

DAFTAR LAMPIRAN

Lampiran 1 Perhitungan formula sediaan SNEDDS kuersetin 30mg/g



Perhitungan bahan:

Formula	Minyak jarak (g)	Tween 80 (g)	Cremophor RH40 (g)	PEG (g)
F1	$= \frac{43,229}{100} \cdot (1-0,03)$ = 0,42	$= \frac{2}{3} \cdot \frac{53,5656}{100} \cdot (1-0,03)$ = 24,99 mg	$= \frac{1}{3} \cdot \frac{53,5656}{100} \cdot (1-0,03)$	$= \frac{3,20543}{100} \cdot (1-0,03)$ = 0,03
F3	$= \frac{20,7391}{100} \cdot (1-0,03)$ = 0,2	$= \frac{2}{3} \cdot \frac{63,0052}{100} \cdot (1-0,03)$ = 0,41	$= \frac{1}{3} \cdot \frac{63,0052}{100} \cdot (1-0,03)$ = 0,2	$= \frac{16,2557}{100} \cdot (1-0,03)$ = 0,16
F4	$= \frac{70}{100} \cdot (1-0,03)$ = 0,67	$= \frac{2}{3} \cdot \frac{30}{100} \cdot (1-0,03)$ = 0,2	$= \frac{1}{3} \cdot \frac{30}{100} \cdot (1-0,03)$ = 0,1	$= \frac{0}{100} \cdot (1-0,03)$ = 0
F5	$= \frac{57,4164}{100} \cdot (1-0,03)$ = 0,56	$= \frac{2}{3} \cdot \frac{42,5836}{100} \cdot (1-0,03)$ = 0,27	$= \frac{1}{3} \cdot \frac{42,5836}{100} \cdot (1-0,03)$ = 0,14	$= \frac{0}{100} \cdot (1-0,03)$ = 0
F6	$= \frac{51,2624}{100} \cdot (1-0,03)$ = 0,5	$= \frac{2}{3} \cdot \frac{30}{100} \cdot (1-0,03)$ = 14 mg	$= \frac{1}{3} \cdot \frac{7}{100} \cdot (1-0,03)$ = 4,9 mg	$= \frac{18,7376}{100} \cdot (1-0,03)$ = 0,17
F8	$= \frac{20}{100} \cdot (1-0,03)$ = 0,2	$= \frac{2}{3} \cdot \frac{80}{100} \cdot (1-0,03)$ = 0,51	$= \frac{1}{3} \cdot \frac{80}{100} \cdot (1-0,03)$ = 0,26	$= \frac{0}{100} \cdot (1-0,03)$ = 0
F9	$= \frac{32,3771}{100} \cdot (1-0,03)$ = 0,31	$= \frac{2}{3} \cdot \frac{67,6229}{100} \cdot (1-0,03)$ = 0,44	$= \frac{1}{3} \cdot \frac{67,6229}{100} \cdot (1-0,03)$ = 0,22	$= \frac{0}{100} \cdot (1-0,03)$ = 0
F10	$= \frac{32,2851}{100} \cdot (1-0,03)$ = 0,32	$= \frac{53,2155}{100} \cdot (1-0,03)$ = 0,34	$= \frac{1}{3} \cdot \frac{53,2155}{100} \cdot (1-0,03)$ = 0,17	$= \frac{14,4994}{100} \cdot (1-0,03)$ = 0,14
F11	$= \frac{26,986}{100} \cdot (1-0,03)$ = 0,26	$= \frac{2}{3} \cdot \frac{43,014}{100} \cdot (1-0,03)$ = 0,28	$= \frac{1}{3} \cdot \frac{43,014}{100} \cdot (1-0,03)$ = 0,14	$= \frac{30}{100} \cdot (1-0,03)$ = 0,29
F12	$= \frac{39,9546}{100} \cdot (1-0,03)$ = 0,38	$= \frac{2}{3} \cdot \frac{30,0454}{100} \cdot (1-0,03)$ = 0,2	$= \frac{1}{3} \cdot \frac{30,0454}{100} \cdot (100-30)$ = 0,1	$= \frac{30}{100} \cdot (100-30)$ = 0,29
F16	$= \frac{40,9641}{100} \cdot (1-0,03)$ = 0,4	$= \frac{2}{3} \cdot \frac{41,2207}{100} \cdot (1-0,03)$ = 0,27	$= \frac{41,2207}{100} \cdot (1-0,03)$ = 0,13	$= \frac{17,8152}{100} \cdot (1-0,03)$ = 0,17

Lampiran 2 Gambar sediaan SNEDDS kuersetin



Lampiran 3 Dokumentasi uji respon SNEDDS kuersetin

No.	Dokumentasi																																																																								
1	 <p>Penampakan persiapan uji persen transmittan nanoemulsi SNEDDS kuersetin dengan pelarut akuades</p>																																																																								
2	 <p>Hasil uji waktu emulsifikasi nanoemulsi SNEDDS kuersetin dengan pelarut HCl 0,1N</p>																																																																								
3	<table border="1"> <thead> <tr> <th>Comment</th> <th>Conc. [ppm]</th> <th>Abs</th> <th>650.0 nm</th> </tr> </thead> <tbody> <tr><td>blanko</td><td></td><td></td><td>0.0001</td></tr> <tr><td>Formula I</td><td></td><td>0.553106</td><td>0.5531</td></tr> <tr><td>Formula II</td><td></td><td>0.447868</td><td>0.4479</td></tr> <tr><td>Formula III</td><td></td><td>0.0016355</td><td>0.0016</td></tr> <tr><td>Formula IV</td><td></td><td>0.265861</td><td>0.2659</td></tr> <tr><td>Formula V</td><td></td><td>0.409452</td><td>0.4095</td></tr> <tr><td>Formula VI</td><td></td><td>0.323452</td><td>0.3235</td></tr> <tr><td>Formula VII</td><td></td><td>0.209951</td><td>0.2100</td></tr> <tr><td>Formula VIII</td><td></td><td>0.107543</td><td>0.1075</td></tr> <tr><td>Formula IX</td><td></td><td>0.174228</td><td>0.1742</td></tr> <tr><td>Formula X</td><td></td><td>0.273541</td><td>0.2735</td></tr> <tr><td>Formula XI</td><td></td><td>0.26518</td><td>0.2652</td></tr> <tr><td>Formula XII</td><td></td><td>0.146774</td><td>0.1468</td></tr> <tr><td>Formula XIII</td><td></td><td>0.105159</td><td>0.1052</td></tr> <tr><td>Formula XIV</td><td></td><td>0.415852</td><td>0.4159</td></tr> <tr><td>Formula XV</td><td></td><td>0.0124242</td><td>0.0124</td></tr> <tr><td>Formula XVI</td><td></td><td>0.202208</td><td>0.2022</td></tr> </tbody> </table> <p>Hasil absorbansi sediaan nanoemulsi SNEDDS kuersetin</p>	Comment	Conc. [ppm]	Abs	650.0 nm	blanko			0.0001	Formula I		0.553106	0.5531	Formula II		0.447868	0.4479	Formula III		0.0016355	0.0016	Formula IV		0.265861	0.2659	Formula V		0.409452	0.4095	Formula VI		0.323452	0.3235	Formula VII		0.209951	0.2100	Formula VIII		0.107543	0.1075	Formula IX		0.174228	0.1742	Formula X		0.273541	0.2735	Formula XI		0.26518	0.2652	Formula XII		0.146774	0.1468	Formula XIII		0.105159	0.1052	Formula XIV		0.415852	0.4159	Formula XV		0.0124242	0.0124	Formula XVI		0.202208	0.2022
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Lampiran 4 Perhitungan nilai persen transmittan nanoemulsi SNEDDS kuersetin

Formula	Perhitungan
1	Anti-log (2- 0,5531) = 27,98
2	Anti-log (2- 0,4479) = 35,65
3	Anti-log (2- 0,0016) = 97,63
4	Anti-log (2- 0,2659) = 99,65
5	Anti-log (2- 0,4095) = 54,21
6	Anti-log (2- 0,3235) = 38,94
7	Anti-log (2- 0,2100) = 47,48
8	Anti-log (2- 0,1075) = 61,65
9	Anti-log (2- 0,1742) = 78,07
10	Anti-log (2- 0,2735) = 66,95
11	Anti-log (2- 0,2652) = 53,27
12	Anti-log (2- 0,1468) = 54,3
13	Anti-log (2- 0,1052) = 53,27
14	Anti-log (2- 0,4159) = 38,37
15	Anti-log (2- 0,0124) = 97,18
16	Anti-log (2- 0,2022) = 62,77

Keterangan: perhitungan pengubahan nilai absorbansi ke nilai transmittan menggunakan kalkulator *scientific*

Lampiran 5 Hasil analisis ANOVA metode D-Optimal respon persen transmitan

Response 1: Transmitan

ANOVA for Cubic model

Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	5688.88	9	632.10	8.52	0.0084	significant
⁽¹⁾ Linear Mixture	1692.13	2	846.07	11.41	0.0090	
AB	123.25	1	123.25	1.66	0.2449	
AC	603.02	1	603.02	8.13	0.0291	
BC	579.32	1	579.32	7.81	0.0314	
ABC	638.29	1	638.29	8.60	0.0262	
AB(A-B)	46.57	1	46.57	0.6278	0.4583	
AC(A-C)	667.59	1	667.59	9.00	0.0240	
BC(B-C)	329.05	1	329.05	4.44	0.0798	
Residual	445.09	6	74.18			
Lack of Fit	188.26	1	188.26	3.66	0.1137	not significant
Pure Error	256.84	5	51.37			
Cor Total	6133.98	15				

Fit Statistics

Std. Dev.	8.61	R²	0.9274
Mean	58.69	Adjusted R²	0.8186
C.V. %	14.67	Predicted R²	-104.2146
		Adeq Precision	9.7615

Final Equation

Transmitan	=
+210.87536	Castor oil
+65.61701	Tween 80 : Cromophor RH40
-11941.86522	PEG 400
-367.30240	Castor oil * Tween 80 : Cromophor RH40
+22769.50053	Castor oil * PEG 400
+20215.53572	Tween 80 : Cromophor RH40 * PEG 400
-22233.08359	Castor oil * Tween 80 : Cromophor RH40 * PEG 400
-445.47542	Castor oil * Tween 80 : Cromophor RH40 * (Castor oil-Tween 80 : Cromophor RH40)
-12695.64256	Castor oil * PEG 400 * (Castor oil-PEG 400)
-7756.64367	Tween 80 : Cromophor RH40 * PEG 400 * (Tween 80 : Cromophor RH40-PEG 400)

Lampiran 6 Hasil analisis ANOVA metode D-Optimal respon waktu emulsifikasi

Response 2: Waktu emulsifikasi

ANOVA for Cubic model

Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	15261.45	9	1695.72	30.78	0.0002	significant
⁽¹⁾ Linear Mixture	11603.23	2	5801.62	105.31	< 0.0001	
AB	24.15	1	24.15	0.4383	0.5325	
AC	1750.68	1	1750.68	31.78	0.0013	
BC	1712.46	1	1712.46	31.08	0.0014	
ABC	1082.78	1	1082.78	19.65	0.0044	
AB(A-B)	20.85	1	20.85	0.3784	0.5610	
AC(A-C)	1320.18	1	1320.18	23.96	0.0027	
BC(B-C)	1706.32	1	1706.32	30.97	0.0014	
Residual	330.55	6	55.09			
Lack of Fit	120.05	1	120.05	2.85	0.1521	not significant
Pure Error	210.50	5	42.10			
Cor Total	15592.00	15				



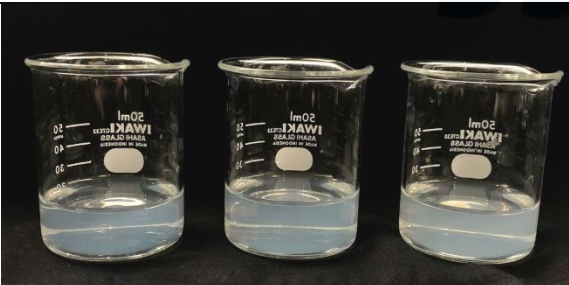
Fit Statistics

Std. Dev.	7.42	R²	0.9788
Mean	43.50	Adjusted R²	0.9470
C.V. %	17.06	Predicted R²	-25.3972
		Adeq Precision	15.4479

Final Equation

Waktu emulsifikasi	=
+47.05215	Castor oil
-7.65937	Tween 80 : Cromophor RH40
-20792.48288	PEG 400
+192.83623	Castor oil * Tween 80 : Cromophor RH40
+35502.90744	Castor oil * PEG 400
+35789.83999	Tween 80 : Cromophor RH40 * PEG 400
-28957.39063	Castor oil * Tween 80 : Cromophor RH40 * PEG 400
+298.04807	Castor oil * Tween 80 : Cromophor RH40 * (Castor oil-Tween 80 : Cromophor RH40)
-17853.22418	Castor oil * PEG 400 * (Castor oil-PEG 400)
-17663.24610	Tween 80 : Cromophor RH40 * PEG 400 * (Tween 80 : Cromophor RH40-PEG 400)

Lampiran 7 Dokumentasi verifikasi sediaan SNEDDS kuersetin optimal

No	Gambar	Keterangan																				
1		Sediaan SNEDDS kuersetin optimal																				
2		Preparasi sediaan nanoemulsi SNEDDS kuersetin optimal pada pelarut akuades																				
3	<table border="1"> <thead> <tr> <th>Comment</th> <th>Conc. [ppm]</th> <th>Abs</th> <th>650.0 nm</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>0.0000</td> </tr> <tr> <td>I</td> <td></td> <td>0.0226811</td> <td>0.0226</td> </tr> <tr> <td>II</td> <td></td> <td>0.0222877</td> <td>0.0223</td> </tr> <tr> <td>III</td> <td></td> <td>0.0185842</td> <td>0.0185</td> </tr> </tbody> </table>	Comment	Conc. [ppm]	Abs	650.0 nm				0.0000	I		0.0226811	0.0226	II		0.0222877	0.0223	III		0.0185842	0.0185	Hasil absorbansi preparasi sediaan nanoemulsi SNEDDS kuersetin optimal menggunakan Spektrofotometer UV Vis
Comment	Conc. [ppm]	Abs	650.0 nm																			
			0.0000																			
I		0.0226811	0.0226																			
II		0.0222877	0.0223																			
III		0.0185842	0.0185																			
4		Hasil pengujian waktu emulsifikasi sediaan SNEDDS kuersetin optimal																				

Lampiran 8 Perhitungan nilai persen transmittan sediaan optimal SNEDDS kuersetin

Replikasi	Perhitungan
1	Anti-log (2- 0,0226) = 94,92
2	Anti-log (2- 0,0223) = 94,99
3	Anti-log (2- 0,0185) = 95,82

Lampiran 9 Analisis data respon persen transmitan SPSS *one sample t test*

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
persen_transmittan	.360	3	.	.808	3	.134

a. Lilliefors Significance Correction

T-TEST

```

/TESTVAL=100
/MISSING=ANALYSIS
/VARIABLES=persen_transmittan
/CRITERIA=CI (.95).
    
```

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
persen_transmittan	3	95.2433	.50063	.28904

One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
persen_transmittan	-16.457	2	.004	-4.75667	-6.0003	-3.5130

Lampiran 10 Analisis data respon waktu emulsifikasi SPSS *one sample t test*

```
EXAMINE VARIABLES=waktu_emulsifikasi
/PLOT BOXPLOT STEMLEAF NPLOT
/COMPARE GROUPS
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
```

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
waktu_emulsifikasi	.328	3	.	.871	3	.298

a. Lilliefors Significance Correction

```
T-TEST
/TESTVAL=14.472
/MISSING=ANALYSIS
/VARIABLES=waktu_emulsifikasi
/CRITERIA=CI (.95).
```

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
waktu_emulsifikasi	3	12.6667	3.21455	1.85592

One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
waktu_emulsifikasi	-.973	2	.433	-1.80533	-9.7907	6.1801

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Esa Unggul

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Lampiran 9 Dokumentasi karakterisasi sediaan SNEDDS optimal

1. Hasil pengujian ukuran globul dan DPI

HORIBA
Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.00

SZ-100

032.C.PSA.VI.2022.nsz

Measurement Results

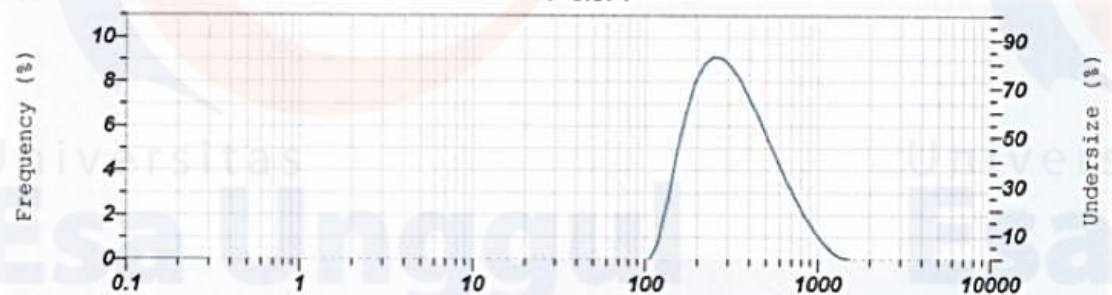
Date : Friday, June 17, 2022 9:53:04 AM
 Measurement Type : Particle Size
 Sample Name : SNEDDS KUERSETIN
 Scattering Angle : 90
 Temperature of the Holder : 24.8 °C
 Dispersion Medium Viscosity : 0.899 mPa·s
 Transmission Intensity before Meas. : 24248
 Distribution Form : Standard
 Distribution Form(Dispersity) : Monodisperse
 Representation of Result : Scattering Light Intensity
 Count Rate : 1919 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	335.0 nm	185.0 nm	232.8 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	335.0 nm	185.0 nm	232.8 nm

Cumulant Operations

Z-Average : 213.2 nm
 PI : 0.574



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	0.000	0.000	64	740.89	2.704	95.635
2	0.38	0.000	0.000	23	4.97	0.000	0.000	44	64.50	0.000	0.000	65	837.07	1.822	97.566
3	0.43	0.000	0.000	24	5.61	0.000	0.000	45	72.87	0.000	0.000	66	948.74	1.292	98.878
4	0.49	0.000	0.000	25	6.34	0.000	0.000	46	82.33	0.000	0.000	67	1066.52	0.739	99.616
5	0.55	0.000	0.000	26	7.17	0.000	0.000	47	93.02	0.000	0.000	68	1207.24	0.517	99.933
6	0.62	0.000	0.000	27	8.10	0.000	0.000	48	105.10	0.000	0.000	69	1365.97	0.087	100.000
7	0.70	0.000	0.000	28	9.15	0.000	0.000	49	118.74	0.762	0.762	70	1541.04	0.000	100.000
8	0.80	0.000	0.000	29	10.34	0.000	0.000	50	134.18	2.351	3.313	71	1741.10	0.000	100.000
9	0.90	0.000	0.000	30	11.68	0.000	0.000	51	151.87	4.685	7.999	72	1969.14	0.000	100.000
10	1.02	0.000	0.000	31	13.20	0.000	0.000	52	171.28	6.959	14.558	73	2222.51	0.000	100.000
11	1.15	0.000	0.000	32	14.91	0.000	0.000	53	193.48	7.636	22.494	74	2511.05	0.000	100.000
12	1.30	0.000	0.000	33	16.84	0.000	0.000	54	218.80	8.775	31.269	75	2837.04	0.000	100.000
13	1.47	0.000	0.000	34	19.03	0.000	0.000	55	248.98	9.119	40.389	76	3205.35	0.000	100.000
14	1.66	0.000	0.000	35	21.50	0.000	0.000	56	279.04	9.047	49.436	77	3621.48	0.000	100.000
15	1.87	0.000	0.000	36	24.29	0.000	0.000	57	315.27	8.645	58.094	78	4091.83	0.000	100.000
16	2.11	0.000	0.000	37	27.45	0.000	0.000	58	356.20	8.008	66.090	79	4622.81	0.000	100.000
17	2.39	0.000	0.000	38	31.01	0.000	0.000	59	402.44	7.202	73.293	80	5222.96	0.000	100.000
18	2.70	0.000	0.000	39	35.03	0.000	0.000	60	454.86	6.303	79.596	81	5901.02	0.000	100.000
19	3.05	0.000	0.000	40	39.58	0.000	0.000	61	513.71	5.365	84.961	82	6668.10	0.000	100.000
20	3.45	0.000	0.000	41	44.72	0.000	0.000	62	580.41	4.432	89.393	83	7532.95	0.000	100.000
21	3.99	0.000	0.000	42	50.53	0.000	0.000	63	656.78	3.537	92.930	84	8510.56	0.000	100.000

2. Hasil pengujian potensial zeta

2022.06.21 09:09:56

HORIBA
Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.00

SZ-100

Measurement Results

Zeta 032.C.PSA.VI.2022.nzt

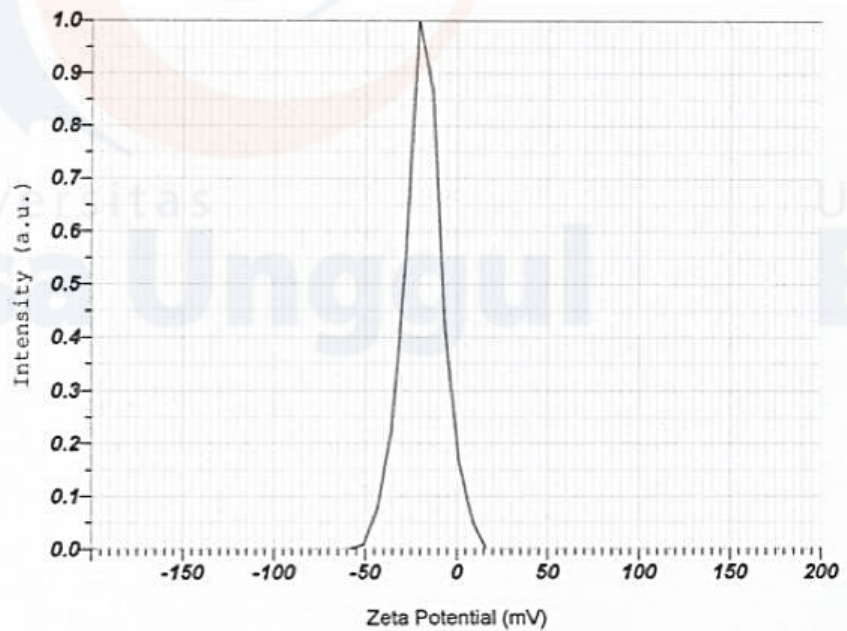
Measurement Results

Date : Tuesday, June 21, 2022 8:58:12 AM
 Measurement Type : Zeta Potential
 Sample Name : SNEDDS Kuersetin
 Temperature of the Holder : 24.9 °C
 Dispersion Medium Viscosity : 0.897 mPa·s
 Conductivity : 0.164 mS/cm
 Electrode Voltage : 3.4 V

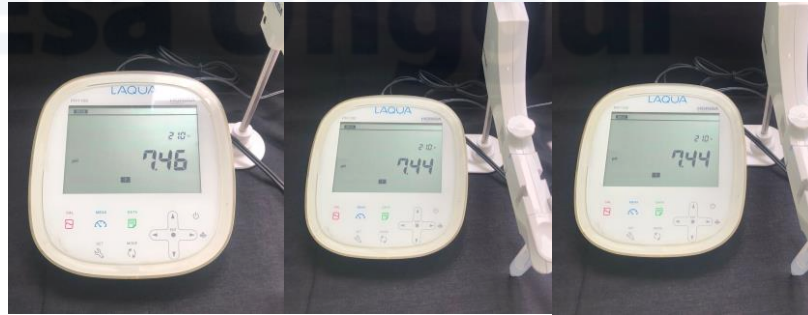
Calculation Results

Peak No.	Zeta Potential	Electrophoretic Mobility
1	-18.4 mV	-0.000142 cm ² /Vs
2	-- mV	-- cm ² /Vs
3	-- mV	-- cm ² /Vs

Zeta Potential (Mean) : -18.4 mV
 Electrophoretic Mobility Mean : -0.000142 cm²/Vs



3. Gambar hasil pengujian pH



Replikasi I

Replikasi II

Replikasi III

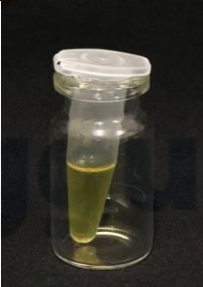
4. Gambar hasil pengujian robustness









Jam ke-0




Jam ke-24

5. Gambar hasil pengujian stabilitas termodinamika

Pengujian	Kecepatan 3500 rpm selama 30 menit
Uji sentrifugasi	

Pengujian	Siklus	-4°C	40°C
Uji panas dingin	1		

Uji panas dingin	2		
	3		

Pengujian	Siklus	-20°C	25°C
Uji freeze-thaw	1	 Meleleh dalam waktu kurang dari 1 menit	
	2	 Meleleh dalam waktu kurang dari 1 menit	