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Lampiran 1. Skema Kerja Penelitian

1. Analisis kandungan Mineral dalam Madu (Metode SSA)

a. Preparasi Sampel

1 gram Madu

- Dimasukkan ke dalam gelas kimia 50 mL
- Ditambahkan 20 mL HNO₃ pekat, dipanaskan sambil diaduk hingga hampir habis
- Ditambahkan lagi 10 mL HNO₃ 1 M diaduk dan disaring
- Dihimpitkan dengan akuabides dalam labu ukur 100 mL
- Dianalisis dengan SSA

Data

b. Pembuatan Larutan Induk Tembaga 10.000 ppm, 1000 ppm dan 100 ppm

CuSO₄.5H₂O

- Ditimbang sebanyak 3,94 gram ke dalam gelas kimia 100 mL
- Dilarutkan dengan akuabides
- Dipindahkan ke dalam labu ukur 100 mL
- Dihimpitkan dengan akuabides hingga tanda batas dan dihomogenkan.

10.00 ppm

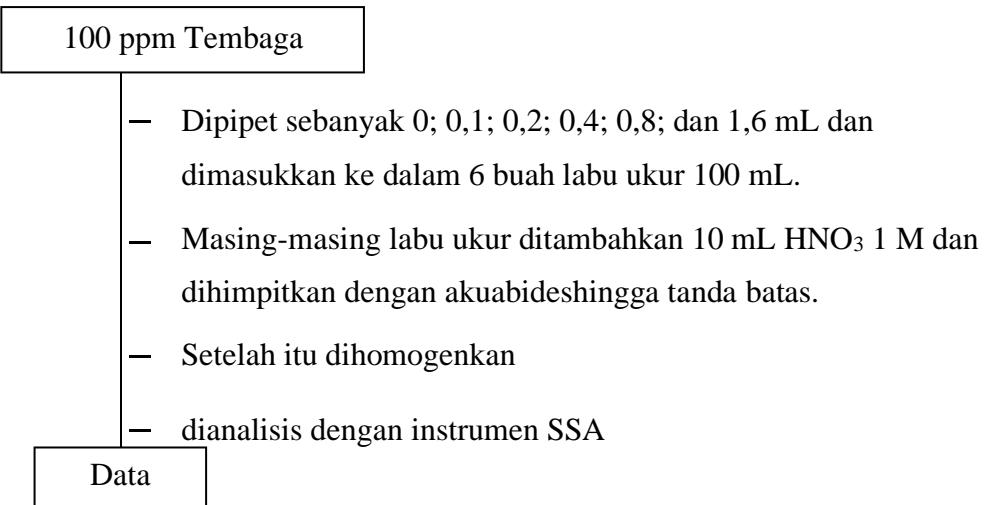
- Dipipet 10 mL ke dalam labu ukur 100 mL
- Dihimpitkan dengan akuabides hingga tanda batas dan dihomogenkan

1000 ppm

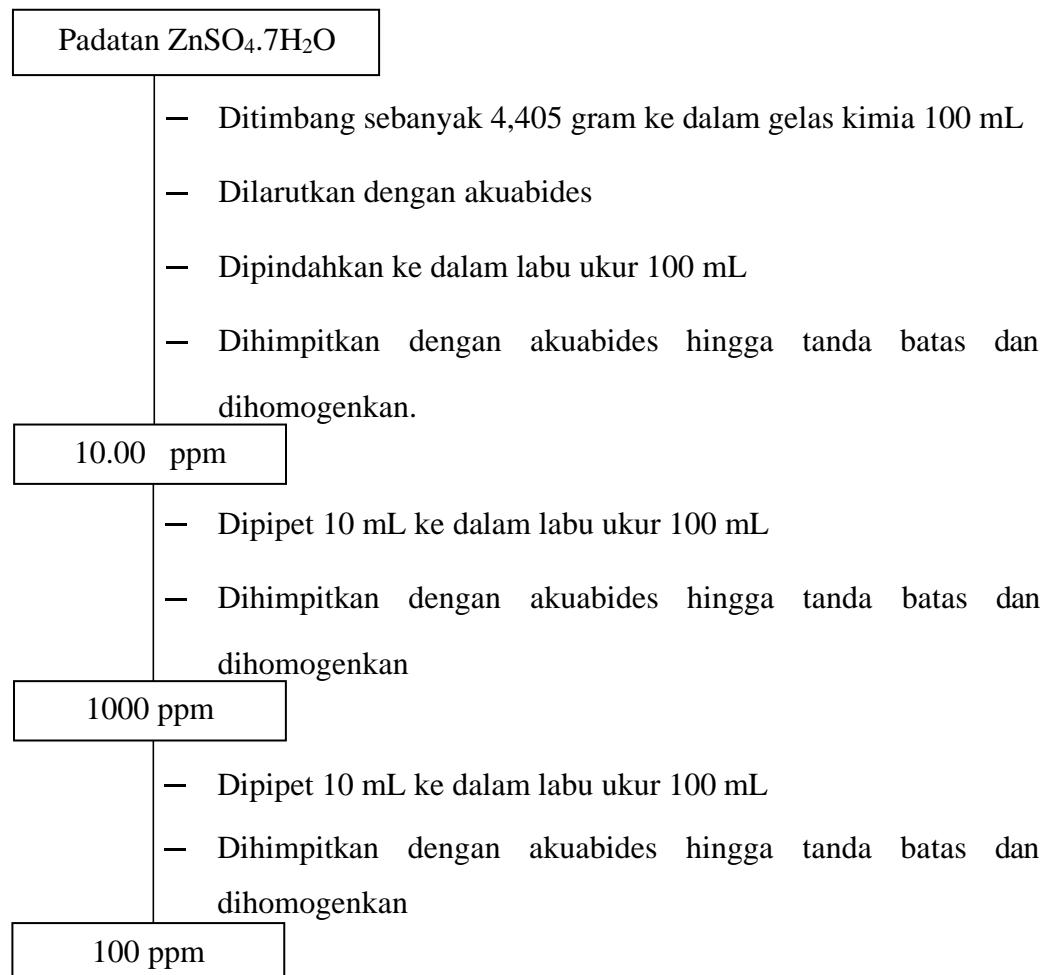
- Dipipet 10 mL ke dalam labu ukur 100 mL
- Dihimpitkan dengan akuabides hingga tanda batas dan dihomogenkan

100 ppm

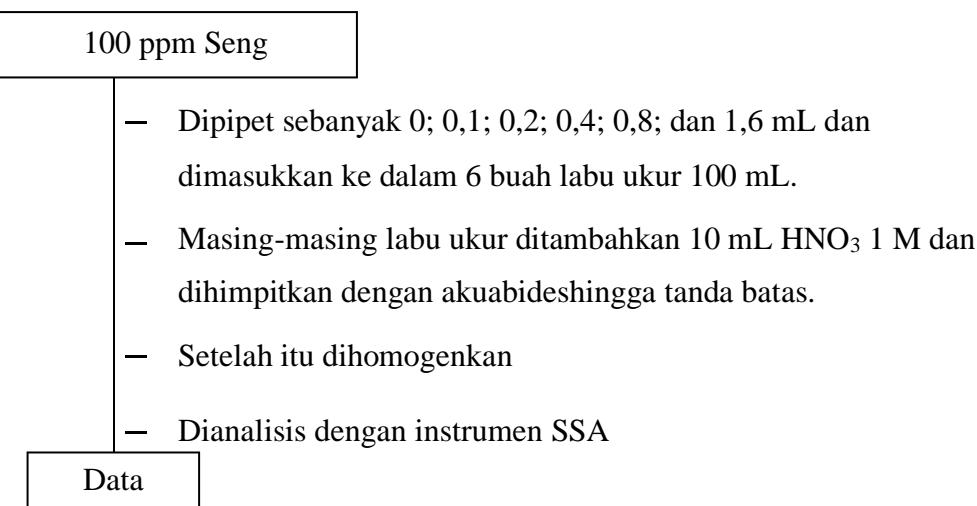
c. Pembuatan Deret Standar Tembaga 0; 0,1; 0,2; 0,4; 0,8 dan 1,6 ppm



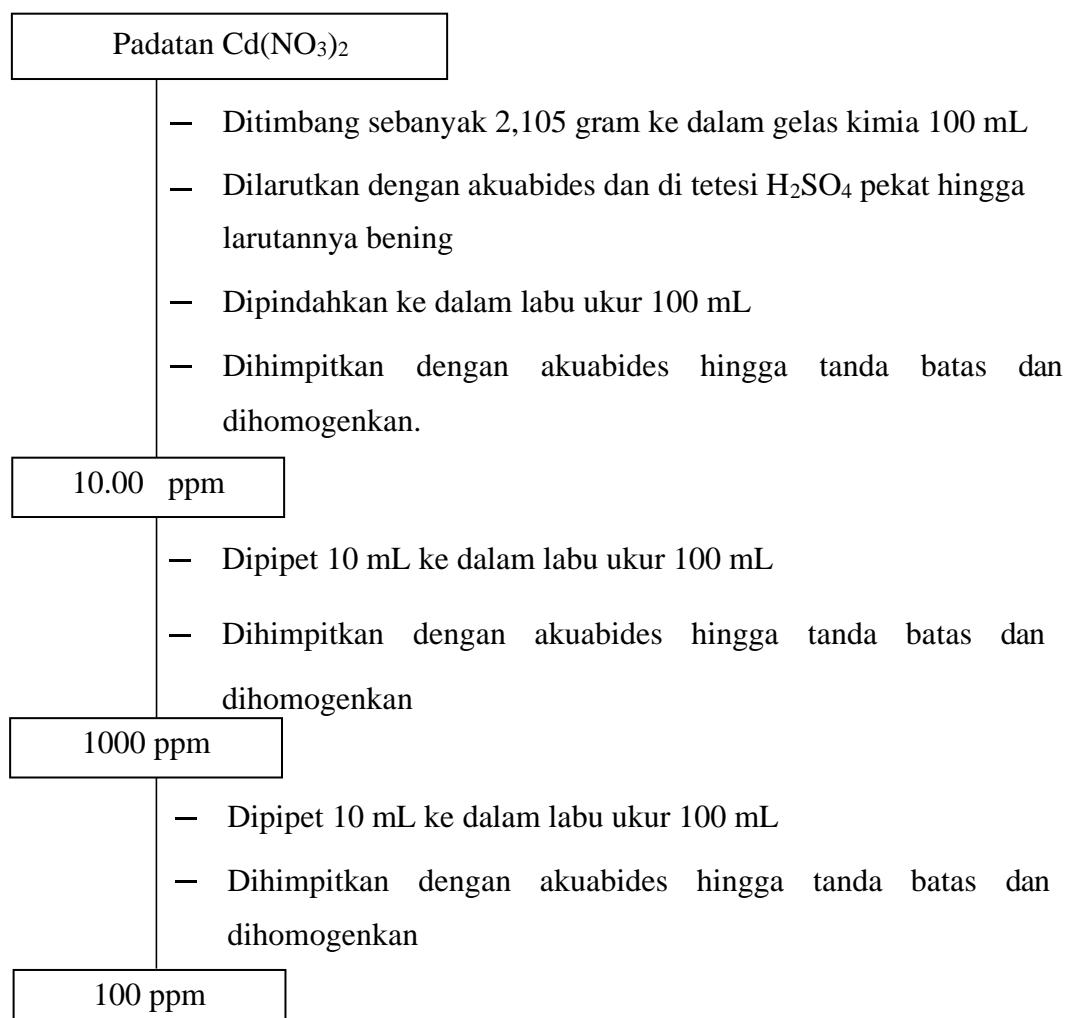
d. Pembuatan Larutan Induk Seng 10.000 ppm, 1000 ppm dan 100 ppm



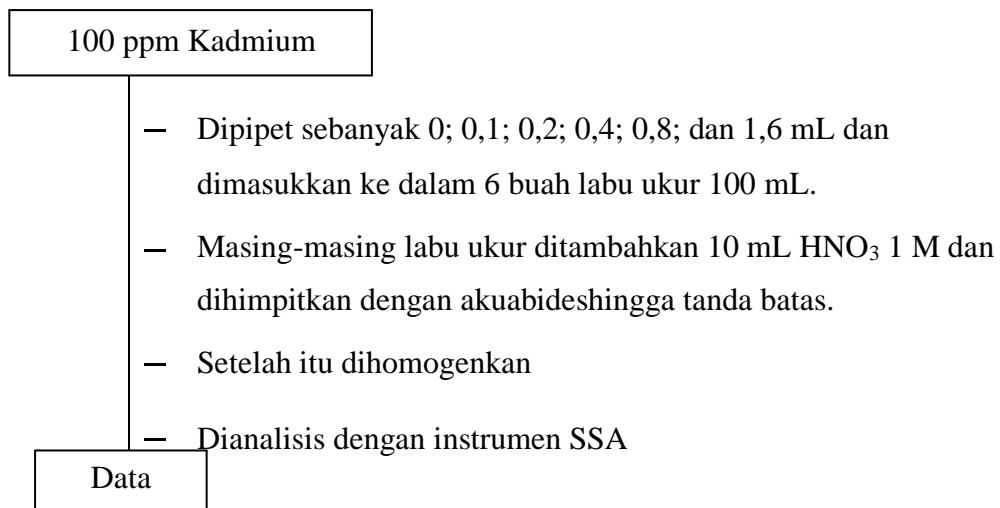
e. Pembuatan Deret Standar Seng 0; 0,1; 0,2; 0,4; 0,8 dan 1,6 ppm



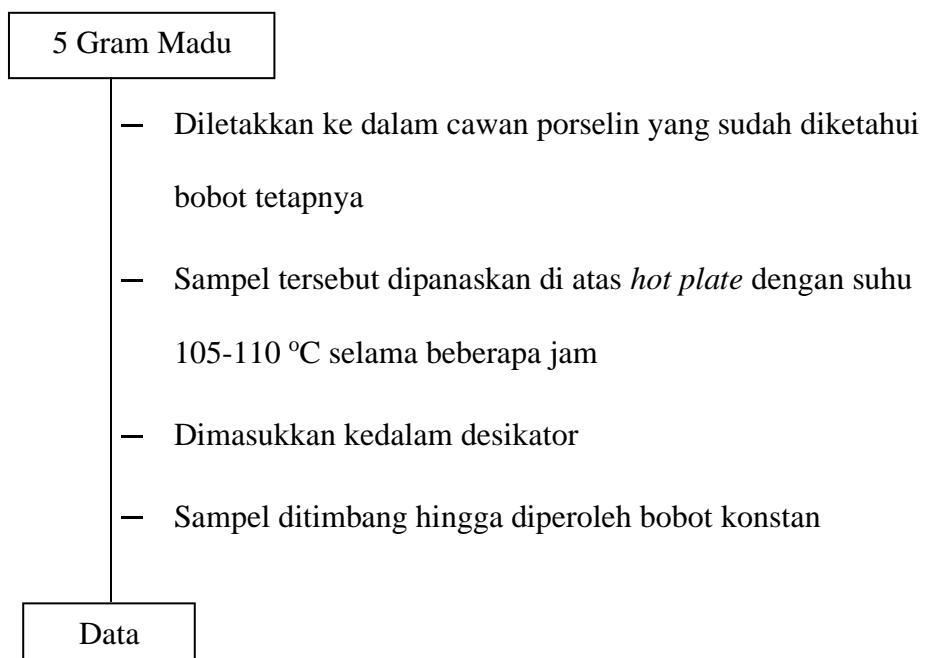
f. Pembuatan Larutan Induk Kadmium 10.000 ppm, 1000 ppm dan 100 ppm



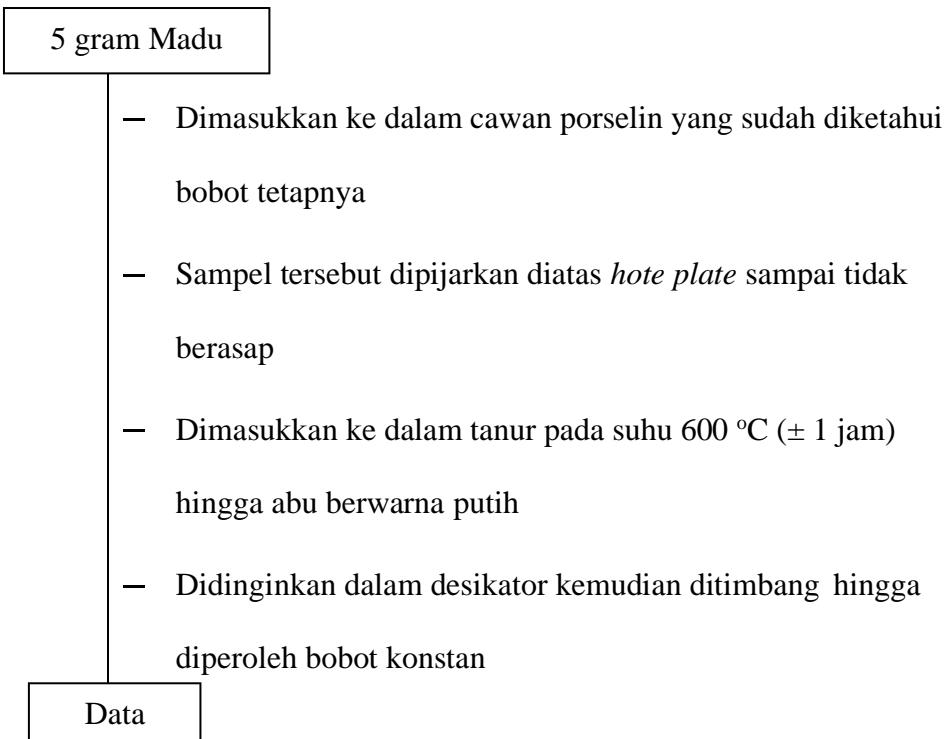
g. Pembuatan Deret Standar Kadmium 0,1; 0,2; 0,4; 0,8; 1,6 dan 3,2 ppm



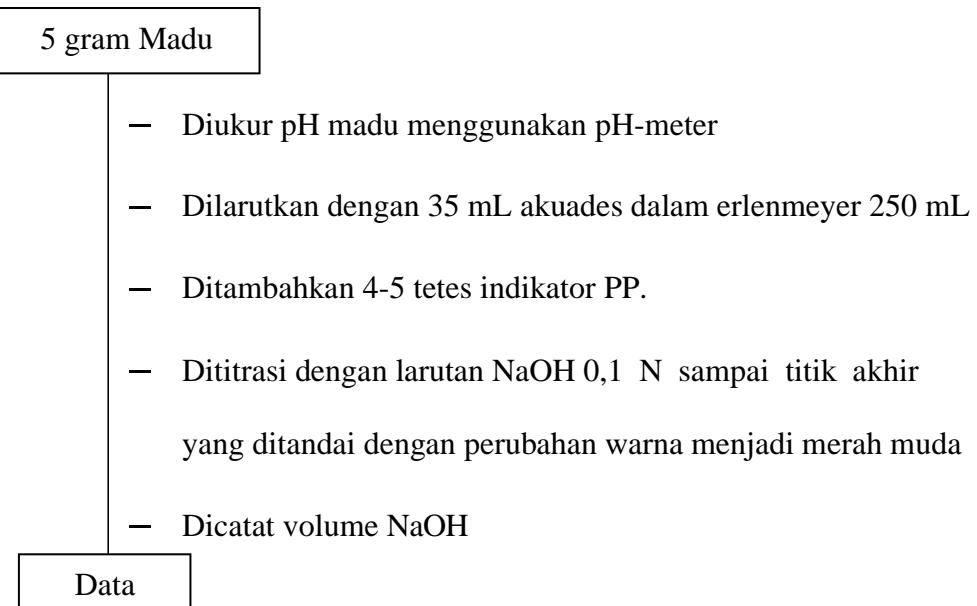
2. Analisis Kadar Air



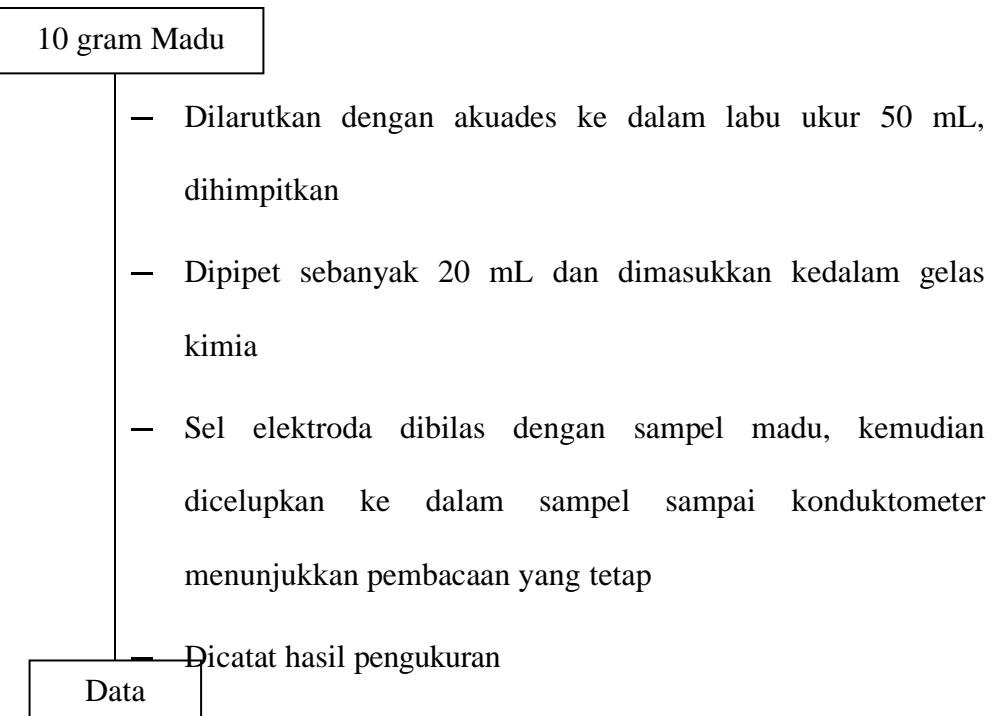
3. Analisis Kadar Abu



4. Penentuan pH dan Keasaman

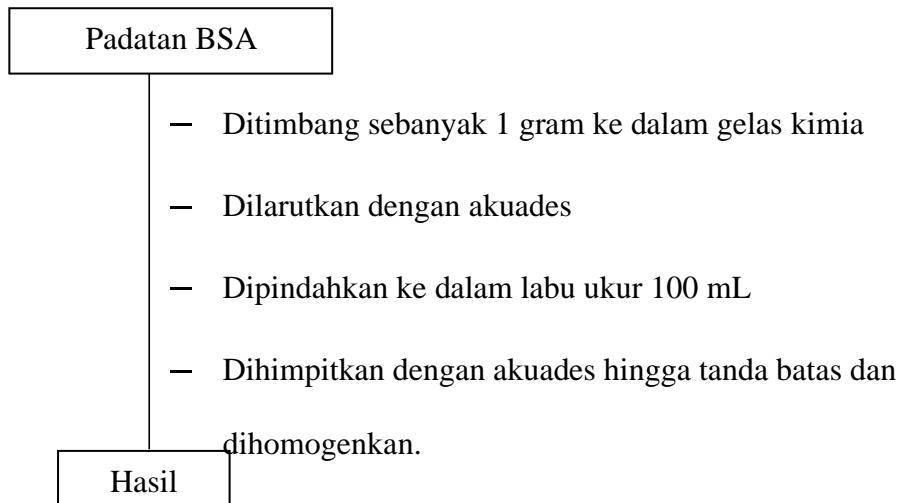


5. Analisis Konduktivitas Elektrik

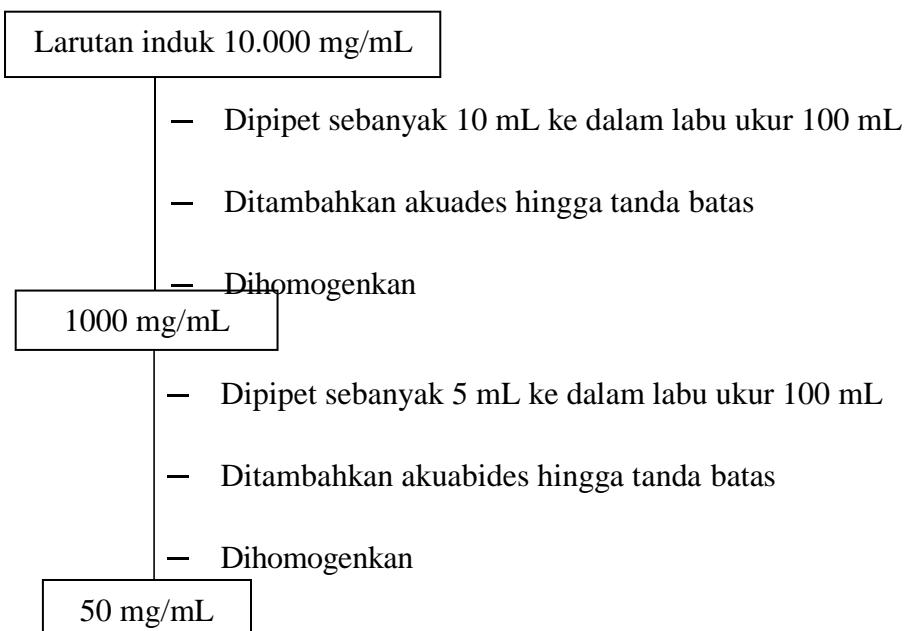


6. Analisis Kadar Protein

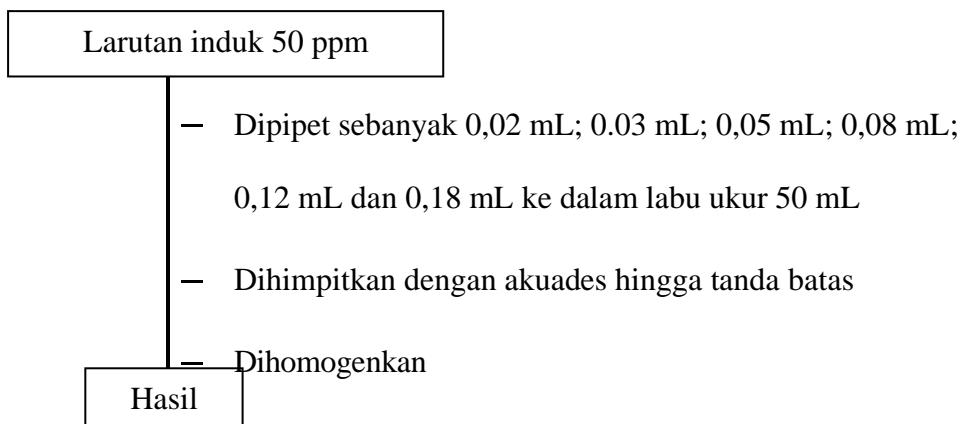
a. Pembuatan Larutan Induk BSA 10.000 mg/mL



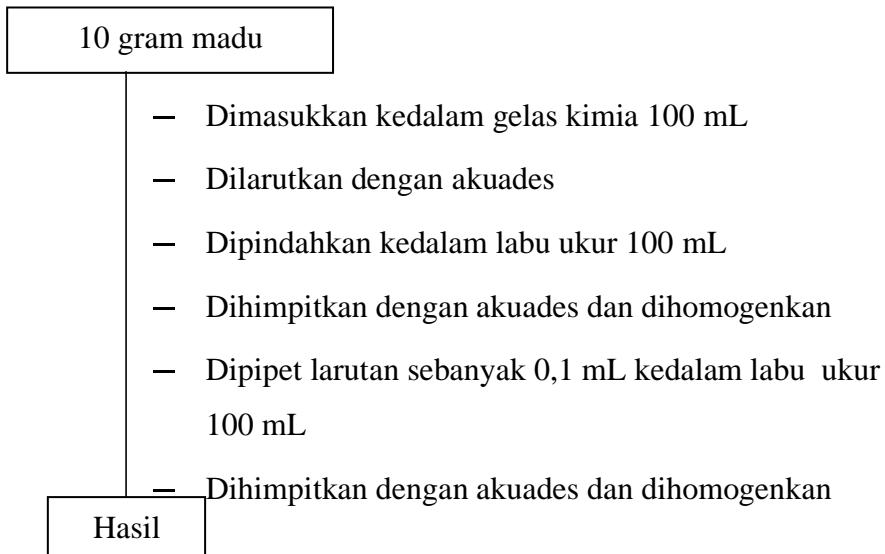
b. Pembuatan larutan induk BSA 1000 mg/mL dan 50 mg/mL



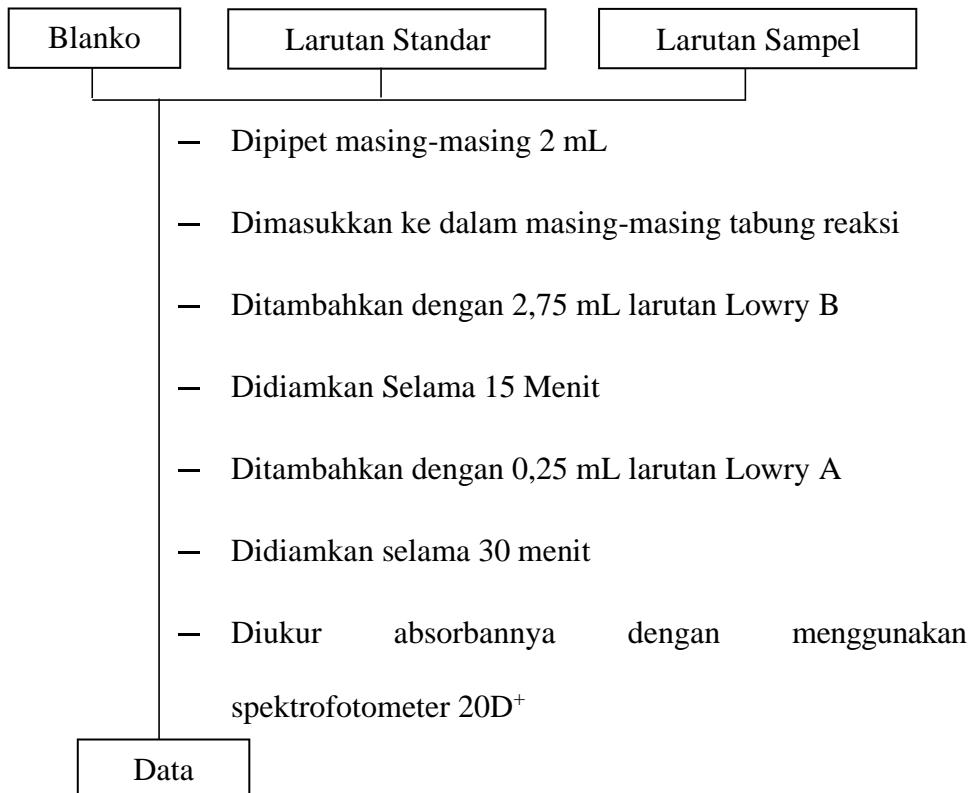
c. Pembuatan Larutan Deret Standar BSA 0,02 mg/mL, 0,04 mg/mL, 0,08 mg/mL, 0,1 mg/mL, 0,12 mg/mL dan 0,18 mg/mL



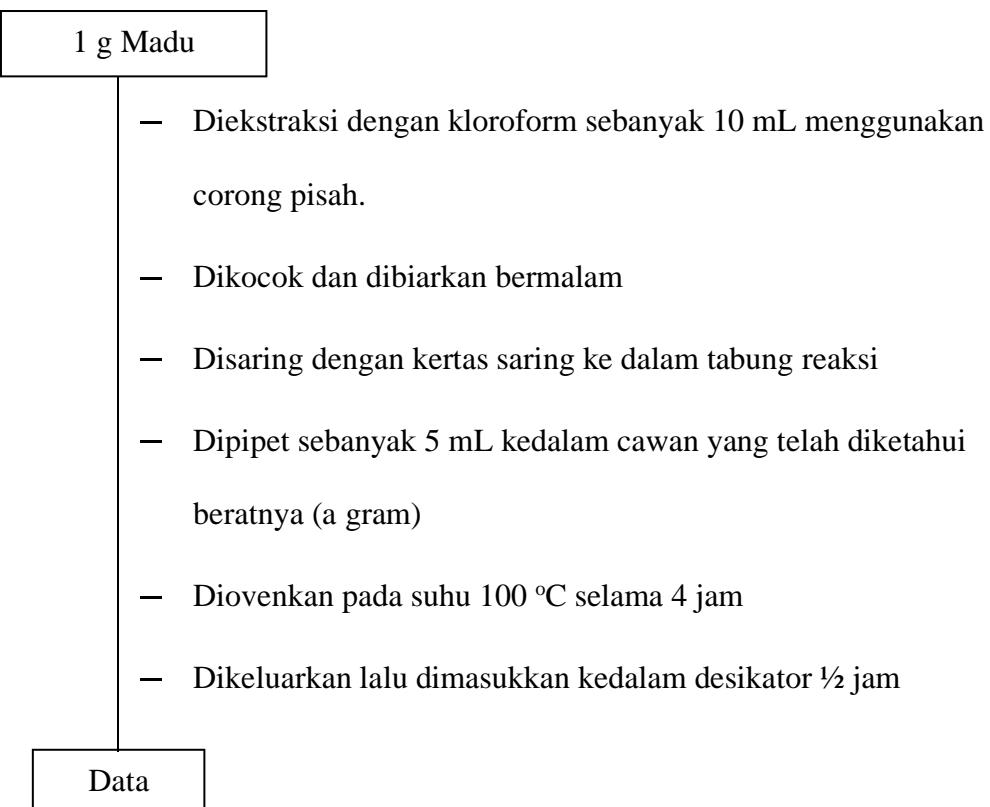
d. Preparasi Sampel untuk Penentuan Kadar Protein



e. Analisis Kadar Protein



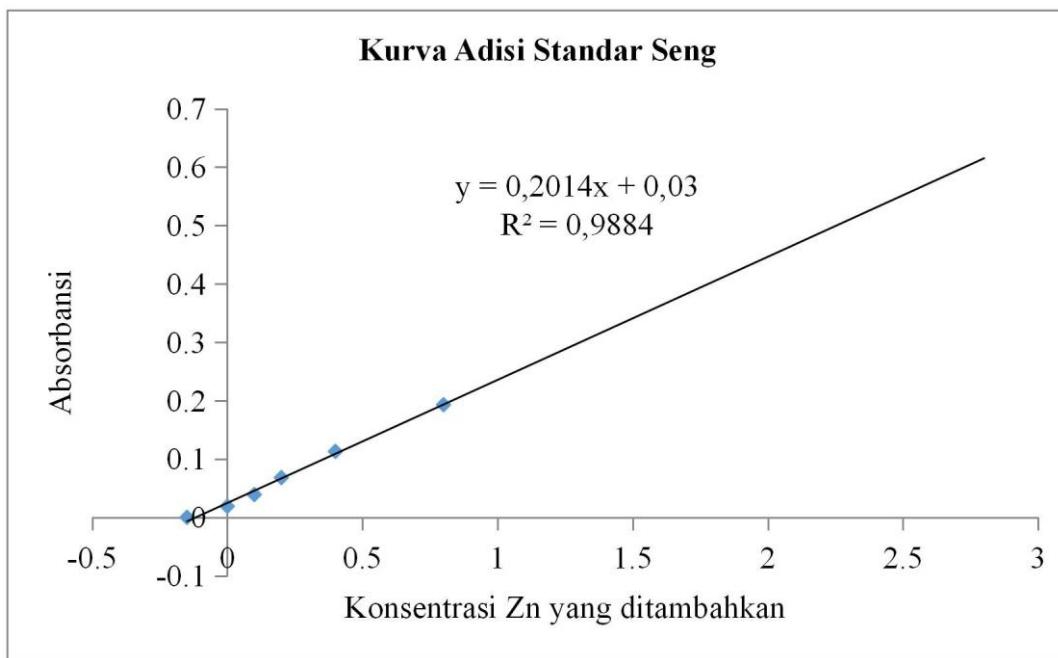
7. Analisis Kadar Lemak (Metode *Batch Solvent Extraction*)



Lampiran 2. Hasil Pengukuran Kurva Adisi Standar pada Sampel Madu

Tabel 9. Hasil Pengukuran Absorbansi dengan Metode Adisi Standar Zn

Konsentrasi Zn yang ditambahkan	Absorbansi
0	0,019
0,1	0,039
0,2	0,068
0,4	0,113
0,8	0,193
1,6	0,314



Gambar 3. Kurva Adisi Standar Zn

$$y = 0,2014x + 0,03$$

$$0 = 0,2014x + 0,03$$

$$x = \frac{-0,03}{0,2014} = -0,1489$$

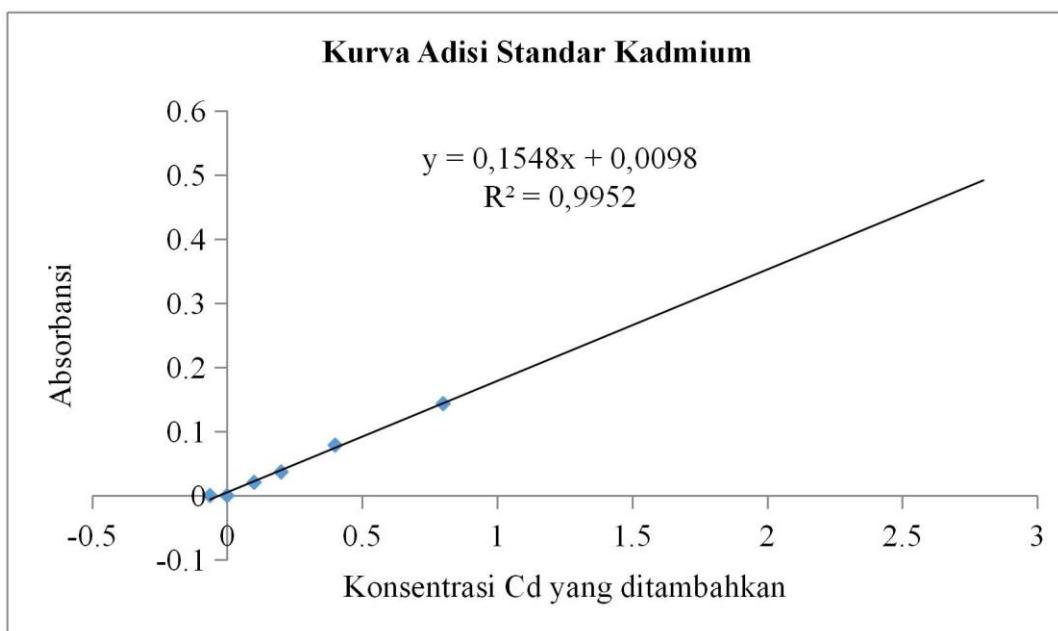
$$C_{\text{sampel}} = \frac{V_{\text{total}}}{V_{\text{sampel}}} \times C_x$$

$$= \frac{25}{20} \times 0,1489$$

$$= 0,1861 \text{ mg/kg}$$

Tabel 10. Hasil Pengukuran Absorbansi dengan Metode Adisi Standar Cd

Konsentrasi Cd yang ditambahkan	Absorbansi
0	0,00003
0,1	0,0206
0,2	0,0368
0,4	0,0786
0,8	0,1433
1,6	0,2516



Gambar 4. Kurva Adisi Standar Cd

$$y = 0,1548x + 0,0098$$

$$0 = 0,1548x + 0,0098$$

$$-0,0098 \\ x = \frac{-0,0098}{0,1548} = -0,0633$$

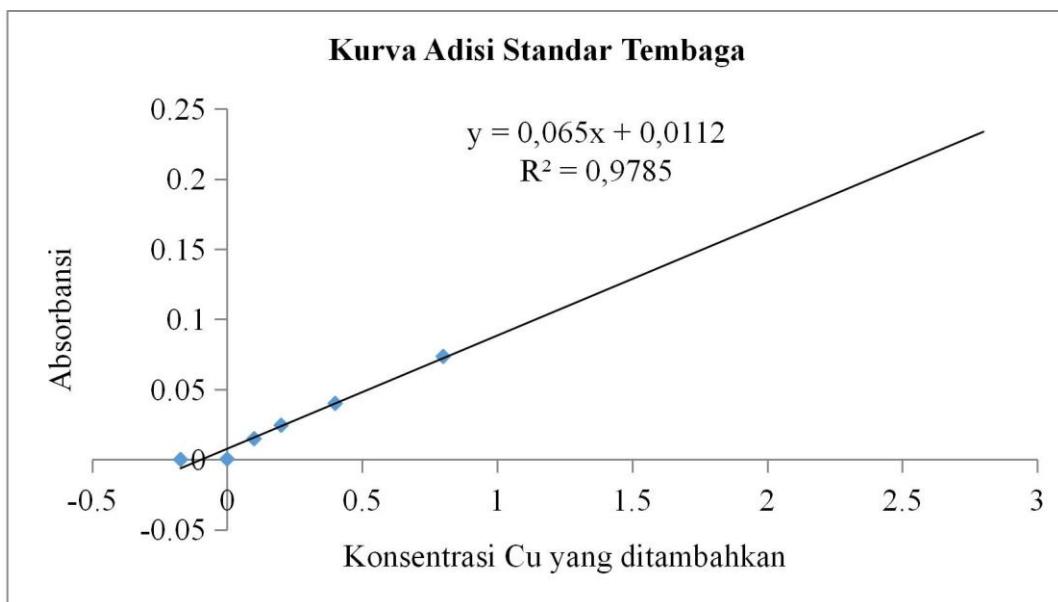
$$C_{\text{sampel}} = \frac{V_{\text{total}}}{V_{\text{sampel}}} \times C_x$$

$$= \frac{25}{20} \times 0,0633$$

$$= 0,0791 \text{ mg/kg}$$

Tabel 11. Hasil Pengukuran Absorbansi dengan Metode Adisi Standar Cu

Konsentrasi Cu yang ditambahkan	Absorbansi
0	0,0003
0,1	0,0148
0,2	0,0244
0,4	0,0400
0,8	0,0735
1,6	0,1092



Gambar 5. Kurva Adisi Standar Cu

$$y = 0,065x + 0,0112$$

$$0 = 0,065x + 0,0112$$

$$\begin{aligned} -0,0112 \\ x = \frac{-0,0112}{0,065} = -0,1723 \end{aligned}$$

$$C_{\text{sampel}} = \frac{V_{\text{total}}}{V_{\text{sampel}}} \times C_x$$

$$= \frac{25}{20} \times 0,1723$$

$$= 0,2153 \text{ mg/kg}$$

Lampiran 3. Perhitungan Kadar Bio-Fisiko Kimia pada Sampel Madu

1. Kadar Air

Rumus :

$$\% \text{ Kadar Air} = \frac{\text{bobot tetap}}{\text{bobot sampel}} \times 100 \%$$

➤ Sampel 1

$$1. \% \text{ Kadar Air} = \frac{0,9631}{5,0222} \times 100 \%$$

$$= 19,17 \%$$

$$2. \% \text{ Kadar Air} = \frac{0,9517}{5,0312} \times 100 \%$$

$$= 18,91 \%$$

$$\text{Rata-rata} = \frac{19,17 \% + 18,91 \%}{2} = 19,04 \%$$

Sampel	B. cawan kosong (g)	B. cawan + sampel (g)	Bobot sampel (g)	Bobot air (g)	bobot tetap (g)	Kadar air (%)	Rata- rata (%)
S1	47,9602 45,7605	52,9824 50,7917	5,0222 5,0312	4,0591 4,0795	0,9631 0,9517	19,17 18,91	19,04
S2	49,6028 34,9033	54,6213 39,9586	5,0185 5,0553	4,0509 4,0676	0,9676 0,9877	19,28 19,53	19,40

2. Kadar Abu

Rumus :

$$\% \text{ Kadar Abu} = \frac{\text{bobot tetap}}{\text{bobot sampel}} \times 100 \%$$

➤ Sampel 1

$$1. \% \text{ Kadar Abu} = \frac{0,0027}{5,0486} \times 100 \%$$

$$= 0,05 \%$$

$$2. \% \text{ Kadar Abu} = \frac{0,0031}{5,0278} \times 100 \%$$

$$= 0,06 \%$$

$$\text{Rata-rata} = \frac{0,05 \% + 0,06 \%}{2} = 0,055 \%$$

Sampel	b. cawan kosong (g)	b. cawan + sampel (g)	Bobot sampel (g)	Bobot abu (g)	bobot tetap (g)	Kadar abu (%)	Rata- rata (%)
S1	25,4002 41,9643	30,4488 46,9921	5,0486 5,0278	5,0459 5,0247	0,0027 0,0031	0,05 0,06	0,055
S2	29,4631 27,2311	34,5175 32,2483	5,0542 5,0172	5,0517 5,0146	0,0025 0,0026	0,05 0,05	0,05

3. Keasaman

Rumus :

$$\text{Keasaman} = \frac{V_{\text{NaOH}} \times N_{\text{NaOH}}}{\text{gram sampel}} \times 1000$$

➤ Sampel 1

$$1. \text{ Keasaman} = \frac{2,2 \times 0,1111}{5,0321} \times 1000$$

$$= 48,57 \text{ meq/kg}$$

$$2. \text{ Keasaman} = \frac{1,9 \times 0,1111}{5,0475} \times 1000$$

$$= 41,82 \text{ meq/kg}$$

$$\text{Rata-rata} = \frac{48,57 + 41,82}{2} = 45,19 \text{ meq/kg}$$

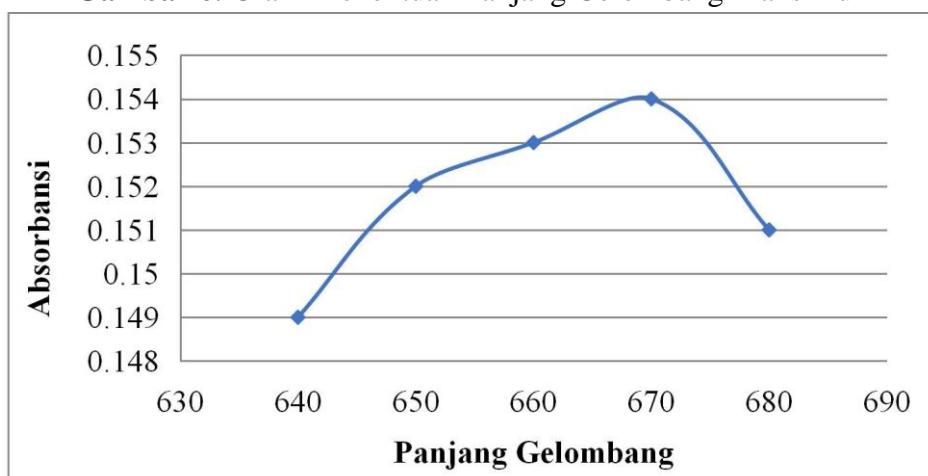
Sampel	Volume NaOH (mL)	N. NaOH	b. sampel (g)	keasaman (meq/kg)	Rata-rata (meq/kg)
S1	2,2	0,1111	5,0321	48,57	45,19
	1,9	0,1111	5,0475	41,82	
S2	1,9	0,1111	5,0701	41,63	42,60
	2,0	0,1111	5,0981	43,58	

4. Kadar Protein

Tabel 12. Penentuan Panjang Gelombang Maksimum

Panjang Gelombang (λ)	Absorbansi
640	0,149
650	0,152
660	0,153
670	0,154
680	0,151

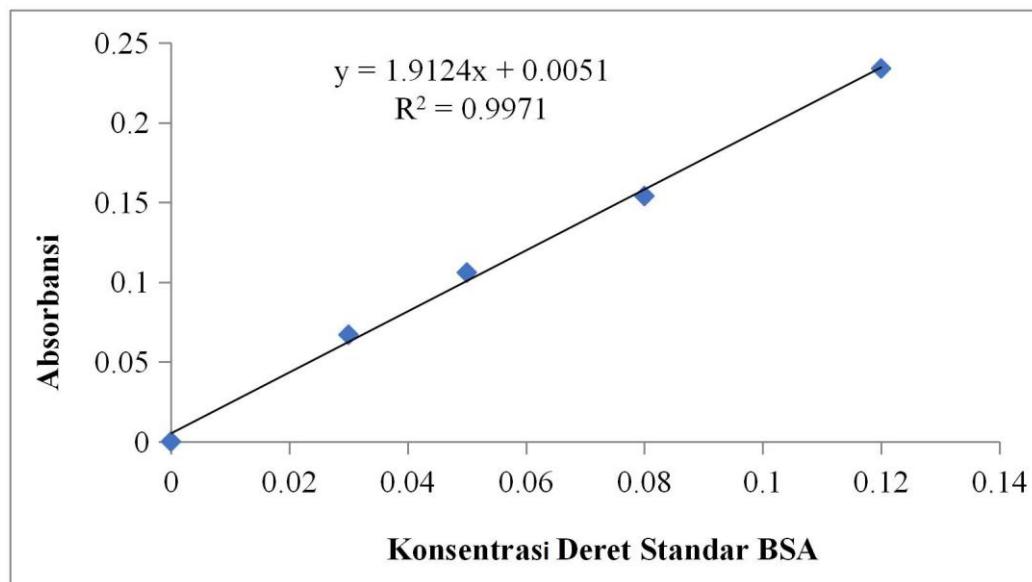
Gambar 6. Grafik Penentuan Panjang Gelombang Maksimum



Tabel 13. Nilai Absorbansi Deret Standar dan Sampel Madu

Konsentrasi (ppm)	Absorbansi
0,03	0,067
0,05	0,106
0,08	0,154
0,12	0,234
Sampel 1	0,062
Sampel 2	0,062

Gambar 7. Grafik Hubungan Konsentrasi Deret Standar dengan Absorbansi



Kadar protein dalam sampel:

$$y = ax + b$$

$$y = 1,7327x + 0,0051; \quad \text{dimana nilai } y = 0,062$$

$$0,062 = 1,7327x + 0,0051$$

$$x = \frac{0,062 - 0,0051}{1,7327}$$

$$x = 0,032$$

$$\text{kadar protein} = 3,2 \times F_p$$

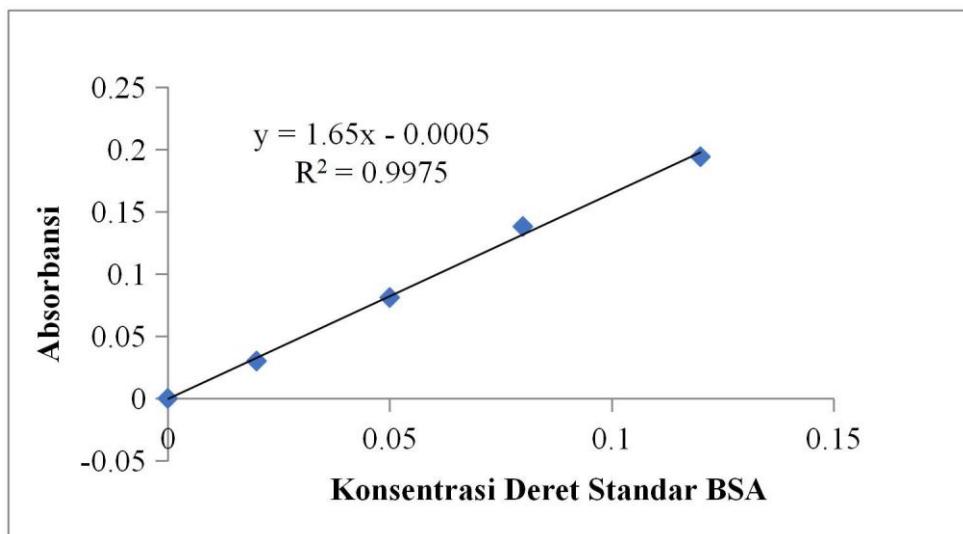
$$= 0,032 \times 100$$

$$= 3,2 \%$$

Tabel 14. Nilai Absorbansi Deret Standar dan Sampel Madu

Konsentrasi (ppm)	Absorbansi
0,02	0,030
0,03	0,063
0,05	0,081
0,08	0,138
0,12	0,194
Sampel 1	0,050
Sampel 2	0,051

Gambar 8. Grafik Hubungan Konsentrasi Deret Standar Dengan Absorbansi



Kadar protein dalam sampel :

$$y = ax + b$$

$$y = 1,5096x + 0,0005; \quad \text{dimana nilai } y = 0,050$$

$$0,050 = 1,5096x + 0,0005$$

$$x = \frac{0,050 - 0,0005}{1,5096}$$

$$x = 0,028$$

$$\text{kadar protein} = 0,039 \times F_p$$

$$= 0,028 \times 100$$

$$= 3,9 \%$$

5. Kadar Lemak

Rumus :

$$\text{Kadar Lemak} = \frac{P \times (b-a)}{\text{gram sampel}} \times 100 \%$$

Keterangan :

P = pengenceran ($10/5$) = 2

b = bobot sampel setelah diovenkan

a = bobot kosong

➤ Sampel 1

$$1. \text{ Kadar Lemak} = \frac{2 \times (46,2648 - 46,2647)}{1,0124} \times 100 \%$$

$$= 0,0197 \%$$

$$2. \text{ Kadar Lemak} = \frac{2 \times (45,9763 - 45,9761)}{1,0267} \times 100 \%$$

$$= 0,0194 \%$$

$$*\text{rata-rata} = \frac{0,0197 \% + 0,0194 \%}{2} = 0,01975 \%$$

Sampel	b cawan kosong (gram)	b setelah diovenkan (gram)	b sampel (gram)	Kadar lemak (%)	Rata-rata (%)
S1	46,2647	46,2648	1,0124	0,0197	0,01955
	45,9763	45,9761	1,0267	0,0194	
S2	40,8999	40,8998	1,0435	0,0196	0,0197
	43,4923	43,4922	1,0059	0,0198	

6. Kadar Karbohidrat

Rumus :

$$\text{Kadar karbohidrat} = 100 - (\% \text{Protein} + \% \text{Lemak} + \% \text{Abu} + \% \text{Air})$$

➤ Sampel 1

$$\begin{aligned}\text{Kadar karbohidrat} &= 100 - (3,2 \% + 0,01955 \% + 0,055 \% + 19,04 \%) \\ &= 100 - (21,8145 \%) \\ &= 78,1855 \%\end{aligned}$$

➤ Sampel 2

$$\begin{aligned}\text{Kadar karbohidrat} &= 100 - (3,9 \% + 0,0197 \% + 0,05 \% + 19,40 \%) \\ &= 100 - (22,2697 \%) \\ &= 77,7303 \%\end{aligned}$$

Sampel	% protein	% lemak	% Abu	% Air	% karbohidrat
S1	3,2	0,01955	0,055	19,04	78,1855
S2	3,9	0,0197	0,05	19,40	77,7303

7. Kalori

Rumus :

$$\text{Kalori} = (9 \times \% \text{ Lemak}) + (4,2 \times \% \text{ Protein}) + (4 \times \% \text{ Karbohidrat})$$

➤ Sampel 1

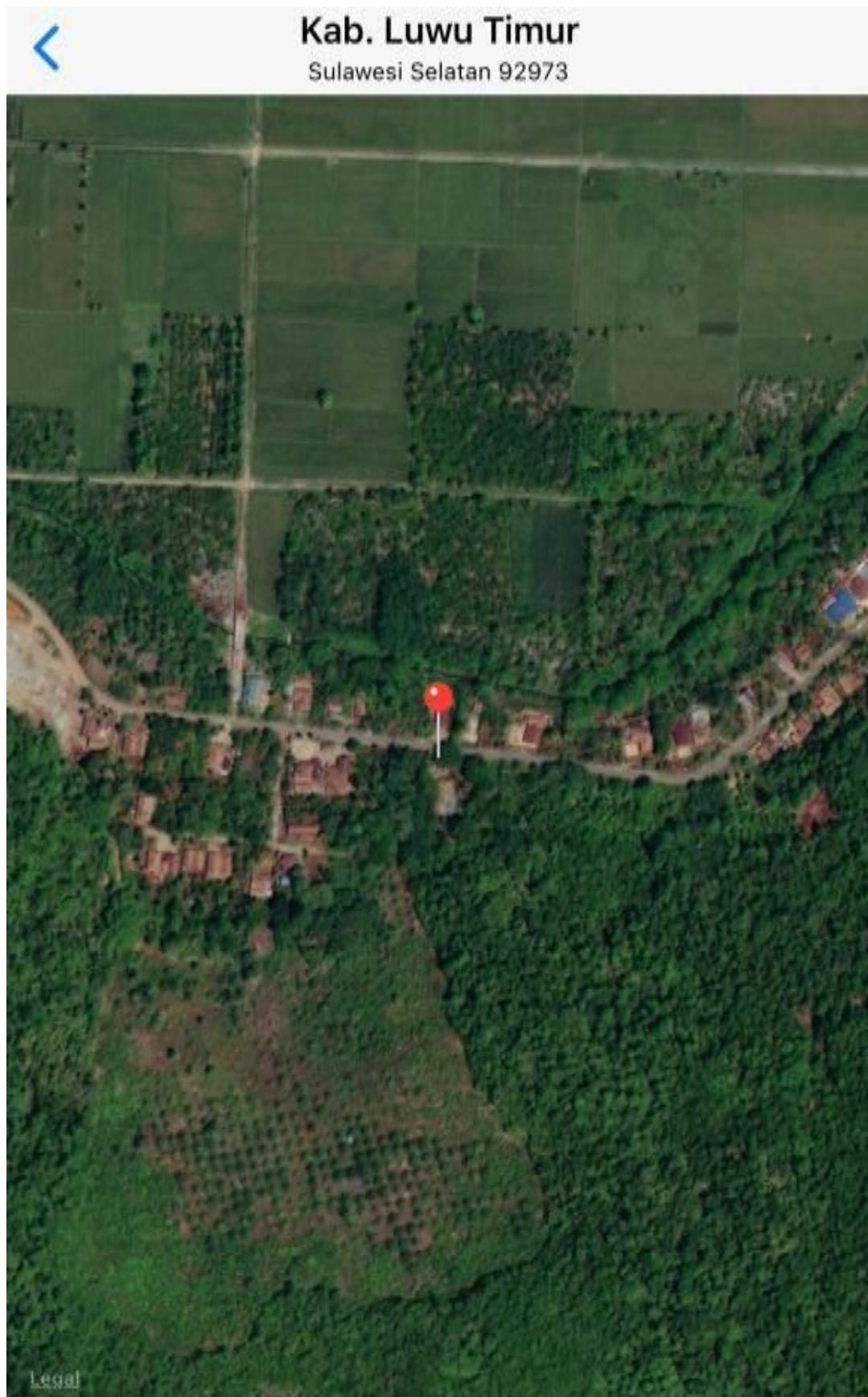
$$\begin{aligned}\text{Kalori} &= (9 \times 0,01955 \%) + (4,2 \times 3,2 \%) + (4 \times 78,1855 \%) \\ &= 0,1759 + 13,44 + 312,754 \\ &= 324,269 \text{ kal.}\end{aligned}$$

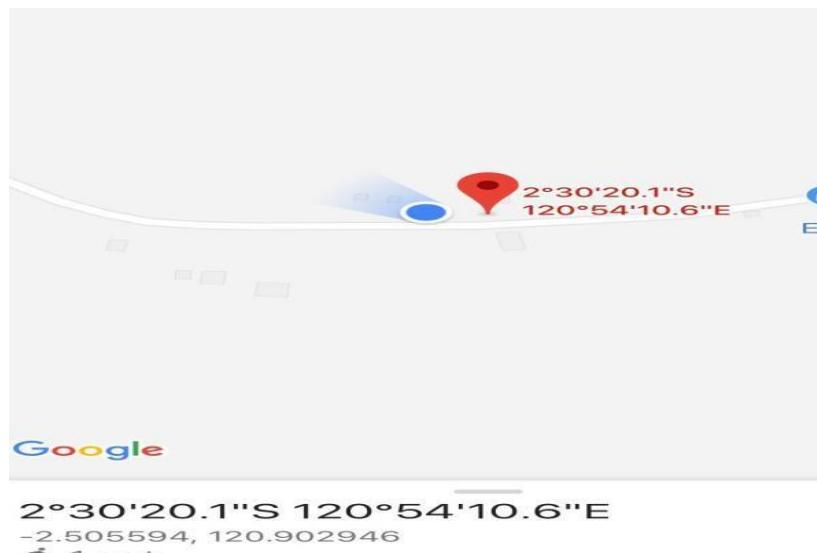
➤ Sampel 2

$$\begin{aligned}\text{Kalori} &= (9 \times 0,0197 \%) + (4,2 \times 3,9 \%) + (4 \times 77,7303 \%) \\ &= 0,1773 + 16,38 + 310,9212 \\ &= 327,478 \text{ kal.}\end{aligned}$$

Sampel	9 x % lemak	4,2 x % protein	4 x % KH	Kalori (kal.)
S1	0,1759	11,34	312,754	326,369
S2	0,1773	11,76	310,9212	327,478

Lampiran 4. Dokumentasi Penelitian





Gambar 9. Peta Lokasi Pengambilan Sampel



Gambar 10. Sampel Madu Hutan



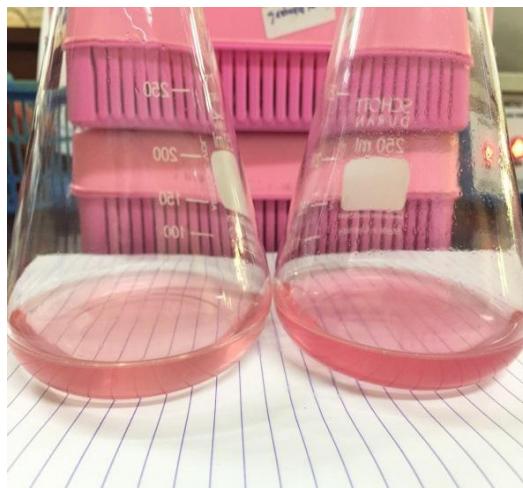
Gambar 11. Penentuan Kadar Air dan Kadar Abu



Gambar 12. Penentuan Kadar Protein



Gambar 13. Penentuan Konduktivitas



Gambar 14. pH dan Keasaman



Gambar 15. Penentuan Kadar Lemak



Gambar 16. Filtrat Sampel



Gambar 17. Deret Standar Seng



Gambar 18. Deret Standar Tembaga



Gambar 19. Deret Standar Kadmium



Gambar 20. Proses Pengukuran Absorbansi dengan Spektrofotometer Serapan Atom