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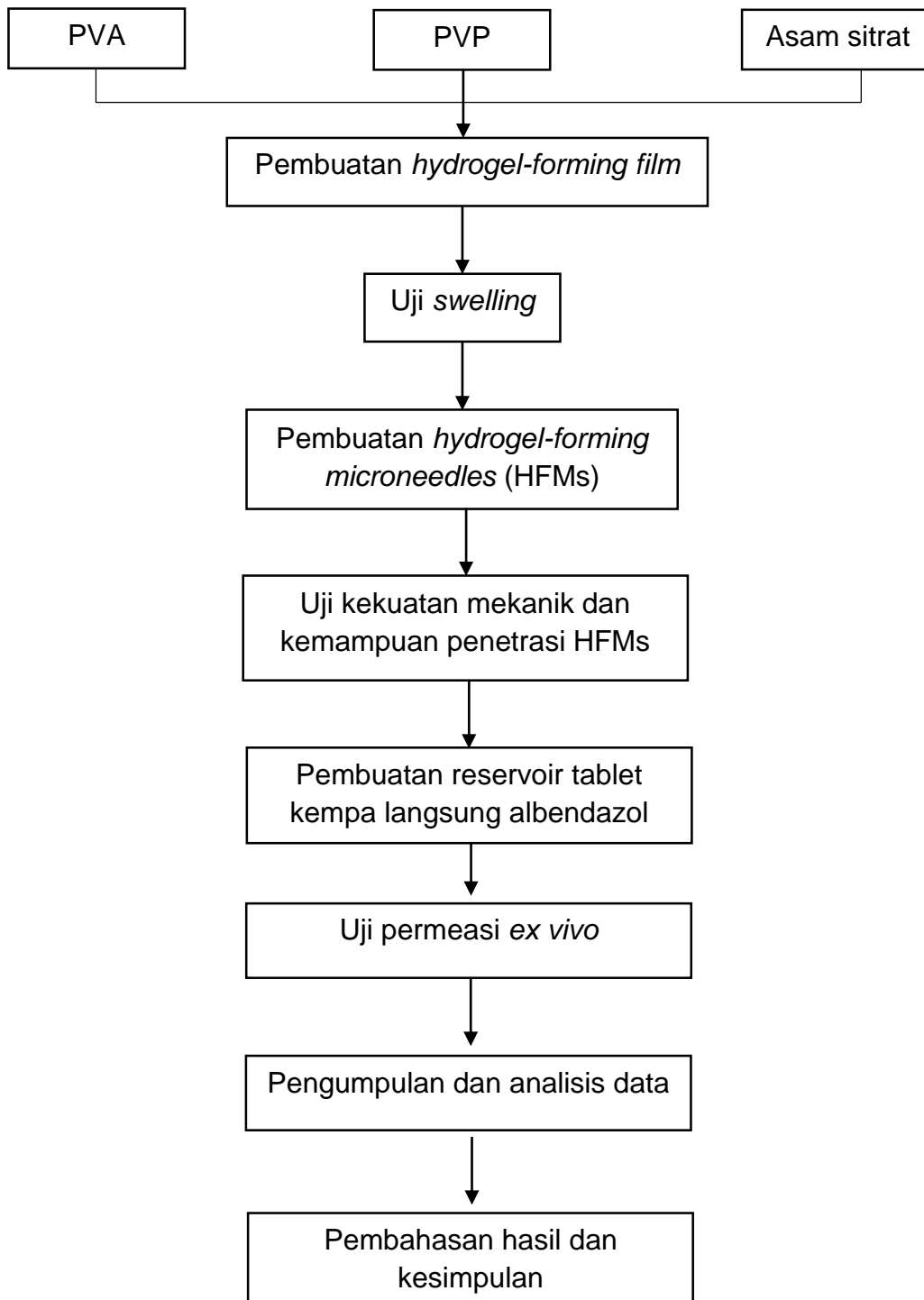
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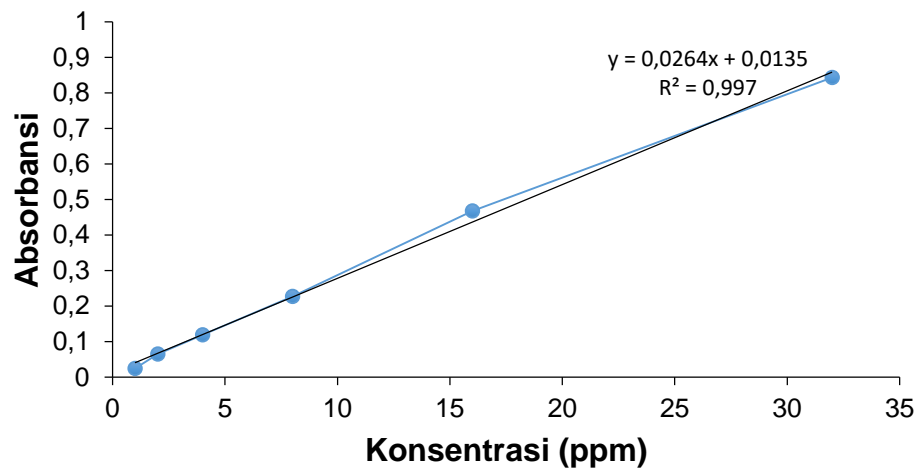
LAMPIRAN

Lampiran 1. Skema kerja



Lampiran 2. Kurva Baku

Kurva Baku Albendazol



Gambar 15. Grafik kurva baku albendazol

Tabel 8. Kurva baku albendazol

Konsentrasi	Abs 1	Abs 2	Abs 3	Rata-rata \pm SD
1	0,047	0,025	0	0,024 \pm 0,024
2	0,085	0,063	0,047	0,065 \pm 0,019
4	0,14	0,119	0,096	0,118 \pm 0,022
8	0,249	0,228	0,205	0,227 \pm 0,022
16	0,491	0,47	0,442	0,468 \pm 0,025
32	0,864	0,856	0,81	0,843 \pm 0,030

Lampiran 3. Tabel Hasil Uji

Tabel 8. Uji *swelling*

Formula	Waktu (jam)											
	0	0,25	0,5	1	2	3	4	5	6	7	8	24
F1	0,28	0,50	0,64	0,97	1,06	1,07	1,08	1,10	1,12	1,13	1,18	1,19
	0,27	0,52	0,66	0,96	0,97	1,02	1,06	1,07	1,09	1,12	1,18	1,17
	0,26	0,48	0,64	0,96	0,99	1,00	1,01	1,05	1,07	1,09	1,18	1,30
F2	0,27	0,57	0,76	0,99	1,05	1,07	1,10	1,12	1,15	1,17	1,18	1,19
	0,28	0,58	0,76	0,99	1,06	1,08	1,08	1,12	1,13	1,15	1,19	1,32
	0,27	0,55	0,74	1,07	1,08	1,09	1,12	1,13	1,13	1,15	1,18	1,31
F3	0,27	0,62	0,86	1,08	1,33	1,42	1,45	1,49	1,52	1,53	1,56	1,58
	0,29	0,60	0,89	1,12	1,31	1,45	1,44	1,44	1,46	1,53	1,53	1,56
	0,28	0,60	0,89	1,12	1,41	1,35	1,43	1,55	1,55	1,56	1,57	1,60
F4	0,27	0,61	0,84	1,21	1,25	1,28	1,30	1,32	1,35	1,36	1,40	1,45
	0,27	0,55	0,84	1,28	1,31	1,31	1,33	1,35	1,36	1,38	1,45	1,48
	0,28	0,58	0,88	1,32	1,35	1,36	1,40	1,43	1,46	1,46	1,46	1,48

Contoh perhitungan uji *swelling*

Diketahui : bobot awal F1 replikasi pertama = 0,277

bobot interval jam ke-2 = 1,057

$$\%Swelling = \frac{\text{Bobot pada interval waktu tertentu} - \text{Bobot awal}}{\text{Bobot awal}} \times 100\%$$

$$= \frac{1,057 - 0,277}{0,277} \times 100\% = 281,59\%$$

Tabel 9. Uji kekuatan mekanik

Formula	Sebelum Uji Kekuatan Mekanik (μm)	Setelah Uji Kekuatan Mekanik (μm)	Persentase Kekuatan Mekanik (%)
F1	701	687	1,10
	709	679	4,23
	706	671	4,96
F2	708	673	4,94
	711	665	6,47
	703	677	3,70
F3	709	591	16,64
	710	587	17,32
	702	571	18,66
F4	711	601	15,47
	702	618	11,97
	709	614	13,40

Contoh perhitungan penurunan tinggi *needle*

Diketahui : tinggi sebelum uji F1 replikasi pertama = 701

tinggi sesudah uji F1 replikasi pertama = 687

$$\% \text{ kekuatan mekanik} = \frac{\text{Tinggi sebelum uji} - \text{Tinggi sesudah uji}}{\text{Tinggi sebelum uji}} \times 100\%$$

$$= \frac{701 - 687}{701} \times 100\%$$

$$= 1,99\%$$

Tabel 10. Uji kemampuan penetrasi

Lapisan	Jumlah lubang yang terbentuk			
	F1	F2	F3	F4
1	100	100	100	100
	100	100	100	100
	100	100	100	100
	100	100	100	100
2	100	100	100	100
	100	100	100	100
	100	91	79	89
	100	98	64	93
3	100	93	81	91
	87	53	34	43
	91	67	21	51
	83	71	28	49
4	32	19	0	0
	28	23	0	0
	45	24	0	0
	0	0	0	0
5	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
6	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
7	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
8	0	0	0	0
	0	0	0	0

Contoh perhitungan penetrasi HFMs

Diketahui : jumlah lubang yang teramati F1 replikasi pertama = 100

jumlah lubang keseluruhan = 100

$$\% \text{ kemampuan penetrasi} = \frac{\text{Jumlah lubang yang teramati}}{\text{jumlah lubang keseluruhan}} \times 100\%$$

$$= \frac{100}{100} \times 100\% = 100\%$$

Tabel 11. Persentase permeasi ex vivo F1

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,03	0,55	0,55	1	7,14	0	7,14		
0,25	0,03	0,66	0,66	1	8,62	0	8,62	8,45	1,24
	0,03	0,74	0,74	1	9,60	0	9,60		
	0,04	1,08	1,08	1	14,03	0,55	14,58		
0,5	0,04	0,97	0,97	1	12,56	0,67	13,22	14,03	0,72
	0,04	1,04	1,04	1	13,54	0,74	14,28		
	0,07	2,03	2,03	1	26,34	1,63	27,97		
0,75	0,07	2,18	2,18	1	28,31	1,63	29,94	28,02	1,90
	0,06	1,88	1,88	1	24,38	1,78	26,16		
	0,08	2,56	2,56	1	33,24	3,66	36,90		
1	0,09	2,94	2,94	1	38,16	3,81	41,97	42,03	5,17
	0,10	3,35	3,35	1	43,58	3,66	47,23		
	0,13	4,49	4,49	1	58,35	6,21	64,56		
2	0,17	5,97	5,97	1	77,56	6,74	84,30	76,17	10,32

Waktu (jam)	Absorbansi	konsentrasi ($\mu\text{g/ml}$)	0.5 ml (μg)	Faktor dilusi	13 ml (μg)	Faktor koreksi	ABZ terpermeasi (μg)	Rata-rata	SD
	0,16	5,59	5,59	1	72,63	7,01	79,64		
	0,20	7,18	7,18	1	93,31	10,70	104,02		
3	0,22	7,78	7,78	1	101,19	12,71	113,91	109,26	4,97
	0,21	7,48	7,48	1	97,25	12,60	109,85		
	0,30	10,78	10,78	1	140,10	17,88	157,97		
4	0,31	11,23	11,23	1	146,00	20,50	166,50	158,26	8,09
	0,28	10,02	10,02	1	130,25	20,08	150,32		
	0,52	19,22	19,22	1	249,91	28,66	278,56		
5	0,63	23,43	23,43	1	304,56	31,72	336,29	306,65	28,90
	0,57	21,16	21,16	1	275,02	30,09	305,11		
	0,51	18,88	18,88	2	490,95	47,88	538,83		
6	0,58	21,57	21,57	2	560,87	55,15	616,02	540,08	75,33
	0,43	15,93	15,93	2	414,13	51,25	465,38		
7	0,51	18,81	18,81	4	977,96	66,76	1044,72	965,45	95,32

Waktu (jam)	Absorbansi	konsentrasi ($\mu\text{g/ml}$)	0.5 ml (μg)	Faktor dilusi	13 ml (μg)	Faktor koreksi	ABZ terpermeasi (μg)	Rata-rata	SD
	0,41	15,06	15,06	4	782,96	76,72	859,68		
	0,48	17,78	17,78	4	924,77	67,18	991,95		
	0,63	23,39	23,39	4	1216,29	85,57	1301,86		
8	0,52	19,15	19,15	4	995,68	91,78	1087,46	1146,15	136,20
	0,50	18,54	18,54	4	964,17	84,96	1049,13		
	0,82	30,51	30,51	5	1983,24	108,96	2092,20		
24	0,80	29,72	29,72	5	1931,53	110,93	2042,46	2060,67	27,41
	0,80	29,91	29,91	5	1943,84	103,50	2047,35		

Tabel 12. Persentase permeasi ex vivo F2

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,04	0,81	0,81	1	10,59	0	10,59		
0,25	0,04	1,04	1,04	1	13,54	0	13,54	12,23	1,50
	0,04	0,97	0,97	1	12,56	0	12,56		
	0,06	1,80	1,80	1	23,40	0,81	24,20		
0,5	0,05	1,42	1,42	1	18,47	1,04	19,51	24,00	4,40
	0,07	2,10	1,10	1	27,33	0,97	28,30		
	0,09	2,94	2,94	1	38,16	2,61	40,78		
0,75	0,10	3,35	3,35	1	43,58	2,46	46,04	43,50	2,64
	0,10	3,13	3,13	1	40,63	3,07	43,70		
	0,14	4,91	4,91	1	63,77	5,55	69,32		
1	0,17	5,97	5,97	1	77,56	5,81	83,37	78,48	7,94
	0,17	5,90	5,90	1	76,57	6,19	82,77		
2	0,21	7,48	7,48	1	97,25	10,45	107,71	113,29	5,59

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,23	8,24	8,24	1	107,10	11,78	118,88		
	0,22	7,78	7,78	1	101,19	12,08	113,28		
	0,33	12,06	12,06	1	156,84	17,94	174,77		
3	0,32	11,57	11,57	1	150,44	20,02	170,45	170,53	4,21
	0,31	11,27	11,27	1	146,50	19,87	166,36		
	0,40	14,72	14,72	1	191,31	30,00	221,31		
4	0,39	14,30	14,30	1	185,90	31,60	217,48	225,33	10,47
	0,43	15,85	15,85	1	206,08	31,14	237,22		
	0,79	29,50	29,50	1	383,35	44,72	428,07		
5	0,82	30,51	30,51	1	396,65	45,90	442,54	435,13	7,24
	0,80	29,83	29,83	1	387,78	46,99	434,77		
	0,62	22,94	22,94	2	596,33	74,20	670,53		
6	0,70	26,04	26,04	2	677,08	76,40	753,48	716,78	42,30
	0,67	24,98	24,98	2	649,51	76,82	726,33		

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,61	22,63	22,63	4	1176,90	97,14	1274,03		
7	0,57	21,16	21,16	4	1100,08	102,44	1202,52	1245,84	38,08
	0,60	22,30	22,30	4	1159,17	101,80	1260,97		
	0,51	18,84	18,84	6	1469,89	119,77	1589,66		
8	0,62	23,01	23,01	6	1794,89	123,60	1918,48	1732,22	168,71
	0,54	20,06	20,06	6	1564,43	124,09	1688,52		
	0,53	19,64	19,64	10	2553,22	138,62	2691,84		
24	0,50	18,35	18,35	10	2385,80	146,61	2532,41	2730,81	220,50
	0,59	21,72	21,72	10	2824,05	144,15	2968,20		

Tabel 13. Persentase permeasi ex vivo F3

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0	0,00	0,00	1	0	0	0		
0,25	0	0,00	0,00	1	0	0	0	0	0
	0	0,00	0,00	1	0	0	0		
0,5	0,03	0,55	0,55	1	7,14	0,00	7,14	9,11	2,26
	0,03	0,66	0,66	1	8,62	0,00	8,62		
	0,04	0,89	0,89	1	11,57	0,00	11,57		
0,75	0,05	1,34	1,34	1	17,48	0,55	18,03	20,64	3,09
	0,06	1,80	1,80	1	23,40	0,66	24,05		
	0,05	1,46	1,46	1	18,96	0,90	19,85		
	0,07	2,18	2,18	1	28,31	1,90	30,21		
1	0,08	2,44	2,44	1	31,76	2,46	34,22	31,37	2,49
	0,07	2,10	2,10	1	27,33	2,35	29,68		
2	0,09	2,94	2,94	1	38,16	4,07	42,23	47,73	5,16

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,10	3,35	3,35	1	43,58	4,91	48,48		
	0,11	3,69	3,69	1	48,01	4,45	52,46		
	0,20	6,99	6,99	1	90,85	7,00	97,86		
3	0,18	6,16	6,16	1	80,02	8,26	88,28	95,04	5,89
	0,20	6,99	6,99	1	90,85	8,14	98,99		
	0,21	7,56	7,56	1	98,24	13,99	112,23		
4	0,27	9,60	9,60	1	124,83	14,41	139,24	122,60	14,56
	0,23	7,78	7,78	1	101,19	15,13	116,33		
	0,43	15,85	15,85	1	206,08	21,55	227,63		
5	0,40	14,56	14,56	1	189,34	24,02	213,35	220,21	7,16
	0,41	15,13	15,13	1	196,72	22,92	219,64		
	0,28	10,13	10,13	2	263,45	37,41	300,85		
6	0,32	11,57	11,57	2	300,87	38,58	339,45	331,00	26,94
	0,33	12,10	12,10	2	314,66	38,05	352,71		

Waktu (jam)	Absorbansi	konsentrasi (µg/ml)	0.5 ml (µg)	Faktor dilusi	13 ml (µg)	Faktor koreksi	ABZ terpermeasi (µg)	Rata-rata	SD
	0,61	22,67	22,67	2	589,43	47,54	636,97		
7	0,72	26,69	26,69	2	693,83	50,15	743,98	696,49	54,51
	0,68	25,32	25,32	2	658,37	70,21	708,52		
	0,42	15,36	15,36	5	998,40	76,84	1068,60		
8	0,40	14,56	14,56	5	946,69	75,47	1023,52	1075,85	56,30
	0,44	16,31	16,31	5	1059,94	85,57	1135,42		
	0,62	22,90	22,90	5	1488,35	85,57	1573,92		
24	0,52	19,22	19,22	5	1249,53	91,40	1340,93	1470,42	118,65
	0,58	21,61	21,61	5	1404,64	91,78	1496,42		

Tabel 14. Persentase permeasi *ex vivo* F4

Waktu (jam)	Absorbansi	Konsentrasi ($\mu\text{g/ml}$)	0.5 ml (μg)	Faktor dilusi	13 ml (μg)	Faktor koreksi	ABZ terpermeasi (μg)	Rata-rata	SD
	0	0,00	0,00	1	0	0	0		
0,25	0	0,00	0,00	1	0	0	0	0	0
	0	0,00	0,00	1	0	0	0		
	0	0,00	0,00	1	0	0,00	0		
0,5	0	0,00	0,00	1	0	0,00	0	0	0
	0	0,00	0,00	1	0	0,00	0		
	0,03	0,66	0,66	1	8,62	0,00	8,62		
0,75	0,03	0,59	0,59	1	7,63	0,00	7,63	9,44	2,33
	0,04	0,93	0,93	1	12,06	0,00	12,06		
	0,07	2,10	2,10	1	27,33	0,66	27,99		
1	0,07	2,18	2,18	1	28,31	0,59	28,90	25,60	4,96
	0,05	1,46	1,46	1	18,96	0,93	19,89		
2	0,09	2,86	2,86	1	37,18	2,77	39,94	38,34	3,66

Waktu (jam)	Absorbansi	Konsentrasi ($\mu\text{g/ml}$)	0.5 ml (μg)	Faktor dilusi	13 ml (μg)	Faktor koreksi	ABZ terpermeasi (μg)	Rata-rata	SD
	0,09	2,94	2,94	1	38,16	2,77	40,93		
	0,08	2,44	2,44	1	31,76	2,39	34,15		
	0,12	4,07	4,07	1	52,94	5,63	58,56		
3	0,15	5,32	5,32	1	69,19	5,70	74,89	65,38	8,49
	0,13	4,45	4,45	1	57,86	4,83	62,69		
	0,18	6,16	6,16	1	80,02	9,70	89,72		
4	0,18	6,38	6,38	1	82,97	11,02	93,99	87,72	7,48
	0,16	5,40	5,40	1	70,17	9,28	79,45		
	0,21	7,52	7,52	1	97,75	15,85	113,60		
5	0,20	6,99	6,99	1	90,85	17,41	108,26	116,52	10,04
	0,24	8,69	8,69	1	113,01	14,68	127,69		
	0,53	19,64	19,64	1	255,32	23,37	278,70		
6	0,44	16,00	16,00	1	208,05	43,01	232,44	260,98	24,95
	0,52	19,11	19,11	1	248,43	40,40	271,80		

Waktu (jam)	Absorbansi	Konsentrasi ($\mu\text{g/ml}$)	0.5 ml (μg)	Faktor dilusi	13 ml (μg)	Faktor koreksi	ABZ terpermeasi (μg)	Rata-rata	SD
	0,34	12,52	12,52	2	325,50	43,01	368,50		
7	0,41	15,06	15,06	2	391,48	40,40	431,88	407,18	33,92
	0,40	14,56	14,56	2	378,67	42,48	421,16		
	0,70	26,04	26,04	2	677,08	55,53	732,61		
8	0,62	22,94	22,94	2	596,33	55,45	651,78	700,27	42,76
	0,68	25,36	25,36	2	659,36	57,05	716,40		
	0,58	21,53	21,53	4	1119,77	81,57	1201,34		
24	0,60	22,29	22,29	4	1159,17	78,40	1237,56	1219,91	18,11
	0,60	21,88	21,88	4	1137,5	82,41	1219,91		

Contoh Perhitungan Jumlah Obat yang Terpermeasi

Diketahui : Nilai serapan F1 jam ke-24 replikasi pertama = 0,819

Faktor pengenceran = 5

Persamaan regresi $y = 0,0264x + 0,0135$

Konsentrasi dan faktor koreksi pada jam ke-8 = 23,39 $\mu\text{g/mL}$ dan 85,57 μg .

Konsentrasi obat dalam $\mu\text{g/mL}$:

$$y = 0,0264x + 0,0135$$

$$x = \frac{y - 0,0135}{0,0264}$$

$$= \frac{0,819 - 0,0135}{0,0264}$$

$$= 30,51 \mu\text{g/mL}$$

Maka, dalam 1 mL yang dicuplik terdapat 30,51 $\mu\text{g/mL}$ obat

Konsentrasi dalam kompartemen reseptor

= Konsentrasi dalam 1 mL x Faktor Pengenceran x Volume kompartemen reseptor

$$= 30,51 \mu\text{g/mL} \times 5 \times 13 \text{ mL} = 1983,1 \mu\text{g}$$

Faktor koreksi = Konsentrasi dalam 1 mL pada jam sebelumnya + Faktor koreksi pada jam sebelumnya

$$= 23,39 \mu\text{g} + 85,57 \mu\text{g}$$

$$= 108,96 \mu\text{g}$$

Jumlah obat yang terpermeasi

= Konsentrasi dalam kompartemen reseptor + Faktor koreksi

$$= 1983,15 \mu\text{g} + 108,96 \mu\text{g}$$

$$= 2092,08 \mu\text{g}$$

Lampiran 3. Fluks

Tabel 15. Data fluks albendazol F1 dan F2

Waktu (jam)	F1					F2				
	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD
0,25	7,14	4,04	16,17	19,14	2,81	10,59	5,99	23,97	27,69	3,41
	8,62	4,88	19,51			13,54	7,67	30,66		
	9,60	5,44	21,74			12,56	7,11	28,43		
0,5	14,58	8,10	16,20	15,51	0,83	24,20	13,47	26,94	26,64	5,00
	13,22	7,30	14,60			19,51	10,75	21,50		
	14,29	7,87	15,75			28,30	15,74	31,49		
0,75	27,97	15,37	20,50	20,52	1,46	40,78	22,34	29,80	31,81	2,02
	29,94	16,49	21,99			46,04	25,37	33,82		
	26,16	14,30	19,07			43,70	23,86	31,82		
1	36,90	19,85	19,85	22,75	2,93	69,32	37,67	37,67	42,77	4,43
	41,97	22,68	22,68			83,37	45,55	45,55		

Waktu (jam)	F1					F2				
	ABZ terpermeasi (μg)	Permeat kumulatif (μg)	Fluks ($\mu\text{g}/\text{cm}^2$)	Rata-rata	SD	ABZ terpermeasi (μg)	Permeat kumulatif (μg)	Fluks ($\mu\text{g}/\text{cm}^2$)	Rata-rata	SD
2	47,23	25,70	25,70	20,62	2,87	82,77	45,10	45,10	30,45	4,43
	64,56	34,80	17,40							
	84,30	45,81	22,91							
	79,64	43,10	21,55							
	104,02	55,85	18,62							
3	113,90	60,88	20,30	19,48	0,84	170,45	90,83	30,28	30,36	0,89
	109,85	58,62	19,54							
	157,97	84,37	21,09							
4	166,50	88,45	22,11	21,02	1,13	217,48	114,17	28,54	29,70	1,48
	150,32	79,41	19,85							
	278,56	149,58	29,92							
5	336,29	181,40	36,28	33,01	3,18	442,54	237,53	47,51	46,67	0,80
	305,11	164,20	32,84			434,77	232,82	46,56		

Waktu (jam)	F1					F2				
	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD
6	538,83	152,51	25,42	25,48	3,55	670,53	189,80	31,63	33,81	1,99
	616,02	174,36	29,06			753,48	213,27	35,55		
	465,38	131,72	21,95			726,33	205,58	34,26		
7	1044,72	157,30	22,47	20,94	1,82	1274,03	194,05	27,72	27,22	0,73
	859,68	132,52	18,93			1202,52	184,69	26,38		
	991,95	149,90	21,41			1260,97	192,86	27,55		
8	1301,86	196,35	24,54	21,82	2,40	1589,66	172,59	21,57	23,32	2,03
	1087,46	166,89	20,86			1918,48	204,33	25,54		
	1049,13	160,50	20,06			1688,52	182,73	22,84		
24	2092,20	255,38	10,64	10,48	0,14	2691,84	183,77	7,66	7,80	0,52
	2042,46	250,08	10,42			2532,41	176,56	7,36		
	2047,35	249,37	10,40			2968,20	200,67	8,36		

Tabel 16. Data fluks albendazol F3 dan F4

Waktu (jam)	F3					F4				
	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD
	0	0	0			0	0	0		
0,25	0	0	0	0	0	0	0	0	0	0
	0	0	0			0	0	0		
	7,14	4,04	8,08			0	0	0		
0,5	8,62	4,88	9,76	10,31	2,55	0	0	0	0	0
	11,57	6,55	13,10			0	0	0		
	18,03	10,05	13,40			8,62	4,88	6,50		
0,75	24,05	13,43	17,90	15,32	2,33	7,63	4,32	5,76	7,12	1,76
	19,85	10,98	14,65			12,06	6,83	9,11		
	30,21	16,56	16,56			27,99	15,66	15,66		
1	34,22	18,88	18,68	17,13	1,36	28,90	16,20	16,19	14,28	2,86
	29,68	16,14	16,14			19,89	10,99	10,99		

Waktu (jam)	F3					F4				
	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD
2	42,23	22,76	11,38	12,88	1,43	39,94	21,83	10,91	10,48	1,01
	48,48	26,06	13,03			40,93	22,39	11,19		
	52,46	28,44	14,22			34,15	18,66	9,33		
3	97,86	53,41	17,80	17,20	1,14	58,56	31,56	10,52	11,83	1,59
	88,28	47,64	15,88			74,89	40,78	13,60		
	98,99	53,74	17,91			62,69	34,12	11,37		
4	112,23	59,57	14,90	16,32	2,06	89,72	48,04	12,01	11,71	1,00
	139,24	74,74	18,69			93,99	50,09	12,52		
	116,33	61,57	15,40			79,45	42,35	10,59		
5	227,63	122,76	24,55	23,64	0,88	113,60	59,82	11,96	12,29	1,21
	213,35	113,98	22,80			108,26	56,36	11,27		
	219,64	117,85	23,57			127,69	68,13	13,63		

Waktu (jam)	F3					F4				
	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD	ABZ terpermeasi (µg)	Permeat kumulatif (µg)	Fluks (µg/cm ²)	Rata-rata	SD
6	300,85	85,15	14,20	15,61	1,27	278,70	151,15	25,19	23,50	2,38
	339,45	96,08	16,01			232,44	124,68	20,78		
	352,71	99,83	16,64			271,80	147,25	24,54		
	636,97	180,30	25,76			368,50	104,30	14,90		
7	743,98	210,58	30,08	28,16	2,20	431,88	122,24	17,46	16,46	1,37
	708,52	200,54	28,65			421,16	119,21	17,03		
	1068,60	132,91	16,61			732,61	207,36	25,92		
8	1023,52	128,93	16,12	16,80	0,80	651,78	184,48	23,06	24,78	1,51
	1135,42	141,37	17,67			716,40	202,77	25,35		
	1573,92	192,73	8,03			1201,34	181,56	7,57		
24	1340,93	167,34	6,97	7,57	0,54	1237,56	186,24	7,76	7,67	0,10
	1496,42	185,01	7,71			1219,91	184,31	7,68		

Contoh perhitungan permeasi kumulatif

F1 replikasi pertama, jam ke-24 diperoleh serapan = 0,819

Persamaan : $y = 0,0264x + 0,0135$

$$x = \frac{y - 0,0135}{0,0264}$$

$$x = \frac{0,819 - 0,0135}{0,0264}$$

$$x = 30,51 \mu\text{g/mL}$$

Permeasi kumulatif dihitung dengan menggunakan rumus:

$$Q = \frac{C_n \cdot V + \sum_{i=1}^{n-1} C_i \cdot S}{A}$$

$$= \frac{30,51 \times 13 + 108,96 \times 0,5}{1,7665}$$

$$= 255,37 \mu\text{g/ cm}^2$$

Keterangan: $C_n = 30,51 \mu\text{g/mL}$

$$\sum_{i=1}^{n-1} = 108,96$$

$$V = 13 \text{ mL}$$

$$S = 0,5 \text{ mL}$$

$$A = 1,7665 \text{ cm}^2$$

Contoh perhitungan fluks tiap jam

$$J = \frac{Q}{T}$$

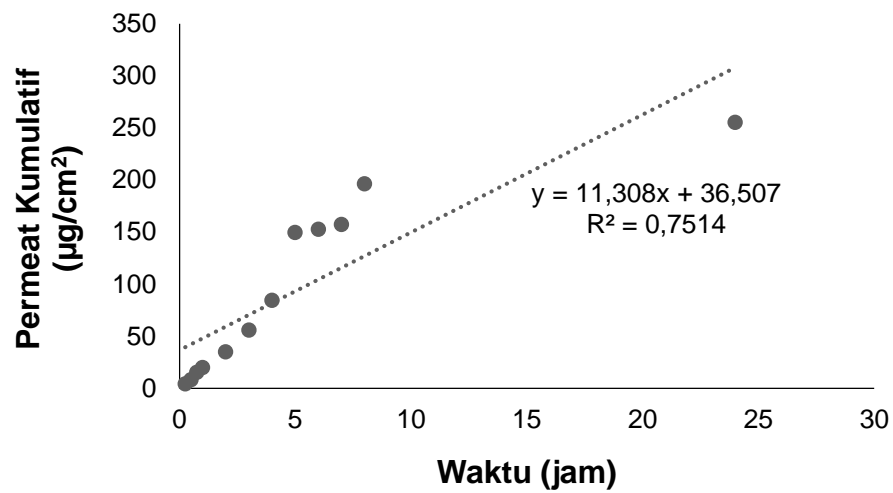
$$= \frac{255,37}{24}$$

$$= 10,64 \mu\text{g/ cm}^2 \cdot \text{jam}$$

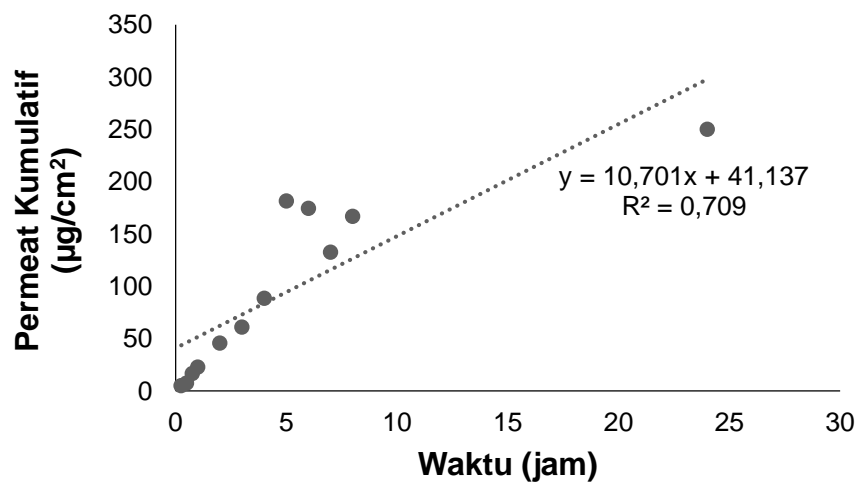
Contoh penentuan nilai fluks rata-rata

Persamaan : $y = bx + a$

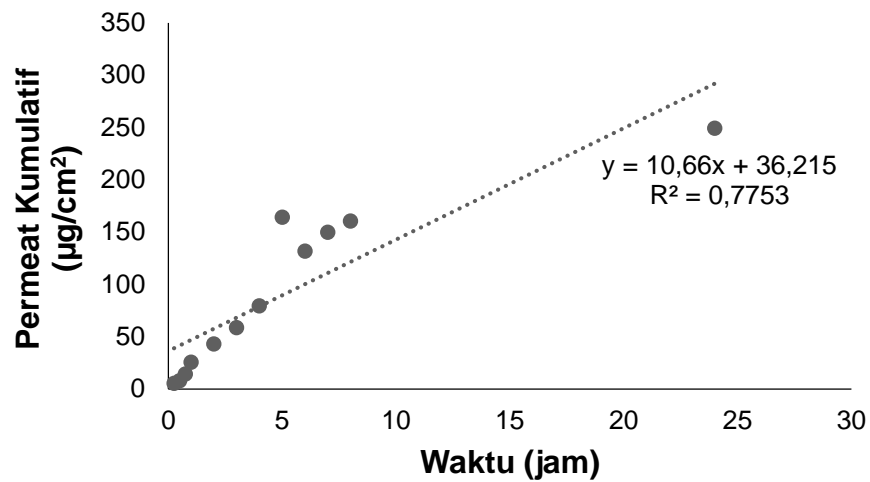
Keterangan : a = intersep, b = slope



Gambar 16. Grafik permeat kumulatif F1 replikasi 1



Gambar 17. Grafik permeat kumulatif F1 replikasi 2



Gambar 17. Grafik permeat kumulatif F1 replikasi 3

Nilai fluks rata-rata dapat diambil dari nilai slope dari persamaan yang didapatkan

Persamaan :

$$\text{F1 replikasi 1 : } y = 11,308x + 36,507$$

$$\text{F1 replikasi 2 : } y = 10,701x + 41,137$$

$$\text{F1 replikasi 3 : } y = 10,66x + 36,215$$

$$\text{Fluks rata-rata F1} = \frac{11,308 + 10,701 + 10,66}{3}$$

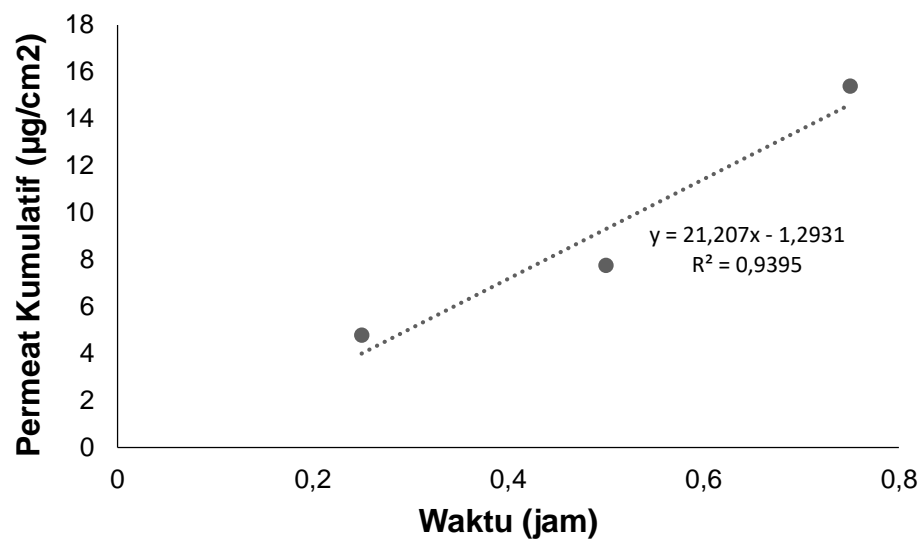
$$= 10,89 \mu\text{g/ cm}^2.\text{jam}$$

Contoh perhitungan nilai *lag time* permeasi

Persamaan : $y = bx + a$

Keterangan : a = intersep, b = slope

Hasil uji permeasi pada waktu ke-0,25; 0,5; 0,75, didapatkan grafik sebagai berikut:



Gambar 17. Grafik permeat kumulatif F1

Persamaan : $y = 21,207x - 1,2931$

Nilai *lag time* dihitung menggunakan rumus:

$$T_L = -\frac{a}{b}$$

$$= -\frac{-1,2931}{21,207}$$

$$= 0,06 \text{ jam}$$

Lampiran 4. Data analisis statistika

Lampiran 4.1 Data uji *swelling*

Tests of Normality

	formula	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
swelling	F1	.347	3	.	.835	3	.202
	F2	.252	3	.	.965	3	.639
	F3	.176	3	.	1.000	3	.987
	F4	.201	3	.	.994	3	.857

a. Lilliefors Significance Correction

ANOVA

swelling					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24978.909	3	8326.303	9.778	.005
Within Groups	6812.126	8	851.516		
Total	31791.035	11			

Multiple Comparisons

Dependent Variable: swelling

Tukey HSD

(I) formula	(J) formula	Mean			95% Confidence Interval	
		Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
F1	F2	-10.9143419	23.8259765	.966	-87.213506	65.384822
	F3	-108.0823696*	23.8259765	.008	-184.381533	-31.783206
	F4	-80.4160936*	23.8259765	.039	-156.715257	-4.116930
F2	F1	10.9143419	23.8259765	.966	-65.384822	87.213506
	F3	-97.1680277*	23.8259765	.015	-173.467191	-20.868864
	F4	-69.5017517	23.8259765	.075	-145.800915	6.797412
F3	F1	108.0823696*	23.8259765	.008	31.783206	184.381533
	F2	97.1680277*	23.8259765	.015	20.868864	173.467191
	F4	27.6662760	23.8259765	.665	-48.632888	103.965440
F4	F1	80.4160936*	23.8259765	.039	4.116930	156.715257
	F2	69.5017517	23.8259765	.075	-6.797412	145.800915
	F3	-27.6662760	23.8259765	.665	-103.965440	48.632888

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

Lampiran 4.2 Data uji kekuatan mekanik

Tests of Normality

	formula	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
penurunan_tinggi_need le	f1	.295	3	.	.919	3	.450
	f2	.193	3	.	.997	3	.893
	f3	.251	3	.	.966	3	.644
	f4	.216	3	.	.989	3	.797

a. Lilliefors Significance Correction

ANOVA

penurunan_tinggi_needle					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	401.864	3	133.955	63.195	.000
Within Groups	16.958	8	2.120		
Total	418.822	11			

Multiple Comparisons

Dependent Variable: penurunan_tinggi_needle

Tukey HSD						
(I) formula	(J) formula	Mean		Sig.	95% Confidence Interval	
		Difference (I-J)	Std. Error		Lower Bound	Upper Bound
f1	f2	-1.30667	1.18876	.700	-5.1135	2.5002
	f3	-13.81667*	1.18876	.000	-17.6235	-10.0098
	f4	-9.88333*	1.18876	.000	-13.6902	-6.0765
f2	f1	1.30667	1.18876	.700	-2.5002	5.1135
	f3	-12.51000*	1.18876	.000	-16.3168	-8.7032
	f4	-8.57667*	1.18876	.000	-12.3835	-4.7698
f3	f1	13.81667*	1.18876	.000	10.0098	17.6235
	f2	12.51000*	1.18876	.000	8.7032	16.3168
	f4	3.93333*	1.18876	.043	.1265	7.7402
f4	f1	9.88333*	1.18876	.000	6.0765	13.6902
	f2	8.57667*	1.18876	.000	4.7698	12.3835
	f3	-3.93333*	1.18876	.043	-7.7402	-.1265

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

Lampiran 4.3 Data uji kemampuan penetrasi

Tests of Normality

	formula	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
persen_penetrasi	f1	.175	3	.	1.000	3	1.000
	f2	.304	3	.	.907	3	.407
	f3	.187	3	.	.998	3	.915
	f4	.292	3	.	.923	3	.463

a. Lilliefors Significance Correction

ANOVA

persen_penetrasi					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5673.000	3	1891.000	45.842	.000
Within Groups	330.000	8	41.250		
Total	6003.000	11			

Multiple Comparisons

Dependent Variable: persen_penetrasi

Tukey HSD						
(I) formula	(J) formula	Mean	95% Confidence Interval			
		Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
f1	f2	23.333333*	5.244044	.009	6.54006	40.12661
	f3	59.333333*	5.244044	.000	42.54006	76.12661
	f4	39.333333*	5.244044	.000	22.54006	56.12661
f2	f1	-23.333333*	5.244044	.009	-40.12661	-6.54006
	f3	36.000000*	5.244044	.001	19.20672	52.79328
	f4	16.000000	5.244044	.062	-.79328	32.79328
f3	f1	-59.333333*	5.244044	.000	-76.12661	-42.54006
	f2	-36.000000*	5.244044	.001	-52.79328	-19.20672
	f4	-20.000000*	5.244044	.021	-36.79328	-3.20672
f4	f1	-39.333333*	5.244044	.000	-56.12661	-22.54006
	f2	-16.000000	5.244044	.062	-32.79328	.79328
	f3	20.000000*	5.244044	.021	3.20672	36.79328

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

Lampiran 4.4 Data uji permeasi *ex vivo*

Tests of Normality

	formula	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
persen_permease	f1	.333	3	.	.861	3	.270
	f2	.269	3	.	.950	3	.568
	f3	.218	3	.	.988	3	.787
	f4	.314	3	.	.893	3	.364

a. Lilliefors Significance Correction

ANOVA

persen_permease					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.666	3	.555	41.417	.000
Within Groups	.107	8	.013		
Total	1.773	11			

Multiple Comparisons

Dependent Variable: persen_permease

Tukey HSD						
(I) formula	(J) formula	Mean	Std. Error	Sig.	95% Confidence Interval	
		Difference (I-J)			Lower Bound	Upper Bound
f1	f2	-.59138949 [*]	.09453977	.001	-.8941391	-.2886399
	f3	.07309385	.09453977	.864	-.2296558	.3758435
	f4	.44876051 [*]	.09453977	.006	.1460109	.7515101
f2	f1	.59138949 [*]	.09453977	.001	.2886399	.8941391
	f3	.66448333 [*]	.09453977	.000	.3617337	.9672330
	f4	1.04015000 [*]	.09453977	.000	.7374004	1.3428996
f3	f1	-.07309385	.09453977	.864	-.3758435	.2296558
	f2	-.66448333 [*]	.09453977	.000	-.9672330	-.3617337
	f4	.37566667 [*]	.09453977	.017	.0729170	.6784163
f4	f1	-.44876051 [*]	.09453977	.006	-.7515101	-.1460109
	f2	-1.04015000 [*]	.09453977	.000	-1.3428996	-.7374004
	f3	-.37566667 [*]	.09453977	.017	-.6784163	-.0729170

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

Lampiran 5. Gambar Penelitian



Gambar 15. Uji *swelling*



Gambar 16. Pembuatan *hydrogel forming microneedle*



Gambar 17. Alat uji kekuatan mekanik dan kemampuan penetrasi



Gambar 18. Alat sentrifugasi



Gambar 19. Aparatus sel difusi Franz