.000

#### Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Daya lekat ke-1 - Daya lekat ke-21	-.01417	.02678	.00773	-.00285	.03118	1.832	11	.094

**Lampiran 13. Hasil uji daya sebar emulgel ekstrak kulit buah delima merah**

Waktu	Beban	Daya sebar formula 1			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	0	6,33	6,3	6,32	6,32	0,02
	50	6,49	6,5	6,48	6,49	0,01
	100	6,6	6,65	6,66	6,64	0,03
	150	6,74	6,73	6,69	6,72	0,03
Hari ke-21	0	6,3	6,3	6,31	6,30	0,01
	50	6,5	6,45	6,44	6,46	0,03
	100	6,6	6,63	6,62	6,62	0,02
	150	6,7	6,75	6,74	6,73	0,03

Waktu	Beban	Daya sebar formula 2			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	0	6,4	6,4	6,38	6,39	0,01
	50	6,51	6,49	6,53	6,51	0,02
	100	6,6	6,69	6,68	6,66	0,05
	150	6,76	6,79	6,8	6,78	0,02
Hari ke-21	0	6,49	6,52	6,54	6,52	0,03
	50	6,65	6,63	6,64	6,64	0,01
	100	6,71	6,7	6,71	6,71	0,01
	150	6,78	6,77	6,82	6,79	0,03

Waktu	Beban	Daya sebar formula 3			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	0	6,48	6,5	6,49	6,49	0,01
	50	6,57	6,61	6,59	6,59	0,02
	100	6,75	6,67	6,66	6,69	0,05
	150	6,85	6,81	6,8	6,82	0,03
Hari ke-21	0	6,52	6,55	6,57	6,55	0,03
	50	6,66	6,69	6,65	6,67	0,02
	100	6,76	6,78	6,78	6,77	0,01
	150	6,89	6,8	6,8	6,85	0,06

Waktu	Beban	Daya sebar formula 4			Rata-rata	SD
		R1	R2	R3		
Hari ke-1	0	6,53	6,52	6,56	6,54	0,02
	50	6,68	6,64	6,66	6,66	0,02
	100	6,8	6,78	6,81	6,80	0,02
	150	6,95	6,98	6,9	6,94	0,04
Hari ke-21	0	6,65	6,64	6,65	6,65	0,01
	50	6,77	6,79	6,81	6,79	0,02
	100	6,92	6,93	6,9	6,92	0,02
	150	7,09	6,96	6,98	7,01	0,07

## Hasil statistic uji daya sebar menggunakan *One Way Anova*

### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Daya sebar ke-1	.197	12	.200*	.943	12	.542
Daya sebar ke-21	.235	12	.066	.897	12	.145

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

a. Lilliefors Significance Correction

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Daya sebar ke-1	Based on Mean	.576	3	8	.647
	Based on Median	.231	3	8	.872
	Based on Median and with adjusted df	.231	3	7.230	.872
	Based on trimmed mean	.544	3	8	.666
Daya sebar ke-21	Based on Mean	2.824	3	8	.107
	Based on Median	.279	3	8	.839
	Based on Median and with adjusted df	.279	3	5.038	.839
	Based on trimmed mean	2.366	3	8	.147

### ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Daya sebar ke-1	Between Groups	.080	3	.027	30.590	.000
	Within Groups	.007	8	.001		
	Total	.086	11			
Daya sebar ke-21	Between Groups	.131	3	.044	19.378	.001
	Within Groups	.018	8	.002		
	Total	.149	11			

### Daya sebar ke-1

Tukey HSDa

formula	N	Subset for alpha = 0.05		
		1	2	3
F1	3	6.7200		
F2	3	6.7833	6.7833	
F3	3		6.8200	
F4	3			6.9433
Sig.		.111	.467	1.000

Means for groups in homogeneous subsets are displayed.

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

### Daya sebar ke-21

Tukey HSD<sup>a</sup>

formula	N	Subset for alpha = 0.05	
		1	2
F1	3	6.7300	
F2	3	6.7900	
F3	3	6.8300	
F4	3		7.0100
Sig.		.120	1.000

Means for groups in homogeneous subsets are displayed.

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

### Hasil statistic uji daya sebar menggunakan *Paired t-test*

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Daya sebar ke-1	.197	12	.200*	.943	12	.542
Daya sebar ke-21	.235	12	.066	.897	12	.145

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

a. Lilliefors Significance Correction

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Daya sebar ke-1	6.8167	12	.08866	.02559
	Daya sebar ke-21	6.8400	12	.11631	.03357

#### Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Daya sebar ke-1 & Daya sebar ke-21	12	.917	.000

#### Paired Samples Test

		Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Daya sebar ke-1 - Daya sebar ke-21	-.02333	.04979	.01437	-.05497	.00830	-1.623	11	.133

### Lampiran 14. Hasil uji cycling test

Waktu	Formula	Viskositas			Rata-rata	SD
		R1	R2	R3		
Sebelum	1	240	250	240	243,33	5,77
	2	230	230	220	226,67	5,77
	3	210	210	220	213,33	5,77
	4	190	200	190	193,33	5,77
Sesudah	1	240	240	240	240,00	0,00
	2	230	220	220	223,33	5,77
	3	210	200	210	206,67	5,77
	4	200	190	180	190,00	10,00

### Hasil statistik uji viskositas cycling test Paired T-Test

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Viskositas sebelum	.125	12	.200*	.951	12	.650
Viskositas sesudah	.142	12	.200*	.935	12	.431

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

a. Lilliefors Significance Correction

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	viskositas sebelum	219.1667	12	19.75225	5.70198
	viskositas sesudah	215.0000	12	20.22600	5.83874

#### Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	viskositas sebelum & viskositas sesudah	12	.944	.000

#### Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	viskositas sebelum - viskositas sesudah	4.16667	6.68558	1.92996	-.08115	8.41448	2.159	11	.054



Waktu	Formula	pH			Rata-rata	SD
		R1	R2	R3		
Sebelum	1	5,88	5,88	5,94	5,90	0,03
	2	5,6	5,59	5,64	5,61	0,03
	3	5,49	5,48	5,49	5,49	0,01
	4	5,25	5,26	5,33	5,28	0,04
Sesudah	1	5,92	5,86	5,87	5,87	0,01
	2	5,55	5,54	5,63	5,57	0,05
	3	5,5	5,43	5,41	5,45	0,05
	4	5,32	5,2	5,22	5,25	0,06

### Hasil statistik uji pH cycling test

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pH sebelum stabilitas	.156	12	.200*	.922	12	.307
pH setelah stabilitas	.156	12	.200*	.931	12	.387

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

a. Lilliefors Significance Correction

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pH sebelum stabilitas	5.5692	12	.23593	.06811
	pH setelah stabilitas	5.5375	12	.24510	.07075

#### Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pH sebelum stabilitas & pH setelah stabilitas	12	.977	.000

#### Paired Samples Test

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pair 1 pH sebelum stabilitas - pH setelah stabilitas	.03167	.05184	.01497	-.00127	.06461	2.116	11	.058

### Lampiran 15. Uji aktivitas SPF

Waktu	Formula	SPF			Rata-rata	SD
		R1	R2	R3		
Sebelum	1	0,09	0,08	0,047	0,07	0,02
	2	12,19	12,61	13,61	12,80	0,73
	3	28,84	28,67	28,18	28,56	0,34
	4	32,79	34,01	34,06	33,62	0,72
Sesudah	1	0,05	0,05	0,04	0,05	0,01
	2	11,43	11,39	11,42	11,41	0,02
	3	25,52	25,11	25,68	25,44	0,29
	4	31,32	31,46	31,41	31,40	0,07

### Hasil statistik nilai SPF menggunakan *Kruskal Wallis*

	Tests of Normality					
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SPF Sebelum	.252	12	.034	.843	12	.030

a. Lilliefors Significance Correction

Ranks			
	formula	N	Mean Rank
SPF Sebelum	F1	3	2.00
	F2	3	5.00
	F3	3	8.00
	Total	9	

### Test Statistics<sup>a,b</sup>

SPF Sebelum	
Kruskal-Wallis H	7.200
df	2
Asymp. Sig.	.027

a. Kruskal Wallis Test

b. Grouping Variable: formula

### Hasil statistik nilai SPF menggunakan *Wilcoxon*

	Tests of Normality					
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SPF Sebelum	.252	12	.034	.843	12	.030
SPF Sesudah	.223	12	.101	.852	12	.039

a. Lilliefors Significance Correction

		Ranks		
		N	Mean Rank	Sum of Ranks
SPF Sesudah - SPF Sebelum	Negative Ranks	12 <sup>a</sup>	6.50	78.00
	Positive Ranks	0 <sup>b</sup>	.00	.00
	Ties	0 <sup>c</sup>		
	Total	12		

- a. SPF Sesudah < SPF Sebelum  
b. SPF Sesudah > SPF Sebelum  
c. SPF Sesudah = SPF Sebelum

### Test Statistics<sup>a</sup>

SPF Sesudah - SPF Sebelum	
Z	-3.061 <sup>b</sup>
Asymp. Sig. (2-tailed)	.002

- a. Wilcoxon Signed Ranks Test  
b. Based on positive ranks.