


LAMPIRAN

Lampiran 1. Rancangan Jadwal Kegiatan

No	Kegiatan	Waktu Penelitian / bulan						
		1	2	3	4	5	6	7
Tahap Persiapan								
A	Penyiapan Sampel	✓						
B	Determinasi Tanaman	✓						
Tahap Pelaksanaan								
A	Pembuatan ekstrak kental bawang putih		✓	✓				
B	Pembuatan fraksi 3 pelarut dan variasi kadar			✓	✓			
D	Uji aktivitas antibakteri secara <i>in vitro</i>				✓	✓		
E	Identifikasi metode GC-MS					✓	✓	
F	Uji <i>molecular docking</i>							✓
Tahap Penyelesaian								
A	Pengumpulan data penelitian		✓	✓	✓	✓	✓	✓
B	Pengolahan data				✓	✓		
C	Analisis data				✓	✓	✓	✓
D	Penyusunan laporan akhir					✓	✓	✓

Lampiran 2. Hasil Uji Determinasi Tanaman



BAGIAN BIOLOGI FARMASI
FAKULTAS FARMASI
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SURAT KETERANGAN
No.: BF/225/ Ident/Det/V/2014

Kepada Yth. :
Sdri/Sdr. Shosa Kalinio G.K
NIM. 20110350076
Fakultas Farmasi Universitas Muhammadiyah Yogyakarta
Di Yogyakarta

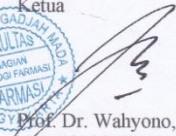
Dengan hormat,

Bersama ini kami sampaikan hasil identifikasi/determinasi sampel yang Saudara kirimkan ke Bagian Biologi Farmasi, Fakultas Farmasi UGM, adalah :


No.Pendaftaran	Jenis	Suku
225	<i>Allium sativum L.</i>	Amaryllidaceae

Demikian, semoga dapat digunakan sebagaimana mestinya.

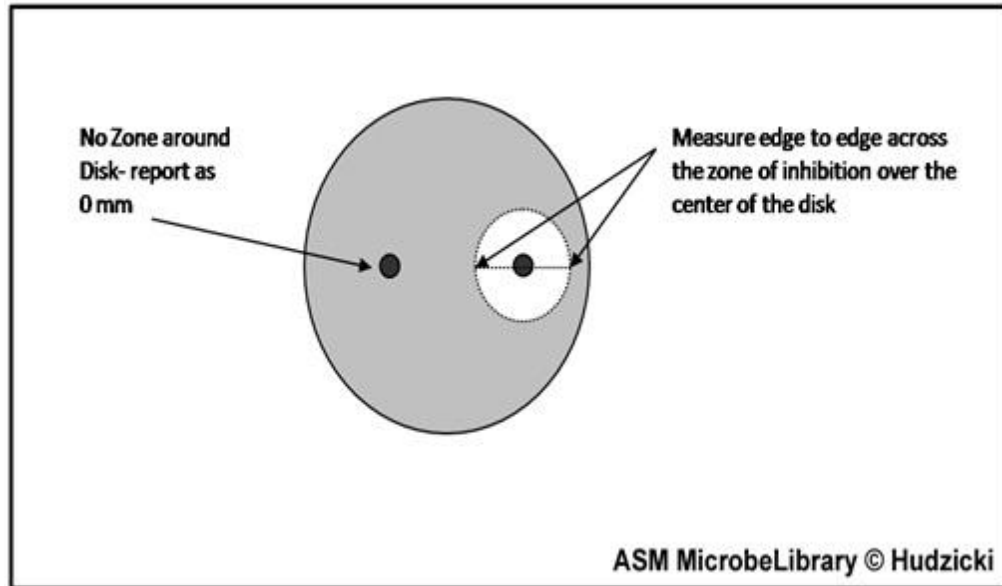
Yogyakarta, 21 Mei 2014
 Ketua



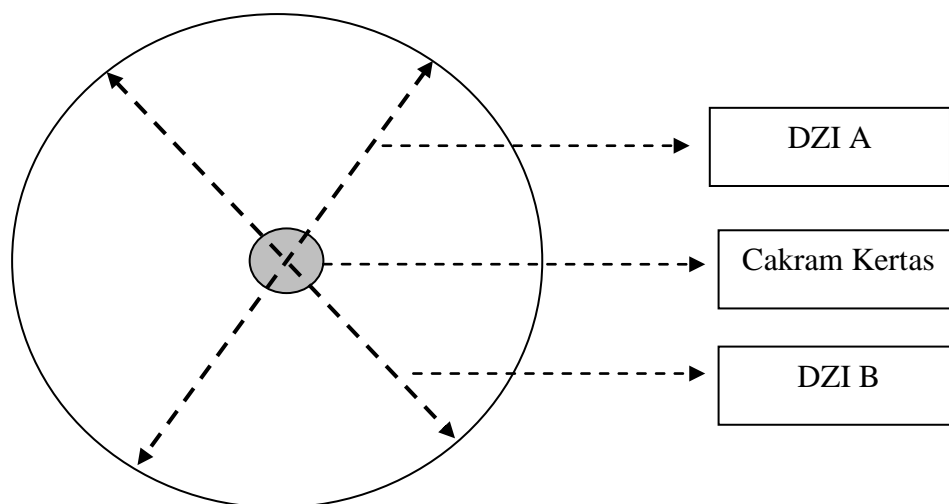
Prof. Dr. Wahyono, SU., Apt.
 NIP. 195007011977021001



Lampiran 3. Cara Pengukuran DZI



(Sumber : Hudzicky, 2013)

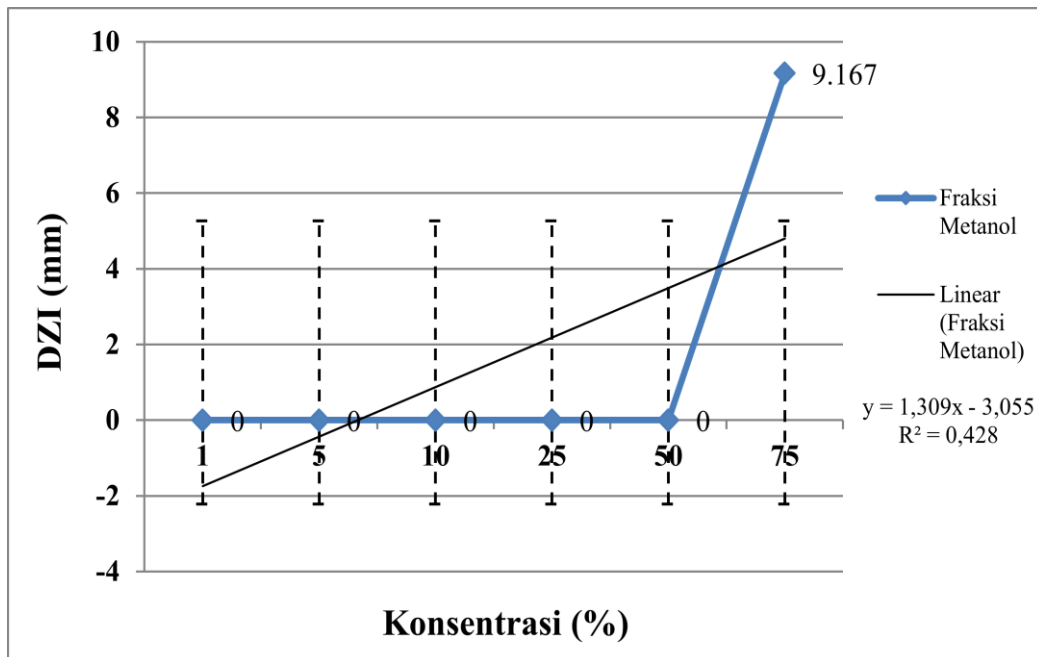


Pengukuran DZI rata-rata :

$$\text{DZI rata - rata} = \frac{\text{DZI A} + \text{DZI B}}{2}$$

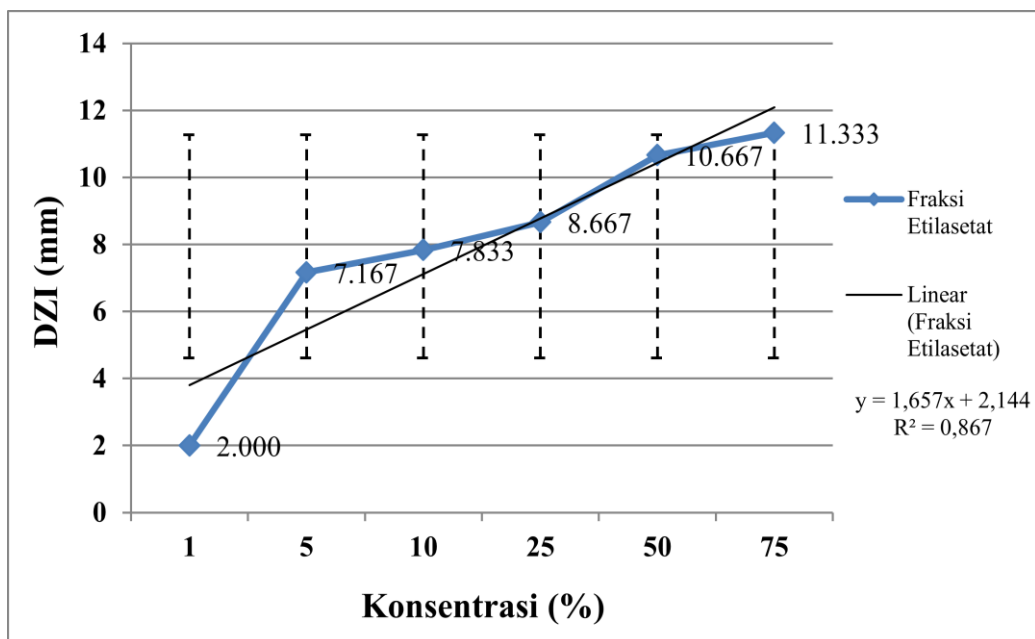
Lampiran 4. Hasil Uji Aktivitas Antibakteri Fraksi Metanol Terhadap Pertumbuhan Bakteri *Shigella flexneri*

Perlakuan	<i>Diameter Zone Inhibition (mm)</i>					
	Konsentrasi					
	1%	5%	10%	25%	50%	75%
Replikasi 1	0	0	0	0	0	8,5
Replikasi 2	0	0	0	0	0	10
Replikasi 3	0	0	0	0	0	9
Rata-rata \pm SD	0 \pm 0	0 \pm 0	0 \pm 0	0 \pm 0	0 \pm 0	9,167 \pm 0,763



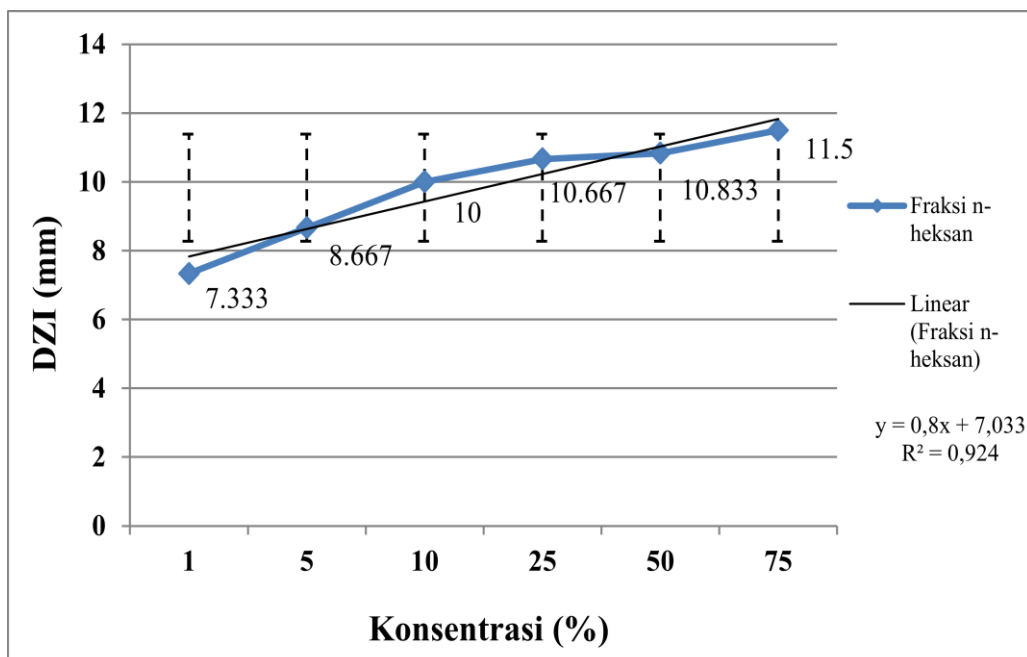
Lampiran 5. Hasil Uji Aktivitas Antibakteri Fraksi Etilasetat Terhadap Pertumbuhan Bakteri *Shigella flexneri*

Perlakuan	<i>Diameter Zone Inhibition (mm)</i>					
	Konsentrasi					
	1%	5%	10%	25%	50%	75%
Replikasi 1	0	7	8	9	11	11
Replikasi 2	6	6	7,5	8	10,5	12
Replikasi 3	0	8,5	8	9	10,5	11
Rata-rata \pm SD	2 \pm 3,464	7,176 \pm 1,258	7,833 \pm 0,288	8,667 \pm 0,577	10,667 \pm 0,288	11,333 \pm 0,577



Lampiran 6. Hasil Uji Aktivitas Antibakteri Fraksi n-heksan Terhadap Pertumbuhan Bakteri *Shigella flexneri*

Perlakuan	<i>Diameter Zone Inhibition (mm)</i>					
	Konsentrasi					
	1%	5%	10%	25%	50%	75%
Replikasi 1	7	9	10	10,5	10,5	11
Replikasi 2	8	9	10	10,5	11	12
Replikasi 3	7	8	10	11	11	11,5
Rata-rata \pm SD	7,333 \pm 0,577	8,667 \pm 0,577	10 \pm 0	10,667 \pm 0,288	10,833 \pm 0,288	11,5 \pm 0,5



Lampiran 7. Hasil Analisis Data dengan SPSS

Analisis Deskriptif

Descriptives

DZI

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Metanol	6	1.52783	3.742412	1.527833	-2.39959	5.45525	.000	9.167
Etil asetat	6	7.94450	3.327761	1.358553	4.45223	11.43677	2.000	11.333
n-heksan	6	9.83333	1.556399	.635397	8.19999	11.46667	7.333	11.500
Total	18	6.43522	4.633353	1.092092	4.13111	8.73933	.000	11.500

Analisis Normalitas Data

Tests of Normality

Fraksi	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DZI Metanol	.492	6	.000	.496	6	.000
Etil asetat	.241	6	.200*	.899	6	.370
n-heksan	.209	6	.200*	.924	6	.538

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Analisis Varians

Test of Homogeneity of Variances

DZI

Levene Statistic	df1	df2	Sig.
.754	2	15	.488

Analisis *One Way* ANOVA

ANOVA

DZI

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	227.445	2	113.723	12.405	.001
Within Groups	137.510	15	9.167		
Total	364.955	17			

Analisis *Multiple Comparison* Uji Tukey

DZI

Tukey HSD

Fraksi	N	Subset for alpha = 0.05	
		1	2
Metanol	6	1.52783	
Etil asetat	6		7.94450
n-heksan	6		9.83333
Sig.		1.000	.540

Means for groups in homogeneous subsets are displayed.

Lampiran 8. Kondisi GC-MS

GCMS-QP2010S SHIMADZU
 Kolom :AGILENTJ%W DB-1
 Panjang : 30 meter
 ID : 0,25 mm
 Gas pembawa : Helium
 Pengionan : EI
 70 Ev

[Comment]

===== Analytical Line 1 =====

[GC-2010]
 Column Oven Temp. :50.0 °C
 Injection Temp. :310.00 °C
 Injection Mode :Split
 Flow Control Mode :Pressure
 Pressure :12.0 kPa
 Total Flow :29.8 mL/min
 Column Flow :0.54 mL/min
 Linear Velocity :26.6 cm/sec
 Purge Flow :3.0 mL/min
 Split Ratio :49.0
 High Pressure Injection :OFF
 Carrier Gas Saver :OFF
 Splitter Hold :OFF
 Oven Temp. Program

Rate	Temperature(°C)	Hold Time(min)
-	50.0	5.00
5.00	260.0	43.00

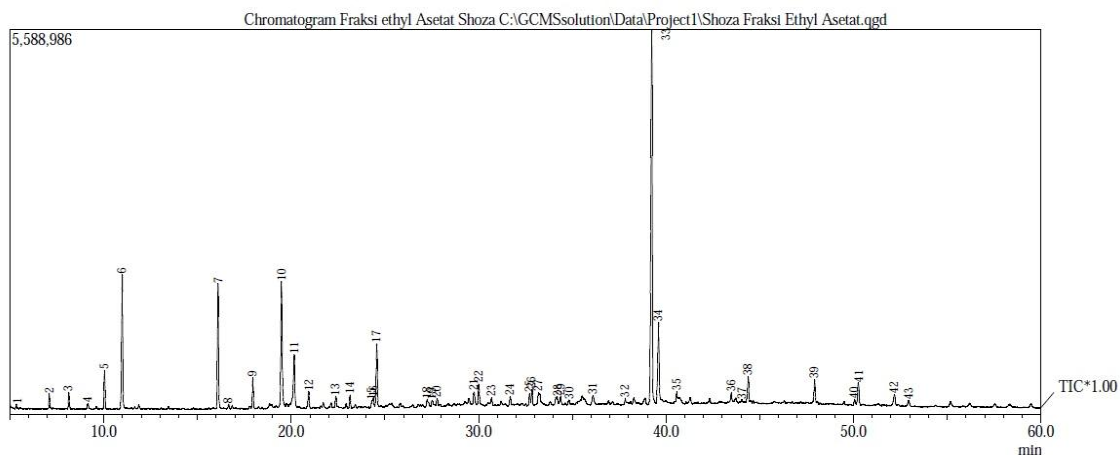
[GC Program]

[GCMS-QP2010]
 IonSourceTemp :250.00 °C
 Interface Temp. :305.00 °C
 Solvent Cut Time :2.00 min
 Detector Gain Mode :Relative
 Detector Gain :+0.00 kV
 Threshold :0

[MS Table]

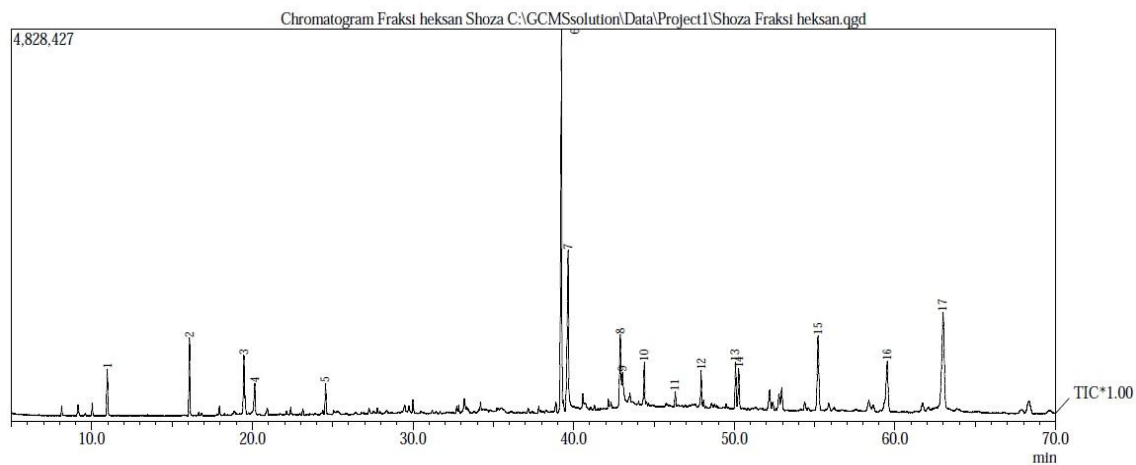
--Group 1 - Event 1--
 Start Time :2.20min
 End Time :90.00min
 ACQ Mode :Scan
 Event Time :0.50sec
 Scan Speed :1250
 Start m/z :28.00
 End m/z :600.00

Lampiran 9. Kromatogram Fraksi Etilasetat



Peak#	R.Time	I.Time	F.Time	Area	Area%	Height	Name
1	5.339	5.292	5.383	159945	0.17	57518	
2	7.089	7.033	7.183	711931	0.77	218624	
3	8.132	8.067	8.225	838780	0.91	240602	
4	9.152	9.092	9.242	306947	0.33	67008	
5	10.037	9.958	10.133	1994564	2.16	555877	
6	10.988	10.875	11.083	8127490	8.79	1929904	
7	16.096	16.000	16.217	7167133	7.75	1809356	
8	16.661	16.617	16.725	183682	0.20	56967	
9	17.956	17.875	18.050	1742599	1.88	444055	
10	19.483	19.375	19.642	8860361	9.58	1793730	
11	20.160	20.008	20.275	3829960	4.14	731042	
12	20.932	20.858	21.008	880048	0.95	225869	
13	22.380	22.308	22.450	554004	0.60	150544	
14	23.147	23.083	23.217	696902	0.75	185476	
15	24.300	24.242	24.350	458610	0.50	93136	
16	24.378	24.350	24.450	428256	0.46	128493	
17	24.567	24.450	24.675	4422122	4.78	911911	
18	27.265	27.192	27.300	229028	0.25	63079	
19	27.525	27.467	27.742	349606	0.38	64945	
20	27.789	27.742	27.867	369210	0.40	95936	
21	29.751	29.667	29.875	1051985	1.14	179711	
22	30.004	29.892	30.117	1490071	1.61	298406	
23	30.691	30.642	30.783	292815	0.32	81682	
24	31.685	31.617	31.767	530264	0.57	121310	
25	32.722	32.658	32.783	647011	0.70	161973	
26	32.840	32.783	32.933	925919	1.00	222280	
27	33.209	33.108	33.333	1185003	1.28	148431	
28	34.204	34.067	34.267	713240	0.77	100462	
29	34.375	34.317	34.458	332297	0.36	91076	
30	34.824	34.750	34.892	249352	0.27	60325	
31	36.108	36.017	36.233	770750	0.83	125152	
32	37.819	37.767	37.875	223591	0.24	75652	
33	39.240	39.075	39.350	29659806	32.08	5421203	
34	39.606	39.350	39.708	5527393	5.98	1132217	
35	40.569	40.508	40.617	364071	0.39	114638	
36	43.482	43.417	43.558	448951	0.49	123473	
37	44.033	44.000	44.275	48546	0.05	35116	
38	44.388	44.275	44.467	1544908	1.67	355208	
39	47.935	47.858	48.017	1233871	1.33	305444	
40	50.067	50.008	50.175	309812	0.34	72388	
41	50.271	50.175	50.375	1769896	1.91	321773	
42	52.184	52.125	52.283	498050	0.54	111083	
43	52.948	52.883	53.033	328157	0.35	70174	

Lampiran 10. Kromatogram Fraksi n-heksan

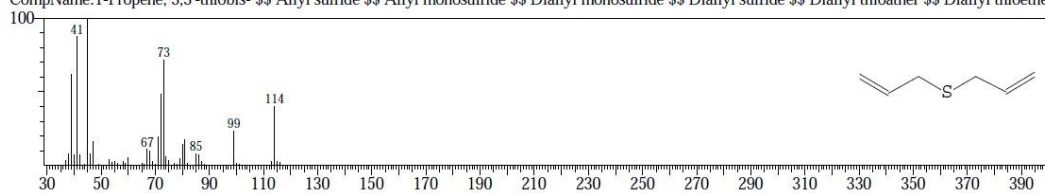


Peak#	R.Time	I.Time	F.Time	Peak Report TIC		
				Area	Area%	Height Name
1	10.972	10.875	11.075	2407173	2.04	568198
2	16.087	15.992	16.192	3601898	3.06	953838
3	19.470	19.367	19.642	3906283	3.31	706739
4	20.153	20.050	20.258	1612103	1.37	341053
5	24.554	24.467	24.667	1760850	1.49	378964
6	39.234	39.067	39.308	23569330	20.00	4643012
7	39.653	39.467	39.775	11689679	9.92	1913514
8	42.904	42.767	42.983	5241242	4.45	856013
9	43.035	42.983	43.208	2325733	1.97	361958
10	44.393	44.308	44.492	1827532	1.55	488431
11	46.326	46.250	46.400	707608	0.60	184991
12	47.934	47.842	48.017	1856135	1.58	429120
13	50.071	49.967	50.167	2825297	2.40	568688
14	50.273	50.167	50.392	2807776	2.38	490324
15	55.211	55.050	55.358	6477326	5.50	903258
16	59.508	59.367	59.683	4264644	3.62	541610
17	62.992	62.775	63.200	11914407	10.11	1142286
18	75.396	75.017	75.667	29046839	24.65	1688658
				117841855	100.00	17160655

Lampiran 11. Hasil Mass Spectrometer Fraksi Etilasetat

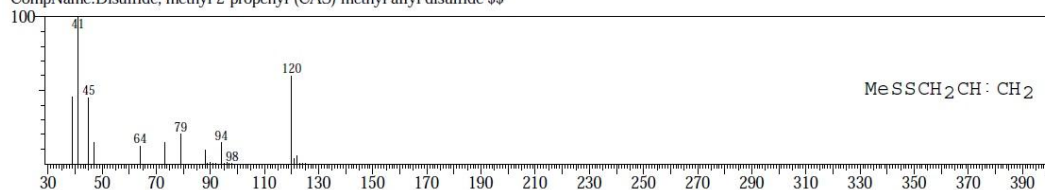
Peak : 3
Waktu retensi : 8,133 menit

Hit#:2 Entry:2944 Library:NIST62.LIB
SI:95 Formula:C6H10S CAS:592-88-1 MolWeight:114 RetIndex:0
CompName:1-Propene, 3,3'-thiobis- \$\$ Allyl sulfide \$\$ Allyl monosulfide \$\$ Diallyl monosulfide \$\$ Diallyl sulfide \$\$ Diallyl thioether \$\$ Diallyl thioether



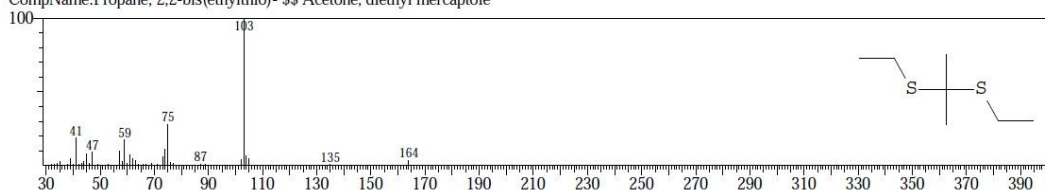
Peak : 5
Waktu retensi : 10,033 menit

Hit#:1 Entry:11474 Library:WILEY229.LIB
SI:84 Formula:C4 H8 S2 CAS:2179-58-0 MolWeight:120 RetIndex:0
CompName:Disulfide, methyl 2-propenyl (CAS) methyl allyl disulfide

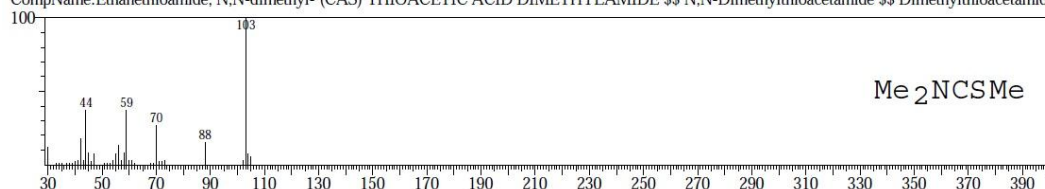


Peak : 6
Waktu retensi : 10,992 menit

Hit#:2 Entry:13322 Library:NIST62.LIB
SI:68 Formula:C7H16S2 CAS:14252-45-0 MolWeight:164 RetIndex:0
CompName:Propane, 2,2-bis(ethylthio)- \$\$ Acetone, diethyl mercaptole

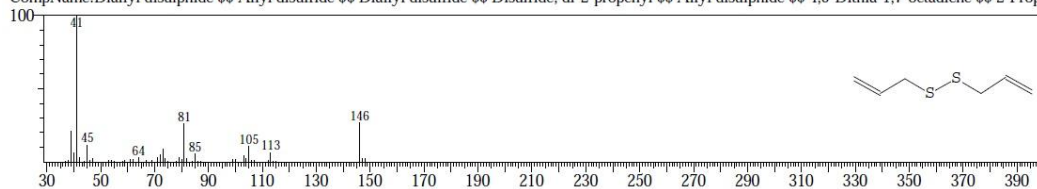


Hit#:1 Entry:6363 Library:WILEY229.LIB
SI:69 Formula:C4 H9 N S CAS:631-67-4 MolWeight:103 RetIndex:0
CompName:Ethanedithioamide, N,N-dimethyl- (CAS) THIOACETIC ACID DIMETHYLAMIDE \$\$ N,N-Dimethylthioacetamide \$\$ Dimethylthioacetamide

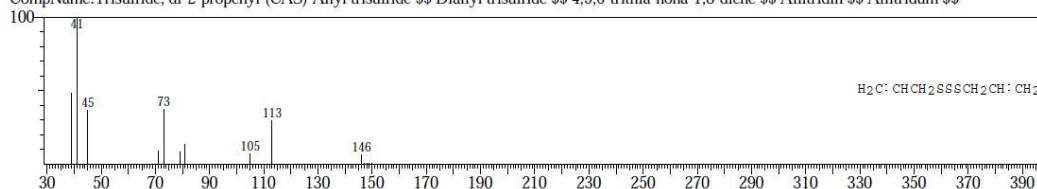


Peak : 7
Waktu retensi : 16,100 menit

Hit#:1 Entry:8750 Library:NIST62.LIB
SI:90 Formula:C6H10S2 CAS:2179-57-9 MolWeight:146 RetIndex:0
CompName:Diallyl disulphide \$\$ Allyl disulfide \$\$ Diallyl disulfide \$\$ Disulfide, di-2-propenyl \$\$ Allyl disulphide \$\$ 4,5-Dithia-1,7-octadiene \$\$ 2-Prope

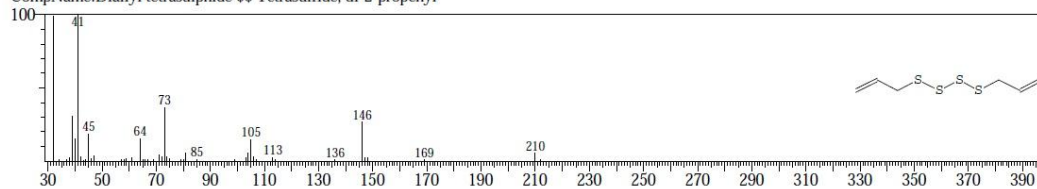


Hit#:4 Entry:48536 Library:WILEY229.LIB
SI:80 Formula:C6 H10 S3 CAS:2050-87-5 MolWeight:178 RetIndex:0
CompName:Trisulfide, di-2-propenyl (CAS) Allyl trisulfide \$\$ Diallyl trisulfide \$\$ 4,5,6-trithia-nona-1,8-diene \$\$ Allitridin \$\$ Allitridum \$\$



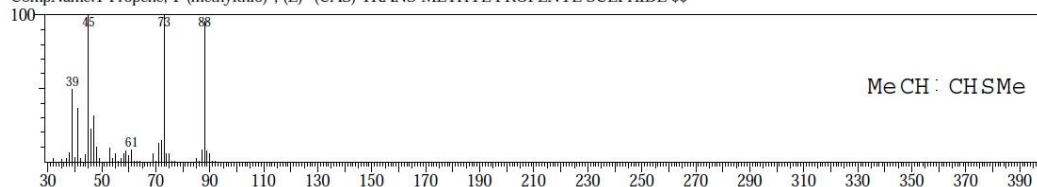
Peak : 8
Waktu retensi : 16,658 menit

Hit#:1 Entry:25190 Library:NIST62.LIB
SI:80 Formula:C6H10S4 CAS:2444-49-7 MolWeight:210 RetIndex:0
CompName:Diallyl tetrasulphide \$\$ Tetrasulfide, di-2-propenyl



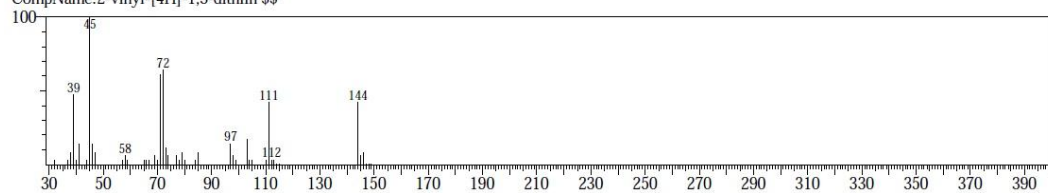
Peak : 9
Waktu retensi : 17,958 menit

Hit#:1 Entry:3214 Library:WILEY229.LIB
SI:78 Formula:C4 H8 S CAS:42848-06-6 MolWeight:88 RetIndex:0
CompName:1-Propene, 1-(methylthio)-, (E)- (CAS) TRANS-METHYL PROPENYL SULPHIDE \$\$

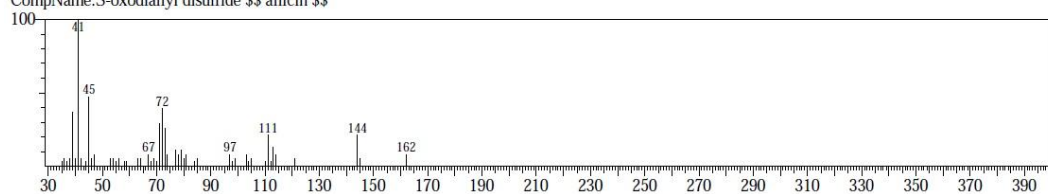


Peak : 11
Waktu retensi : 20,158 menit

Hit#1 Entry:23805 Library:WILEY229.LIB
SI:88 Formula:C6 H8 S2 CAS:0-00-0 MolWeight:144 RetIndex:0
CompName:2-vinyl-[4H]-1,3-dithiin \$\$



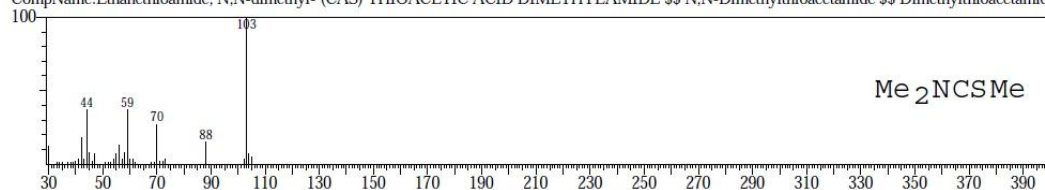
Hit#3 Entry:36492 Library:WILEY229.LIB
SI:76 Formula:C6 H10 O S2 CAS:0-00-0 MolWeight:162 RetIndex:0
CompName:S-oxodiallyl disulfide \$\$ allicin \$\$



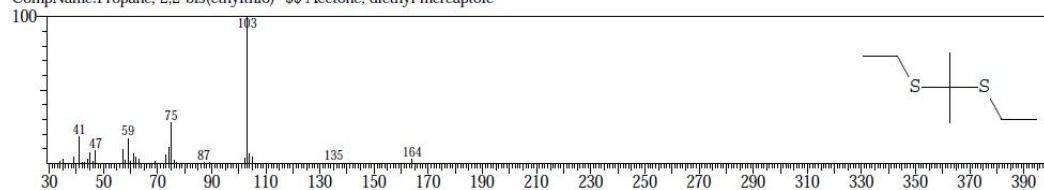
Lampiran 12. Hasil Mass Spectrometer Fraksi n-heksan

Peak : 1
Waktu Retensi : 10,975 menit

Hit#:1 Entry:6363 Library:WILEY229.LIB
SI:69 Formula:C4 H9 N S CAS:631-67-4 MolWeight:103 RetIndex:0
CompName:Ethanethioamide, N,N-dimethyl- (CAS) THIOACETIC ACID DIMETHYLAMIDE \$\$ N,N-Dimethylthioacetamide \$\$ Dimethylthioacetamide

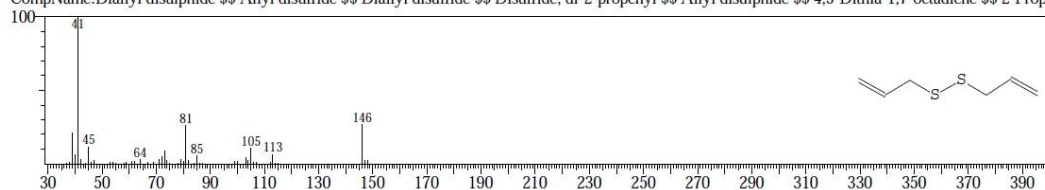


Hit#:2 Entry:13322 Library:NIST62.LIB
SI:68 Formula:C7H16S2 CAS:14252-45-0 MolWeight:164 RetIndex:0
CompName:Propane, 2,2-bis(ethylthio)- \$\$ Acetone, diethyl mercaptole

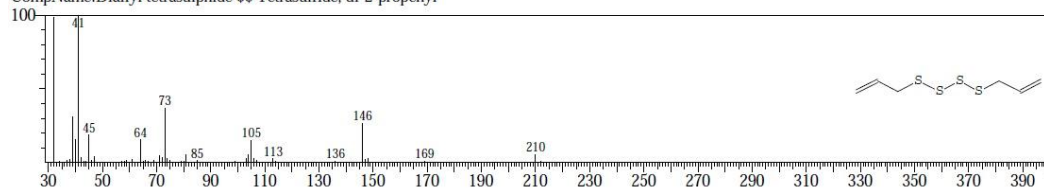


Peak : 2
Waktu Retensi : 16,083 menit

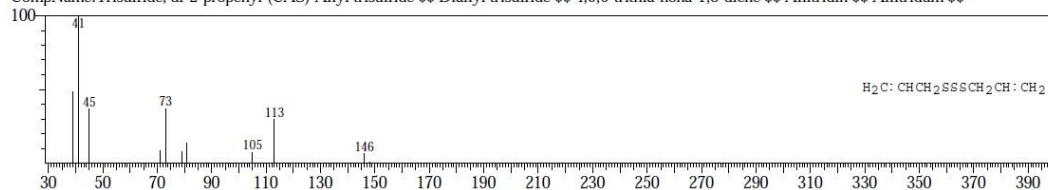
Hit#:1 Entry:8750 Library:NIST62.LIB
SI:90 Formula:C6H10S2 CAS:2179-57-9 MolWeight:146 RetIndex:0
CompName:Diallyl disulphide \$\$ Allyl disulfide \$\$ Diallyl disulfide \$\$ Disulfide, di-2-propenyl \$\$ Allyl disulphide \$\$ 4,5-Dithia-1,7-octadiene \$\$ 2-Propene



Hit#:2 Entry:25190 Library:NIST62.LIB
SI:83 Formula:C6H10S4 CAS:2444-49-7 MolWeight:210 RetIndex:0
CompName:Diallyl tetrasulphide \$\$ Tetrasulfide, di-2-propenyl

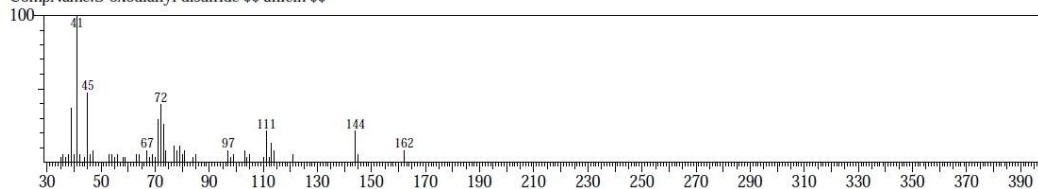


Hit#:5 Entry:48536 Library:WILEY229.LIB
SI:79 Formula:C6 H10 S3 CAS:2050-87-5 MolWeight:178 RetIndex:0
CompName:Trisulfide, di-2-propenyl (CAS) Allyl trisulfide \$\$ Diallyl trisulfide \$\$ 4,5,6-trithia-nona-1,8-diene \$\$ Allitridin \$\$ Allitridum \$\$

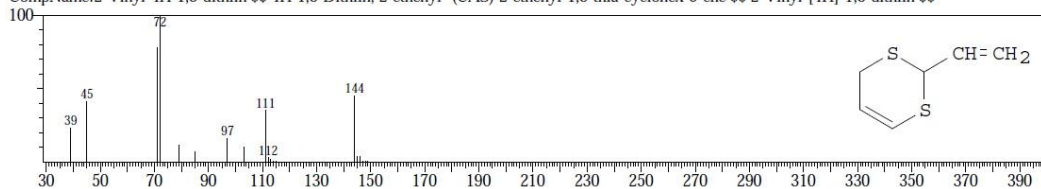


Peak : 3
Waktu Retensi : 19,467 menit

Hit#:3 Entry:36492 Library:WILEY229.LIB
SI:73 Formula:C6 H10 O S2 CAS:0-00-0 MolWeight:162 RetIndex:0
CompName:S-oxodiallyl disulfide \$\$ allacin \$\$

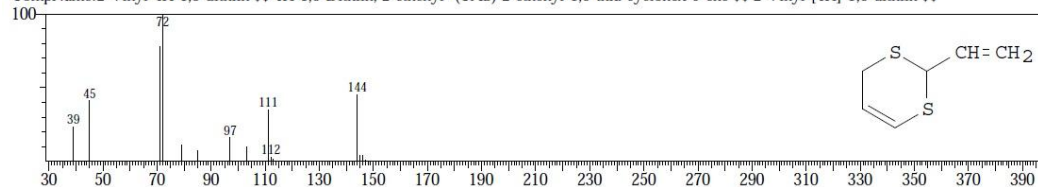


Hit#:4 Entry:23802 Library:WILEY229.LIB
SI:70 Formula:C6 H8 S2 CAS:80028-57-5 MolWeight:144 RetIndex:0
CompName:2-Vinyl-4H-1,3-dithiin \$\$ 4H-1,3-Dithiin, 2-ethenyl- (CAS) 2-ethenyl-1,3-thia-cyclohex-5-ene \$\$ 2-Vinyl-[4H]-1,3-dithiin \$\$

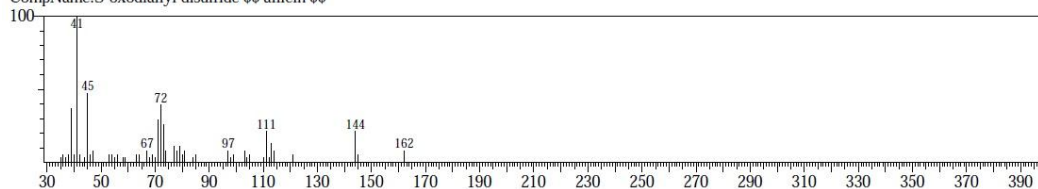


Peak : 4
Waktu Retensi : 20,150 menit

Hit#:2 Entry:23802 Library:WILEY229.LIB
SI:85 Formula:C6 H8 S2 CAS:80028-57-5 MolWeight:144 RetIndex:0
CompName:2-Vinyl-4H-1,3-dithiin \$\$ 4H-1,3-Dithiin, 2-ethenyl- (CAS) 2-ethenyl-1,3-thia-cyclohex-5-ene \$\$ 2-Vinyl-[4H]-1,3-dithiin \$\$



Hit#:3 Entry:36492 Library:WILEY229.LIB
SI:76 Formula:C6 H10 O S2 CAS:0-00-0 MolWeight:162 RetIndex:0
CompName:S-oxodiallyl disulfide \$\$ allacin \$\$



Lampiran 13. Hasil Konformasi *Molecular Docking*

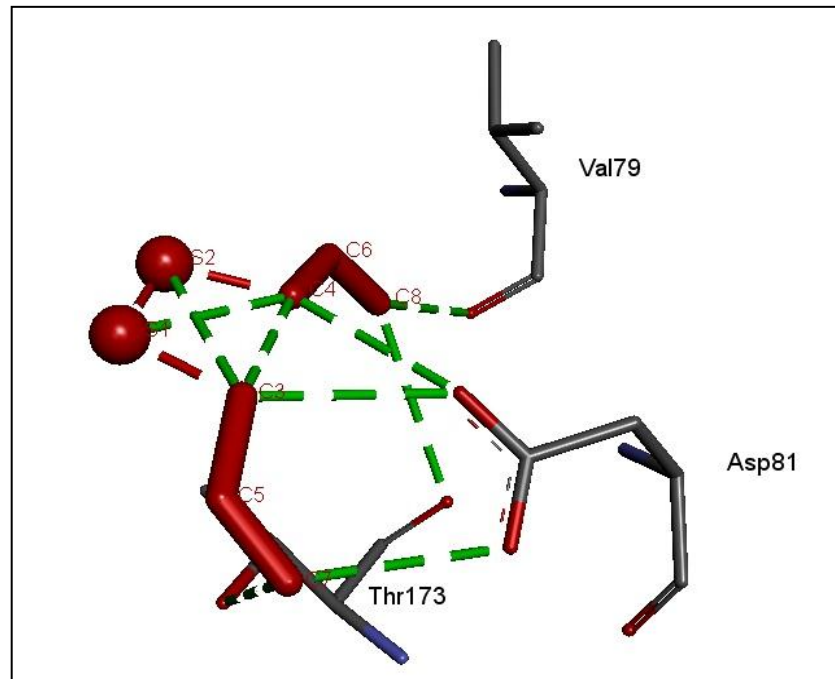
No.	Ligan	Konformasi	Skor		Konformasi Terbaik
			<i>Binding Energy</i> (Kkal/mol)	<i>Inhibition Constant</i> (mM)	
1	Dialil disulfida	1	-3,42	3,11	Konf 6
		2	-3,42	3,11	
		3	-3,34	3,59	
		4	-3,51	2,68	
		5	-3,21	4,44	
		6	-3,56	2,47	
		7	-3,49	2,75	
		8	-3,51	2,69	
		9	-3,27	3,99	
		10	-3,55	2,51	
2	Dialil trisulfida	1	-3,44	3,03	Konf 7
		2	-3,40	2,98	
		3	-3,69	1,97	
		4	-3,77	1,72	
		5	-3,76	1,75	
		6	-3,28	3,94	
		7	-3,83	1,57	
		8	-3,49	2,77	
		9	-3,83	1,56	

		10	-3,47	2,88	
3	Dialil tetrasulfida	1	-3,61	2,27	Konf 8
		2	-3,58	2,37	
		3	-3,64	2,16	
		4	-3,69	1,96	
		5	-3,88	1,43	
		6	-3,63	2,17	
		7	-3,62	2,2	
		8	-3,91	1,35	
		9	-3,65	2,11	
		10	-3,7	1,94	
4	Allicin	1	-3,71	1,89	Konf 10
		2	-3,98	1,2	
		3	-3,66	2,09	
		4	-3,81	1,62	
		5	-3,9	1,38	
		6	-3,8	1,63	
		7	-3,58	2,39	
		8	-3,84	1,53	
		9	-3,58	2,36	
		10	-4,0	1,17	
5	Dietil mercaptole	1	-3,74	1,83	Konf 1

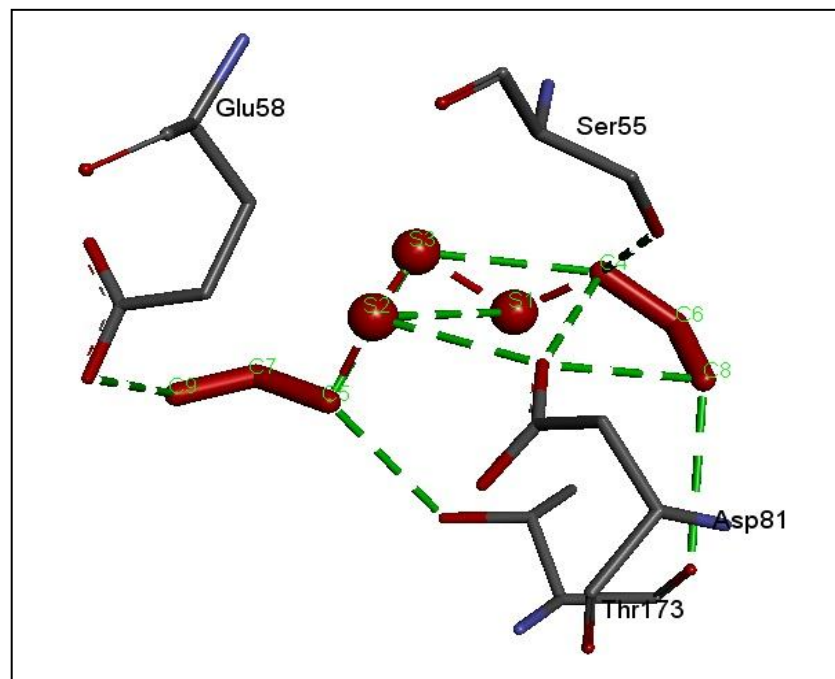
		2	-3,54	2,53	
		3	-3,55	2,49	
		4	-3,71	1,91	
		5	-3,59	2,33	
		6	-3,54	2,54	
		7	-3,62	2,23	
		8	-3,74	1,83	
		9	-3,3	3,84	
		10	-3,58	2,38	
6	2-vinyl-[4H]-1,3-dithiin	1	-3,94	1,3	Konf 9
		2	-3,91	1,36	
		3	-3,91	1,35	
		4	-3,9	1,38	
		5	-3,92	1,34	
		6	-3,85	1,5	
		7	-4,06	1,06	
		8	-3,91	1,37	
		9	-4,07	1,04	
		10	-3,89	1,4	
7	Siprofloksasin	1	-5,3	130,41 μM	Konf 10
		2	-5,65	71,86 μM	
		3	-5,72	64,21 μM	

		4	-5,77	58,92 μM	
		5	-5,61	77,89 μM	
		6	-5,03	205,46 μM	
		7	-5,7	66,78 μM	
		8	-5,09	187,16 μM	
		9	-5,7	66,51 μM	
		10	-5,79	56,73 μM	
8	<i>Ref Ligand</i>	1	-4,89	160,06 μM	Konf 3
		2	-5,42	106,79 μM	
		3	-8,15	1,06 μM	
		4	-5,47	97,02 μM	
		5	-6,17	29,79 μM	
		6	-4,58	442,66 μM	
		7	-6,05	36,73 μM	
		8	-4,38	612,0 μM	
		9	-5,73	62,65 μM	
		10	-4,74	334,7 μM	

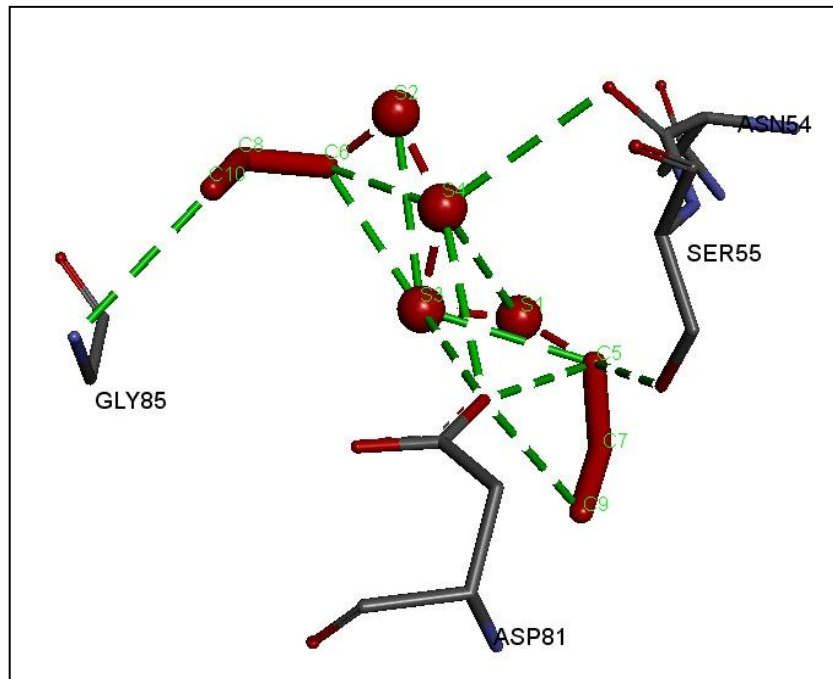
Lampiran 14. Visualisasi 3D Interaksi Antara Dialil disulfida dan DNA gyrase subunit B



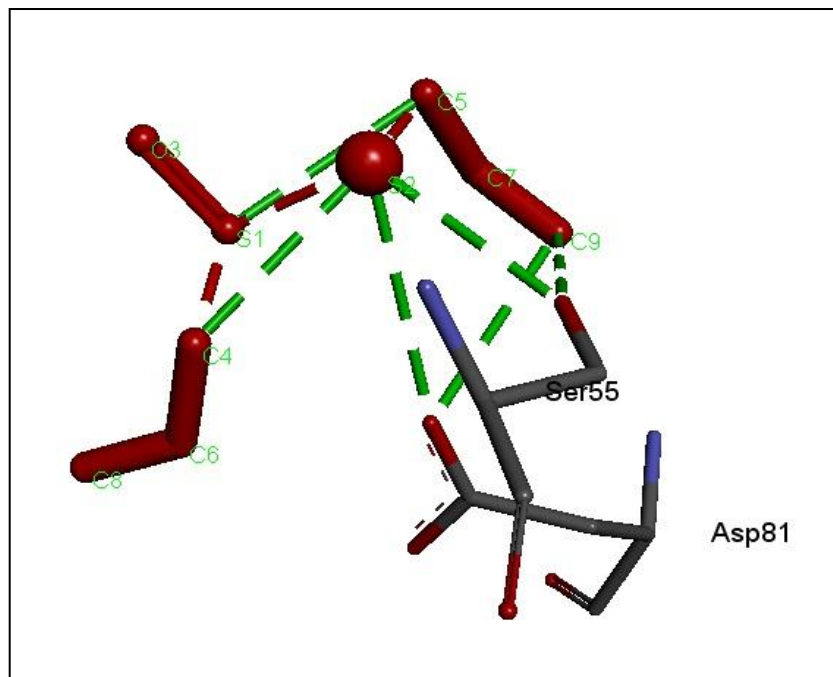
Lampiran 15. Visualisasi 3D Interaksi Antara Dialil trisulfida dan DNA gyrase subunit B



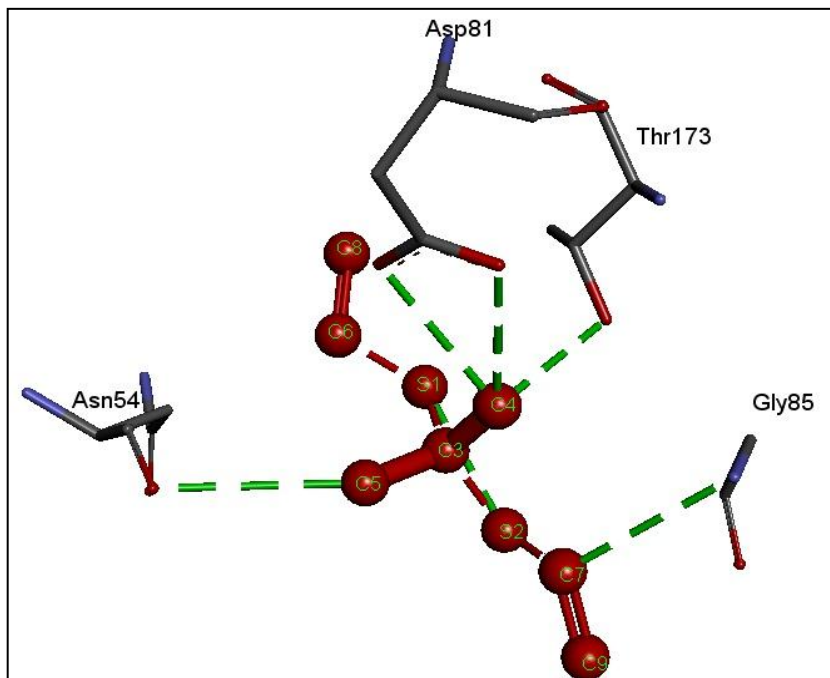
Lampiran 16. Visualisasi 3D Interaksi Antara Dialil tetrasulfida dan DNA gyrase subunit B



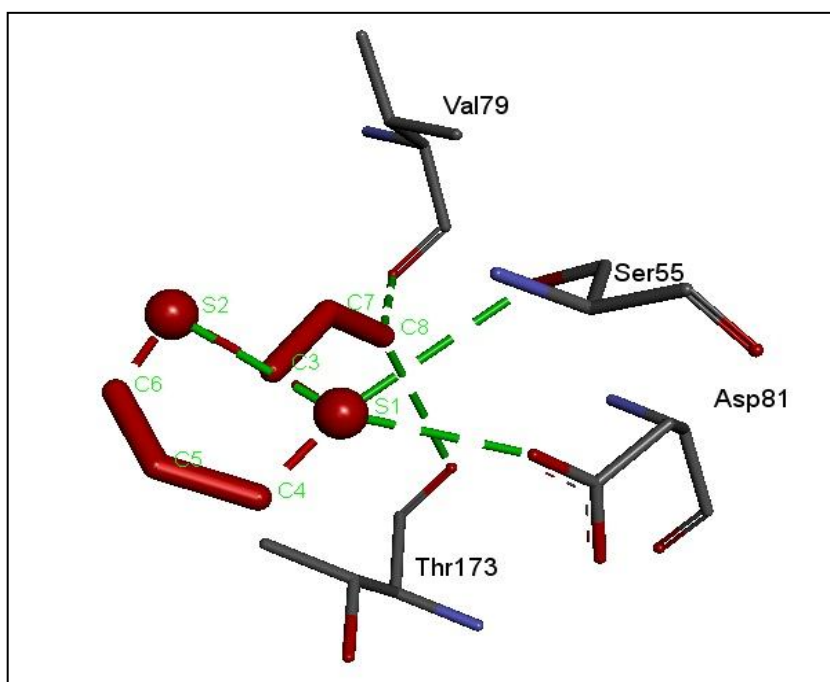
Lampiran 17. Visualisasi 3D Interaksi Antara Allicin dan DNA gyrase subunit B



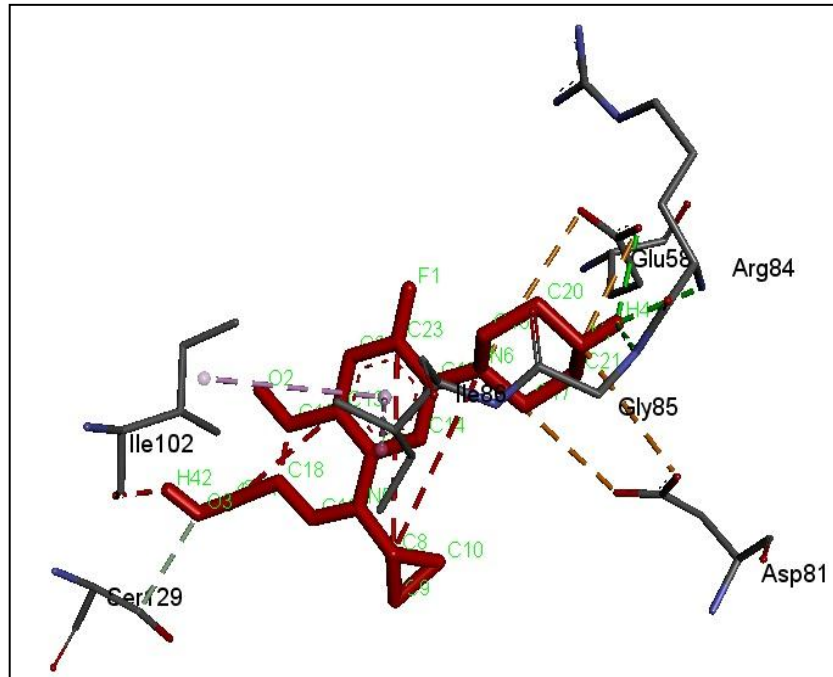
Lampiran 18. Visualisasi 3D Interaksi Antara Dietil mercaptole dan DNA gyrase subunit B



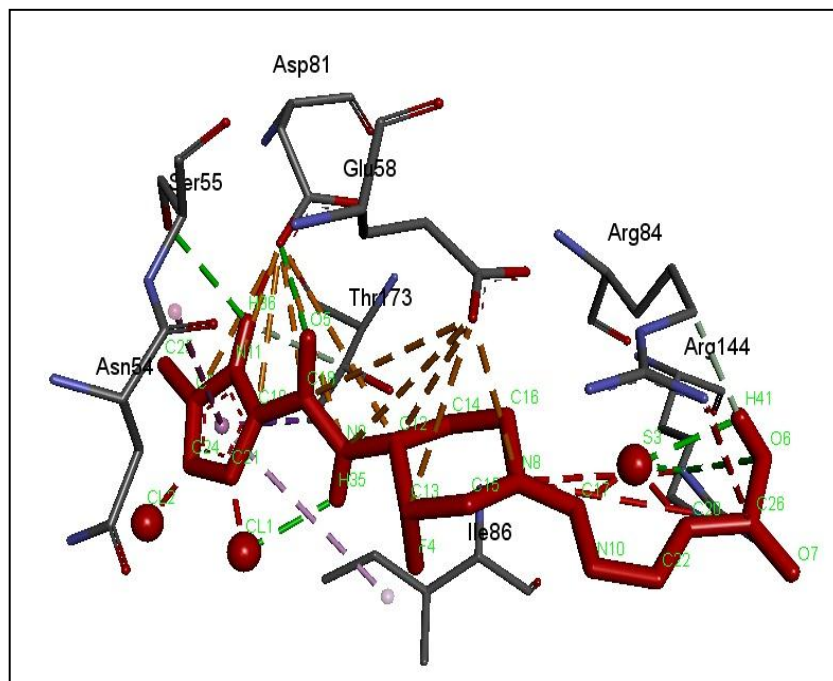
Lampiran 19. Visualisasi 3D Interaksi Antara 2-vinyl-[4H]-1,3-dithiin dan DNA gyrase subunit B



Lampiran 20. Visualisasi 3D Interaksi Antara Siprofloksasin dan DNA gyrase subunit B



Lampiran 21. Visualisasi 3D Interaksi Antara *Ref Ligand* dan DNA gyrase subunit B



Lampiran 22. Foto Penelitian

Gambar 1. Ekstrak Etanolik Bawang Putih



(A)



(B)

Gambar 2. Proses Fraksinasi (A) dan Ekstrak Terfraksi (B)



(A)

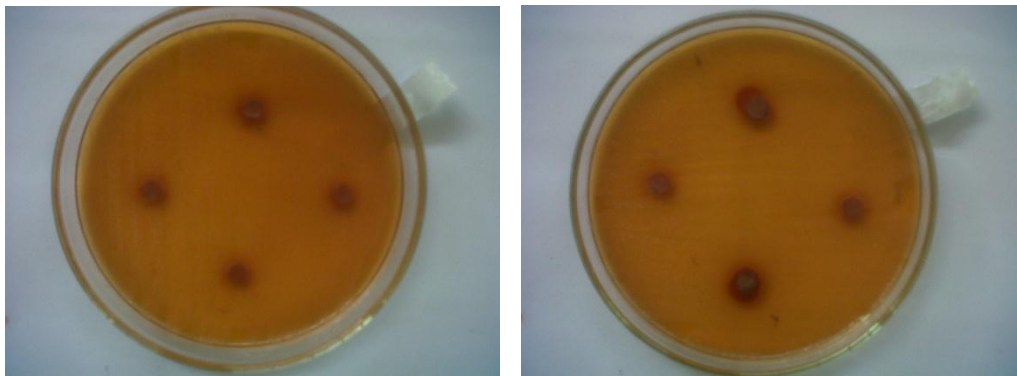


(B)

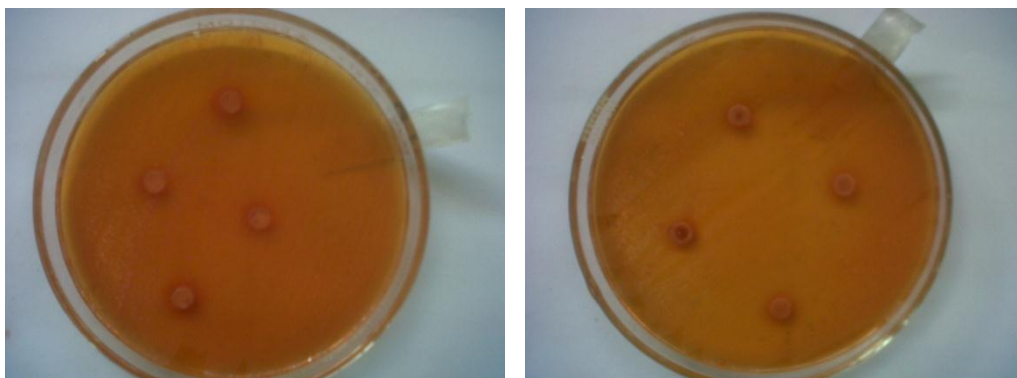
Gambar 3. Hasil Uji Aktivitas Antibakteri Kontrol Positif (A) dan Kontrol Negatif (B)



Gambar 4. Contoh Hasil Uji Aktivitas Antibakteri Fraksi Metanol



Gambar 5. Contoh Hasil Uji Aktivitas Antibakteri Fraksi Etilasetat



Gambar 6. Contoh Hasil Uji Aktivitas Antibakteri Fraksi n-heksan