LAMPIRAN

1. **Perhitungan Densitas**

1.1 Densitas gliserol terhadap waktu

- Sampel 1 (40 Menit)

  Berat Piknometer Isi = 46,64 gr

  Berat Piknometer Kosong = 22,78 gr

  $\text{Densitas} = \dfrac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$

  $= \dfrac{46,64\ gr - 22,78\ gr}{25\ ml}$

  $= 0,954$ gr/ml

- Sampel 2 (50 Menit)

  Berat Piknometer Isi = 46,71 gr

  Berat Piknometer Kosong = 22,80 gr

  $\text{Densitas} = \dfrac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$

  $= \dfrac{46,71\ gr - 22,80\ gr}{25\ ml}$

  $= 0,956$ gr/ml

- Sampel 3 (60 Menit)

  Berat Piknometer Isi = 46,73 gr

  Berat Piknometer Kosong = 22,80 gr

  $\text{Densitas} = \dfrac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$

  $= \dfrac{46,73\ gr - 22,80\ gr}{25\ ml}$

  $= 0,957$ gr/ml

- Sampel 4 (70 Menit)

  Berat Piknometer Isi = 46,77 gr

  Berat Piknometer Kosong = 22,80 gr

  $\text{Densitas} = \dfrac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$

  $= \dfrac{46,77\ gr - 22,80\ gr}{25\ ml}$

  $= 0,959$ gr/ml

- Sampel 5 (80 Menit)

  Berat Piknometer Isi = 46,82 gr

Berat Piknometer Kosong = 22,80 gr

$$\text{Densitas} = \frac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$$

$$= \frac{46,82\ gr - 22,80\ gr}{25\ ml}$$

$$= 0,961\ \text{gr/ml}$$

1.2 Densitas gliserol terhadap Suhu

- Sampel 1 (80 °C)

  Berat Piknometer Isi = 46,77 gr

  Berat Piknometer Kosong = 22,80 gr

  $$\text{Densitas} = \frac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$$

  $$= \frac{46,77\ gr - 22,80\ gr}{25\ ml}$$

  $$= 0,959\ \text{gr/ml}$$

- Sampel 2 (90 °C)

  Berat Piknometer Isi = 50,53 gr

  Berat Piknometer Kosong = 22,80 gr

  $$\text{Densitas} = \frac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$$

  $$= \frac{50,53\ gr - 22,80\ gr}{25\ ml}$$

  $$= 1,109\ \text{gr/ml}$$

- Sampel 3 (100 °C)

  Berat Piknometer Isi = 51,20 gr

  Berat Piknometer Kosong = 22,80 gr

  $$\text{Densitas} = \frac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$$

  $$= \frac{51,20\ gr - 22,80\ gr}{25\ ml}$$

  $$= 1,136\ \text{gr/ml}$$

- Sampel 4 (110 °C)

  Berat Piknometer Isi = 50,32 gr

  Berat Piknometer Kosong = 22,80 gr

  $$\text{Densitas} = \frac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$$

  $$= \frac{50,32\ gr - 22,80\ gr}{25\ ml}$$

  $$= 1,101\ \text{gr/ml}$$

- Sampel 5 (120 °C)

Berat Piknometer Isi = 49,58 gr

Berat Piknometer Kosong = 22,80 gr

Densitas $= \dfrac{Berat\ piknometer\ isi - Berat\ piknometer\ kosong}{Volume\ Piknometer}$

$\qquad = \dfrac{49,58\ gr - 22,80\ gr}{25\ ml}$

$\qquad = 1,071$ gr/ml

2. **Perhitungan Viskositas**

$$\mu x = \frac{tx\ .\ dx}{t0\ .\ d0}\ .\ \mu0$$

Keterangan :

μx : Viskositas

tx : waktu larutan

dx : densitas larutan

$t0$: Waktu air

$d0$: densitas air

$\mu0$: Viskositas air

2.1 Viskositas gliserol terhadap Waktu

- Sampel 1 (40 Menit)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,11 detik

    $$\mu x = \frac{1,11\ .\ 0,954}{1\ .\ 1}\ .\ 1,004\ cp$$

    μx = 1,063 cp

- Sampel 2 (50 Menit)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,18 detik

    $$\mu x = \frac{1,18\ .\ 0,956}{1\ .\ 1}\ .\ 1,004\ cp$$

    μx = 1,133 cp

- Sampel 3 (60 Menit)

to = 1 detik

do = 1 gr/ml

μo = 1,004 cp

tx = 1,25 detik

$$\mu x = \frac{1,25 \; . \; 0,957}{1 \; . \; 1} \; . \; 1,004 \; cp$$

μx = 1,201 cp

- Sampel 4 (70 Menit)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,29 detik

    $$\mu x = \frac{1,29 \; . \; 0,959}{1 \; . \; 1} \; . \; 1,004 \; cp$$

    μx = 1,242 cp

- Sampel 5 (80 Menit)

    to = 1 detik

    do = 1 gr/ml

    μo = 1 cp

    tx = 0,99 detik

    $$\mu x = \frac{0,99 \; . \; 0,961}{1 \; . \; 1} \; . \; 1,004 \; cp$$

    μx = 0,955 cp

2.2 Viskositas gliserol terhadap Suhu

- Sampel 1 (80 ºC)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,29 detik

    $$\mu x = \frac{1,29 \; . \; 0,959}{1 \; . \; 1} \; . \; 1,004 \; cp$$

    μx = 1,242 cp

- Sampel 2 (90 ºC)

    to = 1 detik

    do = 1 gr/ml

μo = 1,004 cp

tx = 1,40 detik

$$\mu x = \frac{1,40 \cdot 1,109}{1 \cdot 1} \cdot 1,004\ cp$$

μx = 1,559 cp

- Sampel 3 (100 $^{\circ}$C)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,57 detik

$$\mu x = \frac{1,57 \cdot 1,136}{1 \cdot 1} \cdot 1,004\ cp$$

μx = 1,791 cp

- Sampel 4 (110 $^{\circ}$C)

    to = 1 detik

    do = 1 gr/ml

    μo = 1,004 cp

    tx = 1,38 detik

$$\mu x = \frac{1,38 \cdot 1,101}{1 \cdot 1} \cdot 1,004\ cp$$

μx = 1,525 cp

- Sampel 5 (120 $^{\circ}$C)

    to = 1 detik

    do = 1 gr/ml

    μo = 1 cp

    tx = 1,30 detik

$$\mu x = \frac{1,30 \cdot 1,071}{1 \cdot 1} \cdot 1,004\ cp$$

μx = 1,398 cp

3. **Perhitungan %kesalahan**

3.1 %kesalahan Viskositas terhadap suhu

Rumus:

y = 0,0028x + 1,225

Keterangan :   y : Viskositas teori

x : Suhu

$$\%\text{Kesalahan} = \left| \frac{(Viskositas\ teori - Viskositas\ praktikum)}{Viskositas\ teori} \right| \text{ x } 100\%$$

- Suhu 80ºC

  y=0,0028(80)+1,225 = 1,449

  $$\%\text{Kesalahan} = \left| \frac{1,449 - 1,242}{1,449} \right| \text{ x } 100\% = 14,3\%$$

- Suhu 90ºC

  y=0,0028(90)+1,225 = 1,447

  $$\%\text{Kesalahan} = \left| \frac{1,447 - 1,559}{1,447} \right| \text{ x } 100\% = 5,6\%$$

- Suhu 100ºC

  y=0,0028(100)+1,225 = 1,505

  $$\%\text{Kesalahan} = \left| \frac{1,505 - 1,791}{1,505} \right| \text{ x } 100\% = 19\%$$

- Suhu 110ºC

  y=0,0028(110)+1,225 = 1,533

  $$\%\text{Kesalahan} = \left| \frac{1,533 - 1,525}{1,533} \right| \text{ x } 100\% = 0,5\%$$

- Suhu 120ºC

  y=0,0028(120)+1,225 = 1,561

  $$\%\text{Kesalahan} = \left| \frac{1,561 - 1,398}{1,561} \right| \text{ x } 100\% = 10,4\%$$

3.2 %kesalahan Viskositas terhadap Waktu

Rumus:

y = ─0,0011x+1,183

Keterangan : y : Viskositas teori

x : Waktu

$$\%\text{Kesalahan} = \left| \frac{(Viskositas\ teori - Viskositas\ praktikum)}{Viskositas\ teori} \right| \text{ x } 100\%$$

- Waktu 40 menit

  y= ─0,0011(40) + 1,183 = 1,139

  $$\%\text{Kesalahan} = \left| \frac{1,139 - 1,063}{1,139} \right| \text{ x } 100\% = 6,7\%$$

- Waktu 50 menit

  y= ─0,0011(50) + 1,183 = 1,128

  $$\%\text{Kesalahan} = \left| \frac{1,128 - 1,133}{1,128} \right| \text{ x } 100\% = 0,4\%$$

- Waktu 60 menit

$y = -0,0011(60) + 1,183 = 1,117$

$\%\,\text{Kesalahan} = \left|\dfrac{1,117 - 1,201}{1,177}\right| \times 100\% = 7,5\%$

- Waktu 70 menit

$y = -0,0011(70) + 1,183 = 1,106$

$\%\,\text{Kesalahan} = \left|\dfrac{1,106 - 1,242}{1,106}\right| \times 100\% = 12,3\%$
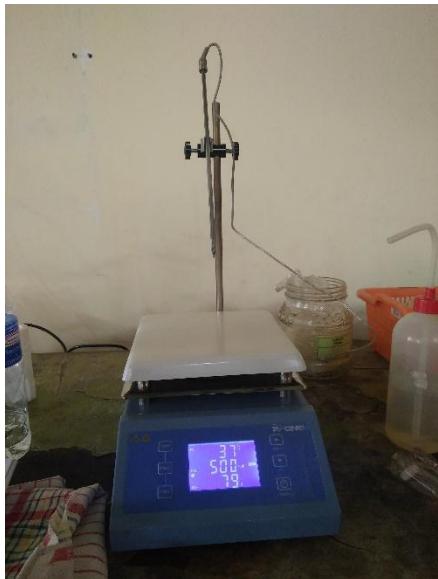
- Waktu 80 menit

$y = -0,0011(80) + 1,183 = 1,095$

$\%\,\text{Kesalahan} = \left|\dfrac{1,095 - 0,955}{1,095}\right| \times 100\% = 12,8\%$

4. Foto Praktikum

Foto	Keterangan
	Hot Plate Magnetic Stirer
	Gliserol yang dihasilkan