

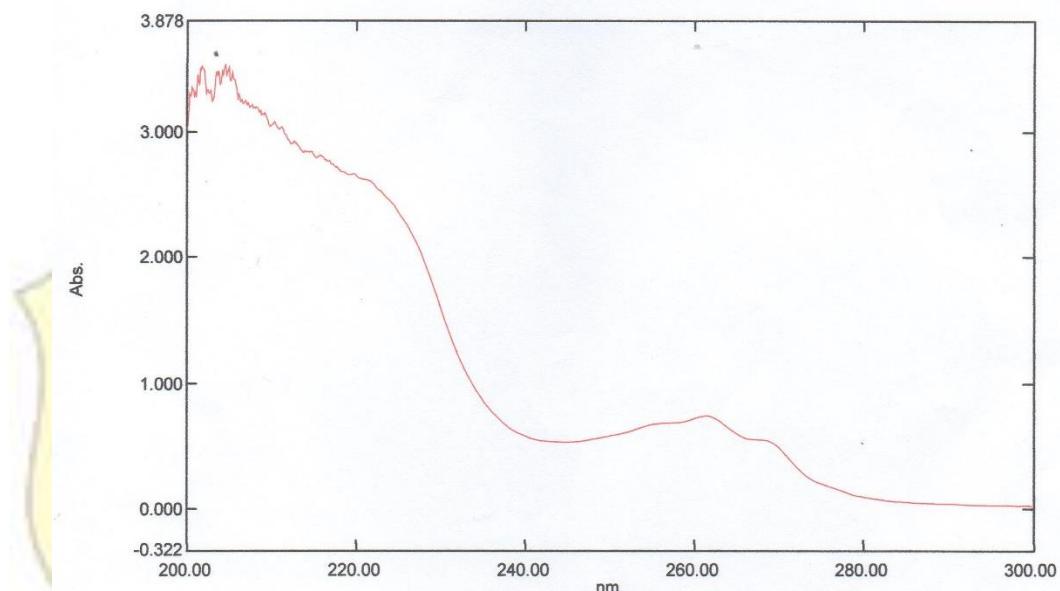
## LAMPIRAN

### Lampiran 1. Gambar Hasil Scanning Penentuan Panjang Gelombang Klorfeniramin Maleat

#### Spectrum Peak Pick Report

05/27/2016 11:19:05 AM

Data Set: File\_160527\_111604 - RawData



[Measurement Properties]

Wavelength Range (nm.): 200.00 to 300.00  
Scan Speed: Fast  
Sampling Interval: 0.1  
Auto Sampling Interval: Enabled  
Scan Mode: Single

[Instrument Properties]

Instrument Type: UV-1800 Series  
Measuring Mode: Absorbance  
Slit Width: 1.0 nm  
Light Source Change Wavelength: 350.0 nm  
S/R Exchange: Normal

[Attachment Properties]

Attachment: 6-Cell  
Number of cells: 4

[Operation]

Threshold: 0.0010000  
Points: 2  
InterPolate: Disabled  
Average: Disabled

[Sample Preparation Properties]

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

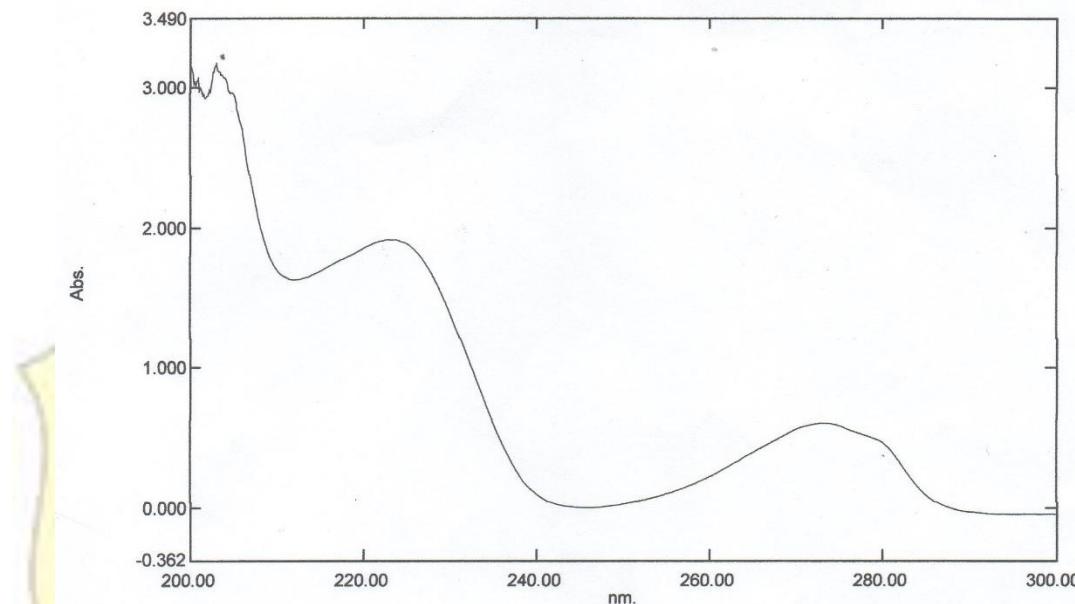
No.	P/V	Wavelength	Abs.	Description
1	●	290.50	0.044	
2	●	287.40	0.049	
3	●	261.50	0.741	
4	●	221.20	2.620	
5	●	219.80	2.666	
6	●	216.90	2.769	
7	●	215.80	2.814	
8	●	212.70	2.926	
9	●	211.20	3.040	
10	●	210.30	3.079	
11	●	208.20	3.198	
12	●	206.90	3.248	
13	●	205.40	3.471	
14	●	205.00	3.510	
15	●	203.70	3.477	
16	●	202.80	3.328	
17	●	201.80	3.518	
18	●	200.60	3.352	
19	↓	298.30	0.029	
20	↓	295.60	0.031	
21	↓	292.90	0.035	
22	↓	289.40	0.044	
23	↓	287.20	0.049	
24	↓	256.80	0.684	

**Lampiran 2. Gambar Hasil Scanning Penentuan Panjang Gelombang Guaifenesin**

**Spectrum Peak Pick Report**

05/27/2016 11:18:14 AM

Data Set: File\_160527\_111448 - RawData



[Measurement Properties]

Wavelength Range (nm.): 200.00 to 300.00  
Scan Speed: Fast  
Sampling Interval: 0.1  
Auto Sampling Interval: Enabled  
Scan Mode: Single

[Instrument Properties]

Instrument Type: UV-1800 Series  
Measuring Mode: Absorbance  
Slit Width: 1.0 nm  
Light Source Change Wavelength: 350.0 nm  
S/R Exchange: Normal

[Attachment Properties]

Attachment: 6-Cell  
Number of cells: 4

[Operation]

Threshold: 0.0010000  
Points: 2  
Interpolate: Disabled  
Average: Disabled

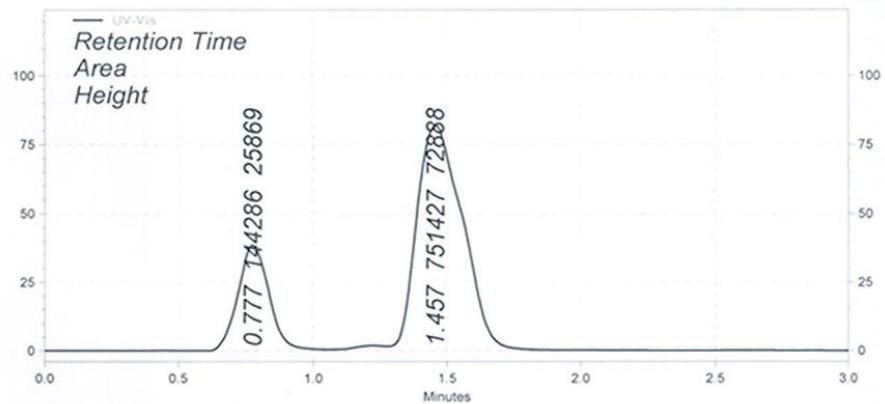
[Sample Preparation Properties]

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

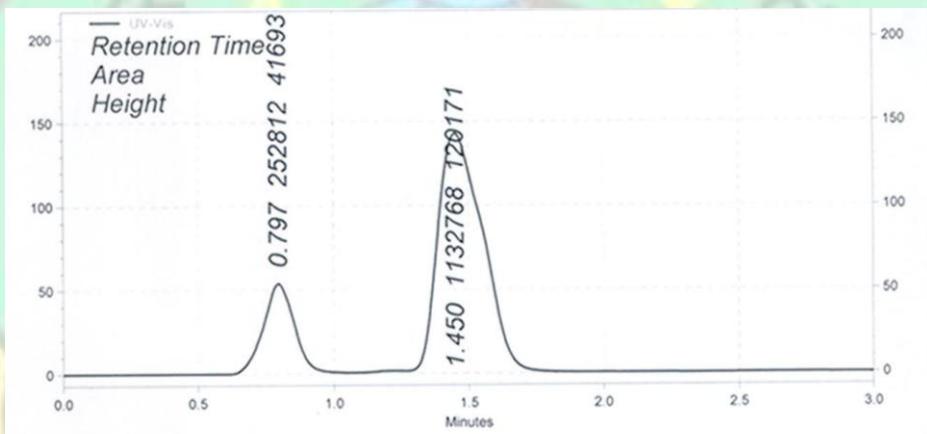
No.	P/V	Wavelength	Abs.	Description
1	●	299.40	-0.039	
2	●	297.00	-0.039	
3	●	273.20	0.605	
4	●	223.70	1.914	
5	●	222.80	1.916	
6	●	203.00	3.169	
7	●	201.20	2.996	
8	●	298.30	-0.041	
9	●	294.80	-0.041	
10	●	292.90	-0.039	
11	●	245.90	0.005	
12	●	223.30	1.912	
13	●	212.00	1.627	
14	●	201.80	2.921	
15	●	201.00	2.976	

**Lampiran 3. Kromatogram Larutan Baku Klorfeniramin maleat dan Guaifenesin**

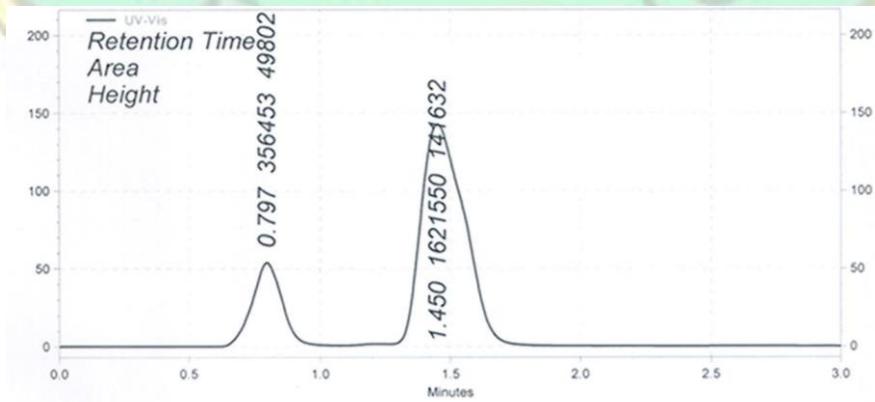
- a. Larutan baku klorfeniramin maleat dan guaifenesin 20 µg/mL



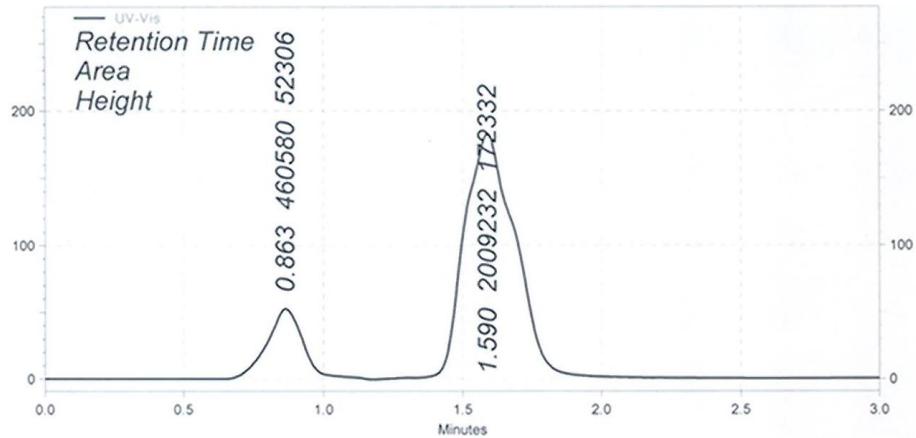
- b. Larutan baku klorfeniramin maleat dan guaifenesin 40 µg/mL



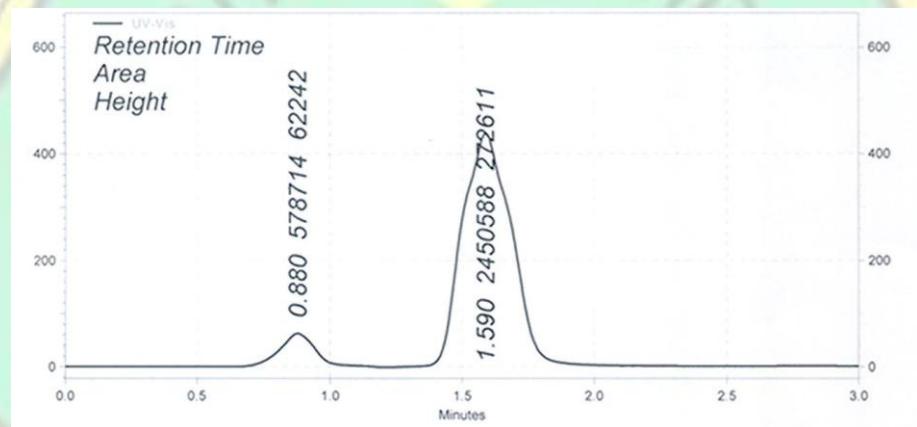
- c. Larutan baku klorfeniramin maleat dan guaifenesin 60 µg/mL



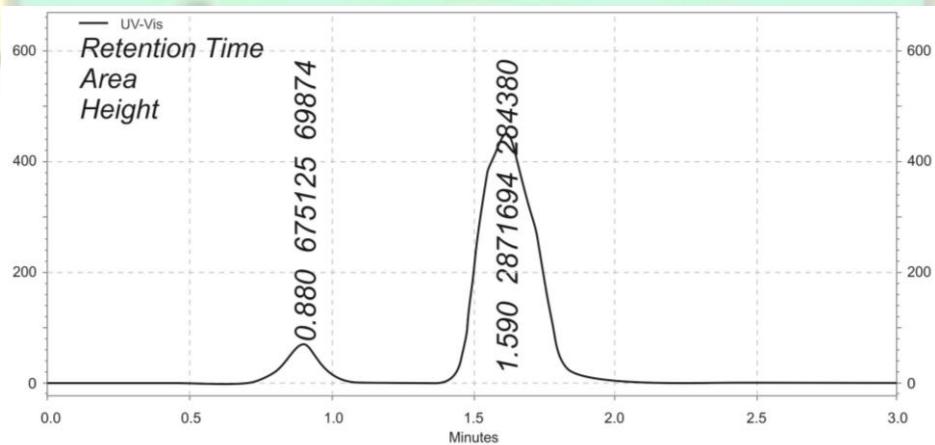
d. Larutan baku klorfeniramin maleat dan guaifenesin 80 µg/mL



e. Larutan baku klorfeniramin maleat dan guaifenesin 100 µg/mL

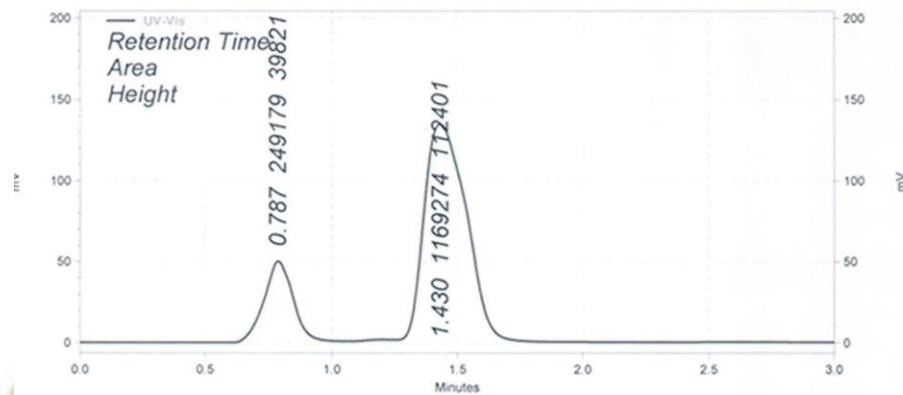


f. Larutan baku klorfeniramin maleat dan guaifenesin 120 µg/mL

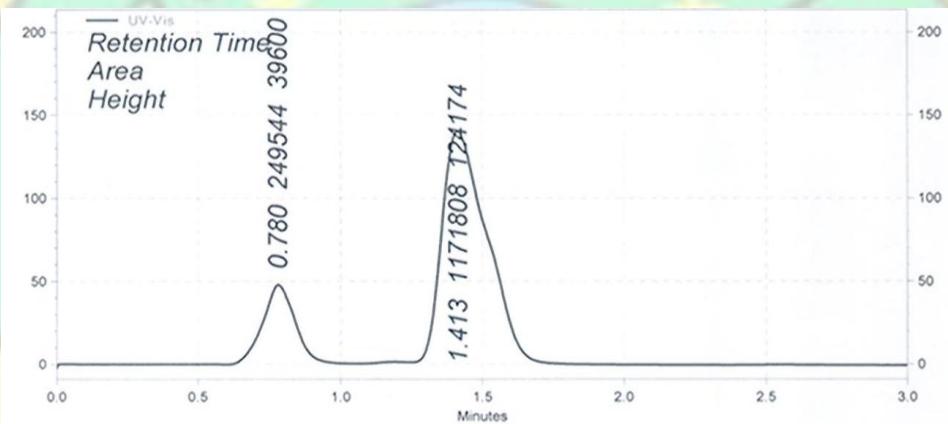


#### Lampiran 4. Contoh Kromatogram Sampel Klorfeniramin Maleat dan Guaifenesin

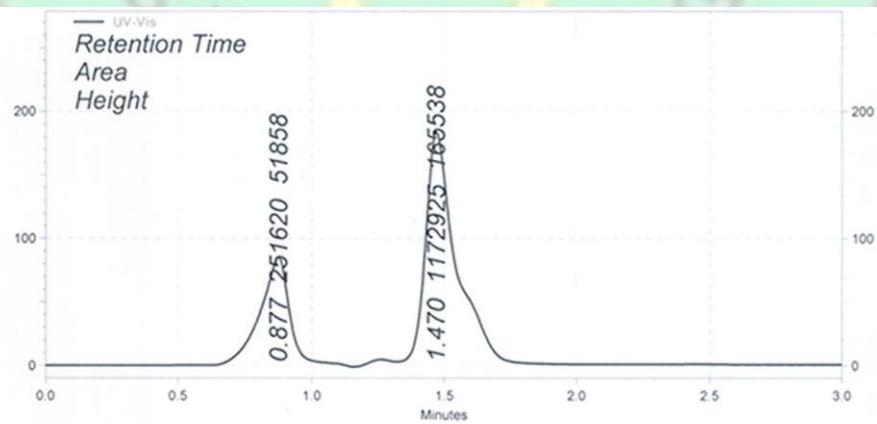
a. Kromatogram sampel klorfeniramin maleat dan guaifenesin sirup A



b. Kromatogram sampel klorfeniramin maleat dan guaifenesin sirup B



c. Kromatogram sampel klorfeniramin maleat dan guaifenesin sirup C



**Lampiran 5. Contoh Perhitungan Perolehan Kembali Klorfeniramin Maleat dengan Metode *Standard Addition Method* sirup A**

1. Perolehan kembali pada sampel yang ditambah baku sejumlah 80% dari target kadar analit dalam sampel

a. Konsentrasi sampel sebelum penambahan bahan baku (B)

1) Luas puncak klorfeniramin maleat = 573714

2) Kadar klorfeniramin maleat berdasarkan persamaan garis  $Y = 5337,183x + 37725,533$  adalah  $100,425 \mu\text{g/mL}$

b. Konsentrasi bahan baku yang ditambahkan (C)

1) Luas puncak klorfeniramin maleat = 465080

2) Kadar klorfeniramin maleat berdasarkan persamaan garis  $Y = 5337,183x + 37725,533$  adalah  $80,071 \mu\text{g/mL}$

c. Konsentrasi sampel yang diperoleh setelah penambahan bahan baku (A)

1) Luas puncak total analit 1 = 998683

Luas puncak total analit 2 = 998921

Luas puncak total analit 3 = 999132

2) Berdasarkan persamaan garis  $Y = 5337,183x + 37725,533$  maka :

Kadar total analit 1 =  $180,049 \mu\text{g/mL}$

Kadar total analit 2 =  $180,094 \mu\text{g/mL}$

Kadar total analit 3 =  $180,133 \mu\text{g/mL}$

2. Perhitungan perolehan kembali

$$\% \text{ perolehan kembali} = \frac{A - B}{C} \times 100 \%$$

a. Analit 1

$$\begin{aligned}\% \text{ perolehan kembali} &= \frac{180,049 - 100,425}{80,071} \times 100 \% \\ &= 99,442\%\end{aligned}$$

b. Analit 2

$$\begin{aligned}\% \text{ perolehan kembali} &= \frac{180,094 - 100,425}{80,071} \times 100 \% \\ &= 99,498\%\end{aligned}$$

c. Analit 3

$$\begin{aligned}\% \text{ perolehan kembali} &= \frac{180,133 - 100,425}{80,071} \times 100 \% \\ &= 99,547\%\end{aligned}$$

### Lampiran 6. Perhitungan LOD dan LOQ Klorfeniramin Maleat

No	X	$X_i^2$	$X_i - \bar{X}$	$(X_i - \bar{X})^2$	$Y_i$	$Y_c$	$(Y_i - Y_c)$	$(Y_i - Y_c)^2$
1	20	400	-50	2500	144286	144469,2	-183,193	33559,68
2	40	1600	-30	900	252812	251212,9	1599,147	2557271
3	60	3600	-10	100	356453	357956,5	-1503,51	2260551
4	80	6400	10	100	460580	464700,2	-4120,17	16975826
5	100	10000	30	900	578714	571443,8	7270,167	52855328
6	120	14400	50	2500	675125	678187,5	-3062,49	9378863
$\bar{X}$	70	$\sum 36400$		$\sum 7000$				$\sum 84061399$

Dari persamaan  $Y = 5337,183x + 37725,533$  maka  $Y_c$  dapat dihitung :

$$1. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(20) + 37725,533$$

$$Y = 144469,193$$

$$2. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(40) + 37725,533$$

$$Y = 251212,853$$

$$3. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(60) + 37725,533$$

$$Y = 357956,513$$

$$4. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(80) + 37725,533$$

$$Y = 464700,173$$

$$5. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(100) + 37725,533$$

$$Y = 571443,833$$

$$6. Y = 5337,183x + 37725,533$$

$$Y = 5337,183(120) + 37725,533$$

$$Y = 678187,493$$

7. Persamaan kurva baku :  $Y = 5337,183x + 37725,533$  ( $r = 0,999$ )

$$S_{y/x} = \left\{ \frac{\sum(Y_i - Y_c)^2}{n-2} \right\}^{1/2}$$

$$\begin{aligned} &= (84061399/4)^{1/2} \\ &= 4584,26 \end{aligned}$$

$$\begin{aligned} S_a &= S_{y/x} \sqrt{\frac{\sum X_i^2}{n \sum (X_i - X_{\text{rata-rata}})^2}} \\ &= 4584,26 \times \sqrt{\frac{36400}{6 \times 7000}} \\ &= 4584,26 \times 0,93 \\ &= 4263,36 \end{aligned}$$

#### Perhitungan nilai LOD :

Nilai Y pada batas deteksi ditentukan dengan persamaan  $Y = Y_B + 3 S_B$

$Y$  = nilai intersept (a) pada persamaan kurva kalibrasi

$S_B$  = simpangan baku intersept (a) ( $S_a$ )

$$Y = 37725,533 + 3 (4263,36)$$

$$= 50515,61$$

$$Y = 5337,183x + 37725,533$$

$$50515,61 = 5337,183x + 37725,533$$

$$\mathbf{LOD = X = 2,40 \mu g/mL}$$

#### Perhitungan nilai LOQ :

Nilai Y pada batas kuantifikasi ditentukan dengan persamaan  $Y = Y_B + 10 S_B$

$Y$  = nilai intersept (a) pada persamaan kurva kalibrasi

$S_B$  = simpangan baku intersept (a) ( $S_a$ )

$$Y = 37725,533 + 10(4263,36)$$

$$= 80359,13$$

$$Y = 5337,183x + 37725,533$$

$$80359,13 = 5337,183x + 37725,533$$

$$\text{LOQ} = \text{X} = 8,00 \mu\text{g/mL}$$



### Lampiran 7. Contoh Perhitungan Kadar Klorfeniramin Maleat

Persamaan regresi linier kurva baku adalah

$$Y = BX + A$$

$$Y = 5337,183x + 37725,533$$

Replikasi 1

$$\begin{aligned} Y &= 5337,183x + 37725,533 \\ 248243 &= 5337,183x + 37725,533 \end{aligned}$$

$$X = 39,443 \text{ } \mu\text{g/mL}$$

Faktor pengenceran 25x, sehingga kadar klorfeniramin maleat adalah

$$\begin{aligned} X &= 39,443 \text{ } \mu\text{g/mL} \times 25 \\ &= 986,088 \text{ } \mu\text{g/mL} \end{aligned}$$

$$\begin{aligned} \text{Kadar klorfeniramin maleat dalam 1 ml sampel (0,2 mg)} &= \frac{0,2 \text{ mg}}{1000 \text{ } \mu\text{g/mL}} \times 986,088 \text{ } \mu\text{g/mL} \\ &= 0,197 \text{ mg} \end{aligned}$$

$$\begin{aligned} \text{Kadar klorfeniramin maleat dalam 1 ml sampel} &= \frac{0,197 \text{ mg}}{1 \text{ mL}} \times 1 \text{ mL} \\ &= 0,197 \text{ mg} \end{aligned}$$

$$\begin{aligned} \% \text{ Kadar klorfeniramin maleat} &= \frac{0,197}{0,2} \times 100\% \\ &= 98,6 \% \end{aligned}$$

**Lampiran 8. Perhitungan Selektivitas Klorfeniramin Maleat dan Guaifenesin**

$$R = 2 \frac{(tR_2 - tR_1)}{W_1 + W_2}$$

$$R = 2 \frac{(1,570 - 0,850)}{0,3 + 0,4}$$

$$R = 2,05$$



### Lampiran 9. Certificate of Analysis Klorfeniramin Maleat

常熟华港制药有限公司  
CHANGSHU HUAGANG PHARMACEUTICALS CO.,LTD  
检验报告单  
CERTIFICATE ANALYSIS

品名 Product Name	扑热息痛 微粉 Paracetamol Micro grade	包装规格 Packing	25kgs/drum
批号 Batch No.	KLB1312351 ✓	数量 Quantity	1000kg
生产日期 Manufacture Date	04-12-2013	有效期 Expiry Date	03-12-2017
检验标准 Standard	BP2010/USP32		
检 验 结 果 Examination		L/C NO.:225LC30502B DATE:SEP 9,2013 INVOICE NO.:CSHG131205 DATE:DEC 5,2013	
项目 Contents		标准 Specification	
性状 Characters		White,crystalline powder,sparingly soluble In water,freely soluble in alcohol,very Slightly soluble in ether and in methylene Chloride.	
鉴别 Identification		A:Melting range 168-172°C B.C.D.E Positive	
相关物质 Related substance		Impurity J(chloracetanilide) ≤10ppm Impurity K(4-aminophenol) ≤50ppm Impurity F(4-nitrophenol) ≤0.05% Any other impurity ≤0.05% Total of other impurity≤0.1%	
氯化物 Chloride		≤0.014%	
硫酸盐 Sulfate		≤0.02%	
硫化物 Sulfide		Complies	
重金属 Heavy metals		≤0.001%	
游离对氨基酚 Free p-Aminophenol		≤0.005%	
对氯苯乙酰胺 chloracetanilide		≤0.001%	
易炭化物 Readily carbonizable substances		Complies	
溶剂残留 Residual solvent		Residual content of acetic acid≤0.5%	
有机挥发性杂质 Organic volatile impurities		Complies	
水份 Water		≤0.5%	
炽灼残渣 Residue on ignition		≤0.1%	
含量 Assay		99.0-101.0%(Dried substance)	
结果 Results			
White,crystalline powder,sparingly soluble In water,freely soluble in alcohol,very slightly Soluble in ether an in methylene Chloride.			
170.1-170.7°C			
B.C.D.E Positive			
≤10ppm			
≤50ppm			
≤0.05%			
≤0.05%			
≤0.1%			
≤0.014%			
≤0.02%			
Complies			
≤0.001%			
≤0.005%			
≤0.001%			
Complies			
Complies			
≤0.09%			
Complies			
0.09%			
0.05%			
100.2%			

结论:  
Conclusion:  
It complies with requirements of the BP2010/USP32

质检部 QA Dept.   
检验者 Inspector: Zhao lin Hong qing  
 

GLOBAL CHEMINDO MEGATRADING  
reliable partner in raw material business

### Lampiran 10. Certificate of Analysis Guaifenesin

 <b>GENNEX LABORATORIES LIMITED</b> ISO 9001: 2008, ISO 14001: 2004, OHSAS 18001: 2007 Certified Company <b>CERTIFICATE OF ANALYSIS</b>				
Name of the Product	GUAIFENESIN BP			
Batch Number	GGE2451114	Batch Size	1001 Kgs	
A.R. Number	COMGGE24514	Quantity	1000 Kgs	
Date of Analysis	28/11/2014	Date of Manufacturing	November' 2014	
Date of Release	28/11/2014	Expiry Date	October' 2019	
Drug Mfg. Licence No.	169/MD/AP/95/B/R			
S.No	TEST	RESULTS	SPECIFICATIONS	
1	Appearance	White crystalline powder	White or almost white crystalline powder.	
2	Solubility	Complies	Sparingly soluble in water, Soluble in alcohol.	
3	Identification By			
	a) Melting point	79.3°C to 80.6 °C	79°C to 83°C	
	b) By IR	Conforms	The IR absorption spectrum of the sample is concordant with the spectrum obtained with Guafenesin CRS / Working reference standard	
3	c) By TLC	Conforms	The principle spot in the chromatogram obtained with the test solution is similar in position and size to the principle spot in the chromatogram obtained with the reference solution.	
	4	Appearance of Solution	The solution is clear and colourless	Solution S is clear and colourless.
	5	Acidity and Alkalinity	0.1mL of 0.01M NaOH Solution.	Should Comply as per BP
6	Related Substances By HPLC			
	a) Impurity-A	0.01 %	Not more than 0.10 %	
	b) Impurity-B	0.50 %	Not more than 1.0 %	
	c) Any Other Impurity	0.07 %	Not more than 0.5 %	
	d) Total impurities. ( Excluding Impurity -B)	0.17 %	Not more than 1.0 %	
7	Chlorides and Monochlorhydrins	Less than 250 ppm	Not more than 250 ppm	
8	Heavy Metals	Less than 25 ppm	Not more than 25ppm	
9	Loss on Drying (In Vacuum at 60°C for 3 h)	0.35 %	Not more than 0.50%	
10	Sulphated Ash	0.08 %	Not more than 0.1%.	
11	Assay by Chemical, (on dry basis )	99.5 %	Not less than 98.0% to Not more than 102.0%. <i>119.3 A 54.14</i>	
12	Additional Test			
	Residual Solvents			
	Methylene Di Chloride	Below Detection limit	Not more than 600ppm	
	Toluene	118 ppm	Not more than 890ppm	
	Methanol	394 ppm	Not more than 3000ppm	
Packing and Storage: Preserve in tight Containers. Remarks : The above batch Complies as per BP / In-House with respect to above tests				
Prepared By:	<i>Raw</i> 28/11/14	Checked By: <i>Chaitanya</i> 28/11/14	Approved By: <i>Jai</i> 28/11/14	
<b>EC NO: DC JAK142052 DATED: 13.11.2014</b>				
Corporate Office : "Akash Ganga" III Floor, Plot # 144, Srinagar Colony, Hyderabad-500 073, Telangana, India, Factory : Sy.No.133, IDA, Bollaram, Jinnaram Mandal, Medak District-502 325, Telangana, India;				
Page 1 of 1				

## Lampiran 11. Surat Keterangan Laboratorium



### UNIVERSITAS WAHID HASYIM FAKULTAS FARMASI BAGIAN KIMIA FARMASI

Jl. Menoreh Tengah X / 22 Sampangan – Semarang 50236 Telp. (024) 8505680 – 8505681 fax. (024) 8505680

#### SURAT KETERANGAN No. 06/Lab. Kimia Farmasi/ C.05/UWH/X/ 2016

Assalamu'alaikum Wr. Wb.

Yang bertanda tangan dibawah ini, Kepala Bagian Kimia Farmasi Fakultas Farmasi Universitas Wahid Hasyim Semarang menerangkan bahwa :

Nama : Ira Afifah  
NIM : 125010823  
Fak/ Univ/ Sekolah : Farmasi / Universitas Wahid Hasyim Semarang

Telah melakukan Penelitian validasi menggunakan alat Spektrofotometer UV-Vis dan HPLC di Laboratorium Kimia Analisa, Fakultas Farmasi Universitas Wahid Hasyim Semarang, dengan judul penelitian :

“ Validasi Metode Penetapan Kadar Klorfeniramin Maleat dan Guesin Glukonat Menggunakan Kromatografi Cair Kinerja Tinggi Serta Aplikasinya dalam Sediaan Sirup ”

Demikian surat keterangan ini dibuat untuk dipergunakan semestinya.

Wassalamu'alaikum Wr. Wb.

Semarang, Oktober 2016

Ka.Bag Kimia Farmasi

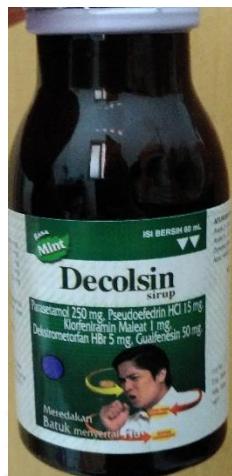


Maria Ulfah, M.Sc, Apt

**Lampiran 12. Instrumen KCKT**

**Lampiran 13. Gambar Sampel**

1. Sirup A.



2. Sirup B



3. Sirup C



