

LAMPIRAN

Lampiran 1. Perhitungan Uji Kesesuaian Sistem Teofilin

DATA TEOFILIN						
Replikasi	RT	Area	TF	K'	N Plates	Rs
1	9.67	9028075	1.21	4.07	6214	24.14
2	9.71	9013980	1.21	4.08	6566	24.26
3	9.69	9026300	1.20	4.09	6270	24.38
4	9.69	9020409	1.20	4.09	6286	24.59
5	9.70	9014320	1.20	4.10	6288	24.72
Jumlah	48.46	45103084				
Rata-Rata	9.69	9020616.80	1.20	4.09	6325	24.42
SD	0.013	6551.02				
Syarat	<% 2	<% 2	< 1.5	2-10	>2000	>1.5
RSD		0.07				
Kesimpulan	MS	MS	MS	MS	MS	MS

$$\begin{aligned} \text{Simpangan baku relatif luas area} &= \frac{SD}{x} \times 100\% = \frac{6551,02}{9020616,80} \times 100\% \\ &= 0,073\% \end{aligned}$$

Lampiran 2. Perhitungan Uji Kesesuaian Sistem Efedrin HCl

DATA EFEDRIN HIDROKLORIDA						
Replikasi	RT	Area	TF	K'	N Plates	Rs
1	1.91	6344	1.331	0.75	2507	5.27
2	1.91	6138	1.240	0.76	2518	4.87
3	1.90	6135	1.388	0.75	2563	5.10
4	1.91	6186	1.357	0.76	2789	5.41
5	1.90	6129	1.420	0.75	2877	5.68
Rata-rata	1.91	6186	1.347	0.75	2651	5.26
SD	0.004	91				
SYARAT	<% 2	<% 2	< 1.5	2-10	>2000	>1.5
RSD		1.471				
Kesimpulan	MS	MS	MS	TMS	MS	MS

$$\text{Simpangan baku relatif luas area} = \frac{SD}{x} \times 100\% = \frac{91}{6186} \times 100\%$$

$$= 1,471$$

Lampiran 3. Perhitungan LoD dan LoQ Teofilin

Teofilin			
Konsentrasi	Luas Area	Yi	(yi-yi) ²
75	5170250	5150518	389351824
100	6865842	6851268	212401476
125	8452107	8552018	9982207921
150	10291005	10252768	1462068169
175	12020260	11953518	4454494564
200	13615117	13654268	1532800801
Jumlah	18033324755		
S	4508331189		
SD	67144,11		
LoD	2,96		
LoQ	9,87		

$$\begin{aligned}
 S &= \frac{\sum (y_i - \bar{y})^2}{N-2} \\
 &= \frac{18033324755}{6-2} = 4508331189
 \end{aligned}$$

$$\begin{aligned}
 S(y/x) &= \sqrt{S} \\
 &= \sqrt{4508331189} \\
 &= 67144,11
 \end{aligned}$$

$$\text{LoD} = \frac{3 \times \text{SD}}{b}$$

$$= \frac{3 \times 67144,11}{68030} = 2,96$$

$$\text{LoQ} = \frac{10 \times \text{SD}}{\text{b}}$$

$$= \frac{10 \times 67144,11}{68030} = 9,87$$

Lampiran 4. Perhitungan LoD dan LoQ Efedrin hidroklorida

Efedrin HCl			
Konsentrasi	Luas Area	Yi	(yi-yi) ²
7,5	4094	4087	56
10	5557	5496	3727
12,5	6813	6905	8538
15	8229	8315	7370
17,5	9892	9724	28123
20	11076	11134	3335
Jumlah	51150		
S	12787		
SD	113,08		
LoD	0,60		
LoQ	2,01		

$$S = \frac{\sum(y_i - \bar{y})^2}{N-2}$$

$$= \frac{51150}{6-2} = 12787$$

$$S(y/x) = \sqrt{S}$$

$$= \sqrt{12787}$$

$$= 113,08$$

$$\begin{aligned}\text{LoD} &= \frac{3 \times \text{SD}}{b} \\ &= \frac{3 \times 113,08}{563,78} = 0,60\end{aligned}$$

$$\begin{aligned}\text{LoQ} &= \frac{10 \times \text{SD}}{b} \\ &= \frac{10 \times 113,08}{563,78} = 2,01\end{aligned}$$

Lampiran 5. Perhitungan Uji Presisi Teofilin

Teofilin		
Konsentrasi (bpj)	Replikasi	Luas Area
125	1	8069619
	2	8044792
	3	8053334
	4	8044104
	5	8036108
	6	8099879
Rata-rata	8057972,67	
SD	23483,7	
RSD	0,29	
Syarat	< 2%	
Keterangan	MS	

$$\begin{aligned}
 \text{Simpangan baku relatif luas area} &= \frac{SD}{x} \times 100\% = \frac{23483,7}{8057972,67} \times 100\% \\
 &= 0,29\%
 \end{aligned}$$

Lampiran 6. Perhitungan Uji Presisi Efedrin Hidroklorida

Efedrin HCl		
Konsentrasi (bpj)	Replikasi	Luas Area
12,5	1	6548
	2	6373
	3	6665
	4	6408
	5	6589
	6	6400
Rata-rata	6497,16	
SD	120	
RSD	1,85	
Syarat	< 2%	
Keterangan	MS	

$$\begin{aligned}
 \text{Simpangan baku relatif luas area} &= \frac{SD}{x} \times 100\% = \frac{120}{6497,16} \times 100\% \\
 &= 1,85\%
 \end{aligned}$$

Lampiran 7. Perhitungan Uji Akurasi Teofilin

Rentang Spesifik (%)	Replikasi	Luas Area	Konsentrasi (bpj)		% Recovery	Rata-rata (%)
			Teoritis	Pengukuran		
80	1	6786816	100	99,053	99,05	98,2
	2	6815387	100	99,473	99,47	
	3	6547159	100	95,530	95,53	
100	1	8641787	125	126,320	101,06	101,49
	2	8718229	125	127,443	101,95	
	3	8639149	125	126,281	101,02	
120	1	10461456	150	153,068	101,2459	99,83
	2	10719004	150	156,853	101,7352	
	3	9525000	150	139,302	99,8998	
Rata-rata						99,78

Contoh perhitungan:

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

$$= \frac{6786816-48268}{68030}$$

$$= 99,053$$

$$\% \text{ recovery : } \frac{\text{kadar pengukuran}}{\text{kadar teoritis}} \times 100\% = \frac{99,053}{100} 100\% = 99,05 \%$$

Lampiran 8. Perhitungan Uji Akurasi Efedrin Hidroklorida

Rentang Spesifik (%)	Replikasi	Luas Area	Konsentrasi (bpj)		% Recovery	Rata-rata (%)
			Teoritis	Pengukuran		
80	1	5357	10	9,755	97,54	98,02
	2	5735	10	10,424	104,24	
	3	5277	10	9,612	96,12	
100	1	6053	12,5	10,988	87,90	99,66
	2	7063	12,5	12,780	102,24	
	3	7529	12,5	13,606	108,85	
120	1	7738	15	13,977	93,18	99,10
	2	8024	15	14,484	96,56	
	3	8954	15	16,134	107,56	
Rata-rata						99,35

Contoh perhitungan :

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

$$= \frac{5357 + 141,85}{563,78}$$

$$= 9,755$$

$$\% \text{ recovery : } \frac{\text{kadar pengukuran}}{\text{kadar teoritis}} \times 100\% = \frac{9,755}{10} 100\% = 97,5$$

Lampiran 9. Perhitungan Kadar Sampel

Sampel	Nama	Luas Area	Dosis Etiket (mg)	Dosis yang dianalisis (mg)	Kadar sampel (%)
1	Teofilin	8947777	130	130,86	101
	Efedrin HCl	6724	12,5	12,18	97
2	Teofilin	8782973	130	128,39	99
	Efedrin HCl	6816	12,5	12,34	99
3	Teofilin	8628620	130	126,13	97
	Efedrin HCl	6600	12,5	11,96	96

Contoh perhitungan kadar sampel :

Data bobot tablet

No	Bobot Tablet (mg)	No	Bobot Tablet (mg)
1	330	11	331
2	328	12	330
3	330	13	328
4	331	14	329
5	330	15	330
6	330	16	330

7	330	17	328
8	330	18	328
9	329	19	328
10	330	20	330
Rata-rata		329,5 mg	

Rata-rata bobot tablet : 329,5 mg

1 tablet mengandung Teofilin 130 mg – Efedrin 12,5 mg dilarutkan dalam labu 25 ml sehingga :

$$130 \text{ mg}/25 \text{ mL} = 5200 \text{ bpj}$$

$$12,5 \text{ mg}/25 \text{ mL} = 500 \text{ bpj}$$

Diencerkan menjadi konsentrasi 130 ppm dan 12,5 ppm di dalam labu 10 mL

a. Teofilin :

$$V_1 \times N_1 = V_2 \times N_2$$

$$V_1 \times 5200 \text{ bpj} = 10 \text{ mL} \times 130 \text{ bpj}$$

$$V_1 = \frac{1300}{5200}$$

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

b. Efedrin HCl :

$$V_1 \times N_1 = V_2 \times N_2$$

$$V_1 \times 500 \text{ bpj} = 10 \text{ mL} \times 12,5 \text{ bpj}$$

$$V_1 = \frac{125}{500}$$

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

1. Perhitungan faktor pengenceran

$$\begin{aligned}\text{Faktor pengenceran} &= \frac{V.\text{labu awal}}{V.\text{pemipetan}} \times \text{vol. labu} \\ &= \frac{20 \text{ ml}}{0,5 \text{ ml}} \times 25 \\ &= 1000\end{aligned}$$

2. Perhitungan kadar sampel

Perhitungan kadar sampel menggunakan rumus :

$$\text{Kadar} = \frac{\text{Dosis yang dianalisis}}{\text{Dosis di etiket}} \times 100\%$$

Bobot sampel yang ditimbang : 334 mg

Bobot rata-rata tablet : 329,5 mg

Jumlah zat aktif per tablet : Teofilin = 130 mg

Efedrin HCl = 12,5 mg

a. Teofilin

Persamaan regresi : $y = 68046x + 44252$

Luas area : 8947777

Konsentrasi teoritis : 130 bpj

Konsentrasi terbaca : $x = \frac{8947777 - 44252}{68046} = 130,85$

Dosis yang dianalisis (mg) = Konsentrasi x Fp
 $= 130,85 \times 1000$

$$= 130850 \mu\text{g}$$

$$= 130,85 \text{ mg}$$

$$\text{Kadar} = \frac{\text{Dosis yang dianalisis}}{\text{Dosis di etiket}} \times 100\%$$

$$= \frac{130,85}{130} \times 100\%$$

$$= 100,65 \%$$

b. Efedrin HCl

$$\text{Persamaan regresi} : y = 602,27x - 593,28$$

$$\text{Luas area} : 6724$$

$$\text{Konsentrasi teoritis} : 12,5 \text{ bpj}$$

$$\text{Konsentrasi terbaca} : x = \frac{6724 + 593,28}{602,27} = 12,18$$

$$\text{Kadar} = \frac{\text{Dosis yang dianalisis}}{\text{Dosis di etiket}} \times 100\%$$

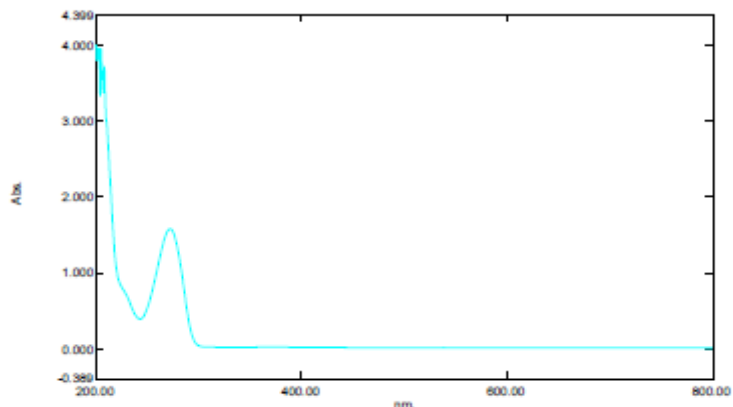
$$= \frac{12,18}{12,5} \times 100\%$$

$$= 97,44 \%$$

Lampiran 10. Spektrum Teofilin

Spectrum Peak Pick Report

Data Set: 30 ppm teofilin dalam air - RawData



[Measurement Properties]
 Wavelength Range (nm): 200.00 to 800.00
 Scan Speed: Medium
 Sampling Interval: 0.5
 Auto Sampling Interval: Enabled
 Scan Mode: Single

[Instrument Properties]
 Instrument Type: UV-1700 Series
 Measuring Mode: Absorbance
 Slit Width: 1.0 nm
 Light Source Change Wavelength: 340.8 nm
 S/R Exchange: Normal

[Attachment Properties]
 Attachment: None

[Operation]
 Threshold: 0.0010000
 Points: 4
 Interpolate: Disabled
 Average: Disabled

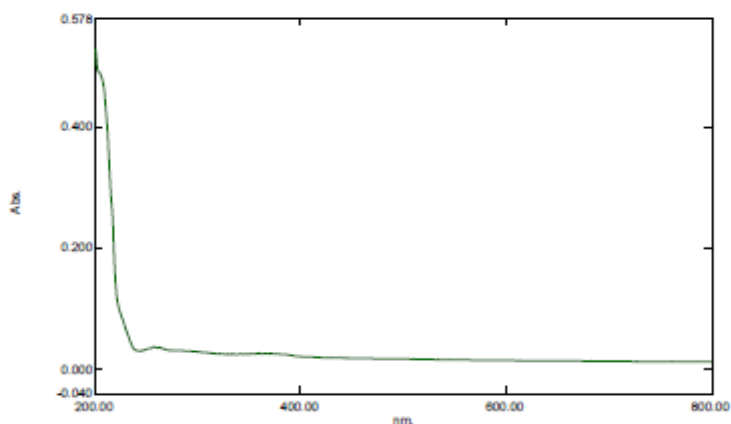
[Sample Preparation Properties]
 Weight:
 Volume:
 Dilution:
 Path Length:
 Additional Information:

No.	FW	Wavelength	Abs.	Description
1	●	359.50	0.021	
2	●	341.00	0.020	
3	●	331.50	0.020	
4	●	272.50	1.576	
5	●	252.50	3.957	
6	●	354.50	0.019	
7	●	338.00	0.018	
8	●	242.50	0.390	

Lampiran 11. Spektrum Efedrin HCl

Spectrum Peak Pick Report

Data Set: 10 ppm efedrin hcl dalam air - RawData



[Measurement Properties]

Wavelength Range (nm): 200.00 to 800.00
 Scan Speed: Medium
 Sampling Interval: 0.5
 Auto Sampling Interval: Enabled
 Scan Mode: Single

[Instrument Properties]

Instrument Type: UV-1700 Series
 Measuring Mode: Absorbance
 Slit Width: 1.0 nm
 Light Source Change Wavelength: 340.8 nm
 S/R Exchange: Normal

[Attachment Properties]

Attachment: None

[Operation]

Threshold: 0.0010000
 Points: 4
 Interpolate: Disabled
 Average: Disabled

[Sample Preparation Properties]

Weight:
 Volume:
 Dilution:
 Path Length:
 Additional Information:

No.	P/V	Wavelength	Abs.	Description
1	1	369.50	0.026	
2	1	359.50	0.026	
3	1	341.50	0.026	
4	1	283.00	0.036	
5	1	257.00	0.037	
6	2	336.00	0.024	
7	2	259.50	0.036	
8	2	242.50	0.030	

Lampiran 12. Kromatogram UKS, LoD dan LoQ

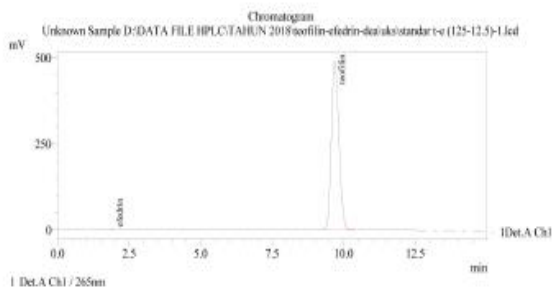
a. Replikasi 1

==== POLITEKNIK KESEHATAN BANDUNG ====

UNIT LABORATORIUM - LABORATORIUM TERPADU

Acquired by : DEA NADIA ULFA
 Sample Name : STANDAR
 Sample ID : TEOFILIN-EFEDRIN (125:12.5)-1
 Injection Volume : 20
 Data File Name : standar t-e (125-12.5)-1.lcd
 Method File Name : oka 30042018.lcm
 Batch File Name : 20190102.lcb
 Report File Name : Default.lcr
 Data Acquired : 19 FEBRUARI 2019

<Chromatogram>



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Detector A

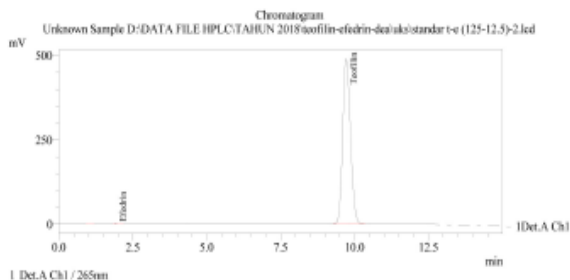
Name	Ret. Time	Area	Theoretical Plate	Resolution	Tailing Factor	HETP	k'
efedrin	1.909	6344	2506.891	5.269	1.331	59.835	2.752
teofilin	9.674	9028075	6213.976	24.139	1.210	24.139	7.880

b. Replikasi 2

==== POLITEKNIK KESEHATAN BANDUNG ====
UNIT LABORATORIUM - LABORATORIUM TERPADU

Acquired by : DEA NADIA ULFA
 Sample Name : STANDAR
 Sample ID : TEOFILIN-EFEDRIN (125:12.5)-2
 Injection Volume : 20
 Data File Name : standar t-e (125-12.5)-2.lcd
 Method File Name : oka 30042018.lcm
 Batch File Name : 20190102.lcb
 Report File Name : Default.lcr
 Data Acquired : 19 FEBRUARI 2019

<Chromatogram>



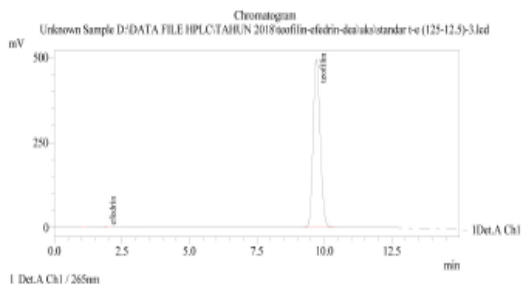
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Detector A							
Name	Ret. Time	Area	Theoretical Plate	Resolution	Tailing Factor	HETP	k'
Efedrin	1.910	6138	2518.075	4.874	1.240	59.569	2.761
Teofilin	9.706	9013980	6266.298	24.261	1.206	23.938	7.948

c. Replikasi 3

==== POLITEKNIK KESEHATAN BANDUNG ====
UNIT LABORATORIUM - LABORATORIUM TERPADU

Acquired by : DEA NADIA ULFA
 Sample Name : STANDAR
 Sample ID : TEOFILIN EFDRIN (125-12.5)-3
 Injection Volume : 20
 Data File Name : standar t-e (125-12.5)-3.lcd
 Method File Name : oka 30042018.lcm
 Batch File Name : 20190102.lcb
 Report File Name : Default.lcr
 Data Acquired : 19 FEBRUARI 2019

<Chromatogram>

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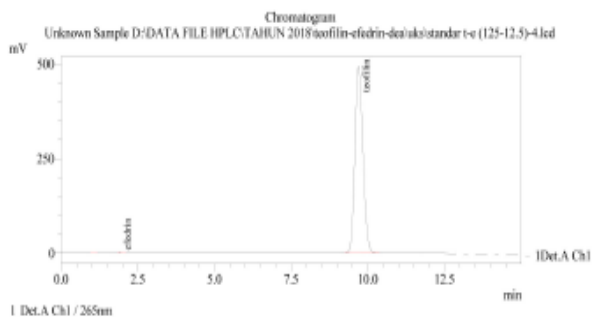
Detector A							
Name	Ret. Time	Area	Theoretical Plate	Resolution	Tailing Factor	HETP	k'
efedrin	1.903	6535	2563.188	5.095	1.388	58.521	2.753
teofilin	9.691	9026300	6292.863	24.377	1.204	23.836	7.927

d. Replikasi 4

==== POLITEKNIK KESEHATAN BANDUNG ====
UNIT LABORATORIUM - LABORATORIUM TERPADU

Acquired by : DEA NADIA ULFA
 Sample Name : STANDAR
 Sample ID : TEOFILIN-EFDRIN (125:12.5)-4
 Injection Volume : 20
 Data File Name : standar t-e (125-12.5)-4.lcd
 Method File Name : oka 30042018.lcm
 Batch File Name : 20190102.lcb
 Report File Name : Default.lcr
 Data Acquired : 19 FEBRUARI 2019

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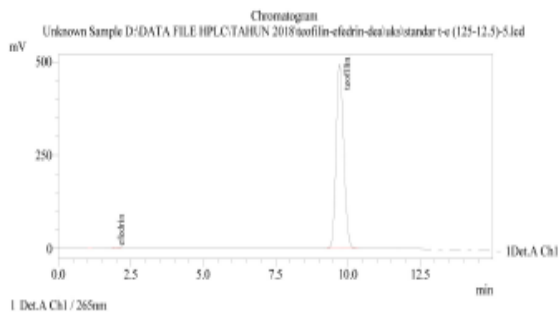
Detector A							
Name	Ret. Time	Area	Theoretical Plate#	Resolution	Tailing Factor	HETP	k'
efedrin	1.905	6186	2789.197	5.407	1.357	53.779	2.759
teofilin	9.696	9020409	6285.854	24.588	1.201	23.863	7.944

e. Replikasi 5

===== POLITEKNIK KESEHATAN BANDUNG =====
UNIT LABORATORIUM - LABORATORIUM TERPADU

Acquired by : DEA NADIA ULFA
 Sample Name : STANDAR
 Sample ID : TEofilin-EFDRIN (125:12.5)-5
 Injection Volume : 20
 Data File Name : standar t-e (125-12.5)-5.lcd
 Method File Name : oka 30042018.lcm
 Batch File Name : 20190102.lcb
 Report File Name : Default.lcr
 Data Acquired : 19 FEBRUARI 2019

<Chromatogram>



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Detector A							
Name	Ret. Time	Area	Theoretical Plate#	Resolution	Tailing Factor	HETP	k'
efedrin	1.901	6329	2876.915	5.676	1.420	52.139	2.749
teofilin	9.701	9014320	6288.299	24.722	1.196	23.864	7.929

Lampiran 13. Alat-alat yang digunakan

 A photograph of a Shimadzu Prominence LC-20AT chromatography system. The system consists of a stack of three white and black modules. On top of the stack is a large, dark brown bottle of solvent. To the left of the stack is a computer monitor and keyboard. The background is a plain wall with a small poster.	KCKT : <i>Shimadzu Prominence LC-20AT</i> Kolom : ODS-3 C₁₈ (150 × 4,6 mm) Detektor: UV Sistem pompa : <i>Low pressure gradient</i> Sistem elusi : Fase terbalik
 A photograph of a UV-Vis Double Beam spectrophotometer. The instrument is a yellow and white benchtop device with a large sample compartment on the left and a control panel with a small screen and buttons on the right. A computer monitor and keyboard are visible in the background.	Spektrofotometer UV-Vis <i>Double Beam</i>



Sonikator



Neraca Analitik

