BAB 5
KESIMPULAN DAN SARAN

5.1. Kesimpulan

Berdasarkan hasil analisis data dan interpretasi penemuan, maka dapat disimpulkan bahwa metode kromatografi lapis tipis yang digunakan dalam kondisi fase diam silika gel 60 GF_{254} dengan fase gerak Kloroform : Metanol : Asam asetat glasial (70:3:0,2 v/v) dapat digunakan untuk identifikasi dan penetapan kadar tadalafil dalam sediaan permen karet cinta karena memiliki ketepatan dan ketelitian yang baik.

Setelah dilakukan aplikasi sampel dari ketiga merek permen karet cinta yang beredar di pasaran dapat disimpulkan bahwa permen karet cinta merek A, B dan C yang beredar di pasaran tidak mengandung tadalafil.

5.2. Saran

Berdasarkan data hasil penelitian maka disarankan agar dapat melakukan penelitian lebih lanjut untuk mengetahui senyawa apa yang memiliki bentuk spektum yang sama dengan spektrum yang diperoleh dari noda sampel permen karet cinta merek A tersebut.

DAFTAR PUSTAKA

Balai POM, 2002, **Petunjuk Operasional Cara Pengolahan Obat yang Baik**, Jakarta.

Balai POM, 2012, **Pedoman Pemberian Sertifikat Produksi Pangan Industri Rumah Tangga**, BPOM, Jakarta

Belitz, H . D., and W, Grouch, 1987, **Food Chemistry**, 2nd ed, Heilderberg, Spinger-Verlag, Berlin, 232

Bliesner, D. M., 2006, **Validating Chromatographic Methods A Practical Guide**, John Wiley and son, Inc., New Jersey, 8.

Carlson *et al*, 2002, **Gum Chewing May Help,** http://indarticles.com/p/articles /mi_m1608/is6_18/ai_86233352/, 12 oktober 2010

Damayanti, S., 2005, **Manfaat Permen Karet bagi Kesehatan**. http://www.pikiran-rakyat.co.id, 03 April 2013.

Deinstrop, E. H., 2000, **Applied Thin Layer Chromatography**. Willey-VCH, New York, 1, 67, 150.

Epshtein, N. A., 2004, **Validation of HPLC Techniques for Pharmaceutical Analysis**, Pharmaceutical Chemistry Journal 38(4), 228.

Ermer, J., 2005, Analitical Validation within the Pharmaceutical Environment, dalam: **Method Validation in Pharmaceutical Analysis**, Wiley-VCH Verlag GmbH & Co. KgaA, Weinheim, 3-5, 16.

Gandjar, I.G., and A. Rohman, 2010, **Kimia Farmasi Analisis, Pustaka Pelajar**, Yogyakarta, 353-367.

Giuliano, F., and L, Varanese, 2002, Tadalafil:a novel treatment for erectile dysfunction, **Eur Heart J Supplements,** 4, 24-31

Gocan, S., 2002, Stationary Phases for Thin-layer chromatography, **Journal of Chromatography Science,** 40, 1-12

Green, J. M., 1996, **Practical Guide to Analytical Method Validation, Analytical Chemistry**.Vol.II, 305.

Harmita, 2004, Petunjuk Pelaksanaan Validasi Metode dan Cara Perhitungannya, **Majalah Ilmu Kefarmasian**, Vol., I, nomor 3, 117-132.

Hilal, S.H., *et al,* 1994, Quantitative Treatments of Solute/Solvent Interactions: **Theoretical and Computational Chemistry**, New York: Elsevier , Vol. 1, pp. 291-353

Keller, Heckman, Belgum., 2007, **International chewing gum association**, http://www.gumassociation.org/default.aspx?cat=3, 10 oktober 2010

Kirchner, J. G., 1978, **Thin-Layer Chromatography**. Jhon Wiley & Sons, 5, 8-11.

Madan, N., and A. Rathnan, 2011, Chewing Gums for Optimal Health, **Chronicles of Young Scienstists**, Vol 2 (1), 8

Martindale, 2009, **The Complete Drug reference**, 36nd ed, Pharmaceutical Press, London, 2196-2197

Matissek, R., and Wittkowski, R., 1990, **High Performance Liquid Chromatography in Food Control** and research. Technomic Publishing Co., Lancaster, pp.19-82, 285-288.

Merck index , 2006, **Merck Index 14th edition**, 1550–1551.

Mulya, M., 1978, **Pemakaian thin layer chromato scanner untuk analisa kuantitatif**. *Buletin ISFI Jatim*,XV,pp.15-24.

Mulya, M., dan Suharman, 1995, **Analisis Instrumental**, Airlangga University Press, Surabaya, 223-235.

Patel, S. A., and P. J. Natvanal, 2011, High Performance Thin Layer Chromatographic Method For Determination Of Tadalafil In Tablet Dosage Form, **American Journal of Pharmtech Recearch,** 1(3), 138-146

Pusponegoro, C., 2013, **Permen Pakar Farmasi Unair Surabaya: Produsen Permen Karet Cinta Telah Berbohong ,** http:// batam.tribunnews.com /m/ index.php/ 2013 /02/09/pakar-farmasi-unair-surabaya-produsen-permen-karet-cinta telah-berbohong , 9 Februari 2013

Redaksi, 2013, **Laporan Khas Redaksi: Kandungan Permen Cinta Sama Dengan Vigra**, Trans 7, Jakarta, 14 Februari 2013.

Rohman, A., 2007, **Kimia Farmasi Analisis,** Cetakan I, Pustaka Pelajar, Yogyakarta, 467, 469.

Rohman, A., and I.G. Gandjar, 2007, **Kimia Farmasi Analisis, cetakan pertama, Pustaka Pelajar**, Yogyakarta

Roth, J., and G. Blaschke, 1998, **Analisis Farmasi**, terjemahan S. Kisman dan S. Ibrahim, Penerbit UGM, Yogyakarta, 402-424

Setiawan, H., S. Esar, E. Sukarti, 2007, **Analisis Sildenafil Sitrat dan Tadalafil Dalam Sediaan Jamu Kuat Pria Secara KLT-Densitometri**, Universitas Widya Mandala, Surabaya.

Setiawan, H., S. Esar, E. Sukarti, 2012, **Analisis Sildenafil Sitrat Dalam Sediaan Jamu Kuat Pria Secara KLT-Densitometri**, Universitas Widya Mandala, Surabaya.

Sherma, J., and B. Fried, 1999, **Thin Layer Chromatography**. 4rd edition. Marcel Dekker, Inc., New York, pp 3-9, 11-15, 177-178.

Skoog , D. A., 1985, **Principles of Instrumental Analysis**, Saunders College Pulb, Piladelphia, 67-69.

Skoog, D.A., and D. M. West, 1980, **Principles of Instrumental Analysis**, Thomson Higher Education, London, 848-851.

Snyder, L.R., and Dolan, J.W., 1985, **Getting Startrd in HPLC User's Manual**. LC Resources Inc., Walnut Creek, CA, pp.22-24.
Sudjadi, 1998, **metode pemisahan,** kanisius, Yogyakarta, 33-42

S. Xiao-Xin, L. Shi-Ling, X. Wei, X. Yu-Lan, 2008, **Tetrahedron Asymmetr,** p19 (2008) 435.

Thomas, G., 2000, **Medicinal Chemistry**, Jhon Wiley & sons, new York, 456-457

Touchstone, J. C., and J. Sherma., 1979, **Densitometry in Thin Layer Chromatography Practice Application**, John Wiley & Sons , New York

Touchstone, J. C., and M . F. Dobbins, , 1983, **Practice of Thin Layer Chomatography,** 2nd ed., John Wiley & Sons, New York, 56.

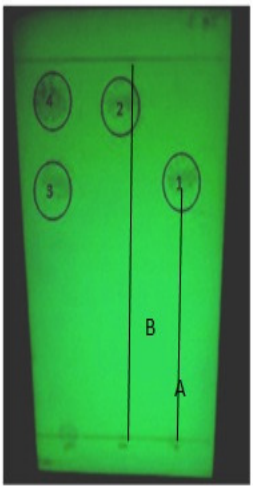
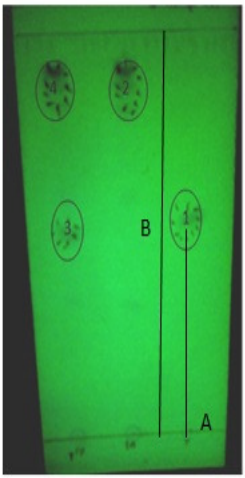
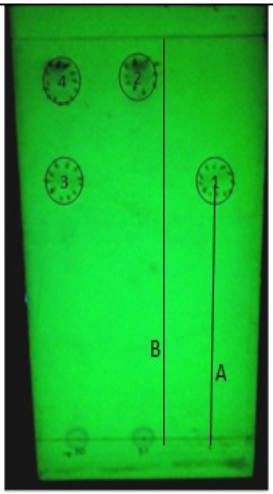
USP, 2012, **The United States Pharmacopeia**, 35th ed., Electronic Version, United States, Vol.1, 878-881.

Watson, D. G., 2009, **Analisis Farmasi**, penerjemah : W. R. Syarif, Penerbit Buku Kedokteran EGC, Jakarta, 380.

Zaimu, A, 2013, **Permen Karet Cinta Bangkitkan Hasrat Seksual dalam 20 Menit**,http://www.tribunnews.com/2013/02/06/permen-karet-cinta-bangkitkan hasrat-seksual-dalam-20-menit, 6 Februari 2013

LAMPIRAN A

Perhitungan Faktor Retardasi (Rf)

		
$Rf = \frac{5{,}8\ cm}{8\ cmB} = 0{,}72$	$Rf = \frac{4{,}2\ cm}{8\ cmB} = 0{,}53$	$Rf = \frac{5{,}2\ cm}{8\ cmB} = 0{,}65$

$Rf = \frac{A}{B}$,

dimana :

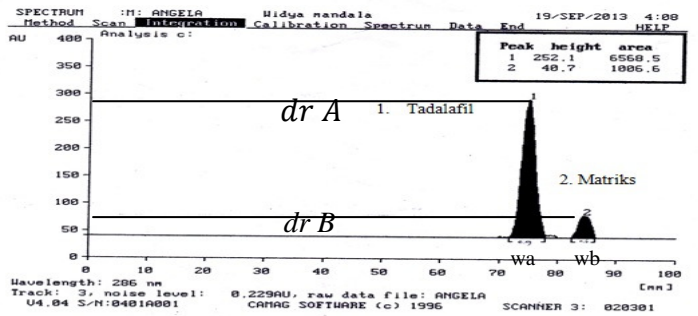
Rf = faktor retardasi

A = jarak dari totolah sampai noda

B = jarak dari totolah sampai batas eluasi.

LAMPIRAN B

Perhitungan Resolusi Analit (Rs)

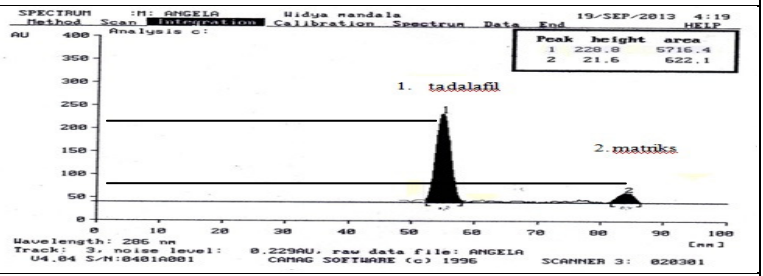


Keterangan :

- Jarak yang ditempuh tadalafil (dr A)
- Jarak yang ditempuh matriks (dr B)
- Lebar puncak tadalafil (W_A)
- Lebar puncak matriks (W_B)

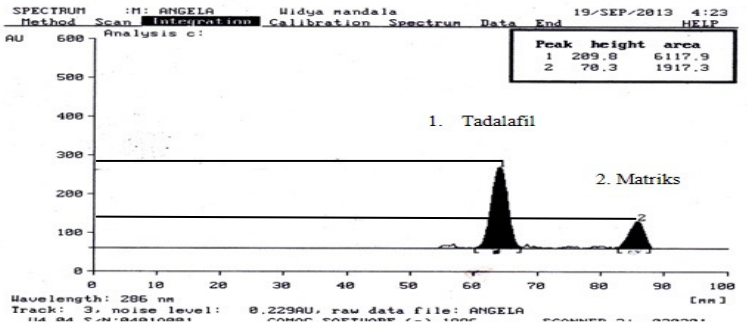
Fase gerak 1 =
Kloroform : Metanol (9 : 1 v/v)

$$Rs = \frac{2(dr\ A - dr\ B)}{WA+WB} = \frac{2(11,85-10,5)}{0,6+0,9} = 1,80$$



Rs fase gerak 2 =
Kloroform:Metanol:Asam asetat glasial (70 : 3 : 0,2 v/v)

$$Rs = \frac{2(dr\ A - dr\ B)}{WA+WB} = \frac{2(11,8-7,8)}{0,8+0,6} = 5,71$$



Rs fase gerak 3 =
Kloroform:Metanol:Amoniak (75 : 2 : 5 v/v)

$$Rs = \frac{2(dr\ A - dr\ B)}{WA + WB}$$

$$= \frac{2(12-9)}{1+0,7} = 3,53$$

LAMPIRAN C

Perhitungan Faktor Asimetris (As) dan Faktor Kapasitas (k')

– Fase Gerak Kloroform : Metanol (9 : 1 v/v)

Diketahui : A = 0,5 cm

B = 0,4 cm

$$As = \frac{B}{A} = \frac{0{,}5\ cm}{0{,}5\ cm} = 1$$

K'= 1-0,72/0,72 = 0,388

– Fase Gerak Kloroform : Metanol : Asam asetat glasial (70 : 3 : 0,2 v/v)

Diketahui : A = 0,4 cm

B = 0,4 cm

$$As = \frac{B}{A} = \frac{0{,}4\ cm}{0{,}4\ cm} = 1$$

K' = 1-0,53/0,53 = 0,886

– Fase Gerak Fase Kloroform : Metanol : Amoniak (75 : 2 : 5 v/v)

Diketahui : A = 0,4 cm

B = 0,4 cm

$$As = \frac{B}{A} = \frac{0{,}5\ cm}{0{,}5\ cm} = 1$$

K' = 1-0,65/0,65 = 0,538

LAMPIRAN D

Perhitungan Indeks Kepolaran

Diketahui :Indeks kepolaran Klofoform = 4,1

Indeks Kepolaran Metanol = 5,1

Indeks kepolaran Asam asetat = 6,2

Indeks polaritas air = 9,0

Indeks kepolaran amoniak tidak diketahui namun dari beberapa literatur menyatakan amoniak bersifat polar hampir menyamai air, polaritas disesuaikan dengan kelarutan amoniak dalam air kemudian di kali dengan polaritas air. Indeks kepolaran amoniak = 1/1,165 x 9,0 = 7,72

- Indeks Kepolaran Campuran Kloroform : Metanol (9 : 1 v/v)

  Perbandingan fase gerak 9 : 1 dalam 20 ml larutan atau 90 : 10 %

  Indeks Kepolaran Fase Gerak $= \left(\frac{90}{100} \times 4{,}1\right) + \left(\frac{10}{100} \times 5{,}1\right) = 4{,}200$

- Indeks Kepolaran Campuran Kloroform : Metanol : Asam asetat glasial (70 : 3 : 0,2 v/v)

  Perbandingan fase gerak 70 : 3 : 0,2 dalam 20 ml larutan atau 95,5 : 4,1 : 0,4 %

  Indeks Kepolaran Fase Gerak $= \left(\frac{95{,}5}{100} \times 4{,}1\right) + \left(\frac{4{,}1}{100} \times 5{,}1\right) + \left(\frac{0{,}04}{100} \times 6{,}2\right) = 4{,}126$

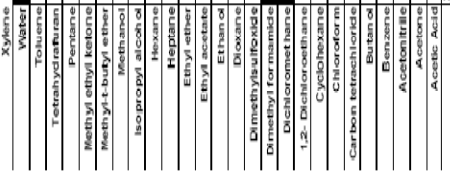
- Indeks Kepolaran Campuran Kloroform : Metanol : Amoniak (75:2:5 v/v)

  Perbandingan fase gerak 75 : 2 : 5 dalam 20 ml larutan atau 91 : 2,4 : 6,6 %

  Indeks Kepolaran Fase Gerak $= \left(\frac{91}{100} \times 4{,}1\right) + \left(\frac{2{,}4}{100} \times 5{,}1\right) + \left(\frac{6{,}6}{100} \times 7{,}72\right) = 4{,}852$

LAMPIRAN E

Tabel Indeks Polaritas



Miscible
Immiscible

	Polarity Index[1]	Viscosity (cP)	UV (nm) Cutoff[2]	Solubility in Water (%)
Acetic Acid	6.2	1.26	230	100
Acetone	5.1	0.32	330	100
Acetonitrile	5.8	0.37	190	100
Benzene	2.7	0.65	280	0.18
Butanol	4.0	0.73	254	0.43
Carbon tetrachloride	1.6	0.97	263	0.08
Chloroform	4.1	0.57	245	0.815
Cyclohexane	0.2	1.00	200	0.01
1,2- Dichloroethane	3.5	0.79	225	0.81
Dichloromethane	3.1	0.44	235	1.6
Dimethyl formamide	6.4	0.92	268	100
Dimethylsulfoxide	7.2	2.00	268	100
Dioxane	4.8	1.54	215	100
Ethanol	5.2	1.20	210	100
Ethyl acetate	4.4	0.45	260	8.7
Ethyl ether	2.8	0.32	220	6.89
Heptane	0.0	0.39	200	0.0003
Hexane	0.0	0.33	200	0.001
Isopropyl alcohol	3.9	2.30	210	100
Methanol	5.1	0.60	205	100
Methyl-t-butyl ether	2.5	0.27	210	4.8
Methyl ethyl ketone	4.7	0.45	329	24
Pentane	0.0	0.23	200	0.0004
Tetrahydrafuran	4.0	0.55	215	100
Toluene	2.4	0.59	285	0.051
Water	9.0	1.00	200	100
Xylene	2.5	0.61	290	0.018

[1] The polarity index is a measure of the relative polarity of a solvent and is useful for identifying suitable mobile phase solvents. The polarity index increases with polarity. For reverse phase chromatography eluent strength decreases as its polarity increases

[2] UV cutoff, the wavelength at which the solvent absorbance in a 1 cm path length cell is equal to 1 AU (absorbance unit) using water in the reference cell.

Solvent Polarity Chart

Relative Polarity	Formula	Group	Solvents
Non-polar	R-H	Alkanes	Petroleum ethers, hexanes, ligroin
	Ar-H	Aromatics	Toluene
	R-O-R	Ethers	Diethyl ether
	R-X	Alkyl halides	Tricholoromethane, chloroform
	R-COOR	Esters	Ethyl acetate
	R-CO-R	Aldehydes and ketones	Acetone, MEK
	R-NH2	Amines	Pyridine, triethylamine
	R-OH	Alcohols	MeOH, EtOH, IPA, Butanol
	R-COHN2	Amides	Dimethyformamide
	R-COOH	Carboxylic Acid	Ethanoic Acid
Polar	H-O-H	Water	

Solvent Miscibility and Viscosity Chart adapted from Paul Sadek The HPLC Solvent Guide Wiley-Interscience, 2002.

Mobile phases, stationary phase, analyte and samples must be compatible

LAMPIRAN F

Cara Perhitungan Harga F Untuk Kurva Baku Tadalafil dari Tiga Kali Replikasi

Hari	Konsentrasi (Ppm) (X)	Luas Area Rata-Rata (Y)		X^2	Y^2	Xy
1	12.57	926.3		158.0049	858031.69	11643.59
	25.14	2005.75		632.0196	4023033.1	50424.56
	50.28	4102.65		2528.0784	16831737	206281.2
	75.42	5927.9		5688.1764	35139998	447082.2
	100.56	7654.6		10112.3136	58592901	769746.6
			Σ=	19118.5929	115445701	1485178
2	12.04	997.5		144.9616	995006.25	12009.9
	25.1	2129.25		630.01	4533705.6	53444.18
	50.2	3992.35		2520.04	15938859	200416
	75.23	5246.65		5659.5529	27527336	394705.5
	100.3	7268.2		10060.09	52826731	729000.5
			Σ=	19014.6545	101821638	1389576
3	12.67	915.85		160.5289	838781.22	11603.82
	25.35	2084.4		642.6225	4344723.4	52839.54
	50.71	4265.45		2571.5041	18194064	216301
	76.06	5941.3		5785.1236	35299046	451895.3
	101.41	7385.25		10283.9881	54541918	748938.2
			Σ=	19443.7672	113218532	1481578

Hari	Σx^2	Σxy	Σy^2	Residual SS	N	Residual DF (n-2)
I	19118.5929	1485178.182	115445701.3	112945,823	5	3
II	19014.6545	1389575.985	101821637.8	320976,823	5	3
III	19443.7672	1481577.81	113218531.5	325140,806	5	3
Σ=	57577.0146	4356331.976	330485870.7	759063,452		9

SS1 $= \Sigma y^2 1 - \frac{\Sigma xy^2}{\Sigma x^2} = 115445701.3 - \frac{2205000000000}{19118.5929} = 112945{,}823$

SS2 $= \Sigma y^2 2 - \frac{\Sigma xy^2}{\Sigma x^2} = 101821637.8 - \frac{1930000000000}{19014.6545} = 320976{,}823$

SS3 $= \Sigma y^2 3 - \frac{\Sigma xy^2}{\Sigma x^2} = 113218531.5 - \frac{2195000000000}{19443.7672} = 325140{,}806$

SSt = SS1 + SS2 + SS3 = 112945,823+ 320976,823 + 325140,806 = 759063,452

SSc $= \Sigma (\Sigma y^2) - \frac{\Sigma (\Sigma xy)^2}{\Sigma(\Sigma x^2)} = 330485870.7 - \frac{1{,}897\ x\ 10^{13}}{57577.0146} = 881628{,}157$

F $= \frac{\frac{SSc - SSt}{DF - 1}}{\frac{SSt}{DFt}} = \frac{\frac{881628{,}157 - 759063{,}452}{3-1}}{\frac{759063{,}452}{9}} = \frac{61282{,}352}{84340{,}383} = 0{,}7266$

F hitung = 0,7266

F $\text{tabel}_{0{,}05\ (2:9)} = 4{,}26$

F hitung< F tabel = 0,7266< 4,26 = tidak berbeda bermakna.

LAMPIRAN G

Cara Perhitungan Akurasi dan Presisi Metode Tadalafil pada Konsentrasi 50, 100 dan 150% dalam Matriks Permen Karet

Matriks permen karet ditimbang sebanyak 300 mg diekstraksi dengan MetOH sebanyak 4 ml 2 kali, kemudian ditambahkan tadalafil konsentrasi 50,100 dan 150 % ad hingga 10 ml

↓

Saring kemudian ditotolkan sebanyak 10 µl, eluasi dengan fase gerak Kloroform : Metanol : Asam asetat glasial (70 : 3 : 0,2 v/v)

↓

% perolehan kembali

Cara Perhitungan Akurasi Dan Presisi Dari Tadalafil

Replikasi	Penimbangan	Kesetaraan /berat tablet	Konsentrasi teoritis (ppm)	Luas area	Konsentrasi sebenarnya (ppm)	% *recovery*
I	88,612 mg	4,86 mg/364,13	24,34	1925,1	23,476	96,45
II	89,22 mg	4,89 mg/364,13	24,5	1997,2	24,524	100,09
III	94,25 mg	5,22 mg/ 361,3	26,13	2163,2	26,93	103,06
I	96,93 mg	5,29 mg/364,13	52,9	4050,7	54,37	102,7
II	95,239 mg	5,272 mg/361,3	52,72	3842,3	51,34	97,38
III	91,6 mg	5,070 mg/361,3	50,70	3743,8	49,91	98,29
I	95,9 mg	5,28 mg/363,3	79,2	5808,7	79,93	100,9
II	95,239 mg	5,272mg/361,3	78,65	5690,3	78,21	99,4
III	91,6 mg	5,070 mg/361,3	76,05	5453,8	74,75	98,29

Cara perhitungan

1. $\%\ \text{perolehan kembali} = \frac{\text{jumlah zat yang diperoleh}}{\text{jumlah zat yang sebenarnya}} \times 100\%$

   Contoh untuk replikasi 1 (50 %) = $\frac{23,476}{24,34} \times 100\%$ = 96,45%

2. $SD = \sqrt{\frac{\Sigma\,(x-\overline{x})^2}{n-1}}$ = SD 50% = $\sqrt{\frac{21,9209}{3-1}}$ = 3,31

   Keterangan :

   $\overline{x} = \frac{96,45+100,9+103,06}{3}$ = 99,86 %

   n = jumlah data

   $\Sigma\,(x-\overline{x})^2$ = (96,45-99,86)² + (100,09-99,86)² + (103,06-99,86) = 21,921

3. $KV = \frac{SD}{\overline{x}}\ x\ 100\%$

   KV 50 % = $\frac{3,31}{99,86}\ x\ 100\%$ = 3,31 %

4. T hitung : $t = \frac{[\Sigma\,\overline{x}-\mu]}{\frac{SD}{\sqrt{n}}}$

   t 50 % = $\frac{[99,86-100]}{\frac{3,31}{\sqrt{3}}}$ = 0,073

LAMPIRAN H

Hasil Perhitungan Harga Thitung dalam Uji Akurasi Menggunakan SPSS

```
T-TEST
  /TESTVAL=100
  /MISSING=ANALYSIS
  /VARIABLES=persen_rec_50 persen_rec_100 persen_rec_150
  /CRITERIA=CI(.95).
```

T-Test

[DataSet0]

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
persen_rec_50	3	99.8667	3.31065	1.91141
persen_rec_100	3	99.4567	2.84542	1.64281
persen_rec_150	3	99.5300	1.30985	.75624

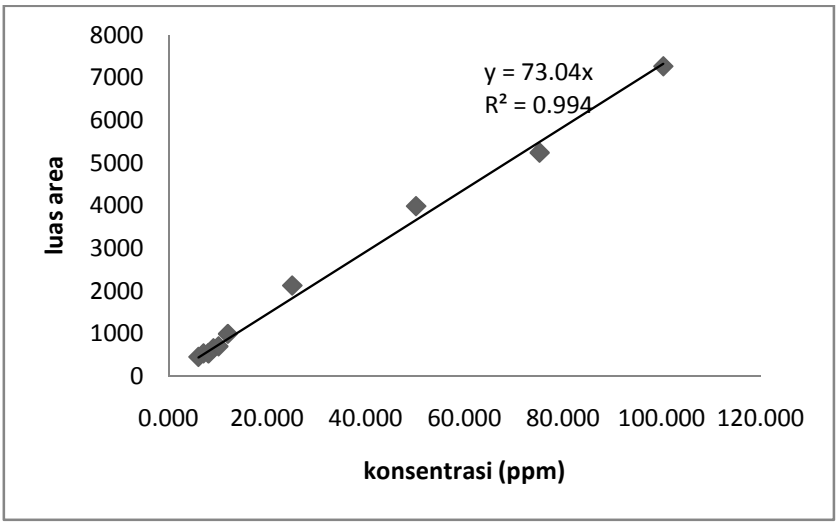
One-Sample Test

	Test Value = 100					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
persen_rec_50	-.070	2	.951	-.13333	-8.3575	8.0908
persen_rec_100	-.331	2	.772	-.54333	-7.6118	6.5251
persen_rec_150	-.621	2	.598	-.47000	-3.7238	2.7838

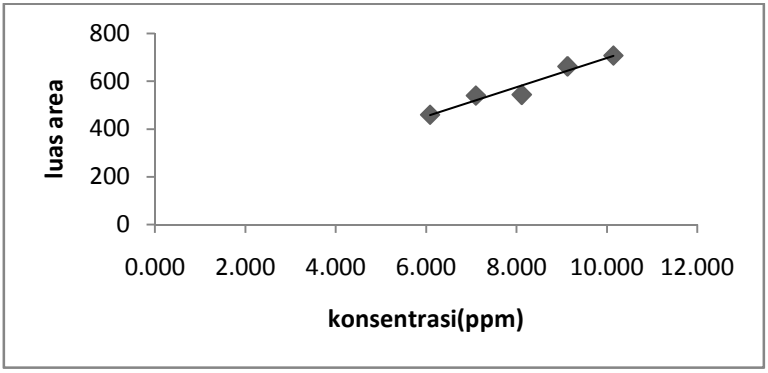
LAMPIRAN I

Hasil Ekstrapolasi Grafik Hubungan antara Jumlah Tadalafil (X) Vs Area pada Uji LOD/LOD

Dihubungkan dengan Kurva Linearitas



Tanpa kurva linearitas



LAMPIRAN J

Perhitungan LOD/LOQ

Konsentrasi (ppm) (Xi)	Area (Y)	Area sebenarnya (Yi)	(Y-Yi)²
6,084	458,8	458,067	0,537
7,098	538,9	519,851	362,864
8,113	542,6	581,696	1528,497
9,126	661,5	643,419	326,922
10,141	706,5	705,264	1,527
			Σ = 2220,347

Persamaan kurva LOD/LOQ = y = 60,9310x + 87,3629

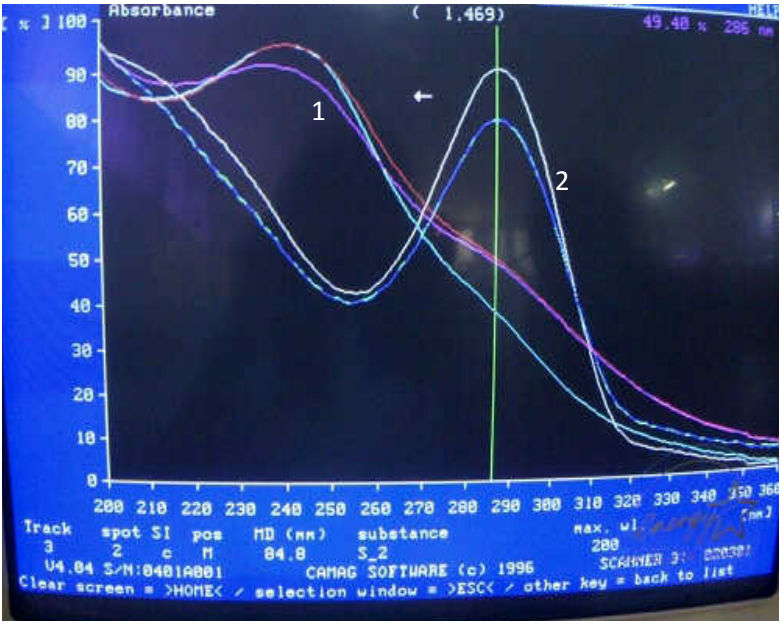
$$S\frac{y}{x} = \sqrt{\frac{\sum(Yi-\overline{Yi})^2}{N-2}} = S\frac{y}{x} = \sqrt{\frac{2220,3472}{3}} = 27,2050$$

$$LOD = \frac{3 \times \text{Sy/x}}{\text{slope}} = \frac{3 \times 27,2050}{60,9310} = 1,339\ \mu g/ml$$

$$LOQ = \frac{10 \times \text{Sy/x}}{\text{slope}} = \frac{10 \times 27,2050}{60,9310} = 4,464\ \mu g/ml$$

LAMPIRAN K

Spektrum Serapan Campuran Tadalafil dan Matriks

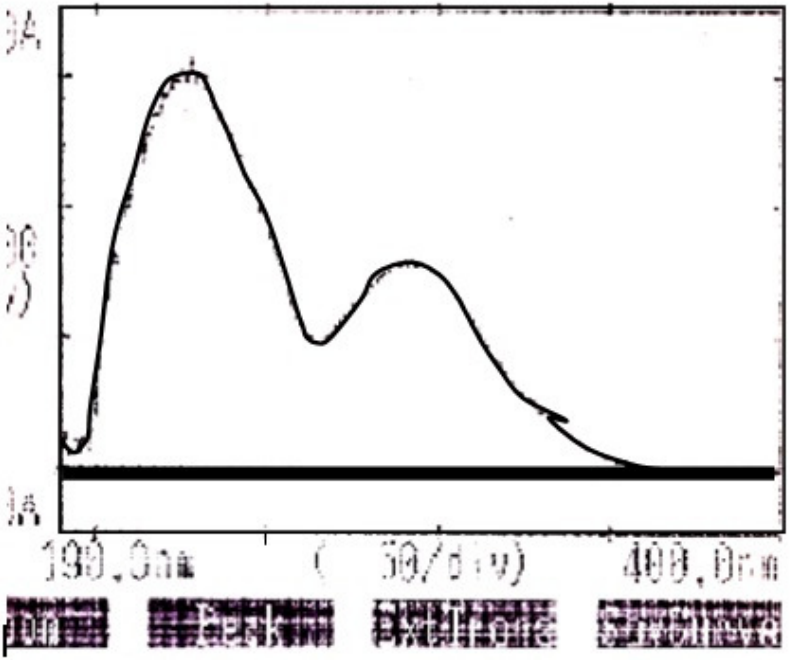


Keterangan :

1. Spektrum matriks permen karet
2. Spektrum tadalafil

LAMPIRAN L

Spektrum Sildenafil Sitrat



LAMPIRAN M

Tabel R

df = (N-2)	Tingkat signifikansi untuk uji satu arah				
	0.05	0.025	0.01	0.005	0.0005
	Tingkat signifikansi untuk uji dua arah				
	0.1	0.05	0.02	0.01	0.001
1	0.9877	0.9969	0.9995	0.9999	1.0000
2	0.9000	0.9500	0.9800	0.9900	0.9990
3	0.8054	0.8783	0.9343	0.9587	0.9911
4	0.7293	0.8114	0.8822	0.9172	0.9741
5	0.6694	0.7545	0.8329	0.8745	0.9509
6	0.6215	0.7067	0.7887	0.8343	0.9249
7	0.5822	0.6664	0.7498	0.7977	0.8983
8	0.5494	0.6319	0.7155	0.7646	0.8721
9	0.5214	0.6021	0.6851	0.7348	0.8470
10	0.4973	0.5760	0.6581	0.7079	0.8233
11	0.4762	0.5529	0.6339	0.6835	0.8010
12	0.4575	0.5324	0.6120	0.6614	0.7800
13	0.4409	0.5140	0.5923	0.6411	0.7604
14	0.4259	0.4973	0.5742	0.6226	0.7419
15	0.4124	0.4821	0.5577	0.6055	0.7247
16	0.4000	0.4683	0.5425	0.5897	0.7084
17	0.3887	0.4555	0.5285	0.5751	0.6932
18	0.3783	0.4438	0.5155	0.5614	0.6788
19	0.3687	0.4329	0.5034	0.5487	0.6652
20	0.3598	0.4227	0.4921	0.5368	0.6524
21	0.3515	0.4132	0.4815	0.5256	0.6402
22	0.3438	0.4044	0.4716	0.5151	0.6287
23	0.3365	0.3961	0.4622	0.5052	0.6178
24	0.3297	0.3882	0.4534	0.4958	0.6074
25	0.3233	0.3809	0.4451	0.4869	0.5974

LAMPIRAN N

Tabel F

df untuk penyebut (N2)	df untuk pembilang (N1)									
	1	2	3	4	5	6	7	8	9	10
1	161	199	216	225	230	234	237	239	241	242
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27

LAMPIRAN O

Tabel t

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										