Lampiran 2 Perhitungan

A. Pembuatan Larutan Induk MB 1000 ppm

Melarutkan 1 g MB kedalam 1 liter aquadest

B. Pengenceran Larutan Standar

M1 = Konsentrasi larutan induk (ppm)

V1 = Volume larutan induk (ml)

M2 = Konsentrasi larutan yang diencerkan (ppm)

V2 = Volume larutan yang diencerkan (ml)

1. Larutan MB 2 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (2 ppm x 100 ml) / 1000 ppm = 0,2 ml

2. Larutan MB 3 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (3 ppm x 100 ml) / 1000 ppm = 0,3 ml

3. Larutan MB 4 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (4 ppm x 100 ml) / 1000 ppm = 0,4 ml

4. Larutan MB 5 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (5 ppm x 100 ml) / 1000 ppm = 0,5 ml

5. Larutan MB 6 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (6 ppm x 100 ml) / 1000 ppm = 0,6 ml

Lampiran 2 Perhitungan

6. Larutan MB 7 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (7 ppm x 100 ml) / 1000 ppm = 0,7 ml

C. Pengenceran Inlet

M1 = Konsentrasi larutan induk (ppm)

V1 = Volume larutan induk (ml)

M2 = Konsentrasi larutan yang diencerkan (ppm)

V2 = Volume larutan yang diencerkan (ml)

1. Larutan inlet MB 150 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (150 ppm x 100 ml) / 1000 ppm = 15 ml
2. Larutan MB 300 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (300 ppm x 100 ml) / 1000 ppm = 30 ml
3. Larutan MB 400 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (400 ppm x 100 ml) / 1000 ppm = 40 ml
4. Larutan MB 800 ppm

   M1 x V1 = M2 x V2

   V1 = (M2 x V2) / M1

   V1 = (800 ppm x 100 ml) / 1000 ppm = 80 ml

Lampiran 2 Perhitungan

D. Pembuatan kurva kalibrasi

Data hasil pengukuran larutan standar

No	Konsentrasi (C)	Absorbansi (A)
1	2	0.414
2	3	0.580
3	4	0.824
4	5	0.980
5	6	1.157
6	7	1.339
7	8	1.368

Persamaan regresi linear

No	(X)	(Y)	(XY)	(X2)
1	2	0.414	0.828	4
2	3	0.580	1.740	9
3	4	0.824	3.296	16
4	5	0.980	4.900	25
5	6	1.157	6.942	36
6	7	1.339	9.373	49
7	8	1.368	10.944	64
Σ	35	6.662	38.023	203

$$Y = bX + a$$

$$b = \frac{\Sigma XiYi - [(\Sigma Xi.\Sigma Yi)/n]}{\Sigma Xi^2 - [((\Sigma Xi)^2)/n]}$$

$$b = \frac{38.023 - [(35.6{,}662)/7]}{203 - [((35)^2)/7]} = 0{,}0451$$

$$a = [\Sigma Yi - (b.\Sigma Xi)]/n$$

$$a = \frac{[6{,}662 - (0{,}0451.35)]}{6} = 0{,}1861$$

Lampiran 2 Perhitungan

$$Y = bX + a$$

$$Y = 0{,}1861x + 0{,}0451$$

E. Perhitungan Dosis Pemberian Adsorben + Alginate

Berat alginate dalam 30 ml alginate 3% = (30 g / 1000 ml) x 30 ml = 0,9 g

Berat alginate + adsorben (kering) = 0,9 g + 2 g = 2,9 g

Berat alginate + adsorben (basah) = 54 g

Kadar air = (2,9 gr / 54 g) x 100% = 5.4 %

Berat alginate : adsorben (kering) = 0,9 g : 2 g (÷10)

= 0,09 g : 0,2 g = 0,29 g (dosis)

F. Perhitungan Dosis Pemberian Adsorben + Agar

Berat agar + adsorben (kering) = 1 g + 2,5 g = 3,5g

Berat agar+ adsorben (basah) = 34,8602 g

Kadar air = (2,9 g / 60 g) x 100% = 4,8 %

Berat agar : adsorben (kering) = 1 g : 2,5 g (÷12)

= 0,08 g : 0,2 gr = 0,28 g (dosis)

G. Perhitungan Grafik Isotherm Langmuir

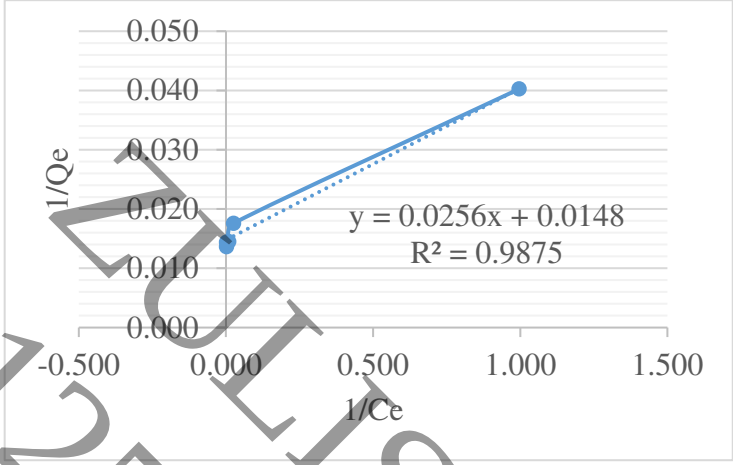
RSP

Variasi Konsentrasi (ppm)	Massa Adsorben (mg)	Volume Larutan (ml)	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Langmuir		
							Qe	1/Qe	1/Ce
150	200	50	100.4	1.004	99.396	99.000	24.849	0.040	0.996
300	200	50	266.4	38.950	227.450	85.379	56.863	0.018	0.026
400	200	50	385.1	109.100	276.000	71.670	69.000	0.014	0.009
800	200	50	782	488.800	293.200	37.494	73.300	0.014	0.002
1000	200	50	1010.75	733.000	277.750	27.480	69.438	0.014	0.001

Lampiran 2 Perhitungan

Selisih (ΔC) = Konsentrasi Awal (Co) – Konsentrasi Akhir (Ce)

$$Qe = \frac{\text{Selisih } (\Delta C)}{Volume\ larutan\ (L)} x\ massa\ adsorben\ (g)$$



Y = bx + a

Y = 0,0256 x + 0,0148

Qm = 1 / a = 1 / 0,0148 = 67,567 mg/g

Kl = b = 0,0256 l/mg

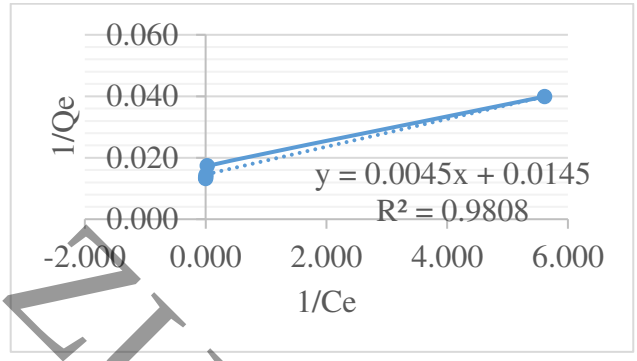
PAS

Variasi Konsentrasi (ppm)	Massa Adsorben (mg)	Volume Larutan (ml)	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Langmuir		
							Qe	1/Qe	1/Ce
150	200	50	100.4	0.178	100.222	99.823	25.056	0.040	5.618
300	200	50	266.4	35.450	230.950	86.693	57.738	0.017	0.028
400	200	50	385.1	107.250	277.850	72.150	69.463	0.014	0.009
800	200	50	782	485.300	296.700	37.941	74.175	0.013	0.002
1000	200	50	1010.75	707.500	303.250	30.002	75.813	0.013	0.001

Selisih (ΔC) = Konsentrasi Awal (Co) – Konsentrasi Akhir (Ce)

$$Qe = \frac{\text{Selisih } (\Delta C)}{Volume\ larutan\ (L)} x\ massa\ adsorben\ (g)$$

Lampiran 2 Perhitungan



Y = bx + a

Y = 0,0045 x + 0,0145

Qm = 1 / a = 1 / 0,0145 = 68,4932 mg/g

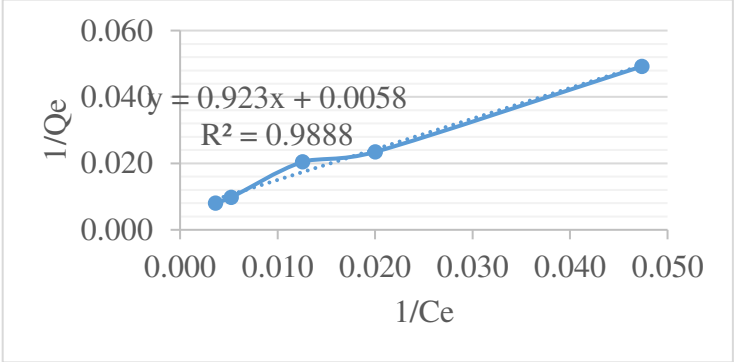
Kl = b = 0,0045 l/mg

ENKAPSULASI ALGINATE

Variasi Konsentrasi	Massa Adsorben	Volume Larutan	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Langmuir		
							Qe	1/Qe	1/Ce
150	290	50	138.90	21.100	117.800	84.809	20.310	0.049	0.047
300	290	50	296.90	49.900	247.000	83.193	42.586	0.023	0.020
400	290	50	363.10	79.600	283.500	78.078	48.879	0.020	0.013
800	290	50	784.60	190.800	593.800	75.682	102.379	0.010	0.005
1000	290	50	994.60	273.300	721.300	72.522	124.362	0.008	0.004

Selisih (ΔC) = Konsentrasi Awal (Co) – Konsentrasi Akhir (Ce)

$$Qe = \frac{\text{Selisih } (\Delta C)}{Volume\ larutan\ (L)}\ x\ massa\ adsorben\ (g)$$



Lampiran 2 Perhitungan

Y = bx + a

Y = 0,923 x + 0,0058

Qm = 1 / a = 1 / 0,0058 = 172,414 mg/g

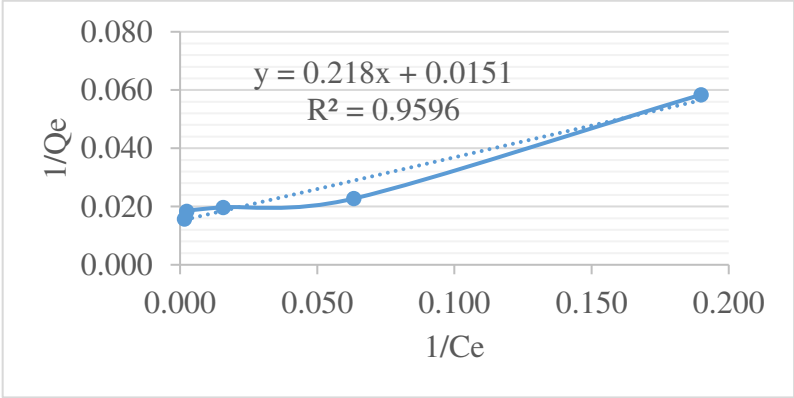
Kl = b = 0,923 l/mg

ENKAPSULASI AGAR

Variasi Konsentra	Massa Adsorbe	Volume Larutan	Konsentrasi Awal (Co)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Langmuir		
							Qe	1/Qe	1/Ce
150	280	50	101.10	5.264	95.836	94.793	17.114	0.058	0.190
300	280	50	262.20	15.800	246.400	93.974	44.000	0.023	0.063
400	280	50	347.30	63.700	283.600	81.659	50.643	0.020	0.016
800	280	50	727.70	423.100	304.600	41.858	54.393	0.018	0.002
1000	280	50	994.60	637.800	356.800	35.874	63.714	0.016	0.002

Selisih (ΔC) = Konsentrasi Awal (Co) – Konsentrasi Akhir (Ce)

$$Qe = \frac{\text{Selisih } (\Delta C)}{Volume\ larutan\ (L)} x\ massa\ adsorben\ (g)$$



Y = bx + a

Y = 0,218 x + 0,0151

Qm = 1 / a = 1 / 0,0151 = 66,225 mg/g

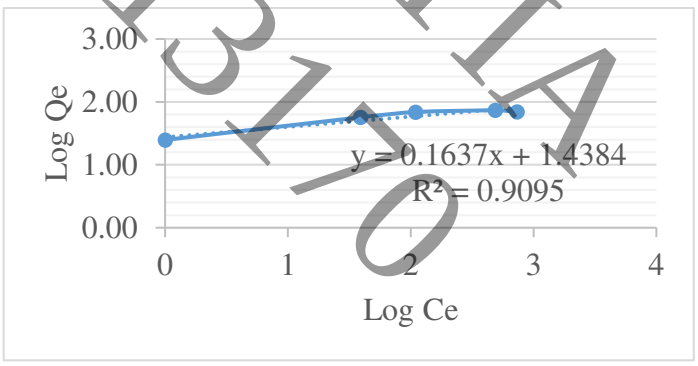
Kl = 0,218 l/mg

Lampiran 2 Perhitungan

H. Perhitungan Grafik Isotherm Freundlich

RSP

Variasi Konsentrasi (ppm)	Massa Adsorben (mg)	Volume Larutan (ml)	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Freundlich		
							Qe	Log Qe	Log Ce
150	200	50	100.4	1.004	99.396	99.000	24.85	1.40	0.00173
300	200	50	266.4	38.950	227.450	85.379	56.86	1.75	1.59051
400	200	50	385.1	109.100	276.000	71.670	69.00	1.84	2.03782
800	200	50	782	488.800	293.200	37.494	73.30	1.87	2.68913
1000	200	50	1010.75	733.000	277.750	27.480	69.44	1.84	2.8651



Y = bx + a

Y = 0,1637 x + 1,4384

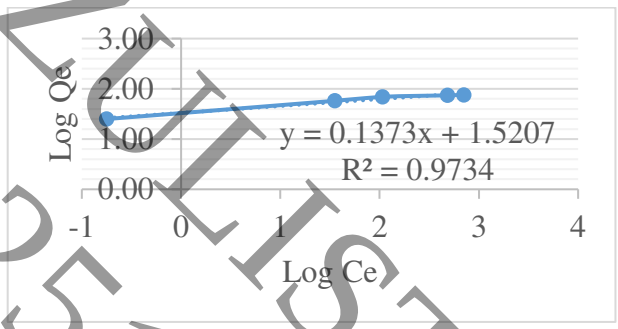
n = 1 / b = 1 / 0,1637= 6,109

KF = exp (a) = exp (1,4384) = 4,21

PAS

Variasi Konsentrasi (ppm)	Massa Adsorben (mg)	Volume Larutan (ml)	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Freundlich		
							Qe	Log Qe	Log Ce
150	200	50	100.4	0.178	100.222	99.823	25.06	1.40	-0.7496
300	200	50	266.4	35.450	230.950	86.693	57.74	1.76	1.54962
400	200	50	385.1	107.250	277.850	72.150	69.46	1.84	2.0304
800	200	50	782	485.300	296.700	37.941	74.18	1.87	2.68601
1000	200	50	1010.75	707.500	303.250	30.002	75.81	1.88	2.84973

Lampiran 2 Perhitungan



Y = bx + a

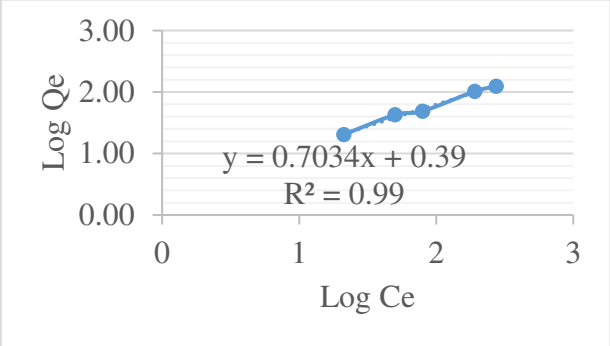
Y = 0,13737 x + 1,5207

n = 1 / b = 1 / 0,13737 = 7,279

KF = exp (a) = exp (1,5207) = 4,575

ENKAPSULASI ALGINATE

Variasi Konsentrasi	Massa Adsorbent	Volume Larutan	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Freundlich		
							Qe	Log Qe	Log Ce
150	290	50	138.90	21.100	117.800	84.809	20.31	1.31	1.3243
300	290	50	296.90	49.900	247.000	83.193	42.59	1.63	1.6981
400	290	50	363.10	79.600	283.500	78.078	48.88	1.69	1.9009
800	290	50	784.60	190.800	593.800	75.682	102.38	2.01	2.2806
1000	290	50	994.60	273.300	721.300	72.522	124.36	2.09	2.4366



Y = bx + a

Y = 0,7034 x + 0,39

Lampiran 2 Perhitungan

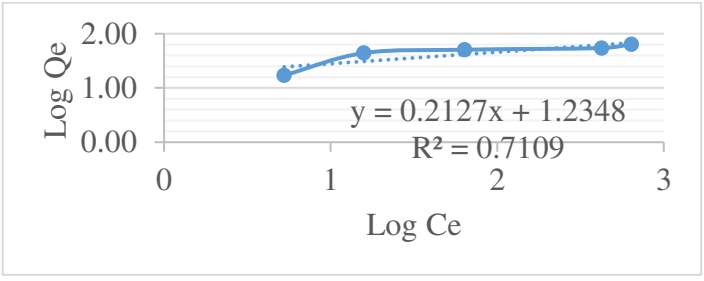
n = 1 / b = 1 / 0,7034= 1,421

KF = exp (a) = exp (0,39) = 1,477

ENKAPSULASI AGAR

Variasi Konsentrasi	Massa Adsorbent	Volume Larutan	Konsentrasi Awal (C0)	Konsentrasi Akhir (Ce)	Selisih (ΔC)	Persentase Penyisihan	Freundlich		
							Qe	Log Qe	Log Ce
150	280	50	101.10	5.26	95.836	94.793	17.11	1.23	0.7213
300	280	50	262.20	15.80	246.400	93.974	44.00	1.64	1.1987
400	280	50	347.30	63.70	283.600	81.659	50.64	1.70	1.8041
800	280	50	727.70	423.10	304.600	41.858	54.39	1.74	2.6264
1000	280	50	994.60	637.80	356.800	35.874	63.71	1.80	2.8047

Lampiran 2 Perhitungan



Y = bx + a

Y = 0,2127 x + 1,2348

n = 1 / b = 1 / 0,2127 = 4,7016

KF = exp (a) = exp (1,2348) = 3,438

	LANGMUIR			FRUNDLICH		
	Qm (mg/g)	**K_L (l/mg)**	**R^2**	**KF**	**n**	**R^2**
PAS	68,4932	0,0045	0,9808	4,575	7,279	0,9734
RSP	67,567	0,0256	0,9875	4,21	6,109	0,9095
PAS-AG	172,414	0,923	0,9888	1,477	1,421	0,99
PAS-AR	66,225	0,218	0,9696	3,438	4,7016	0,7109