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Lampiran 1

Pembuatan ekstrak umbi Sarang Semut *(Myrmecodia Pendans)*

a. Persiapan umbi Sarang Semut

Diambil dari hutan

- dibersihkan dari kotoran
- dibuang bagian ujung sarang semut yang berdaun dengan menggunakan pisau
- dikupas kulit luar sarang semut dengan menggunakan pisau
- dibelah menjadi 4 bagian
- dicuci dengan akuabides
- dirajang tipis-tipis
- dikering-anginkan selama 1 hari
- dioven selama ±30 menit pada suhu 50^0C

Sampel sarang semut kering

- diblender

Bubuk sarang semut

b. Ekstraksi Sarang Semut

Bubuk sarang semut

- ditimbang 10 gr
- ditambahkan akuabides 1:10 (b/v)
- dididihkan selama ±15 menit
- larutan didinginkan
- disaring menggunakan kertas Whatman No. 42

Filtrat

Lampiran 2

Pembuatan larutan induk $AgNO_3$ 1 mM

Serbuk $AgNO_3$

↓

- ditimbang 0.043 gr
- dilarutkan ke dalam akuabides 250 mL
- dikocok

Larutan $AgNO_3$

Lampiran 3 Variasi konsentrasi dan lama pengadukan

a. Variasi konsentrasi larutan $AgNO_3$

Masing-masing 2 mL Ekstrak sampel Sarang Semut

↓

- Ditambahkan ke dalam 5 labu erlenmeyer yang telah berisikan 20 mL larutan $AgNO_3$ pada berbagai konsentrasi (0.5, 1, 1.5, 2, 2.5 mM)
- Masing-masing labu distirer selama 2 jam.

↓

Larutan AgNPs

↓

- Diuji dengan spektrofotometer UV-Vis

↓

Konsentrasi optimum 1 mM

b. Variasi lama pengadukan

Masing-masing 2 mL Ekstrak sampel Sarang Semut

- Ditambahkan ke dalam 5 labu erlenmeyer yang telah berisikan 20 mL larutan $AgNO_3$ dengan konsentrasi 1 mM (sesuai konsentrasi optimum yang sudah didapatkan)
- Masing-masing labu distirer pada berbagai variasi waktu (30, 60, 90, 120, dan 150 menit)

Larutan AgNPs

- Diuji dengan spektrofotometer UV-Vis

Waktu optimum 150 menit

Lampiran 4

Sintesis nanopartikel perak

a. Dengan ekstrak umbi Sarang Semut tanpa penstabil

20 mL Larutan $AgNO_3$

↓

- ditambahkan 2 mL ekstrak sarang semut
- diaduk selama 150 menit

Ag-NPs

b. Dengan ekstrak umbi Sarang semut menggunakan penstabil

20 mL Larutan $AgNO_3$

↓

- ditambahkan 2 mL ekstrak sarang semut dan 2 mL PVA
- diaduk selama 150 menit

Ag-NPs

c. Dengan Kaempferol

20 mL Larutan $AgNO_3$

↓

- ditambahkan 3 tetes kaempferol 0.1 M
- diaduk selama 150 menit

Ag-NPs

d. Dengan kuersetin

20 mL Larutan $AgNO_3$

- ditambahkan 3 tetes kuersetin 0.1 M
- diaduk selama 150 menit

↓

Ag-NPs

e. Pengeringan Nanopartikel Ag

Larutan koloid Ag-NPs

- Dikeringkan dengan *freeze dryer*

↓

Serbuk Ag-NPs

Lampiran 5

Pembuatan larutan glukosa standard

1,8 g glukosa

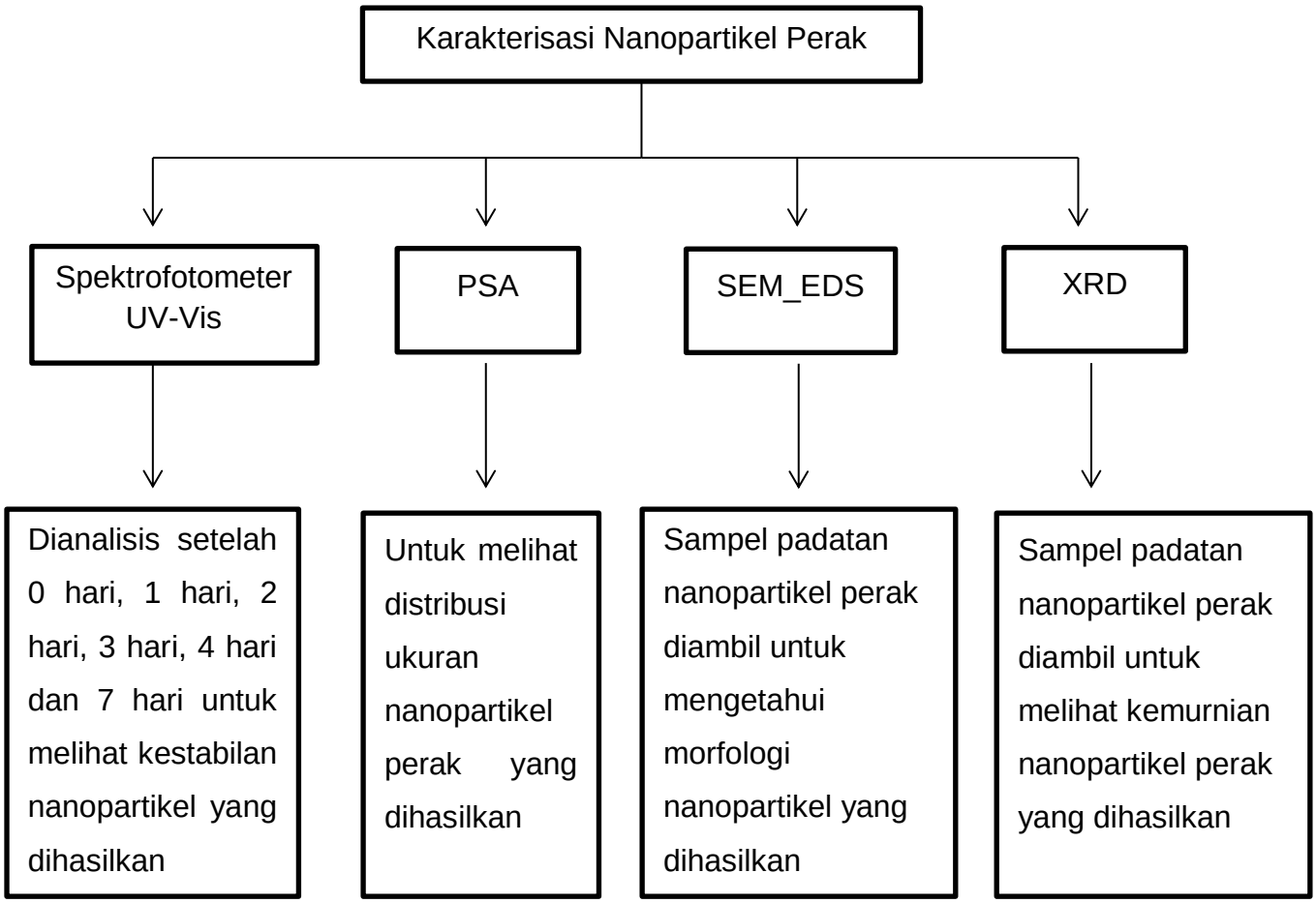
↓

- ditambahkan akuabides sampai volume 1000 mL
- dilakukan pengenceran dengan variasi konsentrasi 1-10 mM

Larutan glukosa standard

Lampiran 6

Karakterisasi Nanopartikel Perak



Lampiran 7

Persiapan elektroda modifikasi (elektroda kerja)

Kawat platina

↓

- dicelupkan ke dalam asam poliakrilik, selama 30 menit
- dibilas dengan air
- dicelupkan ke dalam suspensi nanopartikel perak, 15 menit
- dibilas air lagi
- siklus ini diulang 3x

Elektroda modifikasi (elektroda kerja)

Lampiran 8

Perhitungan XRD

a. 3 puncak tanpa penstabil

Peak 1. 2θ = 37.80

$$d_s = \frac{k\lambda}{B\cos\theta}$$

$$= \frac{0.98\ x\ 0.154\ nm}{(1.032°)\cos(\frac{37.80}{2})}$$

$$= \frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 1.032°)\cos(18.9)}$$

$$= \frac{0.15092\ nm}{0.018002\ x\ 0.946085}$$

$$= \frac{0.15092}{0.01703}$$

= 8.862 nm

Peak 2. 2θ = 64.24

$$ds = \frac{k\lambda}{B\cos\theta}$$

$$= \frac{0.98\ x\ 0.154\ nm}{(0.660°)\cos(\frac{64.24}{2})}$$

$$= \frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.660°)\cos(32.12)}$$

$$= \frac{0.15092}{0.011513\ x\ 0.846936}$$

$$\frac{0.15092}{0.00975}$$

5.478 nm

Peak 3. 2θ = 77.46

$$ds = \frac{k\lambda}{B\cos\theta}$$

$$= \frac{0.98\ x\ 0.154\ nm}{(0.365°)\cos(\frac{77.46}{2})}$$

$$= \frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.365°)\cos(38.73)}$$

$$= \frac{0.15092}{0.006367\ x\ 0.780103}$$

$$= \frac{0.15092}{0.00496}$$

= 30,427 nm

b. 4 puncak dengan penstabil

Peak 1. 2θ= 37.775

$$ds = \frac{k\lambda}{B\cos\theta}$$

$$= \frac{0.98\ x\ 0.154\ nm}{(0.55660°)\cos(\frac{37.775}{2})}$$

$$= \frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.55660°)\cos(18.8875)}$$

$$= \frac{0.15092}{0.009709\ x\ 0.946156}$$

$$= \frac{0.15092}{0.009186}$$

43 nm

Peak 2. 2θ= 44.047

ds= $\frac{k\lambda}{B\cos\theta}$

= $\frac{0.98\ x\ 0.154\ nm}{(0.2897°)\cos(\frac{44.047}{2})}$

= $\frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.2897°)\cos(22.023)}$

= $\frac{0.15092}{0.005053\ x\ 0.927033}$

= $\frac{0.15092}{0.00468}$

= 32.24 nm

Peak 3. 2θ= 64.38

ds= $\frac{k\lambda}{B\cos\theta}$

= $\frac{0.98\ x\ 0.154\ nm}{(0.3159°)\cos(\frac{64.38}{2})}$

= $\frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.3159°)\cos(32.19)}$

= $\frac{0.15092}{0.005510\ x\ 0.846286}$

= $\frac{0.15092}{0.00466}$

38 nm

Peak 4. 2θ= 77.49

$$ds = \frac{k\lambda}{B\cos\theta}$$

$$= \frac{0.98\ x\ 0.154\ nm}{(0.3405°)\cos(\frac{77.49}{2})}$$

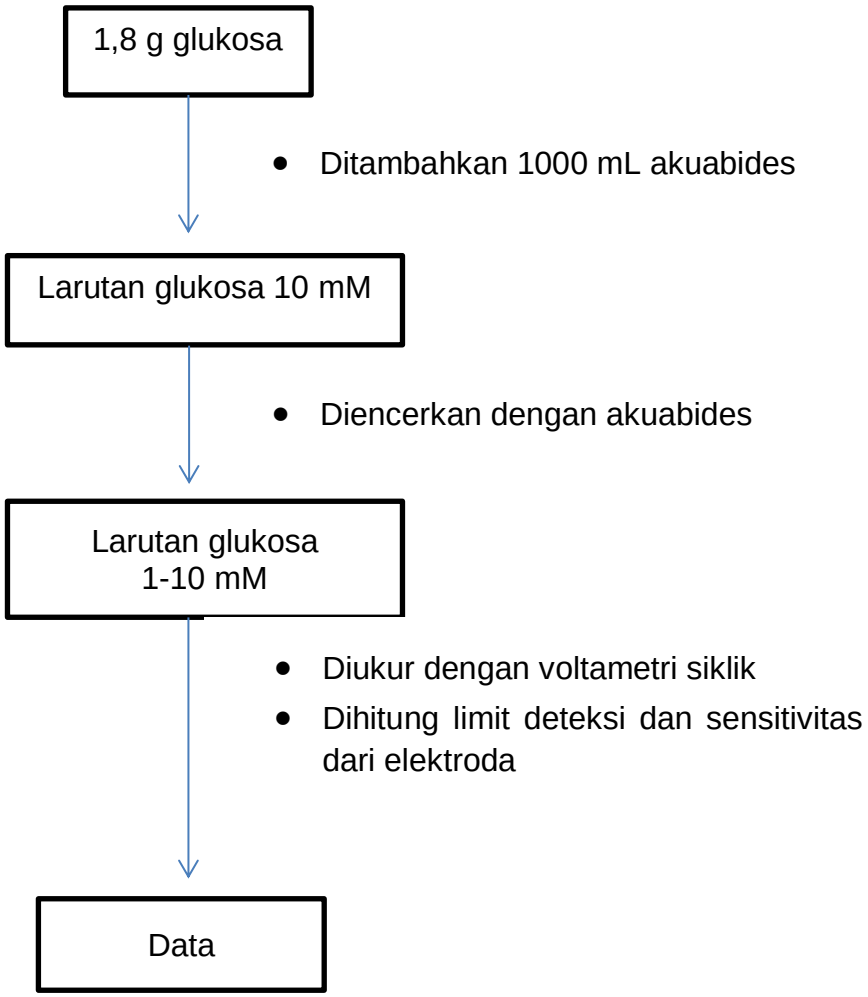
$$= \frac{0.98\ x\ 0.154\ nm}{\left(\frac{3.14}{180°}\right) x\ 0.3405°)\cos(38.745)}$$

$$= \frac{0.15092}{0.005939\ x\ 0.779939}$$

$$= \frac{0.15092}{0.00463}$$

= 32.59 nm

Lampiran 9. Bagan kerja pengujian terhadap larutan gula standar



Lampiran 10. Hasil pengukuran nanopartikel perak dengan menggunakan XRD

*** Basic Data Process ***

Group : Standard
Data : tp101

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	1	31.9351	2.80015	100	0.33590	765	15518
2	16	45.9440	1.97370	60	0.34220	461	8736
3	7	37.8000	2.37808	33	1.03200	255	9124

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	31.9351	2.80015	100	0.33590	765	15518
2	33.4800	2.67438	3	0.31000	23	491
3	33.9500	2.63843	7	0.62000	51	1796
4	36.8200	2.43909	5	0.20000	42	545
5	37.2000	2.41504	11	0.64000	86	1659
6	37.4800	2.39764	24	0.50660	182	2002
7	37.8000	2.37808	33	1.03200	255	9124
8	38.6600	2.32713	10	0.00000	77	0
9	38.9200	2.31218	6	0.00000	48	0
10	39.4800	2.28066	6	0.40000	45	1805
11	41.2497	2.18681	15	0.28850	113	2134
12	43.6600	2.07151	4	0.44000	32	1102
13	44.0016	2.05622	11	0.29670	81	1034
14	44.4000	2.03869	3	0.28000	25	564
15	45.5400	1.99027	7	0.18660	54	911
16	45.9440	1.97370	60	0.34220	461	8736
17	48.8595	1.86253	4	0.32900	34	701
18	51.1893	1.78310	5	0.39470	35	947
19	54.5469	1.68101	18	0.35200	136	2906
20	57.2111	1.60889	21	0.35110	160	2852
21	57.5000	1.60149	8	0.20400	60	756
22	57.8250	1.59326	3	0.17000	23	224
23	64.2400	1.44876	12	0.66000	93	3735
24	67.1983	1.39199	7	0.30330	55	987
25	67.9116	1.37910	4	0.31670	34	600
26	68.3783	1.37082	3	0.26330	24	283
27	68.7366	1.36455	4	0.28670	27	513
28	74.1675	1.27748	4	0.33500	34	827
29	75.5500	1.25750	3	0.38000	26	471
30	76.0600	1.25034	5	0.34000	36	719
31	76.5460	1.24360	20	0.50800	152	4051
32	77.0000	1.23740	13	0.00000	102	0
33	77.4600	1.23120	15	0.36500	115	3698

```
        ***  Basic Data Process  ***

# Data Infomation
        Group              : Standard
        Data               : tp101
        Sample Nmae        : serbuk
        Comment            :
        Date & Time        : 08-24-18 09:55:14

# Measurement Condition
    X-ray tube
        target             : Cu
        voltage            : 40.0 (kV)
        current            : 30.0 (mA)
    Slits
        Auto Slit          : Used
        divergence slit    :   1.00000 (deg)
        scatter slit       :   1.00000 (deg)
        receiving slit     :   0.30000(mm)
    Scanning
        drive axis         : Theta-2Theta
        scan range         :   30.0000 - 80.0000 (deg)
        scan mode          : Continuous Scan
        scan speed         :    2.0000 (deg/min)
        sampling pitch     :    0.0200 (deg)
        preset time        :    0.60 (sec)

# Data Process Condition
    Smoothing              [ AUTO ]
        smoothing points   : 19
    B.G.Subtruction        [ AUTO ]
        sampling points    : 21
        repeat times       : 30
    Ka1-a2 Separate        [ MANUAL ]
        Ka1 a2 ratio       : 50 (%)
    Peak Search            [ AUTO ]
        differential points : 19
        FWHM threhold      : 0.050 (deg)
        intensity threhold : 30 (par mil)
        FWHM ratio  (n-1)/n : 2
    System error Correction [ NO ]
    Precise peak Correction [ NO ]
```

*** Basic Data Process ***

Group : Standard
Data : p101

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	3	31.9179	2.80161	100	0.44180	337	8122
2	39	77.4990	1.23068	86	0.34050	290	5782
3	9	37.7750	2.37959	64	0.55660	214	4778

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	30.8050	2.90025	3	0.29000	10	198
2	31.3600	2.85017	7	0.14000	23	263
3	31.9179	2.80161	100	0.44180	337	8122
4	33.5600	2.66819	3	0.32000	11	299
5	33.9606	2.63763	14	0.37470	47	827
6	34.4200	2.60347	4	0.28000	12	291
7	36.1600	2.48208	3	0.24000	10	196
8	36.9800	2.42890	9	0.44000	32	1297
9	37.7750	2.37959	64	0.55660	214	4778
10	38.2600	2.35053	24	0.80000	80	2712
11	38.6800	2.32597	12	0.00000	39	0
12	38.8600	2.31561	8	0.80000	27	773
13	39.4960	2.27978	16	0.31200	55	838
14	41.1825	2.19023	12	0.40500	41	914
15	43.5600	2.07604	5	0.12000	17	222
16	44.0475	2.05418	54	0.28970	182	2699
17	44.5567	2.03188	3	0.18000	11	161
18	45.9191	1.97472	63	0.43830	212	5301
19	48.8000	1.86466	4	0.28000	13	282
20	51.1700	1.78372	5	0.38000	16	300
21	51.5000	1.77307	4	0.24000	12	141
22	54.5366	1.68130	18	0.44670	61	1620
23	56.7200	1.62165	4	0.24000	12	202
24	57.2753	1.60724	24	0.57730	81	2213
25	57.8800	1.59188	3	0.16000	10	116
26	63.7600	1.45851	6	0.32000	19	657
27	64.3800	1.44595	59	0.31590	200	3064
28	64.7200	1.43917	5	0.26000	18	533
29	67.1900	1.39214	8	0.50000	26	739
30	67.9433	1.37853	8	0.32670	26	416
31	68.3400	1.37149	4	0.28000	14	219
32	68.7788	1.36381	24	0.24960	81	1003
33	69.2453	1.35576	5	0.16270	18	177
34	71.8616	1.31270	3	0.18330	10	152
35	74.1000	1.27848	6	0.36000	19	416
36	75.4950	1.25828	5	0.29000	17	273
37	75.9800	1.25145	6	0.33340	19	419
38	76.4800	1.24451	24	0.56000	81	2956
39	77.4990	1.23068	86	0.34050	290	5782

```
        ***  Basic Data Process  ***

# Data Infomation
        Group               : Standard
        Data                : p101
        Sample Nmae         : serbuk
        Comment             :
        Date & Time         : 08-24-18 09:25:57

# Measurement Condition
    X-ray tube
        target              : Cu
        voltage             : 40.0 (kV)
        current             : 30.0 (mA)
    Slits
        Auto Slit           : Used
        divergence slit     :   1.00000 (deg)
        scatter slit        :   1.00000 (deg)
        receiving slit      :   0.30000(mm)
    Scanning
        drive axis          : Theta-2Theta
        scan range          :   30.0000 - 80.0000 (deg)
        scan mode           : Continuous Scan
        scan speed          :    2.0000 (deg/min)
        sampling pitch      :    0.0200 (deg)
        preset time         :    0.60 (sec)

# Data Process Condition
    Smoothing               [ AUTO ]
        smoothing points    : 25
    B.G.Subtruction         [ AUTO ]
        sampling points     : 27
        repeat times        : 30
    Ka1-a2 Separate         [ MANUAL ]
        Ka1 a2 ratio        : 50 (%)
    Peak Search             [ AUTO ]
        differential points : 23
        FWHM threhold       : 0.050 (deg)
        intensity threhold  : 30 (par mil)
        FWHM ratio  (n-1)/n : 2
    System error Correction [ NO ]
    Precise peak Correction [ NO ]
```

Lampiran 11. Hasil pengukuran nanopartikel perak dengan menggunakan PSA

BECKMAN COULTER

Delsa™ Nano
Common

Condition Summary S/N : 123909

User	: Common	Group	:	Repetition	: 1/1
Date	: 8/14/2018	File Name	: SS - Ag 1_20180814_145558		
Time	: 14:55:58	Sample Information	:		
SOP Name	: Sampel Uji PSA			Security	: No Security

Version 2.31 / 2.03

Measurement Condition

Sampling Time	: N/A	(μs)			
Correlation Channel	: 440	(ch)	Correlation Method	: TD	
Accumulation times	: 30	(times)	Attenuator 1	: 30.38	(%)
Cell Center	: Z : 3.000	(mm)	Pinhole	: 50	(μm)
	X : 7.500	(mm)			
Scattering Angle	: 165.0	(°)	Temperature	: 24.9	(°C)
Diluent Name	: WATER				
Refractive Index	: 1.3328		Viscosity	: 0.8898	(cP)
Intensity	: 8788	(cps)			

Cumulants Results

Mean Diameter (d)	: 76.1	(nm)	Diffusion Constant (D)	: 6.447e-008	(cm²/sec)
Polydispersity Index (P.I.)	: 0.324		Decay Constant (Γ)	: 4080.7	(1/sec)

Fitting Parameter

Analysis Method	: CONTIN						
Histogram Range	: 10.0 - 4000.0	(nm)	Cut	Left	: 0	Right	: 0
Fitting Range	: 1.003 - 2						
Noise Cut Level	: 0.3	(%)					
Residual	: 8.713e-003 [OK]						

BECKMAN COULTER

Delsa™ Nano
Common

Condition Summary S/N : 123909

User	: Common	Group	:	Repetition	: 1/1
Date	: 9/10/2018	File Name	: HS - PVA_20180910_135101		
Time	: 13:51:01	Sample Information	:		
SOP Name	: Sampel Uji PSA			Security	: No Security

Version 2.31 / 2.03

Measurement Condition

Sampling Time	: N/A	(μs)			
Correlation Channel	: 440	(ch)	Correlation Method	: TD	
Accumulation times	: 30	(times)	Attenuator 1	: 65.58	(%)
Cell Center	: Z : 3.000	(mm)	Pinhole	: 50	(μm)
	X : 7.500	(mm)			
Scattering Angle	: 165.0	(°)	Temperature	: 25.0	(°C)
Diluent Name	: WATER				
Refractive Index	: 1.3328		Viscosity	: 0.8878	(cP)
Intensity	: 8096	(cps)			

Cumulants Results

Mean Diameter	(d)	: 78.3	(nm)	Diffusion Constant	(D)	: 6.286e-008	(cm^2/sec)
Polydispersity Index	(P.I.)	: 0.303		Decay Constant	(Γ)	: 3978.8	(1/sec)

Fitting Parameter

Analysis Method	: CONTIN							
Histogram Range	: 10.0 - 4000.0	(nm)	Cut	Left	: 0	Right	: 0
Fitting Range	: 1.003 - 2						
Noise Cut Level	: 0.3	(%)					
Residual	: 1.042e-002 [OK]						

Perhitungan konsentrasi glukosa dalam darah

Diketahui : Kuat arus (y)= 2,67 mA

$$y = 0{,}961x + 0{,}495$$

$$2{,}67 = 0{,}961x + 0{,}495$$

$$x = \frac{2{,}67 - 0{,}495}{0{,}961}$$

$$= 2{,}263 \text{ mM}$$

Faktor pengenceran 10/5=2

Konsentrasi glukosa = 2,263 x 2 = 4,53 mM

4,53 mM = 4,53 mM x Mr

= 4,53 mmol/L x 180 mg/mmol

= 815,4 mg/L

= 81,54 mg/dL

Jadi, konsentrasi glukosa dalam sampel darah berdasarkan analisis dengan sensor berbasis nanopartikel perak adalah 4,53 mM atau 81,54 mg/dL.

Lampiran 12. Perhitungan limit deteksi

y= 0,961x + 0,495

y= 0,184x + 4,016 -

= 0,777x - 3,521

x= $\frac{3,521}{0,777}$

x= 4,53 mM (garis singgung pada fungsi linear Nernstian dan non-Nernstian)

Limit deteksi untuk konsentrasi glukosa yang terukur:

Konsentrasi glukosa (x)	Kuat arus (y)	y_i	$(y-y_i)^2$
1	1,98	1,456	0,275
2	2,34	2,417	0,006
3	2,67	3,378	0,501
4	3,89	4,339	0,201
5	6,01	5,3	0,504
			Σ = 1,487

y_i= nilai x yang dimasukkan dalam persamaam regresi.

$S(y/x)^2 = \frac{\Sigma(y-yi)^2}{n-2} = \frac{1,487}{3}$ = 0,4956 ; S(y/x)= $\sqrt{0,4956}$ = 0,704

eksi= $\frac{3\ S(\frac{y}{x})}{b} = \frac{3\ x\ 0,704}{0,961}$ = 2,19 mM

Lampiran 13. Uji statistik perbedaan hasil pengukuran glukosa darah metode sensor berbasis nanopartikel perak dengan alat *Automated analyzed clinical chemistry*

Pengukuran ke-	Sensor		*Automated analyzed clinical chemistry*
	Kuat arus (mA)	Konsentrasi	
1	2,63	4,442 (79,95 mg/dL	77 mg/dL
2	2,66	4,504 (81,07 mg/dL)	77 mg/dL
3	2,71	4,608 (82,94 mg/dL)	77 mg/dL
Rata-rata	2,67	4,53 (81,54 mg/dL)	77 mg/dL

Diketahui;

$\bar{x}_1$= 81,54 n_1= 3

$\bar{x}_2$= 77 n_2= 3

Ditanyakan;

H_0= Ada perbedaan yang bermakna antara hasil pemeriksaan glukosa darah metode sensor berbasis nanopartikel perak dengan alat *Automated analyzed clinical chemistry*

H_a= Tidak ada perbedaan yang bermakna antara hasil pemeriksaan glukosa darah metode sensor berbasis nanopartikel perak dengan alat *Automated analyzed clinical chemistry*

Kriteria penerimaan dan penolakan yaitu H_0 diterima bila $t_{hitung} < t_{tabel}$ dan sebaliknya H_a ila $t_{hitung} > t_{tabel}$

Penyelesaian;

$$\bar{S} = \sqrt{\frac{\Sigma\,(x_i - \bar{x})^2}{n}}$$

$$\bar{S}_{\text{sensor}} = \sqrt{\frac{\Sigma\,(x_i - \overline{x_1}}{n}}$$

$$= \sqrt{\frac{(79.95-81{,}54)^2 + (81.07-81{,}54)^2 + (82{,}94-81{,}54)^2}{3}}$$

= 1,252

$$\bar{S}_2 = \sqrt{\frac{\Sigma\,(x_i - \overline{x_2}}{n}}$$

$$= \sqrt{\frac{(77-77)^2 + (77-77)^2 + (77-77)^2}{3}}$$

= 0

$$\overline{S_{gabungan}} = \sqrt{\frac{(n_1+1)\overline{S_1}^2 + (n_2+1)\overline{S_2}^2}{n_1+n_2-2}}$$

$$= \sqrt{\frac{(3+1)(1{,}252)^2 + (3+1)(0)^2}{3+3-2}}$$

= 1,251

Uji t

$$\frac{\overline{X_1} + \overline{X_2}}{ab\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$= \frac{81{,}54-77}{1{,}251\sqrt{\frac{1}{3}+\frac{1}{3}}}$$

= 4,45

Menunjukkan bahwa t_{hitung} 4,45 > t_{tabel} 2,13 dengan tingkat kepercayaan 95% maka H_a diterima.

Untuk data pada pengujian 1

Pengukuran ke-	Kuat arus	Konsentrasi	*Automated analyzed clinical chemistry*
1	0,60	0,218 (3,924 mg/dL)	77 mg/dL
2	3,10	5,421(97,57 mg/dL)	77 mg/dL
3	3,53	6,3 (113,4 mg/dL)	77 mg/dL
Rata-rata	2,41	71,71 mg/dL	77 mg/dL

Diketahui;

$\bar{x}_1$= 71,71 n_1= 3

$\bar{x}_2$= 77 n_2= 3

Ditanyakan;

H_0= Ada perbedaan yang bermakna antara hasil pemeriksaan glukosa darah metode sensor berbasis nanopartikel perak dengan alat *Automated analyzed clinical chemistry*

H_a= Tidak ada perbedaan yang bermakna antara hasil pemeriksaan glukosa darah metode sensor berbasis nanopartikel perak dengan alat *Automated analyzed clinical chemistry*

Kriteria penerimaan dan penolakan yaitu H_0 diterima bila $t_{hitung} < t_{tabel}$ dan sebaliknya H_a diterima bila $t_{hitung} > t_{tabel}$

Penyelesaian;

$$\bar{S} = \sqrt{\frac{\Sigma\,(x_i - \bar{x})^2}{n}}$$

$$\bar{S}_{sensor} = \sqrt{\frac{\Sigma\,(x_i - \overline{x_1}}{n}}$$

$$= \sqrt{\frac{(3{,}924-71{,}71)^2 + (97{,}57-71{,}71)^2 + (113{,}4-71{,}71)^2}{3}}$$

= 48,303

$$\bar{S}_2 = \sqrt{\frac{\Sigma\,(x_i - \overline{x_2}}{n}}$$

$$= \sqrt{\frac{(77-77)^2 + (77-77)^2 + (77-77)^2}{3}}$$

= 0

$$\overline{S_{gabungan}} = \sqrt{\frac{(n_1+1)\overline{S_1}^2 + (n_2+1)\overline{S_2}^2}{n_1+n_2-2}}$$

$$\sqrt{\frac{(3+1)(48{,}303)^2 + (3+1)(0)^2}{3+3-2}}$$

8,303

Uji t

Uji t= $\frac{\overline{X_1}+\overline{X_2}}{S_{gab}\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$

$= \frac{71,71-77}{48,303\sqrt{\frac{1}{3}+\frac{1}{3}}}$

= -0,134

Menunjukkan bahwa t_{hitung} -0,134 < t_{tabel} 2,13 dengan tingkat kepercayaan 95% maka H_0 diterima.

Lampiran 14. Dokumentasi penelitian