

LAMPIRAN

Lampiran A Pembuatan Larutan NaOH dan Asam Sulfat

Lampiran A.1. Lautan NaOH 3 M

$$M = \frac{n \text{ (mol)}}{V \text{ (L)}}$$

$$M = \frac{(\text{massa} / Mr)}{V \text{ (L)}}$$

$$3 \text{ M} = \frac{\frac{(\text{massa})}{50 \text{ g/mol}}}{0,2 \text{ L}}$$

$$\text{massa} = 3 \text{ mol/L} \times 0,2 \text{ L} \times 50 \text{ g/mol}$$

$$\text{massa} = 30 \text{ gram}$$

Lampiran A.2. Lautan NaOH 6 M

$$M = \frac{n \text{ (mol)}}{V \text{ (L)}}$$

$$M = \frac{(\text{massa} / Mr)}{V \text{ (L)}}$$

$$6 \text{ M} = \frac{\frac{(\text{massa})}{50 \text{ g/mol}}}{0,2 \text{ L}}$$

$$\text{massa} = 6 \text{ mol/L} \times 0,2 \text{ L} \times 50 \text{ g/mol}$$

$$\text{massa} = 60 \text{ gram}$$

Lampiran A.3. Lautan NaOH 8 M

$$M = \frac{n \text{ (mol)}}{V \text{ (L)}}$$

$$M = \frac{(\text{massa} / Mr)}{V \text{ (L)}}$$

$$8 \text{ M} = \frac{\frac{(\text{massa})}{50 \text{ g/mol}}}{0,2 \text{ L}}$$

$$\text{massa} = 8 \text{ mol/L} \times 0,2 \text{ L} \times 50 \text{ g/mol}$$

$$\text{massa} = 80 \text{ gram}$$

Lampiran A.4. Lautan Asam Sulfat

$$\text{massa} = M \times V \times M_r$$

$$\text{massa} = (1M) \times (0,5 \text{ L}) \times (98 \text{ g/mol})$$

$$\text{massa} = 49 \text{ gram}$$

Lampiran B Hasil Analisa Menggunakan *X-Ray Fluorescence*

At. numb.	Element	Series	Intensity	Concentration
14	SiO ₂	K	582564	64,141 ± 0,138%
13	Al ₂ O ₃	K	137066	24,753 ± 0,117%
26	Fe ₂ O ₃	K	575117	5,006 ± 0,018%
20	CaO	K	107731	1,958 ± 0,014%
12	MgO	K	3549	1,224 ± 0,068%
11	Na ₂ O	K	647	0,751 ± 0,191%
16	SO ₃	K	17034	0,692 ± 0,015%
22	TiO ₂	K	50239	0,633 ± 0,008%
19	K ₂ O	K	21630	0,632 ± 0,015%
15	P ₂ O ₅	K	2589	0,168 ± 0,016%
25	Mn ₃ O ₄	K	2904	0,040 ± 0,003%

Tabel B.1. Hasil Analisa Sampel *Bottom Ash* Sebelum Menggunakan Alat *X-Ray Fluorescence*

At. numb.	Element	Series	Intensity	Concentration
14	SiO ₂	K	838962	75,512 ± 0,120%
13	Al ₂ O ₃	K	113772	17,636 ± 0,097%
26	Fe ₂ O ₃	K	235089	2,302 ± 0,011%
16	SO ₃	K	32271	1,192 ± 0,017%
12	MgO	K	2848	0,847 ± 0,058%
20	CaO	K	44261	0,725 ± 0,010%
22	TiO ₂	K	61289	0,680 ± 0,008%
19	K ₂ O	K	21443	0,569 ± 0,014%
11	Na ₂ O	K	448	0,450 ± 0,167%
15	P ₂ O ₅	K	1062	0,063 ± 0,014%
25	Mn ₃ O ₄	K	1529	0,024 ± 0,002%

Tabel B.2. Hasil Analisa Sampel *Bottom Ash* dengan NaOH 3M Menggunakan Alat *X-Ray Fluorescence*

At. numb.	Element	Series	Intensity	Concentration
14	SiO ₂	K	808555	78,512 ± 0,121%
13	Al ₂ O ₃	K	74711	13,105 ± 0,094%
26	Fe ₂ O ₃	K	471886	4,064 ± 0,015%
16	SO ₃	K	33873	1,394 ± 0,019%
20	CaO	K	44385	0,805 ± 0,010%
12	MgO	K	1841	0,624 ± 0,057%
22	TiO ₂	K	48333	0,595 ± 0,008%
11	Na ₂ O	K	437	0,501 ± 0,181%
19	K ₂ O	K	10661	0,315 ± 0,014%
15	P ₂ O ₅	K	969	0,064 ± 0,015%
25	Mn ₃ O ₄	K	1657	0,023 ± 0,002%

Tabel B.3. Hasil Analisa Sampel *Bottom Ash* dengan NaOH 6M Menggunakan Alat *X-Ray Fluorescence*

At. numb.	Element	Series	Intensity	Concentration
14	SiO ₂	K	922663	79,436 ± 0,111%
13	Al ₂ O ₃	K	83336	12,899 ± 0,088%
16	SO ₃	K	85588	3,177 ± 0,025%
26	Fe ₂ O ₃	K	192878	1,911 ± 0,010%
22	TiO ₂	K	55553	0,622 ± 0,008%
20	CaO	K	35689	0,592 ± 0,009%
12	MgO	K	1610	0,482 ± 0,054%
19	K ₂ O	K	15448	0,416 ± 0,014%
11	Na ₂ O	K	385	0,390 ± 0,174%
15	P ₂ O ₅	K	951	0,056 ± 0,014%
25	Mn ₃ O ₄	K	1326	0,021 ± 0,002%

Tabel B.4. Hasil Analisa Sampel *Bottom Ash* dengan NaOH 8M Menggunakan Alat *X-Ray Fluorescence*

Lampiran C Spesifikasi Alat Pengujian XRF

SPESIFIKASI ALAT X-RAY FLUORESCENCE LABORATORIUM KIMIA ANALISA DAN INSTRUMENTASI PENGUJIAN FMIPA



Brand : Elvatech

Type : ElvaX Plus

SPECS

Digital X-Ray Source digiX-50

Anode : W, Rh, Ag

Voltage : 50 kV

Power : 5 W

5 Position filter changer

X-Ray Detector

Type : Fast SDD

Area : 25 mm²

Energy resolution : 140 eV at Mn Ka, 85 eV at Al Ka

Count rate : 500 000 cps

Electronics

DPP : proprietary DAS (Dynamically Adaptive Shaping) type, 80 MHz sampling rate

MCA : 4096 channels

General

Dimensions : 430 x 340 x 200 mm

Weight : 18 kg

Power supply : 90 – 240 V, 50/60 Hz

Power consumption : 40 W

Software

Operating system : Windows XP/Vista/7/8/10

Analysis algorithms : Fundamental parameters (FPA), Empirical (regression), calibrations, Manual spectra comparison