

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **A. Kesimpulan**

Berdasarkan Penelitian yang sudah dilakukan dapat diambil kesimpulan bahwa :

1. Minyak biji kelor (*moringa seed oil*) dapat dibuat dalam sediaan micellar water dengan surfaktan *PEG 7 Glyceryl Cocoate*.
2. Micellar water minyak biji kelor (*moringa seed oil*) yang baik adalah cair, tidak berwarna dan jernih.
3. Konsentrasi *PEG 7 Glyceryl Cocoate* sebagai surfaktan untuk formulasi micellar water minyak biji kelor (*moringa seed oil*) yang baik adalah 2,25% karena hasilnya jernih dan stabil.

#### **B. Saran**

1. Perlu dilakukan pengembangan formulasi dengan memperhatikan suhu.
2. Perlu dilakukan penelitian lebih lanjut dengan konsentrasi dan surfaktan yang berbeda.
3. Perlu dilakukan pengujian stabilitas sediaan Micellar Water minyak biji kelor (*Moringa oil*) pada suhu rendah dan suhu tinggi.

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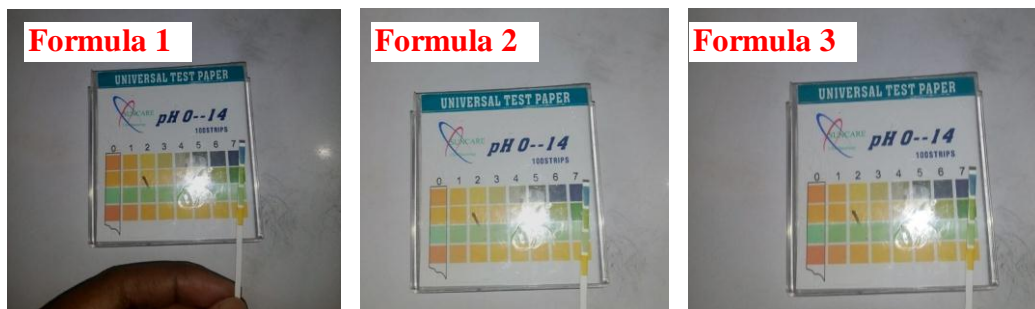
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## Lampiran 1. Gambar Hasil Sediaan dan Hasil Uji pH

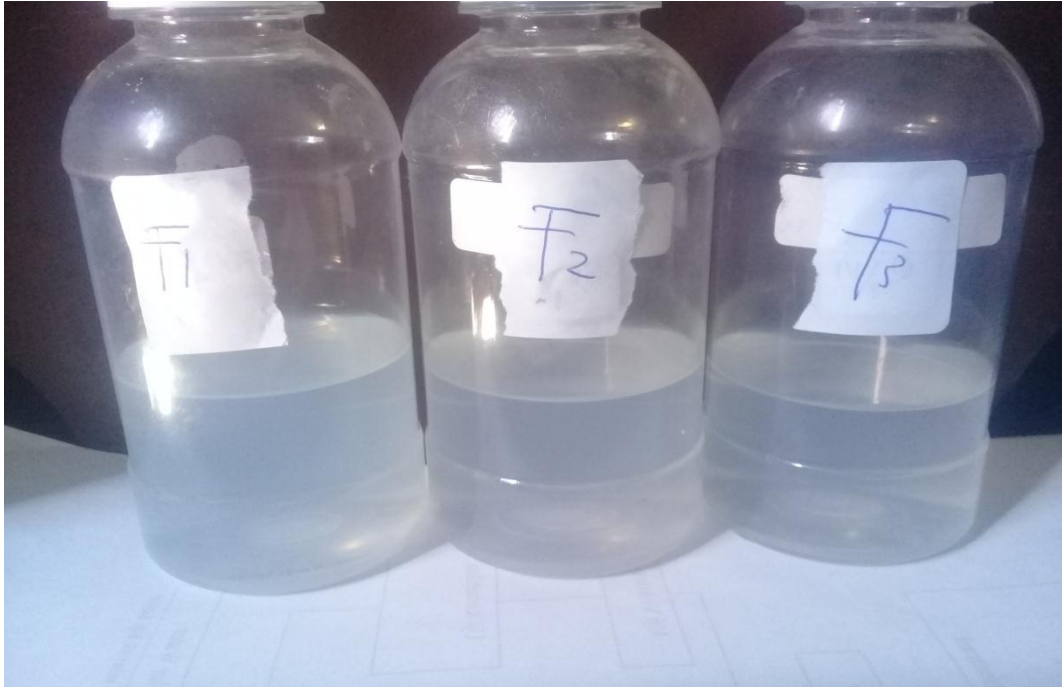
### 1. Sediaan Minggu ke-0



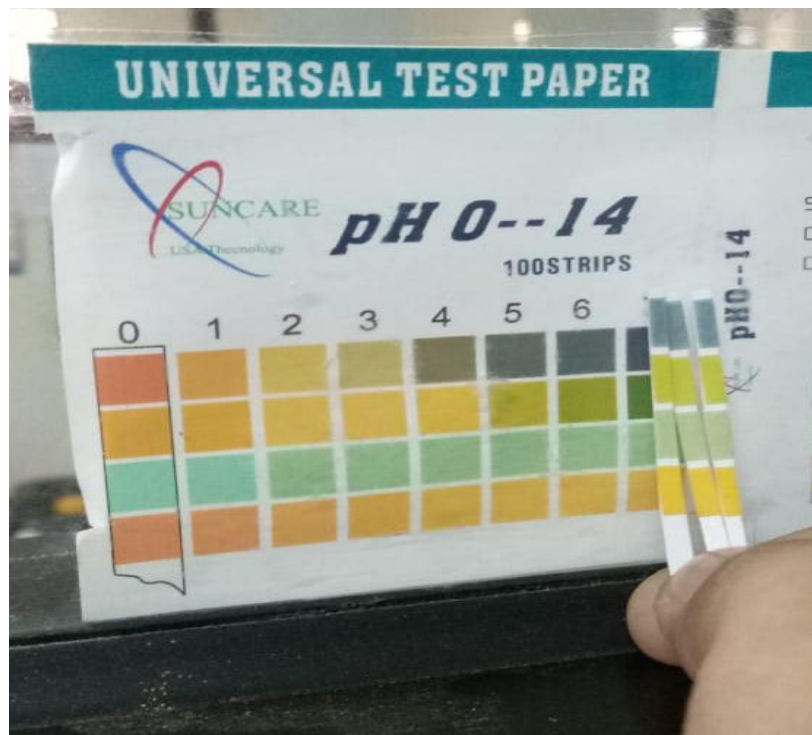
### 2. Hasil uji pH minggu ke-0



3. Gambar sediaan minggu ke-1



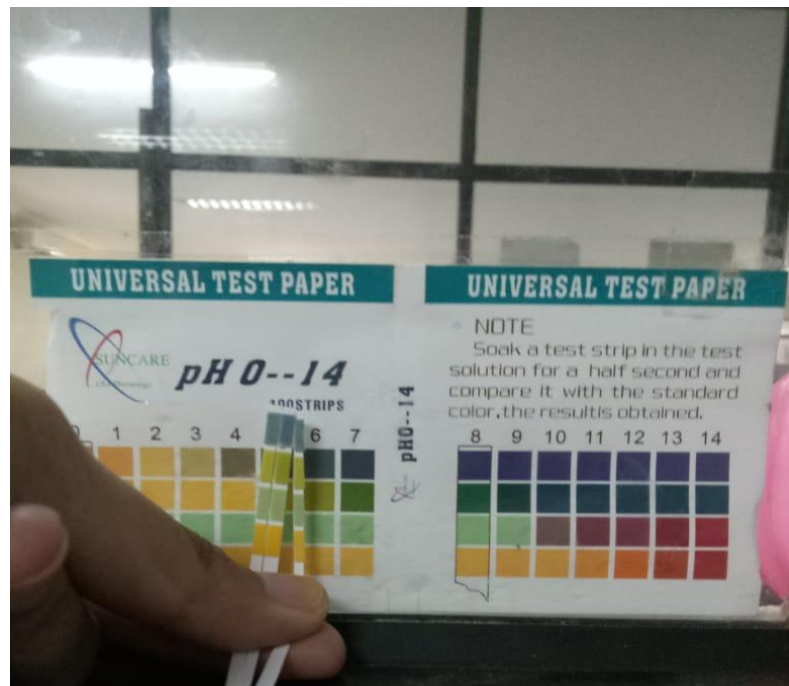
4. Hasil uji pH minggu ke-1



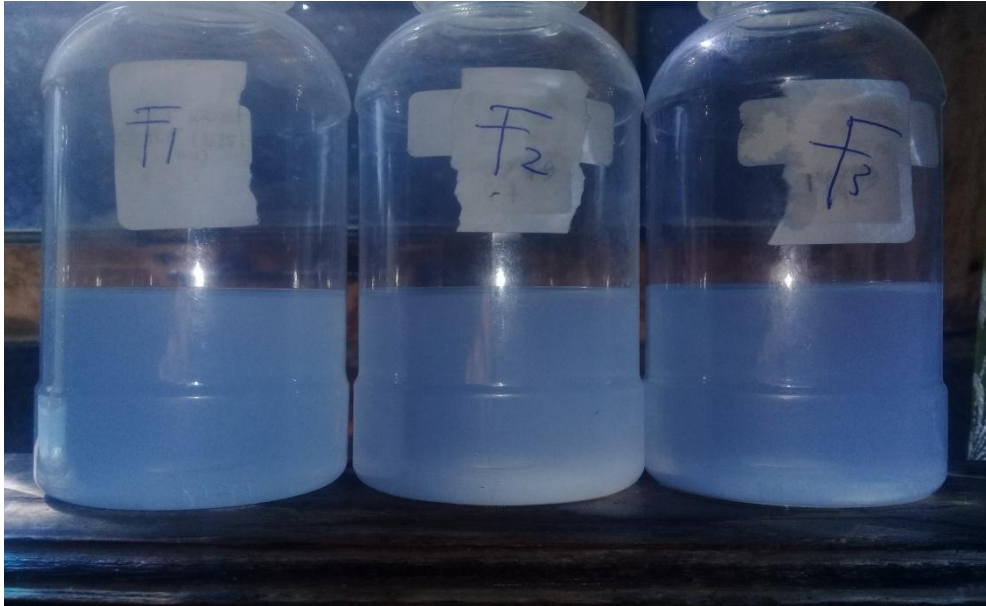
## 5. Hasil sediaan minggu ke-2



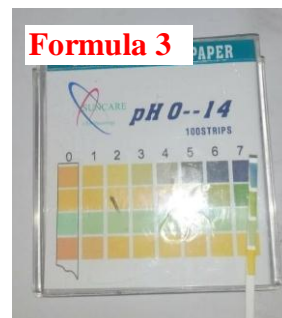
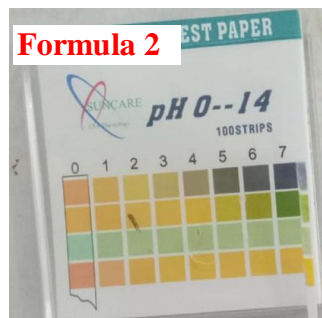
## 6. Hasil uji pH minggu ke-2



7. Gambar sediaan minggu ke-3

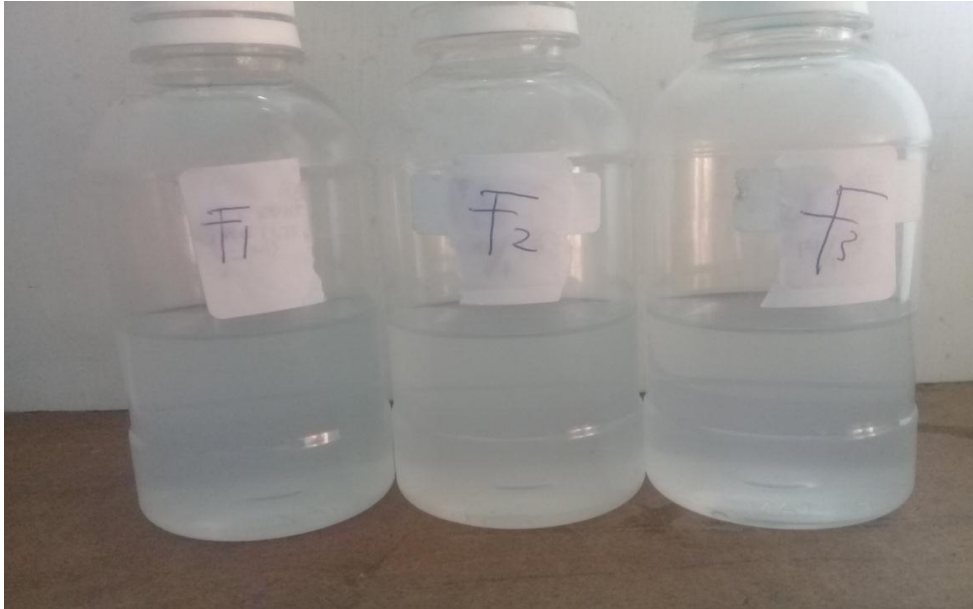


8. Hasil uji pH minggu ke-3





## 9. Gambar sediaan minggu ke-4



## 10. Hasil pH minggu ke-4



**Lampiran 2. Certificate of Analysis Minyak Biji Kelor**

**Certificate of Analysis**

Product	Moringa Oil
Appearance	Mobile liquid
Colour	Light Yellow colour
Odour	The odour is Strong, Sharp, Pungent.

**Physico-Chemical Properties:-**

SPECIFIC GRAVITY	0.910 - 0.975	0.959
REFRACTIVE INDEX	1.450 - 1.472	1.467
IODINE VALUE	50 - 60	56.85
ACID VALUE	15-25	19.70

**CHEMICAL CONSTITUENTS:**

Palmitoleic Acid	0.50 - 3.0	1.14
Palmitic Acid	2.0 - 10.0	5.6
Eicosanoic Acid	0.5 - 3.0	1.7
Oleic Acid	65.0 - 88.0	80.3
Linoleic Acid	1.0 - 5.0	2.5
Linolenic Acid	0.6 - 25.	1.5
Lignoceric Acid	2.0 - 6.0	4.8

### Lampiran 3. Perhitungan Viskositas

Perhitungan viskositas sediaan Micellar based water dapat diukur dengan persamaan :

$$\frac{d_1 \times t_1}{d_2 \times t_2} = V$$

Keterangan:

V = viskositas

d<sub>1</sub> = densitas sampel

t<sub>1</sub> = waktu alir sampel

d<sub>2</sub> = densitas aquadest

t<sub>2</sub> = waktu alir aquadest

Data hasil pengukuran:

#### 1. Minggu ke-0

##### Formula 1

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,43 \times 0,86}{0,996 \times 4,55} = 1,041 \text{ cps}$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,44 \times 0,86}{0,996 \times 4,55} = 1,043 \text{ cps}$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,39 \times 0,86}{0,996 \times 4,55} = 1,033 \text{ cps}$$

$$\text{Mean} = \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$$

$$= \frac{1,041+1,043+1,033}{3} = 1,039 \text{ cps}$$

$$\text{SD} = \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$$

$$= 0,005$$

### Formula 2

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,50 \times 0,86}{0,996 \times 4,55} = 1,054 \text{ cps}$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,48 \times 0,86}{0,996 \times 4,55} = 1,050 \text{ cps}$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,51 \times 0,86}{0,996 \times 4,55} = 1,056 \text{ cps}$$

$$\text{Mean} = \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$$

$$= \frac{1,054 + 1,050 + 1,056}{3} = 1,054 \text{ cps}$$

$$\text{SD} = \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$$

$$= 0,003$$

### Formula 3

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,62 \times 0,86}{0,996 \times 4,55} = 1,077$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,63 \times 0,86}{0,996 \times 4,55} = 1,079$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,63 \times 0,86}{0,996 \times 4,55} = 1,079 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,077 + 1,079 + 1,079}{3} = 1,078 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,001 \end{aligned}$$

## 2. Minggu ke-1

### Formula 1

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,40 \times 0,86}{0,996 \times 4,55} = 1,035 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,39 \times 0,86}{0,996 \times 4,55} = 1,033 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,42 \times 0,86}{0,996 \times 4,55} = 1,039 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,035 + 1,033 + 1,039}{3} = 1,036 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,003 \end{aligned}$$

**Formula 2**

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,48 \times 0,86}{0,996 \times 4,55} = 1,050 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,49 \times 0,86}{0,996 \times 4,55} = 1,052 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,45 \times 0,86}{0,996 \times 4,55} = 1,045 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,050 + 1,052 + 1,045}{3} = 1,049 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,004 \end{aligned}$$

**Formula 3**

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,60 \times 0,86}{0,996 \times 4,55} = 1,073 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,61 \times 0,86}{0,996 \times 4,55} = 1,075 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,58 \times 0,86}{0,996 \times 4,55} = 1,070 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,073 + 1,075 + 1,070}{3} = 1,073 \text{ cps} \end{aligned}$$

$$\begin{aligned}
 \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\
 &= 0,003
 \end{aligned}$$

### 3. Minggu ke-2

#### Formula 1

$$\begin{aligned}
 \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\
 &= \frac{1,010 \times 5,38 \times 0,86}{0,996 \times 4,55} = 1,031
 \end{aligned}$$

$$\begin{aligned}
 \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\
 &= \frac{1,010 \times 5,36 \times 0,86}{0,996 \times 4,55} = 1,027
 \end{aligned}$$

$$\begin{aligned}
 \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\
 &= \frac{1,010 \times 5,38 \times 0,86}{0,996 \times 4,55} = 1,031
 \end{aligned}$$

$$\begin{aligned}
 \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\
 &= \frac{1,031 + 1,027 + 1,031}{3} = 1,030 \text{ cps}
 \end{aligned}$$

$$\begin{aligned}
 \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\
 &= 0,002
 \end{aligned}$$

#### Formula 2

$$\begin{aligned}
 \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\
 &= \frac{1,010 \times 5,45 \times 0,86}{0,996 \times 4,55} = 1,045
 \end{aligned}$$

$$\begin{aligned}
 \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\
 &= \frac{1,010 \times 5,42 \times 0,86}{0,996 \times 4,55} = 1,039
 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,47 \times 0,86}{0,996 \times 4,55} = 1,048 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,045 + 1,039 + 1,048}{3} = 1,044 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,005 \end{aligned}$$

**Formula 3**

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,58 \times 0,86}{0,996 \times 4,55} = 1,070 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,55 \times 0,86}{0,996 \times 4,55} = 1,064 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,57 \times 0,86}{0,996 \times 4,55} = 1,068 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,070 + 1,064 + 1,068}{3} = 1,067 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,003 \end{aligned}$$



#### 4. Minggu ke-3

##### Formula 1

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,35 \times 0,86}{0,996 \times 4,55} = 1,025 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,31 \times 0,86}{0,996 \times 4,55} = 1,018 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,33 \times 0,86}{0,996 \times 4,55} = 1,022 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,025 + 1,018 + 1,022}{3} = 1,022 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,004 \end{aligned}$$

##### Formula 2

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,40 \times 0,86}{0,996 \times 4,55} = 1,035 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,39 \times 0,86}{0,996 \times 4,55} = 1,033 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,41 \times 0,86}{0,996 \times 4,55} = 1,037 \end{aligned}$$

$$\text{Mean} = \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$$

$$= \frac{1,035+1,033+1,037}{3} = 1,035 \text{ cps}$$

$$\text{SD} = \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$$

$$= 0,002$$

**Formula 3**

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,50 \times 0,86}{0,996 \times 4,55} = 1,054$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,52 \times 0,86}{0,996 \times 4,55} = 1,058$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,52 \times 0,86}{0,996 \times 4,55} = 1,058$$

$$\text{Mean} = \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$$

$$= \frac{1,054 + 1,058 + 1,058}{3} = 1,057 \text{ cps}$$

$$\text{SD} = \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$$

$$= 0,002$$

**5. Minggu ke-4****Formula 1**

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,30 \times 0,86}{0,996 \times 4,55} = 1,016$$

$$\text{Viskositas} = \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$$

$$= \frac{1,010 \times 5,28 \times 0,86}{0,996 \times 4,55} = 1,012$$

Viskositas  $= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$

$$= \frac{1,010 \times 5,27 \times 0,86}{0,996 \times 4,55} = 1,010$$

Mean  $= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$

$$= \frac{1,016 + 1,012 + 1,010}{3} = 1,013 \text{ cps}$$

SD  $= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$

$$= 0,003$$

**Formula 2**

Viskositas  $= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$

$$= \frac{1,010 \times 5,35 \times 0,86}{0,996 \times 4,55} = 1,025$$

Viskositas  $= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$

$$= \frac{1,010 \times 5,33 \times 0,86}{0,996 \times 4,55} = 1,022$$

Viskositas  $= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}}$

$$= \frac{1,010 \times 5,38 \times 0,86}{0,996 \times 4,55} = 1,031$$

Mean  $= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3}$

$$= \frac{1,025 + 1,022 + 1,031}{3} = 1,026 \text{ cps}$$

SD  $= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}}$

$$= 0,005$$

**Formula 3**

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,45 \times 0,86}{0,996 \times 4,55} = 1,045 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,46 \times 0,86}{0,996 \times 4,55} = 1,047 \end{aligned}$$

$$\begin{aligned} \text{Viskositas} &= \frac{\text{density sampel} \times \text{waktu sampel} \times \eta \text{ aquadest}}{\text{density pembanding} \times \text{waktu pembanding}} \\ &= \frac{1,010 \times 5,47 \times 0,86}{0,996 \times 4,55} = 1,048 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{\text{viskositas 1} + \text{viskositas 2} + \text{viskositas 3}}{3} \\ &= \frac{1,045 + 1,047 + 1,048}{3} = 1,047 \text{ cps} \end{aligned}$$

$$\begin{aligned} \text{SD} &= \sqrt{\frac{\sum y^2 - \frac{(\sum y)^2}{n}}{n-1}} \\ &= 0,002 \end{aligned}$$