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Lampiran IV

Perhitungan Viskositas Mukus

a. Perhitungan viskositas mukus setelah penambahan fraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Tabel 6. Data waktu alir uji aktivitas mukolitik fraksi heksan

No	Waktu alir (detik)								
	Air Suling	Kontrol negatif	Kontrol positif	Fraksi I		Fraksi II		Fraksi III	
				F_R I 0,25%	F_R I 1 %	F_R II 0,25%	F_R II 1 %	F_R III 0,25%	F_R III 1 %
1	8,75	17,08	14,60	12,30	10,91	12,68	15,12	15,61	22,10
2	8,93	24,51	14,04	14,51	12,91	11,51	10,75	14,77	15,26
3	8,67	24,59	13,33	12,58	14,11	11,86	10,37	15,45	11,60
Rata-rata	8,78	22,06	13,99	13,13	12,64	12,02	12,08	15,28	16,32

Tabel 7. Data bobot bahan uji dengan piknometer

No.	Bobot (gram)								
	Air Suling	Kontrol negative	Kontrol positif	Fraksi I		Fraksi II		Fraksi III	
				F_R I 0,25%	F_R I 1 %	F_R II 0,25%	F_R II 1 %	F_R III 0,25%	F_R III 1 %
1	19,599	20,881	20,084	19,665	20,851	20,093	21,338	19,705	20,910
2	19,606	20,083	20,856	20,890	20,040	20,897	19,696	20,919	20,066
3	19,579	20,915	20,042	20,042	20,912	19,654	21,292	20,102	21,336
Rata-rata	19,595	20,626	20,327	20,199	20,601	20,215	20,775	20,242	20,771

Tabel 8. Data bobot jenis bahan uji

No.	Bobot jenis (gram)								
	Air Suling	Kontrol negatif	Kontrol positif	Fraksi I		Fraksi II		Fraksi III	
				F_R I 0,25%	F_R I 1 %	F_R II 0,25%	F_R II 1 %	F_R III 0,25%	F_R III 1 %
1	0,993	1,049	1,042	1,000	1,046	1,043	1,094	1,004	1,052
2	0,994	1,042	1,046	1,050	1,037	1,050	1,003	1,053	1,040
3	0,991	1,052	1,037	1,037	1,052	0,999	1,090	1,043	1,094
Rata-rata	0,993	1,048	1,042	1,029	1,045	1,031	1,062	1,033	1,062

Perhitungan bobot jenis (BJ) air pada suhu 37^0C $= \frac{Bobot\ air\ (g) - bobot\ piknometer\ kosong\ (g)}{Volume\ piknometer\ rata\text{-}rata\ (mL)}$

$$= \frac{19{,}595\ g - 9{,}568\ g}{10\ mL}$$

$$= \frac{9{,}92\ g}{10\ mL}$$

$$= 0{,}993\ g/mL$$

Berat jenis air pada suhu 37^0C adalah 0,993 g/mL

Diketahui bobot piknometer kosong : I = 9,668 g

II = 10,392 g

Volume piknometer kosong : 10 ml

Perhitungan bobot jenis bahan uji yang mengandung fraksi heksan

Bobot jenis mukus (37^0C) $= \frac{Bobot\ mukus\ (g) - bobot\ piknometer\ kosong\ (g)}{Volume\ piknometer\ rata-rata\ (mL)}$

a. Bobot jenis kontrol negatif

$$\text{Bobot jenis} = \frac{20{,}881 - 10{,}392}{10} = 1{,}049\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}083 - 9{,}668}{10} = 1{,}042\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}915 - 10{,}392}{10} = 1{,}052\ \text{g/mL}$$

Bobot jenis rata-rata = 1,048 g/mL

b. Bobot jenis kontrol positif

$$\text{Bobot jenis} = \frac{20{,}084 - 9{,}668}{10} = 1{,}042\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}856 - 10{,}392}{10} = 1{,}046\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}042 - 9{,}668}{10} = 1{,}037\ \text{g/mL}$$

Bobot jenis rata-rata = 1,042 g/mL

c. Bobot jenis bahan uji fraksi I 0,25% (mukus-dapar fosfat 20% dan fraksi I ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{19{,}665-9{,}668}{10} = 1{,}000\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}890-10{,}392}{10} = 1{,}050\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}042-9{,}668}{10} = 1{,}037\,\text{g/mL}$$

Bobot jenis rata-rata = 1,029 g/mL

d. Bobot jenis bahan uji fraksi I 1% (mukus-dapar fosfat 20% dan fraksi ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{20{,}851-10{,}392}{10} = 1{,}046\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}040-9{,}668}{10} = 1{,}037\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}912-10{,}392}{10} = 1{,}052\,\text{g/mL}$$

Bobot jenis rata-rata = 1,045 g/mL

e. Bobot jenis bahan uji fraksi II 0,25% (mukus-dapar fosfat 20% dan fraksi II ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{20{,}093-9{,}668}{10} = 1{,}043\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}897-10{,}392}{10} = 1{,}050\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}654-9{,}668}{10} = 0{,}999\,\text{g/mL}$$

Bobot jenis rata-rata = 1,031 g/mL

f. Bobot jenis bahan uji fraksi II 1% (mukus-dapar fosfat 20% dan fraksi II ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{21{,}338-10{,}392}{10} = 1{,}094\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}696-9{,}668}{10} = 1{,}003\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{21{,}292-10{,}392}{10} = 1{,}090\,\text{g/mL}$$

Bobot jenis rata-rata = 1,062 g/mL

g. Bobot jenis bahan uji fraksi III 0,25% (mukus-dapar fosfat 20% dan fraksi III ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{19{,}705-9{,}668}{10} = 1{,}004\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}919-10{,}392}{10} = 1{,}053\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}102-9{,}668}{10} = 1{,}043\,\text{g/mL}$$

Bobot jenis rata-rata = 1,033 g/mL

h. Bobot jenis bahan uji fraksi III 1% (mukus-dapar fosfat 20% dan fraksi III ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{20{,}910-10{,}392}{10} = 1{,}052\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}066-9{,}668}{10} = 1{,}040\,\text{g/mL}$$

$$\text{Bobot jenis} = \frac{21{,}336-10{,}242}{10} = 1{,}094\,\text{g/mL}$$

Bobot jenis rata-rata = 1,062 g/mL

Perhitungan viskositas bahan uji pada suhu 37°C

$$\eta \text{ mukus} = \frac{\rho \text{ larutan uji } 37°C \times t \text{ larutan uji } 37°C}{\rho \text{ air } 37°C \times t \text{ air } 37°C} \times \eta \text{ air } 37°C$$

Diketahui :

η air pada suhu 37°C = 0,692 cps

t air = 8,78 dtk

a. η kontrol negatif

$$\eta \text{ bahan uji} = \frac{1{,}049 \times 17{,}08}{0993 \times 8{,}78} \times 0{,}692 = 1{,}426 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}042 \times 24{,}51}{0993 \times 8{,}78} \times 0{,}692 = 1{,}992 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}052 \times 24{,}59}{0993 \times 8{,}78} \times 0{,}692 = 2{,}083 \text{ cps}$$

η bahan uji rata-rata = 1,834 cps

b. η kontrol positif

$$\eta \text{ bahan uji} = \frac{1,042x14,60}{0993x8,78} \times 0,692 = 1,211 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,046x14,04}{0993x8,78} \times 0,692 = 1,145 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,037x13,33}{0993x8,78} \times 0,692 = 1,113 \text{cps}$$

η bahan uji rata-rata = 1,156 cps

c. η bahan uji fraksi I 0,25% (mukus-dapar fosfat 20% dan fraksi ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1,000x12,30}{0993x8,78} \times 0,692 = 0,976 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,050x14,51}{0993x8,78} \times 0,692 = 1,208 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,037x12,58}{0993x8,78} \times 0,692 = 1,038 \text{ cps}$$

η bahan uji rata-rata = 1,074 cps

d. η bahan uji fraksi I 1% (mukus-dapar fosfat 20% dan fraksiI ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{1,046x10,91}{0993x8,78} \times 0,692 = 0,906 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,037x12,91}{0993x8,78} \times 0,692 = 1,062 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1,052x14,11}{0993x8,78} \times 0,692 = 1,810 \text{cps}$$

η bahan uji rata-rata = 1,259 cps

e. η bahan uji fraksi II 0,25% (mukus-dapar fosfat 20% dan fraksi II ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1,043x12,68}{0993x8,78} \times 0,692 = 1,050 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1050x11,51}{0993x8,78} \times 0,692 = 0,958 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0,999x11,86}{0993x8,78} \times 0,692 = 0,942 \text{cps}$$

η bahan uji rata-rata = 0,983 cps

f. η bahan uji fraksi II 1% (mukus-dapar fosfat 20% dan fraksi II ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{1{,}094 \times 15{,}12}{0993 \times 8{,}78} \times 0{,}692 = 1{,}317 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}003 \times 10{,}75}{0993 \times 8{,}78} \times 0{,}692 = 0{,}841 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}090 \times 10{,}37}{0993 \times 8{,}78} \times 0{,}692 = 0{,}910 \text{ cps}$$

η bahan uji rata-rata = 1,023 cps

g. η bahan uji fraksi III 0,25% (mukus-dapar fosfat 20% dan fraksi III ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1{,}004 \times 15{,}61}{0993 \times 8{,}78} \times 0{,}692 = 1{,}244 \text{cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}053 \times 14{,}77}{0993 \times 8{,}78} \times 0{,}692 = 1{,}233 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}043 \times 15{,}45}{0993 \times 8{,}78} \times 0{,}692 = 1{,}282 \text{ cps}$$

η bahan uji rata-rata = 1,253 cps

h. η bahan uji fraksi III 1% (mukus-dapar fosfat 20% dan fraksi III ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{1{,}052 \times 22{,}10}{0{,}993 \times 8{,}78} \times 0{,}692 = 1{,}845 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}040 \times 15{,}26}{0993 \times 8{,}78} \times 0{,}692 = 1{,}258 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}094 \times 11{,}60}{0993 \times 8{,}78} \times 0{,}692 = 1{,}009 \text{ cps}$$

η bahan uji rata-rata = 1,371 cps

b. Perhitungan viskositas mukus setelah penambahan subfraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Tabel 9. Data waktu alir uji aktivitas mukolitik subfraksi heksan

NO.	Waktu alir (detik)								
	Air Suling	Kontrol Negatif	Kontrol Positif	FII a		FIIb		FII c	
				FII a 0,25%	FII a 1%	FIIb 0,25%	FIIb 1%	FIIc 0,25%	FIIc 1%
1	8,49	14,61	10,28	13,44	15,64	10,27	11,21	12,6	14,17
2	8,58	14,16	10,4	13,54	15,71	10,33	10,23	16,63	13,36
3	8,67	14,74	10,27	13,73	16,94	10,27	10,26	14,32	13,37
Rata-rata	8,58	14,5	10.32	13,57	16,1	10,29	10,57	14,52	13,63

Tabel 10. Data bobot bahan uji dengan piknometer

NO.	Bobot (gram)								
	Air Suling	Kontrol Negatif	Kontrol Positif	FII a		FIIb		FII c	
				FII a 0,25%	FII a 1%	FIIb 0,25%	FIIb 1%	FIIc 0,25%	FIIc 1%
1	19,613	21,395	19,792	21,344	19,724	20,108	20,871	21,321	20,108
2	19,621	19.761	21,385	19,745	21,362	19,758	19,758	21,319	19,758
3	19,729	21,39	19,842	21,375	19,781	20,109	20,109	21,317	20,109
Rata-rata	19,654	20,849	20,340	20,821	20,289	19,992	20,246	21,319	19,992

Tabel 11. Data bobot jenis bahan uji

NO.	Bobot jenis (gram)								
	Air Suling	Kontrol Negatif	Kontrol Positif	FII a		FIIb		FII c	
				FII a 0,25%	FII a 1%	FIIb 0,25%	FIIb 1%	FIIc 0,25%	FIIc 1%
1	1,025	1,069	1,043	1,061	0,974	1,074	1,016	1,063	1,036
2	1,026	1,04	1,068	0,961	0,989	0,905	1,039	1,038	1,065
3	1,036	1,068	1,048	0,961	0,974	1,074	0,940	1,067	1,042
Rata-rata	1,029	1,059	1,053	0,994	0,979	1,018	0,998	1,056	1,048

Perhitungan berat jenis (BJ) air pada suhu 37^0C= $\frac{\text{Bobot air (g)} - \text{bobot piknometer kosong (g)}}{\text{Volume piknometer rata-rata (mL)}}$

$$= \frac{19{,}654\,g - 9{,}366\,g}{10\,mL}$$

$$= \frac{10{,}288\,g}{10\,mL}$$

$$= 1{,}029\,g/mL$$

Berat jenis air pada suhu 37^0C adalah 0,993 g/mL

Diketahui bobot piknometer kosong : I = 9,366 g

II = 10,710 g

Volume piknometer kosong : 10 ml

Perhitungan bobot jenis bahan uji yang mengandung fraksi heksan

Bobot jenis mukus (37^0C) $= \frac{Bobot\ mukus\ (g) - bobot\ piknometer\ kosong\ (g)}{Volume\ piknometer\ rata-rata\ (mL)}$

i. Bobot jenis kontrol negatif

$$\text{Bobot jenis} = \frac{21,395 - 10,710}{10} = 1,069\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19,761 - 9,366}{10} = 1,040\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{21,390 - 10,710}{10} = 1,068\ \text{g/mL}$$

Bobot jenis rata-rata = 1,068 g/mL

j. Bobot jenis kontrol positif

$$\text{Bobot jenis} = \frac{19,792 - 9,366}{10} = 1,043\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{21,385 - 10,710}{10} = 1,068\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19,842 - 9,366}{10} = 1,048\ \text{g/mL}$$

Bobot jenis rata-rata =1,053 g/mL

k. Bobot jenis bahan uji subfraksi a 0,25% (mukus-dapar fosfat 20% dan subfraksi a ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{21,321 - 10,710}{10} = 1,061\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}319-10{,}710}{10} = 0{,}961\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}317-10{,}710}{10} = 0{,}961\ \text{g/mL}$$

Bobot jenis rata-rata = 0,994 g/mL

l. Bobot jenis bahan uji subfraksi a 1% (mukus-dapar fosfat 20% dan subfraksi a ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{19{,}108-9{,}366}{10} = 0{,}974\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}258-9{,}366}{10} = 0{,}989\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}109-9{,}366}{10} = 0{,}974\ \text{g/mL}$$

Bobot jenis rata-rata = 0,979 g/mL

m. Bobot jenis bahan uji subfraksi b 0,25% (mukus-dapar fosfat 20% dan subfraksi b ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{20{,}108-9{,}366}{10} = 1{,}074\text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}758-10{,}710}{10} = 0{,}905\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}109-9{,}366}{10} = 1{,}074\ \text{g/mL}$$

Bobot jenis rata-rata = 1,018 g/mL

n. Bobot jenis bahan uji subfraksi b 1% (mukus-dapar fosfat 20% dan subfraksi II ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{20{,}871-10{,}710}{10} = 1{,}016\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}758-9{,}366}{10} = 1{,}039\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{20{,}109-10{,}710}{10} = 0{,}940\ \text{g/mL}$$

Bobot jenis rata-rata = 0,998 g/mL

o. Bobot jenis bahan uji subfraksi c 0,25% (mukus-dapar fosfat 20% dan subfraksi ekstrak heksan 0,25%)

$$\text{Bobot jenis} = \frac{121{,}344 - 10{,}710}{10} = 1{,}063\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}745 - 9{,}366}{10} = 1{,}038\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{21{,}375 - 9{,}668}{10} = 1{,}067\ \text{g/mL}$$

Bobot jenis rata-rata = 1,056 g/mL

p. Bobot jenis bahan uji subfraksi c 1% (mukus-dapar fosfat 20% dan subfraksi c ekstrak heksan 1%)

$$\text{Bobot jenis} = \frac{19{,}724 - 9{,}366}{10} = 1{,}036\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{21{,}362 - 10{,}710}{10} = 1{,}065\ \text{g/mL}$$

$$\text{Bobot jenis} = \frac{19{,}781 - 9{,}366}{10} = 1{,}042\ \text{g/mL}$$

Bobot jenis rata-rata = 1,048 g/mL

Perhitungan viskositas bahan uji pada suhu 37°C

$$\eta \text{ mukus} = \frac{\rho \text{ larutan uji } 37°\text{C} \times t \text{ larutan uji } 37°\text{C}}{\rho \text{ air } 37°\text{C} \times t \text{ air } 37°\text{C}} \times \eta \text{ air } 37°\text{C}$$

Diketahui :

η air pada suhu 37°C = 0,692 cps

t air = 8,58 dtk

i. η kontrol negatif

$$\eta \text{ bahan uji} = \frac{1{,}069 \times 14{,}61}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}193\ \text{cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}040 \times 14{,}16}{1{,}028 \times 8{,}58} \times 0{,}692 = 1{,}154\ \text{cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}068 \times 14{,}74}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}204\ \text{cps}$$

η bahan uji rata-rata = 1,184 cps

j. η kontrol positif

$$\eta \text{ bahan uji} = \frac{1{,}043 \times 10{,}28}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}819\ \text{cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}068 \times 10{,}40}{1{,}028 \times 8{,}58} \times 0{,}692 = 0{,}870\ \text{cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}048 \times 10{,}27}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}823 \text{ cps}$$

η bahan uji rata-rata = 0,838 cps

k. η bahan uji subfraksi a 0,25% (mukus-dapar fosfat 20% dan subfraksi ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1061 \times 13{,}44}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}090 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0961 \times 13{,}54}{1{,}028 \times 8{,}58} \times 0{,}692 = 1{,}020 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0{,}961 \times 13{,}73}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}009 \text{ cps}$$

η bahan uji rata-rata = 1,040 cps

l. η bahan uji subfraksi a 1% (mukus-dapar fosfat 20% dan subfraksiI ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{0974 \times 15{,}64}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}165 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0989 \times 15{,}71}{1{,}028 \times 8{,}58} \times 0{,}692 = 1{,}218 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0{,}974 \times 16{,}94}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}262 \text{ cps}$$

η bahan uji rata-rata =1,215 cps

m. η bahan uji subfraksi b 0,25% (mukus-dapar fosfat 20% dan subfraksi b ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1074 \times 10{,}27}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}843 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0{,}905 \times 10{,}33}{1{,}028 \times 8{,}58} \times 0{,}692 = 0{,}733 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}074 \times 10{,}27}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}844 \text{ cps}$$

η bahan uji rata-rata = 0,807 cps

n. η bahan uji subfraksi b 1% (mukus-dapar fosfat 20% dan subfraksi b ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{1{,}016 \times 11.21}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}871 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1039 \times 10{,}23}{1{,}028 \times 8{,}58} \times 0{,}692 = 0{,}833 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{0{,}940 \times 10{,}26}{1{,}054 \times 8{,}58} \times 0{,}692 = 0{,}737 \text{ cps}$$

η bahan uji rata-rata =0,814 cps

o. η bahan uji subfraksi c 0,25% (mukus-dapar fosfat 20% dan subfraksi c ekstrak heksan 0,25%)

$$\eta \text{ bahan uji} = \frac{1{,}063 \times 12{,}60}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}024 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}038 \times 16{,}63}{1{,}028 \times 8{,}58} \times 0{,}692 = 1{,}353 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}067 \times 14{,}32}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}168 \text{ cps}$$

η larutan uji rata-rata = 1,182 cps

p. η bahan uji subfraksi c 1% (mukus-dapar fosfat 20% dan subfraksi c ekstrak heksan 1%)

$$\eta \text{ bahan uji} = \frac{1{,}036 \times 14{,}17}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}122 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}065 \times 13{,}36}{1{,}028 \times 8{,}58} \times 0{,}692 = 1{,}116 \text{ cps}$$

$$\eta \text{ bahan uji} = \frac{1{,}042 \times 13{,}37}{1{,}054 \times 8{,}58} \times 0{,}692 = 1{,}065 \text{ cps}$$

η bahan uji rata-rata = 1,101cps

Lampiran V

Pengujian Normalitas dan Homogenitas

a. Pengujian normalitas dan homogenitas data viskositas fraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Case Processing Summary

Variasi konsentrasi F.Heksan		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Viskositas	Kontrol Negatif	3	100.0%	0	0.0%	3	100.0%
	Kontrol Positif Asetilsistein	3	100.0%	0	0.0%	3	100.0%
	FI 0,25%	3	100.0%	0	0.0%	3	100.0%
	FI 1%	3	100.0%	0	0.0%	3	100.0%
	FII 0,25%	3	100.0%	0	0.0%	3	100.0%
	FII 1%	3	100.0%	0	0.0%	3	100.0%
	FIII 0,25%	3	100.0%	0	0.0%	3	100.0%
	FIII 1%	3	100.0%	0	0.0%	3	100.0%

Tests of Normality

Variasi konsentrasi F.Heksan		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	df	Sig.
Viskositas	Kontrol Negatif	.338	3	.	.852	3	.245
	Kontrol Positif Asetilsistein	.256	3	.	.961	3	.622
	FI 0,25%	.250	3	.	.967	3	.650
	FI 1%	.182	3	.	.999	3	.938
	FII 0,25%	.350	3	.	.830	3	.188
	FII 1%	.336	3	.	.856	3	.257
	FIII 0,25%	.211	3	.	.991	3	.817
	FIII 1%	.288	3	.	.929	3	.485

a. Lilliefors Significance Correction

Test of Homogeneity of Variances

Viskositas F.Heksan

Levene Statistic	df1	df2	Sig.
4.735	7	16	.005

b. Pengujian normalitas dan homogenitas data viskositas subfraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Case Processing Summary

Variasi konsentrasi FII b		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Viskositas	Kontrol Negatif	3	100.0%	0	0.0%	3	100.0%
	Kontrol Positif Asetilsistein	3	100.0%	0	0.0%	3	100.0%
	FII a 0,25%	3	100.0%	0	0.0%	3	100.0%
	FII a 1%	3	100.0%	0	0.0%	3	100.0%
	FII b 0,25%	3	100.0%	0	0.0%	3	100.0%
	FII b 1%	3	100.0%	0	0.0%	3	100.0%
	FII c 0,25%	3	100.0%	0	0.0%	3	100.0%
	FII c 1%	3	100.0%	0	0.0%	3	100.0%

Tests of Normality

Variasi konsentrasi FII b		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Viskositas	Kontrol Negatif	.305	3	.	.905	3	.403
	Kontrol Positif Asetilsistein	.360	3	.	.808	3	.135
	FII a 0,25%	.339	3	.	.850	3	.240
	FII a 1%	.191	3	.	.997	3	.898
	FII b 0,25%	.382	3	.	.757	3	.015
	FII b 1%	.277	3	.	.941	3	.532
	FII c 0,25%	.200	3	.	.995	3	.863
	FII c 1%	.351	3	.	.828	3	.183

a. Lilliefors Significance Correction

Test of Homogeneity of Variances

Viskositas FII b

Levene Statistic	df1	df2	Sig.
2.259	7	16	.084

LAMPIRAN VI

Analisis Statistik

a. Hasil analisis statistik non-parametrik (Wilkoxon) viskositas mukus setelah perlakuan dengan hasil fraksinasi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Viskositas – variasi konsentrasi F.Heksan	Negative Ranks	21[a]	13.71	288.00
	Positive Ranks	3[b]	4.00	12.00
	Ties	0[c]		
	Total	24		

a. Viskositas < Sampel
b. Viskositas > Sampel
c. Viskositas = Sampel

Test Statistics[a]

	Viskositas – variasi konsentrasi F.Heksan
Z	-3.943[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

b. Hasil analisis statistik dengan one way anova terhadap data viskositas mukus setelah perlakuan dengan hasil fraksinasi fraksi II ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Kontrol Negatif		3	1.18367	.026274	.015169	1.11840	1.24894	1.154	1.204
Kontrol Positif Asetilsistein		3	.83733	.028361	.016374	.76688	.90779	.819	.870
FII a 0,25%		3	1.03967	.043936	.025366	.93052	1.14881	1.009	1.090
FII a 1%		3	1.21500	.048570	.028042	1.09435	1.33565	1.165	1.262
FII b 0,25%		3	.80667	.063799	.036834	.64818	.96515	.733	.844
FII b 1%		3	.81367	.069060	.039872	.64211	.98522	.737	.871
FII c 0,25%		3	1.18167	.164925	.095220	.77197	1.59136	1.024	1.353
FII c 1%		3	1.10100	.031321	.018083	1.02319	1.17881	1.065	1.122
Total		24	1.02233	.179797	.036701	.94641	1.09826	.733	1.353
Model	Fixed Effects			.073148	.014931	.99068	1.05399		
	Random Effects				.062579	.87436	1.17031		

ANOVA

Viskositas FII b

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.658	7	.094	17.566	.000
Within Groups	.086	16	.005		
Total	.744	23			

Nilai sig. <α = 0,01 maka variasi konsentrasi subfraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.) berpengaruh secara signifikan terhadap viskositas mukus

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Viskositas

LSD

(I) Variasi konsentrasi Subfraksi Heksan	(J) Variasi konsentrasi Subfraksi Heksan	Mean Difference (I-J)	Std. Error	Sig.	Interval	
					Lower Bound	Upper Bound
Kontrol Negatif	Kontrol Positif Asetilsistein	.346333*	.059725	.000	.21972	.47294
	FII a 0,25%	.144000*	.059725	.028	.01739	.27061
	FII a 1%	-.031333	.059725	.607	-.15794	.09528
	FII b 0,25%	.377000*	.059725	.000	.25039	.50361
	FII b 1%	.370000*	.059725	.000	.24339	.49661
	FII c 0,25%	.002000	.059725	.974	-.12461	.12861
	FII c 1%	.082667	.059725	.185	-.04394	.20928

(I) Variasi konsentrasi Subfraksi Heksan	(J) Variasi konsentrasi Subfraksi Heksan	Mean Difference (I-J)	Std. Error	Sig.	Interval	
					Lower Bound	Upper Bound
Kontrol Positif Asetilsistein	Kontrol Negatif	-.346333*	.059725	.000	-.47294	-.21972
	FII a 0,25%	-.202333*	.059725	.004	-.32894	-.07572
	FII a 1%	-.377667*	.059725	.000	-.50428	-.25106
	FII b 0,25%	.030667	.059725	.615	-.09594	.15728
	FII b 1%	.023667	.059725	.697	-.10294	.15028
	FII c 0,25%	-.344333*	.059725	.000	-.47094	-.21772
	FII c 1%	-.263667*	.059725	.000	-.39028	-.13706
FII a 0,25%	Kontrol Negatif	-.144000*	.059725	.028	-.27061	-.01739
	Kontrol Positif Asetilsistein	.202333*	.059725	.004	.07572	.32894
	FII a 1%	-.175333*	.059725	.010	-.30194	-.04872
	FII b 0,25%	.233000*	.059725	.001	.10639	.35961
	FII b 1%	.226000*	.059725	.002	.09939	.35261
	FII c 0,25%	-.142000*	.059725	.030	-.26861	-.01539
	FII c 1%	-.061333	.059725	.320	-.18794	.06528
FII a 1%	Kontrol Negatif	.031333	.059725	.607	-.09528	.15794
	Kontrol Positif Asetilsistein	.377667*	.059725	.000	.25106	.50428
	FII a 0,25%	.175333*	.059725	.010	.04872	.30194
	FII b 0,25%	.408333*	.059725	.000	.28172	.53494
	FII b 1%	.401333*	.059725	.000	.27472	.52794
	FII c 0,25%	.033333	.059725	.584	-.09328	.15994
	FII c 1%	.114000	.059725	.074	-.01261	.24061

(I) Variasi konsentrasi Subfraksi Heksan	(J) Variasi konsentrasi Subfraksi Heksan	Mean Difference (I-J)	Std. Error	Sig.	Interval	
					Lower Bound	Upper Bound
FII b 0,25%	Kontrol Negatif	-.377000*	.059725	.000	-.50361	-.25039
	Kontrol Positif Asetilsistein	-.030667	.059725	.615	-.15728	.09594
	FII a 0,25%	-.233000*	.059725	.001	-.35961	-.10639
	FII a 1%	-.408333*	.059725	.000	-.53494	-.28172
	FII b 1%	-.007000	.059725	.908	-.13361	.11961
	FII c 0,25%	-.375000*	.059725	.000	-.50161	-.24839
	FII c 1%	-.294333*	.059725	.000	-.42094	-.16772
FII b 1%	Kontrol Negatif	-.370000*	.059725	.000	-.49661	-.24339
	Kontrol Positif Asetilsistein	-.023667	.059725	.697	-.15028	.10294
	FII a 0,25%	-.226000*	.059725	.002	-.35261	-.09939
	FII a 1%	-.401333*	.059725	.000	-.52794	-.27472
	FII b 0,25%	.007000	.059725	.908	-.11961	.13361
	FII c 0,25%	-.368000*	.059725	.000	-.49461	-.24139
	FII c 1%	-.287333*	.059725	.000	-.41394	-.16072
FII c 0,25%	Kontrol Negatif	-.002000	.059725	.974	-.12861	.12461
	Kontrol Positif Asetilsistein	.344333*	.059725	.000	.21772	.47094
	FII a 0,25%	.142000*	.059725	.030	.01539	.26861
	FII a 1%	-.033333	.059725	.584	-.15994	.09328
	FII b 0,25%	.375000*	.059725	.000	.24839	.50161
	FII b 1%	.368000*	.059725	.000	.24139	.49461
	FII c 1%	.080667	.059725	.196	-.04594	.20728

(I) Variasi konsentrasi Subfraksi Heksan	(J) Variasi konsentrasi Subfraksi Heksan	Mean Difference (I-J)	Std. Error	Sig.	Interval	
					Lower Bound	Upper Bound
FII c 1%	Kontrol Negatif	-.082667	.059725	.185	-.20928	.04394
	Kontrol Positif Asetilsistein	.263667*	.059725	.000	.13706	.39028
	FII a 0,25%	.061333	.059725	.320	-.06528	.18794
	FII a 1%	-.114000	.059725	.074	-.24061	.01261
	FII b 0,25%	.294333*	.059725	.000	.16772	.42094
	FII b 1%	.287333*	.059725	.000	.16072	.41394
	FII c 0,25%	-.080667	.059725	.196	-.20728	.04594

*. The mean difference is significant at the 0.05 level.

a) Perbedaan mean yang signifikan :

1. Kontrol (-) dengan kontrol (+) Asetilsistein
2. Kontrol (-) dengan FII a 0,25%
3. Kontrol (-) dengan FII b 0,25%
4. Kontrol (-) dengan FII b 1%
5. Kontrol (+) Asetilsistein dengan FII a 0,25%
6. Kontrol (+) Asetilsistein dengan FII a 1%
7. Kontrol (+) Asetilsistein dengan FII c 0,25%

8. Kontrol (+) Asetilsistein dengan FII c 1%
9. FII a 0,25% dengan FII a 1%
10. FII a 0,25% dengan FII b 0,25%
11. FII a 0,25% dengan FII b 1%
12. FII a 0,25% dengan FII c 0,25%
13. FII a 1% dengan FII b 0,25%
14. FII a 1% dengan FII b 1%
15. FII b 0,25% dengan FII c 0,25%
16. FII b 0,25% dengan FII c 1%
17. FII b 1% dengan FII c 0,25%
18. FII b 1% dengan FII c 1%

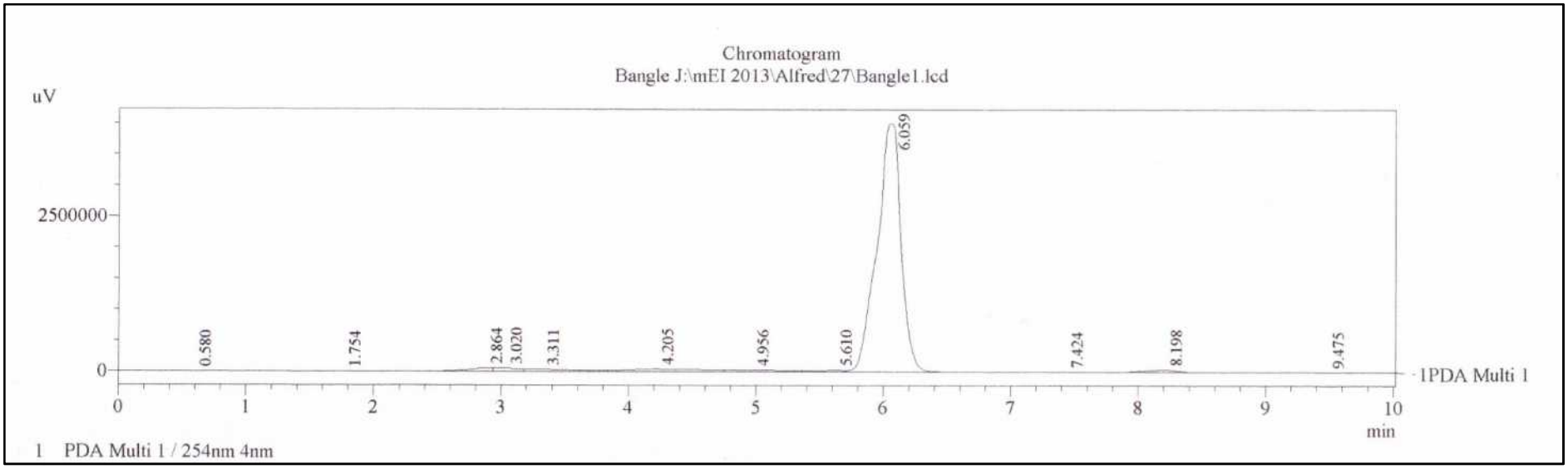
b) Perbedaan mean yang tidak signifikan :

1. Kontrol (-) dengan FII a 1%
2. Kontrol (-) dengan FII c 0,25%
3. Kontrol (-) dengan FII c 1%
4. Kontrol (+) Asetilsistein dengan FII b 0,25%
5. Kontrol (+) Asetilsistein dengan FII b 1%
6. FII a 0,25% dengan FII c 1%
7. FII a 1% dengan FII c 0,25%
8. FII a 1%dengan FII c 1%
9. FII b 0,25% dengan FII b 1%
10. FII c 0,25% dengan FII c 1%

Lampiran VII

Profil Kromatogram UFLC

a. Profil kromatogram UFLC subfraksi FII b ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.) pada panjang gelombang 254 nm.

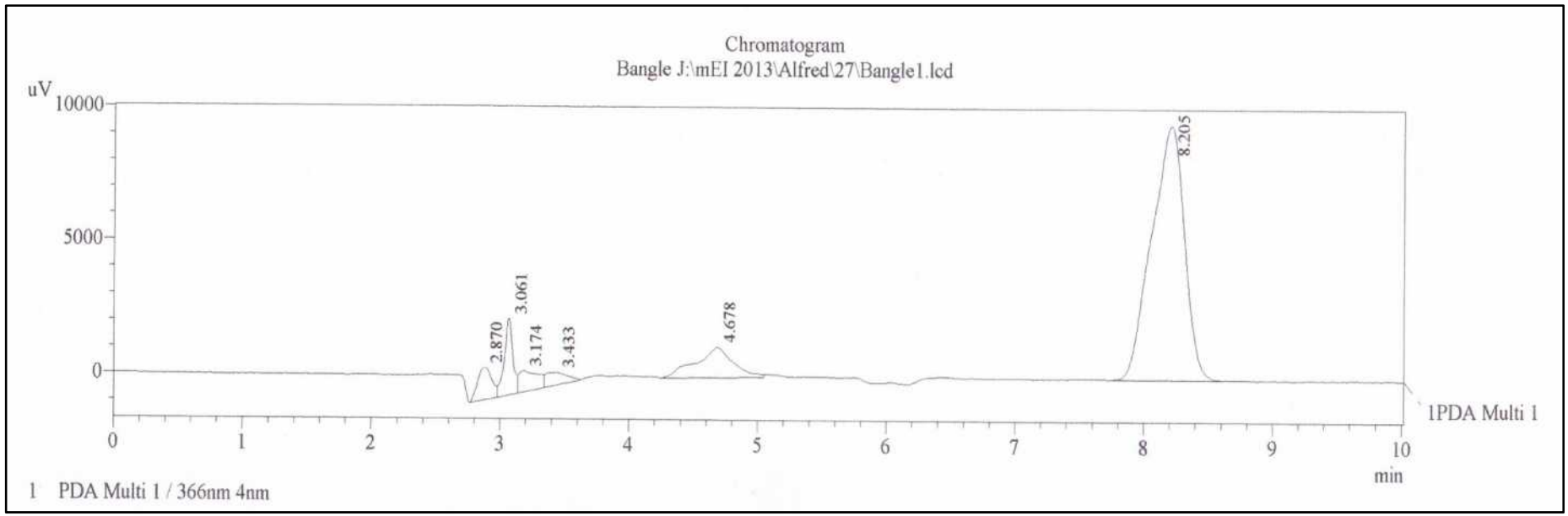


Gambar 5. Profil kromatogram UFLC subfraksi FII b pada panjang gelombang 254 nm.

Informasi sampel :

Fase diam	: *Oktadesil silica* (ODS)
Fase gerak	: Asetonitril:Air (70:30)
Suhu kolom	: 40^0C
Volume injeksi	: 10 µl
Laju	: 0,5 ml/ menit
Kolom	: Shim-Pack Vp-Ods

b. Profil kromatogram UFLC subfraksi FII b ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.) pada panjang gelombang 366 nm.



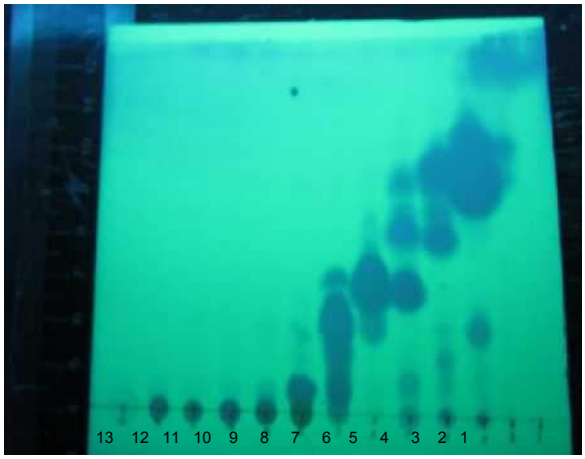
Gambar 6. Profil kromatogram UFLC subfraksi FII b pada panjang gelombang 366 nm.

Informasi sampel :

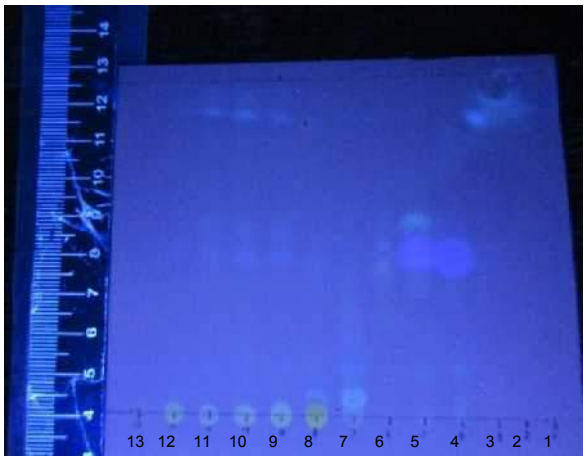
Fase diam	: *Oktadesil silica* (ODS)
Fase gerak	: Asetonitril:Air (70:30)
Suhu kolom	: 40^0C
Volume injeksi	: 10 µl
Laju	: 0,5 ml/ menit
Kolom	: Shim-Pack Vp-Ods

LAMPIRAN VIII

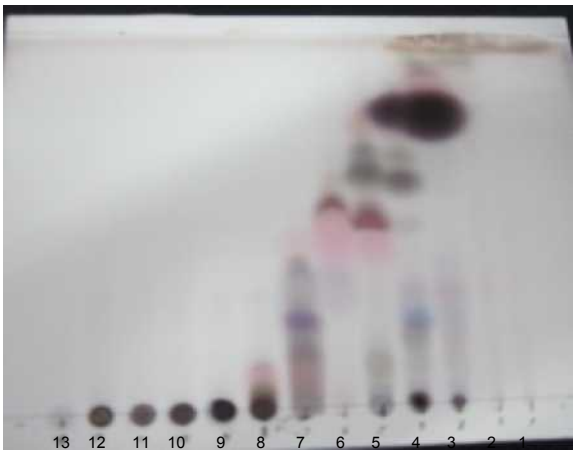
a. Profil Kromatografi Lapis Tipis fraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)



{a}



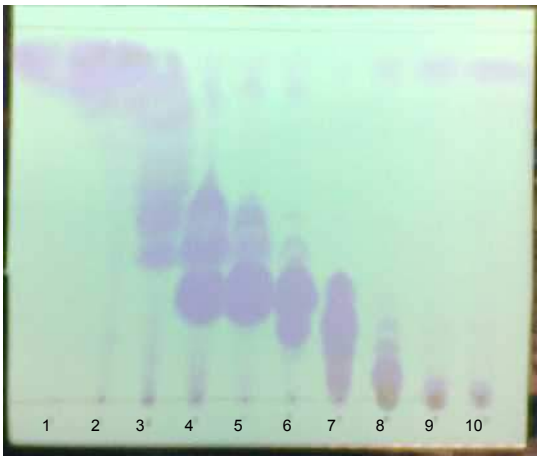
{b}



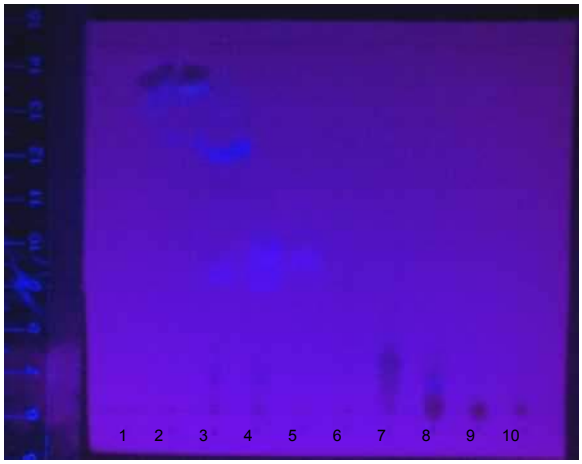
{c}

Gambar 7. Profil kromatogram lapis tipis fraksi ekstrak heksan bangle. Keterangan : a=UV 254 nm, b=UV 366nm, c=H_2SO_4, Fase gerak hexan-etil asetat (5:1) dan fase diam lempeng KLT GF_{254}.

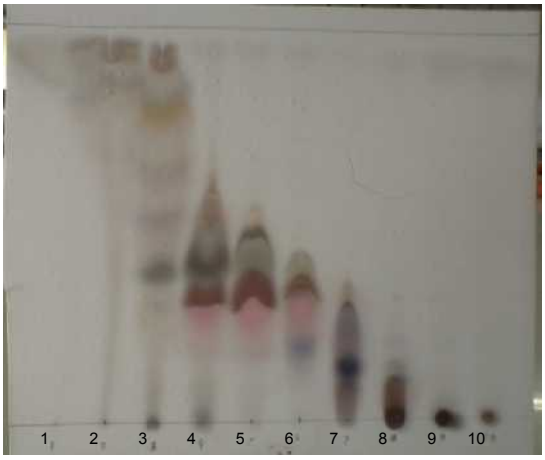
b. Profil Kromatografi Lapis Tipis subfraksi ekstrak heksan rimpang bangle (*Zingiber cassumunar* Roxb.)



{a}

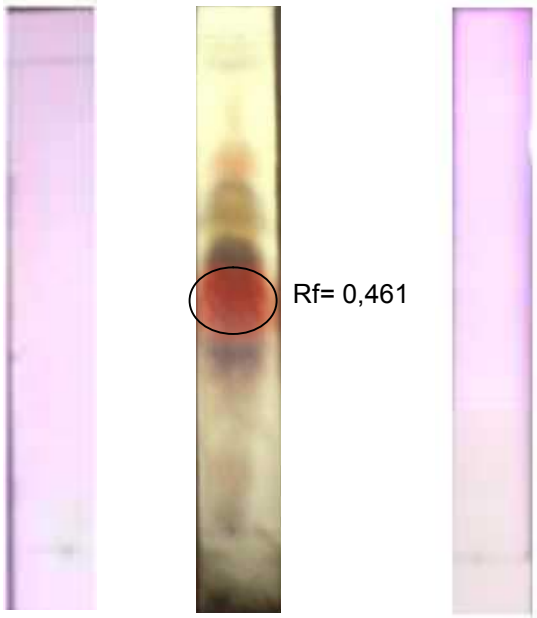


{b}



{c}

Gambar 8. Profil kromatogram lapis tipis subfraksi ekstrak heksan bangle. Keterangan : a=UV 254 nm, b=UV 366nm, c=H_2SO_4, Fase gerak hexan-etil asetat (5:1) dan fase diam lempeng KLT $GF_{254.}$



Gambar 9. Profil kromatogram lapis tipis subfraksi FII b. Keterangan : a = Penampak bercak $AlCl_3$,b = Penampak bercak Liebermann-Burchard, c = Penampak bercak Sitroborat.

LAMPIRAN IX

Foto Pengujian Mukolitik

{a}

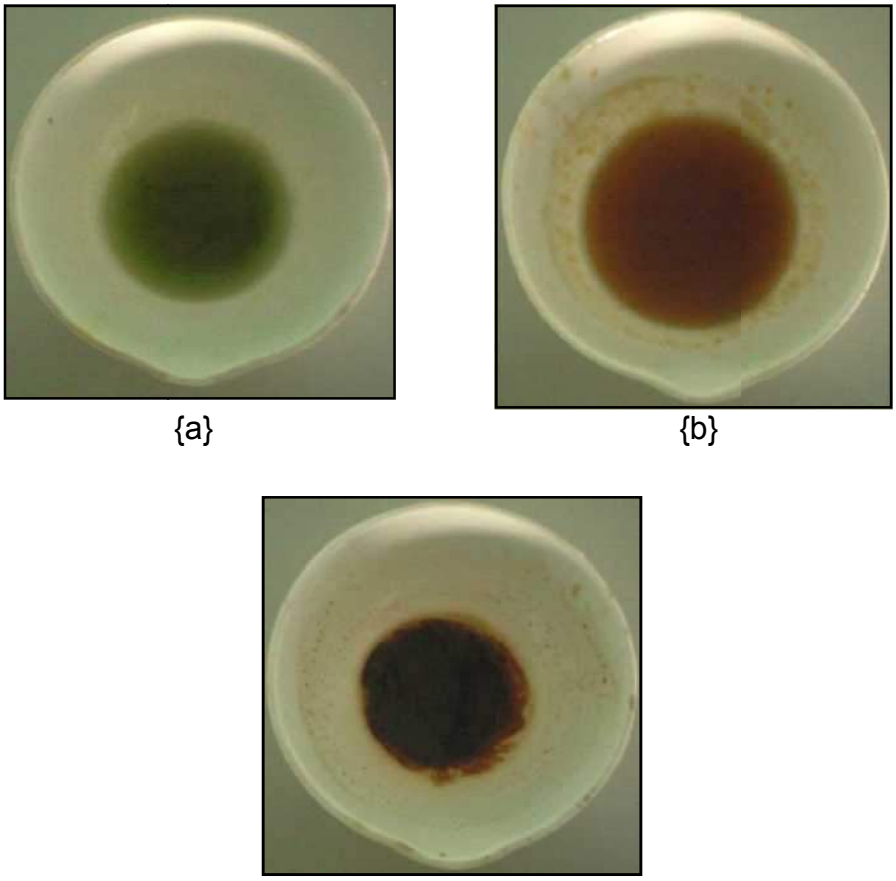
{b}

{c}

Gambar 10. Foto pengujian mukolitik. Keterangan : a= Usus sapi, b= penimbangan bobot jenis bahan uji, c= pengukuran waktu alir bahan uji dengan viskometer Ostwald.

LAMPIRAN X

Ekstrak Fraksi Heksan



{a} {b}

{c}

Gambar 11. Ekstrak fraksi heksan rimpang bangle *(Zingiber cassumunar* Roxb.).
Keterangan : a= ekstrak fraksi I, b= ekstrak fraksi II, c= ekstrak fraksi III.

LAMPIRAN XI

Gambar Sampel

{a}

{b}

{c}

Gambar 12. Gambar sampel. Keterangan : a=Tanaman Bangle, b=rimpang bangle, c=simplisia rimpang bangle