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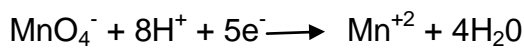
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**PERHITUNGAN REAGENSIA**

**1.1 Perhitungan Larutan Titer  $\text{KMnO}_4$**

Diketahui:	BM $\text{KMnO}_4$	= 159
	V $\text{KMnO}_4$	= 300 ml
	N $\text{KMnO}_4$	= 0,1 N
	e	= 1/5

Reaksi:



Ditanya: Berat  $\text{KMnO}_4 = \dots\dots\dots?$

Jawab :  $W = V \times N \times \text{BM} \times e / 1000$

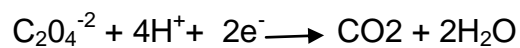
$$W = 200 \times 0,1 \times 159 \times 1/5 / 1000$$

$$W = 0,636 \text{ g}$$

**1.2 Perhitungan Larutan Baku  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  0,1N**

Diketahui :	BM $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	= 126
	V $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	= 60 ml
	N $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	= 0,1 N
	e	= 1/2

Reaksi :



Ditanya : Berat  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O} = \dots?$

Jawab:  $W = V \times N \times \text{BM} \times e / 1000$

$$W = \frac{60 \times 0,1 \times 126 \times 1/2}{1000}$$

$$W = 0,378 \text{ g}$$

**1.3 Perhitungan Indikator larutan  $\text{H}_2\text{SO}_4$**

Diketahui :	BM $\text{H}_2\text{SO}_4$	= 98
	V $\text{H}_2\text{SO}_4$	= 100 ml
	N $\text{H}_2\text{SO}_4$	= 6 N
	e	= 1/2

$$\begin{aligned}
 \text{H}_2\text{SO}_4 \text{ pekat \%} &= 98\% \\
 \text{BJ} &= 1,84 \text{ g/ml} \\
 \text{Jawab } W &= \frac{V \times N \times \text{BM} \times e}{1000} \\
 W &= \frac{100 \times 6 \times 98 \times \frac{1}{2}}{1000} \\
 W &= 29,4 \text{ g} \\
 \text{H}_2\text{SO}_4 \text{ pekat \%} &= \frac{100\%}{98\%} \times w \\
 &= \frac{100\%}{98\%} \times 29,4 \text{ g} \\
 \text{H}_2\text{SO}_4 \text{ pekat \%} &= 30 \text{ g} \\
 V &= \frac{W}{\text{BJ}} \\
 V &= \frac{30 \text{ g}}{1,84 \text{ g/ml}} \\
 V &= 16,30 \text{ ml}
 \end{aligned}$$

#### 1.4 Perhitungan Pereaksi HCl

$$\begin{aligned}
 \text{Diketahui : BM HCl} &= 36,5 \text{ g/mol} \\
 \text{BJ HCl} &= 1,19 \text{ g/ml}
 \end{aligned}$$

Ditanya : N =.....?

V =.....?

Jawab : :

$$N = ( (10\% \times \text{berat jenis}) \times \text{valensi} ) / \text{BM}$$

$$N = ( ( 10 \times 37\% \times 1,19 ) \times 1 ) / 36,5$$

$$N = 12,06 \text{ N}$$

$$\begin{aligned}
 N_1 \times V_1 &= N_2 \times V_2 \\
 12,06 \times V_1 &= 1 \times 1000 \\
 V_1 &= 1000 \times \frac{1}{12,06} \\
 V_1 &= 83 \text{ ml}
 \end{aligned}$$

Jadi asam klorida pekat yang dibutuhkan sebanyak 83 ml.

### 1.5 Perhitungan Pereaksi HNO<sub>3</sub>

Diketahui : Bj = 1,40 gr/ml  
Kemurnian = 65 %  
BM = 63,01 gr/mol

Ditanya : N =.....?  
V =.....?

Jawab :

$$N = ( 1,40 \times 10 \times 65 ) / 63,01$$

$$N = 14,4$$

$$N_1 \times V_1 = N_2 \times V_2$$

$$14,4 \times V_1 = 0,5N \times 1000 \text{ ml}$$

$$V_1 = 500/14,4$$

$$V_1 = 34,7 \text{ ml}$$

### 1.6 Kenormalan KMnO<sub>4</sub>

Dik : V H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> = 10 ml  
N H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> = 0,05 N  
V KMnO<sub>4</sub> = 4,86 ml

Dit : N KMnO<sub>4</sub> =.....?

Jawab :

$$V \text{ KMnO}_4 \times N \text{ KMnO}_4 = V \text{ H}_2\text{C}_2\text{O}_4 \times N \text{ H}_2\text{C}_2\text{O}_4$$

$$4,86 \text{ ml} \times N \text{ KMnO}_4 = 10 \text{ ml} \times 0,05 \text{ N}$$

$$N \text{ KMnO}_4 = \frac{5 \text{ ml}}{4,86 \text{ ml}}$$

$$N \text{ KMnO}_4 = 0.1028$$

## LAMPIRAN 2

### 1.7 Penetapan Kadar Kalsium Pada Tempe

Rumus : Kadar kalsium(%)=  $V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/Mg}$   
sampel  $\times 100 \%$

a. Tempe 1p

Dik :  $V \text{ KMnO}_4 = 1,4 \text{ ml}$

$N \text{ KMnO}_4 = 0,1028$

Be ca = 20

Berat sampel = 5.007g

Kadar kalsium(%) =  $V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mg}$  sampel  $\times 100 \%$

$$\begin{aligned} &= \frac{1,6 \text{ ml} \times 0,1028 \times 20}{5007} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,5748 \% \\ &= \frac{0,5748}{100} \times 5007 \\ &= 28,96 \text{ mg} \end{aligned}$$

Jadi dalam 0,5748 % terdapat 28,96 mg

b. Tempe 1d

Dik :  $V \text{ KMnO}_4 = 1,6 \text{ ml}$

$N \text{ KMnO}_4 = 0,1028$

Be ca = 20

Berat sampel = 5.008g

Kadar kalsium(%) =  $V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mg}$  sampel  $\times 100 \%$

$$\begin{aligned} &= \frac{1,6 \text{ ml} \times 0,1028 \times 20}{5008} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,6568 \% \\ &= \frac{0,6568}{100} \times 5008 \\ &= 32,89 \text{ mg} \end{aligned}$$

Jadi dalam 0,6568 % terdapat 32,89 mg

c. Tempe 2p

Dik :  $V \text{ KMnO}_4 = 1,23 \text{ ml}$

$N \text{ KMnO}_4 = 0,1028$

$$\text{Be ca} = 20$$

$$\text{Berat sampel} = 5.006\text{g}$$

$$\begin{aligned}\text{Kadar kalsium(\%)} &= V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mgsampel} \times 100 \% \\ &= \frac{1,23\text{ml} \times 0,1028 \times 20}{5006} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,5051 \% \\ &= \frac{0,5051}{100} \times 5006 \\ &= 25,28 \text{ mg}\end{aligned}$$

Jadi dalam 0,5051 % terdapat 25,28 mg

d. Tempe 2d

$$\text{Dik : } V \text{ KMnO}_4 = 2,13 \text{ ml}$$

$$N \text{ KMnO}_4 = 0,1028$$

$$\text{Be ca} = 20$$

$$\text{Berat sampel} = 5.009\text{g}$$

$$\begin{aligned}\text{Kadar kalsium(\%)} &= V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mgsampel} \times 100 \% \\ &= \frac{2,13\text{ml} \times 0,1028 \times 20}{5009} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,8742 \% \\ &= \frac{0,8742}{100} \times 5008 \\ &= 43,77 \text{ mg}\end{aligned}$$

Jadi dalam 0,8742 % terdapat 43,77 mg

e. Tempe 3p

$$\text{Dik : } V \text{ KMnO}_4 = 1,9 \text{ ml}$$

$$N \text{ KMnO}_4 = 0,1028$$

$$\text{Be ca} = 20$$

$$\text{Berat sampel} = 5.005\text{g}$$

$$\begin{aligned}\text{Kadar kalsium(\%)} &= V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mgsampel} \times 100 \% \\ &= \frac{1,9\text{ml} \times 0,1028 \times 20}{5005} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,78049 \% \\ &= \frac{0,78049}{100} \times 5005 \\ &= 32,06 \text{ mg}\end{aligned}$$

Jadi dalam 0,78049 % terdapat 32,06 mg

f. Tempe 3d

$$\text{Dik : } V \text{ KMnO}_4 = 1,96 \text{ ml}$$

$$N \text{ KMnO}_4 = 0,1028$$

$$\text{Be ca} = 20$$

$$\text{Berat sampel} = 5.003\text{g}$$

$$\text{Kadar kalsium(\%)} = V \text{ KMnO}_4 \times N \text{ KMnO}_4 \times \text{be Ca/mgsampel} \times 100 \%$$

$$= \frac{1,96 \text{ ml} \times 0,1028 \times 20}{5003} \times 100 \% \times \frac{100 \text{ ml}}{10 \text{ ml}} = 0,8054 \%$$

$$= \frac{0,8054}{100} \times 5003$$

$$= 40,29 \text{ mg}$$

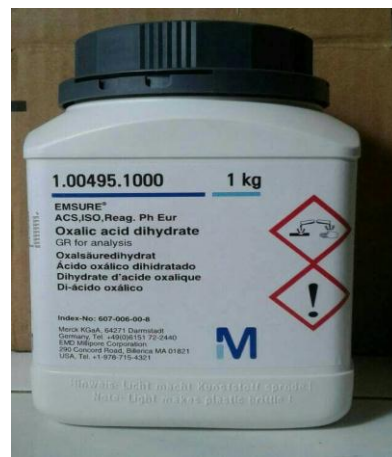
Jadi dalam 0,8054 % terdapat 40,29 mg

## LAMPIRAN 3

### Dokumentasi Penelitian



3.1 Timbangan analitik



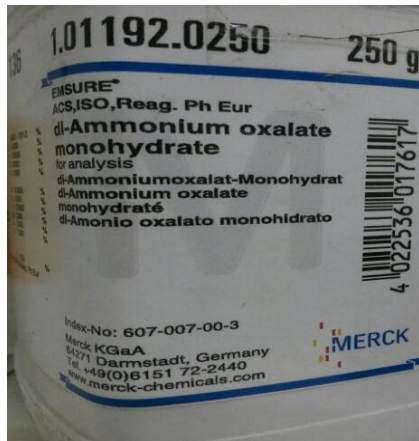
3.2 asam oksalat



3.3 H<sub>2</sub>SO<sub>4</sub> pekat



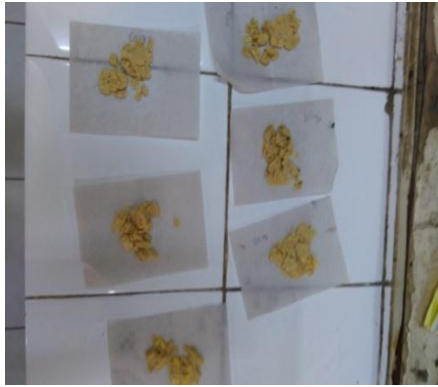
3.4 KMnO<sub>4</sub>



3.5 ammonium Oksalat

3.6 HCl pekat





3.8 Sampel yang ditimbang  
Dan dihaluskan



3.9 Sampel dicampur  
dengan HNO<sub>3</sub>(p) dan HCl(p)



3.10 Sampel yang dipanaskan



3.11 sampel yang telah  
dipanaskan ditambah 2ml asam  
nitrat (p)



3.11 Larutan jernih yang telah dipindahkan secara kuantitatif ke dalam labu takar



3.12 Titrasi Permanganometri



3.13 Sampel Tempe(p)



3.14 Sampel Tempe(d)

Lampiran 4

POLITEKNIK KESEHATAN  
JURUSAN FARMASI  
Jl. AIRLANGGA NO.20 MLDAN



KARTU LAPORAN PERTEMUAN BIMBINGAN KTI

Nama Mahasiswa : ABRAHAM LINCOLN GULTOM  
 NIM : 07539015001  
 Pembimbing : Resnora Mely. Rongkhan, ST, M.Si

No	TGL	PERTEMUAN	PEMBAHASAN	PARAF MAHASISWA	PARAF PEMBIMBING
1	26/2/18	I	KONSULTASI JUDUL	Abang	Resnora
2	20/3/18	II	Penyusunan Proposal	Abang	Resnora
3	25/4/18	III	BAB I Pendahuluan	Abang	Resnora
4	29/4/18	IV	BAB II Tinjauan Pustaka	Abang	Resnora
5		V	BAB III Metode Penelitian	Abang	Resnora
6		VI	Perbaikan Seminar proposal	Abang	Resnora
7		VII	Revisi proposal KTI	Abang	Resnora
8		VIII	persiapan penelitian	Abang	Resnora
9		IX	BAB IV Hasil dan Pembahasan	Abang	Resnora
10		X	BAB V Kesimpulan dan Saran	Abang	Resnora
11		XI	Perbaikan Bab IV dan V	Abang	Resnora
12		XII	Persiapan Ujian Akhir Program	Abang	Resnora

Ketua,  
  
 Dita Masriyah, M.Kes. Apt.  
 NIP. 196204281995032001

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 BADAN PENGEMBANGAN DAN  
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