

LAMPIRAN

Lampiran 1. Pembuatan H₂SO₄

Perhitungan :

Diketahui : Konsentrasi H₂SO₄ pekat = 98%

BJ = 1,84g/ml

BM = 98,08g/ml

Ditanya : Volume yang dipipet untuk pembuatan H₂SO₄ 0,5 N?

Jawab :

$$M = \frac{10 \times \% \times BJ}{BM}$$
$$M = \frac{10 \times 98\% \times 1,84g/ml}{98,08g/ml}$$

$$M = 18,38M$$

$$M_1 \times V_1 = M_2 \times V_2$$

$$18,38M \times V_1 = 0,25M \times 100$$

$$V_1 = 1,36ml$$

Lampiran 2. Pembuatan Larutan Stok 3CdSO₄.8H₂O 100ppm

Perhitungan :

Diketahui : Konsentrasi larutan induk = 100ppm = $\frac{100mg}{L}$

Volume akhir = 100ppm

Mr 3CdSO₄.8H₂O = 226,482 g/mol

Ar Cd (II) = 112,411

Ditanya : Massa 3CdSO₄.8H₂O?

Jawab :

$$mol\ Cd(II)\ dalam\ 1\ liter = \frac{Massa\ Cd\ (II)}{Ar\ Cd\ (II)}$$

$$mol\ Cd(II)\ dalam\ 1\ liter = \frac{100mg}{112,411}$$

$$mol\ Cd(II)\ dalam\ 1\ liter = 0,889\ mmol$$

$$mol\ 3CdSO_4.8H_2O = mol\ Cd(II)$$

$$= \frac{1}{1} \times 0,889\ mmol = 0,889\ mmol$$

$$massa\ 3CdSO_4.8H_2O = 0,889\ mmol \times 226,482\ mg/mmol$$

$$= 201,3425 \text{ mg}/1000\text{ml}$$

$$= 20,13425\text{mg}/100\text{ml}$$

Lampiran 3. Pembuatan Kurva Baku

Perhitungan :

Diketahui : Konsentrasi larutan stok $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ (M1) = 100ppm

Konsentrasi larutan yang dibuat (M2) = 1,2,3,4 dan 5ppm

Volume akhir (V2) = 20ml

Ditanya : Volume larutan stok $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ 100ppm yang dipipet (V1)?

Jawab :

$$M1 \times V1 = M2 \times V2$$

$$100\text{ppm} \times V1 = 1\text{ppm} \times 20\text{ml}$$

$$V1 = 0,2\text{ml}$$

$$100\text{ppm} \times V1 = 2\text{ppm} \times 20\text{ml}$$

$$V1 = 0,4\text{ml}$$

$$100\text{ppm} \times V1 = 3\text{ppm} \times 20\text{ml}$$

$$V1 = 0,6\text{ml}$$

$$100\text{ppm} \times V1 = 4\text{ppm} \times 20\text{ml}$$

$$V1 = 0,8\text{ml}$$

$$100\text{ppm} \times V1 = 5\text{ppm} \times 20\text{ml}$$

$$V1 = 1\text{ml}$$

Lampiran 4. Pembuatan Larutan Kerja $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ 5ppm Untuk Penentuan Waktu Kontak

Perhitungan :

Diketahui : Konsentrasi larutan stok $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ (M1) = 100ppm

Konsentrasi larutan yang dibuat (M2) = 5ppm

Volume akhir (V2) = 500ml

Ditanya : Volume larutan stok $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ 100ppm yang dipipet (V1)?

Jawab :

$$M1 \times V1 = M2 \times V2$$

$$100\text{ppm} \times V1 = 5\text{ppm} \times 500\text{ml}$$

$$V_1 = 25\text{ml}$$

Lampiran 5 Perhitungan Kapasitas Adsorpsi

Konsentrasi Awal

$$y = 0,0986x + 0,4722$$

$$0,785 = 0,0986x + 0,4722$$

$$0,785 - 0,4722 = 0,0986x$$

$$x = \frac{0,785 - 0,4722}{0,098}$$

$$x = 3,191 \text{ mg/L}$$

$$C_{\text{Awal}} = 3,191 \text{ mg/L}$$

Kapasitas Adsorpsi WK.20

Kapasitas Absorbansi WK.20.I

$$y = 0,0986x + 0,4722$$

$$0,712 = 0,0986x + 0,4722$$

$$0,712 - 0,4722 = 0,0986x$$

$$x = \frac{0,712 - 0,4722}{0,098}$$

$$x = 2,446 \text{ mg/L}$$

$$C_{\text{Akhir}} = 2,446 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,446) \times 0,02}{0,2504}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,059 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_0 - C \text{ (mg/L)}}{C_0 \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,446}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 23,35\%$$

Kapasitas Adsorbansi WK.20.II

$$y = 0,0986x + 0,4722$$

$$0,701 = 0,0986x + 0,4722$$

$$0,701 - 0,4722 = 0,0986x$$

$$x = \frac{0,701 - 0,4722}{0,098}$$

$$x = 2,334 \text{ mg/L}$$

$$C \text{ Akhir} = 2,334 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_o - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,334) \times 0,02}{0,2502}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,068 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_o - C \text{ (mg/L)}}{C_o \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,334}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 26,86\%$$

Kapasitas Adsorbansi WK.20.III

$$y = 0,0986x + 0,4722$$

$$0,699 = 0,0986x + 0,4722$$

$$0,699 - 0,4722 = 0,0986x$$

$$x = \frac{0,699 - 0,4722}{0,098}$$

$$x = 2,008 \text{ mg/L}$$

$$C \text{ Akhir} = 2,008 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_o - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,008) \times 0,02}{0,2504}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,094 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,008}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 37,07 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 20} = \frac{0,059 + 0,068 + 0,094}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 20} = 0,0737 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 20} = \frac{23,34\% + 26,85\% + 37,07\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 20} = 29,09\%$$

Kapasitas Adsorpsi WK.40

Kapasitas Absorbansi WK.40.I

$$y = 0,0986x + 0,4722$$

$$0,693 = 0,0986x + 0,4722$$

$$0,693 - 0,4722 = 0,0986x$$

$$x = \frac{0,693 - 0,4722}{0,098}$$

$$x = 2,431 \text{ mg/L}$$

$$C \text{ Akhir} = 2,431 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,431) \times 0,02}{0,2503}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,060 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,431}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 23,82 \%$$

Kapasitas Absorbansi WK.40.II

$$y = 0,0986x + 0,4722$$

$$0,731 = 0,0986x + 0,4722$$

$$0,731 - 0,4722 = 0,0986x$$

$$x = \frac{0,731 - 0,4722}{0,098}$$

$$x = 2,640 \text{ mg/L}$$

$$C \text{ Akhir} = 2,640 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,640) \times 0,02}{0,2500}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,044 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_0 - C \text{ (mg/L)}}{C_0 \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,640}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 17,27 \%$$

Kapasitas Absorbansi WK.40.III

$$y = 0,0986x + 0,4722$$

$$0,633 = 0,0986x + 0,4722$$

$$0,633 - 0,4722 = 0,0986x$$

$$x = \frac{0,633 - 0,4722}{0,098}$$

$$x = 1,640 \text{ mg/L}$$

$$C \text{ Akhir} = 1,640 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 1,640) \times 0,02}{0,2504}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,123 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_o - C \text{ (mg/L)}}{C_o \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,640}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 48,61 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 40} = \frac{0,060 + 0,044 + 0,123}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 40} = 0,0757 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 40} = \frac{23,82\% + 17,27\% + 48,61\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 40} = 29,90\%$$

Kapasitas Adsorpsi WK.60

Kapasitas Absorbansi WK.60.I

$$y = 0,0986x + 0,4722$$

$$0,593 = 0,0986x + 0,4722$$

$$0,593 - 0,4722 = 0,0986x$$

$$x = \frac{0,593 - 0,4722}{0,098}$$

$$x = 2,857 \text{ mg/L}$$

$$C \text{ Akhir} = 2,857 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_o - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi } \left(\frac{\text{mg}}{\text{g}} \right) = \frac{(3,191 - 2,857) \times 0,02}{0,2503}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,026 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,857}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 10,47 \%$$

Kapasitas Adsorpsi WK.60.II

$$y = 0,0986x + 0,4722$$

$$0,666 = 0,0986x + 0,4722$$

$$0,666 - 0,4722 = 0,0986x$$

$$x = \frac{0,666 - 0,4722}{0,0986}$$

$$x = 1,977 \text{ mg/L}$$

$$C \text{ Akhir} = 1,977 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,079) \times 0,02}{0,2505}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,097 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,977}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 38,04 \%$$

Kapasitas Adsorpsi WK.60.III

$$y = 0,0986x + 0,4722$$

$$0,648 = 0,0986x + 0,4722$$

$$0,648 - 0,4722 = 0,0986x$$

$$x = \frac{0,648 - 0,4722}{0,0986}$$

$$x = 1,793 \text{ mg/L}$$

$$C \text{ Akhir} = 1,793 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 1,793) \times 0,02}{0,2502}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,111 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,793}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 43,81 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 60} = \frac{0,026 + 0,097 + 0,111}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 60} = 0,078 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 60} = \frac{10,47\% + 38,04\% + 43,81\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 60} = 30,77\%$$

Kapasitas Adsorpsi WK.80

Kapasitas Absorbansi WK.80.I

$$y = 0,0986x + 0,4722$$

$$0,636 = 0,0986x + 0,4722$$

$$0,636 - 0,4722 = 0,0986x$$

$$x = \frac{0,636 - 0,4722}{0,098}$$

$$x = 1,671 \text{ mg/L}$$

$$C \text{ Akhir} = 1,671 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{3,191 - 1,671 \times 0,02}{0,2500}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,121 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,671}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 47,63 \%$$

Kapasitas Absorbansi WK.80.II

$$y = 0,0986x + 0,4722$$

$$0,756 = 0,0986x + 0,4722$$

$$0,756 - 0,4722 = 0,0986x$$

$$x = \frac{0,756 - 0,4722}{0,0986}$$

$$x = 2,895 \text{ mg/L}$$

$$C \text{ Akhir} = 2,895 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,895) \times 0,02}{0,2503}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,023 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,895}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 9,28 \%$$

Kapasitas Absorbansi WK.80.III

$$y = 0,0986x + 0,4722$$

$$0,669 = 0,0986x + 0,4722$$

$$0,669 - 0,4722 = 0,0986x$$

$$x = \frac{0,669 - 0,4722}{0,098}$$

$$x = 2,008 \text{ mg/L}$$

$$C \text{ Akhir} = 2,008 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,008) \times 0,02}{0,2502}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,094 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,008}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 37,07 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 80} = \frac{0,121 + 0,023 + 0,094}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 80} = 0,079 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 80} = \frac{47,63\% + 9,28\% + 37,07\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 80} = 31,33\%$$

Kapasitas Adsorpsi WK.100

Kapasitas Absorbansi WK.100.I

$$y = 0,0986x + 0,4722$$

$$0,658 = 0,0986x + 0,4722$$

$$0,658 - 0,4722 = 0,0986x$$

$$x = \frac{0,658 - 0,4722}{0,098}$$

$$x = 1,895 \text{ mg/L}$$

$$C \text{ Akhir} = 1,895 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 1,895) \times 0,02}{0,2501}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,103 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,895}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 40,61\%$$

Kapasitas Absorbansi WK.100.II

$$y = 0,0986x + 0,4722$$

$$0,649 = 0,0986x + 0,4722$$

$$0,649 - 0,4722 = 0,0986x$$

$$x = \frac{0,649 - 0,4722}{0,098}$$

$$x = 1,804 \text{ mg/L}$$

$$C \text{ Akhir} = 1,804 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 1,804) \times 0,02}{0,2505}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,110 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,804}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 43,47 \%$$

Kapasitas Adsorpsi WK.100.III

$$y = 0,0986x + 0,4722$$

$$0,617 = 0,0986x + 0,4722$$

$$0,617 - 0,4722 = 0,0986x$$

$$x = \frac{0,617 - 0,4722}{0,0986}$$

$$x = 1,477 \text{ mg/L}$$

$$C \text{ Akhir} = 1,477 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 1,477) \times 0,02}{0,2500}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,137 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_0 - C \text{ (mg/L)}}{C_0 \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 1,477}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 53,71 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 100} = \frac{0,103 + 0,110 + 0,137}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 100} = 0,116 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 100} = \frac{40,61\% + 43,47\% + 53,71\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 100} = 45,93\%$$

Kapasitas Adsorpsi WK.120**Kapasitas Adsorpsi WK.120.I**

$$y = 0,0986x + 0,4722$$

$$0,708 = 0,0986x + 0,4722$$

$$0,708 - 0,4722 = 0,0986x$$

$$x = \frac{0,708 - 0,4722}{0,098}$$

$$x = 2,406 \text{ mg/L}$$

$$C \text{ Akhir} = 2,406 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,406) \times 0,02}{0,2502}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,062 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,406}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 24,60 \%$$

Kapasitas Absorbansi WK.120.II

$$y = 0,0986x + 0,4722$$

$$0,752 = 0,0986x + 0,4722$$

$$0,752 - 0,4722 = 0,0986x$$

$$x = \frac{0,752 - 0,4722}{0,098}$$

$$x = 2,855 \text{ mg/L}$$

$$C \text{ Akhir} = 2,855 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,855) \times 0,02}{0,2505}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,026 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,855}{3,191} \times 100\%$$

(R) Hasil Penyerapan (%) = 10,53 %

Kapasitas Absorbansi WK.120.III

$$y = 0,0986x + 0,4722$$

$$0,672 = 0,0986x + 0,4722$$

$$0,672 - 0,4722 = 0,0986x$$

$$x = \frac{0,672 - 0,4722}{0,0986}$$

$$x = 2,038 \text{ mg/L}$$

$$C \text{ Akhir} = 2,038 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,038) \times 0,02}{0,2500}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,092 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_0 - C \text{ (mg/L)}}{C_0 \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,038}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 36,13 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 120} = \frac{0,062 + 0,026 + 0,092}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 120} = 0,060 \text{ mg/g}$$

$$\text{Rata - Rata Hasil Penyerapan WK. 120} = \frac{24,60\% + 10,53\% + 36,13\%}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 120} = 23,75\%$$

Kapasitas Adsorpsi WK.140**Kapasitas Absorbansi WK.140.I**

$$y = 0,0986x + 0,4722$$

$$0,715 = 0,0986x + 0,4722$$

$$0,715 - 0,4722 = 0,0986x$$

$$x = \frac{0,715 - 0,4722}{0,0986}$$

$$x = 2,477 \text{ mg/L}$$

$$C \text{ Akhir} = 2,477 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_o - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,477) \times 0,02}{0,2501}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,057 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_o - C \text{ (mg/L)}}{C_o \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,477}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 22,38 \%$$

Kapasitas Absorbansi WK.140.II

$$y = 0,0986x + 0,4722$$

$$0,727 = 0,0986x + 0,4722$$

$$0,727 - 0,4722 = 0,0986x$$

$$x = \frac{0,727 - 0,4722}{0,0986}$$

$$x = 2,600 \text{ mg/L}$$

$$C \text{ Akhir} = 2,600 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_o - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,600) \times 0,02}{0,2505}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,047 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,600}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 18,52 \%$$

Kapasitas Absorbansi WK.140.III

$$y = 0,0986x + 0,4722$$

$$0,719 = 0,0986x + 0,4722$$

$$0,719 - 0,4722 = 0,0986x$$

$$x = \frac{0,719 - 0,4722}{0,0986}$$

$$x = 2,518 \text{ mg/L}$$

$$C \text{ Akhir} = 2,518 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,518) \times 0,02}{0,2500}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,53 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,518}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 21,09 \%$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 140} = \frac{0,057 + 0,047 + 0,053}{3}$$

$$\text{Rata - Rata Kapasitas Adsorpsi WK. 140} = 0,052 \text{ mg/g}$$

$$\text{Rata – Rata Hasil Penyerapan WK.140} = \frac{22,38\% + 18,52\% + 21,09\%}{3}$$

$$\text{Rata – Rata Kapasitas Adsorpsi WK.140} = 20,66\%$$

Kapasitas Adsorpsi WK.160

Kapasitas Absorbansi WK.160.I

$$y = 0,0986x + 0,4722$$

$$0,723 = 0,0986x + 0,4722$$

$$0,723 - 0,4722 = 0,0986x$$

$$x = \frac{0,723 - 0,4722}{0,0986}$$

$$x = 2,559 \text{ mg/L}$$

$$C \text{ Akhir} = 2,559 \text{ mg/L}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{C_0 - C \text{ (mg/L)} \times \text{Volume Adsorbat (L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,559) \times 0,02}{0,2501}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,050 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{C_0 - C \text{ (mg/L)}}{C_0 \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,559}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 19,81 \%$$

Kapasitas Absorbansi WK.160.II

$$y = 0,0986x + 0,4722$$

$$0,747 = 0,0986x + 0,4722$$

$$0,747 - 0,4722 = 0,0986x$$

$$x = \frac{0,747 - 0,4722}{0,0986}$$

$$x = 2,804 \text{ mg/L}$$

C Akhir = 2,804 mg/L

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{(3,191 - 2,804) \times 0,02}{0,2505}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,030 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,804}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 12,13 \%$$

Kapasitas Absorbansi WK.160.III

$$y = 0,0986x + 0,4722$$

$$0,751 = 0,0986x + 0,4722$$

$$0,751 - 0,4722 = 0,0986x$$

$$x = \frac{0,751 - 0,4722}{0,098}$$

$$x = 2,846 \text{ mg/L}$$

C Akhir = 2,846 mg/L

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{Co - C \text{ (mg/L)} \times \text{Volume Adsorbat(L)}}{\text{Massa Biosorben (g)}}$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = \frac{3,191 - 2,846}{0,2500} \times 0,02$$

$$(q) \text{ Kapasitas Adsorpsi (mg/g)} = 0,027 \text{ mg/g}$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{Co - C \text{ (mg/L)}}{Co \text{ (mg/L)}} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = \frac{3,191 - 2,846}{3,191} \times 100\%$$

$$(R) \text{ Hasil Penyerapan (\%)} = 10,81 \%$$

$$\text{Rata – Rata Kapasitas Adsorpsi WK. 160} = \frac{0,050 + 0,030 + 0,027}{3}$$

$$\text{Rata – Rata Kapasitas Adsorpsi WK. 160} = 0,035 \text{ mg/g}$$

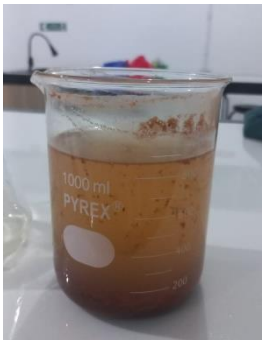
$$\text{Rata – Rata Hasil Penyerapan WK. 160} = \frac{19,81\% + 12,13\% + 10,81\%}{3}$$

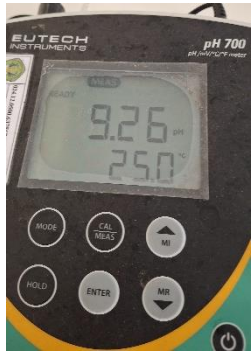
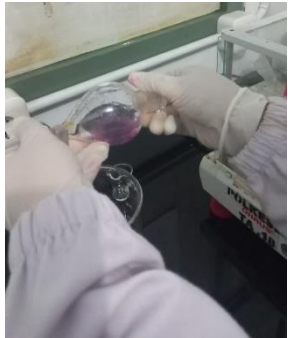
$$\text{Rata – Rata Kapasitas Adsorpsi WK. 160} = 14,25\%$$

Lampiran 6 Data Pengaruh Waktu Kontak

No	Jenis	Replikasi	Absorbansi	Konsentrasi (mg/L)	Rata-Rata Konsentrasi (mg/L)	Kapasitas Adsorpsi (mg/g)	Rata-Rata	Hasil Penyerapan (%)	Rata-Rata Hasil Penyerapan (%)
1.	WK0	I	0,785	3,191	3,1910	-	-		
2.	WK.20	I	0,712	2,446	2,2627	0,059	0,0737	23,35	29,09
		II	0,701	2,334		0,068		26,86	
		III	0,699	2,008		0,094		37,07	
3.	WK.40	I	0,693	2,431	2,2370	0,060	0,0757	23,82	29,90
		II	0,731	2,640		0,044		17,27	
		III	0,633	1,640		0,123		48,61	
4.	WK.60	I	0,593	2,857	2,2090	0,026	0,0780	10,47	30,77
		II	0,666	1,977		0,097		38,04	
		III	0,648	1,793		0,111		43,81	
5.	WK.80	I	0,636	1,671	2,1913	0,121	0,0793	47,63	31,33
		II	0,756	2,895		0,023		9,28	
		III	0,669	2,008		0,094		37,07	
6.	WK.100	I	0,658	1,895	1,7253	0,103	0,1167	40,61	45,93
		II	0,649	1,804		0,110		43,47	
		III	0,617	1,477		0,137		53,71	
7.	WK.120	I	0,708	2,406	2,4330	0,062	0,0600	24,60	23,75
		II	0,752	2,855		0,026		10,53	
		III	0,672	2,038		0,092		36,13	
8.	WK.140	I	0,715	2,477	2,5317	0,057	0,0523	22,38	20,66
		II	0,727	2,600		0,047		18,52	
		III	0,719	2,518		0,053		21,09	
9.	WK.160	I	0,723	2,559	2,7363	0,050	0,0357	19,81	14,25
		II	0,747	2,804		0,030		12,13	
		III	0,751	2,846		0,027		10,81	

Lampiran 7 Dokumentasi

		
Penimbangan serbuk simplisia 200 mesh	Penambahan formaldehida & H₂SO₄	Proses pemanasan biosorbent
		
Setelah dipanaskan selama 3 jam	Proses penyaringan biosorben	Setelah dikeringkan hingga didapat bobot konstan
		
Penimbangan biosorben	Proses pengadukan dengan lama waktu kontak	Penyaringan biosorben

		
Pengujian pH biosorbat yang tersisa	Pengujian pH akhir dengan penambahan NaOH hingga pH 9	Proses pengompleksan
		
Hasil setelah dikompleksan dengan ditizon		