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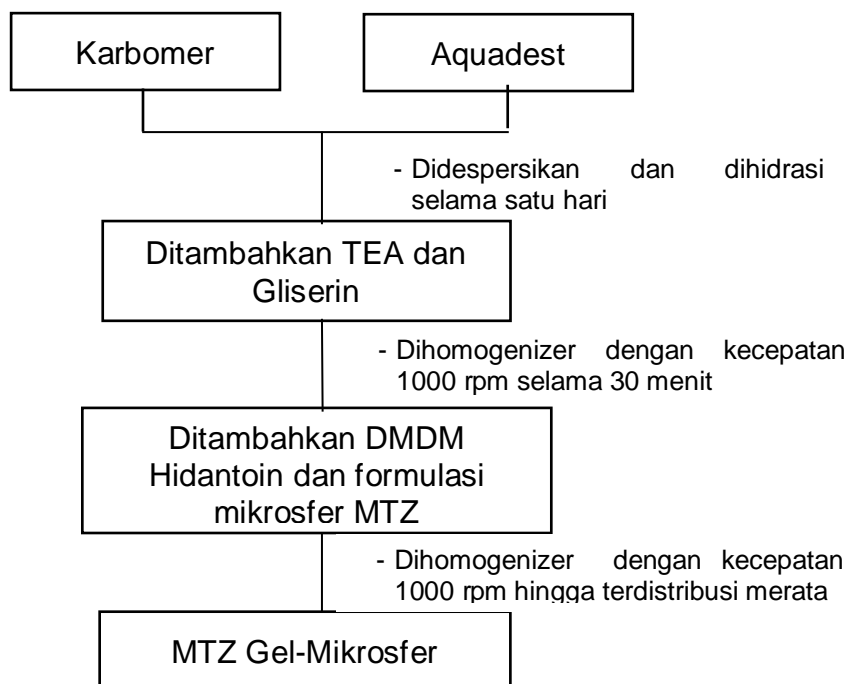
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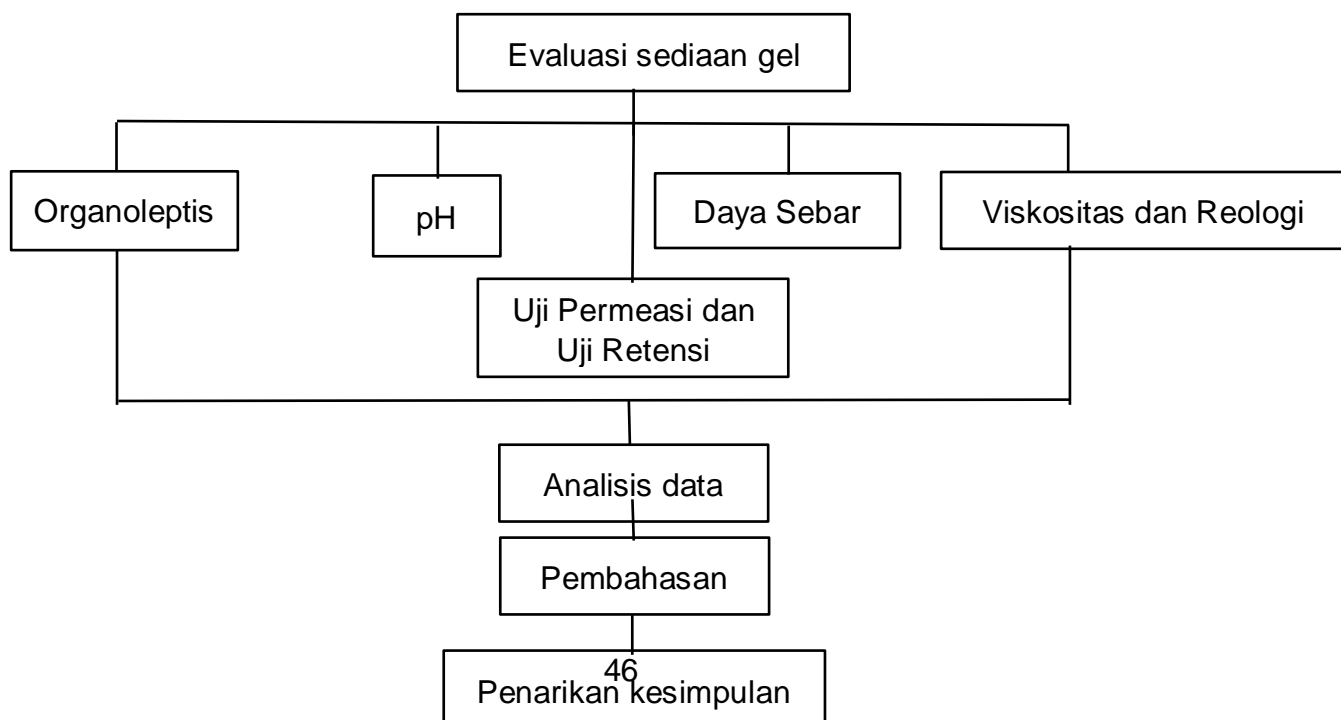
# LAMPIRAN

## Lampiran 1. Skema Kerja Penelitian

### 1. Formulasi

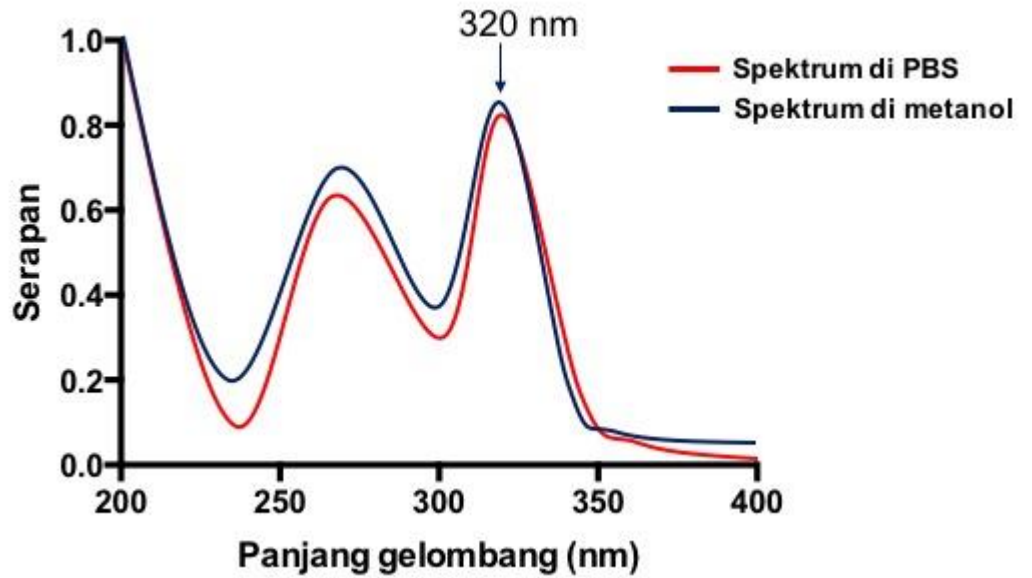


### 2. Penelitian



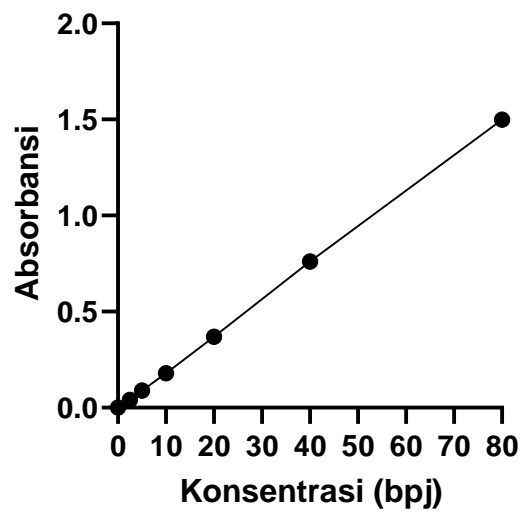
## Lampiran 2. Panjang Gelombang Maksimum dan Kurva Baku

### Lampiran 2.1. Panjang Gelombang Maksimum



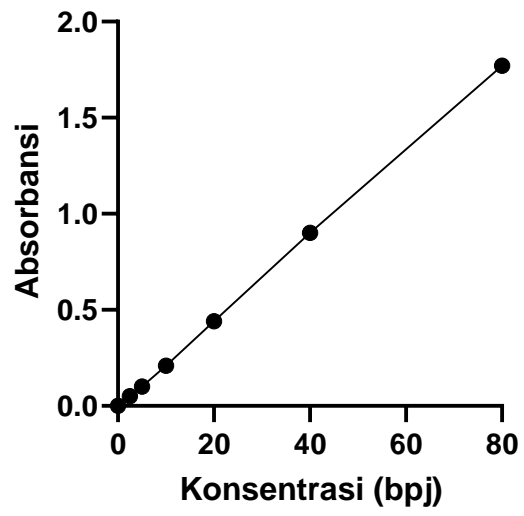
Gambar 18. Panjang Gelombang Metronidazol

### Lampiran 2.2. Kurva Baku

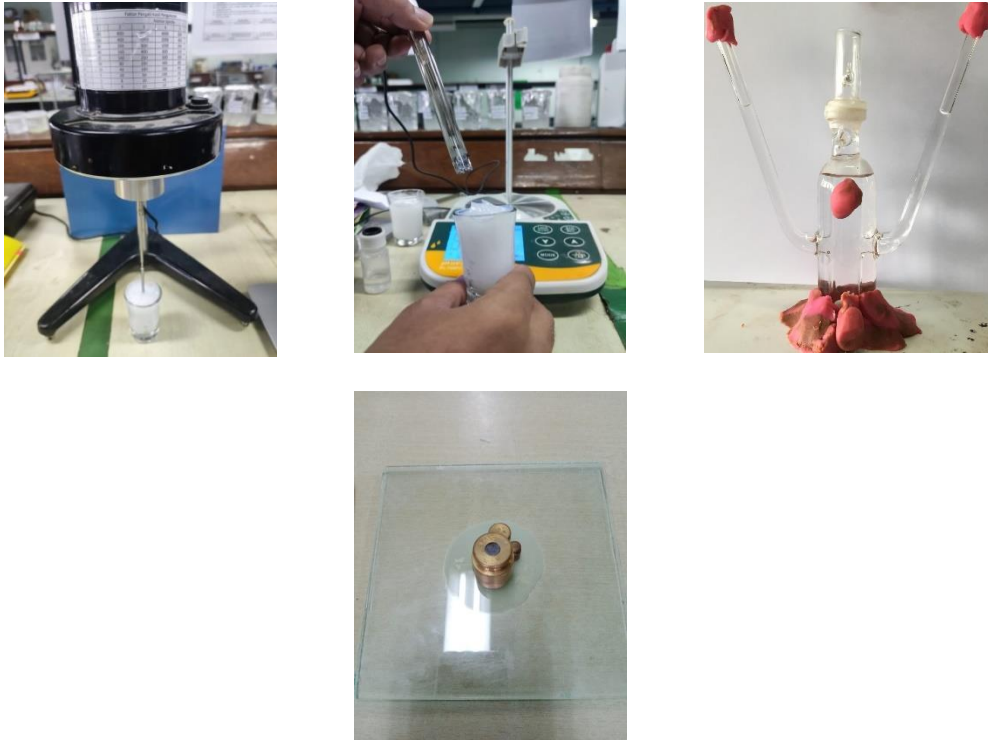


Gambar 19. Persamaan Kurva Baku (PBS)





Gambar 20. Persamaan Kurva Baku (Metanol)

**Lampiran 3. Gambar Penelitian**

**Gambar 21. (a) Viskositas gel (b) Pengujian pH (c) Uji permeasi (d) Uji daya sebar**

## Lampiran 4. Perhitungan

### a. Uji Permeasi Gel-Mikrosfer

1 mL formula tiap pengujian mengandung 10 mg metronidazol

Persamaan:  $y = 0.0189x - 0.0058$

Dimana:  $y$  = serapan;  $x$  = konsentrasi

Pada F3 Replikasi 1 jam 8, diperoleh serapan = 0,18

Sehingga, untuk mendapatkan konsentrasi:

$$0,18 = 0.0189x - 0.0058$$

$$x = \frac{0,18 + 0,0058}{0,0189}$$

$$x = 9,83 \mu\text{g/mL}$$

Konsentrasi dalam 1,5 mL = 9,83  $\mu\text{g}$

$$\text{Konsentrasi dalam 28 mL} = \frac{9,83 \mu\text{g} \times 28 \text{ mL}}{1000} = 0,27 \text{ mg}$$

Jumlah terpermeasi = konsentrasi dalam 28 mL + Faktor koreksi

$$= 0,27 + 0$$

$$= 0,27 \text{ mg}$$

Jumlah terpermeasi = konsentrasi dalam 28 mL + Faktor koreksi

$$= 0,27 + 0,05$$

$$= 0,32 \text{ mg}$$

Kecepatan permeasi sediaan (fluks,  $J$ ,  $\mu\text{g/cm}^2/\text{jam}^{-1}$ ) dihitung dengan rumus :

$$J = \frac{M}{S \times t}$$

Dimana :

$J$  = Fluks ( $\mu\text{g/cm}^2/\text{jam}^{-1}$ )

- S = Luas area difusi (cm<sup>2</sup>)  
 M = Jumlah zat yang terpenetrasi (µg)  
 T = Waktu (Jam)

Maka :

$$J = \frac{0,32 \text{ mg}}{4,9 \text{ cm}^2 \times 8 \text{ jam}} \times 1000 = 8,17 \text{ } \mu\text{g/cm}^2/\text{jam}^{-1}$$

Persamaan:  $y = 0.0189x - 0.0058$

Dimana:  $y$  = serapan;  $x$  = konsentrasi

Pada F3 Replikasi 1 jam 24, diperoleh serapan = 0,36

Sehingga, untuk mendapatkan konsentrasi:

$$0,36 = 0.0189x - 0.0058$$

$$x = \frac{0,36 + 0,0058}{0,0189}$$

$$x = 19,35 \text{ } \mu\text{g/mL}$$

Konsentrasi dalam 1,5 mL = 19,35 µg

$$\text{Konsentrasi dalam 28 mL} = \frac{19,35 \text{ } \mu\text{g} \times 28 \text{ mL}}{1000} = 0,54 \text{ mg}$$

Jumlah terpermeasi = konsentrasi dalam 28 mL + Faktor koreksi

$$= 0,54 + 0$$

$$= 0,54 \text{ mg}$$

Jumlah terpermeasi = konsentrasi dalam 28 mL + Faktor koreksi

$$= 0,54 + 0,06$$

$$= 0,60 \text{ mg}$$

Kecepatan permeasi sediaan (fluks,  $J$ ,  $\mu\text{g/cm}^2/\text{jam}^{-1}$ ) dihitung dengan rumus :

$$J = \frac{M}{S \times t}$$

Dimana :

J = Fluks ( $\mu\text{g}/\text{cm}^2/\text{jam}^{-1}$ )

S = Luas area difusi ( $\text{cm}^2$ )

M = Jumlah zat yang terpenetrasi ( $\mu\text{g}$ )

T = Waktu (Jam)

Maka :

$$J = \frac{0,60 \text{ mg}}{4,9 \text{ cm}^2 \times 24 \text{ jam}} \times 1000 = 5,11 \mu\text{g}/\text{cm}^2/\text{jam}^{-1}$$

#### **b. Uji Retensi Gel-Mikrosfer**

Persamaan:  $y = 0,0223x - 0,0069$

Dimana; y = serapan : x = konsentrasi

Pada F3 Replikasi 1, diperoleh serapan 1,55

Sehingga, untuk mendapatkan konsentrasi:

$$1,55 = 0,0223x - 0,0069$$

$$x = \frac{1,55 + 0,0069}{0,0223}$$

$$x = 69,82 \mu\text{g}/\text{mL}$$

$$\text{Jumlah Metronidazol yang terdeposisi} = \frac{69,82}{1000} \times 30 \text{ mL} = 2,09 \text{ mg}$$

## Lampiran 5. Tabel hasil Evaluasi

### Lampiran 5.1. Tabel Kurva Baku

#### Lampiran 5.1.1 Kurva Baku PBS

Konsentrasi	Serapan 1	Serapan 2	Serapan 3	Rata-rata	SD
0	0	0	0	0	0
2.5	0.046	0.038	0.044	0.04	0.00
5	0.089	0.081	0.086	0.09	0.00
10	0.184	0.168	0.176	0.18	0.01
20	0.380	0.369	0.359	0.37	0.01
40	0.756	0.761	0.762	0.76	0.00
80	1.496	1.506	1.509	1.50	0.01

#### Lampiran 5.1.2 Kurva Baku Metanol

Konsentrasi	Serapan 1	Serapan 2	Serapan 3	Rata-rata	SD
0	0	0	0	0	0
2.5	0.054	0.045	0.052	0.05	0.01
5	0.105	0.095	0.101	0.10	0.00
10	0.218	0.198	0.208	0.21	0.01
20	0.449	0.435	0.424	0.44	0.01
40	0.892	0.898	0.899	0.90	0.00
80	1.766	1.777	1.781	1.77	0.01

Lampiran 5.2. Tabel Uji pH

Replikasi	Formula			
	F1	F2	F3	F4
1	5.25	5.34	5.37	5.42
2	5.27	5.36	5.36	5.43
3	5.24	5.33	5.39	5.4
Rata-rata	5.25	5.34	5.37	5.42
SD	0.02	0.02	0.02	0.02

Lampiran 5.3. Tabel Uji Daya Sebar

Beban	Formula			
	F1	F2	F3	F4
125	3.27	3.03	2.84	2.63
	3.31	3.07	2.89	2.69
	3.26	3.05	2.82	2.64
225	3.98	3.77	3.61	3.25
	4.06	3.73	3.43	3.13
	4.04	3.70	3.59	3.22
325	4.55	4.26	3.98	3.64
	4.51	4.32	3.95	3.61
	4.67	4.28	4.00	3.70
425	5.12	4.55	4.41	4.15
	5.09	4.66	4.34	4.20
	5.13	4.63	4.38	4.18
525	5.57	5.11	4.79	4.54

	5.52	5.09	4.82	4.51
	5.53	5.12	4.78	4.57
<b>Rata-rata</b>	4.51	4.16	3.91	3.64
<b>SD</b>	0.83	0.74	0.70	0.70

Lampiran 5.4. Tabel Uji Viskositas

Replikasi	Fromula			
	F1	F2	F3	F4
1	25700	31000	35300	47500
2	23600	32300	37700	43500
3	24800	31700	38100	48700
<b>Rata-rata</b>	24700	31666.67	37033.33	46566.67
<b>SD</b>	1053.57	650.64	1514.38	2722.74

Lampiran 5.5. Tabel Uji Rheologi F1

Kecepatan (rpm)	Rate of Shear $s^{-1}$	Shearing Stress mPa				
		R1	R2	R3	Rata-Rata	SD
0	0.00	0.00	0.00	0.00	0.00	0.00
5	8.52	91.96	97.41	98.77	96.05	3.60
10	17.03	222.75	235.01	227.52	228.43	6.18



20	34.06	315.06	303.13	315.06	311.08	6.88
50	85.15	2186.65	2009.54	2111.72	2102.64	88.90
100	170.30	5960.50	6028.62	5946.88	5978.67	43.80

**Lampiran 5.6. Tabel Uji Rheologi F2**

Kecepatan (rpm)	Rate of Shear $s^{-1}$	Shearing Stress mPa				
		R1	R2	R3	Rata-Rata	SD
0	0.00	0.00	0.00	0.00	0.00	0.00
5	8.52	146.46	153.27	146.46	148.73	3.93
10	17.03	269.07	282.70	262.94	271.57	10.11
20	34.06	366.15	383.18	374.66	374.66	8.51
50	85.15	2639.65	2752.05	2697.55	2696.42	56.21
100	170.30	6294.29	6369.22	6437.34	6366.95	71.55

**Lampiran 5.7. Tabel Uji Rheologi F3**

Kecepatan (rpm)	Rate of Shear $s^{-1}$	Shearing Stress mPa				
		R1	R2	R3	Rata-Rata	SD

0	0.00	0.00	0.00	0.00	0.00	0.00
5	8.52	160.08	153.27	156.68	156.68	3.41
10	17.03	282.70	272.48	282.70	279.29	5.90
20	34.06	434.27	468.33	451.30	451.30	17.03
50	85.15	3005.45	3209.81	3244.22	3153.16	129.07
100	170.30	6709.82	6777.94	6743.88	6743.88	34.06

**Lampiran 5.8. Tabel Uji Rheologi F4**

Kecepatan (rpm)	Rate of Shear $s^{-1}$	Shearing Stress mPa				
		R1	R2	R3	Rata-Rata	SD
0	0	0.0	0.0	0.0	0.0	0.0
5	8.52	1818.80	974.12	2077.66	1623.53	577.11
10	17.03	2227.52	2350.14	2009.54	2195.73	172.51
20	34.06	3780.66	3746.60	3780.66	3769.31	19.66
50	85.15	4044.28	3704.03	4146.81	3965.04	231.78
100	170.30	4121.26	4189.38	4087.20	4132.61	52.03

Lampiran 5.9. Tabel Uji Permeasi F1

Jam	Replikasi	Serapan	Konsentrasi ( $\mu\text{g/ml}$ )	1.5 ml ( $\mu\text{g}$ )	28 ml (mg)	Faktor koreksi	Jumlah terpermeasi	Rata-rata	SD
<b>0,25</b>	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00		
<b>0.5</b>	1	0.05	2.89	4.33	0.08	0.00	0.08	0.08	0.00
	2	0.05	2.71	4.07	0.08	0.00	0.08		
	3	0.05	2.98	4.47	0.08	0.00	0.08		
<b>0.75</b>	1	0.09	5.03	7.54	0.14	0.00	0.15	0.16	0.01
	2	0.10	5.74	8.61	0.16	0.00	0.16		
	3	0.10	5.56	8.34	0.16	0.00	0.16		
<b>1</b>	1	0.12	6.72	10.08	0.19	0.01	0.20	0.22	0.02
	2	0.15	8.23	12.35	0.23	0.01	0.24		
	3	0.13	7.25	10.88	0.20	0.01	0.22		
<b>2</b>	1	0.18	9.75	14.62	0.27	0.02	0.29	0.31	0.01
	2	0.18	10.03	15.05	0.28	0.03	0.31		
	3	0.19	10.41	15.62	0.29	0.02	0.32		
<b>3</b>	1	0.21	11.56	17.34	0.32	0.04	0.36	0.37	0.01
	2	0.22	11.84	17.77	0.33	0.04	0.37		
	3	0.21	11.65	17.48	0.33	0.04	0.37		
<b>4</b>	1	0.26	13.87	20.81	0.39	0.05	0.44	0.44	0.01
	2	0.26	14.07	21.10	0.39	0.06	0.45		
	3	0.25	13.58	20.37	0.38	0.06	0.44		



	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00		
<b>0.75</b>	1	0.05	2.82	4.23	0.08	0.00	0.08		
	2	0.04	2.65	3.97	0.07	0.00	0.07		
	3	0.05	2.91	4.36	0.08	0.00	0.08	0.08	0.00
<b>1</b>	1	0.09	4.90	7.35	0.14	0.00	0.14		
	2	0.10	5.60	8.39	0.16	0.00	0.16		
	3	0.10	5.42	8.13	0.15	0.00	0.16	0.15	0.01
<b>2</b>	1	0.12	6.55	9.82	0.18	0.01	0.19		
	2	0.15	8.02	12.03	0.22	0.01	0.24		
	3	0.13	7.07	10.60	0.20	0.01	0.21	0.21	0.02
<b>3</b>	1	0.15	8.21	12.32	0.23	0.02	0.25		
	2	0.15	8.45	12.68	0.24	0.02	0.26		
	3	0.16	8.77	13.16	0.25	0.02	0.27	0.26	0.01
<b>4</b>	1	0.18	9.73	14.60	0.27	0.03	0.31		
	2	0.18	9.97	14.96	0.28	0.04	0.32		
	3	0.18	9.81	14.72	0.27	0.04	0.31	0.31	0.01
<b>5</b>	1	0.21	11.67	17.51	0.33	0.05	0.38		
	2	0.22	11.83	17.75	0.33	0.05	0.38		
	3	0.21	11.43	17.14	0.32	0.05	0.37	0.38	0.01
<b>6</b>	1	0.25	13.31	19.96	0.37	0.07	0.44		
	2	0.25	13.47	20.21	0.38	0.07	0.45		
	3	0.24	13.14	19.71	0.37	0.07	0.44	0.44	0.01
<b>7</b>	1	0.27	14.48	21.72	0.41	0.09	0.49	0.50	0.01

	2	0.28	15.00	22.50	0.42	0.09	0.51		
	3	0.28	14.91	22.37	0.42	0.09	0.51		
<b>8</b>	1	0.28	15.17	22.76	0.42	0.11	0.53		
	2	0.28	15.00	22.50	0.42	0.11	0.53		
	3	0.26	14.13	21.20	0.40	0.11	0.51	0.52	0.02
<b>24</b>	1	0.60	31.88	47.83	0.89	0.13	1.02		
	2	0.45	24.06	36.09	0.67	0.13	0.81		
	3	0.72	38.61	57.91	1.08	0.13	1.21	1.01	0.20

Lampiran 5.11. Tabel Uji Permeasi F3

Jam	Replikasi	Serapan	Konsentrasi ( $\mu\text{g/ml}$ )	1.5 ml ( $\mu\text{g}$ )	28 ml (mg)	Faktor koreksi	Jumlah terpermeasi	Rata-rata	SD
<b>0.25</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>0.5</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>0.75</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>1</b>	1	0.03	2.06	3.10	0.06	0.00	0.06	0.06	0.01

	2	0.03	1.81	2.71	0.05	0.00	0.05		
	3	0.04	2.36	3.55	0.07	0.00	0.07		
<b>2</b>	1	0.05	3.04	4.56	0.09	0.00	0.09		
	2	0.06	3.69	5.53	0.10	0.00	0.11		
	3	0.06	3.27	4.90	0.09	0.00	0.10	0.10	0.01
<b>3</b>	1	0.06	3.50	5.25	0.10	0.01	0.11		
	2	0.06	3.60	5.40	0.10	0.01	0.11		
	3	0.06	3.73	5.59	0.10	0.01	0.11	0.11	0.00
<b>4</b>	1	0.07	4.13	6.19	0.12	0.01	0.13		
	2	0.07	4.23	6.34	0.12	0.01	0.13		
	3	0.07	4.16	6.24	0.12	0.01	0.13	0.13	0.00
<b>5</b>	1	0.09	4.82	7.23	0.13	0.02	0.15		
	2	0.10	5.50	8.25	0.15	0.02	0.17		
	3	0.09	5.33	8.00	0.15	0.02	0.17	0.17	0.01
<b>6</b>	1	0.12	6.44	9.66	0.18	0.03	0.21		
	2	0.14	7.89	11.83	0.22	0.03	0.25		
	3	0.13	6.95	10.42	0.19	0.03	0.22	0.23	0.02
<b>7</b>	1	0.15	8.20	12.30	0.23	0.04	0.27		
	2	0.15	8.44	12.66	0.24	0.04	0.28		
	3	0.16	8.76	13.14	0.25	0.04	0.28	0.28	0.01
<b>8</b>	1	0.18	9.72	14.57	0.27	0.05	0.32		
	2	0.18	9.95	14.93	0.28	0.05	0.33		
	3	0.18	9.80	14.69	0.27	0.05	0.33	0.33	0.01
<b>24</b>	1	0.36	19.27	28.91	0.54	0.06	0.60		0.56

2	0.28	14.99	22.49	0.42	0.07	0.49
3	0.35	18.63	27.94	0.52	0.07	0.59

**Lampiran 5.12. Tabel Uji Permeasi F4**

Jam	Replikasi	Serapan	Konsentrasi ( $\mu\text{g/ml}$ )	1.5 ml ( $\mu\text{g}$ )	28 ml (mg)	Faktor koreksi	Jumlah terpemeasi	Rata-rata	SD
<b>0.25</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>0.5</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>0.75</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>1</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>2</b>	1	0.00	0.00	0.00	0.00	0.00	0.00		
	2	0.00	0.00	0.00	0.00	0.00	0.00		
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<b>3</b>	1	0.03	1.93	2.90	0.05	0.00	0.05	0.05	0.00



	2	0.02	1.59	2.38	0.04	0.00	0.04		
	3	0.03	1.73	2.60	0.05	0.00	0.05		
<b>4</b>	1	0.05	2.93	4.40	0.08	0.00	0.09		
	2	0.06	3.56	5.33	0.10	0.00	0.10		
	3	0.05	3.15	4.73	0.09	0.00	0.09	0.09	0.01
<b>5</b>	1	0.05	3.18	4.77	0.09	0.01	0.10		
	2	0.06	3.27	4.90	0.09	0.01	0.10		
	3	0.06	3.38	5.07	0.09	0.01	0.10	0.10	0.00
<b>6</b>	1	0.06	3.57	5.36	0.10	0.01	0.11		
	2	0.06	3.65	5.48	0.10	0.01	0.11		
	3	0.06	3.60	5.40	0.10	0.01	0.11	0.11	0.00
<b>7</b>	1	0.07	3.83	5.75	0.11	0.02	0.12		
	2	0.08	4.46	6.69	0.12	0.02	0.14		
	3	0.08	4.32	6.48	0.12	0.02	0.14	0.14	0.01
<b>8</b>	1	0.10	5.34	8.01	0.15	0.02	0.17		
	2	0.12	6.53	9.79	0.18	0.02	0.21		
	3	0.10	5.76	8.64	0.16	0.02	0.19	0.19	0.02
<b>24</b>	1	0.27	14.34	21.51	0.40	0.03	0.43		
	2	0.19	10.62	15.93	0.30	0.03	0.33		
	3	0.24	12.79	19.18	0.36	0.03	0.39	0.39	0.05

Lampiran 5.13. Tabel Uji Permeasi Kontrol

Jam	Replikasi	Serapan	Konsentrasi ( $\mu\text{g/ml}$ )	1.5 ml ( $\mu\text{g}$ )	28 ml (mg)	Faktor koreksi	Jumlah terpemeasi	Rata-rata	SD
<b>0.25</b>	1	0.07	3.93	5.89	0.11	0.00	0.11	0.11	0.01
	2	0.06	3.68	5.52	0.10	0.00	0.10		
	3	0.07	4.05	6.08	0.11	0.00	0.11		
<b>0.5</b>	1	0.13	6.92	10.39	0.19	0.01	0.20	0.22	0.01
	2	0.14	7.92	11.88	0.22	0.01	0.23		
	3	0.14	7.67	11.51	0.21	0.01	0.22		
<b>0.75</b>	1	0.17	9.30	13.94	0.26	0.02	0.28	0.30	0.03
	2	0.21	11.42	17.13	0.32	0.02	0.34		
	3	0.18	10.05	15.07	0.28	0.02	0.30		
<b>1</b>	1	0.25	13.50	20.26	0.38	0.03	0.41	0.42	0.01
	2	0.26	13.90	20.86	0.39	0.03	0.42		
	3	0.27	14.44	21.66	0.40	0.03	0.44		
<b>2</b>	1	0.30	16.04	24.05	0.45	0.05	0.50	0.51	0.01
	2	0.30	16.44	24.65	0.46	0.06	0.52		
	3	0.30	16.17	24.25	0.45	0.05	0.51		
<b>3</b>	1	0.41	21.76	32.64	0.61	0.07	0.68	0.69	0.01
	2	0.41	22.07	33.11	0.62	0.08	0.70		
	3	0.40	21.30	31.95	0.60	0.08	0.67		
<b>4</b>	1	0.46	24.85	37.27	0.70	0.11	0.80	0.81	0.01
	2	0.47	25.16	37.74	0.70	0.11	0.82		
	3	0.46	24.54	36.81	0.69	0.11	0.80		

<b>5</b>	1	0.43	23.08	34.61	0.65	0.14	0.79		
	2	0.45	23.91	35.87	0.67	0.15	0.82		
	3	0.44	23.77	35.66	0.67	0.15	0.81	0.81	0.02
<b>6</b>	1	0.45	24.19	36.29	0.68	0.18	0.86		
	2	0.45	23.91	35.87	0.67	0.19	0.86		
	3	0.42	22.52	33.77	0.63	0.18	0.81	0.84	0.02
<b>7</b>	1	0.60	31.88	47.82	0.89	0.22	1.11		
	2	0.56	30.01	45.02	0.84	0.22	1.06		
	3	0.61	32.81	49.22	0.92	0.22	1.14	1.10	0.04
<b>8</b>	1	0.88	46.96	70.43	1.31	0.26	1.58		
	2	0.91	48.20	72.30	1.35	0.27	1.62		
	3	0.92	49.11	73.66	1.38	0.27	1.64	1.61	0.03
<b>24</b>	1	1.54	81.95	122.92	2.29	0.33	2.63		
	2	1.42	75.39	113.08	2.11	0.34	2.45		
	3	1.63	86.66	129.98	2.43	0.34	2.77	2.61	0.16

Lampiran 6.1. Tabel Hasil Fluks F1

Fluks Permeasi ( $\mu\text{g}/\text{cm}^2/\text{jam}$ )	Rata-rata	SD
0.00		
0.00		
0.00	0.00	0.00
33.02		
30.98		
34.04	32.68	1.55
39.48		
44.83		
43.58	42.63	2.80
40.81		
49.63		
44.06	44.83	4.46
30.09		
31.22		
32.17	31.16	1.04
24.50		
25.28		
24.87	24.89	0.39
22.57		
23.05		
22.30	22.64	0.38

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21.13		
21.53		
21.01	21.22	0.27
18.79		
19.50		
19.33	19.21	0.37
17.45		
17.45		
16.58	17.16	0.50
15.78		
15.21		
16.16	15.72	0.48
9.17		
9.46		
8.52	9.05	0.48

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**Lampiran 6.2. Tabel Hasil Fluks F2**

Fluks Permeasi ( $\mu\text{g}/\text{cm}^2/\text{jam}$ )	Rata-rata	SD
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
21.49		
20.17		
22.16	21.27	1.01
28.87		
32.79		
31.87	31.18	2.05
19.89		
24.19		
21.47	21.85	2.17
17.10		
17.76		
18.28	17.72	0.59
15.62		
16.14		
15.87	15.88	0.26
15.31		

15.65		
15.14	15.37	0.26
<hr/>		
14.91		
15.20		
14.83	14.98	0.19
<hr/>		
14.32		
14.87		
14.73	14.64	0.29
<hr/>		
13.58		
13.58		
12.90	13.36	0.39
<hr/>		
8.70		
6.88		
10.31	8.63	1.72
<hr/>		

Lampiran 6.3. Tabel Hasil Fluks F3

Fluks Permeasi ( $\mu\text{g}/\text{cm}^2/\text{jam}$ )	Rata-rata	SD
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
11.79		
10.33		
13.51	11.88	1.59
9.01		
10.81		
9.70	9.84	0.91
7.19		
7.41		
7.67	7.42	0.24
6.56		
6.73		
6.66	6.65	0.09



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6.29		
7.10		
6.92	6.77	0.43
7.03		
8.47		
7.58	7.69	0.73
7.74		
8.06		
8.28	8.03	0.27
8.17		
8.46		
8.32	8.32	0.14
5.12		
4.14		
5.00	4.76	0.53

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Lampiran 6.4. Tabel Hasil Fluks F4

Fluks Permeasi ( $\mu\text{g}/\text{cm}^2/\text{jam}$ )	Rata-rata	SD
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
0.00		
0.00		
0.00	0.00	0.00
3.68		
3.02		
3.30	3.33	0.33
4.34		
5.20		
4.64	4.73	0.44

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3.93		
4.05		
4.16	4.05	0.12
3.81		
3.91		
3.85	3.86	0.05
3.64		
4.17		
4.05	3.95	0.28
4.41		
5.29		
4.73	4.81	0.45
3.68		
2.82		
3.32	3.28	0.43

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### Lampiran 6.5. Tabel Hasil Fluks Kontrol

Fluks Permeasi ( $\mu\text{g}/\text{cm}^2/\text{jam}$ )	Rata-rata	SD
89.78		
84.07		
92.63	88.83	4.36
81.54		
92.80		
90.18	88.17	5.89
75.26		
91.74		
81.33	82.77	8.33
83.33		
86.50		
89.16	86.33	2.92
50.97		
52.61		
51.74	51.77	0.82
46.52		
47.48		
45.91	46.64	0.79
40.97		
41.71		
40.70	41.12	0.53
32.27		

33.49		
33.18	32.98	0.64
29.13		
29.13		
27.67	28.64	0.84
32.30		
30.99		
33.11	32.13	1.07
40.25		
41.26		
41.86	41.12	0.81
22.35		
20.84		
23.52	22.24	1.34

Lampiran 7.1. Tabel Uji Retensi

Formula	Replikasi	Serapan	Konsentrasi ( $\mu\text{g/ml}$ )	Jumlah metrodinazol terdeposisi setelah 8 jam (mg)	Rata-rata	SD
<b>F1</b>	1	0.38	17.26	0.52	0.54	0.03
	2	0.42	18.97	0.57		
	3	0.40	18.20	0.55		
<b>F2</b>	1	0.60	27.19	0.82	0.79	0.04
	2	0.55	24.88	0.75		
	3	0.59	26.76	0.80		
<b>F3</b>	1	1.55	69.82	2.09	2.10	0.04
	2	1.59	71.53	2.15		
	3	1.52	68.62	2.06		
<b>F4</b>	1	0.05	2.62	0.08	0.08	0.01
	2	0.06	2.96	0.09		
	3	0.05	2.54	0.08		
<b>F3 Kontrol</b>	1	0.06	3.13	0.09	0.09	0.01
	2	0.05	2.71	0.08		
	3	0.06	3.05	0.09		

## Lampiran 8. Data Hasil Analisis Statistika

### Lampiran 8.1. Uji pH

#### ANOVA

pH

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.043	3	.014	61.429	.000
Within Groups	.002	8	.000		
Total	.045	11			

#### Post Hoc Tests

#### Multiple Comparisons

Dependent Variable: pH

Tukey HSD

(I) Mikrosfergel	(J) Mikrosfergel	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	-.09000*	.01247	.000	-.1299	-.0501
	Formula 3	-.12000*	.01247	.000	-.1599	-.0801
	Formula 4	-.16333*	.01247	.000	-.2033	-.1234
Formula 2	Formula 1	.09000*	.01247	.000	.0501	.1299
	Formula 3	-.03000	.01247	.153	-.0699	.0099
	Formula 4	-.07333*	.01247	.002	-.1133	-.0334

Formula 3	Formula 1	.12000*	.01247	.000	.0801	.1599
	Formula 2	.03000	.01247	.153	-.0099	.0699
	Formula 4	-.04333*	.01247	.034	-.0833	-.0034
Formula 4	Formula 1	.16333*	.01247	.000	.1234	.2033
	Formula 2	.07333*	.01247	.002	.0334	.1133
	Formula 3	.04333*	.01247	.034	.0034	.0833

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

## Homogeneous Subsets

Tukey HSD<sup>a</sup>

Mikrosfergel	N	Subset for alpha = 0.05		
		1	2	3
Formula 1	3	5.2533		
Formula 2	3		5.3433	
Formula 3	3		5.3733	
Formula 4	3			5.4167
Sig.		1.000	.153	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.



**Lampiran 8.2. Uji Daya Sebar****Kruskal-Wallis Test**

<b>Ranks</b>			
	Formula	N	Mean Rank
Beban	Formula 1	15	30.50
	Formula 2	15	30.50
	Formula 3	15	30.50
	Formula 4	15	30.50
	Total		60

<b>Test Statistics<sup>a,b</sup></b>	
	DayaSebar
Chi-Square	9.335
Df	3
Asymp. Sig.	.025

a. Kruskal Wallis Test

b. Grouping Variable: Formula

## Post Hoc Tests

Dependent Variable:

DayaSebar

Tukey HSD

(I) Beban	(J) Beban	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Beban 125	Beban 225	-.66750*	.13900	.000	-1.0595	-.2755
	Beban 325	-1.16417*	.13900	.000	-1.5562	-.7721
	Beban 425	-1.61167*	.13900	.000	-2.0037	-1.2196
	Beban 525	-2.03750*	.13900	.000	-2.4295	-1.6455
Beban 225	Beban 125	.66750*	.13900	.000	.2755	1.0595
	Beban 325	-.49667*	.13900	.006	-.8887	-.1046
	Beban 425	-.94417*	.13900	.000	-1.3362	-.5521
	Beban 525	-1.37000*	.13900	.000	-1.7620	-.9780
Beban 325	Beban 125	1.16417*	.13900	.000	.7721	1.5562
	Beban 225	.49667*	.13900	.006	.1046	.8887
	Beban 425	-.44750*	.13900	.018	-.8395	-.0555
	Beban 525	-.87333*	.13900	.000	-1.2654	-.4813
Beban 425	Beban 125	1.61167*	.13900	.000	1.2196	2.0037
	Beban 225	.94417*	.13900	.000	.5521	1.3362
	Beban 325	.44750*	.13900	.018	.0555	.8395
	Beban 525	-.42583*	.13900	.027	-.8179	-.0338

Beban 525	Beban 125	.03750*	13900	000	.6455	.4295
	Beban 225	.37000*	13900	000	9780	.7620
	Beban 325	87333*	13900	000	4813	.2654
	Beban 425	42583*	13900	027	0338	8179

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

## Homogeneous Subsets

### DayaSebar

Tukey HSD<sup>a</sup>

Beban	N	Subset for alpha = 0.05				
		1	2	3	4	5
Beban 125	12	2.9583				
Beban 225	12		3.6258			
Beban 325	12			4.1225		
Beban 425	12				4.5700	
Beban 525	12					4.9958
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 = 12.000.

### Lampiran 8.3. Uji Viskositas

#### ANOVA

Viskositas

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	641862500.000	3	213954166.667	11.232	.003
Within Groups	152386666.667	8	19048333.333		
Total	794249166.667	11			

### Post Hoc Tests

#### Multiple Comparisons

Dependent Variable: Viskositas

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	-6966.66667	3563.55004	.280	-18378.4083	4445.0749
	Formula 3	-14500.00000*	3333.39583	.010	-25174.7068	-3825.2932
	Formula 4	-20800.00000*	3984.17007	.004	-33558.7150	-8041.2850
Formula 2	Formula 1	6966.66667	3563.55004	.280	-4445.0749	18378.4083
	Formula 3	-7533.33333	3333.39583	.187	-18208.0402	3141.3735
	Formula 4	-13833.33333*	3984.17007	.034	-26592.0483	-1074.6183

Formula 3	Formula 1	14500.00000*	3333.39583	.010	3825.2932	25174.7068
	Formula 2	7533.33333	3333.39583	.187	-3141.3735	18208.0402
	Formula 4	-6300.00000	3779.71560	.398	-18403.9798	5803.9798
Formula 4	Formula 1	20800.00000*	3984.17007	.004	8041.2850	33558.7150
	Formula 2	13833.33333*	3984.17007	.034	1074.6183	26592.0483
	Formula 3	6300.00000	3779.71560	.398	-5803.9798	18403.9798

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

## Homogeneous Subsets

### Viskositas

Tukey HSD<sup>a,b</sup>

Formula	N	Subset for alpha = 0.05		
		1	2	3
Formula 1	3	24700.0000		
Formula 2	3	31666.6667	31666.6667	
Formula 3	4		39200.0000	39200.0000
Formula 4	2			45500.0000
Sig.		.301	.247	.376

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 2.824.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

## Lampiran 8.4. Uji Rheologi

### Kruskal Wallis Test

Ranks			
	Formula	N	Mean Rank
ShearingStress	Formula 1	18	30.83
	Formula 2	18	33.89
	Formula 3	18	36.11
	Formula 4	18	45.17
	Total	72	
RateofShare	Formula 1	18	36.50
	Formula 2	18	36.50
	Formula 3	18	36.50
	Formula 4	18	36.50
	Total	72	

Test Statistics <sup>a,b</sup>		
	ShearingStress	RateofShare
Chi-Square	4.715	.000
df	3	3
Asymp. Sig.	.194	1.000

- a. Kruskal Wallis Test  
 b. Grouping Variable: Formula

## Post Hoc Tests

### Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
ShearingStress	Formula 1	Formula 2	-190.24500	733.01445	.994	-2120.7977	1740.3077
		Formula 3	-344.57500	733.01445	.965	-2275.1277	1585.9777
		Formula 4	-1161.56000	733.01445	.394	-3092.1127	768.9927
	Formula 2	Formula 1	190.24500	733.01445	.994	-1740.3077	2120.7977
		Formula 3	-154.33000	733.01445	.997	-2084.8827	1776.2227
		Formula 4	-971.31500	733.01445	.550	-2901.8677	959.2377
	Formula 3	Formula 1	344.57500	733.01445	.965	-1585.9777	2275.1277
		Formula 2	154.33000	733.01445	.997	-1776.2227	2084.8827
		Formula 4	-816.98500	733.01445	.682	-2747.5377	1113.5677
	Formula 4	Formula 1	1161.56000	733.01445	.394	-768.9927	3092.1127
		Formula 2	971.31500	733.01445	.550	-959.2377	2901.8677
		Formula 3	816.98500	733.01445	.682	-1113.5677	2747.5377
RateofShare	Formula 1	Formula 2	.00000	20.40353	1.000	-53.7371	53.7371

	Formula 3	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 4	.00000	20.40353	1.000	-53.7371	53.7371
Formula 2	Formula 1	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 3	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 4	.00000	20.40353	1.000	-53.7371	53.7371
Formula 3	Formula 1	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 2	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 4	.00000	20.40353	1.000	-53.7371	53.7371
Formula 4	Formula 1	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 2	.00000	20.40353	1.000	-53.7371	53.7371
	Formula 3	.00000	20.40353	1.000	-53.7371	53.7371

## Homogeneous Subsets

### ShearingStress

Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05
		1
Formula 1	18	1452.8100
Formula 2	18	1643.0550
Formula 3	18	1797.3850



Formula 4	18	2614.3700
Sig.		.394

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 18.000.

### Lampiran 8.5. Uji Permeasi

#### 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 Jam8 - Jam24	-.34083	.16968	.04898	-.44864	-.23303	-6.958	11	.000

#### ANOVA

Jam ke 8

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.332	3	.111	554.153	.000
Within Groups	.002	8	.000		
Total	.334	11			

## Post Hoc Tests

### Multiple Comparisons

Dependent Variable: Jam ke 8

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	.09333*	.01155	.000	.0564	.1303
	Formula 3	.29000*	.01155	.000	.2530	.3270
	Formula 4	.42667*	.01155	.000	.3897	.4636
Formula 2	Formula 1	-.09333*	.01155	.000	-.1303	-.0564
	Formula 3	.19667*	.01155	.000	.1597	.2336
	Formula 4	.33333*	.01155	.000	.2964	.3703
Formula 3	Formula 1	-.29000*	.01155	.000	-.3270	-.2530
	Formula 2	-.19667*	.01155	.000	-.2336	-.1597
	Formula 4	.13667*	.01155	.000	.0997	.1736
Formula 4	Formula 1	-.42667*	.01155	.000	-.4636	-.3897
	Formula 2	-.33333*	.01155	.000	-.3703	-.2964
	Formula 3	-.13667*	.01155	.000	-.1736	-.0997

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

## Homogeneous Subsets

### Jam ke 8

Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05			
		1	2	3	4
Formula 4	3	.1900			
Formula 3	3		.3267		
Formula 2	3			.5233	
Formula 1	3				.6167
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.

### ANOVA

Jam ke 24

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.014	3	.338	27.310	.000
Within Groups	.099	8	.012		
Total	1.113	11			

## Post Hoc Tests

### Multiple Comparisons

Dependent Variable: Jam ke 24

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	.05000	.09083	.944	-.2409	.3409
	Formula 3	.50333*	.09083	.002	.2125	.7942
	Formula 4	.68000*	.09083	.000	.3891	.9709
Formula 2	Formula 1	-.05000	.09083	.944	-.3409	.2409
	Formula 3	.45333*	.09083	.005	.1625	.7442
	Formula 4	.63000*	.09083	.001	.3391	.9209
Formula 3	Formula 1	-.50333*	.09083	.002	-.7942	-.2125
	Formula 2	-.45333*	.09083	.005	-.7442	-.1625
	Formula 4	.17667	.09083	.283	-.1142	.4675
Formula 4	Formula 1	-.68000*	.09083	.000	-.9709	-.3891
	Formula 2	-.63000*	.09083	.001	-.9209	-.3391
	Formula 3	-.17667	.09083	.283	-.4675	.1142

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

## Homogeneous Subsets

### Jam ke 24

Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05	
		1	2
Formula 4	3	.3833	
Formula 3	3	.5600	
Formula 2	3		1.0133
Formula 1	3		1.0633
Sig.		.283	.944

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

## Lampiran 8.6. Uji Permeasi (F1-F4 : Kontrol)

### T-Test

#### Group Statistics

	Grup	N	Mean	Std. Deviation	Std. Error Mean
Konsentrasi	1.00	3	2.6167	.16042	.09262
	5.00	3	.3833	.05033	.02906

**Independent Samples Test**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Konsentrasi	2.181	.214	23.008	4	.000	2.23333	.09707	1.96383	2.50284
Equal variances assumed									
Equal variances not assumed			23.008	2.390	.001	2.23333	.09707	1.87465	2.59202

**Lampiran 8.7. Fluks Permeasi (F1-F4)**

**ANOVA**

Jam ke 24

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	73.440	3	24.480	26.836	.000
Within Groups	7.298	8	.912		
Total	80.738	11			

## Post Hoc Tests

### Multiple Comparisons

Dependent Variable: Jam ke 24

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	.42000	.77984	.947	-2.0773	2.9173
	Formula 3	4.29667*	.77984	.003	1.7994	6.7940
	Formula 4	5.77667*	.77984	.000	3.2794	8.2740
Formula 2	Formula 1	-.42000	.77984	.947	-2.9173	2.0773
	Formula 3	3.87667*	.77984	.005	1.3794	6.3740
	Formula 4	5.35667*	.77984	.001	2.8594	7.8540
Formula 3	Formula 1	-4.29667*	.77984	.003	-6.7940	-1.7994
	Formula 2	-3.87667*	.77984	.005	-6.3740	-1.3794
	Formula 4	1.48000	.77984	.301	-1.0173	3.9773
Formula 4	Formula 1	-5.77667*	.77984	.000	-8.2740	-3.2794
	Formula 2	-5.35667*	.77984	.001	-7.8540	-2.8594
	Formula 3	-1.48000	.77984	.301	-3.9773	1.0173

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

## Homogeneous Subsets

### Jam ke 24

Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05	
		1	2
Formula 4	3	3.2733	
Formula 3	3	4.7533	
Formula 2	3		8.6300
Formula 1	3		9.0500
Sig.		.301	.947

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

## Lampiran 8.8. Uji Retensi

### Kruskal- Wallis Test

#### Ranks

	Formula	N	Mean Rank
Jam ke 8	Formula 1	3	5.00
	Formula 2	3	8.00



Formula 3	3	11.00
Formula 4	3	2.00
Total	12	

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

	Jam ke 8
Chi-Square	10.421
df	3
Asymp. Sig.	.015

a. Kruskal Wallis Test

b. Grouping Variable:

Formula

## Post Hoc Test

### Multiple Comparisons

Dependent Variable: Jam ke 8

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Formula 1	Formula 2	-.24333*	.02603	.000	-.3267	-.1600
	Formula 3	-1.55333*	.02603	.000	-1.6367	-1.4700
	Formula 4	.46333*	.02603	.000	.3800	.5467
Formula 2	Formula 1	.24333*	.02603	.000	.1600	.3267

	Formula 3	-1.31000*	.02603	.000	-1.3934	-1.2266
	Formula 4	.70667*	.02603	.000	.6233	.7900
Formula 3	Formula 1	1.55333*	.02603	.000	1.4700	1.6367
	Formula 2	1.31000*	.02603	.000	1.2266	1.3934
	Formula 4	2.01667*	.02603	.000	1.9333	2.1000
Formula 4	Formula 1	-.46333*	.02603	.000	-.5467	-.3800
	Formula 2	-.70667*	.02603	.000	-.7900	-.6233
	Formula 3	-2.01667*	.02603	.000	-2.1000	-1.9333

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

### Lampiran 6.8. Uji Retensi (F1-F4 : Kontrol)

#### T-Test

Group Statistics					
	Grup	N	Mean	Std. Deviation	Std. Error Mean
Konsentrasi	1.00	3	2.9633	.22301	.12875
	5.00	3	2.7067	.22301	.12875

#### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Konsentrasi									
Equal variances assumed	.000	1.000	1.410	4	.231	.25667	.18209	-.24889	.76222
Equal variances not assumed			1.410	4.000	.231	.25667	.18209	-.24889	.76222