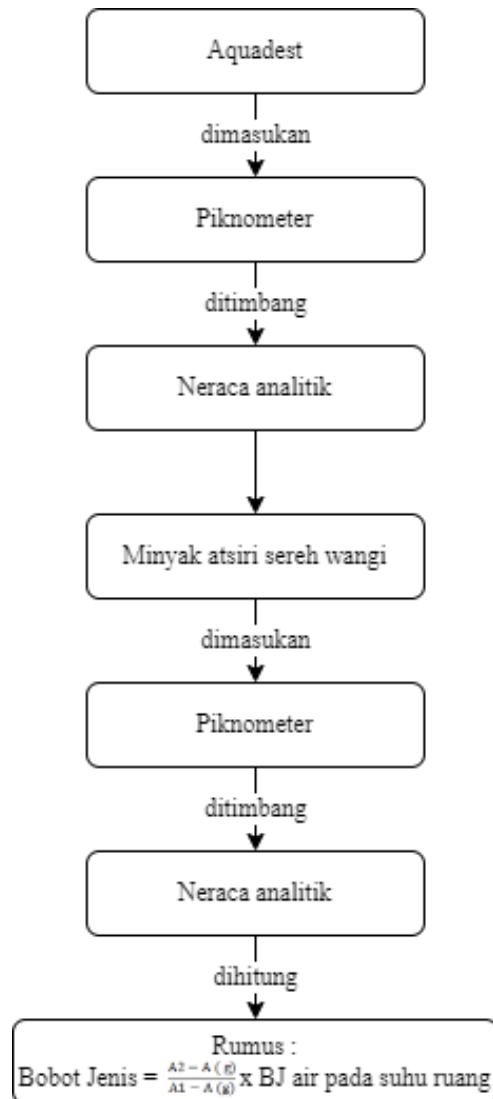


LAMPIRAN

Lampiran 1. Skema kerja karakterisasi minyak atsiri serih wangi (*Cymbopogon nardus L.*).

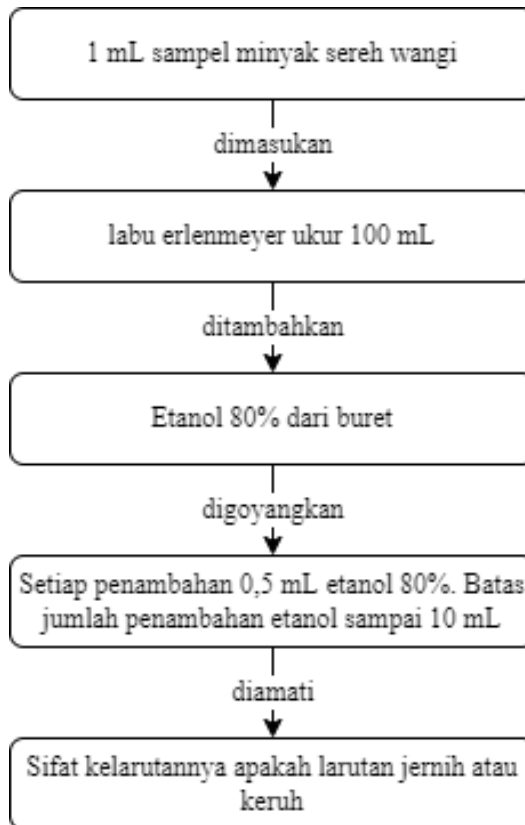
A. Bobot Jenis



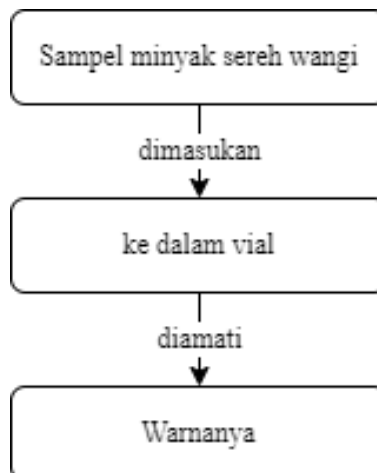
Keterangan :

- A : bobot piknometer kosong (g)
- A1 : bobot piknometer berisi air (g)
- A2 : bobot piknometer berisi sediaan (g)
- BJ : bobot jenis (g/mL)

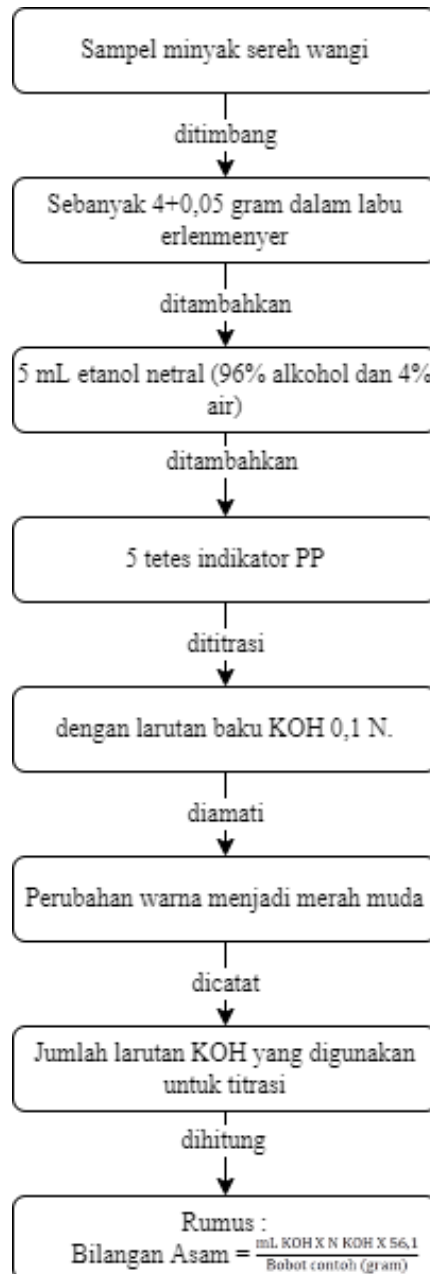
B. Kelarutan dalam etanol 80%



C. Identifikasi warna



D. Bilangan Asam



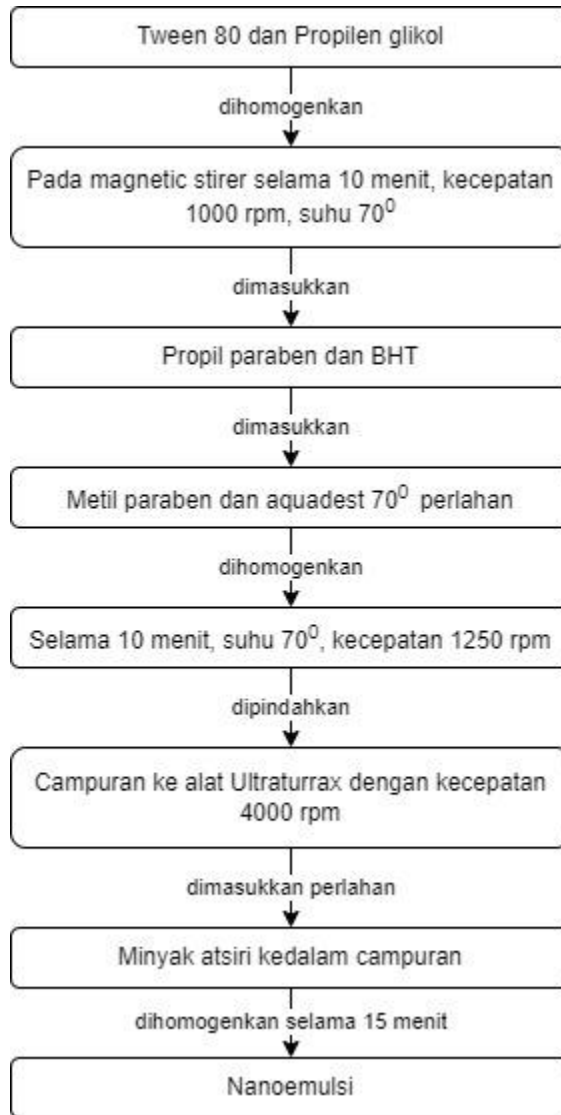
Keterangan :

mL KOH = jumlah larutan KOH yang digunakan untuk titrasi (mL)

N KOH = normalitas larutan KOH dalam etanol (N)

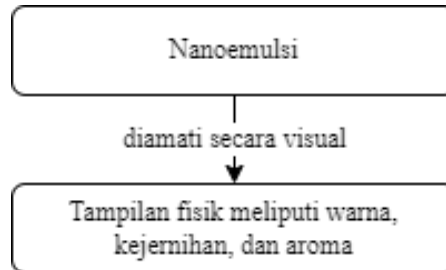
56,1 = berat molekul KOH (g/mL)

Lampiran 2. Skema kerja cara pembuatan sediaan nanoemulsi antiacne minyak atsiri serih wangi (*Cymbopogon nardus L.*).

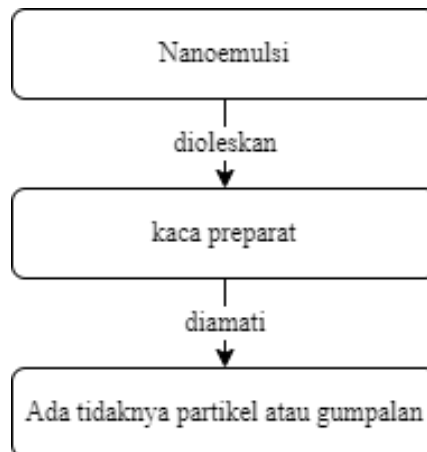


Lampiran 3. Skema kerja evaluasi sediaan nanoemulsi antiacne minyak atsiri sereh wangi (*Cymbopogon nardus L.*).

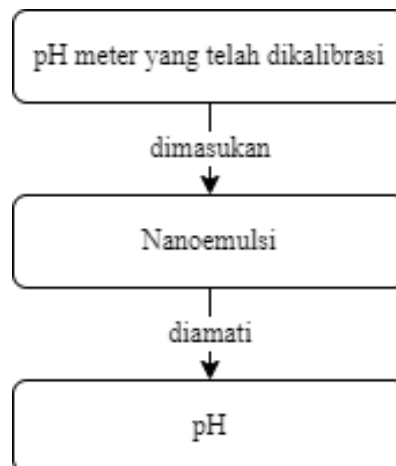
A. Organoleptis



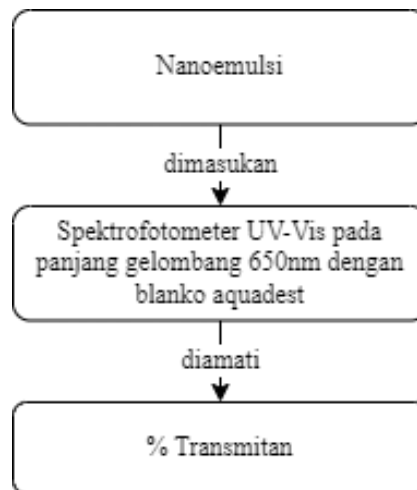
B. Homogenitas



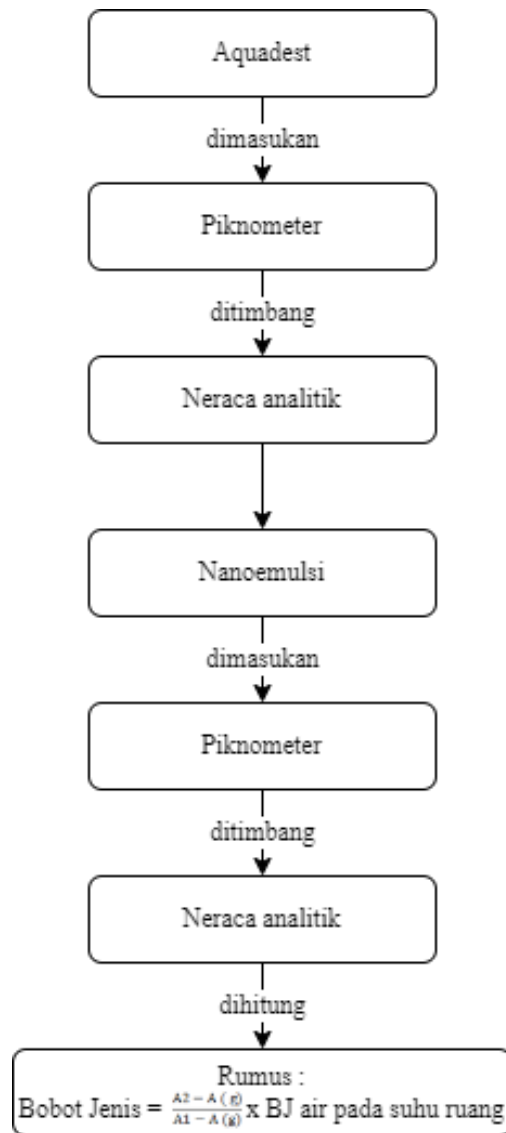
C. pH



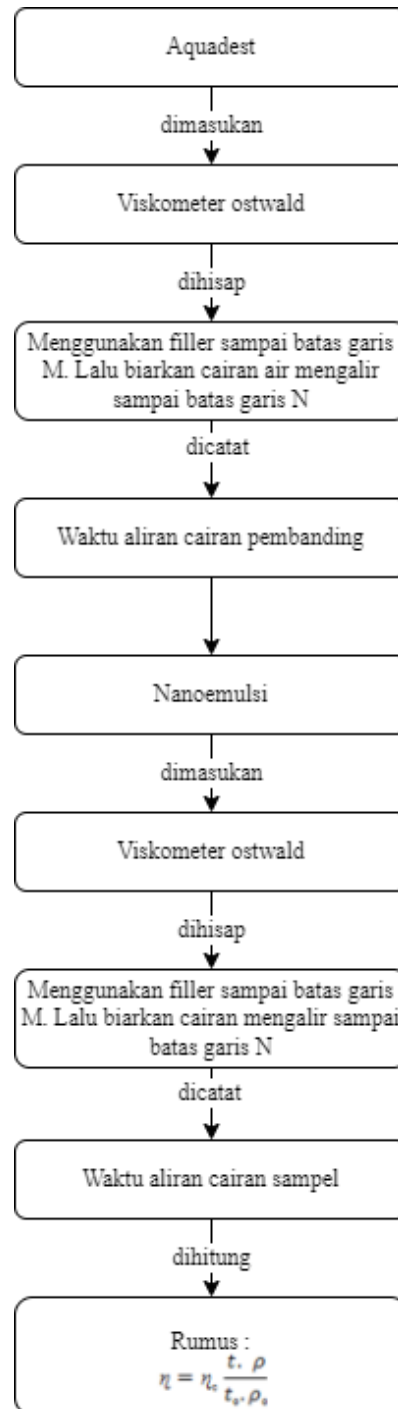
D. Persen Transmitan



E. Bobot jenis



F. Viskositas



Keterangan :

η = Viskositas cairan sampel (cP)

η_0 = Viskositas cairan pembanding (cP)

t = Waktu aliran cairan sampel (s)

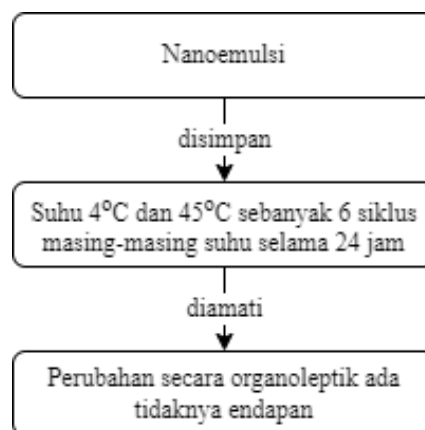
t_0 = Waktu aliran cairan pembanding (s)

ρ = Massa jenis cairan sampel (g/mL)

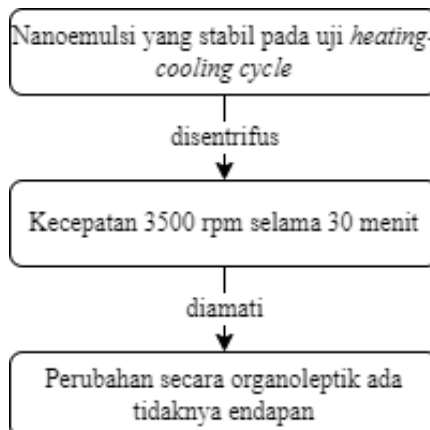
ρ_0 = Massa jenis cairan pembanding (g/mL)

G. Uji stabilitas termodinamika

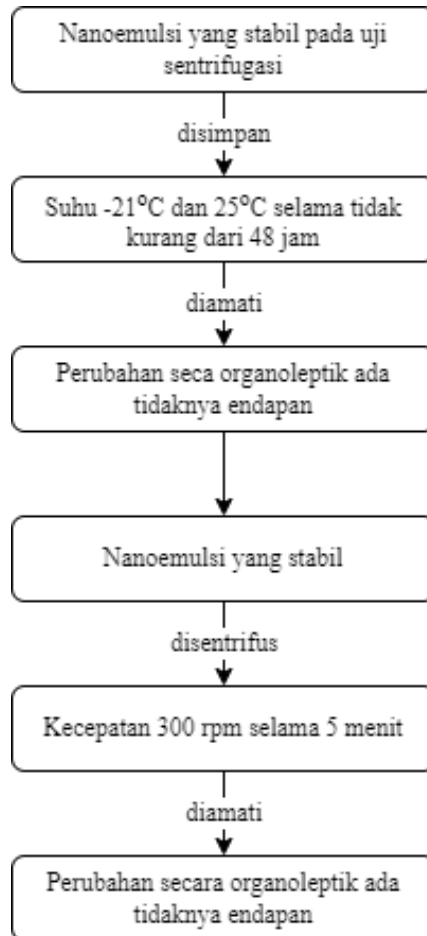
Uji *Heating-Cooling Cycle*



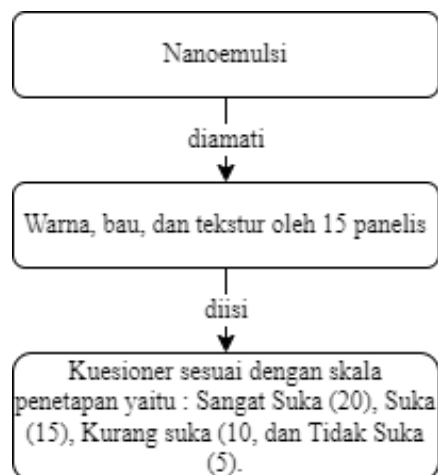
Uji Sentrifugasi



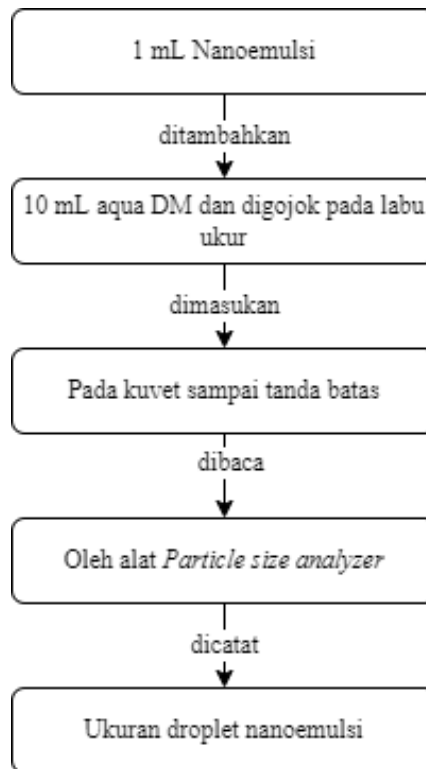
Uji *Freeze-Thaw*



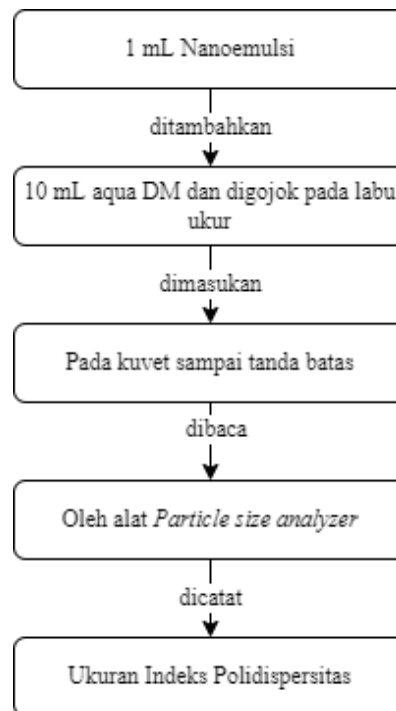
H. Uji Hedonik



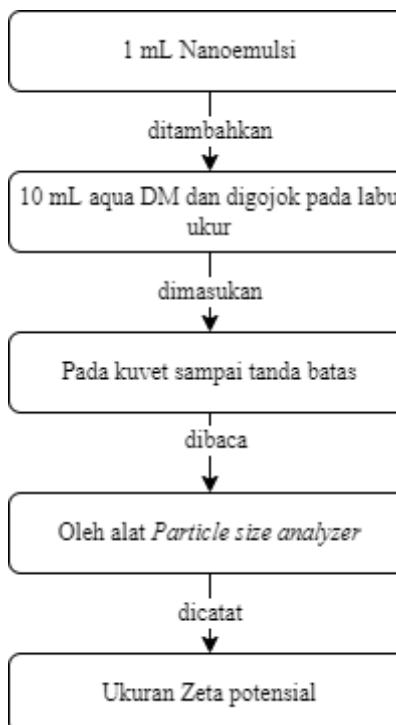
I. Uji Ukuran partikel untuk formula optimum



J. Uji Indeks Polidispersitas untuk formula optimum

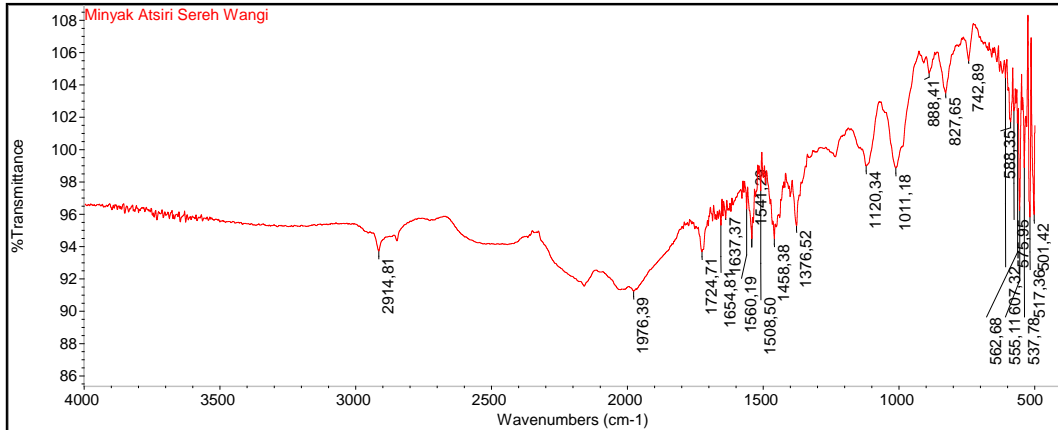


K. Uji Zeta potensial untuk formula optimum



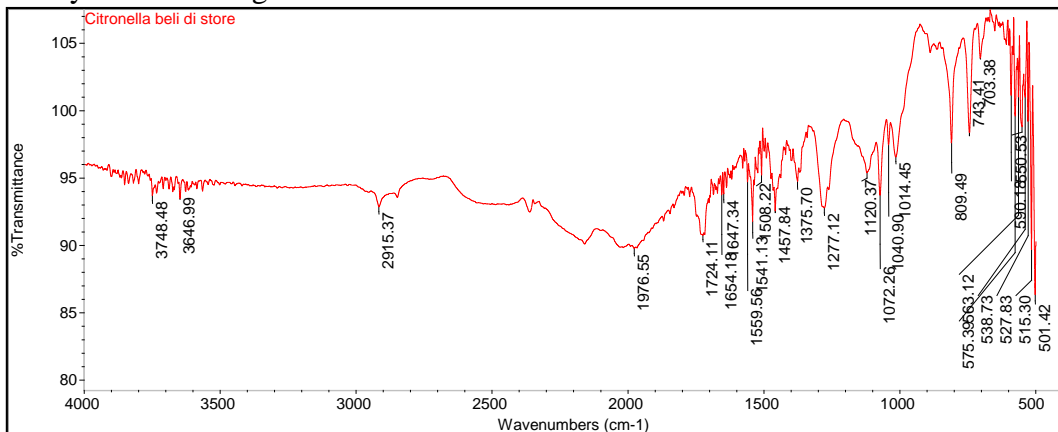
Lampiran 4. Karakterisasi minyak atsiri sereh wangi

Identifikasi *Spektrofotometri Fourier Transform Infra-Red (FTIR)*
Minyak atsiri sereh wangi desa Payakabung



Bilangan Gelombang (cm ⁻¹)	Perkiraan Gugus Fungsi
2914,81	CH alkana
1724,71	C=O Keton
1654,81	C=C alkena
1376,52	-CH ₃
827,65	-C-H alkena

Minyak sereh wangi tersertifikasi



Bilangan Gelombang (cm ⁻¹)	Perkiraan Gugus Fungsi
2915,37	CH alkana
1724,11	C=O Keton
1654,18	C=C alkana
1375,70	-CH ₃
809,49	-C-H alkana

A. Penentuan bobot jenis

Piknometer kosong	Piknometer degan aquadest	Minyak sereh	Rata-rata
			0,8819 g/mL

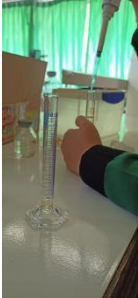


Bobot jenis

$$\begin{aligned}
 \text{Replikasi 1} &= \frac{\text{Bobot sampel (g)}}{\text{Bobot aquadest (ml)}} \\
 &= \frac{23,91 \text{ gr} - 15,16 \text{ gr}}{25,07 \text{ ml} - 15,16 \text{ ml}} \\
 &= \frac{8,75 \text{ gr}}{9,91 \text{ ml}} = 0,8829 \text{ gr/mL}
 \end{aligned}$$

$$\begin{aligned}
 \text{Replikasi 2} &= \frac{\text{Bobot sampel (g)}}{\text{Bobot aquadest (ml)}} \\
 &= \frac{23,90 \text{ gr} - 15,16 \text{ gr}}{25,07 \text{ ml} - 15,16 \text{ ml}} \\
 &= \frac{8,74 \text{ gr}}{9,91 \text{ ml}} = 0,8819 \text{ gr/mL}
 \end{aligned}$$

$$\begin{aligned}
 \text{Replikasi 3} &= \frac{\text{Bobot sampel (g)}}{\text{Bobot aquadest (ml)}} \\
 &= \frac{23,89 \text{ gr} - 15,16 \text{ gr}}{25,07 \text{ ml} - 15,16 \text{ ml}} \\
 &= \frac{8,73 \text{ gr}}{9,91 \text{ ml}} = 0,8809 \text{ gr/mL}
 \end{aligned}$$




B. Kelarutan dalam etanol 80%

Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata
			1 : 1,7

C. Identifikasi warna

Citronella oil Official store	Minyak serih wangi desa payakabung	Minyak serih wangi	Keterangan
			Jernih kekuningan

D. Bilangan asam

Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata
			2,0778

Bilangan asam

$$\begin{aligned}
 \text{Replikasi 1} &= \frac{\text{ml KOH} \times N \text{ KOH} \times 56,1}{\text{Bobot contoh (gram)}} \\
 &= \frac{2 \text{ ml} \times 0,1 N \times 56,1}{4,05 \text{ gram}} \\
 &= \frac{11,22}{4,05} = 2,7704 \text{ mL}
 \end{aligned}$$

$$\begin{aligned}
 \text{Replikasi 2} &= \frac{\text{ml KOH} \times N \text{ KOH} \times 56,1}{\text{Bobot contoh (gram)}} \\
 &= \frac{1,5 \text{ ml} \times 0,1 N \times 56,1}{4,05 \text{ gram}} \\
 &= \frac{8,415}{4,05} = 2,0778 \text{ mL}
 \end{aligned}$$

$$\begin{aligned}
 \text{Replikasi 3} &= \frac{\text{ml KOH} \times N \text{ KOH} \times 56,1}{\text{Bobot contoh (gram)}} \\
 &= \frac{1 \text{ ml} \times 0,1 N \times 56,1}{4,05 \text{ gram}} \\
 &= \frac{5,61}{4,05} = 1,3852 \text{ mL}
 \end{aligned}$$

Lampiran 5. Lampiran *design expert* 12

A. Desain faktorial 2 level

Regular Two-Level Factorial Design

Design for 2 to 21 factors where each factor is set to 2 levels. Useful for estimating main effects and interactions. Fractional factorials can be used for screening many factors to find the significant few. The color coding represents the design resolution: **Green** (Characterization) = Res V or higher, **Yellow** (Screening) = Res IV, and **Red** (Ruggedness testing) = Res III.

Replicates: 3 Blocks: 1 Center points per block: 0 Show Generators

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
4	2 ²	2 ³																		
8		2 ⁵	2 ⁶⁻¹	2 ⁷⁻²	2 ⁸⁻³	2 ⁹⁻⁴	2 ¹⁰⁻⁵													
16			2 ⁴	2 ⁵⁻¹	2 ⁶⁻²	2 ⁷⁻³	2 ⁸⁻⁴	2 ⁹⁻⁵	2 ¹⁰⁻⁶	2 ¹¹⁻⁷	2 ¹²⁻⁸	2 ¹³⁻⁹	2 ¹⁴⁻¹⁰	2 ¹⁵⁻¹¹						
32				2 ⁵	2 ⁶⁻¹	2 ⁷⁻²	2 ⁸⁻³	2 ⁹⁻⁴	2 ¹⁰⁻⁵	2 ¹¹⁻⁶	2 ¹²⁻⁷	2 ¹³⁻⁸	2 ¹⁴⁻⁹	2 ¹⁵⁻¹⁰	2 ¹⁶⁻¹¹	2 ¹⁷⁻¹²	2 ¹⁸⁻¹³	2 ¹⁹⁻¹⁴	2 ²⁰⁻¹⁵	2 ²¹⁻¹⁶
64					2 ⁶	2 ⁷⁻¹	2 ⁸⁻²	2 ⁹⁻³	2 ¹⁰⁻⁴	2 ¹¹⁻⁵	2 ¹²⁻⁶	2 ¹³⁻⁷	2 ¹⁴⁻⁸	2 ¹⁵⁻⁹	2 ¹⁶⁻¹⁰	2 ¹⁷⁻¹¹	2 ¹⁸⁻¹²	2 ¹⁹⁻¹³	2 ²⁰⁻¹⁴	2 ²¹⁻¹⁵
128						2 ⁷	2 ⁸⁻¹	2 ⁹⁻²	2 ¹⁰⁻³	2 ¹¹⁻⁴	2 ¹²⁻⁵	2 ¹³⁻⁶	2 ¹⁴⁻⁷	2 ¹⁵⁻⁸	2 ¹⁶⁻⁹	2 ¹⁷⁻¹⁰	2 ¹⁸⁻¹¹	2 ¹⁹⁻¹²	2 ²⁰⁻¹³	2 ²¹⁻¹⁴
256							2 ⁸	2 ⁹⁻¹	2 ¹⁰⁻²	2 ¹¹⁻³	2 ¹²⁻⁴	2 ¹³⁻⁵	2 ¹⁴⁻⁶	2 ¹⁵⁻⁷	2 ¹⁶⁻⁸	2 ¹⁷⁻⁹	2 ¹⁸⁻¹⁰	2 ¹⁹⁻¹¹	2 ²⁰⁻¹²	2 ²¹⁻¹³
512								2 ⁹	2 ¹⁰⁻¹	2 ¹¹⁻²	2 ¹²⁻³	2 ¹³⁻⁴	2 ¹⁴⁻⁵	2 ¹⁵⁻⁶	2 ¹⁶⁻⁷	2 ¹⁷⁻⁸	2 ¹⁸⁻⁹	2 ¹⁹⁻¹⁰	2 ²⁰⁻¹¹	2 ²¹⁻¹²

B. Faktor

Regular Two-Level Factorial Design

Factors: 2

Horizontal
 Vertical

	Name	Units	Type	Low	High
A	[Numeric] Tween 80	%	Numeric	36	45
B	[Numeric] Propilen Glikol	%	Numeric	12	25

C. Respon

Regular Two-Level Factorial Design

Optional Power Wizard: For each response, you may enter the minimum change the design should detect as statistically significant and the estimated standard deviation (generally obtained from historical data). The ratio will then be calculated in the Delta/Sigma field. Press **Next** to see the calculated power for each response.

Responses: 3 (1 to 999) Horizontal Vertical Edit response types

Name	Units	Diff. to detect Delta("Signal")	Est. Std. Dev. Sigma("Noise")	Delta/Sigma (Signal/Noise Ratio)
% Transmittar %	2		1	2
Bobot Jenis g/mL	2		1	2
Viskositas cP	2		1	2

Buttons: Cancel, << Back, Next >>, Finish

D. Optimasi formula

Navigation Pane: Design (Actual), Information, Notes, Summary, Graph Columns, Evaluation, Analysis, Optimization, Post Analysis, Point Prediction

Std	Run	Factor 1 A:Tween 80 %	Factor 2 B:Propilen Glikol %	Response 1 Uji Transmittan %	Response 2 Bobot Jenis g/mL g/mL	Response 3 Viskositas mPas
10	1	45	25			
8	2	36	25			
11	3	45	25			
4	4	45	12			
5	5	45	12			
3	6	36	12			
12	7	45	25			
9	8	36	25			
2	9	36	12			
1	10	36	12			
6	11	45	12			
7	12	36	25			

Design Properties:

- Cell: Cell Status Normal
- Run 12: Comment, Row Status Normal
- Response: Name Viskositas, Units mPas, Format General

Lampiran 6. Respon hasil evaluasi *design expert* 12

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File Edit View Display Options Design Tools Help

Design Layout Column Info Pop-Out View

Navigation Pane

Std	Run	Factor 1 A:Tween 80 %	Factor 2 B:Propilen Glikol %	Response 1 Uji Transmitan %	Response 2 Bobot Jenis g/mL g/mL	Response 3 Viskositas mPas
10	1	45	25	99.8	1.0636	12.5402
8	2	36	25	99.9	1.0585	16.638
11	3	45	25	99.7	1.0626	13.0071
4	4	45	12	95.9	1.0636	19.3212
5	5	45	12	94.6	1.0646	19.611
3	6	36	12	99.4	1.0575	25.2164
12	7	45	25	99.8	1.0626	14.2626
9	8	36	25	99.7	1.0575	15.6422
2	9	36	12	99.1	1.0545	26.8294
1	10	36	12	98.9	1.0555	26.5411
6	11	45	12	93.8	1.0636	18.9686
7	12	36	25	99.8	1.0585	15.0093

Design Properties

Run 1

Comment

Row Status Normal

For Help, press F1

Type here to search

23°C Berawan 5:06 PM 8/10/2022

Lampiran 7. Anova respon transmitan (%) *design expert* 12

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File Edit View Display Options Design Tools Help

Transform Effects ANOVA Diagnostics Model Graphs

Navigation Pane

Design (Actual)

Information

Notes

Summary

Graph Columns

Evaluation

Analysis

R1:Uji Transmitan (Analyzed)

R2:Bobot Jenis g/mL (Analyzed)

R3:Viskositas (Analyzed)

Optimization

Numerical

Graphical

Post Analysis

Point Prediction

Confirmation

Coefficients Table

Analysis of Variance

ANOVA for selected factorial model

Response 1: Uji Transmitan

Source	Sum of Squares	df	Mean Square	F-value	p-value	Significant
Model	52.69	3	17.56	58.54	< 0.0001	significant
A-Tween 80	14.52	1	14.52	48.40	0.0001	
B-Propilen Glikol	24.08	1	24.08	80.28	< 0.0001	
AB	14.08	1	14.08	46.94	0.0001	
Pure Error	2.40	8	0.3000			
Cor Total	55.09	11				

Factor coding is Coded.

Sum of squares is Type III - Partial

The Model F-value of 58.54 implies the model is significant. There is only a 0.01% chance that an F-value this large could occur due to noise.

P-values less than 0.0500 indicate model terms are significant. In this case A, B, AB are significant model terms. Values greater than 0.1000 indicate the model terms are not significant. If there are many insignificant model terms (not counting those required to support hierarchy), model reduction may improve your model.

Fit Statistics

Std. Dev.	0.5477	R ²	0.9564
Mean	98.37	Adjusted R ²	0.9401
C.V. %	0.5568	Predicted R ²	0.9020
		Adeq Precision	15.9168

The Predicted R² of 0.9020 is in reasonable agreement with the Adjusted R² of 0.9401; i.e. the difference is less than 0.2.

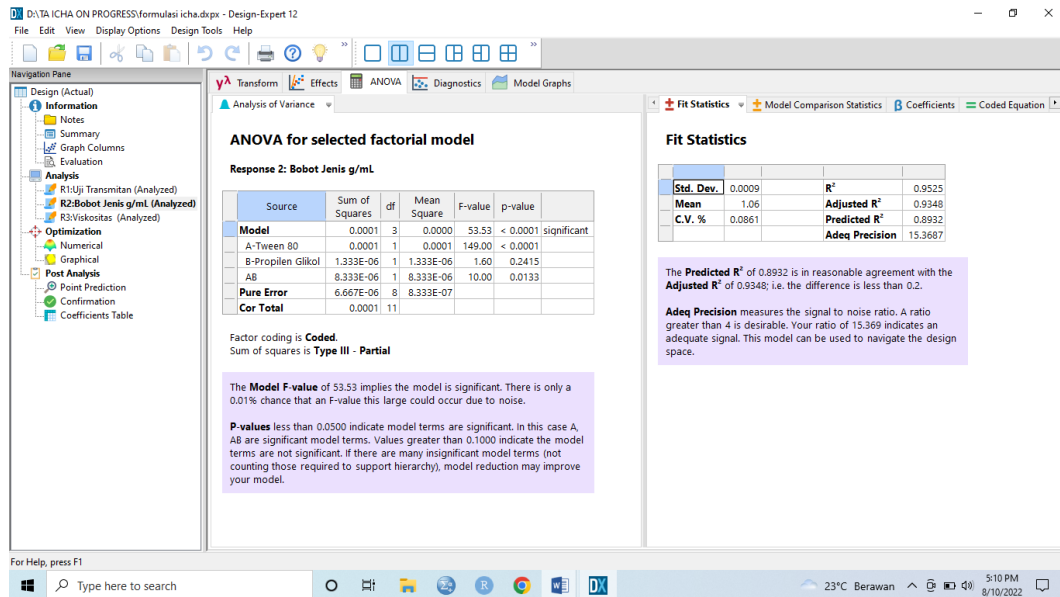
Adeq Precision measures the signal to noise ratio. A ratio greater than 4 is desirable. Your ratio of 15.917 indicates an adequate signal. This model can be used to navigate the design space.

For Help, press F1

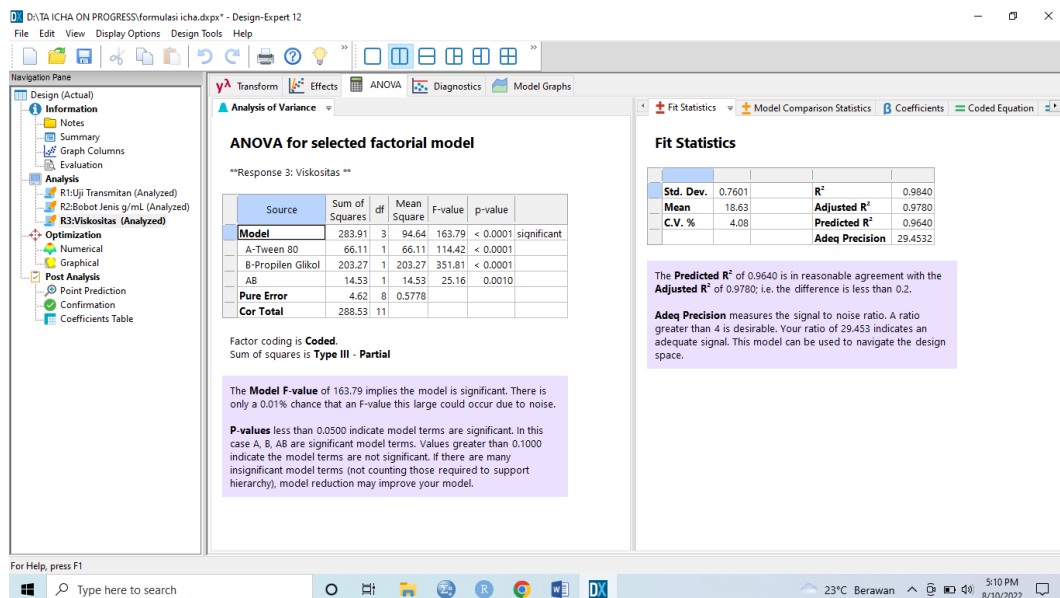
Type here to search

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Lampiran 8. Anova bobot jenis *design expert 12*



Lampiran 9. Anova respon viskositas *design expert 12*



Lampiran 10. Formula optimum *design expert 12*

Constraints

Name	Goal	Lower Limit	Upper Limit	Lower Weight	Upper Weight	Importance
A:Tween 80	is in range	36	45	1	1	3
B:Propilen Glikol	is in range	12	25	1	1	3
Uji Transmittan	maximize	90	100	0.1	0.1	5
Bobot Jenis g/mL	maximize	1.0545	1.0646	0.1	0.1	5
viskositas	minimize	1	100	0.1	0.1	5

Solutions

6 Solutions found

Number	Tween 80	Propilen Glikol	Uji Transmittan	Bobot Jenis g/mL	Viskositas	Desirability
1	45.000	25.000	99.767	1.063	13.270	0.989 Selected
2	44.968	25.000	99.767	1.063	13.279	0.989
3	45.000	24.920	99.736	1.063	13.307	0.989
4	44.923	25.000	99.767	1.063	13.291	0.989
5	45.000	24.754	99.672	1.063	13.384	0.989
6	45.000	24.375	99.526	1.063	13.560	0.988

Lampiran 11. CI(%) dan PI(%) *design expert 12*

Factors

Factor	Name	Level	Low Level	High Level	Std. Dev.	Coding
A	Tween 80	45.00	36.00	45.00	0.0000	Actual
B	Propilen Glikol	25.00	12.00	25.00	0.0000	Actual

Point Prediction

Two-sided Confidence = 95% Population = 99%

Solution 1 of 6 Response	Predicted Mean	Predicted Median	Observed	Std Dev	SE Mean	95% CI low for Mean	95% CI high for Mean	95% TI low for 99% Pop	95% TI high for 99% Pop
Uji Transmittan	99.7667	99.7667		0.547723	0.316228	99.0374	100.496	96.7647	102.769
Bobot Jenis q/mL	1.06293	1.06293		0.000912871	0.000527046	1.06172	1.06415	1.05793	1.06794
Viskositas	13.27	13.27		0.760117	0.438854	12.258	14.282	9.10384	17.4361

Lampiran 12. Konfirmasi formula optimum *design expert 12*

Confirmation Location #1

Tween 80 | Propilen Glikol
45 | 25

Response data

Runs: 1

Uji Transmitan	Bobot Jenis g/mL	Viskositas
99.4	1.06357	13.3

Confirmation

Two-sided Confidence = 95%

Solution 1 of 6 Response	Predicted Mean	Predicted Median	Observed	Std Dev	n	SE Pred	95% PI low	Data Mean	95% PI high
Uji Transmitan	99.7667	99.7667		0.547723	1	0.632456	98.3082	99.4	101.225
Bobot Jenis q/mL	1.06293	1.06293		0.000912871	1	0.00105409	1.0605	1.06357	1.06536
Viskositas	13.27	13.27		0.760117	1	0.877708	11.246	13.3	15.294

Lampiran 13. Persamaan matematis (regresi) *design expert 12*

Coefficients Table

p-value shading: $p < 0.05$ $0.05 \leq p < 0.1$ $p \geq 0.1$

	Intercept	A	B	AB
Uji Transmitan	98.3667	-1.1	1.41667	1.08333
p-values	0.0001	< 0.0001	0.0001	0.0001
Bobot Jenis q/mL	1.06022	0.00321667	0.000333333	0.000833333
p-values	< 0.0001	0.2415	0.0133	
Viskositas	18.6322	-2.34714	-4.11568	1.10054
p-values	< 0.0001	< 0.0001	0.0010	

Lampiran 14. Perhitungan formula nanoemulsi minyak atsiri sereh wangi (*Cymbopogon nardus L.*).

- Formula 1

$$\begin{aligned} \text{Minyak atsiri} &= \frac{2}{100} * 50 \text{ mL} = 1 \text{ mL} \\ \text{Tween} &= \frac{36}{100} * 50 \text{ mL} = 18 + 20\%(18) = 21,6 \text{ mL} \\ \text{Propilen glikol} &= \frac{12}{100} * 50 \text{ mL} = 6 + 20\%(6) = 7,5 \text{ mL} \\ \text{Metyl paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{Propil paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{BHT} &= \frac{0,03}{100} * 50 \text{ mL} = 0,015 + 20\%(0,015) = 0,018 \text{ gram} \\ \text{Aquadest} &= 50 \text{ mL} - (1 + 21,6 + 7,5 + 0,06 + 0,06 + 0,18) = \\ &19,762 \text{ mL} \end{aligned}$$

- Formula 2

$$\begin{aligned} \text{Minyak atsiri} &= \frac{2}{100} * 50 \text{ mL} = 1 \text{ mL} \\ \text{Tween} &= \frac{36}{100} * 50 \text{ mL} = 18 + 20\%(18) = 21,6 \text{ mL} \\ \text{Propilen glikol} &= \frac{25}{100} * 50 \text{ mL} = 12,5 + 20\%(12,5) = 15 \text{ mL} \\ \text{Metyl paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{Propil paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{BHT} &= \frac{0,03}{100} * 50 \text{ mL} = 0,015 + 20\%(0,015) = 0,018 \text{ gram} \\ \text{Aquadest} &= 50 \text{ mL} - (1 + 21,6 + 15 + 0,06 + 0,06 + 0,18) = 12,262 \text{ mL} \end{aligned}$$

- Formula 3

$$\begin{aligned} \text{Minyak atsiri} &= \frac{2}{100} * 50 \text{ mL} = 1 \text{ mL} \\ \text{Tween} &= \frac{45}{100} * 50 \text{ mL} = 22,5 + 20\%(22,5) = 27 \text{ mL} \\ \text{Propilen glikol} &= \frac{12}{100} * 50 \text{ mL} = 6 + 20\%(6) = 7,5 \text{ mL} \\ \text{Metyl paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{Propil paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\ \text{BHT} &= \frac{0,03}{100} * 50 \text{ mL} = 0,015 + 20\%(0,015) = 0,018 \text{ gram} \\ \text{Aquadest} &= 50 \text{ mL} - (1 + 27 + 7,5 + 0,06 + 0,06 + 0,18) = 14,362 \text{ mL} \end{aligned}$$


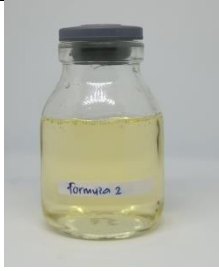

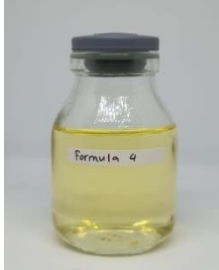
- Formula 4

$$\begin{aligned} \text{Minyak atsiri} &= \frac{2}{100} * 50 \text{ mL} = 1 \text{ mL} \\ \text{Tween} &= \frac{45}{100} * 50 \text{ mL} = 22,5 + 20\%(22,5) = 27 \text{ mL} \end{aligned}$$

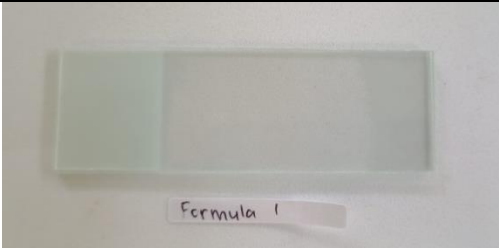
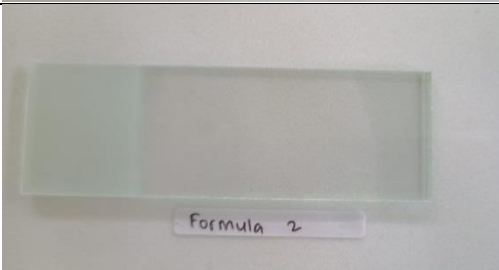

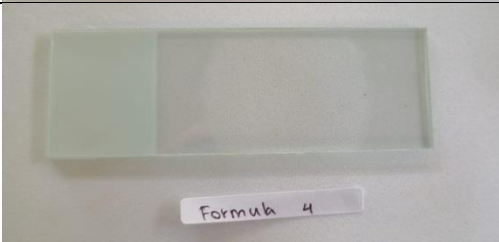
$$\begin{aligned}
\text{Propilen glikol} &= \frac{25}{100} * 50 \text{ mL} = 12,5 + 20\%(12,5) = 15 \text{ mL} \\
\text{Metyl paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\
\text{Propil paraben} &= \frac{0,1}{100} * 50 \text{ mL} = 0,05 + 20\%(0,05) = 0,06 \text{ gram} \\
\text{BHT} &= \frac{0,03}{100} * 50 \text{ mL} = 0,015 + 20\%(0,015) = 0,018 \text{ gram} \\
\text{Aquadest} &= 50 \text{ mL} - (1 + 27 + 15 + 0,06 + 0,06 + 0,18) = 6,862 \text{ mL}
\end{aligned}$$

Lampiran 15. Evaluasi sediaan nanoemulsi minyak atsiri sereh wangi


A. Uji Organoleptis

Formula	Nanoemuls	Warna	Kejernihan	Aroma
1		Kuning	Jernih	Khas sereh wangi
2		Kuning	Jernih	Khas sereh wangi
3		Kuning	Jernih	Khas sereh wangi
4		Kuning	Jernih	Khas sereh wangi










B. Uji Homogenitas




Formula	Nanoemulsi	Keterangan
1		Homogen
2		Homogen
3		Homogen
4		Homogen

C. Uji pH

Formula	Pengujian	Nilai pH
1	 <p>The image shows a pH test kit (MColorpHast™) and a glass vial labeled 'Formula 1'. The kit includes a color chart with pH values from 0 to 7. The vial contains a yellow liquid, which corresponds to a pH of 5 on the color chart.</p>	5
2	 <p>The image shows a pH test kit (MColorpHast™) and a glass vial labeled 'Formula 2'. The kit includes a color chart with pH values from 0 to 7. The vial contains a yellow liquid, which corresponds to a pH of 5 on the color chart.</p>	5
3	 <p>The image shows a pH test kit (MColorpHast™) and a glass vial labeled 'Formula 3'. The kit includes a color chart with pH values from 0 to 7. The vial contains a yellow liquid, which corresponds to a pH of 5 on the color chart.</p>	5
4	 <p>The image shows a pH test kit (MColorpHast™) and a glass vial labeled 'Formula 4'. The kit includes a color chart with pH values from 0 to 7. The vial contains a yellow liquid, which corresponds to a pH of 5 on the color chart.</p>	5

D. Penentuan bobot jenis

Formula	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata
1				1.0558 g/mL
2				1.0582 g/mL
3				1.0639 g/mL

4				1.0629 g/mL
---	---	---	--	----------------

Bobot Jenis

- Formula 1

$$\text{Replikasi 1} = \frac{(A2 - A)}{A1 - A} = \frac{25,64 - 15,16}{25,07 - 15,16} = \frac{10,48}{9,91} = 1,0575 \text{ g/mL}$$

$$\text{Replikasi 2} = \frac{(A2 - A)}{A1 - A} = \frac{25,61 - 15,16}{25,07 - 15,16} = \frac{10,45}{9,91} = 1,0545 \text{ g/mL}$$

$$\text{Replikasi 3} = \frac{(A2 - A)}{A1 - A} = \frac{25,62 - 15,16}{25,07 - 15,16} = \frac{10,46}{9,91} = 1,0555 \text{ g/mL}$$

- Formula 2

$$\text{Replikasi 1} = \frac{(A2 - A)}{A1 - A} = \frac{25,65 - 15,16}{25,07 - 15,16} = \frac{10,49}{9,91} = 1,0585 \text{ g/mL}$$

$$\text{Replikasi 2} = \frac{(A2 - A)}{A1 - A} = \frac{25,64 - 15,16}{25,07 - 15,16} = \frac{10,48}{9,91} = 1,0575 \text{ g/mL}$$

$$\text{Replikasi 3} = \frac{(A2 - A)}{A1 - A} = \frac{25,65 - 15,16}{25,07 - 15,16} = \frac{10,49}{9,91} = 1,0585 \text{ g/mL}$$

- Formula 3

$$\text{Replikasi 1} = \frac{(A2 - A)}{A1 - A} = \frac{25,70 - 15,16}{25,07 - 15,16} = \frac{10,54}{9,91} = 1,0636 \text{ g/mL}$$

$$\text{Replikasi 2} = \frac{(A2 - A)}{A1 - A} = \frac{25,71 - 15,16}{25,07 - 15,16} = \frac{10,55}{9,91} = 1,0646 \text{ g/mL}$$

$$\text{Replikasi 3} = \frac{(A2 - A)}{A1 - A} = \frac{25,70 - 15,16}{25,07 - 15,16} = \frac{10,54}{9,91} = 1,0636 \text{ g/mL}$$

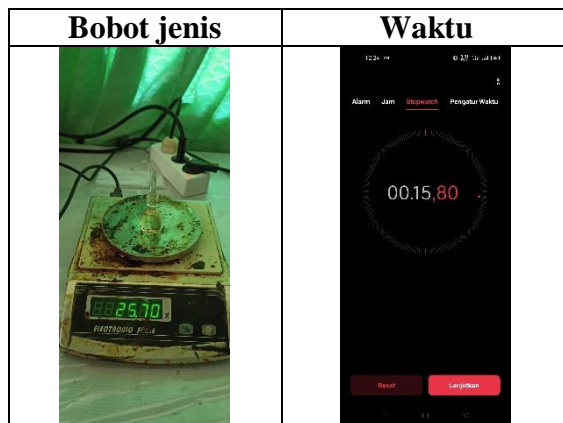
- Formula 4

$$\text{Replikasi 1} = \frac{(A2 - A)}{A1 - A} = \frac{25,70 - 15,16}{25,07 - 15,16} = \frac{10,54}{9,91} = 1,0636 \text{ g/mL}$$

$$\text{Replikasi 2} = \frac{(A2 - A)}{A1 - A} = \frac{25,69 - 15,16}{25,07 - 15,16} = \frac{10,53}{9,91} = 1,0626 \text{ g/mL}$$

$$\text{Replikasi 3} = \frac{(A2 - A)}{A1 - A} = \frac{25,69 - 15,16}{25,07 - 15,16} = \frac{10,53}{9,91} = 1,0626 \text{ g/mL}$$

Lampiran 16. Uji viskositas



Viskositas

ρ_1 (ρ air) dan η_1 (viskositas air) berdasarkan (Rowe, 2009) :

$$\rho_1 = 0,9971$$

$$\eta_1 = 0,89$$

$$t(\text{air}) \text{ rata-rata} = 1,05$$

- Formula 1

$$\text{Replikasi 1} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0575 \times 28,05} \gg \eta_2 = \frac{26,39996}{1,04696} = 25,21637 \text{ cP}$$

$$\text{Replikasi 2} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0545 \times 29,93} \gg \eta_2 = \frac{28,08946}{1,04696} = 26,82967 \text{ cP}$$

$$\text{Replikasi 3} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0555 \times 29,58} \gg \eta_2 = \frac{27,78730}{1,04696} = 26,54106 \text{ cP}$$

- Formula 2

$$\text{Replikasi 1} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0585 \times 18,49} \gg \eta_2 = \frac{17,41878}{1,04696} = 16,63799 \text{ cP}$$

$$\text{Replikasi 2} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0575 \times 17,40} \gg \eta_2 = \frac{16,37645}{1,04696} = 15,63799 \text{ cP}$$

$$\text{Replikasi 3} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0585 \times 16,68} \gg \eta_2 = \frac{15,71364}{1,04696} = 15,00928 \text{ cP}$$

- Formula 3

$$\text{Replikasi 1} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0636 \times 21,37} \gg \eta_2 = \frac{20,22893}{1,04696} = 19,32117 \text{ cP}$$

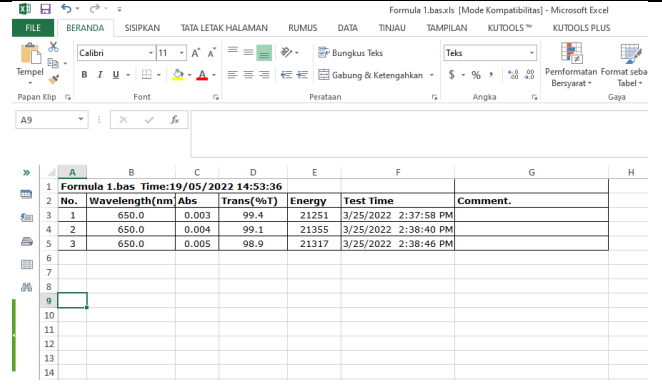
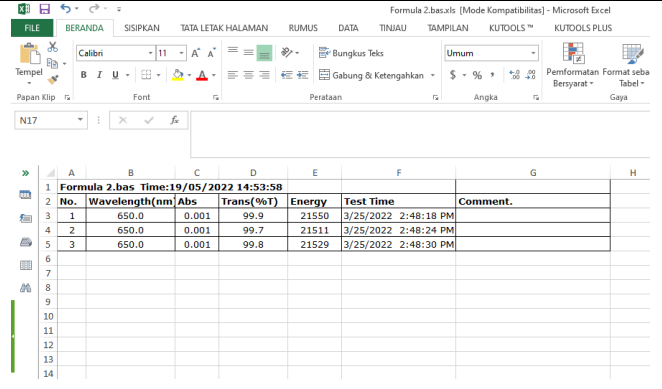
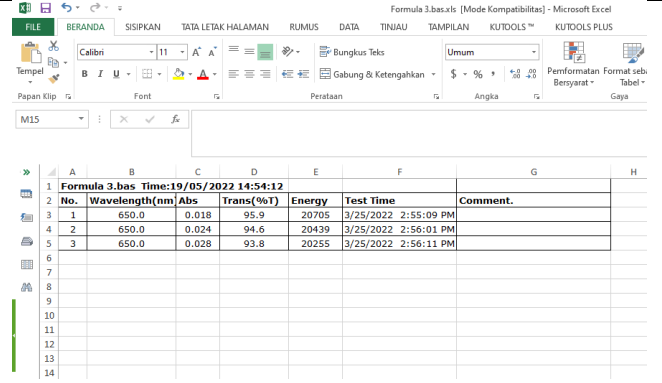
$$\text{Replikasi 2} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0646 \times 21,67} \gg \eta_2 = \frac{20,53219}{1,04696} = 19,61100 \text{ cP}$$

$$\text{Replikasi 3} = \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0636 \times 20,98} \gg \eta_2 = \frac{19,85975}{1,04696} = 18,96856 \text{ cP}$$

- Formula 4

$$\begin{aligned} \text{Replikasi 1} &= \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0636 \times 13,87} \gg \eta_2 = \frac{13,12940}{1,04696} = 12,54023 \text{ cP} \\ \text{Replikasi 2} &= \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0626 \times 14,40} \gg \eta_2 = \frac{13,61828}{1,04696} = 13,00706 \text{ cP} \\ \text{Replikasi 3} &= \frac{0,89}{\eta_2} = \frac{0,9971 \times 1,05}{1,0626 \times 15,79} \gg \eta_2 = \frac{14,93282}{1,04696} = 14,26260 \text{ cP} \end{aligned}$$

Lampiran 17. Uji transmittan

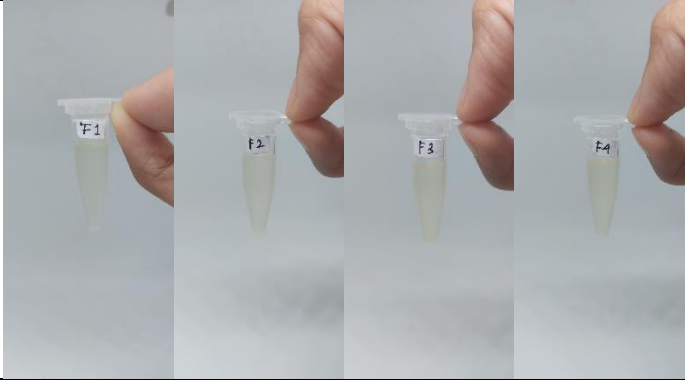
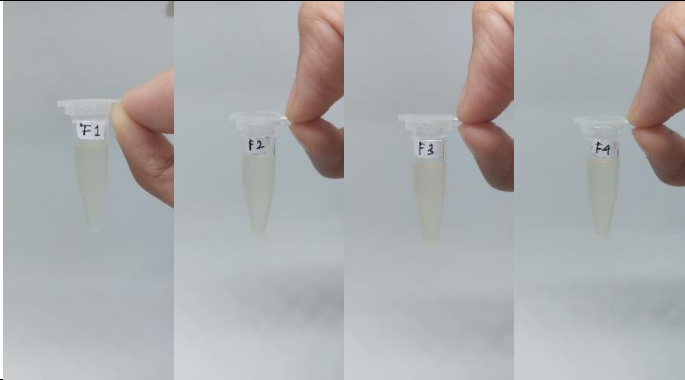
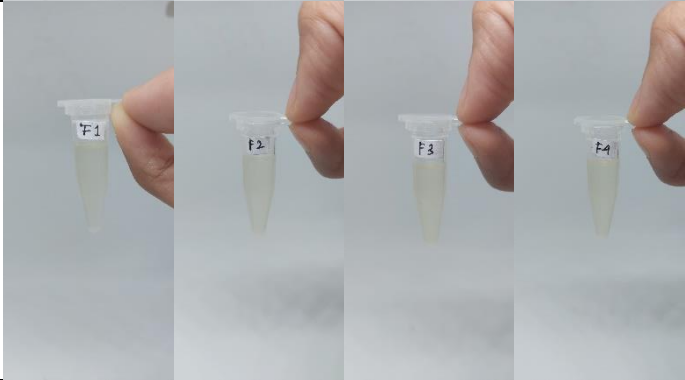
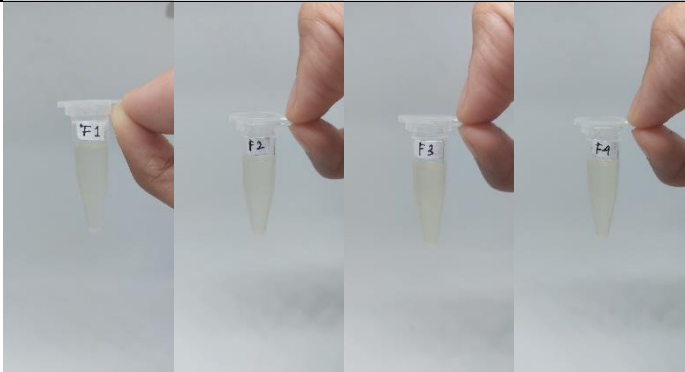
Formula	Nanoemulsi	Keterangan																												
1	 <table border="1" data-bbox="486 600 1098 683"> <thead> <tr> <th>No.</th> <th>Wavelength(nm)</th> <th>Abs</th> <th>Trans(%T)</th> <th>Energy</th> <th>Test Time</th> <th>Comment.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>650.0</td> <td>0.003</td> <td>99.4</td> <td>21251</td> <td>3/25/2022 2:37:58 PM</td> <td></td> </tr> <tr> <td>2</td> <td>650.0</td> <td>0.004</td> <td>99.1</td> <td>21355</td> <td>3/25/2022 2:38:40 PM</td> <td></td> </tr> <tr> <td>3</td> <td>650.0</td> <td>0.005</td> <td>98.9</td> <td>21317</td> <td>3/25/2022 2:38:46 PM</td> <td></td> </tr> </tbody> </table>	No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.	1	650.0	0.003	99.4	21251	3/25/2022 2:37:58 PM		2	650.0	0.004	99.1	21355	3/25/2022 2:38:40 PM		3	650.0	0.005	98.9	21317	3/25/2022 2:38:46 PM		99.4
No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.																								
1	650.0	0.003	99.4	21251	3/25/2022 2:37:58 PM																									
2	650.0	0.004	99.1	21355	3/25/2022 2:38:40 PM																									
3	650.0	0.005	98.9	21317	3/25/2022 2:38:46 PM																									
2	 <table border="1" data-bbox="486 1003 1098 1086"> <thead> <tr> <th>No.</th> <th>Wavelength(nm)</th> <th>Abs</th> <th>Trans(%T)</th> <th>Energy</th> <th>Test Time</th> <th>Comment.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>650.0</td> <td>0.001</td> <td>99.9</td> <td>21550</td> <td>3/25/2022 2:48:18 PM</td> <td></td> </tr> <tr> <td>2</td> <td>650.0</td> <td>0.001</td> <td>99.7</td> <td>21511</td> <td>3/25/2022 2:48:24 PM</td> <td></td> </tr> <tr> <td>3</td> <td>650.0</td> <td>0.001</td> <td>99.8</td> <td>21529</td> <td>3/25/2022 2:48:30 PM</td> <td></td> </tr> </tbody> </table>	No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.	1	650.0	0.001	99.9	21550	3/25/2022 2:48:18 PM		2	650.0	0.001	99.7	21511	3/25/2022 2:48:24 PM		3	650.0	0.001	99.8	21529	3/25/2022 2:48:30 PM		99.8
No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.																								
1	650.0	0.001	99.9	21550	3/25/2022 2:48:18 PM																									
2	650.0	0.001	99.7	21511	3/25/2022 2:48:24 PM																									
3	650.0	0.001	99.8	21529	3/25/2022 2:48:30 PM																									
3	 <table border="1" data-bbox="486 1400 1098 1482"> <thead> <tr> <th>No.</th> <th>Wavelength(nm)</th> <th>Abs</th> <th>Trans(%T)</th> <th>Energy</th> <th>Test Time</th> <th>Comment.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>650.0</td> <td>0.018</td> <td>95.9</td> <td>20705</td> <td>3/25/2022 2:55:09 PM</td> <td></td> </tr> <tr> <td>2</td> <td>650.0</td> <td>0.024</td> <td>94.6</td> <td>20439</td> <td>3/25/2022 2:56:01 PM</td> <td></td> </tr> <tr> <td>3</td> <td>650.0</td> <td>0.028</td> <td>93.8</td> <td>20255</td> <td>3/25/2022 2:56:11 PM</td> <td></td> </tr> </tbody> </table>	No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.	1	650.0	0.018	95.9	20705	3/25/2022 2:55:09 PM		2	650.0	0.024	94.6	20439	3/25/2022 2:56:01 PM		3	650.0	0.028	93.8	20255	3/25/2022 2:56:11 PM		94.7
No.	Wavelength(nm)	Abs	Trans(%T)	Energy	Test Time	Comment.																								
1	650.0	0.018	95.9	20705	3/25/2022 2:55:09 PM																									
2	650.0	0.024	94.6	20439	3/25/2022 2:56:01 PM																									
3	650.0	0.028	93.8	20255	3/25/2022 2:56:11 PM																									

4




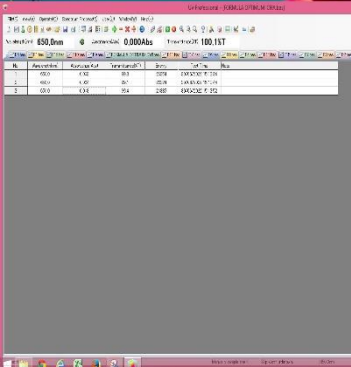
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3	650.0	0.001	99.8	21609	3/25/2022 3:09:42 PM	



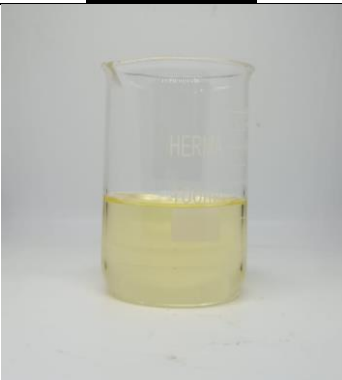


99.8


Lampiran 18. Uji stabilitas

Nanoemulsi	Keterangan
	<p><i>Uji heating-cooling cycle</i></p>
	<p>Uji sentrifugasi</p>
	<p><i>Uji freeze-thawing cycle</i></p>
	<p>Formula stabil</p>

Lampiran 19. Evaluasi formula optimum sediaan nanoemulsi minyak atsiri sereh wangi

Nomor	Uji	Gambar	Keterangan
1	Organoleptis		Warna kekuningan, Jernih dan baunya segar.
2	Homogenitas		Homogen
3	pH		5,86
4	Persen transmittan		95

5	Bobot jenis		1,028 g/mL
6	Viskositas		1,12 cP
7	Stabilitas Termodinamika		Stabil
8	Ukuran partikel		9,881 nm
9	Indeks polidispersitas		0,1365

10	Zeta potensial		-11,02 mV
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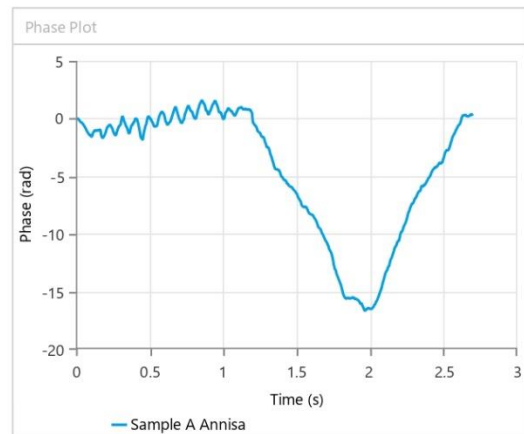
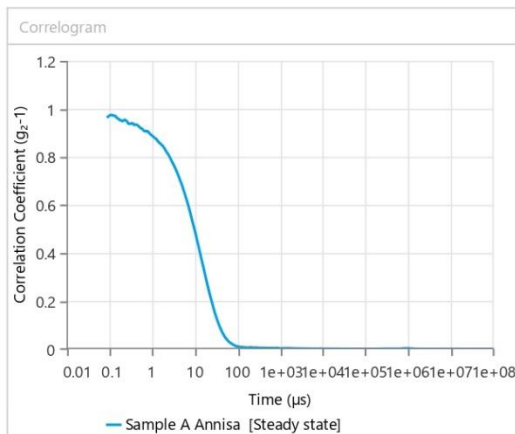
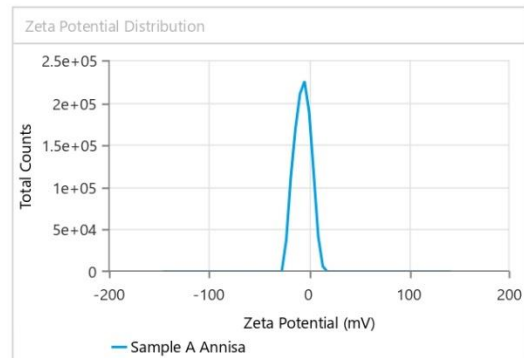
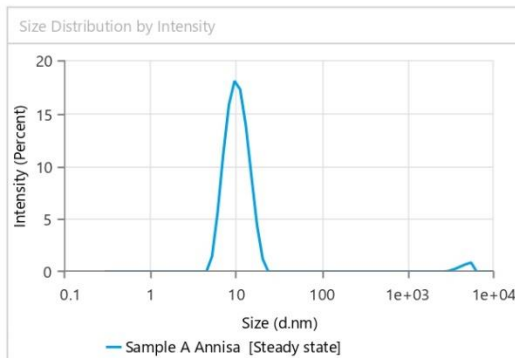
Lampiran 20.Uji Partikel, Indeks Polidispersitas dan Zeta Potensial

Size & Zeta Report

Malvern Panalytical



Sample Details	
Sample Name:	Sample A Annisa
Project Name:	Farmasi UnSri_210622
Date and Time:	Tuesday, June 21 2022 09:47:32 AM
Type:	Size
Cell Name:	DTS0012
Material Name:	Nano emulsion
Material RI:	1.52
Material Absorption:	0.1
Result Source:	Instrument
Temperature (°C):	25
Dispersant Name:	Water
Dispersant RI:	1.33
Dispersant Viscosity (cP):	0.887
Dispersant Dielectric Constant:	78.5



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ZS XPLOER
Page 1 of 2

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Template Created: 11/25/2019
Printed: 6/23/2022 10:11 AM

Size & Zeta Report

Malvern Panalytical



Statistics Table					
Name	Mean	Standard Deviation	RSD	Minimum	Maximum
Z-Average (nm)	10.11	-	-	10.11	10.11
Polydispersity Index (PI)	0.1724	-	-	0.1724	0.1724
Mean Count Rate (kcps)	310.1	-	-	310.1	310.1
Peak 1 Mean by Intensity ordered by area (nm)	10.65	-	-	10.65	10.65
Peak 2 Mean by Intensity ordered by area (nm)	4682	-	-	4682	4682
Intercept	0.9711	-	-	0.9711	0.9711
Fit Error	0.001039	-	-	0.001039	0.001039

Statistics Table					
Name	Mean	Standard Deviation	RSD	Minimum	Maximum
Zeta Potential (mV)	-6.317	-	-	-6.317	-6.317
Zeta Deviation (mV)	8.024	-	-	8.024	8.024
Conductivity (mS/cm)	0.03568	-	-	0.03568	0.03568
Zeta Peak One Area	100	-	-	100	100
Zeta Peak One Mean	-6.458	-	-	-6.458	-6.458
Zeta Peak One Width	8.106	-	-	8.106	8.106
Mean Count Rate (kcps)	147.5	-	-	147.5	147.5
Derived Mean Count Rate (kcps)	1.053E+04	-	-	1.053E+04	1.053E+04

