

LAMPIRAN A
DATA PENGAMATAN

1. Uji Kadar Air

Tabel A.1 Hasil Uji Kadar Air pada *Cookies Kelor*

Sampel	% Kadar air
F1	3,64
F2	3,85
F3	4,05
F4	4,39
F5	4,74

2. Uji Kadar Abu

Tabel A.1 Hasil Uji Kadar Abu pada *Cookies Kelor*

Sampel	% Kadar abu
F1	0,34
F2	0,78
F3	0,88
F4	1,07
F5	1,17

3. Uji Kadar Kalsium

Tabel A.1 Hasil Uji Kalsium pada *Cookies Kelor*

Sampel	Kadar kalsium (mg/100)
F1	158,2
F2	164,0
F3	174,0
F4	180,0
F5	183,0

4. Uji Kadar Protein

5. **Tabel A.7**Hasil Uji Protein pada *Cookies* Kelor

Sampel	Kadar Protein
	(%)
F1	4,88
F2	6,37
F3	7,82
F4	13,16
F5	39,85

6. Uji Organoleptik

Tabel A.8Hasil Uji Organoleptik pada *Cookies* Kelor

Sampel	Rata-rata			
	rasa	aroma	warna	tekstur
F1	3,0	3,0	3,0	3,2
F2	3,1	3,1	3,1	3,3
F3	2,7	2,6	2,7	2,7
F4	2,4	2,4	2,2	2,4
F5	2,1	2,3	1,8	2,0

LAMPIRAN B

PERHTUNGAN

1. Penentuan Kadar Air Sampel

Perhitungan kadar air sampel dengan menggunakan rumus berikut :

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

Tabel 5. Nilai Kadar Air

Sampel	Berat cawan kosong (gr)	Berat cawan + sampel awal (gr)	Berat cawan + sampel akhir (gr)	Kadar Air (%)
F1	64,6134	66,6649	66,5920	3,6844
F2	106,0024	108,6192	108,5220	3,8577
F3	105,9869	108,0425	107,9624	4,0546
F4	75,6942	77,7235	77,6380	4,3986
F5	75,6942	77,7128	77,6210	4,7436

1. Sampel F1

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

$$\text{Kadar Air} = \frac{(66,6649) - (66,5920)}{(66,5920) - (64,6134)} \times 100\%$$

$$\text{Kadar Air} = \frac{(0,0729)}{(1,9786)} \times 100\%$$

$$\text{Kadar Air} = 3,6844\%$$

2. Sampel F2

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

$$\text{Kadar Air} = \frac{(108,6192) - (108,5220)}{108,5220 - 106,0024} \times 100\%$$

$$\text{Kadar Air} = \frac{(0,0972)}{(2,5196)} \times 100\%$$

$$\text{Kadar Air} = 3,8577\%$$

3. Sampel F3

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

$$\text{Kadar Air} = \frac{(108,0425) - (107,9624)}{(107,9624) - (105,9869)} \times 100\%$$

$$\text{Kadar Air} = \frac{(0,0801)}{(1,9755)} \times 100\%$$

$$\text{Kadar Air} = 4,0546\%$$

4. Sampel F4

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

$$\text{Kadar Air} = \frac{(77,7235) - (77,6380)}{(77,6380) - (75,6942)} \times 100\%$$

$$\text{Kadar Air} = \frac{(0,0855)}{(1,9438)} \times 100\%$$

$$\text{Kadar Air} = 4,3986\%$$

5. Sampel F5

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan} + \text{berat sampel akhir})}{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawanl kosong})} \times 100\%$$

$$\text{Kadar Air} = \frac{(77,7128) - (77,6210)}{(77,6210) - (75,6942)} \times 100\%$$

$$\text{Kadar Air} = \frac{(0,0914)}{(1,9268)} \times 100\%$$

$$\text{Kadar Air} = 4,7436\%$$

2. Penentuan Kadar Abu Sampel

Perhitungan kadar abu sampel dengan menggunakan rumus berikut :

$$\text{Kadar Air} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

Tabel 6. Nilai Kadar Abu

Sampel	Berat cawan kosong + tutup (gr)	Berat cawan + sampel awal (gr)	Berat cawan + sampel akhir (gr)	Kadar Abu (%)
F1	43,6980	45,6657	43,6949	0,3488
F2	66,6782	68,5992	66,6933	0,7860
F3	51,6626	53,6294	51,6801	0,8897
F4	23,8214	25,7836	23,8425	1,0753
F5	24,7134	26,1083	24,7298	1,1757

1. Sampel F1

$$\text{Kadar abu} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

$$\text{Kadar abu} = \frac{(43,6949) - (43,6880)}{(45,6657) - (43,6980)} \times 100\%$$

$$\text{Kadar abu} = \frac{(0,0069)}{(1,9777)} \times 100\%$$

$$\text{Kadar abu} = 0,3488 \%$$

2. Sampel F2

$$\text{Kadar abu} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

$$\text{Kadar abu} = \frac{(66,6933) - (66,6782)}{(68,5992) - (66,672)} \times 100\%$$

$$\text{Kadar abu} = \frac{(0,0151)}{(1,921)} \times 100\%$$

$$\text{Kadar abu} = 0,7860\%$$

3. Sampel F3

$$\text{Kadar abu} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

$$\text{Kadar abu} = \frac{(51,6901) - (51,6626)}{(53,6294) - (51,6626)} \times 100\%$$

$$\text{Kadar abu} = \frac{(0,0175)}{(1,9668)} \times 100\%$$

$$\text{Kadar abu} = 0,8897 \%$$

4. Sampel F4

$$\text{Kadar abu} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

$$\text{Kadar abu} = \frac{(23,8425) - (23,8214)}{(25,7836) - (23,8214)} \times 100\%$$

$$\text{Kadar abu} = \frac{(0,0211)}{(1,9622)} \times 100\%$$

$$\text{Kadar abu} = 1,0753\%$$

5. Sampel F5

$$\text{Kadar abu} = \frac{(\text{cawan} + \text{berat sampel akhir}) - (\text{cawan kosong})}{(\text{cawan} + \text{berat sampel awal}) - (\text{cawan kosong})} \times 100\%$$

$$\text{Kadar abu} = \frac{(24,7298) - (24,7134)}{(26,1083) - (24,7134)} \times 100\%$$

$$\text{Kadar abu} = \frac{(0,0164)}{(1,3949)} \times 100\%$$

$$\text{Kadar abu} = 1,1757 \%$$

3. Penentuan Kadar Kalsium Sampel

1. Pembuatan Larutan Standar Ca^{2+}

- a) 100 ppm Ca^{2+} dari 1000 ppm Ca^{2+}

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

$$\begin{aligned} (100 \text{ mg/L}) \times (100 \text{ mL}) &= (1000 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 100 \text{ ml} \end{aligned}$$

- b) 5 ppm Ca^{2+} dari 100 ppm Ca^{2+}

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

$$\begin{aligned} (5 \text{ mg/L}) \times (100 \text{ mL}) &= (100 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 5 \text{ ml} \end{aligned}$$

- c) 10 ppm Ca^{2+} dari 100 ppm Ca^{2+}

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

$$\begin{aligned} (10 \text{ mg/L}) \times (100 \text{ mL}) &= (100 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 10 \text{ ml} \end{aligned}$$

- d) 15 ppm Ca^{2+} dari 100 ppm Ca^{2+}

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

$$\begin{aligned} (15 \text{ mg/L}) \times (100 \text{ mL}) &= (100 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 15 \text{ ml} \end{aligned}$$

- e) 20 ppm Ca^{2+} dari 100 ppm Ca^{2+}

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

$$\begin{aligned} (20 \text{ mg/L}) \times (100 \text{ mL}) &= (100 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 20 \text{ ml} \end{aligned}$$

- f) 25 ppm Ca^{2+} dari 100 ppm Ca^{2+}

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

$$\begin{aligned} (25 \text{ mg/L}) \times (100 \text{ mL}) &= (100 \text{ mg/L}) \times \text{Volume} \\ \text{Volume} &= 25 \text{ ml} \end{aligned}$$

2. Data Kalibrasi Kalsium dengan Spektrofotometer Serapan Atom.
Perhitungan Pers. Garis Regresi dan Koefisien Korelasi (r)

No.	Konsentrasi (X) (µg/ml)	Absorbansi (Y)
1.	5	0,0980
2.	10	0,1837
3.	15	0,2624
4.	20	0,3475
5.	25	0,4163

No.	X	Y	XY	X ²	Y ²
1.	5	0,0980	0,49	25	0,0096
2.	10	0,1837	1,837	100	0,0337
3.	15	0,2624	3,936	225	0,0688
4.	20	0,3475	6,95	400	0,1207
5.	25	0,4163	10,4075	625	0,1733
$\Sigma = 75$		$\Sigma = 1,3079$	$\Sigma = 23,6205$	$\Sigma = 1375$	$\Sigma = 0,4061$
$X = 15$		$= 0,2615$			

$$a = \frac{\Sigma XY - \left[\frac{(\Sigma X \times \Sigma Y)}{n} \right]}{\Sigma X^2 - \left[\frac{(\Sigma X)^2}{n} \right]}$$

$$a = \frac{23,6205 - \left[\frac{(75 \times 1,3079)}{5} \right]}{1375 - \left[\frac{(75)^2}{5} \right]}$$

$$a = \frac{4,0020}{250}$$

$$a = 0,0160$$

$$Y = ax + b$$

$$b = Y - ax$$

$$= 0,2615 - (0,0160 \times 15)$$

$$= 0,0215$$

Maka, persamaan garis regresinya : $Y = 0,0160x + 0,0215$

3. Perhitungan Kadar Kalsium

Perhitungan kadar kalsium sampel dengan menggunakan rumus berikut:

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} (\text{faktorpengenceran})$$

Tabel 7. Nilai Kadar Kalsium

Sampel	Berat sampel (g)	Absorbansi (Y)	Konsentrasi (µg/ml)	Kadar Kalsium (mg/100g)
F1	5	0,0848	3,953	158,2
F2	5	0,0871	4,097	164,0
F3	5	0,0911	4,350	174,0
F4	5	0,0936	4,505	180,2
F5	5	0,0947	4,573	183,0

a) Sampel F1

Berat sampel yang ditimbang = 5 gr

Absorbansi (Y) = 0,0833

Persamaan regresi Y = 0,0160x + 0,0215

$$x = \frac{Y - 0,0215}{0,0160}$$

$$x = \frac{0,0848 - 0,0215}{0,0160}$$

$$x = 3,9562 \text{ mcg/ml}$$

konsentrasi kalsium = 3,9562 mcg/ml

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} (\text{faktorpengenceran})$$

$$[Ca] = 3,9562 \text{ µg/ml} \times \frac{100 \text{ ml}}{5 \text{ gr}} (20)$$

$$[Ca] = 1582 \text{ mcg/g}$$

$$[Ca] = 158,2 \text{ mg/100g}$$

b) Sampel F2

Berat sampel yang ditimbang = 5 gr

Absorbansi (Y) = 0,0871

Persamaan regresi $Y = 0,0160x + 0,0215$

$$x = \frac{Y - 0,0215}{0,0160}$$

$$x = \frac{0,0871 - 0,0215}{0,0160}$$

$$x = 4,100 \text{ mcg/ml}$$

konsentrasi kalsium = 4,100 mcg/ml

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} (\text{faktorpengenceran})$$

$$[Ca] = 4,100 \text{ } \mu\text{g/ml} \times \frac{100 \text{ ml}}{5 \text{ gr}} (20)$$

$$[Ca] = 1640 \text{ mcg/g}$$

$$[Ca] = 164,0 \text{ mg/100g}$$

c) Sampel F3

Berat sampel yang ditimbang = 5 gr

Absorbansi (Y) = 0,0911

Persamaan regresi $Y = 0,0160x + 0,0215$

$$x = \frac{Y - 0,0215}{0,0160}$$

$$x = \frac{0,0911 - 0,0215}{0,0160}$$

$$x = 4,350 \text{ mcg/ml}$$

konsentrasi kalsium = 4,350 mcg/ml

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} (\text{faktorpengenceran})$$

$$[Ca] = 4,350 \text{ } \mu\text{g/ml} \times \frac{100 \text{ ml}}{5 \text{ gr}} (20)$$

$$[Ca] = 1740 \text{ mcg/g}$$

$$[Ca] = 174,0 \text{ mg/100g}$$

d) Sampel F4

Berat sampel yang ditimbang = 5 gr

Absorbansi (Y) = 0,0936

Persamaan regresi $Y = 0,0160x + 0,0215$

$$x = \frac{Y - 0,0215}{0,0160}$$

$$x = \frac{0,0936 - 0,0215}{0,0160}$$

$$x = 4,5062 \text{ mcg/ml}$$

konsentrasi kalsium = 4,5062 mcg/ml

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} \text{ (faktorpengenceran)}$$

$$[Ca] = 4,5062 \text{ } \mu\text{g/ml} \times \frac{100 \text{ ml}}{5 \text{ gr}} \text{ (20)}$$

$$[Ca] = 1802 \text{ mcg/g}$$

$$[Ca] = 180,2 \text{ mg/100g}$$

e) Sampel F₄

Berat sampel yang ditimbang = 5 gr

Absorbansi (Y) = 0,0947

Persamaan regresi $Y = 0,0160x + 0,0215$

$$x = \frac{Y - 0,0215}{0,0160}$$

$$x = \frac{0,0947 - 0,0215}{0,0160}$$

$$x = 4,575 \text{ mcg/ml}$$

konsentrasi kalsium = 4,575 mcg/ml

$$[Ca] = \text{konsentrasikalsium} \times \frac{\text{volumelabuukur}}{\text{berat sampel}} \text{ (faktorpengenceran)}$$

$$[Ca] = 4,575 \mu\text{g/ml} \times \frac{100 \text{ ml}}{5 \text{ gr}} \quad (20)$$

$$[Ca] = 1830 \text{ mcg/g}$$

$$[Ca] = 183,0 \text{ mg/100g}$$

4. Perhitungan Kadar Protein

1. Menghitung Konsentrasi Sampel Awal

diketahui :

$$\text{berat sampel 1} = 5 \text{ gr}$$

$$\text{volume} = 50 \text{ ml}$$

penyelesaian :

$$\text{konsetrasi sampel 1 (ppm)} = \frac{5 \text{ gr}}{50 \text{ ml}} = \frac{5.000 \text{ mg}}{0,05 \text{ L}} = 100.000 \text{ ppm}$$

diketahui :

$$\text{berat sampel 3} = 5 \text{ gr}$$

$$\text{volume} = 50 \text{ ml}$$

penyelesaian :

$$\text{konsetrasi sampel 3 (ppm)} = \frac{5 \text{ gr}}{50 \text{ ml}} = \frac{5.000 \text{ mg}}{0,05 \text{ L}} = 100.000 \text{ ppm}$$

diketahui :

$$\text{berat sampel 5} = 5 \text{ gr}$$

$$\text{volume} = 50 \text{ ml}$$

penyelesaian :

$$\text{konsetrasi sampel 5 (ppm)} = \frac{5 \text{ gr}}{50 \text{ ml}} = \frac{5.000 \text{ mg}}{0,05 \text{ L}} = 100.000 \text{ ppm}$$

mencari konsentrasi setelah pengenceran : $M1 \cdot V1 = M2 \cdot V2$

$$100.000 \text{ ppm} \cdot 10 \text{ ml} = M2 \cdot 50 \text{ ml}$$

$$M2 = 20.000 \text{ ppm}$$

2. Mencari Konsentrasi pada Sampel F2 dan F4

No.	Komposisi Tepung Daun Kelor (gr)	Konsentrasi (ppm)
1.	0	4880,2
2.	2	x
3.	4	7826
4.	6	y
5.	8	7970,6

a. Menghitung Konsentrasi pada Sampel F2 (dalam 100.000 ppm)

$$x = 4880,2 + \left(\frac{(2 - 0)}{(4 - 0)} \right) (7826 - 4880,2)$$

$$x = 6371,1 \text{ ppm}$$

b. Menghitung Konsentrasi pada Sampel F4 (dalam 60.000 ppm)

$$y = 7826 + \left(\frac{(6 - 4)}{(8 - 4)} \right) (7970,6 - 7826)$$

$$y = 7898,45 \text{ ppm}$$

3. Menghitung Kadar Protein

1. Sampel 1

diketahui : konsentrasi = 4880,2 ppm

penyelesaian :

$$\% \text{ Protein} = \frac{4880,2 \text{ ppm}}{100.000 \text{ ppm}} \times 100 \% = 4,88\%$$

$$\% \text{ Protein} = 4,88\%$$

2. Sampel 2

diketahui : konsentrasi = 6371,1 ppm

penyelesaian :

$$\% \text{ Protein} = \frac{6371,1 \text{ ppm}}{100.000 \text{ ppm}} \times 100 \% = 6,37\%$$

$$\% \text{ Protein} = 6,37\%$$

3. Sampel 3

diketahui : konsentrasi = 7826 ppm

penyelesaian :

$$\% \text{ Protein} = \frac{7826 \text{ ppm}}{100.000 \text{ ppm}} \times 100 \%$$

$$\% \text{ Protein} = 7,82\%$$

4. Sampel 4

diketahui : konsentrasi = 7898,45ppm

Konsentrasi Awal (ppm)	Konsentrasi Protein (ppm)
100.000	7826
Z	7898,45
20.000	7970,6

$$z = 100.000 + \left(\frac{(7898,45 - 7826)}{(7970,6 - 7826)} \right) (20.000 - 100.000)$$

$$z = 60.000 \text{ ppm}$$

penyelesaian :

$$\% \text{ Protein} = \frac{7898,45 \text{ ppm}}{60.000 \text{ ppm}} \times 100 \%$$

$$\% \text{ Protein} = 13,16\%$$

5. Sampel 5

diketahui : konsentrasi = 7970,6 ppm

penyelesaian :

$$\% \text{ Protein} = \frac{7970,6 \text{ ppm}}{20.000 \text{ ppm}} \times 100 \%$$

$$\% \text{ Protein} = 39,85\%$$

LAMPIRAN C
GAMBAR PERCOBAAN



Pengambilan Bahan Daun Kelor



Pencucian Daun Kelor



Penjemuran Daun Kelor 2-3 Hari



Menyiapkan Mesin Penepung



Penggilingan Daun Kelor Menjadi
Tepung



Daun Kelor

Pembuatan Cookies Daun Kelor



Menyiapkan Bahan



Pencampuran bahan



Adonan Cookies



Pengovenan



Produk Cookies

Analisa Kadar Air



Proses Pengovenan



Oven pada Suhu 105 °C



Pendinginan Didalam Desikator



Setelah dikeluarkan dari desikator



Penimbangan sampel setelah dioven

Analisa Kadar Abu



Menyiapkan cawan porselen



Memfurnace cawan yang telah berisi sampel



Furnace dengan suhu 850°C selama 5 jam

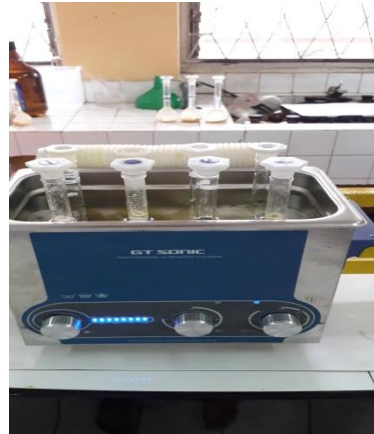


hasil abu *Cookies*

Analisa Protein



Menyiapkan Sampel



Melakukan Pengenceran/Filtrat



Setelah Pengenceran



Melakukan Penyaringan



Setelah disaring



Melakukan Analisa

Analisa Kadar Kalsium



Gambar Alat Spektrofotometer Serapan Atom

ORGANOLEPTIK



