LAMPIRAN

Lampiran 1. Perhitungan

1.1 Perhitungan Pembuatan Larutan H_3PO_4 14%

Pembuatan larutan H_3PO_4 14% dari larutan H_3PO_4 85%

$M_1 \cdot V_1 = M_2 \cdot V_2$

H_3PO_4 85% . V_1 = H_3PO_4 14% . 100 ml

$$V_1 = \frac{\text{H3PO4 14\% . 100 ml}}{\text{H3PO4 85\%}}$$

V_1 = 16,5 ml

Volume H_3PO_4 85% yang dibutuhkan yaitu 16,5 ml

1.2 Perhitungan Pembuatan Larutan Induk Metilen Biru

Larutan induk metilen biru 200 ppm dibuat dalam labu ukur 250 ml

1000 ppm = 1000 mg/L

$$200 \text{ ppm} = \frac{200\ mg}{1000 \text{ ml}}$$

$$200 \text{ ppm} = \frac{x}{250 \text{ ml}}$$

x = 50 mg

x = 0,5 gram

1.3 Pembuatan Larutan Standar Metilen Biru untuk Aplikasi

1.3.1 Pembuatan Larutan Standar Metilen Biru 1 ppm

$M_1 \cdot V_1 = M_2 \cdot V_2$

200 ppm . V_1 = 1 ppm. 100 ml

$$V_1 = \frac{1\ ppm\ .\ 100\ ml}{200 \text{ ppm}}$$

V_1 = 0,5 ml

1.3.2 Pembuatan Larutan Standar Metilen Biru 2 ppm

$M_1 \cdot V_1 = M_2 \cdot V_2$

200 ppm . V_1 = 2 ppm. 100 ml

$$V_1 = \frac{2\ ppm\ .100\ ml}{200 \text{ ppm}}$$

V_1 = 1 ml

1.3.3 Pembuatan Larutan Standar Metilen Biru 3 ppm

$M_1 . V_1 = M_2 . V_2$

$200 \text{ ppm} . V_1 = 3 \text{ ppm}. 100 \text{ ml}$

$V_1 = \frac{3\ ppm\ .\ 100\ ml}{200 \text{ ppm}}$

$V_1 = 1{,}5 \text{ ml}$

1.3.4 Pembuatan Larutan Standar Metilen Biru 4 ppm

$M_1 . V_1 = M_2 . V_2$

$200 \text{ ppm} . V_1 = 4 \text{ ppm}. 100 \text{ ml}$

$V_1 = \frac{4\ ppm\ .\ 100\ ml}{200 \text{ ppm}}$

$V_1 = 2 \text{ ml}$

1.3.5 Pembuatan Larutan Standar Metilen Biru 5 ppm

$M_1 . V_1 = M_2 . V_2$

$200 \text{ ppm} . V_1 = 5 \text{ ppm}. 100 \text{ ml}$

$V_1 = \frac{5\ ppm\ .\ 100\ ml}{200 \text{ ppm}}$

$V_1 = 2{,}5 \text{ ml}$

1.3.6 Pembuatan Larutan Standar Metilen Biru 6 ppm

$M_1 . V_1 = M_2 . V_2$

$200 \text{ ppm} . V_1 = 6 \text{ ppm}. 100 \text{ ml}$

$V_1 = \frac{6\ ppm\ .\ 100\ ml}{200 \text{ ppm}}$

$V_1 = 3 \text{ ml}$

Lampiran 2. Perhitungan Konsentrasi Setelah Adsorpsi

2.1 Perhitungan Konsentrasi Massa Surfaktan

2.1.1 Variasi 0 mg absorbansi 0,990

y = 0,2137x - 0,0015

0,990 = 0,2137x - 0,00 15

0,2137x = 0,990 + 0,0015

$$x = \frac{0,990 + 0,0015}{0,2137}$$

x = 4,6397

2.1.2 Variasi 3 mg absorbansi 0,914

y = 0,2137x - 0,0015

0,914 = 0,2137x - 0,00 15

0,2137x = 0,914 + 0,0015

$$x = \frac{0,914 + 0,0015}{0,2137}$$

x = 4,2840

2.1.3 Variasi 6 mg absorbansi 0,774

y = 0,2137x - 0,0015

0,774 = 0,2137x - 0,0015

0,2137x = 0,774 + 0,0015

$$x = \frac{0,774 + 0,0015}{0,2137}$$

x = 3,6289

2.1.4 Variasi 9 mg absorbansi 0,594

y = 0,2137x - 0,0015

0,594 = 0,2137x - 0,0015

0,2137x = 0,594x + 0,0015

$$x = \frac{0,594x + 0,0015}{0,2137}$$

x = 2,7866

2.1.5 Variasi 12 mg absorbansi 0,510

y = 0,2137x - 0,0015

0,510 = 0,2137x - 0,0015

0,2137x = 0,510 + 0,0015

$$x = \frac{0,510 + 0,0015}{0,2137}$$

x = 2,3935

2.1.6 Variasi 15 mg absorbansi 0,461

y = 0,2137x - 0,0015

0,461 = 0,2137x - 0,0015

0,2137x = 0,461 + 0,0015

$$x = \frac{0,461 + 0,0015}{0,2137}$$

x = 2,1642

2.2 Perhitungan Konsentrasi Variais pH

2.2.1 pH 2 absorbansi 0,311

y = 0,2137x - 0,0015

0,311 = 0,2137x - 0,0015

0,2137x = 0,311 + 0,0015

$$x = \frac{0,311 + 0,0015}{0,2137}$$

x = 1,4623

2.2.2 pH 4 absorbansi 0,252

y = 0,2137x - 0,0015

0,252 = 0,2137x - 0,0015

0,2137x = 0,252 + 0,0015

$$x = \frac{0,252 + 0,0015}{0,2137}$$

x = 1,1862

2.2.3 pH 7 absorbansi 0,806

y = 0,2137x - 0,0015

0,806 = 0,2137x - 0,0015

0,2137x = 0,806 + 0,0015

$$x = \frac{0,806 + 0,0015}{0,2137}$$

x = 3,7787

2.2.4 pH 10 absorbansi 0,072

y = 0,2137x - 0,0015

0,072 = 0,2137x - 0,0015

0,2137x = 0,072 + 0,0015

$$x = \frac{0,072 + 0,0015}{0,2137}$$

x = 0,3439

2.2.5 pH 12absorbansi 0,329

y = 0,2137x - 0,0015

0,329 = 0,2137x - 0,0015

0,2137x = 0,29 + 0,0015

$$x = \frac{0,329 + 0,0015}{0,2137}$$

x = 1,5466

2.3 Perhitungan Konsentrasi Variais Waktu

2.3.1 Variasi 15 menit absorbansi 0,148

$$y = 0{,}2137x - 0{,}0015$$
$$0{,}148 = 0{,}2137x - 0{,}0015$$
$$0{,}2137x = 0{,}148 + 0{,}0015$$
$$x = \frac{0{,}148 + 0{,}0015}{0{,}2137}$$
$$x = 0{,}6996$$

2.3.2 Variasi 30 menit absorbansi 0,129

$$y = 0{,}2137x - 0{,}0015$$
$$0{,}129 = 0{,}2137x - 0{,}0015$$
$$0{,}2137x = 0{,}129 + 0{,}0015$$
$$x = \frac{0{,}129 + 0{,}0015}{0{,}2137}$$
$$x = 0{,}6107$$

2.3.3 Variasi 45 menit absorbansi 0,121

$$y = 0{,}2137x - 0{,}0015$$
$$0{,}121 = 0{,}2137x - 0{,}0015$$
$$0{,}2137x = 0{,}121 + 0{,}0015$$
$$x = \frac{0{,}121 + 0{,}0015}{0{,}2137}$$
$$x = 0{,}5732$$

2.3.4 Variasi 60 menit absorbansi 0,060

$$y = 0{,}2137x - 0{,}0015$$
$$0{,}060 = 0{,}2137x - 0{,}0015$$
$$0{,}2137x = 0{,}060 + 0{,}0015$$
$$x = \frac{0{,}060 + 0{,}0015}{0{,}2137}$$
$$x = 0{,}2878$$

2.3.5 Variasi 75 menit absorbansi 0,033

$$y = 0{,}2137x - 0{,}0015$$
$$0{,}033 = 0{,}2137x - 0{,}0015$$
$$0{,}2137x = 0{,}033 + 0{,}0015$$
$$x = \frac{0{,}033 + 0{,}0015}{0{,}2137}$$
$$x = 0{,}1614$$

Lampiran 3. Perhitungan Kapasitas Adsorpsi

3.1 Kapasitas Adsorpsi Variasi Massa Surfaktan

3.1.1 SDS 0 mg

$\frac{25-4,6397}{25}$ x 100% = 81,4412%

3.1.2 SDS 3 mg

$\frac{25-4,2840}{25}$ x 100% = 82,8640%

3.1.3 SDS 6 mg

$\frac{25-3,6289}{25}$ x 100% = 85,4844%

3.1.4 SDS 9 mg

$\frac{25-2,7866}{25}$ x 100% = 88,8536%

3.1.5 SDS 12 mg

$\frac{25-2,3935}{25}$ x 100% = 90,4260%

3.1.6 SDS 15 mg

$\frac{25-2,1642}{25}$ x 100% = 91,3432%

3.2 Kapasitas Adsorpsi Variasi pH

3.2.1 pH 2

$\frac{25-14,6230}{25}$ x 100% = 41,5080%

3.2.2 pH 4

$\frac{25-11,8620}{25}$ x 100% = 52,5520%

3.2.3 pH 7

$\frac{25-3,7787}{25}$ x 100% = 84,8852%

3.2.4 pH 10

$\frac{25-0,3439}{25}$ x 100% = 98,6244%

3.2.5 pH 12

$\frac{25-1,5466}{25}$ x 100% = 93,8136%

3.3 Kapasitas Adsorpsi Variasi Waktu Kontak

3.3.1 Waktu kontak 15 menit

$\frac{25-0,6996}{25}$ x 100% = 97,2016%

3.3.2 Waktu kontak 30 menit

$\frac{25-0,6107}{25}$ x 100% = 97,5572%

3.3.3 Waktu kontak 45 menit

$\frac{25-0,5732}{25}$ x 100% = 97,7072%

3.3.4 Waktu kontak 60 menit

$\frac{25-0,2878}{25}$ x 100% = 98,8488%

3.3.5 Waktu kontak 75 menit

$\frac{25-0,1614}{25}$ x 100% = 99,3544%

Lampiran 4. Analisis Data

4.1 Penentuan Massa Surfaktan Optimum

Massa surf. (mg)	w (g)	t (menit)	Co (mg/L)	Abs	Ce (mg/L)	C selisih (mg/L)	qe (mg/L)	% teradsorpsi
0	0,125	60	25	0,990	4,6397	20,3603	4,0721	81,4412
3	0,125	60	25	0,914	4,2840	20,7160	4,1432	82,8640
6	0,125	60	25	0,774	3,6289	21,3711	4,2742	85,4844
9	0,125	60	25	0,594	2,7866	22,2134	4,4427	88.8536
12	0,125	60	25	0,510	2,3935	22,6065	4,5213	90,4260
15	0,125	60	25	0,416	2,1642	22,8358	4,5672	91,3432

4.2 Penentuan pH Optimum

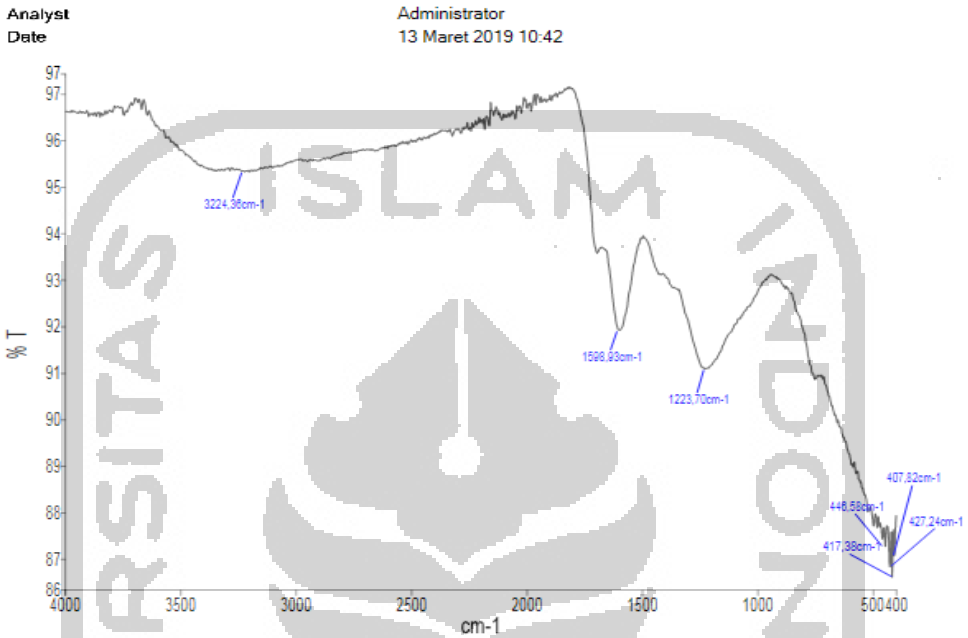
Massa surf. (mg)	pH	w (g)	t (menit)	Co (mg/L)	Abs	Ce (mg/L)	Fp	C selisih (mg/L)	qe (mg/L)	% teradsorpsi
15	2	0,125	60	25	0,311	1,4623	10	10,3770	2.0754	41,5080
15	4	0,125	60	25	0,252	1,1862	10	13,1380	2,6276	52,5520
15	7	0,125	60	25	0,806	3,7787	1	21,2213	4,2443	84,8852
15	10	0,125	60	25	0,072	0,3439	1	24,6561	4,9312	98,6244
15	12	0,125	60	25	0,329	1,5466	1	23,4534	4,6907	93,8136

4.3 Penentuan Waktu Kontak Optimum

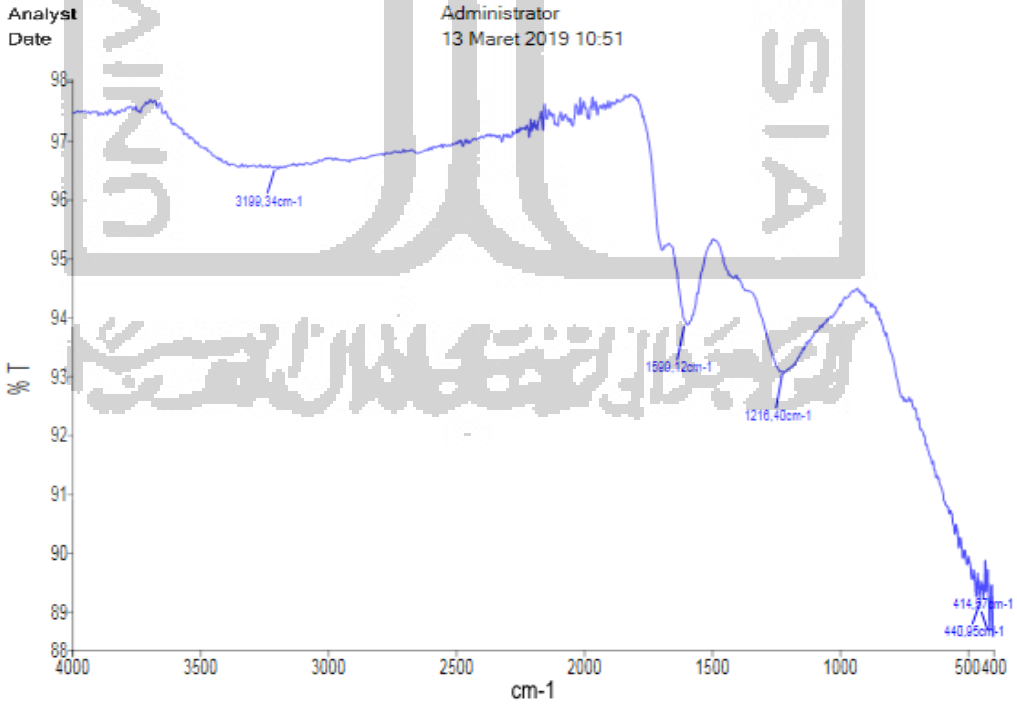
Massa surf. (mg)	pH	w (g)	t (menit)	Co (mg/L)	Abs	Ce (mg/L)	C selisih (mg/L)	qe (mg/L)	% teradsorpsi
15	10	0,125	15	25	0,148	0,6996	24,3004	4,8601	97,2016
15	10	0,125	30	25	0,129	0,6107	24,3893	4,8779	97,5572
15	10	0,125	45	25	0,121	0,5732	24,4268	4,8854	97,7072
15	10	0,125	60	25	0,060	0,2878	24,7122	4,9424	98,8488
15	10	0,125	75	25	0,033	0,1614	24,8386	4,9677	99,3544

Lampiran 5. Hasil Karakterisasi

5.1 Hasil Karakterisasi Menggunakan FTIR

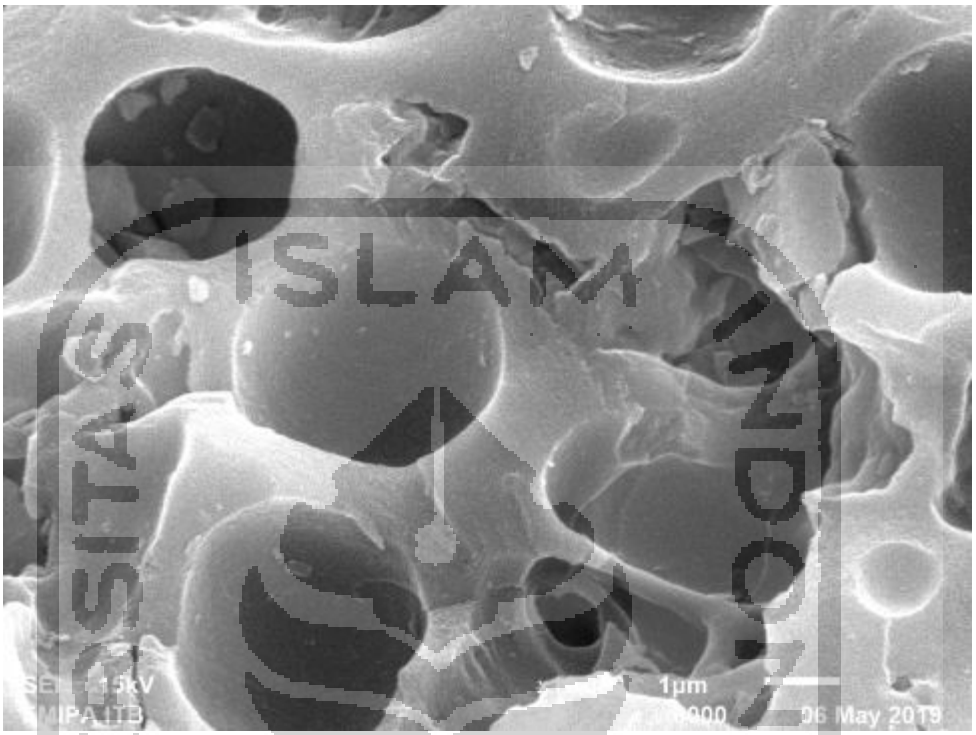


Hasil FTIR *Biochar* no surfaktan

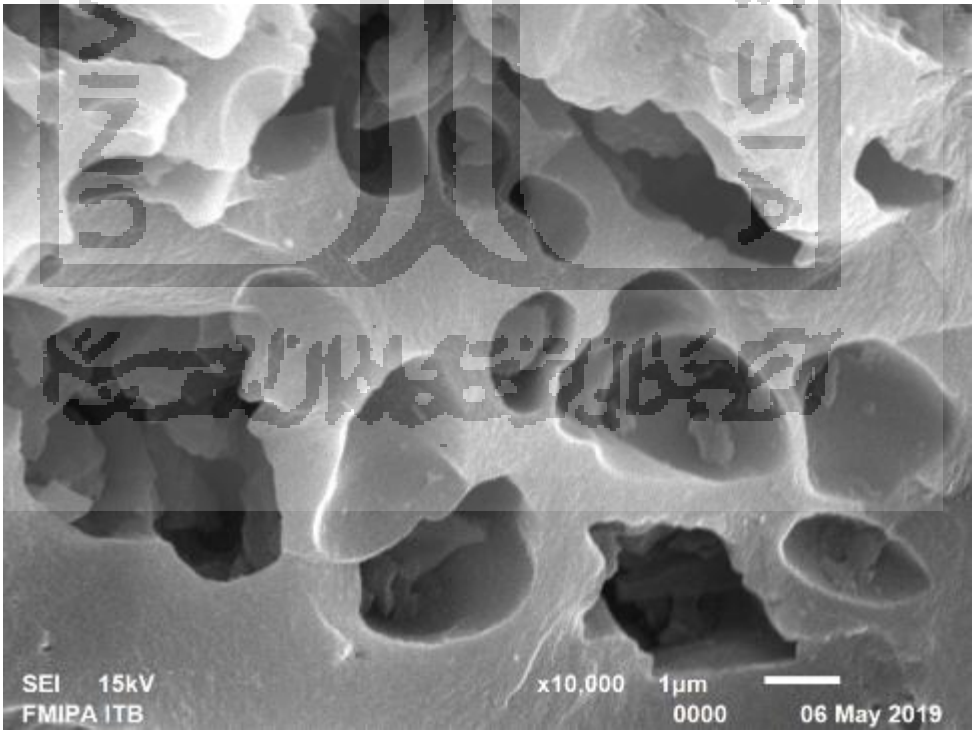


Hasil FTIR *Biochar* 15 mg SD

5.2 Hasil Karakterisasi Menggunakan SEM- EDX

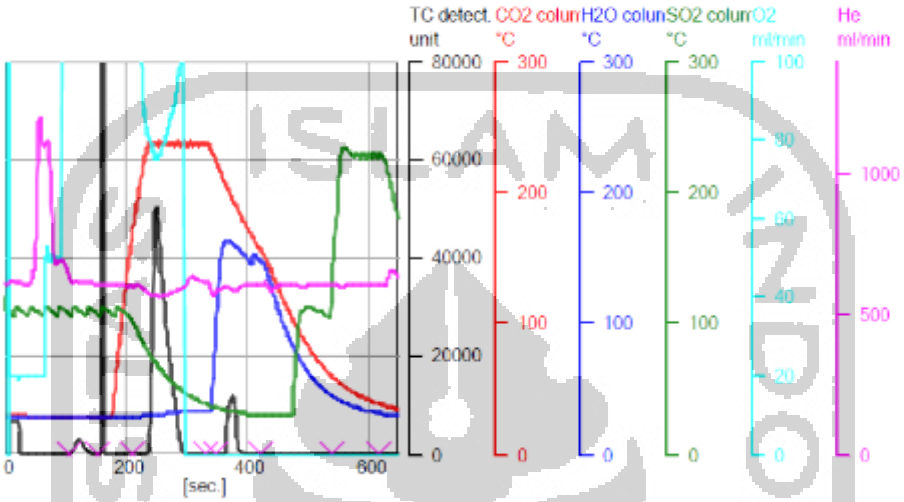


Hasil SEM biochar no surfaktan



Hasil SEM biochar dengn 15 mg SDS

5.3 Hasil Karakterisasi Menggunakan *Elemental Analyzer*

Graphic report

No.	Weight [mg]	Name	Method	N Area	C Area	H Area	S Area	N [%]	C [%]	H [%]	S [%]	C/N ratio	C/H ratio	N Factor	C Factor	H Factor	S Factor	Prot. Factor	Prot. [%]	Date	Time
17	20.7000	BIODISO	coal	5.168	177.667	17.787	209	1.65	64.90	3.588	0.210	39.0196	18.0580	0.9073	1.0043	1.1728	1.0358	6.2500	11.566	26/06/2019 12:...