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## Lampiran 1. Surat ijin penelitian laboratorium




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**UPT- LABORATORIUM**


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Nomor : 0376/UPT-lab/17.09.2022  
 Lamp. : -  
 Hal : Ijin Penelitian di Laboratorium

Kepada Yth. Bapak,Ibu Laboran dan PU

Di Tempat

Dengan hormat,

Sehubungan dengan penyelesaian penelitian mahasiswa, maka kami UPT laboratorium menyetujui untuk praktikum kepada :

Nama/NIM : LINA AGUSTININGRUM/25195859A  
 Fakultas : Farmasi  
 Nomor Lab & Masa Berlaku : 1 selama 45 hari (tgl 19 September – 18 November 2022)  
 Nomor Lab & Masa Berlaku : 4 selama 25 hari (tgl 19 September – 18 November 2022)

**\*Note : jam mengikuti jadwal lab apabila ada praktikum reguler penelitian dilarang masuk**

Atas perhatian dan kerjasamanya, kami ucapkan terimakasih.

Catatan : Membawa bukti transfer yang sudah difotokopi dan diperbesar sebanyak 4 lembar dan Selama praktikum mahasiswa yang bersangkutan harus memakai APD lengkap ( jas praktek, masker, sepatu )

Surakarta, 17 September 2022  
 Ka UPT Laboratorium



Asik Gunawan



**Lampiran 2. Sampel krim I**



**Lampiran 3. Sampel krim II**



**Lampiran 4. Sampel krim III**



**Lampiran 5. Sampel krim IV**



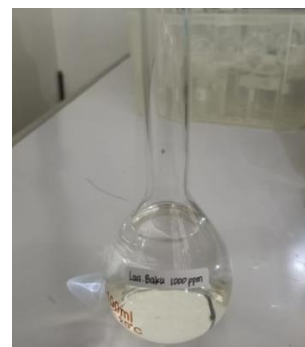
**Lampiran 6. Sampel krim V**



**Lampiran 7. Baku hidrokuinon**



**Lampiran 8. Penimbangan baku hidrokuinon**



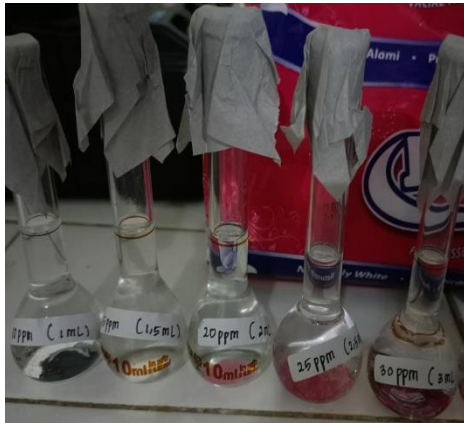
**Lampiran 9. Baku hidrokuinon 1000 ppm**



Lampiran 10. larutan untuk lamda max



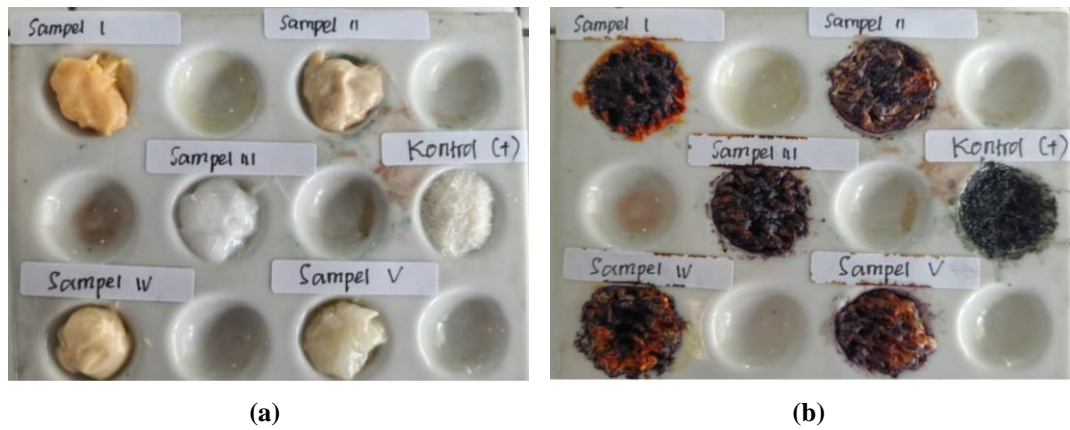
Lampiran 12. Pembuatan larutan OT



Lampiran 11. Larutan kurva baku hidrokuinon



Lampiran 13. Penimbangan sampel krim pemutih wajah



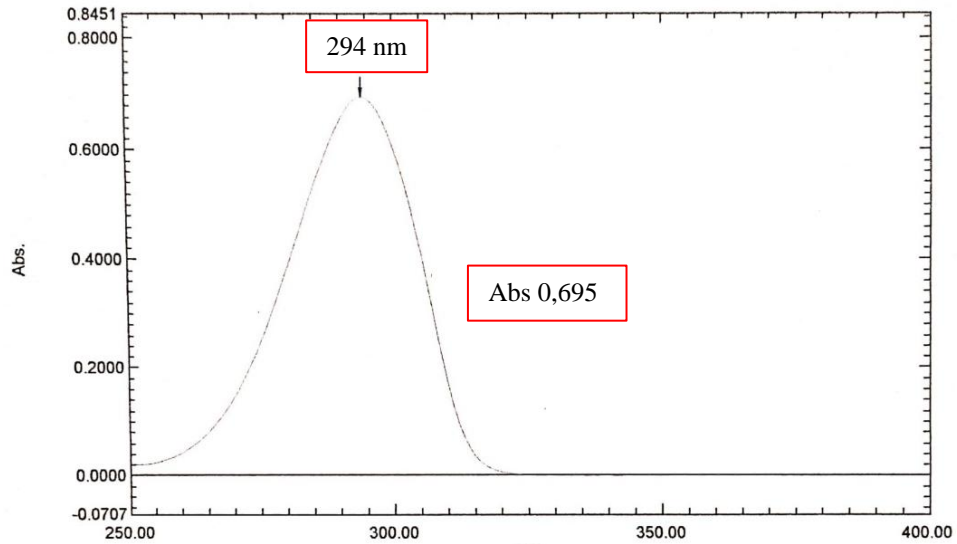
Lampiran 14. (a) Sampel krim pemutih dan kontrol (+) sebelum ditetesi  $\text{FeCl}_3$ , (b) Sampel krim pemutih dan kontrol (+) sesudah ditetesi  $\text{FeCl}_3$

Lampiran 15. Panjang gelombang maksimum hidrokuinon

## Spectrum Peak Pick Report

11/10/2022 01:48:29 PM

Data Set: File\_220915\_170626\_093330 - RawData



No.	P/V	Wavelength	Abs.	Description
1	⬆	294.00	0.6953	

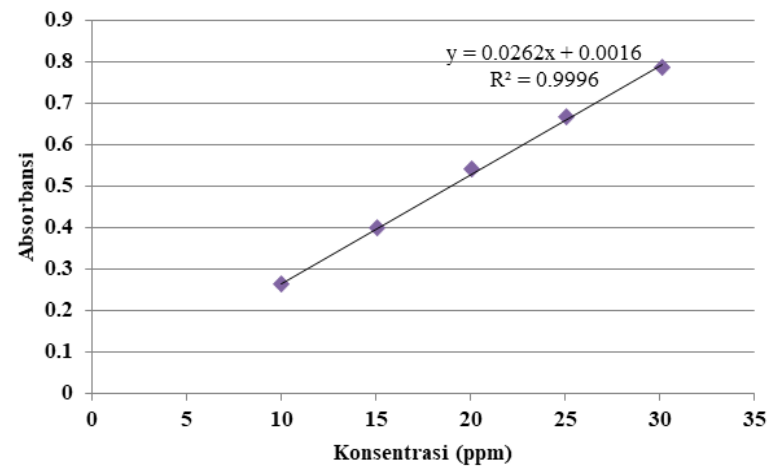
Time ( Minute )	RawData ...
51.000	0.682
52.000	0.682
53.000	0.682
54.000	0.682
55.000	0.682
56.000	0.682
57.000	0.682
58.000	0.682
59.000	0.683
60.000	0.682

Lampiran 16. *Operating time* hidrokuinon**Kinetics Data Print Report**

11/10/2022 03:21:53 PM

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Time ( Minute )	RawData ...
0.000	0.673
1.000	0.673
2.000	0.674
3.000	0.673
4.000	0.674
5.000	0.674
6.000	0.675
7.000	0.675
8.000	0.676
9.000	0.675
10.000	0.675
11.000	0.676
12.000	0.675
13.000	0.676
14.000	0.676
15.000	0.677
16.000	0.677
17.000	0.677
18.000	0.677
19.000	0.677
20.000	0.677
21.000	0.677
22.000	0.678
23.000	0.677
24.000	0.678
25.000	0.678
26.000	0.678
27.000	0.677
28.000	0.678
29.000	0.679
30.000	0.678
31.000	0.679
32.000	0.679
33.000	0.679
34.000	0.679
35.000	0.679
36.000	0.679
37.000	0.679
38.000	0.680
39.000	0.680
40.000	0.680
41.000	0.680
42.000	0.679
43.000	0.681
44.000	0.681
45.000	0.681
46.000	0.681
47.000	0.680
48.000	0.681
49.000	0.681
50.000	0.681

**Lampiran 17. Linearitas kurva baku hidrokuinon**



**Lampiran 18. Perhitungan****a. Pembuatan larutan baku hidrokuinon 1000 ppm**

Penimbangan:

- Kertas + zat = 0,3403 g
- Kertas + sisa = 0,2400 g

Bobot baku hidrokuinon:

$$\begin{aligned}
 &= (\text{Kertas} + \text{zat}) - (\text{Kertas} + \text{sisa}) \\
 &= 0,3403 \text{ g} - 0,2400 \text{ g} \\
 &= 0,1003 \text{ g} \\
 &= 100,3 \text{ mg (dilarutkan dalam labu takar 100 mL + etanol p.a ad tanda batas)}
 \end{aligned}$$

Konsentrasi baku sebenarnya:

$$\begin{aligned}
 &= 100,3 \text{ mg}/100 \text{ mL} \\
 &= 1003 \text{ mg/L} \\
 &= 1003 \text{ ppm}
 \end{aligned}$$

Dari lart. Baku 1003 ppm dipipet 10 mL (pipet vol. 10 mL) dalam labu takar 100 mL + etanol p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$10 \text{ mL} \times 1003 \text{ ppm} = 100 \text{ mL} \times C_2$$

$$C_2 = \frac{10 \text{ mL} \times 1003 \text{ ppm}}{100 \text{ mL}}$$

$$C_2 = 100,3 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

**b. Penentuan panjang gelombang maksimum**

Dari lart. baku 100,3 ppm dipipet 2,5 mL dalam labu takar 10 mL + etanol p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$2,5 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{2,5 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 25,075 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

### c. Penentuan *operating time*

Dari lart. Baku 100,3 ppm dipipet 2,5 mL dalam labu takar 10 mL + etanol p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$2,5 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{2,5 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 25,075 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

### d. Pembuatan kurva baku hidrokuinon

Dari lart. Baku 100,3 ppm dipipet 1 mL, 1,5 mL, 2 mL, 2,5 mL, 3 mL dalam labu takar 10 mL + etanol p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$1 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{1 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 10,3 \text{ ppm}$$

$$V_1 \times C_1 = V_2 \times C_2$$

$$1,5 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{1,5 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 15,045 \text{ ppm}$$

$$V_1 \times C_1 = V_2 \times C_2$$

$$2 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{2 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 20,06 \text{ ppm}$$

$$V_1 \times C_1 = V_2 \times C_2$$

$$2,5 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{2,5 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 25,075 \text{ ppm}$$

$$V_1 \times C_1 = V_2 \times C_2$$

$$3 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{13 \text{ mL} \times 100,3 \text{ ppm}}{100 \text{ mL}}$$

$$C_2 = 30,09 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

### e. Regresi Linear

Konsentrasi (x) (ppm)	Absorbansi (y)
10,03	0,259
15,045	0,397
20,06	0,536
25,075	0,662
30,09	0,784

$$a = 0,0016$$

$$b = 0,0262$$

$$r = 0,9996$$

$$y = 0,0016 + 0,0262 x.$$

Keterangan :

y = Absorbansi sampel

x = Konsentrasi larutan baku

a = *Intercept*

b = *Slope* (kemiringan)

r = koefisien korelasi

### f. Validasi metode analisis

#### 1. Presisi

Dari lart. Baku 100,3 ppm dipipet 1 mL dalam labu takar 10 mL + etanol

p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$1 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{1 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 10,3 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

Pengulangan	Konsentrasi (x) ppm	Absorbansi (y)
1		0,267
2		0,266
3		0,260
4		0,267
5	10,03	0,260
6		0,267
7		0,265
8		0,266
9		0,260
10		0,262

Keterangan:

x = Konsentrasi

y = Absorbansi

### Konsentrasi Sebenarnya

$$x \text{ sebenarnya} = \frac{Abs - a}{b}$$

Keterangan:

Abs = absorbansi

a = *Intercept*

b = *Slope* (kemiringan)

1	$0,267 - 0,0016 / 0,0262 =$	10,122
2	$0,266 - 0,0016 / 0,0262 =$	10,083
3	$0,260 - 0,0016 / 0,0262 =$	9,855
4	$0,267 - 0,0016 / 0,0262 =$	10,122
5	$0,260 - 0,0016 / 0,0262 =$	9,855
6	$0,267 - 0,0016 / 0,0262 =$	10,122
7	$0,265 - 0,0016 / 0,0262 =$	10,045
8	$0,266 - 0,0016 / 0,0262 =$	10,083
9	$0,260 - 0,0016 / 0,0262 =$	9,855
10	$0,262 - 0,0016 / 0,0262 =$	9,931
Rata rata	$=$	10,007

$$SD = 11,93\%$$

$$\begin{aligned} RSD &= \frac{SD \text{ (simpangan baku)}}{x \text{ rata-rata}} \\ &= \frac{11,93\%}{10,007} \\ &= 1,19\% < 2\% \\ &= MS \end{aligned}$$

Keterangan:

SD = *Standard Deviation*

RSD = *Relative Standard Deviation*

MS : Memenuhi Syarat

TMS : Tidak Memenuhi Syarat

## 2. Akurasi

Dari lart. Baku 100,3 ppm dipipet 1 mL dalam labu takar 10 mL + etanol  
p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$1 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{1 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 10,3 \text{ ppm}$$

Dari lart. Baku 100,3 ppm dipipet 1,5 mL dalam labu takar 10 mL + etanol  
p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$1,5 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{1,5 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 15,045 \text{ ppm}$$

Dari lart. Baku 100,3 ppm dipipet 2 mL dalam labu takar 10 mL + etanol  
p.a ad tanda batas

$$V_1 \times C_1 = V_2 \times C_2$$

$$2 \text{ mL} \times 100,3 \text{ ppm} = 10 \text{ mL} \times C_2$$

$$C_2 = \frac{2 \text{ mL} \times 100,3 \text{ ppm}}{10 \text{ mL}}$$

$$C_2 = 20,06 \text{ ppm}$$

Keterangan:

$V_1$  = Volume larutan awal (mL)

$C_1$  = Konsentrasi larutan baku (ppm)

$V_2$  = Volume hasil pengenceran (mL)

$C_2$  = Konsentrasi yang dibuat (ppm)

Konsentrasi (x) ppm	Absorbansi (y)
10,03	0,263
	0,265
	0,260
15,045	0,403
	0,406
	0,401
20,06	0,523
	0,533
	0,532

Keterangan:

x = Konsentrasi

y = Absorbansi

$$x \text{ sebenarnya} = \frac{Abs - a}{b}$$

Keterangan:

Abs = absorbansi

a = *Intercept*

b = *Slope* (kemiringan)

1	$0,263 - 0,0016 / 0,0262 =$	9,984
	$0,265 - 0,0016 / 0,0262 =$	10,045
	$0,260 - 0,0016 / 0,0262 =$	9,855
2	$0,403 - 0,0016 / 0,0262 =$	15,308
	$0,406 - 0,0016 / 0,0262 =$	15,423
	$0,401 - 0,0016 / 0,0262 =$	15,232
3	$0,523 - 0,0016 / 0,0262 =$	19,885
	$0,533 - 0,0016 / 0,0262 =$	20,266
	$0,532 - 0,0016 / 0,0262 =$	20,228

$$\% \text{ Recovery} = \frac{\text{konsentrasi terhitung}}{\text{konsentrasi sebenarnya}} \times 100 \%$$

1	9,984 / 10,03 x 100% =	99,54 %	99,32%
	10,045 / 10,03 x 100% =	100,15 %	
	9,855 / 10,03 x 100% =	98,25 %	
2	15,308 / 15,045 x 100% =	101,749 %	101,83 %
	15,423 / 15,045 x 100% =	102,51 %	
	15,232 / 15,045 x 100% =	101,24 %	
3	19,885 / 20,06 x 100% =	99,13 %	100,33 %
	20,266 / 20,06 x 100% =	101,03 %	
	20,228 / 20,06 x 100% =	100,84 %	
Rata – rata total			100,49 %

### 3. LOD dan LOQ

Konsentrasi (x) ppm	Absorbansi (y)	
10,03	0,259	a = 0,0016
15,045	0,397	b = 0,0262
20,06	0,536	r = 0,9996
25,075	0,662	y = 0,0016 + 0,0262 x.
30,09	0,784	

Keterangan :

y = Absorbansi sampel

x = Konsentrasi larutan baku

a = *Intercept*

b = *Slope* (kemiringan)

r = koefisien korelasi

Konsentrasi (x) ppm	Absorbansi (y)	$y' = a+bx$	$y-y'$	$(y-y')^2$
10,03	0,259	0,2646	-0,0056	3,14E-05
15,045	0,397	0,3961	0,0009	8,10E-07
20,06	0,536	0,5276	0,0084	7,06E-05
25,075	0,662	0,6591	0,0029	8,41E-06
30,09	0,784	0,7906	-0,0066	4,36E-05

Konsentrasi (x) rata- rata = 20,06

Sigma  $((y-y')^2) = 0,0001547$

$$= \frac{\text{sigma}}{n-2}$$

$$= \frac{0,0001547}{5-2} = 5,157E-05$$

$$S \frac{y}{x} = 0,007180993$$

$$\begin{aligned} \text{LOD} &= (3,3 \times \frac{S_y}{x}) / b \\ &= (3,3 \times 0,007180993) / 0,0262 \\ &= 0,9037 \text{ ppm} \end{aligned}$$

$$\begin{aligned} \text{LOQ} &= (10 \times \frac{S_y}{x}) / b \\ &= (10 \times 0,007180993) / 0,0262 \\ &= 2,7386 \text{ ppm} \end{aligned}$$

Keterangan:

LOD = *Limit Of Detection*

LOQ = *Limit Of Quantification*

b = *Slope* (kemiringan)

$$\begin{aligned} V_{x0} &= \frac{S_y}{x} / (b \times \text{Kons. Rata-rata}) \\ &= 0,007180993 / (0,0262 \times 20,06) \\ &= 0,0136 \\ &= 1,365\% < 2\% = \text{MS} \end{aligned}$$

Keterangan:

b = *Slope* (kemiringan)

MS : Memenuhi Syarat

TMS : Tidak Memenuhi Syarat

#### g. Penentuan kadar hidrokuinon sampel

##### Sampel I

Botol timbang kosong = 22,4024 g  
Botol timbang + sampel = 22,4277 g  
Bobot sampel = 0,0253 g

##### Sampel II

Botol timbang kosong = 20,7699 g  
Botol timbang + sampel = 20,7950 g  
Bobot sampel = 0,0251 g

##### Sampel III

Botol timbang kosong = 19,7369 g  
Botol timbang + sampel = 19,7621 g  
Bobot sampel = 0,0252 g

##### Sampel IV

Botol timbang kosong = 21,5125 g  
Botol timbang + sampel = 21,5376 g  
Bobot sampel = 0,0251 g

##### Sampel V

Botol timbang kosong = 23,8881 g  
Botol timbang + sampel = 23,9134 g  
Bobot sampel = 0,0253 g



Sampel	Bobot sampel (mg)	Absorbansi rata-rata
I	25,3	0,494
II	25,1	0,593
III	25,2	0,537
IV	25,1	0,538
V	25,3	0,410

**Diketahui :**

- Faktor pembuat (dilarutkan dalam labu takar) = 10 mL
- Faktor pengencer (dipipet 2 mL dalam labu takar 10 mL) = 5

**Sampel I**

$$y = 0,0016 + 0,0262 x$$

$$0,494 = 0,0016 + 0,0262 x$$

$$x = \frac{0,494 - 0,0016}{0,0262}$$

$$x = 18,791 \text{ mg/L}$$

$$= 0,0188 \text{ mg/mL}$$

$$\begin{aligned} \% \text{ Kadar} &= \frac{C \text{ regresi} \times F. \text{pembuat} \times F. \text{pengencer}}{\text{Bobot sampel (mg)}} \times 100 \% \\ &= \frac{0,0188 \text{ mg/mL} \times 10 \text{ mL} \times 5}{25,3 \text{ mg}} \times 100 \% \\ &= 3,71\% \end{aligned}$$

**Sampel II**

$$y = 0,0016 + 0,0262 x$$

$$0,593 = 0,0016 + 0,0262 x$$

$$x = \frac{0,593 - 0,0016}{0,0262}$$

$$x = 22,554 \text{ mg/L}$$

$$= 0,0226 \text{ mg/mL}$$

$$\begin{aligned} \% \text{ Kadar} &= \frac{C \text{ regresi} \times F. \text{pembuat} \times F. \text{pengencer}}{\text{Bobot sampel (mg)}} \times 100 \% \\ &= \frac{0,0226 \text{ mg/mL} \times 10 \text{ mL} \times 5}{25,1 \text{ mg}} \times 100 \% \\ &= 4,49\% \end{aligned}$$

**Sampel III**

$$y = 0,0016 + 0,0262 x$$

$$0,537 = 0,0016 + 0,0262 x$$

$$x = \frac{0,537 - 0,0016}{0,0262}$$

$$x = 20,418 \text{ mg/L}$$

$$= 0,0204 \text{ mg/mL}$$

$$\begin{aligned} \% \text{ Kadar} &= \frac{C \text{ regresi} \times F. \text{pembuat} \times F. \text{pengencer}}{\text{Bobot sampel (mg)}} \times 100 \% \\ &= \frac{0,0204 \text{ mg/mL} \times 10 \text{ mL} \times 5}{25,2 \text{ mg}} \times 100 \% \\ &= 4,05\% \end{aligned}$$

**Sampel IV**

$$y = 0,0016 + 0,0262 x$$

$$0,538 = 0,0016 + 0,0262 x$$

$$x = \frac{0,538 - 0,0016}{0,0262}$$

$$x = 20,418 \text{ mg/L}$$

$$= 0,0205 \text{ mg/mL}$$

$$\begin{aligned} \% \text{ Kadar} &= \frac{C \text{ regresi} \times F. \text{pembuat} \times F. \text{pengencer}}{\text{Bobot sampel (mg)}} \times 100 \% \\ &= \frac{0,0205 \text{ mg/mL} \times 10 \text{ mL} \times 5}{25,1 \text{ mg}} \times 100 \% \\ &= 4,08\% \end{aligned}$$

**Sampel V**

$$y = 0,0016 + 0,0262 x$$

$$0,410 = 0,0016 + 0,0262 x$$

$$x = \frac{0,410 - 0,0016}{0,0262}$$

$$x = 15,588 \text{ mg/L}$$

$$= 0,0156 \text{ mg/mL}$$

$$\begin{aligned} \% \text{ Kadar} &= \frac{C \text{ regresi} \times F. \text{pembuat} \times F. \text{pengencer}}{\text{Bobot sampel (mg)}} \times 100 \% \\ &= \frac{0,0156 \text{ mg/mL} \times 10 \text{ mL} \times 5}{25,3 \text{ mg}} \times 100 \% \\ &= 3,08\% \end{aligned}$$

**Lampiran 19. Diagram kadar hidrokuinon dalam sampel krim pemutih wajah**