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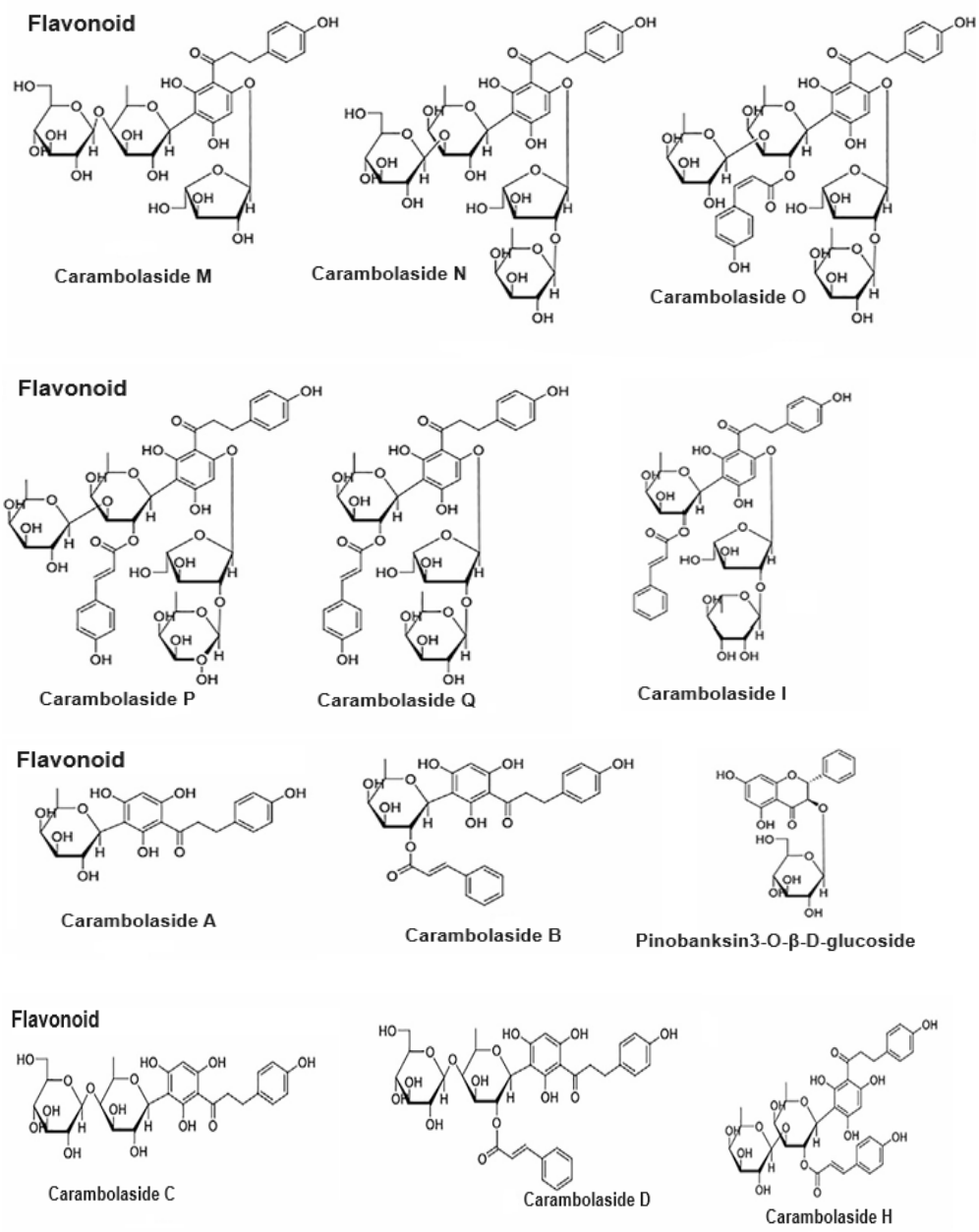
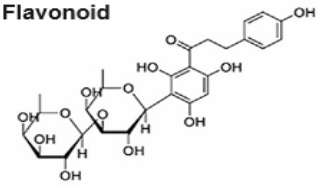
Lampiran 1. Senyawa yang terkandung pada buah belimbing *Averrhoa carambola* Linn (Luan et al., 2021)



Flavonoid



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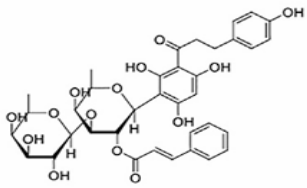

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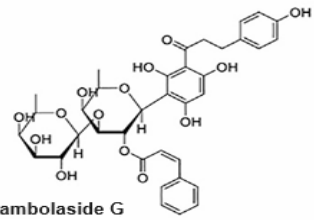

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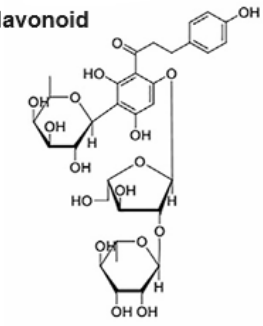

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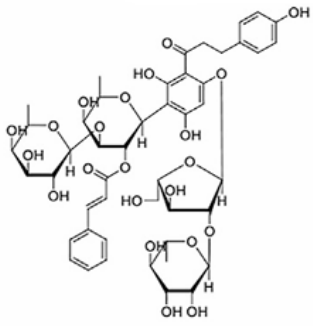

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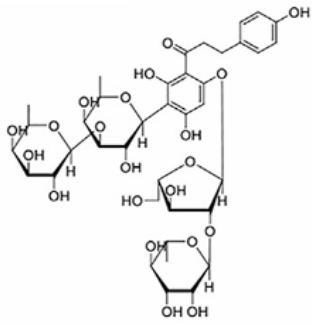
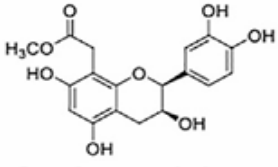
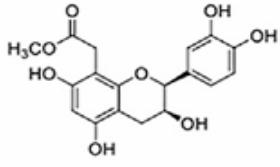


Carambolaside Ja

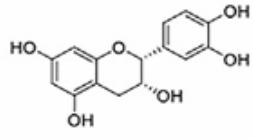
Flavonoid



8-carboxymethyl-(+)-epicatechinmethylester

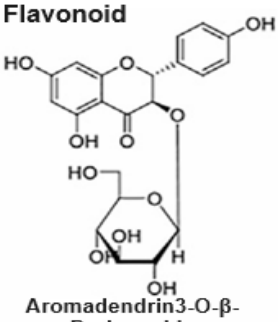


(+)-Epicatechin



(–)-Epicatechin

Flavonoid



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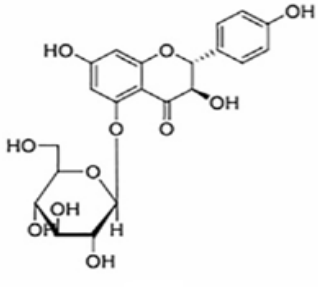

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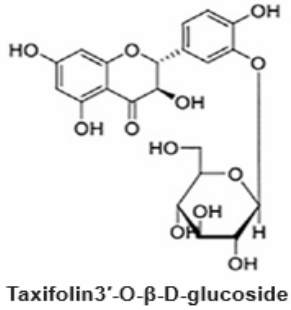
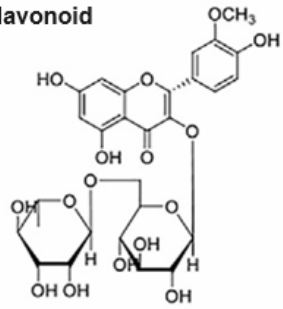
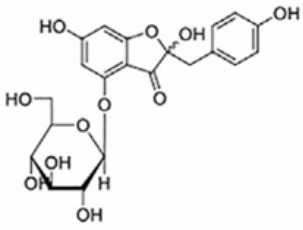


Taxifolin3′-O-β-D-glucoside

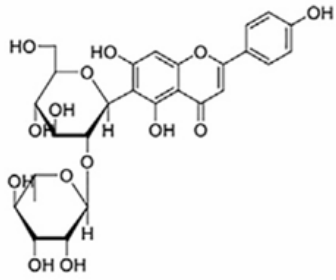
Flavonoid



Isorhamnetin3-O-rutinoside

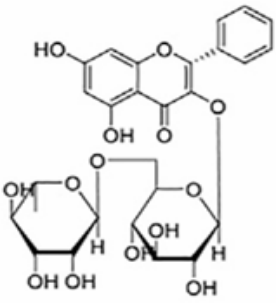


Hovertichoside C

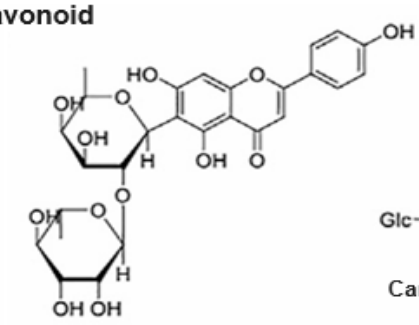


Isovitexin2″-O-α-L-rhamnopyranoside

Flavonoid

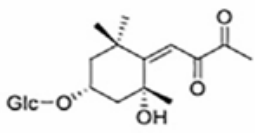


Norathyriol

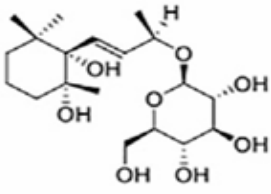


Carambolaflavone

Terpen

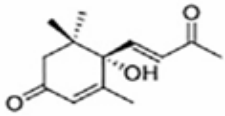


CannabisideD

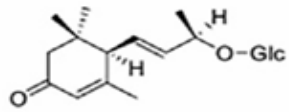


(5R,6S,7E,9R)-5,6,9-trihydroxy-7-megastigmene9-O-β-D-glucoside

Terpen

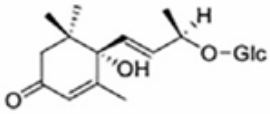


Drovomifoliol

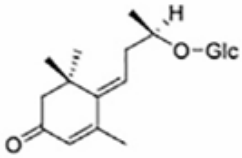


3-oxo-α-ionol-9-O-β-D-glucoside

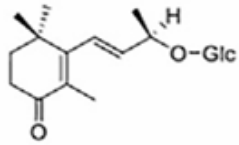
Terpen



Roseoside



3-oxo-9-O-β-D-glucosyloxy-4,6E-megastigmadien



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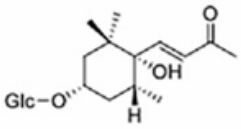
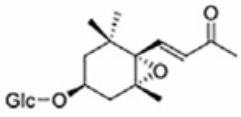
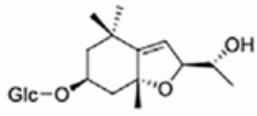


Dendranthemoside B

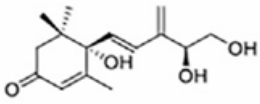


Icariside

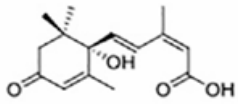


Officinoside A

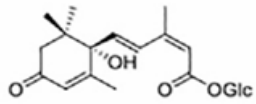
Terpen



6S,7E,10S)-$\Delta^{9,15}$-10-hydroxyabscisic alcohol

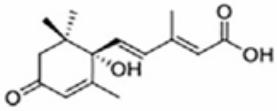


Abscisic acid

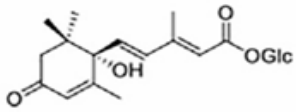


Abscisyl β-D-glucoside

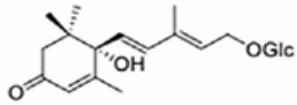
Terpen



9E-abscisic acid

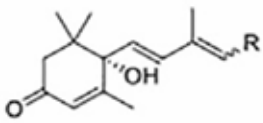


9E-abscisyl β-D-glucoside



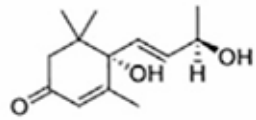
9E-abscisic alcohol β-D-glucoside

Terpen



68-70, 72-73, 75

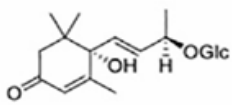
	R
68	*cis*-COOH
69	*tran*-COOH
70	*tran*-CH_2OH
72	*cis*-COOGlc
73	*tran*-CH_2OGlc
75	*cis*-CH_2OGlc



(6S,9R)-vomifoliol

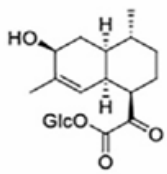
68 cis-abscisic acid
69 trans-abscisic acid
70 trans-abscisic alcohol

72 cis-abscisic acid β-D-glucopyranosyl ester
73 trans-abscisic alcohol β-D-glucopyranoside
75 cis-abscisic alcohol β-D-glucopyranoside

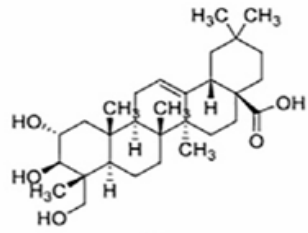


(6S,9R)-roseoside

Terpen

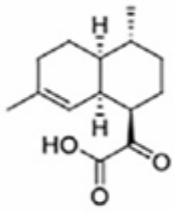


3-β-hydroxyartemisinic acid β-D-glucopyranosyl ester

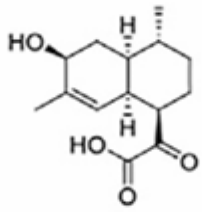


Arjunolic acid

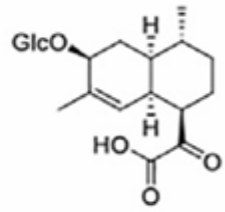
Terpen



Artemisinic acid

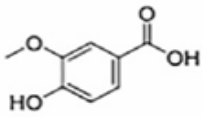


3-β-hydroxyartemisinic acid

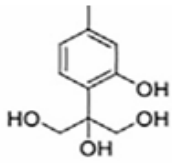


Artemisinicacid3-β-O-β-D-glucopyranoside

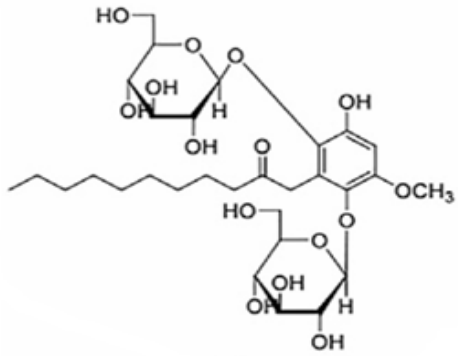
Fenolik



Vanillic acid

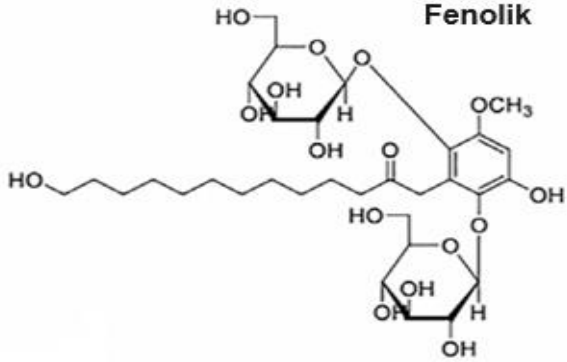


8,9,10-trihydroxythymol

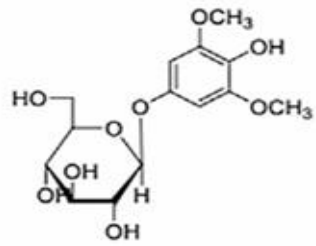


Carambolaside K

Fenolik

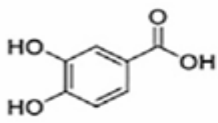


Carambolaside L

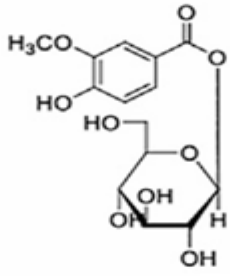


Koaburaside

Fenolik

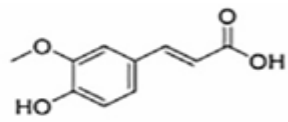


Protocatechuic acid

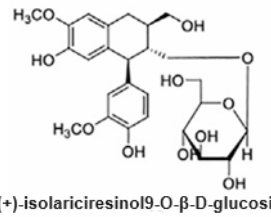


1-O-vanilloyl-β-D-glucose

Fenilpropanoid

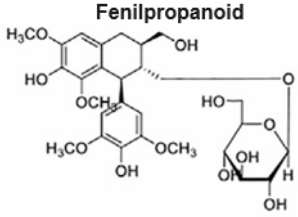


Ferulic acid

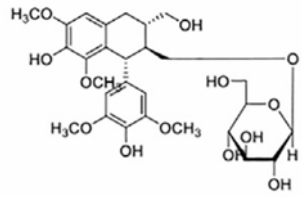


(+)-isolariciresinol9-O-β-D-glucoside

Fenilpropanoid

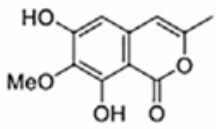


(+)-lyoniresinol9-O-β-D-glucoside

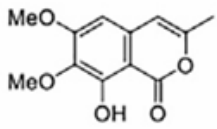


(−)-lyoniresinol9-O-β-D-glucoside

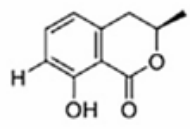
Fenilpropanoid



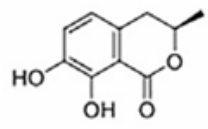
Reticulol



6-O-methyl-reticulol

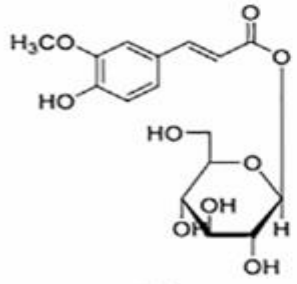


5-methylmellein

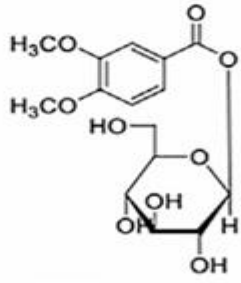


7-hydroxy-5-methylmellein

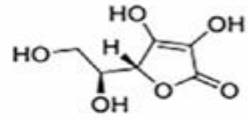
Fenilpropanoid



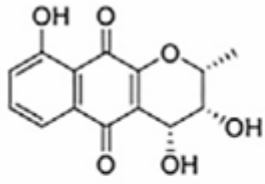
1-O-feruloyl-β-D-glucose



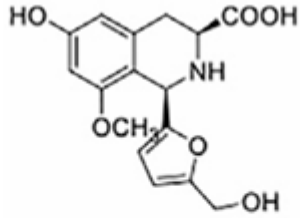
Tecomin



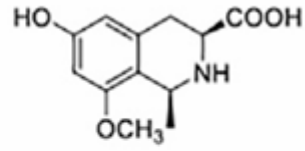
L-ascorbic acid



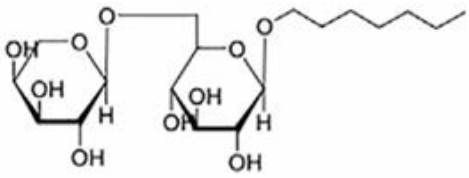
(+)-cryptosporin



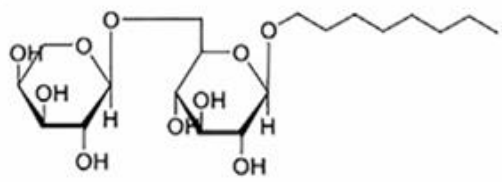
(1R*,3S*)-1-(5-hydroxymethylfuran-2-yl)-3-carboxy-6-hydroxy-8 methoxyl-1,2,3,4-tetrahydroisoquinoline



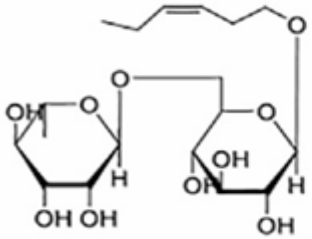
(1S*,3S*)-1-methyl-3-carboxy-6-hydroxy-8-methyoxyl-1,2,3,4 tetrahydroisoquinoline



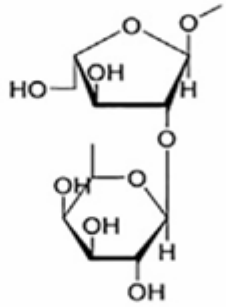
Heptyl vicianoside



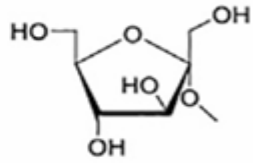
Octyl vicianoside



cis-3-hexenyl rutinoside



Methyl 2-O-β-D-fucopyranosyl-α-L-arabinofuranoside



Methyl α-D-fructofuranoside

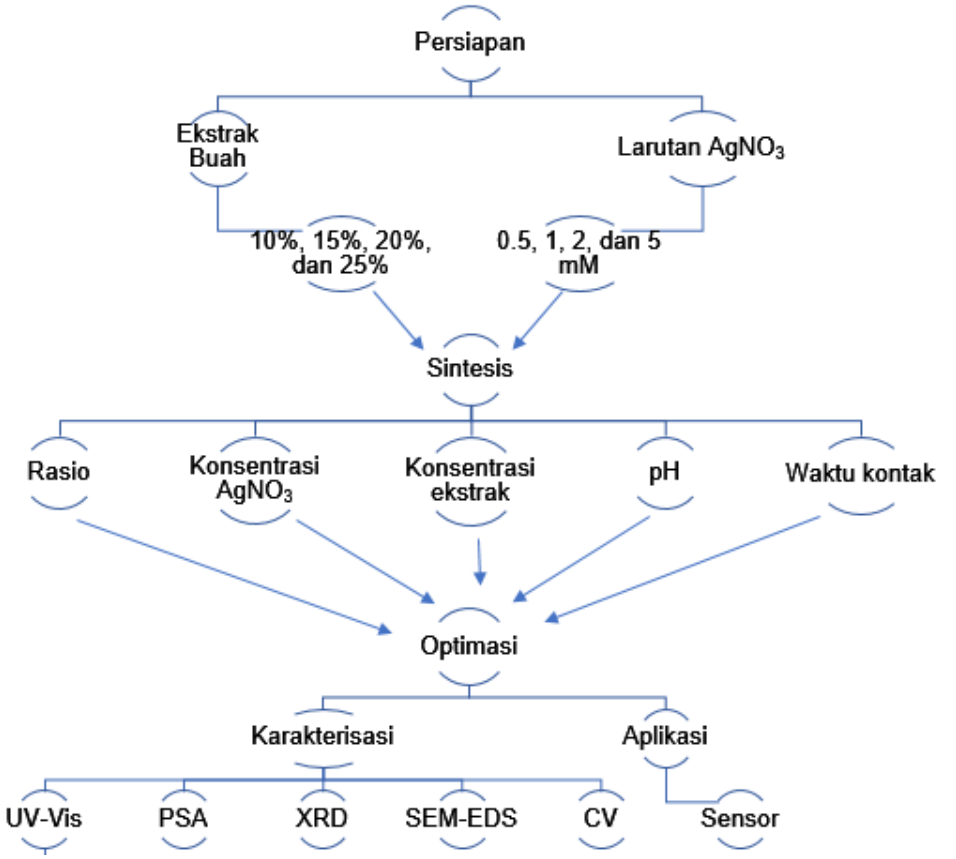
Lampiran 2. Aplikasi nanopartikel perak dengan penggunaan beberapa tanaman

No.	Tanaman	Aplikasi	Referensi
1.	Kulit buah *Musa paradisiaca*	Antimikroba	Ibrahim, 2015
2.	Daun *Talinum triangulare*	Antimikroba dan antioksidan	Elemike et al., 2016
3.	*Linum usitatissimum* L.	Antimikroba	Abbasi dan Anjum, 2016
4.	Bawang bombai	Sensor asam askorbat	Khalilzadeh dan Borzoo, 2016
5.	Kulit batang *Prosopis juliflora*	Antimikroba dan reduksi katalitik	Arya et al., 2017
6.	Buah *Terminalia bellirica*	Antibakteri dan reduksi katalitik	Patil et al., 2017
7.	Daun *Salvia leriifolia*	Antibakteri dan sensor nitrit	Baghayeri et al., 2017
8.	Kulit buah *Musa Paradisiaca* L.	Antifotooksidasi	Colling et al., 2018
9.	Daun *Ocimum tenuiflorum*	Sensor glukosa	Dayakar et al., 2018
10.	Buah *Ficus carica* L.	Antioksidan dan sitotoksis	Faidah, 2019
11.	Akar *Arctium lappa*	Antimikroba dan fotodegradasi	Nguyen et al., 2018
12.	Bunga *Cassia angustifolia*	Sitotoksis dan antioksidan	Bharathi dan Bhuvaneshwari, 2018
13.	Daun oak	Sensor H_2O_2	Hemmati et al., 2018
14.	Daun *Muntingia calabura* L.	Sensor glukosa	Wahab et al., 2018
15.	*Avicennia marina*	Antibakteri	Johansyah, 2018
16.	Daun *Ocimum Sanctum* L.	Fotodegradasi zat warna metilen biru	Bere et al., 2019
17.	Buah *Cinnamomum camphora*	Antifungi	Huang et al., 2019
18.	Bunga *Rosa damascena*	Sensor vanilin dan H_2O_2	Dodevska et al., 2019
19.	Buah *Myrmecodia Pendans*	Sensor glukosa	Maarebia, 2019
20.	Buah *Phoenix dactylifera*	Antimikroba dan sitotoksis	Zafar dan Zafar, 2019
21.	Buah *Cordia obliqua Willd*	Antimikroba dan reduksi katalitik	Saidu et al., 2019
22.	Daun *Ageratum conyzoides L.*	Antioksidan, sensor H_2O_2	Chandraker et al., 2019
23.	Daun *Cucumis prophetarum*	Antibakteri dan antikanker	Hemlata et al., 2020

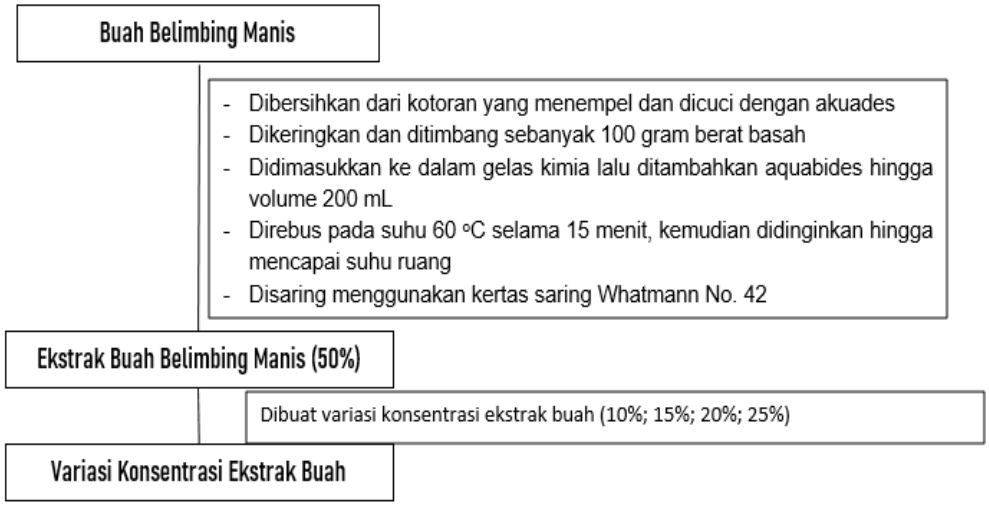
24.	Bunga *Clitoria ternatea* L.	Inhibitor enzim α-amilase	Cahyani, 2020
25.	Buah *Crescentia cujete*	Antimikroba	Legaspi dan Fundador, 2020
26.	Bunga *Aerva lanata*	Antibakteri dan sitotoksis	Kanniah et al., 2020
27.	Batang *Opuntia ficus*	Sensor glukosa	Khalifa et al., 2020
28.	Buah *Piper retrofractum Vahl*	Antibakteri	Amaliyah et al., 2021
29.	Daun *Tamarix articulata*	Antioksidan	Anwar et al., 2021
30.	Daun *Ziziphus mauritiana* L.	Sensor dopamin	Memon et al., 2021
31.	Buah *Diospyros malabarica*	Antimikroba, antikanker, dan reduksi katalitik	Bharadwaj et al., 2021
32.	Batang *Terminalia brownii*	Antiinflamasi dan sitotoksis	Berihu et al., 2021
33.	Daun *Terminalia catappa*	Fotodegradasi zat warna metilen biru	Siregar dan Yanuar, 2021
34.	Akar *Asparagus officinalis*	Antibakteri dan sitotoksis	Tripathi et al., 2021
35.	Buah *Cupressus sempervirens* L.	Antioksidan	Turunc et al., 2021
36.	Daun V*ernonia amygdalina*	Sensor glukosa	Jamaluddin, 2021
37.	Daun *Muntingia calabura* L.	Sensor H_2O_2	Rizqi dan Alauhdin, 2021
38.	Kulit buah *Citrus macroptera*	Reduksi katalitik	Saha et al., 2021
39.	*Eucheuma cottonii*	Antioksidan	Shonhaji, 2021
40.	Daun *Abelmoschus esculentus*	Sensor glukosa	Roddu, 2021
41.	Buah *Araucaria angustifolia*	Sensor parasetamol	Zamarchi et al., 2021
42.	Daun *Moringa oleifera*	Antibakteri	Asif et al., 2022
43.	Daun *Amaranthus spinosus*	Sensor glukosa	Mamuru et al., 2022
44.	Daun *Eucalyptus camaldulensis*	Antimikroba dan sitotoksis	Liaqat et al., 2022
45.	Daun *Syzigium aromaticum*	Anti *Lichen* pada batuan	Asysyafiiyah, 2022
46.	Kulit buah *Citrus microcarpa*	Antioksidan	Masykuroh dan Abna, 2022
47.	Daun dan akar *Strobilanthes glutinosus*	Antibakteri dan antioksidan	Javed et al., 2023
48.	Buah *Rhamnus prinioides*	Antibakteri	Solomon, 2023

49.	Buah *Phyllanthus reticulatus*	Sensor nikotin	Sridharan et al., 2023
50.	Buah olive	Antibakteri dan antioksidan	Ullah et al., 2023
51.	Batang *Musa acuminata*	Sensor glukosa	Zalke et al., 2023
52.	Daun *Rubus discolor*	Antibakteri dan antikanker	Ghasemi et al., 2024

Lampiran 3. Diagram alur penelitian



Lampiran 4. Bagan kerja preparasi ekstrak buah



Lampiran 5. Perhitungan larutan $AgNO_3$

a. Larutan induk $AgNO_3$ 5 mM
   Massa = M x L x BM
   = 0,005 mol/L x 0,5 L x 170 g/mol
   = 0,425 gram

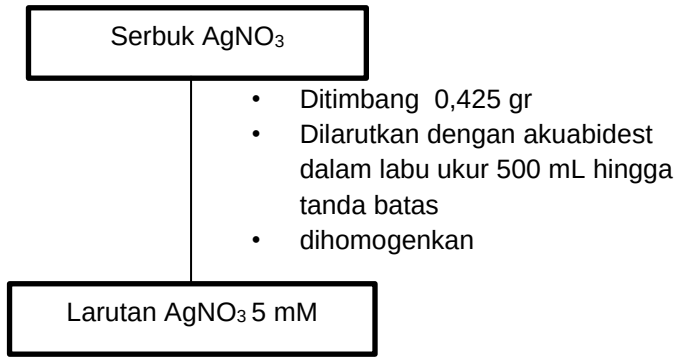
   Larutan induk $AgNO_3$ 1 mM
   Massa = M x L x BM
   = 0,001 mol/L x 1 L x 170 g/mol
   = 0,17 gram

b. Larutan standar $AgNO_3$ 2 mM
   $M_1V_1 = M_2V_2$
   5 mM x V_1 = 2 mM x 50 mL
   V_1= 20 mL

c. Larutan standar $AgNO_3$ 1 mM
   $M_1V_1 = M_2V_2$
   5 mM x V_1 = 1 mM x 50 mL
   V_1= 10 mL

d. Larutan standar $AgNO_3$ 0,5 mM
   $M_1V_1 = M_2V_2$
   5 mM x V_1 = 0,5 mM x 50 mL
   V_1= 5 mL

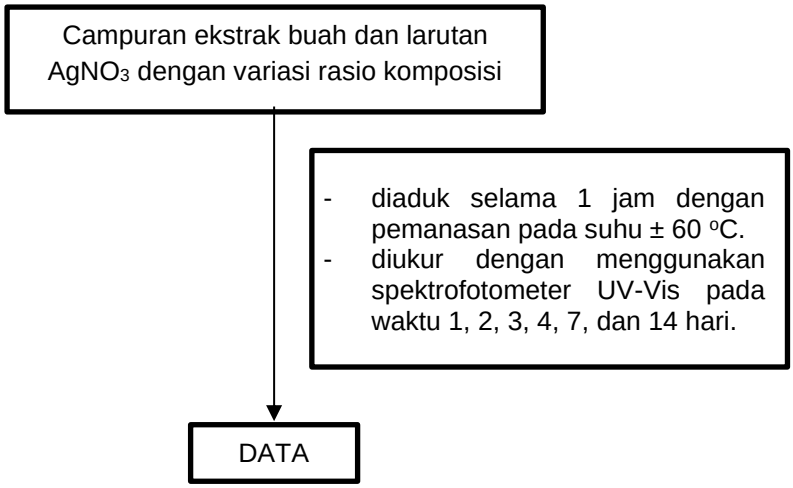
Lampiran 6. Bagan kerja pembuatan larutan $AgNO_3$



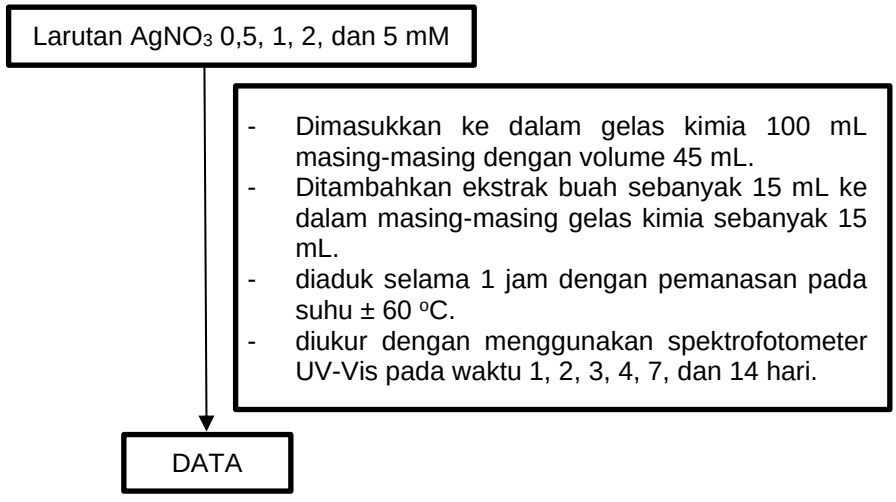
Lampiran 7. Bagan kerja optimasi rasio ekstrak buah terhadap larutan $AgNO_3$

Tabel rasio ekstrak buah (20%) terhadap larutan $AgNO_3$ 1 mM

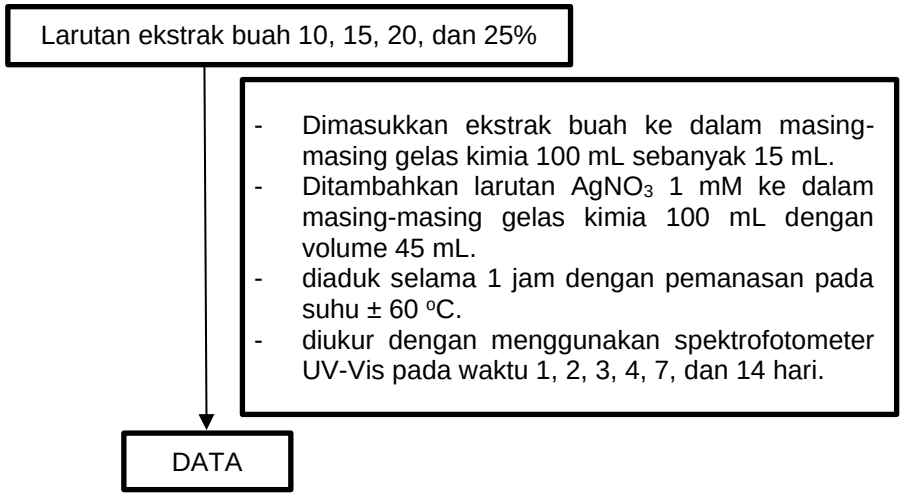
Rasio	Volume Ekstrak (mL)	Volume $AgNO_3$ 1 mM (mL)
1:3	15	45
1:2	20	40
1:1	30	30
2:1	20	40



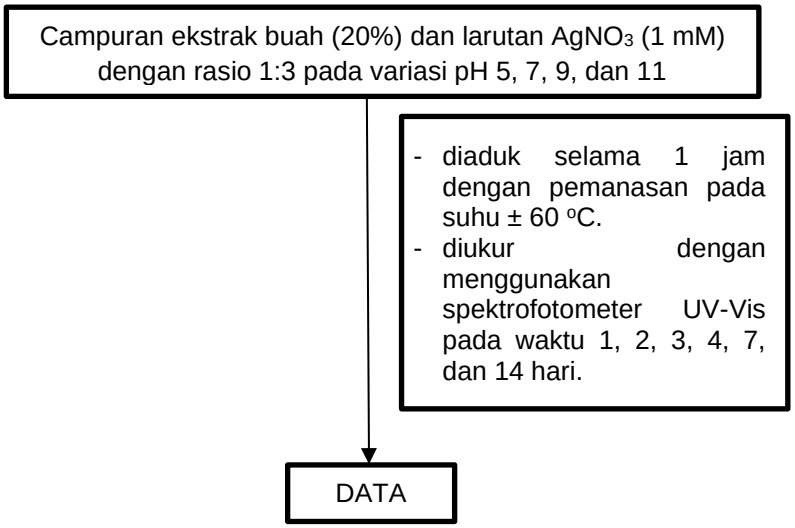
Lampiran 8. Bagan kerja optimasi konsentrasi $AgNO_3$



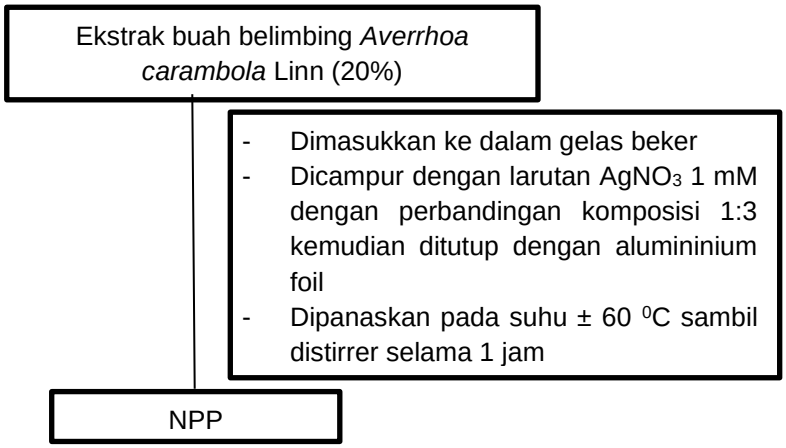
Lampiran 9. Bagan kerja optimasi konsentrasi ekstrak buah



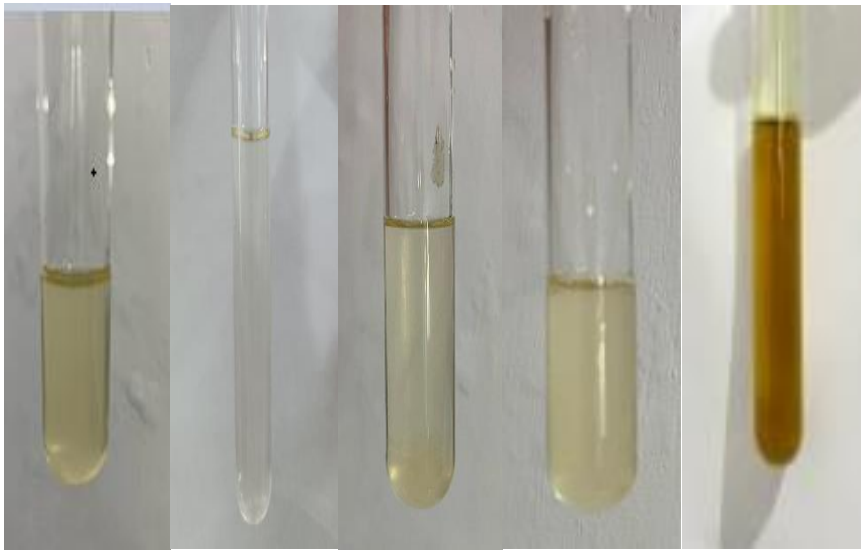
Lampiran 10. Bagan kerja optimasi pH



Lampiran 11. Bagan kerja sintesis nanopartikel perak (NPP)



Lampiran 12. Hasil uji fitokimia ekstrak buah belimbing manis



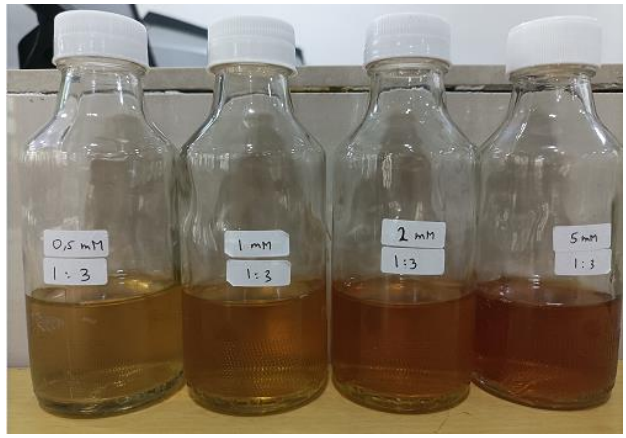
Uji Flavonoid Uji saponin Uji Steroid Uji Terpenoid Uji Tanin

Lampiran 13. Hasil optimasi nanopartikel perak

a. Optimasi perbandingan komposisi

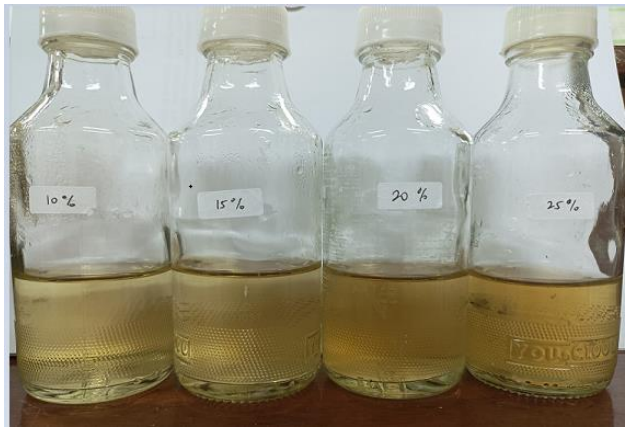
Gambar. Hasil optimasi perbandingan komposisi

b. Optimasi konsentrasi $AgNO_3$



Gambar. Hasil optimasi konsentrasi $AgNO_3$

c. Optimasi Ekstrak



Gambar. Hasil optimasi ekstrak

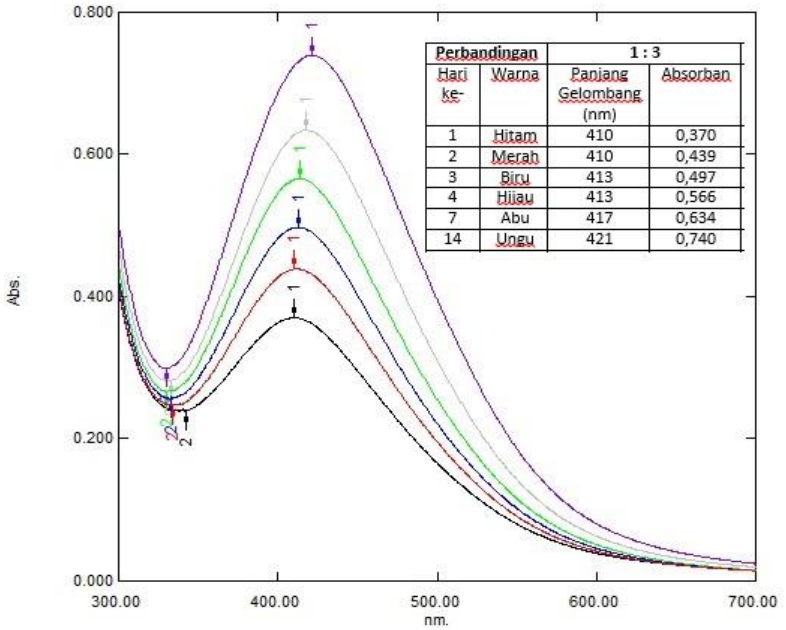
d. Optimasi pH

Gambar. Hasil optimasi pH

Lampiran 14. Hasil pengukuran optimasi NPP dengan spektrofotometer UV-Vis

1. Perbandingan komposisi

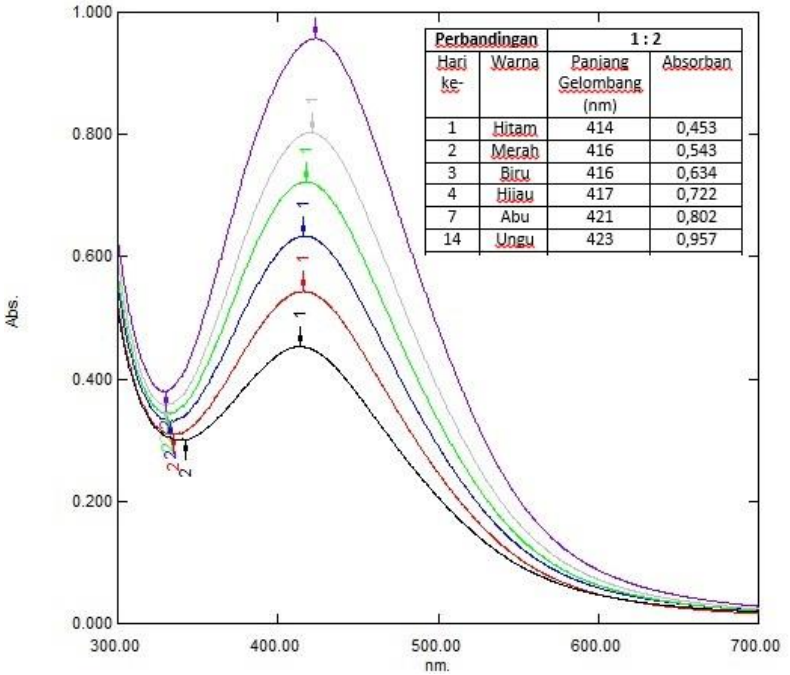
a.



Perbandingan		1 : 3	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	410	0,370
2	Merah	410	0,439
3	Biru	413	0,497
4	Hijau	413	0,566
7	Abu	417	0,634
14	Ungu	421	0,740

Gambar. Spektrum UV-Vis nanopartikel perak komposisi 1:3

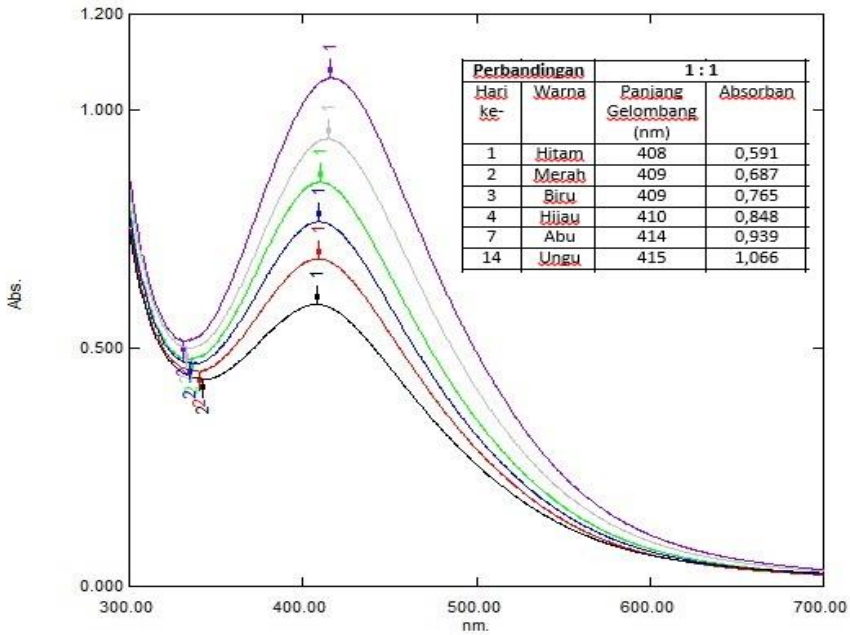
b.



Perbandingan		1 : 2	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	414	0,453
2	Merah	416	0,543
3	Biru	416	0,634
4	Hijau	417	0,722
7	Abu	421	0,802
14	Ungu	423	0,957

Gambar. Spektrum UV-Vis nanopartikel perak komposisi 1:2

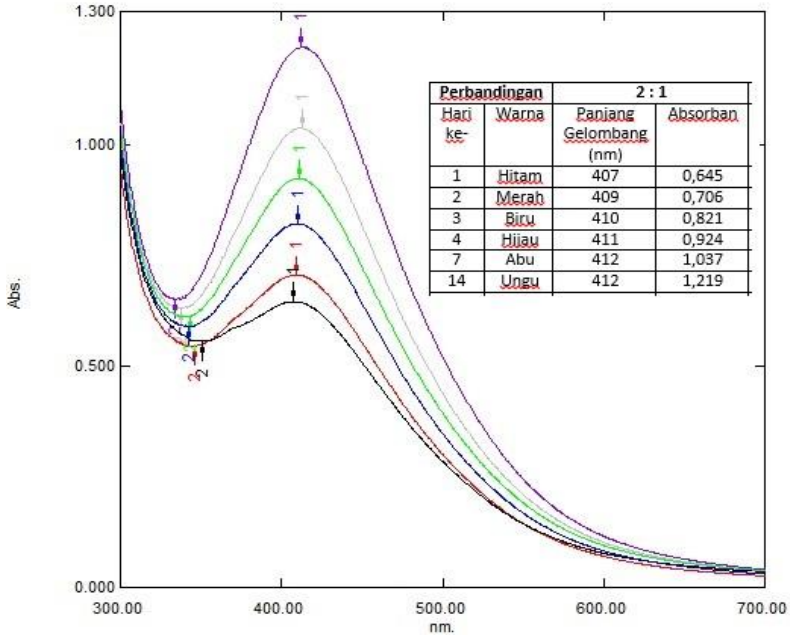
c.



Perbandingan		1 : 1	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	408	0,591
2	Merah	409	0,687
3	Biru	409	0,765
4	Hijau	410	0,848
7	Abu	414	0,939
14	Ungu	415	1,066

Gambar. Spektrum UV-Vis nanopartikel perak komposisi 1:1

d.

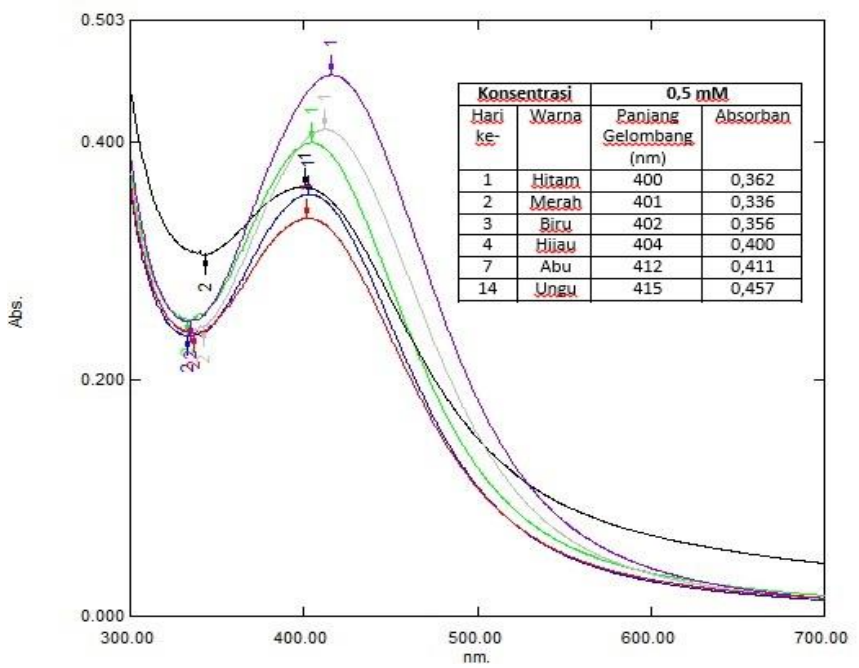


Perbandingan		2 : 1	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	407	0,645
2	Merah	409	0,706
3	Biru	410	0,821
4	Hijau	411	0,924
7	Abu	412	1,037
14	Ungu	412	1,219

Gambar. Spektrum UV-Vis nanopartikel perak 2:1

2. Perbandingan konsentrasi larutan $AgNO_3$

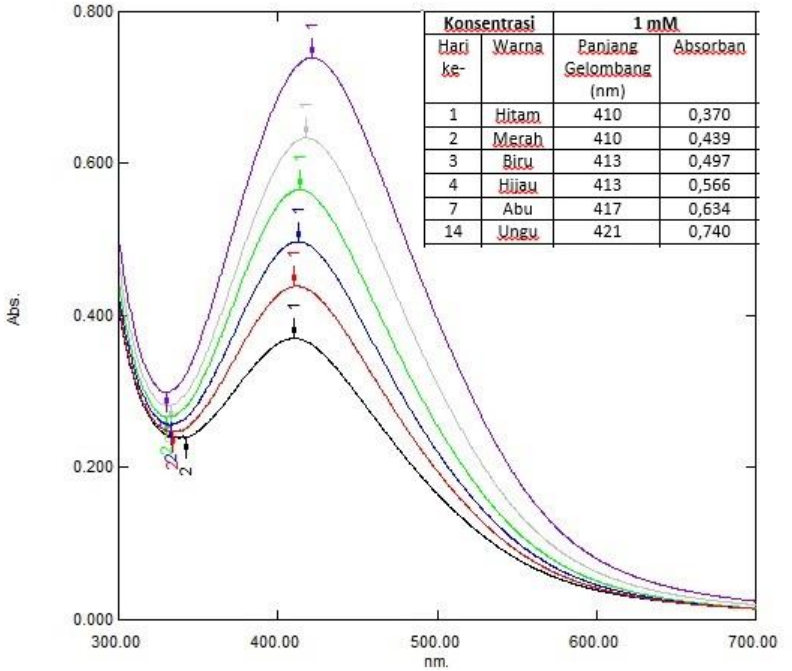
a.



Konsentrasi		0,5 mM	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	400	0,362
2	Merah	401	0,336
3	Biru	402	0,356
4	Hijau	404	0,400
7	Abu	412	0,411
14	Ungu	415	0,457

Gambar. Spektrum UV-Vis nanopartikel perak larutan $AgNO_3$ 0,5 mM

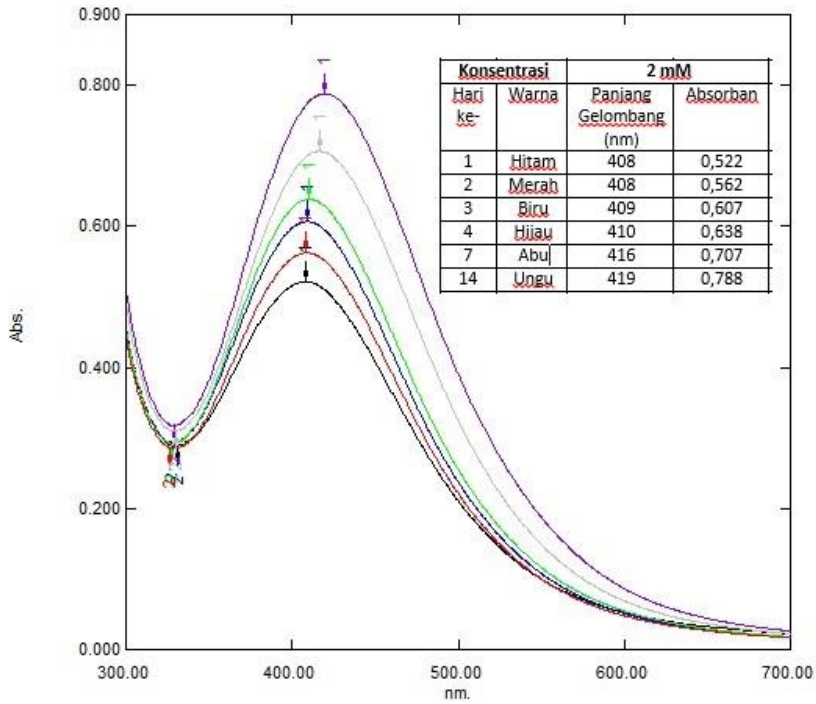
b.



Konsentrasi		1 mM	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	410	0,370
2	Merah	410	0,439
3	Biru	413	0,497
4	Hijau	413	0,566
7	Abu	417	0,634
14	Ungu	421	0,740

Gambar. Spektrum UV-Vis nanopartikel perak larutan $AgNO_3$ 1 mM

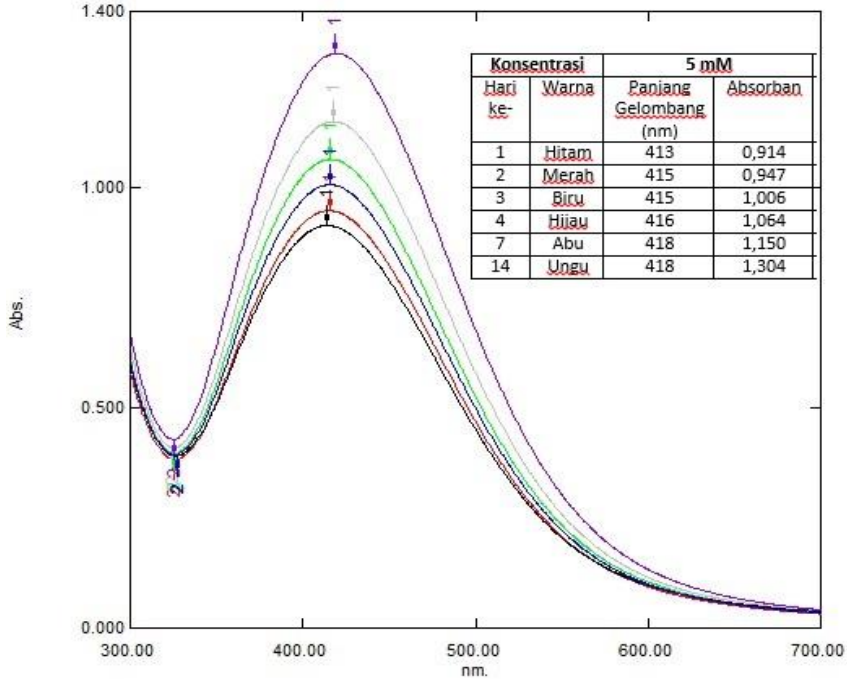
c.



Konsentrasi		2 mM	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	408	0,522
2	Merah	408	0,562
3	Biru	409	0,607
4	Hijau	410	0,638
7	Abu	416	0,707
14	Ungu	419	0,788

Gambar. Spektrum UV-Vis nanopartikel perak larutan $AgNO_3$ 2 mM

d.

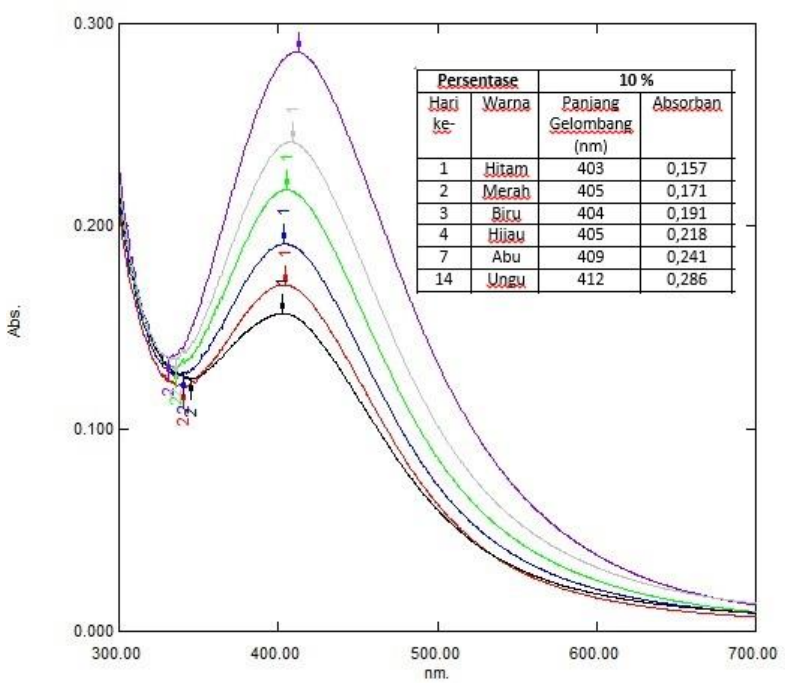


Konsentrasi		5 mM	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	413	0,914
2	Merah	415	0,947
3	Biru	415	1,006
4	Hijau	416	1,064
7	Abu	418	1,150
14	Ungu	418	1,304

Gambar. Spektrum UV-Vis nanopartikel perak larutan $AgNO_3$ 5 mM

2. Perbandingan konsentrasi ekstrak

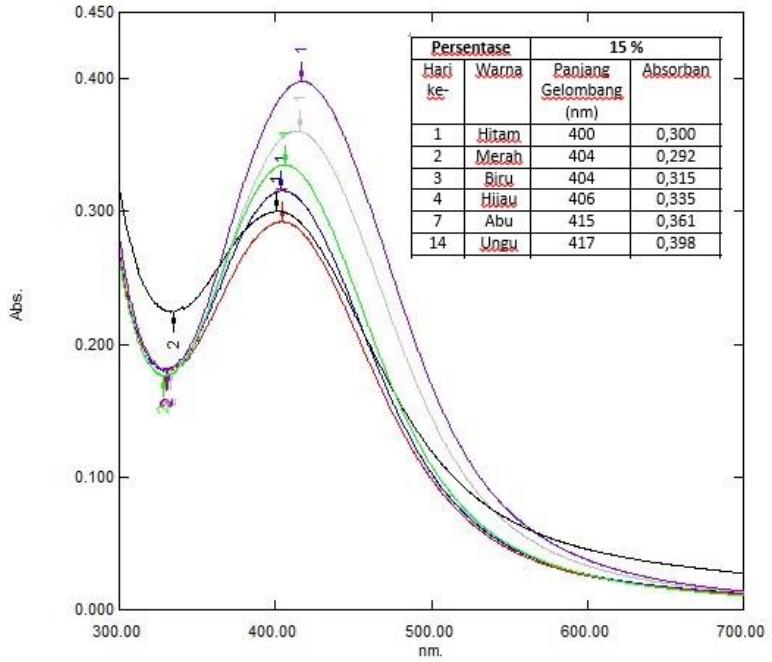
a.



Persentase		10 %	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	403	0,157
2	Merah	405	0,171
3	Biru	404	0,191
4	Hijau	405	0,218
7	Abu	409	0,241
14	Ungu	412	0,286

Gambar. Spektrum UV-Vis nanopartikel perak dengan ekstrak 10 %

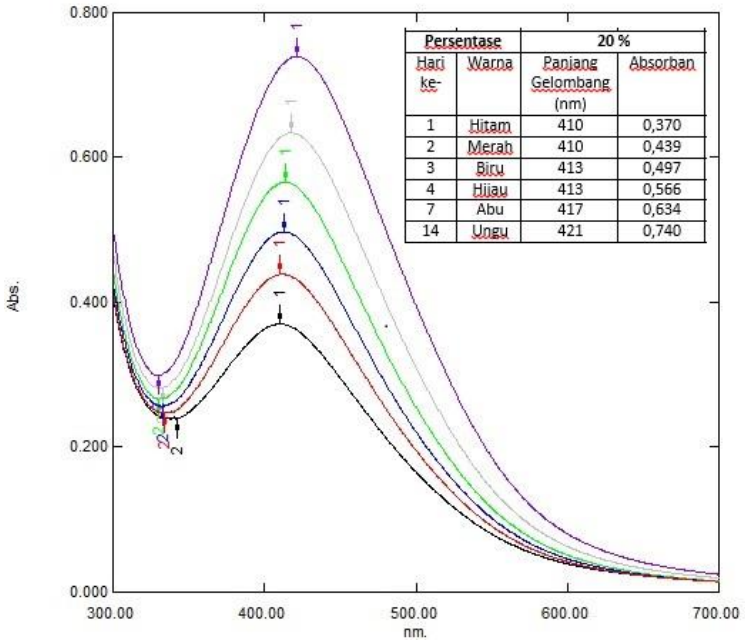
b.



Persentase		15 %	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	400	0,300
2	Merah	404	0,292
3	Biru	404	0,315
4	Hijau	406	0,335
7	Abu	415	0,361
14	Ungu	417	0,398

Gambar. Spektrum UV-Vis nanopartikel perak dengan ekstrak 15 %

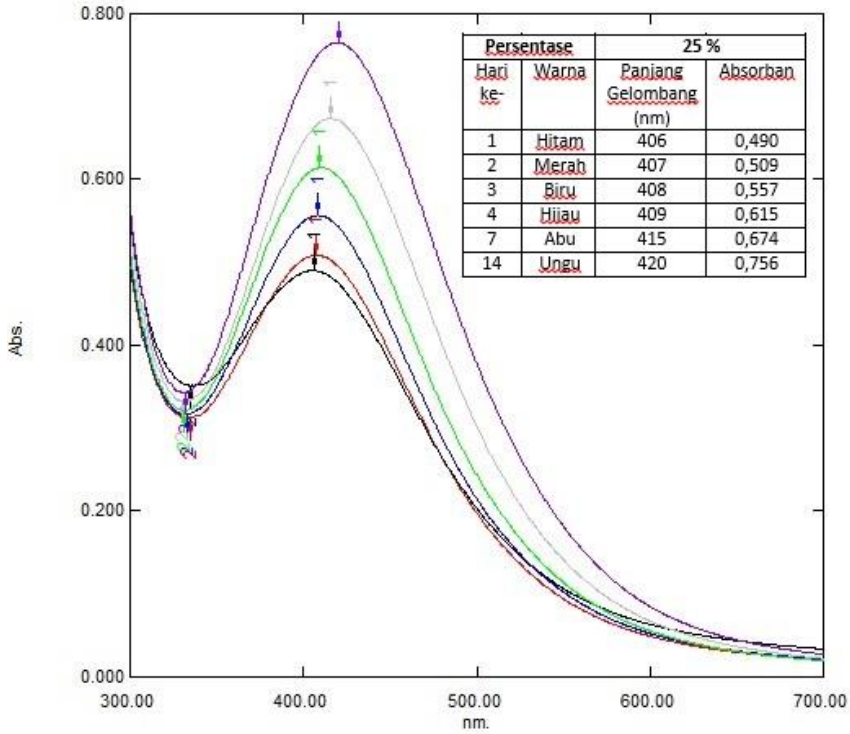
c.



Persentase		20 %	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	410	0,370
2	Merah	410	0,439
3	Biru	413	0,497
4	Hijau	413	0,566
7	Abu	417	0,634
14	Ungu	421	0,740

Gambar. Spektrum UV-Vis nanopartikel perak dengan ekstrak 20 %

d.

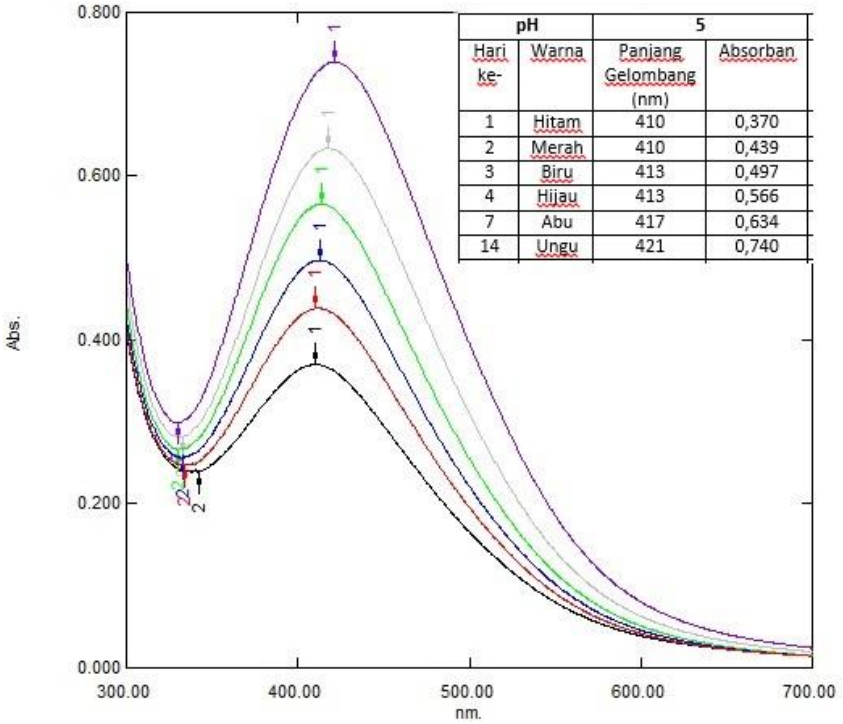


Persentase		25 %	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	406	0,490
2	Merah	407	0,509
3	Biru	408	0,557
4	Hijau	409	0,615
7	Abu	415	0,674
14	Ungu	420	0,756

Gambar. Spektrum UV-Vis nanopartikel perak dengan ekstrak 25 %

2. Perbandingan kondisi pH

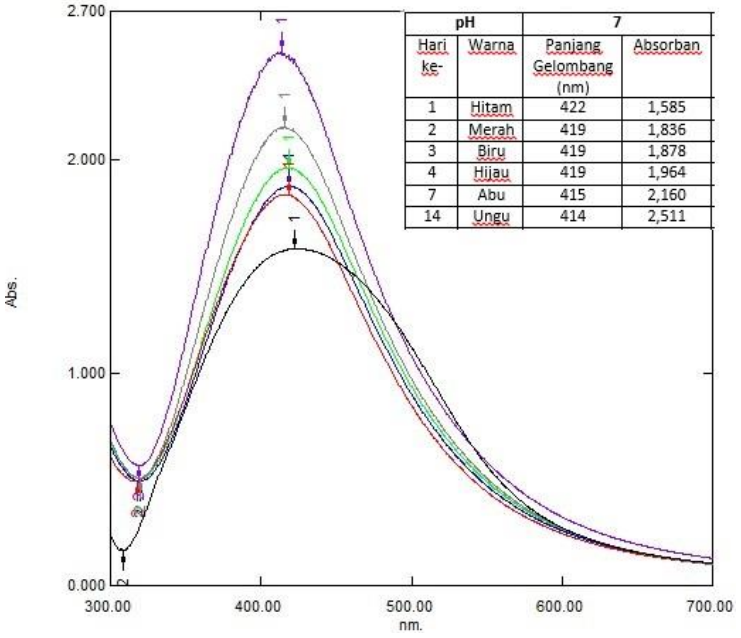
a.



pH		5	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	410	0,370
2	Merah	410	0,439
3	Biru	413	0,497
4	Hijau	413	0,566
7	Abu	417	0,634
14	Ungu	421	0,740

Gambar. Spektrum UV-Vis nanopartikel perak dengan pH 5

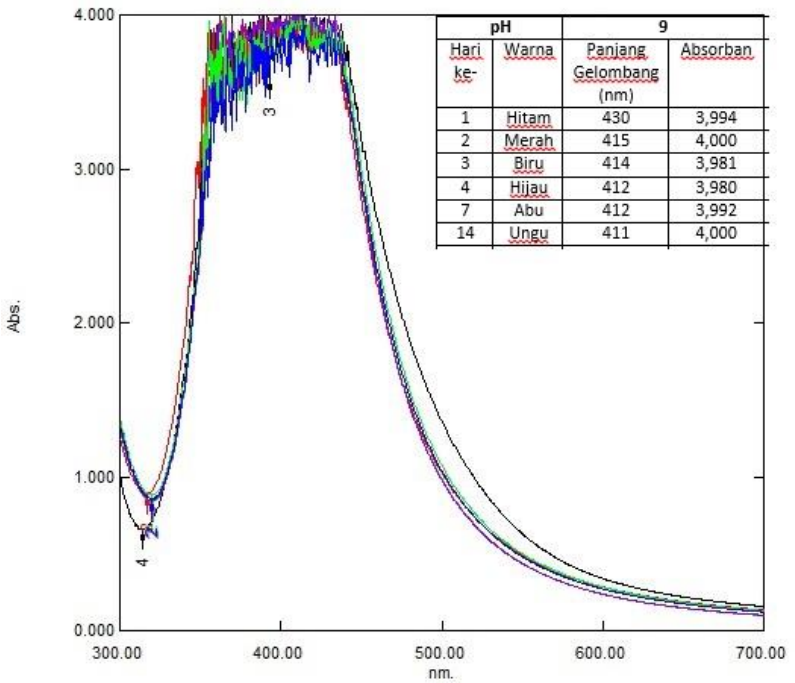
b.



pH		7	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	422	1,585
2	Merah	419	1,836
3	Biru	419	1,878
4	Hijau	419	1,964
7	Abu	415	2,160
14	Ungu	414	2,511

Gambar. Spektrum UV-Vis nanopartikel perak dengan pH 7

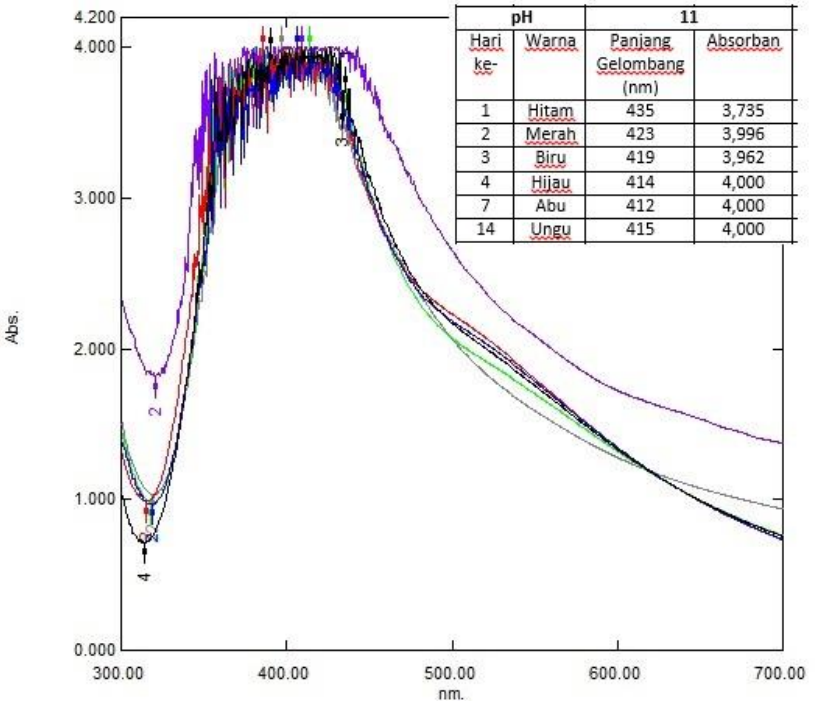
c.



pH		9	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	430	3,994
2	Merah	415	4,000
3	Biru	414	3,981
4	Hijau	412	3,980
7	Abu	412	3,992
14	Ungu	411	4,000

Gambar. Spektrum UV-Vis nanopartikel perak dengan pH 9

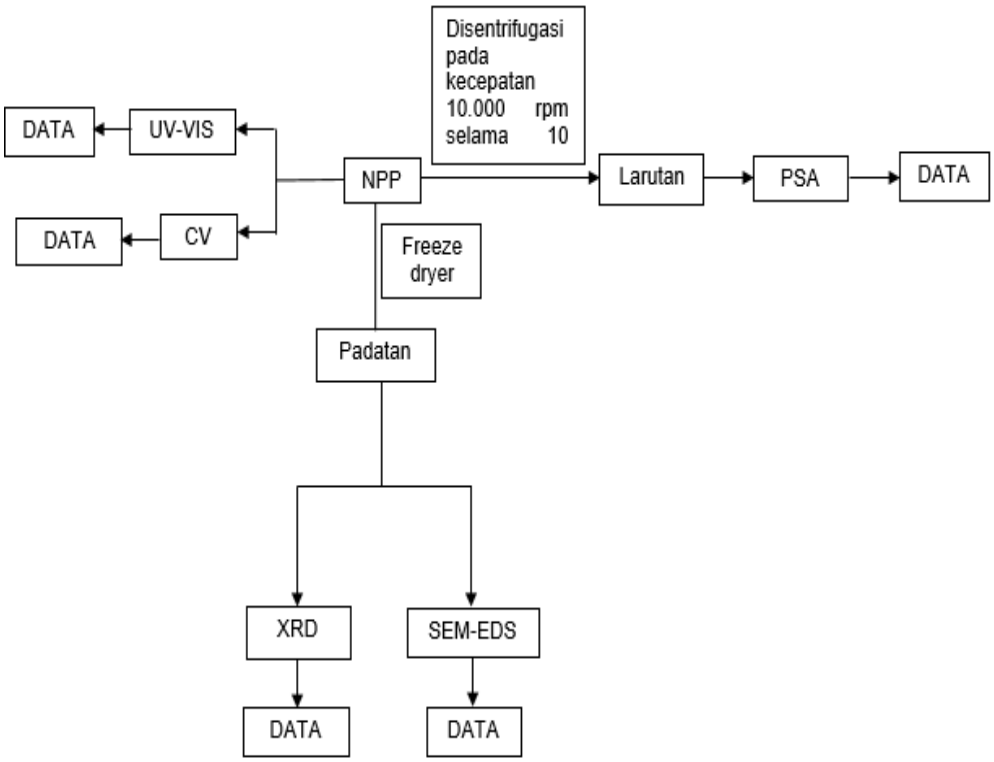
d.



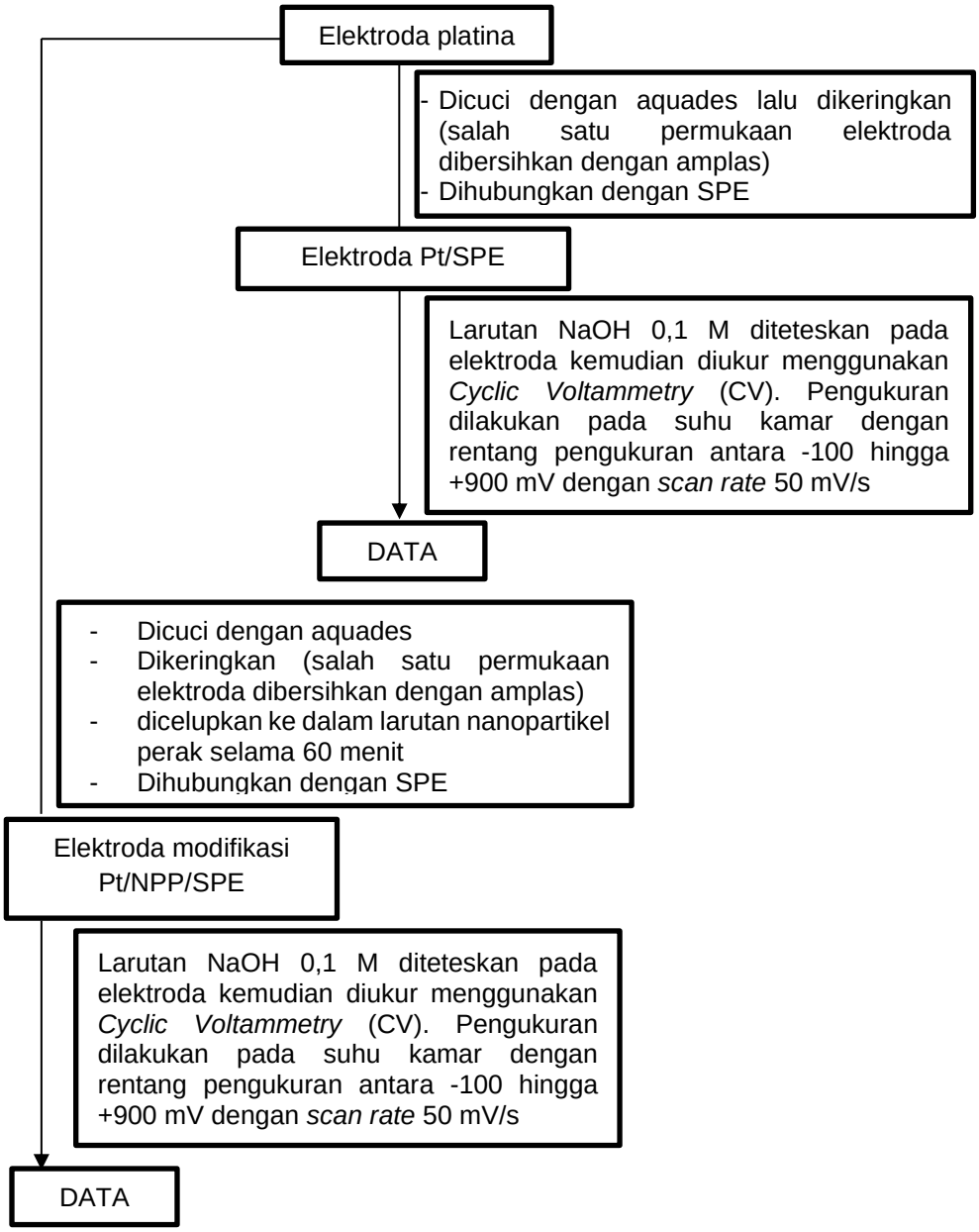
pH		11	
Hari ke-	Warna	Panjang Gelombang (nm)	Absorban
1	Hitam	435	3,735
2	Merah	423	3,996
3	Biru	419	3,962
4	Hijau	414	4,000
7	Abu	412	4,000
14	Ungu	415	4,000

Gambar. Spektrum UV-Vis nanopartikel perak dengan pH 11

Lampiran 15. Bagan kerja karakterisasi nanopartikel perak (NPP)



Lampiran 16. Bagan kerja karakterisasi NPP secara elektrokimia



Lampiran 17. Hasil pengukuran nanopartikel perak dengan menggunakan PSA

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

AgNP_EBM_2404.nsz

Measurement Results

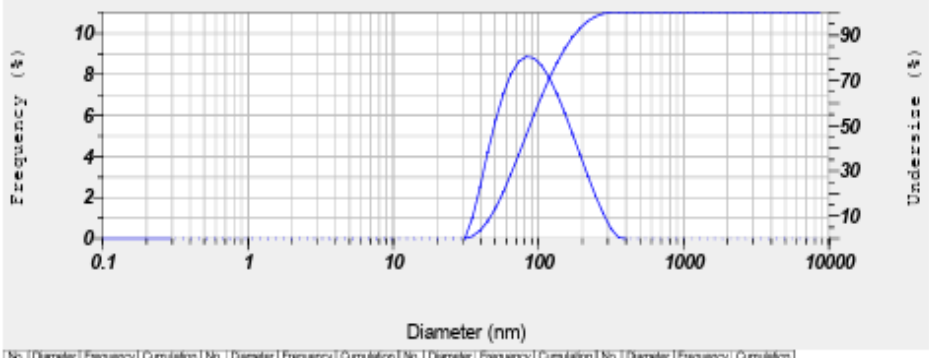
Date	: 20 September 2023 10:06:00
Measurement Type	: Particle Size
Sample Name	: AgNP_EBM
Scattering Angle	: 90
Temperature of the Holder	: 25.0 deg. C
Dispersion Medium Viscosity	: 0.896 mPa.s
Transmission Intensity before Meas.	: 16986
Distribution Form	: |Standard|
Distribution Form(Dispersity)	: Polydisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 813 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	100.7 nm	52.1 nm	77.6 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	100.7 nm	52.1 nm	77.6 nm

Cumulant Operations

Z-Average	: 76.6 nm
PI	: 0.320



No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation
1	0.34	0.000	0.000	22	4.40	0.000	0.000	43	57.09	7.027	20.465	64	740.89	0.000	100.000
2	0.38	0.000	0.000	23	4.97	0.000	0.000	44	64.50	7.965	28.460	65	837.07	0.000	100.000
3	0.43	0.000	0.000	24	5.61	0.000	0.000	45	72.87	8.604	37.064	66	945.74	0.000	100.000
4	0.49	0.000	0.000	25	6.34	0.000	0.000	46	82.33	8.558	45.622	67	1068.52	0.000	100.000
5	0.55	0.000	0.000	26	7.17	0.000	0.000	47	93.02	8.782	54.404	68	1207.24	0.000	100.000
6	0.62	0.000	0.000	27	8.10	0.000	0.000	48	105.10	8.416	63.120	69	1363.97	0.000	100.000
7	0.70	0.000	0.000	28	9.15	0.000	0.000	49	118.74	7.810	70.931	70	1541.04	0.000	100.000
8	0.80	0.000	0.000	29	10.34	0.000	0.000	50	134.16	7.019	77.950	71	1741.10	0.000	100.000
9	0.92	0.000	0.000	30	11.68	0.000	0.000	51	151.57	6.096	84.046	72	1967.14	0.000	100.000
10	1.02	0.000	0.000	31	13.20	0.000	0.000	52	171.25	5.093	89.139	73	2222.51	0.000	100.000
11	1.15	0.000	0.000	32	14.91	0.000	0.000	53	193.48	4.059	93.198	74	2511.05	0.000	100.000
12	1.30	0.000	0.000	33	16.84	0.000	0.000	54	218.60	3.035	96.233	75	2837.04	0.000	100.000
13	1.47	0.000	0.000	34	19.03	0.000	0.000	55	246.98	2.064	98.297	76	3205.35	0.000	100.000
14	1.66	0.000	0.000	35	21.50	0.000	0.000	56	279.04	1.190	99.487	77	3621.48	0.000	100.000
15	1.87	0.000	0.000	36	24.29	0.000	0.000	57	315.27	0.478	99.965	78	4091.63	0.000	100.000
16	2.11	0.000	0.000	37	27.45	0.000	0.000	58	356.20	0.035	100.000	79	4622.81	0.000	100.000
17	2.39	0.000	0.000	38	31.01	0.000	0.000	59	402.44	0.000	100.000	80	5222.96	0.000	100.000
18	2.70	0.000	0.000	39	35.03	0.966	0.966	60	454.69	0.000	100.000	81	5901.02	0.000	100.000
19	3.05	0.000	0.000	40	39.58	2.525	3.521	61	513.71	0.000	100.000	82	6667.10	0.000	100.000
20	3.45	0.000	0.000	41	44.72	4.184	7.705	62	580.41	0.000	100.000	83	7532.65	0.000	100.000
21	3.89	0.000	0.000	42	50.53	5.732	13.438	63	655.76	0.000	100.000	84	8510.56	0.000	100.000

Tabel histogram distribusi ukuran nanopartikel perak

No.	Diameter (nm)	Intesitas (%)
1	35,03	0,996
2	39,58	2,525
3	44,72	4,184
4	50,53	5,732
5	57,09	7,027
6	64,5	7,995
7	72,87	8,604
8	82,33	8,8858
9	93,02	8,782
10	105,1	8,416
11	118,74	7,81
12	134.16	7,019
13	151,57	6,096
14	171,25	5,093
15	193,48	4,059
16	218,6	3,035
17	246,98	2,064
18	279,04	1,19

Tabel distribusi ukuran nanopartikel perak

No	Diameter (nm)	Intensitas (%)
1	0-20	0
2	21-40	3,521
3	41-60	16,943
4	61-80	16,599
5	81-100	17,6678
6	101-120	16,226
7	121-140	7,019
8	141-160	6,096
9	161-180	5,093
10	181-200	4,059
11	201-220	3,035
12	221-240	0
13	241-260	2,064
14	261-280	1,19

Lampiran 18. Hasil pengukuran dengan menggunakan XRD

*** Basic Data Process ***

Group : Standard
Data : xrd#ar#ag

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	113	64.4058	1.44544	100	0.21170	90	1049
2	68	44.0250	2.05518	80	0.21660	72	807
3	53	37.7665	2.38011	37	0.35700	33	532

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	20.0800	4.41849	4	0.04000	4	14
2	20.2366	4.38465	6	0.03330	5	11
3	20.5400	4.32056	7	0.08000	6	30
4	20.6900	4.28957	7	0.06000	6	23
5	21.9900	4.03883	4	0.06000	4	16
6	22.4475	3.95754	8	0.04500	7	40
7	22.8216	3.89351	4	0.06330	4	19
8	23.2000	3.83085	3	0.01340	3	5
9	23.9666	3.71003	7	0.09330	6	55
10	24.1100	3.68828	10	0.06000	9	40
11	24.4075	3.64400	8	0.06500	7	34
12	24.7416	3.59554	7	0.14330	6	42
13	24.8800	3.57585	4	0.12000	4	26
14	25.1258	3.54143	10	0.07830	9	44
15	25.4233	3.50065	6	0.03330	5	19
16	25.9800	3.42689	10	0.16000	9	137
17	26.2800	3.38845	3	0.04000	3	18
18	26.5766	3.35130	11	0.08670	10	70
19	26.9525	3.30541	9	0.10500	8	46
20	27.3460	3.25873	13	0.22800	12	153
21	27.7100	3.21675	9	0.10000	8	50
22	27.8400	3.20202	6	0.08000	5	25
23	28.4100	3.13906	6	0.10000	5	44
24	28.7566	3.10201	9	0.15330	8	73
25	29.0600	3.07031	9	0.14660	8	60
26	29.2000	3.05590	13	0.28000	12	124
27	29.5650	3.01900	8	0.15000	7	59
28	29.7783	2.99786	11	0.14330	10	75
29	30.5750	2.92154	6	0.07000	5	41
30	31.0400	2.87882	7	0.12000	6	43
31	31.1800	2.86621	6	0.04000	5	13
32	31.4580	2.84152	12	0.11600	11	76
33	31.7600	2.81518	34	0.24000	31	364
34	32.0800	2.78783	16	0.16000	14	154
35	32.2800	2.77101	8	0.08000	7	53
36	32.5500	2.74864	7	0.06000	6	26
37	32.7550	2.73190	4	0.05000	4	14
38	33.0400	2.70899	3	0.00000	3	0
39	33.3133	2.68738	4	0.05330	4	18
40	33.4700	2.67516	6	0.10000	5	35
41	33.6200	2.66356	3	0.04000	3	16
42	34.1300	2.62492	4	0.10000	4	25
43	34.3350	2.60972	6	0.05000	5	26
44	34.5433	2.59446	7	0.12670	6	59
45	34.9950	2.56199	7	0.09000	6	41
46	35.4200	2.53222	8	0.12000	7	70
47	35.7800	2.50756	7	0.16000	6	66
48	36.1550	2.48241	8	0.13000	7	52
49	36.4550	2.46267	8	0.13000	7	46

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
50	36.7066	2.44636	6	0.06670	5	19
51	37.0850	2.42227	7	0.19000	6	49
52	37.4400	2.40011	18	0.26000	16	185
53	37.7665	2.38011	37	0.35700	33	532
54	38.1400	2.35765	17	0.14660	15	120
55	38.3675	2.34420	8	0.10500	7	62
56	38.6450	2.32800	11	0.09000	10	53
57	38.9483	2.31057	7	0.12330	6	58
58	39.1650	2.29828	3	0.05000	3	18
59	39.6500	2.27128	14	0.12000	13	90
60	40.3200	2.23507	3	0.04000	3	13
61	40.6800	2.21611	3	0.04000	3	23
62	40.9800	2.20058	6	0.08000	5	25
63	41.2800	2.18528	3	0.02000	3	7
64	42.0600	2.14654	3	0.04000	3	11
65	42.5600	2.12247	3	0.08000	3	24
66	43.2825	2.08870	7	0.16500	6	54
67	43.6300	2.07287	9	0.14000	8	64
68	44.0250	2.05518	80	0.21660	72	807
69	44.3016	2.04299	8	0.10330	7	51
70	45.2500	2.00235	4	0.10000	4	30
71	45.7200	1.98285	10	0.16000	9	97
72	45.9200	1.97468	12	0.14000	11	111
73	46.5900	1.94783	10	0.14000	9	65
74	46.8600	1.93724	3	0.04000	3	17
75	47.4100	1.91604	4	0.06000	4	16
76	47.8650	1.89888	3	0.13000	3	30
77	48.1033	1.89003	7	0.12670	6	51
78	48.5200	1.87477	3	0.04000	3	14
79	49.1000	1.85397	4	0.16000	4	47
80	49.3400	1.84551	3	0.08000	3	24
81	49.5350	1.83870	8	0.11000	7	50
82	49.9050	1.82593	7	0.15000	6	51
83	50.5533	1.80403	8	0.13330	7	58
84	50.7800	1.79650	9	0.16000	8	71
85	51.0833	1.78655	8	0.15330	7	62
86	51.2900	1.77983	7	0.14000	6	43
87	51.4400	1.77499	3	0.04000	3	14
88	51.7450	1.76525	7	0.13000	6	37
89	52.0200	1.75656	4	0.12000	4	26
90	52.4600	1.74286	6	0.12000	5	48
91	52.8000	1.73243	9	0.16000	8	68
92	53.0800	1.72395	4	0.08000	4	36
93	53.7300	1.70462	8	0.18000	7	111
94	54.4150	1.68477	8	0.13000	7	57
95	54.6750	1.67737	9	0.17000	8	75
96	55.2000	1.66265	4	0.12000	4	35
97	55.9300	1.64267	3	0.14000	3	37
98	56.1350	1.63715	7	0.11000	6	36
99	56.6000	1.62480	3	0.08000	3	28
100	57.1800	1.60969	6	0.12000	5	38
101	57.5300	1.60073	4	0.06000	4	18
102	58.1500	1.58513	3	0.10000	3	36
103	59.0700	1.56262	3	0.06000	3	24
104	59.6500	1.54880	4	0.14000	4	34
105	60.0150	1.54025	3	0.03000	3	10
106	60.9700	1.51839	4	0.12000	4	40
107	61.6100	1.50415	6	0.10000	5	34
108	62.4200	1.48656	3	0.04000	3	13
109	63.0600	1.47300	3	0.04000	3	15
110	63.3700	1.46654	3	0.10000	3	16
111	63.9000	1.45565	7	0.08000	6	79

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
112	64.0600	1.45240	10	0.00000	9	0
113	64.4058	1.44544	100	0.21170	90	1049
114	64.8233	1.43713	9	0.15330	8	59
115	65.1966	1.42980	4	0.12670	4	28
116	65.7350	1.41939	4	0.13000	4	43
117	66.2400	1.40979	3	0.08000	3	30
118	66.5400	1.40416	3	0.04000	3	15
119	66.8350	1.39867	4	0.07000	4	24
120	67.4200	1.38795	3	0.08000	3	18
121	67.9600	1.37823	3	0.04000	3	16
122	68.8500	1.36257	7	0.18000	6	57
123	69.1500	1.35739	7	0.14000	6	40
124	69.6100	1.34954	7	0.14000	6	53
125	69.9500	1.34381	3	0.10000	3	19

*** Basic Data Process ***

Data Infomation

Group	: Standard
Data	: xrd#ar#ag
Sample Name	: gel
Comment	:
Date & Time	: 11-20-23 14:49:57

Measurement Condition

X-ray tube

target	: Cu
voltage	: 40.0 (kV)
current	: 30.0 (mA)

Slits

Auto Slit	: not Used
divergence slit	: 1.00000 (deg)
scatter slit	: 1.00000 (deg)
receiving slit	: 0.30000 (mm)

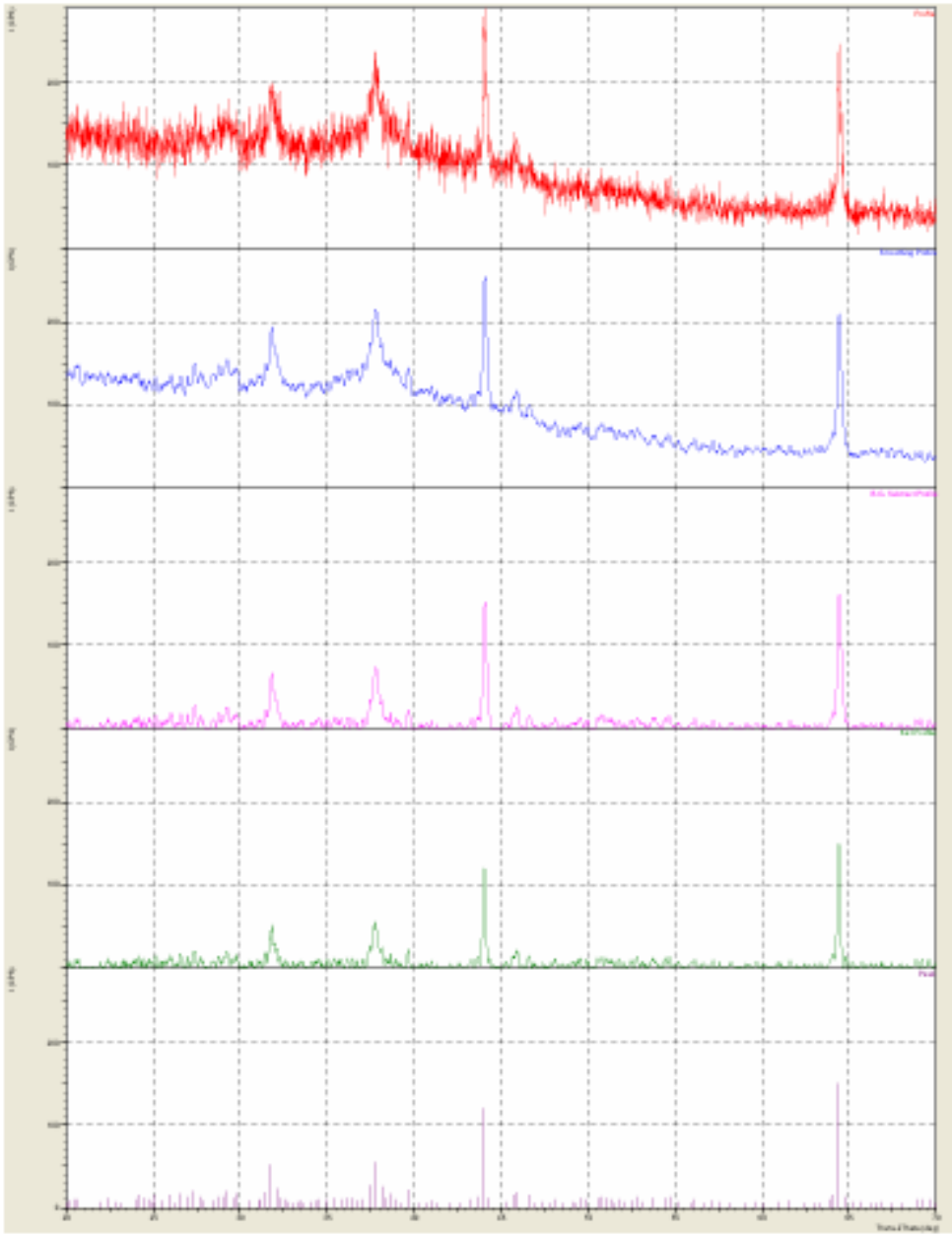
Scanning

drive axis	: Theta-2Theta
scan range	: 20.0000 - 70.0000 (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	: 17
B.G.Subtruction	[AUTO]
sampling points	: 19
repeat times	: 30
Kal-a2 Separate	[MANUAL]
Kal a2 ratio	: 50 (%)
Peak Search	[AUTO]
differential points	: 11
FWHM threhold	: 0.050 (deg)
intensity threhold	: 30 (par mil)
FWHM ratio (n-1)/n	: 2
System error Correction	[NO]
Precise peak Correction	[NO]

< Group: Standard Data: xrd#ar#ag >



Lampiran 19. Perhitungan XRD kristal nanopartikel perak

Tabel. Data hasil pengukuran puncak XRD nanopartikel perak

2θ	$Sin^2\theta$	1000 x $Sin^2\theta$	$\frac{1000 \text{ x } sin^2\theta}{36}$	Refleksi
37,7665	0,1047	104,7	3	(111)
44,0250	0,1405	140,5	4	(200)
64,4058	0,2839	283,9	8	(220)

Tabel. Data hasil pengukuran puncak XRD dari d-spacing atau d(Å)

Nomor puncak	2θ	d(Å)	1000 / d^2	$\frac{1000 \,/\, d^2}{60,26}$	Refleksi
53	37,7665	2,3800	176,54	3	(111)
68	44,0250	2,0550	236,80	4	(200)
113	64,4058	1,4450	478,92	8	(220)

D = $\frac{k\,\lambda}{\beta \cos\theta}$

Di mana:

D = ukuran diameter Kristal

λ = panjang gelombang sinar X (1,54 Å)

k = konstanta material

β = nilai FWHM

cos θ = sudut Bragg

Tabel. Data difraktogram nanopartikel perak

Nomor puncak	2θ	d	FWHM (deg)	Intensitas	D (nm)
53	37,7665	2,38011	0,35700	33	23,27
68	44,0250	2,05518	0,21660	72	39,14
113	64,4058	1,44544	0,21170	90	43,88

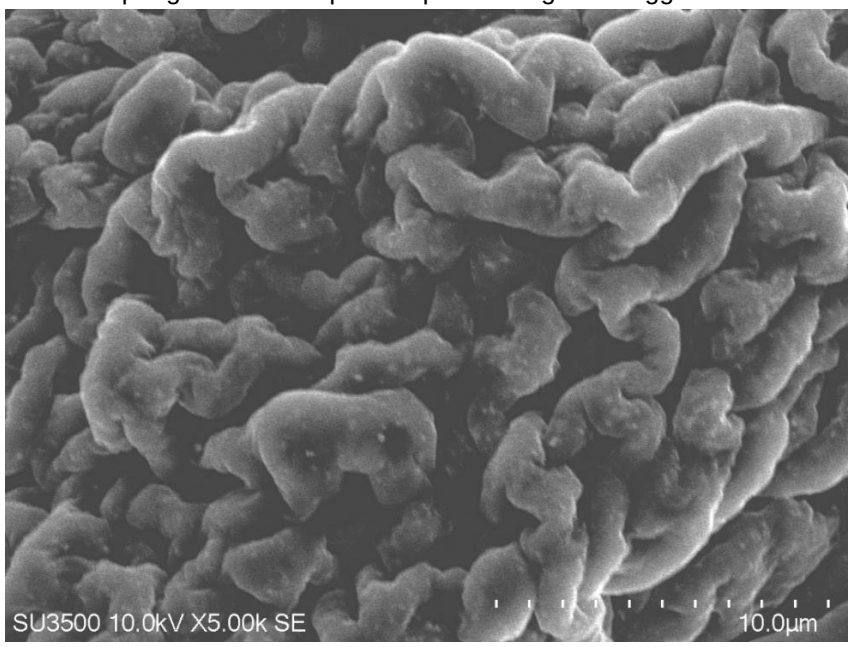
Perhitungan:

1. D = $\frac{k\,\lambda}{\beta \cos\theta} = \frac{0,89\,.\,1,54056\text{ Å}}{(0,357).\frac{3,14}{180}\,.\cos\frac{37,7665}{2}}$ = 23,27 nm

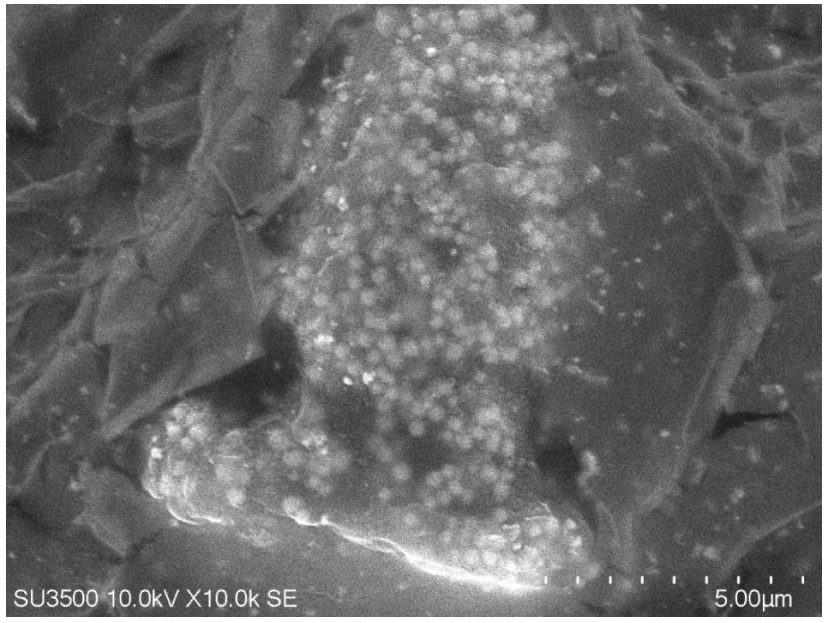
2. D = $\frac{k\,\lambda}{\beta \cos\theta} = \frac{0,89\,.\,1,54056\text{ Å}}{(0,2166).\frac{3,14}{180}\,.\cos\frac{44,025}{2}}$ = 39,14 nm

3. D = $\frac{k\,\lambda}{\beta \cos\theta} = \frac{0,89\,.\,1,54056\text{ Å}}{(0,2117).\frac{3,14}{180}\,.\cos\frac{64,4058}{2}}$ = 43,88 nm

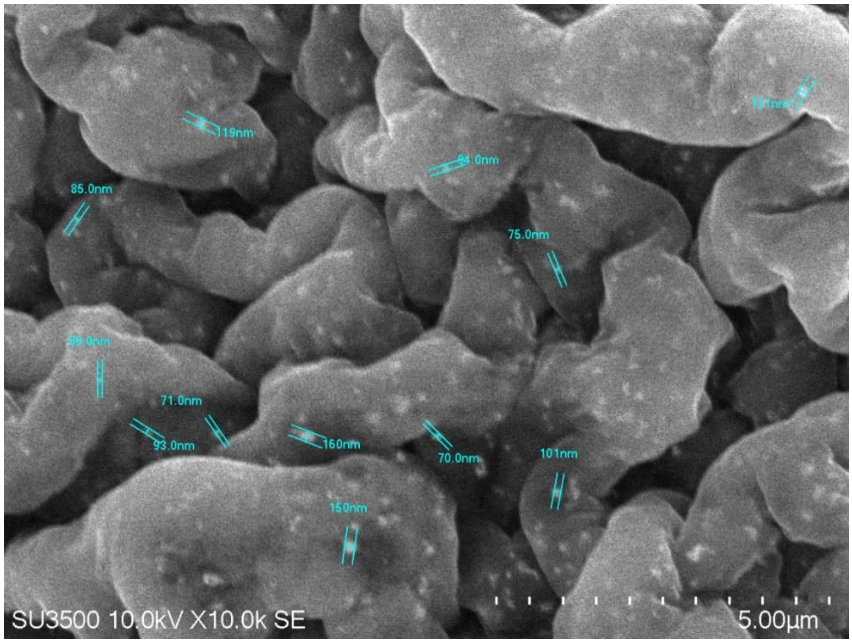
Lampiran 20. Hasil pengukuran nanopartikel perak dengan menggunakan SEM



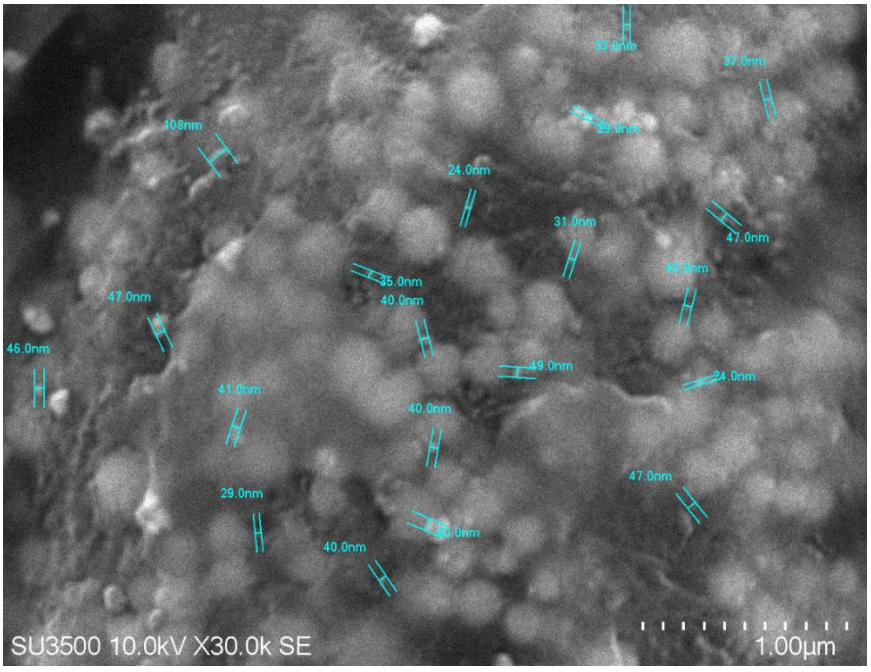
Gambar. SEM nanopartikel perak dengan skala pembacaan 10 µm



Gambar. SEM nanopartikel perak dengan skala pembacaan 5 µm



Gambar. Morfologi nanopartikel perak dengan skala pembacaan 5 µm



Gambar. Morfologi nanopartikel perak dengan skala pembacaan 1 µm

Lampiran 21. Hasil pengukuran nanopartikel perak dengan menggunakan EDS

EDAX TEAM

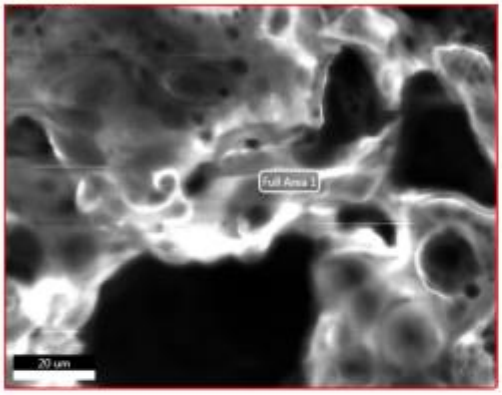
2022

Author: Fathur

Creation: 1/18/2024 12:25:35 AM

Sample Name: New Sample

Area 705

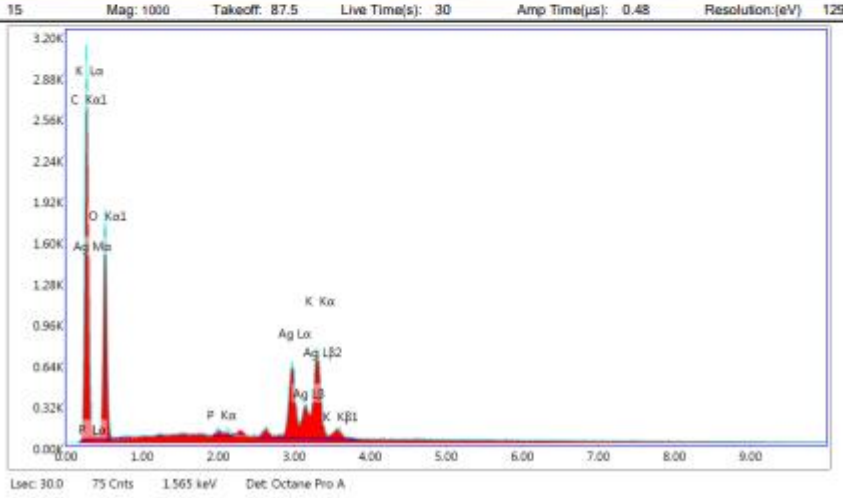


eZAF Smart Quant Results

Element	Weight %	Atomic %	Net Int.
C K	36.25	55.48	1128.15
O K	30.07	34.56	725.88
P K	0.62	0.37	34.55
AgL	19.86	3.38	419.43
K K	13.2	6.21	483.55

Full Area 1

kV: 15 Mag: 1000 Takeoff: 87.5 Live Time(s): 30 Amp Time(µs): 0.48 Resolution:(eV) 129.7

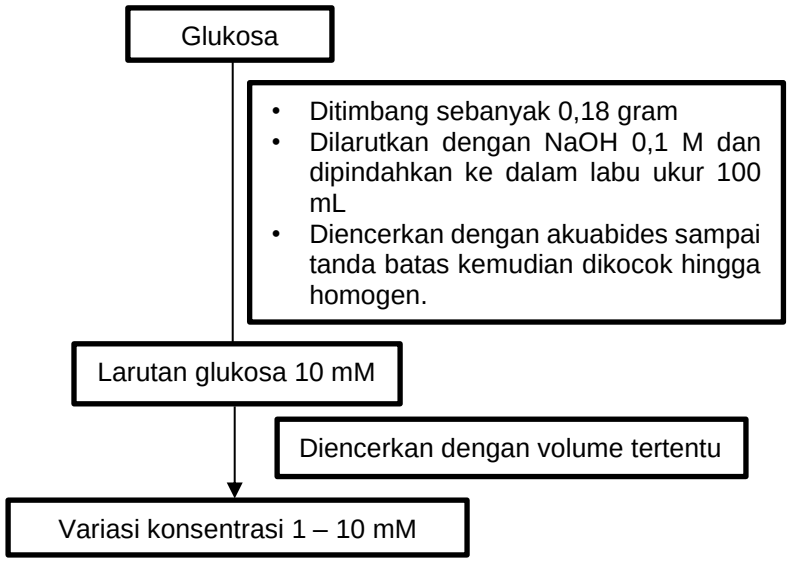


Lsec: 30.0 75 Cnts 1.565 keV Det: Octane Pro A

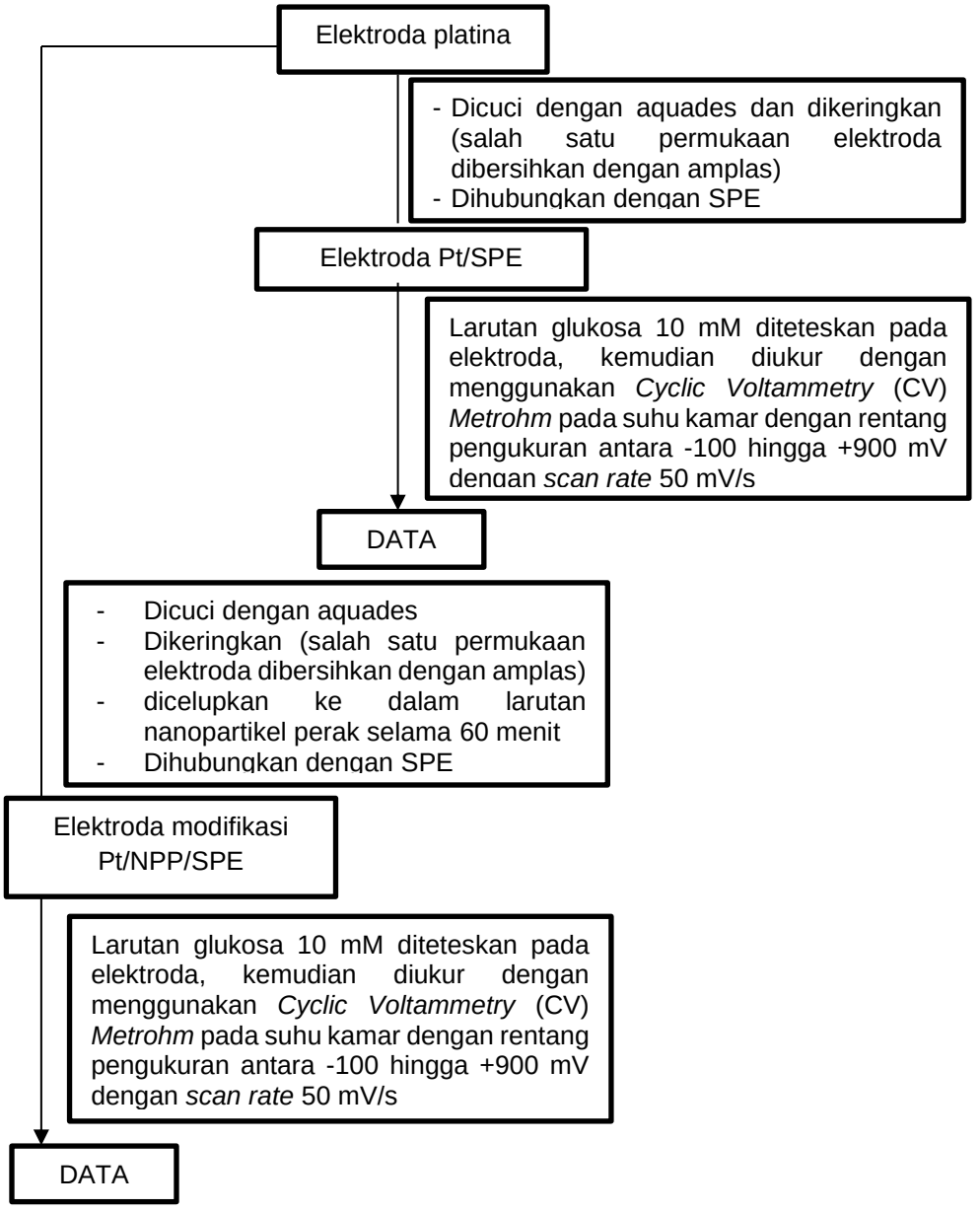
Lampiran 22. Perhitungan larutan glukosa

a. Larutan induk glukosa 10 mM
   Massa = M x L x BM
   = 0,01 mol/L x 0,1 L x 180 g/mol
   = 0,1800 gram
b. Larutan standar glukosa 8 mM
   $M_1V_1 = M_2V_2$
   10 mM x V_1 = 8 mM x 25 mL
   V_1= 20 mL
c. Larutan standar glukosa 6 mM
   $M_1V_1 = M_2V_2$
   10 mM x V_1 = 6 mM x 25 mL
   V_1= 15 mL
d. Larutan standar glukosa 4 mM
   $M_1V_1 = M_2V_2$
   10 mM x V_1 = 4 mM x 25 mL
   V_1= 10 mL
e. Larutan standar glukosa 2 mM
   $M_1V_1 = M_2V_2$
   10 mM x V_1 = 2 mM x 25 mL
   V_1= 5 mL
f. Larutan standar glukosa 4 mM
   $M_1V_1 = M_2V_2$
   10 mM x V_1 = 1 mM x 25 mL
   V_1= 2,5 mL

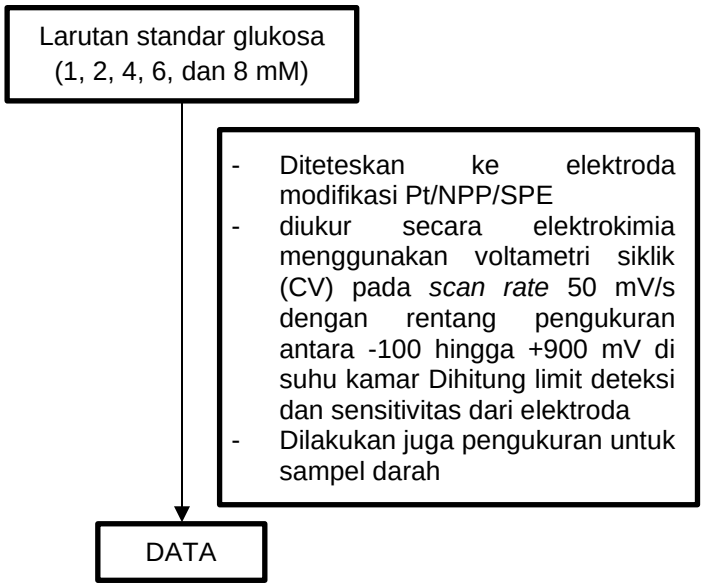
Lampiran 23. Bagan kerja pembuatan larutan induk glukosa 10 mM



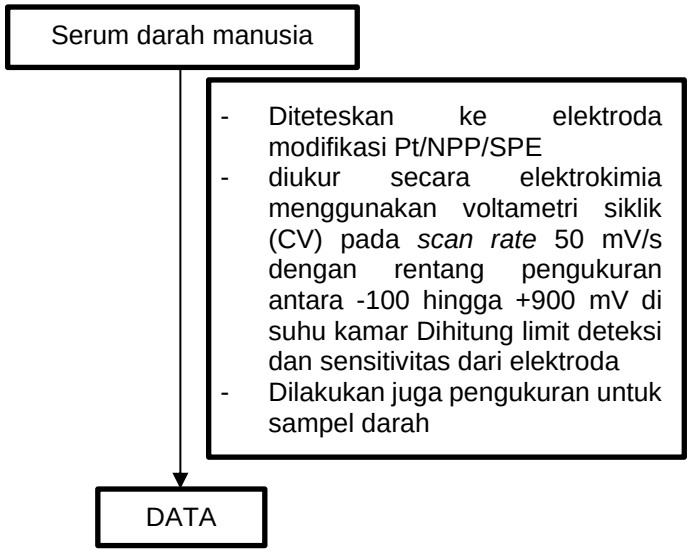
Lampiran 24. Bagan kerja elektrokatalitik NPP pada larutan glukosa 10 mM



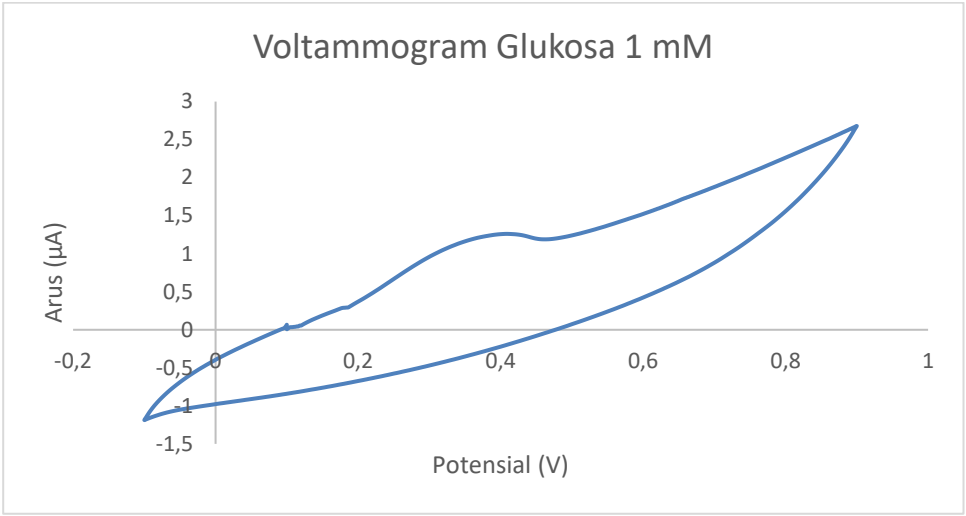
Lampiran 25. Bagan kerja uji kinerja elektroda modifikasi NPP dengan larutan standar glukosa

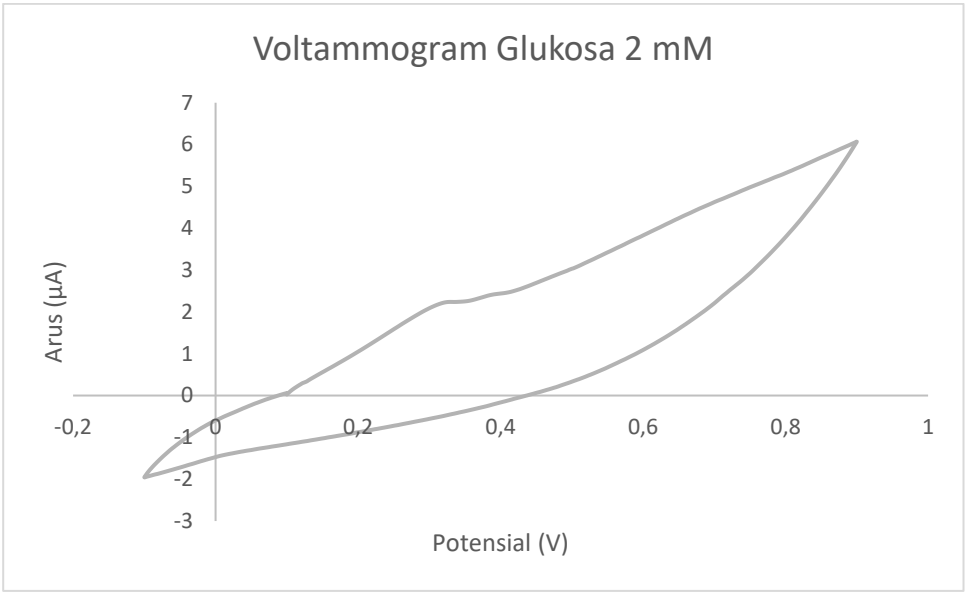


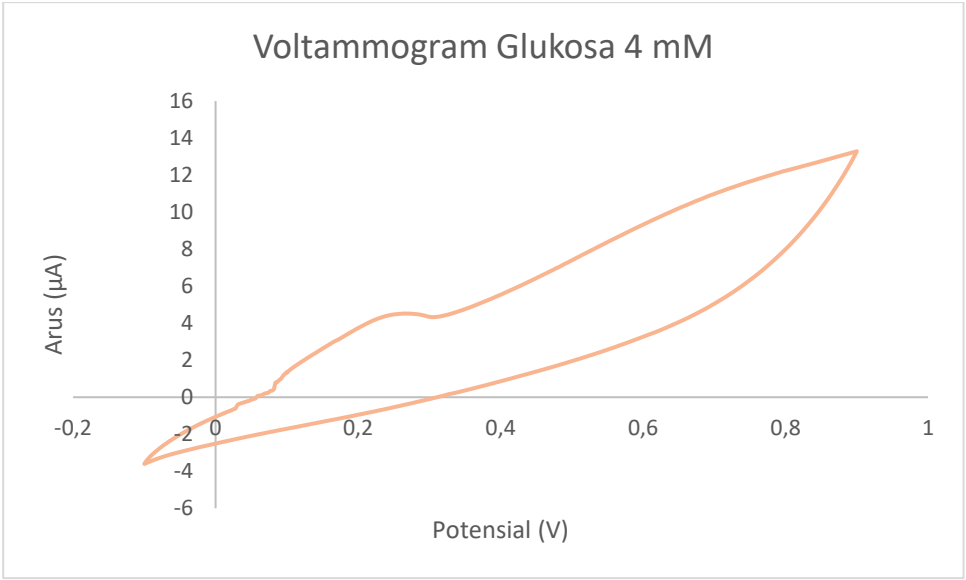
Lampiran 26. Bagan kerja pengukuran serum darah manusia

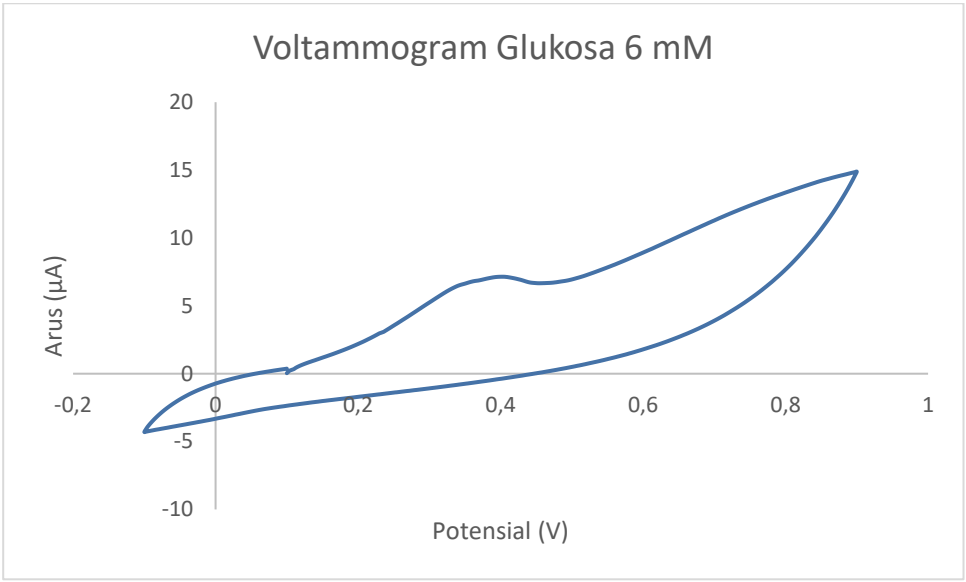


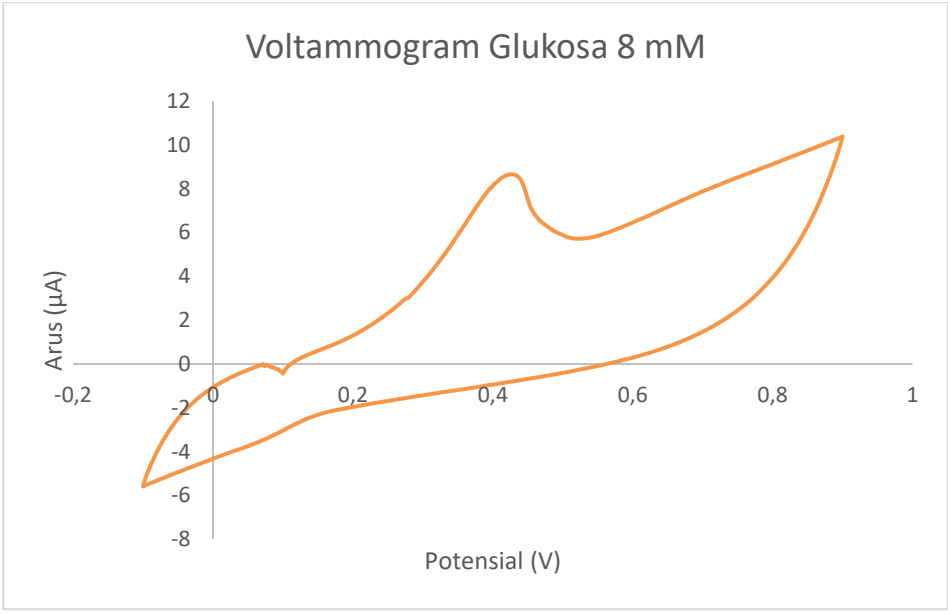
Lampiran 27. Kurva voltammogram masing masing larutan standar glukosa






Voltammogram Glukosa 4 mM
16
14
12
10
8
6
4
2
0
-2
-4
-6
Arus (µA)
-0,2
0
0,2
0,4
0,6
0,8
1
Potensial (V)


Voltammogram Glukosa 6 mM
20
15
10
5
0
-5
-10
Arus (µA)
-0,2
0
0,2
0,4
0,6
0,8
1
Potensial (V)


Voltammogram Glukosa 8 mM
12
10
8
6
4
2
0
-2
-4
-6
-8
Arus (µA)
-0,2
0
0,2
0,4
0,6
0,8
1
Potensial (V)

Lampiran 28. Perhitungan uji kinerja elektroda dengan modifikasi NPP

1. Perhitungan limit deteksi untuk standar glukosa pada elektroda Pt/NPP/SPE

y = 1,087x + 0,1724

a. Untuk konsentrasi 1 mM
   y = 1,087 (1) + 0,1724
   = 1,2594 µA

b. Untuk konsentrasi 2 mM
   y = 1,087 (2) + 0,1724
   = 2,3464 µA

c. Untuk konsentrasi 4 mM
   y = 1,087 (4) + 0,1724
   = 4,5204 µA

d. Untuk konsentrasi 6 mM
   y = 1,087 (6) + 0,1724
   = 6,6944 µA

e. Untuk konsentrasi 8 mM
   y = 1,087 (8) + 0,1724
   = 8,8684 µA

Konsentrasi Larutan Glukosa (mM)	Arus/µA (a)	Arus perhitungan/µA (b)	$(a-b)^2$
1	1,26054	1,2594	0,000001
2	2,23808	2,3464	0,011733
4	4,51917	4,5204	0,000002
6	7,01875	6,6944	0,105203
8	8,65333	8,8684	0,046255
		$\sum(a-b)^2$	0,163194

$$SD = \sqrt{\frac{\sum(a-b)^2}{n-2}}$$

$$= \sqrt{\frac{0,16394}{5-2}}$$

= 0,2332

Y_{LOD} = 3 SD + a
= 3 (0,2332) + 0,1724
= 0,8721

Y_{LOD} = 1,087x + 0,1724

0,8721 = 1,087x + 0,1724

x = 0,6437 mM = 115,87 ppm = 11,59 mg/dL

2. Perhitungan sensitivitas untuk standar glukosa pada elektroda Pt/NPP/SPE

$$\frac{slope}{A} = \frac{1,087}{(3,14)(0,5)(0,5)} = 1,3847\ \mu A.mM^{-1}.mm^{-2}$$

3. Perhitungan akurasi untuk standar glukosa pada elektroda Pt/NPP/SPE

R = $\frac{Csp}{Ks}$ x 100 %

Dimana: Csp = Konsentrasi Larutan Glukosa Terhitung (mM) dan
Ks = Konsentrasi Larutan Glukosa (mM)

a. Untuk konsentrasi glukosa 1 mM
Arus pengukuran = 1,26054
y = 1,087x + 0,1724
1,26054 = 1,087x + 0,1724
x = 1,0010 mM
R = $\frac{1,0010}{1}$ x 100 % = 100,10 %

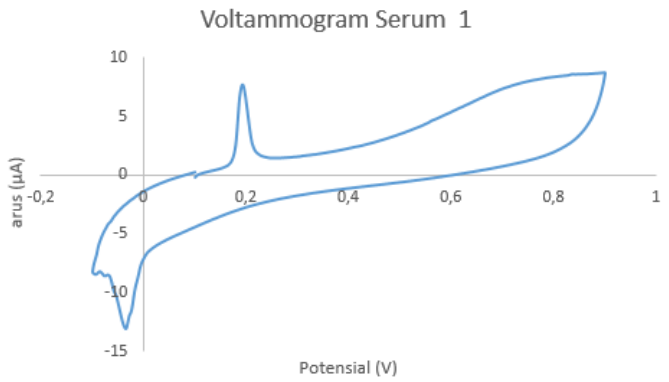
b. Untuk konsentrasi glukosa 2 mM
Arus pengukuran = 2,23808
y = 1,087x + 0,1724
2,23808 = 1,087x + 0,1724
x = 1,9003 mM
R = $\frac{1,9003}{2}$ x 100 % = 95,02 %

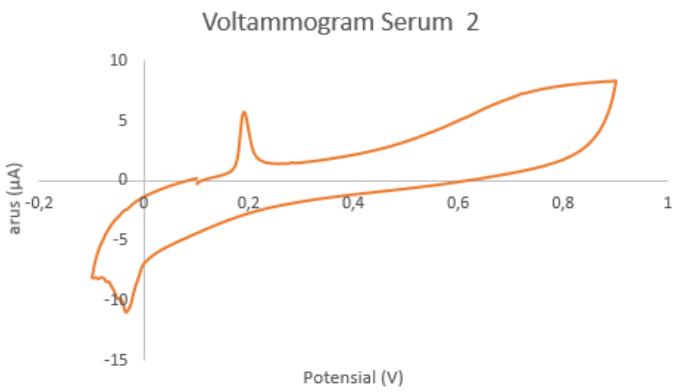
c. Untuk konsentrasi glukosa 4 mM
Arus pengukuran = 4,51917
y = 1,087x + 0,1724
4,51917 = 1,087x + 0,1724
x = 3,9989 mM
R = $\frac{3,9989}{4}$ x 100 % = 99,97 %

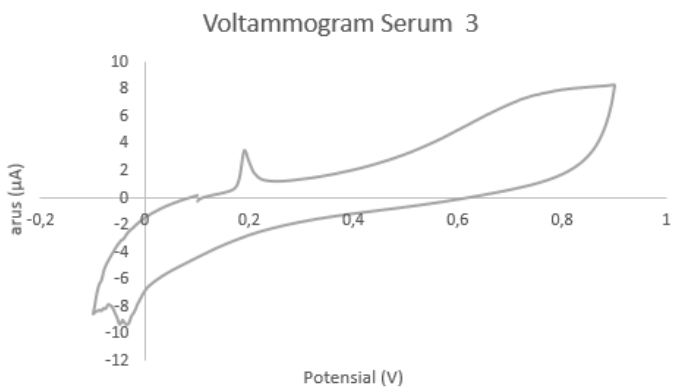
d. Untuk konsentrasi glukosa 6 mM
Arus pengukuran = 7,01875
y = 1,087x + 0,1724
7,01875 = 1,087x + 0,1724
x = 6,2984 mM
R = $\frac{6,2984}{6}$ x100 % = 104,97%

e. Untuk konsentrasi glukosa 8 mM
Arus pengukuran = 8,65333
y = 1,087x + 0,1724
8,6533 = 1,087x + 0,1724
x = 7,8021 mM
R = $\frac{7,8021}{8}$ x 100 % = 97,53 %

Lampiran 29. Voltammogram serum darah







Lampiran 30. Perhitungan konsentrasi serum darah

a. Untuk pengukuran 1
Arus pengukuran = 7,65458
y = 1,087x + 0,1724
7,65458 = 1,087x + 0,1724
x = 6,8833 mM

b. Untuk pengukuran 2
Arus pengukuran = 5,75833
y = 1,087x + 0,1724
5,75833 = 1,087x + 0,1724
x = 5,1389 mM

c. Untuk pengukuran 3
Arus pengukuran = 3,54696
y = 1,087x + 0,1724
3,54696 = 1,087x + 0,1724
x = 3,1045 mM

Rata-rata pengukuran = $\frac{6,8833+5,1389+3,1045}{3}$ = 5,0422 mM

Konsentrasi serum darah = 5,0422 x 18 mg/dL = 90,76 mg/dL

Lampiran 31. Hasil uji kadar glukosa pada serum darah dengan *Automated Analyzed Clinical Chemistry*

KEMENTERIAN KESEHATAN REPUBLIK INDONESIA
DIREKTORAT JENDERAL KESEHATAN MASYARAKAT
BALAI BESAR LABORATORIUM KESEHATAN MASYARAKAT MAKASSAR
Jl Perintis Kemerdekaan KM 11 Tamalanrea Makassar 90245 Telp 0411-8959205
Surel : bblabkesmasmakassar@gmail com laman bblabkesmasmakassar go id

LAPORAN HASIL UJI

No 24001086/LHU/BBLKM-MKS/01/2024

LIS No	:24000616	RS/Dr. Pengirim	(DR. HJ. IRNARATY HAERUDDIN, M.K.M)
Nama	:DACHLIA INDAHSARI DACHLAN	Tgl Terima	22-01-24 10:12
Umur/SEX	:38 th 11 bln 15 hari/Perempuan	Jenis Sampel	Darah
Alamat Pasien	:BTN BUMI PESONA PELANGI JL. BIRU NO. 7 KOTA SAR		
No Telepon	:082141698853		

Parameter	Hasil Uji	Satuan	Rujukan	Spesifikasi/Identitas Metode Pengujian
KIMIA DARAH				
Glukosa Darah Puasa	93	mg/dL	70 - 110	IKM/S 4 27/BBLK-MKS (GOD-PAP) (**)

Catatan :
1. Hasil uji ini hanya berlaku untuk sampel yang diuji
2. Laporan hasil uji ini tidak boleh digandakan
   Kecuali secara lengkap dan seizin tertulis laboratorium penguji
   Balai Besar Laboratorium Kesehatan Makassar
(**) Parameter terakreditasi
H/L) Hasil diluar nilai rujukan
3. Batas maksimal konfirmasi 3 hari kerja setelah tanggal hasil keluar

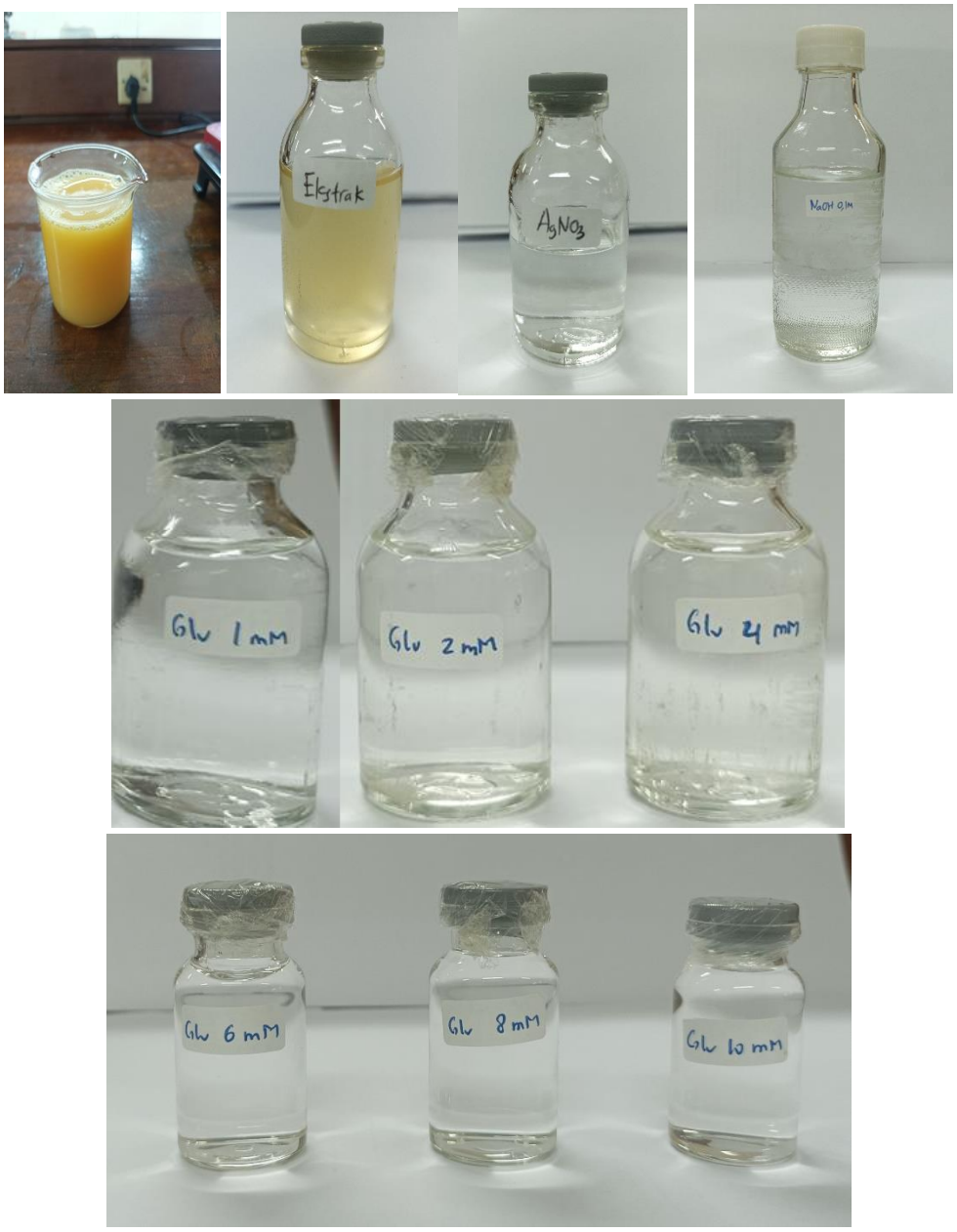
DP/084/BBLKM-MKS/02/01/2024-rev.2

dr. Fatmawaty Ahmad, Sp.PK
NIK 9198309192023010225

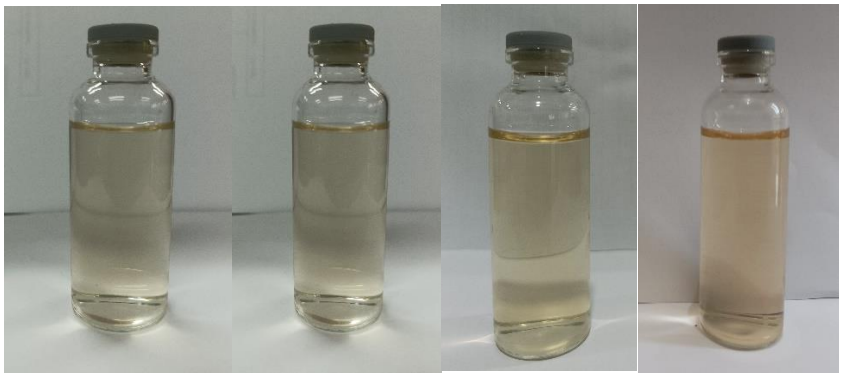
Hal 1 dari 1

Lampiran 32. Dokumentasi penelitian

a. Bahan



b. Observasi visual NPP

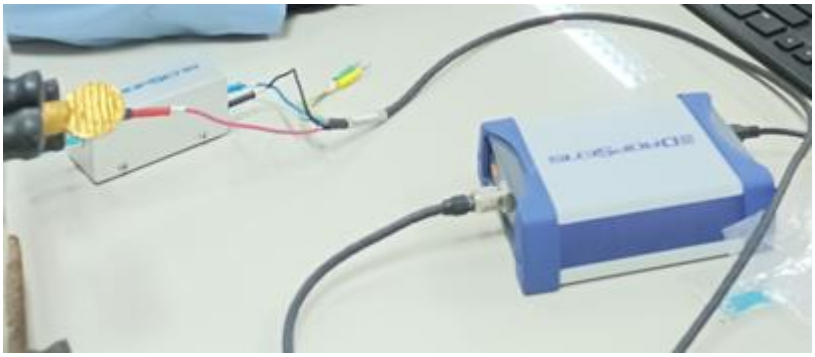


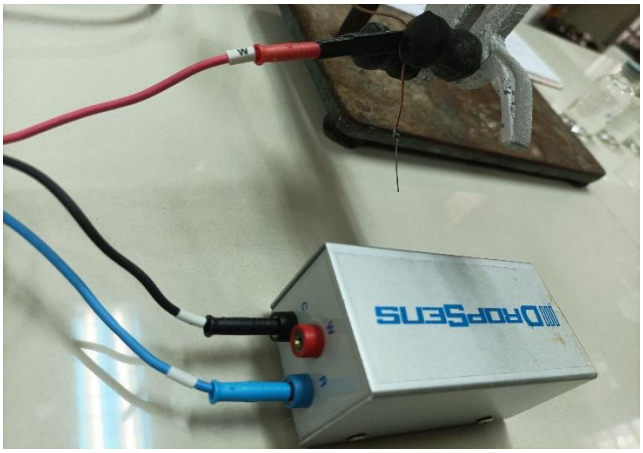
30 enit 1 jam 2 jam 4 jam

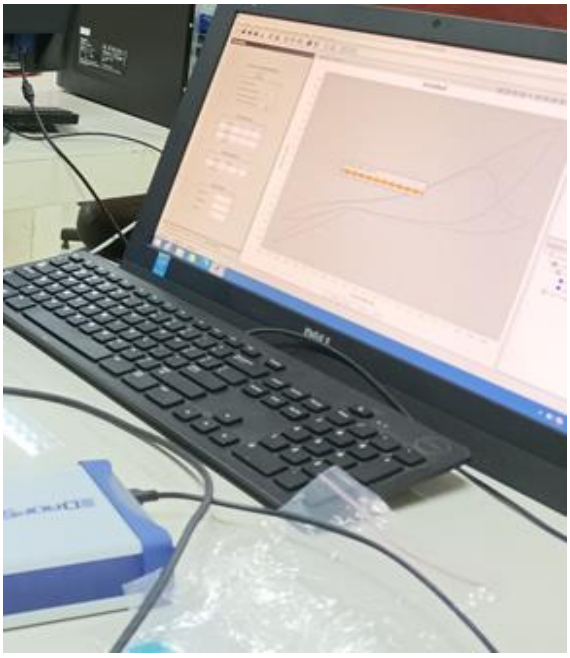
8 jam 12 jam 24 jam

c. Padatan nanopartikel perak

d. Alat voltametri siklik







CURRICULUM VITAE

A. Data Pribadip

1. Nama : Dachlia Indahsari Dachlan
2. Tempat, Tanggal Lahir : Merauke/7 Februari 1985
3. Alamat : Bumi Pesona Pelangi Jl. Biru No. 7
4. Kewarganegaraan : Indonesia

B. Riwayat Pendidikan

1. Tamat SMA tahun 2003 di SMUN 5 Makassar
2. Sarjana (S1) tahun 2007 di Universitas Hasanuddin

C. Pekerjaan dan Riwayat Pekerjaan

- Jenis Pekerjaan : Pegawai Negeri Sipil (PNS)
- NIP : 198502072009112001
- Pangkat/Jabatan : Penata Tk.1/IIId/Guru Muda

D. Karya ilmiah yang telah dipublikasikan: -

E. Makalah pada Seminar/Konferensi Ilmiah Nasional dan Internasional

Dachlan et al., 2024. Optimizations and Dynamic Light Scattering (DLS) of Green Synthesis Silver Nanoparticles Using Sweet Fruit Extract of Averrhoa Carambola L. Proceeding of the 6th International Conference on Science (ICOS) 2024, April 2024. Makassar, Indonesia.