LAMPIRAN

Lampiran A Potensial Reduksi Standar pada 25°C

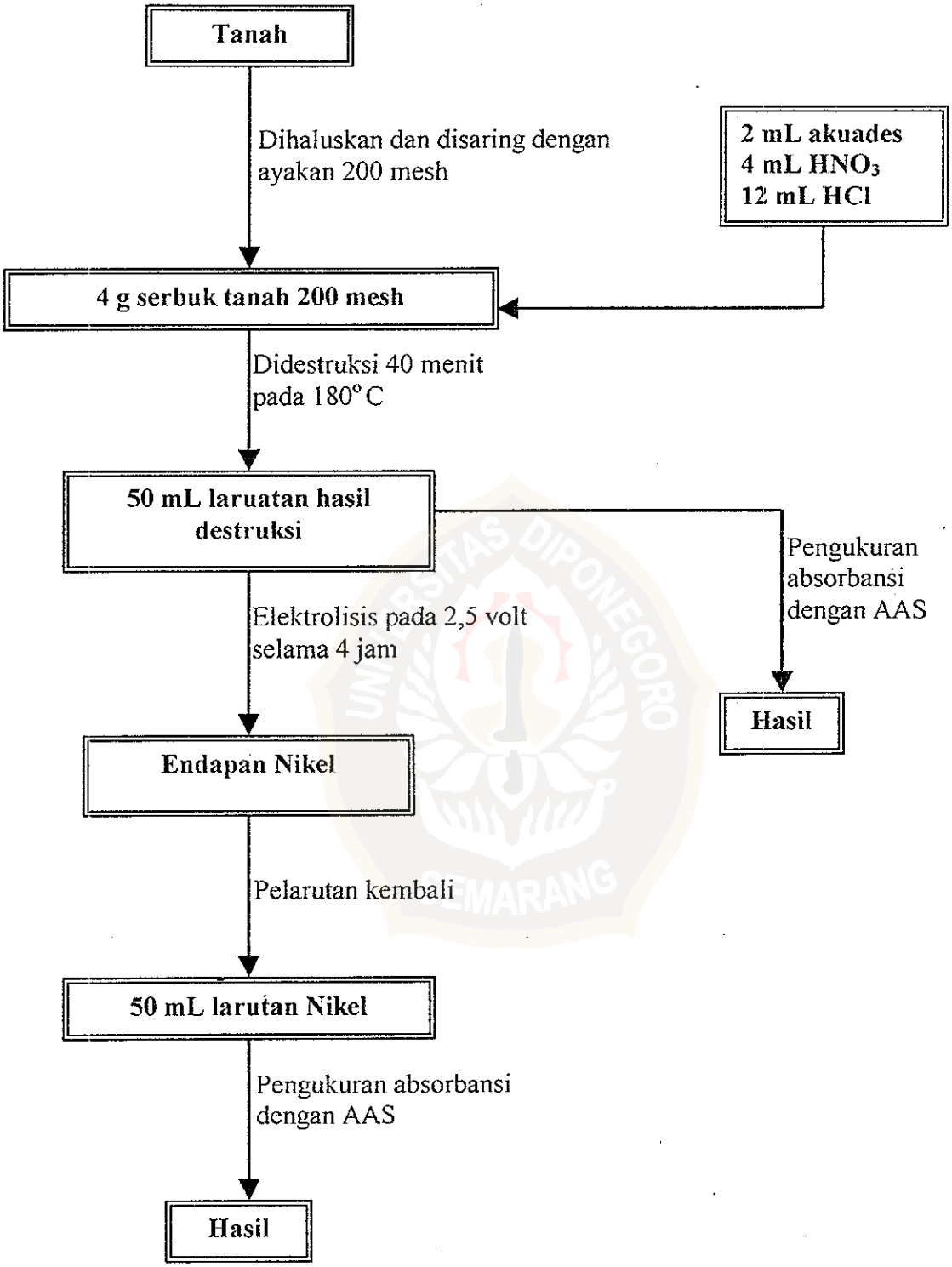
Beberapa harga potensial reduksi standar pada 25°C

Setengah Reaksi	E^o(V)
$F_2(g) + 2e^- \leftrightarrows 2F^-$	+2.87
$PbO_2(s) + SO_4^{2-}(aq) + 4H^+ + 2e^- \leftrightarrows PbSO_4(s) + H_2O$	+1.69
$2HOCl(aq) + 2H^+(aq) + 2e^- \leftrightarrows Cl_2(g) + 2H_2O$	+1.63
$MnO^{4-}(aq) + 8H^+(aq) + 5e^- \leftrightarrows Mn^{2+}(aq) + 4H_2O$	+1.51
$PbO_2(s) + 4H^+(aq) + 2e^- \leftrightarrows Pb^+(aq) + 2H_2O$	+1.46
$BrO^{3-}(aq) + 6H^+(aq) + 6e^- \leftrightarrows Br^-(aq) + 3H_2O$	+1.44
$Au^{3+}(aq) + 3e^- \leftrightarrows Au(s)$	+1.42
$Cl_2(g) + 2e^- \leftrightarrows Cl^-(aq)$	+1.36
$O_2(g) + 4H^+(aq) + 4e^- \leftrightarrows 2H_2O$	+1.23
$Br_2(aq) + 2e^- \leftrightarrows 2Br^-(aq)$	+1.07
$NO^{3-}(aq) + 4H^+(aq) + 3e^- \leftrightarrows NO(g) + 2H_2O$	+0.96
$Ag^+(aq) + e^- \leftrightarrows Ag(s)$	+0.80
$Fe^{3+}(aq) + e^- \leftrightarrows Fe^{2+}(aq)$	+0.77
$I_2(s) + 2e^- \leftrightarrows 2I^-(aq)$	+0.54
$NiO_2(aq) + 4H^+(aq) + 3e^- \leftrightarrows Ni(OH)_2(s) + 2OH^-(aq)$	+0.49
$Cu^{2+}(aq) + 2e^- \leftrightarrows Cu(s)$	+0.34
$SO_4^{2-} + 4H^+(aq) + 2e^- \leftrightarrows H_2SO_3(aq) + H_2O$	+0.17

Lanjutan

Setengah Reaksi	E^0(V)
$2H^+(aq) + 2e^- \leftrightarrows H_2(g)$	+0.00
$Sn^{2+}(aq) + 2e^- \leftrightarrows Sn(s)$	-0.14
$Ni^{2+}(aq) + 2e^- \leftrightarrows Ni(s)$	-0.25
$Co^{2+}(aq) + 2e^- \leftrightarrows Co(s)$	-0.28
$PbSO_4(s) + 2e^- \leftrightarrows Pb(s) + SO_4^{2-}$	-0.36
$Cd^{2+}(aq) + 2e^- \leftrightarrows Cd(s)$	-0.40
$Fe^{2+}(aq) + 2e^- \leftrightarrows Fe(s)$	-0.44
$Cr^{3+}(aq) + 3e^- \leftrightarrows Cr(s)$	-0.74
$Zn^{2+}(aq) + 2e^- \leftrightarrows Zn(s)$	-0.83
$2H_2O(s) + 2e^- \leftrightarrows H_2(g) + 2OH^-(s)$	-1.66
$Mg^{2+}(aq) + 2e^- \leftrightarrows Mg(s)$	-2.37
$Na^+(aq) + e^- \leftrightarrows Na(s)$	-2.71
$Ca^{2+}(aq) + 2e^- \leftrightarrows Ca(s)$	-2.76
$K^+(aq) + e^- \leftrightarrows K(s)$	-2.92
$Li^+(aq) + e^- \leftrightarrows Li(s)$	-3.05

Lampiran B Skema Kerja

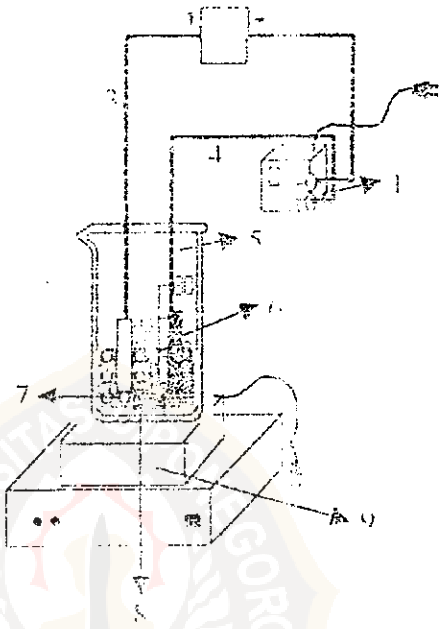


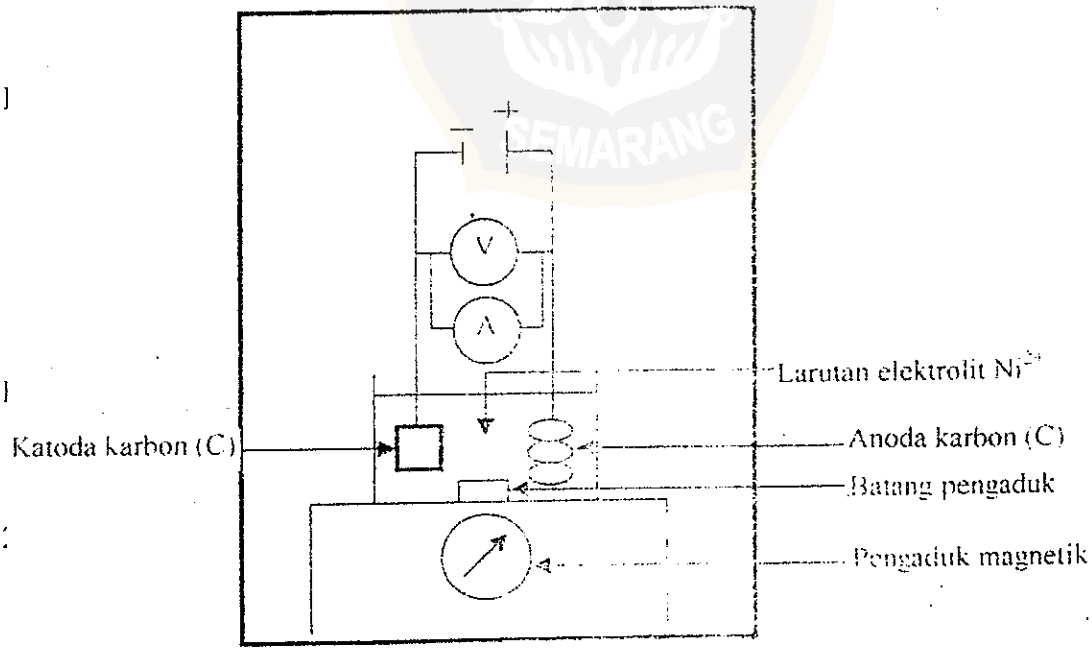
Lampiran C Skema Alat

1. Skema alat elektrolisis

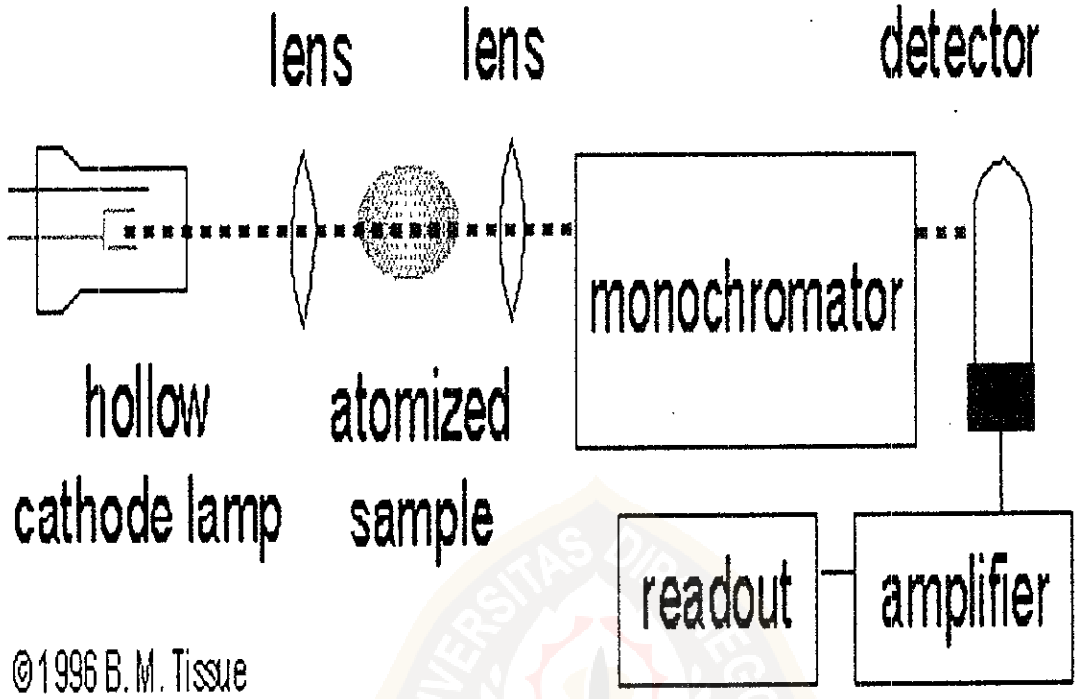
Keterangan gambar :

1. Adaptor
2. Multimeter
3. Kabel Katoda
4. Kabel Anoda
5. Gelas Beker
6. Anoda Karbon
7. Katoda Karbon
8. Pengaduk Magnetik
9. *Hot Plate*





2. Skema alat spektrometer serapan atom



Lampiran D Data Elektrolisis Sampel pada Potensial 2,5 V

Nomor	Waktu elektrolisis (menit)	Arus (mA)
1	0	450
2	5	430
3	10	410
4	15	420
5	20	410
6	25	400
7	30	380
8	35	370
9	40	350
10	45	340
11	50	330
12	55	320
13	60	300
14	65	290
15	70	280
16	75	290
17	80	280
18	85	270
19	90	270
20	95	260
21	100	270
22	105	260
23	110	270
24	115	260
25	120	250
26	125	240

Lanjutan

27	130	240
28	135	240
29	140	230
30	145	230
31	150	230
32	155	230
33	160	240
34	165	240
35	170	210
36	175	210
37	180	210
38	185	210
39	190	180
40	195	160
41	200	140
42	205	140
43	210	140
44	215	140
45	220	140
46	225	140
47	230	140
48	235	140
49	240	140

Lampiran E Data Pengukuran dengan Spektrometer Serapan Atom

1. Data kurva kalibrasi

Konsentrasi Ni (mg/L)	Absorbansi (A)
0,0	0,00
0,5	0,024
1	0,053
1,5	0,09
2	0,106

2. Data kurva pengendapan logam nikel

Persamaan kurva kalibrasi y = 0,0556x-0,001 atau A = 0,0556C-0,001

Konsentrasi Ni sisa elektrolisis, $C = \frac{A + 0{,}001}{0{,}0556}$ x 1000 (f_p)

Berat Ni sisa elektrolisis, $W_{\text{Ni sisa}} = \frac{50ml}{1000ml}$ x C

Berat Ni terendapkan, $W_{\text{Ni endapan}} = W_{\text{Ni awal}} - W_{\text{Ni sisa}}$; dimana W_{awal} = 63,8489 mg

Persen Ni terendapkan (%) = $\frac{W_{Ni\,endapan}}{W_{Ni\,awal}} x100\%$

Waktu elektrolisis (menit)	Absorbansi sampel (A)	Konsentrasi Ni sisa elektrolisis (mg/L)	Berat Ni sisa elektrolisis (mg)	Berat Ni terendapkan (mg)	Persen Ni terendapkan (%)
25	0,064	1169,065	58,45325	5,39565	8,4507
50	0,06	1097,122	54,8561	8,9928	14,0845
75	0,057	1043,165	52,15825	11,69065	18,3099
100	0,052	953,237	47,66185	16,18705	25,3521
125	0,046	845,324	42,2662	21,5827	33,8028
150	0,045	827,338	41,3669	22,482	35,2113
175	0,044	809,353	40,46765	23,38125	36,6197

Lampiran F Perhitungan

1. Destruksi

A. Perhitungan berat Ni dalam sampel tanah

Persamaan kurva standar, y = 0,0556x-0,001

$$A = e.b.c$$

$$C = \frac{A + 0{,}001}{0{,}0556}, \qquad \text{dengan absorbansi (A) = 0,07}$$

$$\text{Konsentrasi Ni} = \frac{0{,}07 + 0{,}001}{0{,}0556} = 1{,}27698 \text{ ppm}$$

Konsentrasi Ni sebelum pengenceran = 1000 x 1,27698 ppm = 1276,98 ppm

Dalam 1 Liter larutan mengandung 1276,98 mg Ni

$$\text{Dalam 50 mL sampel} = \frac{50ml}{1000ml} \text{ x } 1276{,}98 \text{ mg} = 63{,}85 \text{ mg}$$

$$= 63{,}85.10^{-3} \text{ g}$$

Berat Ni dalam 4 g sampel adalah $63{,}85.10^{-3}$ g

B. Perhitungan kadar Ni dalam sampel tanah

$$\text{Kadar Ni dalam sampel tanah} = \frac{Berat\ Ni}{BeratSampel} x100\%$$

$$= \frac{63{,}85.10^{-3}\ g}{4\ g} x100\%$$

$$= 1{,}59\ \%$$

Kadar Ni dalam tanah 1,59 %

2. Elektrolisis sampel

A. Perhitungan berat Ni terendapkan

Persamaan kurva standar, y = 0,0556x-0,001

$$A = e.b.c$$

Absorbansi = 0,066

$$\text{Konsentrasi Ni} = \frac{0,066 + 0,001}{0,0556} = 1,20504 \text{ ppm}$$

Konsentrasi Ni sebelum pengenceran=1000 x 1,20504 ppm = 1205,04 ppm

Dalam 1 liter larutan mengandung 1205,04 mg Ni

$$\text{Dalam 50 mL sampel} = \frac{50ml}{1000ml} \text{ x } 1205,04 \text{ mg}$$

$$= 60,26 \text{ mg}$$

$$= 60,26 .10^{-3} \text{ g}$$

Berat nikel terendapkan adalah $60,26.10^{-3}$ g.

B. Perhitungan kadar Ni dalam endapan

Berat karbon = 3602,2 mg = 3,6022 g

Berat katoda (karbon + endapan) = 3676,2 mg = 3,6762 g

Berat endapan = (3,6762-3,6022)g = 0,074 g = 74.10^{-3} g

$$\text{Kadar Ni hasil elektrolisis} = \frac{\textit{Berat Ni terendapkan}}{\textit{Berat endapan}} \text{ x } 100\%$$

$$= \frac{60,2518.10^{-3}\ g}{74.10^{-3}\ g} \text{ x } 100\ \% = 81,42\ \%$$

Kadar Ni dalam endapan hasil elektrolisis adalah 81,42 %

C. Efisiensi elektrolisis

$$\text{Efisiensi elektrolisis (\%)} = \frac{\textit{Berat nikel yang terendapkan}}{\textit{Berat nikel dalam laru}\,\text{tan}\,\textit{sampel}} \times 100\%$$

$$= \frac{60{,}26.10^{-3}\ g}{63{,}85.10^{-3}\ g} x100\%$$

$$= 94{,}37\ \%$$

3. Rendemen Faraday

Berat Ni terendapkan = W = $60{,}26.10^{-3}$ g

$$W = \frac{Ar\ Ni}{n} \times \frac{Q_{app}}{96.500}$$

Maka,

$$Q_{app} = \frac{60{,}26.10^{-3}\ (2)\ 96.500}{58{,}71}$$

$$= 198{,}038\ C$$

$$Q_{teori} = I_{rata\text{-}rata} \times t_{total} = \frac{12700.10^{-3}}{49} \times 240 \times 60$$

$$= 259{,}183 \times 10^{-3} \times 240 \times 60$$

$$= 3732{,}235 \text{ coulomb}$$

$$\text{Rendemen Faraday} = \frac{Q_{app}}{Q_{teori}} \times 100\%$$

$$= \frac{198{,}038\ C}{3732{,}235\ C} \times 100\%$$

$$= 5{,}31\%$$