

LAMPIRAN

Lampiran 1 Certificate of Analysis Vitamin E Asetat



DL-A-TOCOPHERYL ACETATE



CERTIFICATE OF ANALYSIS

Productcode : 0420085
 Lot No. : UT18080219
 Analysis No. : 03D07192

Test	Result	Limits / Specifications	Dimension / Units
Appearance visual	clear viscous oil	clear viscous oil	
Colour visual	colourless	colourless almost colourless slightly yellow slightly greenish yellow	
Identity GC	corresponds	corresponds	
Optical rotation Ph.Eur.	0.00	-0.01 to +0.01	*
Heavymetals ICP-MS	corresponds*	max. 10	ppm
Lead ICP-MS	corresponds*	max. 2	ppm
Arsenic ICP-MS	corresponds*	max. 1	ppm
Mercury ICP-MS	corresponds*	max. 0.1	ppm
Cadmium ICP-MS	corresponds*	max. 0.5	ppm
Residual Solvents			
- Pyridine GC	corresponds*	max. 200	ppm
- Toluene GC	corresponds*	max. 890	ppm
Acidity Titration / USP	0.1	max. 1.0	ml 0.10N NaOH
Related Subst. (Ph.Eur.)			
- Impurity A GC	0.1	max. 0.5	%
- Impurity B GC	0.6	max. 0.6	%
- Impurity C (free tocopherol) GC	0.1	max. 0.5	%
- Impurity D and E GC	0.3	max. 1.0	%
- Any other impurity, each GC	0.07	max. 0.25	%
- Total GC	1.6	max. 2.5	%

DSM Nutritional Products Ltd
 Branch Site Sisseln
 Quality Management
 CH-4334 Sisseln

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Date of issue : 31-Aug-2018

**DL-A-TOCOPHERYL ACETATE****CERTIFICATE OF ANALYSIS**

Productcode : 0420085
Lot No. : UT18080219
Analysis No. : 03D07192

Test	Result	Limits / Specifications	Dimension / Units
Assay Tocopherylacetate (Ph.Eur.) GC	99.4	95.5 to 102.0	%
Assay Tocopherylacetate (USP/FCC) GC	98.5	95.0 to 102.0	%

*) checked at regular intervals

This lot was analysed and released by our authorized Quality Control Department and was found to meet the specifications as given above.

The product meets all requirements of the following valid compendia when tested accordingly:
USP, FCC, Ph.Eur.

DSM Nutritional Products Ltd
The Quality Assurance Manager

Zoehner Juergen

Lampiran 2 Certificate of Analysis Geleol



GATTEFOSSÉ
Certificate of Analysis

Product name : GELEOL MONO AND DIGLYCERIDES NF			
Item N° : 5749PPD			
Batch N° : 176267			
Manufacturing date : 07.2019			
Expiry date : 07.2022			
CHEMICAL DEFINITION : Glycerol monostearate 40-55 (Type I) EP current edition / Mono and diglycerides NF current edition.			
Characteristic	Method	Specification	Result
APPEARANCE	MA0193	Waxy solid	Conforms
ODOUR	MA0170	Faint	Conforms
COLOUR (Gardner Scale)	MA0214	<= 3.0	1.0
MELTING POINT (Cap Tube)	MA0167	54.0 to 64.0 °C	58.5
DROP POINT (METTLER)	MA0003	54.5 to 64.5 °C	59.3
ACID VALUE	MA0008	<= 1.5 mgKOH/g	0.2
SAPONIFICATION VALUE (NV = 174)	MA0172	158 to 177 mgKOH/g	174
IODINE VALUE (NV < 3)	MA0092	<= 3.0 gI2/100g	<= 3.0*
WATER CONTENT	MA0007	<= 1.0 %	< 0.1
HYDROXYL VALUE (NV = 216)	MA0172	194 to 237 mgKOH/g	227
FREE GLYCEROL CONTENT	MA0006	<= 3.0 %	1.4
TOTAL MONOGLYCERIDES CONTENT (NV = 47)	MA0006	42.3 to 51.7 %	50.1
TOTAL DIESTERS CONTENT	MA0006	30.0 to 45.0 %	40.3
TOTAL TRIESTERS CONTENT	MA0006	5.0 to 15.0 %	8.1
STEARIC ACID (C18)	MA0002	40.0 to 60.0 %	53.4
SUM OF PALMITIC AND STEARIC ACIDS	MA0002	>= 90.0 %	98.6
TOTAL ASHES CONTENT	MA0028	<= 0.1 %	<= 0.1*
HEAVY METALS CONTENT (Pb)	MA0032	< 10 ppm	Conforms *
NICKEL CONTENT	MA0256	< 1 ppm	Conforms *
ARSENIC CONTENT	MA0323	< 2 ppm	Conforms *
RESIDUAL SOLVENTS (Eur. Pharm., USP/NF)		Meets the requirements	Conforms *
EUR. PHARM. AND USP/NF (Current ed.)		Conforms	Conforms *
RESIDUE ON IGNITION	MA0028	<= 0.10 %	<= 0.10*
MONOESTER AND DIESTER CONTENT	MA0006	>= 70 %	90
LEAD CONTENT	MA0323	< 2 ppm	Conforms *
MERCURY CONTENT	MA0323	< 1 ppm	Conforms *
CADMIUM CONTENT	MA0323	< 1 ppm	Conforms *
TOTAL GLYCEROL CONTENT	MA0328	16.0 to 33.0 %	21.9

* Characteristic guaranteed but not tested.

This batch was released by our authorized Quality Manager and was found to meet the specifications as stated above. The above results do not discharge the customer from the obligation to carry out an inspection of goods received.
This report has been produced electronically and does not require a signature.

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Lampiran 3 Hasil Karakterisasi NLC Vitamin E Asetat

Data Karakterisasi NLC Vitamin E Asetat Hari Ke-1

Formula	Ukuran Partikel (nm)	PdI	Zeta Potensial (mV)	Entrapment Efficiency (%)
F1	273.53 ± 11.90	0.66 ± 0.03	-25.03 ± 1.35	97.10 ± 1.14
F2	202.30 ± 17.08	0.45 ± 0.04	-43.33 ± 3.76	94.34 ± 1.04
F3	272.40 ± 13.62	0.61 ± 0.01	-27.50 ± 2.28	97.00 ± 0.76
F4	234.63 ± 11.66	0.59 ± 0.01	-36.27 ± 4.55	88.08 ± 1.08
F5	209.73 ± 8.02	0.40 ± 0.10	-38.47 ± 5.39	96.74 ± 1.28

Data Karakterisasi NLC Vitamin E Asetat Hari Ke-30

Formula	Ukuran Partikel (nm)	PdI	Zeta Potensial (mV)	Entrapment Efficiency (%)
F1	291.93 ± 66.14	0.63 ± 0.12	-26.17 ± 1.22	96.63 ± 0.63
F2	205.33 ± 3.60	0.51 ± 0.01	-33.30 ± 0.43	93.06 ± 0.38
F3	245.17 ± 13.62	0.65 ± 0.01	-27.03 ± 2.21	94.81 ± 0.44
F4	251.73 ± 31.45	0.63 ± 0.12	-21.13 ± 0.95	87.62 ± 1.70
F5	621.70 ± 271.3	0.73 ± 0.04	-30.57 ± 1.67	93.53 ± 1.74

Lampiran 4 Kurva Kalibrasi Vitamin E Asetat

1.1 Perhitungan Pembuatan Larutan Vitamin E Asetat

1.1.1 Larutan Induk

$$\begin{aligned}\text{Konsentrasi Larutan} &= \frac{\text{Bobot vitamin E asetat}}{\text{volume}} \\ 100 \text{ ppm} &= \frac{100 \text{ mg}}{1000 \text{ mL}} \\ &= \frac{10 \text{ mg}}{100 \text{ mL}} \\ \text{Bobot vitamin E asetat} &= \frac{5 \text{ mg}}{50 \text{ mL}}\end{aligned}$$

1.1.2 Pengenceran Larutan

a. Konsentrasi 10 ppm

$$\begin{aligned}V_1 \times C_1 &= V_2 \times C_2 \\ V_1 \times 100 \text{ ppm} &= 5 \text{ ml} \times 10 \text{ ppm} \\ V_1 &= \frac{50 \text{ ml}}{100 \text{ ppm}} \\ V_1 &= 0,5 \text{ ml} = 500 \mu\text{L}\end{aligned}$$

b. Konsentrasi 9 ppm

$$\begin{aligned}V_1 \times C_1 &= V_2 \times C_2 \\ V_1 \times 100 \text{ ppm} &= 5 \text{ ml} \times 9 \text{ ppm} \\ V_1 &= \frac{45 \text{ ml}}{100 \text{ ppm}} \\ V_1 &= 0,45 \text{ ml} = 450 \mu\text{L}\end{aligned}$$

c. Konsentrasi 8 ppm

$$\begin{aligned}V_1 \times C_1 &= V_2 \times C_2 \\ V_1 \times 100 \text{ ppm} &= 5 \text{ ml} \times 8 \text{ ppm} \\ V_1 &= \frac{40 \text{ ml}}{100 \text{ ppm}} \\ V_1 &= 0,4 \text{ ml} = 400 \mu\text{L}\end{aligned}$$

d. Konsentrasi 7 ppm

$$\begin{aligned}V_1 \times C_1 &= V_2 \times C_2 \\ V_1 \times 100 \text{ ppm} &= 5 \text{ ml} \times 7 \text{ ppm} \\ V_1 &= \frac{35 \text{ ml}}{100 \text{ ppm}} \\ V_1 &= 0,35 \text{ ml} = 350 \mu\text{L}\end{aligned}$$

e. Konsentrasi 6 ppm

$$V1 \times C1 = V2 \times C2$$

$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 6 \text{ ppm}$$

$$V1 = \frac{30 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,3 \text{ ml} = 300 \mu\text{L}$$

f. Konsentrasi 5 ppm

$$V1 \times C1 = V2 \times C2$$

$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 5 \text{ ppm}$$

$$V1 = \frac{25 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,25 \text{ ml} = 250 \mu\text{L}$$

g. Konsentrasi 4 ppm

$$V1 \times C1 = V2 \times C2$$

$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 4 \text{ ppm}$$

$$V1 = \frac{20 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,2 \text{ ml} = 200 \mu\text{L}$$

h. Konsentrasi 3 ppm

$$V1 \times C1 = V2 \times C2$$

$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 3 \text{ ppm}$$

$$V1 = \frac{15 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,15 \text{ ml} = 150 \mu\text{L}$$

i. Konsentrasi 2 ppm

$$V1 \times C1 = V2 \times C2$$

$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 2 \text{ ppm}$$

$$V1 = \frac{10 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,1 \text{ ml} = 100 \mu\text{L}$$

j. Konsentrasi 1 ppm

$$V1 \times C1 = V2 \times C2$$

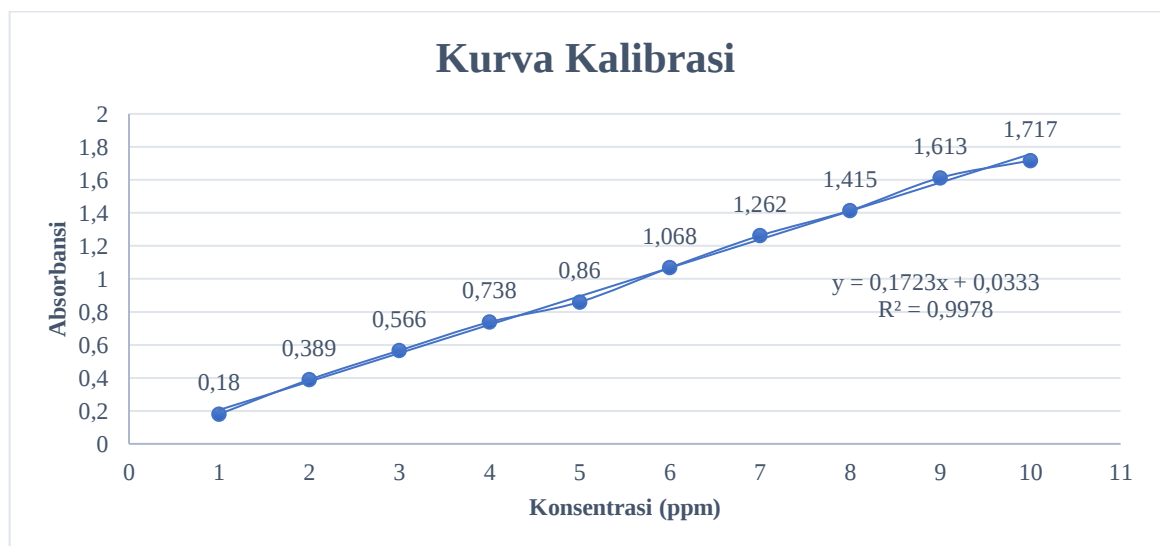
$$V1 \times 100 \text{ ppm} = 5 \text{ ml} \times 1 \text{ ppm}$$

$$V1 = \frac{5 \text{ ml}}{100 \text{ ppm}}$$

$$V1 = 0,05 \text{ ml} = 50 \mu\text{L}$$

1.2 Kurva Kalibrasi Vitamin E Asetat

Konsentrasi	Absorbansi
1 ppm	0,18
2 ppm	0,389
3 ppm	0,566
4 ppm	0,738
5 ppm	0,86
6 ppm	1,068
7 ppm	1,262
8 ppm	1,415
9 ppm	1,613
10 ppm	1,717



Lampiran 5 Perhitungan %EE NLC Vitamin E Asetat

a. Konsentrasi Larutan

$$\text{Konsentrasi} = \frac{y-a}{b}$$

b. Bobot zat aktif bebas

$$\text{Bobot zat aktif bebas} = \text{konsentrasi} \times \text{volume} \times \text{fp}$$

c. Rumus %EE

$$\%EE = \frac{\text{Total zat aktif} - \text{zat aktif bebas}}{\text{total zat aktif}} \times 100\%$$

Data Pengukuran Efisiensi Penjerapan Hari Ke-1

Formula	Absorbansi			Efficiency Entrapment (%)			SD
	1	2	3	1	2	3	
F1	0.212	0.222	0.115	96.54	96.34	98.41	1.14
F2	0.325	0.272	0.38	94.35	95.36	93.29	1.04
F3	0.231	0.181	0.153	96.17	97.14	97.68	0,76
F4	0.691	0.586	0.672	87.27	89.30	87.64	1,08
F5	0.197	0.138	0.271	96.83	97.97	95.40	1,28

Perhitungan

1. F1

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,212-0,0333}{0,1723} = 1,0371 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,0371 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1037,1 \text{ } \mu\text{g}$$

$$= 1,0731 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,0731 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 96,54 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,222-0,0333}{0,1723} = 1,0951 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,0951 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1095,1 \text{ } \mu\text{g}$$

$$= 1,0951 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,0951 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 96,34\%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,115-0,0333}{0,1723} = 0,4741 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 0,4741 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 474,1 \mu\text{g} \end{aligned}$$

$$= 0,4741 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 0,4741 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 98,41\%$$

2. F2

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,325-0,0333}{0,1723} = 1,6929 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,6929 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1692,9 \mu\text{g} \end{aligned}$$

$$= 1,6929 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,6929 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 94,35 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,272-0,0333}{0,1723} = 1,3853 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,3853 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1385,3 \mu\text{g} \end{aligned}$$

$$= 1,3853 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,3853 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 95,38 \%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,38-0,0333}{0,1723} = 2,0121 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 2,0121 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 2012,1 \mu\text{g} \end{aligned}$$

$$= 2,0121 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 2,0121 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 93,29\%$$

3. F3

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,231-0,0333}{0,1723} = 1,1474 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,1474 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1147,4 \text{ } \mu\text{g} \\ &= 1,1474 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 1,1474 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 96,17 \% \end{aligned}$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,181-0,0333}{0,1723} = 0,8572 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 0,8572 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 857,2 \text{ } \mu\text{g} \\ &= 0,8572 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 0,8572 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 97,14 \% \end{aligned}$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,153-0,0333}{0,1723} = 0,6947 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 0,6947 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 694,7 \text{ } \mu\text{g} \\ &= 0,6947 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 0,6947 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 97,68 \% \end{aligned}$$

4. F4

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,691-0,0333}{0,1723} = 3,8171 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 3,8171 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 3817,1 \text{ } \mu\text{g} \\ &= 3,8171 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 3,8171 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 87,27 \% \end{aligned}$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,586-0,0333}{0,1723} = 3,2077 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 3,2077 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 3207,7 \mu\text{g}$$

$$= 3,2077 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 3,2077 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 89,30 \%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,672-0,0333}{0,1723} = 3,7069 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 3,7069 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 3706,9 \mu\text{g}$$

$$= 3,7069 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 3,7069 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 87,64 \%$$

5. F5

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,197-0,0333}{0,1723} = 0,9500 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 0,9500 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 950 \mu\text{g}$$

$$= 0,95 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 0,95 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 96,83 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,138-0,0333}{0,1723} = 0,6076 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 0,5438 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 607,6 \mu\text{g}$$

$$= 0,6076 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 0,6076 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 97,97\%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,271-0,0333}{0,1723} = 1,3795 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,3795 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1379,5 \text{ } \mu\text{g}$$

$$= 1,3795 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,3795 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 95,40 \%$$

Data Pengukuran Efisiensi Penjerapan Hari Ke-30

Formula	Absorbansi			Efficiency Entrapment (%)			SD
	1	2	3	1	2	3	
F1	0.217	0.171	0.235	96.44	97.33	96.09	0.63
F2	0.374	0.413	0.389	93.40	92.65	93.11	0,38
F3	0.289	0.288	0.328	95.05	95.07	94.29	0,44
F4	0.766	0.592	0.662	85.82	89.19	87.83	0,70
F5	0.333	0.333	0.437	94.20	94.20	92.18	1,74

Perhitungan

1. F1

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,217-0,0333}{0,1723} = 1,0661 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,0661 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1066,1 \text{ } \mu\text{g}$$

$$= 1,0661 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,0661 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 96,44 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,171-0,0333}{0,1723} = 0,7991 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 0,7991 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 799,1 \text{ } \mu\text{g}$$

$$= 0,7991 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,6930 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 97,33 \%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,235-0,0333}{0,1723} = 1,1706 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,1706 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1170,6 \mu\text{g}$$

$$= 1,1706 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,1706 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 96,09 \%$$

2. F2

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,374-0,0333}{0,1723} = 1,9773 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 1,9773 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 1977,3 \mu\text{g}$$

$$= 1,9773 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,9773 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 93,40 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,413-0,0333}{0,1723} = 2,2037 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 0,5902 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 2203,7 \mu\text{g}$$

$$= 2,2037 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 2,2037 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 92,65 \%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,389-0,0333}{0,1723} = 2,0644 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 2,0644 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 2064,4 \mu\text{g}$$

$$= 2,0644 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 2,0644 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 93,11 \%$$

3. F3

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,289-0,0333}{0,1723} = 1,4840 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,4840 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1,484 \text{ } \mu\text{g} \\ &= 1,484 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 1,484 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 95,05 \% \end{aligned}$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,288-0,0333}{0,1723} = 1,4782 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,4782 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1478,2 \text{ } \mu\text{g} \\ &= 1,4782 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 1,4782 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 95,07 \% \end{aligned}$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,328-0,0333}{0,1723} = 1,7103 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,7103 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1710,3 \text{ } \mu\text{g} \\ &= 1,7103 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 1,7103 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 94,29 \% \end{aligned}$$

4. F4

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,766-0,0333}{0,1723} = 4,2524 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 4,2524 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 4252,4 \mu\text{g} \\ &= 4,2524 \text{ mg} \end{aligned}$$

$$\begin{aligned} \%EE &= \frac{30 \text{ mg} - 4,2524 \text{ mg}}{30 \text{ mg}} \times 100\% \\ &= 85,82 \% \end{aligned}$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,592-0,0333}{0,1723} = 3,2426 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 3,2426 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 3242,6 \mu\text{g} \end{aligned}$$

$$= 3,2426 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 3,2426 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 89,19\%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,662-0,0333}{0,1723} = 3,6488 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 3,6488 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 3648,8 \mu\text{g} \end{aligned}$$

$$= 3,6488 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 3,6488 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 87,83 \%$$

5. F5

a. Absorbansi 1

$$\text{Konsentrasi} = \frac{0,333-0,0333}{0,1723} = 1,7394 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,7394 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1739,4 \mu\text{g} \end{aligned}$$

$$= 1,7394 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,7394 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 94,20 \%$$

b. Absorbansi 2

$$\text{Konsentrasi} = \frac{0,333-0,0333}{0,1723} = 1,7394 \text{ ppm}$$

$$\begin{aligned} \text{Bobot zat aktif bebas} &= 1,7394 \text{ ppm} \times 10 \text{ mL} \times 100 \\ &= 1739,4 \mu\text{g} \end{aligned}$$

$$= 1,7394 \text{ mg}$$

$$\%EE = \frac{30 \text{ mg} - 1,7394 \text{ mg}}{30 \text{ mg}} \times 100\%$$

$$= 94,20 \%$$

c. Absorbansi 3

$$\text{Konsentrasi} = \frac{0,437 - 0,0333}{0,1723} = 2,3430 \text{ ppm}$$

$$\text{Bobot zat aktif bebas} = 2,3430 \text{ ppm} \times 10 \text{ mL} \times 100$$

$$= 2343 \mu\text{g}$$

$$= 2,343 \text{ mg}$$

$$\% \text{EE} = \frac{30 \text{ mg} - 2,343 \text{ mg}}{30 \text{ mg}} \times 100\%$$

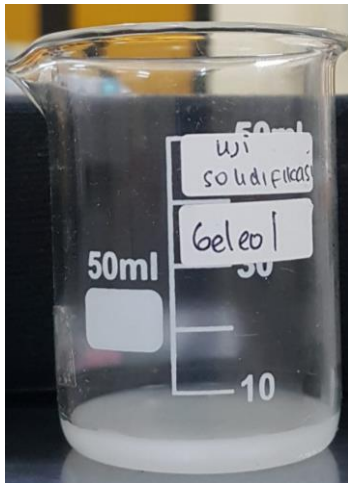
$$= 92,19 \%$$

Lampiran 6 Hasil Uji T-Test

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	F1_UkuranPartikel_H1 - F1_UkuranPartikel_H30	-18.40000	68.07959	39.30577	-187.51907	150.71907	-.468	2	.686
Pair 2	F1_Pdl_H1 - F1_Pdl_H30	.00800	.08418	.04860	-.20113	.21713	.165	2	.884
Pair 3	F1_ZetaPotensial_H1 - F1_ZetaPotensial_H30	1.13333	.20817	.12019	.61622	1.65045	9.430	2	.011
Pair 4	F1_EE_H1 - F1_EE_H30	.47720	1.68659	.97375	-3.71252	4.66693	.490	2	.673
Pair 5	F2_UkuranPartikel_H1 - F2_UkuranPartikel_H30	-3.03333	19.31640	11.15233	-51.01793	44.95127	-.272	2	.811
Pair 6	F2_Pdl_H1 - F2_Pdl_H30	-.06067	.04646	.02682	-.17607	.05474	-2.262	2	.152
Pair 7	F2_ZetaPotensial_H1 - F2_ZetaPotensial_H30	-10.03333	3.58097	2.06747	-18.92895	-1.13772	-4.853	2	.040
Pair 8	F2_EE_H1 - F2_EE_H30	1.28329	1.30945	.75601	-1.96957	4.53615	1.697	2	.232
Pair 9	F3_UkuranPartikel_H1 - F3_UkuranPartikel_H30	27.23333	6.17846	3.56713	11.88519	42.58147	7.635	2	.017
Pair 10	F3_Pdl_H1 - F3_Pdl_H30	-.03867	.07370	.04255	-.22176	.14443	-.909	2	.459
Pair 11	F3_ZetaPotensial_H1 - F3_ZetaPotensial_H30	-.46667	.11547	.06667	-.75351	-.17982	-7.000	2	.020
Pair 12	F3_EE_H1 - F3_EE_H30	2.19256	1.13671	.65628	-.63119	5.01630	3.341	2	.079
Pair 13	F4_UkuranPartikel_H1 - F4_UkuranPartikel_H30	-17.10000	38.91234	22.46605	-113.76360	79.56360	-.761	2	.526
Pair 14	F4_Pdl_H1 - F4_Pdl_H30	-.03933	.11514	.06647	-.32535	.24668	-.592	2	.614
Pair 15	F4_ZetaPotensial_H1 - F4_ZetaPotensial_H30	-15.13333	3.90683	2.25561	-24.83844	-5.42823	-6.709	2	.022
Pair 16	F4_EE_H1 - F4_EE_H30	.45786	.87386	.50453	-1.71294	2.62866	.908	2	.460
Pair 17	F5_UkuranPartikel_H1 - F5_UkuranPartikel_H30	-411.96667	271.45814	156.72643	-1086.30608	262.37274	-2.629	2	.119
Pair 18	F5_Pdl_H1 - F5_Pdl_H30	-.33167	.09023	.05210	-.55582	-.10751	-6.366	2	.024
Pair 19	F5_ZetaPotensial_H1 - F5_ZetaPotensial_H30	-7.90000	6.62042	3.82230	-24.34604	8.54604	-2.067	2	.175
Pair 20	F5_EE_H1 - F5_EE_H30	2.53434	1.28924	.74434	-.66831	5.73699	3.405	2	.076

Lampiran 7 Dokumentasi Penelitian



Karakterisasi daya larut dan solidifikasi lipid padat terhadap Vitamin E Asetat



Karakterisasi kelarutan Vitamin E Asetat dalam surfaktan



Pembuatan NLC Vitamin E Asetat (Sonikator Probe)



Pencampuran dengan *magnetic stirrer*



Pengukuran ukuran partikel, PDI, dan zeta potensial menggunakan instrument PSA



Sentrifugasi (efisiensi penjerapan)

Lampiran 8 Format Surat Pernyataan Bebas Plagiasi**SURAT PERNYATAAN**

Yang bertanda tangan di bawah ini,

Nama : Rifaldi Muhamad Agni

N P M : 11181136

Adalah mahasiswa Fakultas Farmasi, Universitas Bhakti Kencana, menyatakan dengan sesungguhnya bahwa Naskah Tugas Akhir/Skripsi yang saya tulis dengan judul:

**Pengembangan Formula Dan Karakterisasi Nanostructured Lipid Carrier
(NLC) Vitamin E Asetat Dengan Lipid Padat Glyceryl Monostearate
(Geleol®) Dan Surfaktan Lauryl Glucoside (Plantacare®)**

adalah benar-benar merupakan hasil karya saya sendiri. Apabila di kemudian hari diketahui bahwa isi Naskah Skripsi ini merupakan hasil plagiasi, maka saya bersedia menerima sanksi berupa pembatalan kelulusan dan atau pencabutan gelar yang saya peroleh.

Demikian surat pernyataan ini saya buat untuk dapat dipergunakan sebagaimana mestinya.

Bandung, 15 September 2022

Yang membuat pernyataan,



(Rifaldi Muhamad Agni)

NPM 11181136

Lampiran 9 Surat Persetujuan Untuk dipublikasikan di media online
SURAT PERNYATAAN

Yang bertanda tangan di bawah ini,

Nama : Rifaldi Muhamad Agni

N P M : 11181136

Menyatakan bahwa demi kepentingan perkembangan ilmu pengetahuan, saya menyetujui abstrak Skripsi yang saya tulis dengan judul:

Pengembangan Formula Dan Karakterisasi Nanostructured Lipid Carrier (NLC) Vitamin E Asetat Dengan Lipid Padat Glyceryl Monostearate (Geleol®) Dan Surfaktan Lauryl Glucoside (Plantacare®)

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Bandung, 15 September 2022

Yang,



(Rifaldi Muhamad Agni)

NPM 11181136