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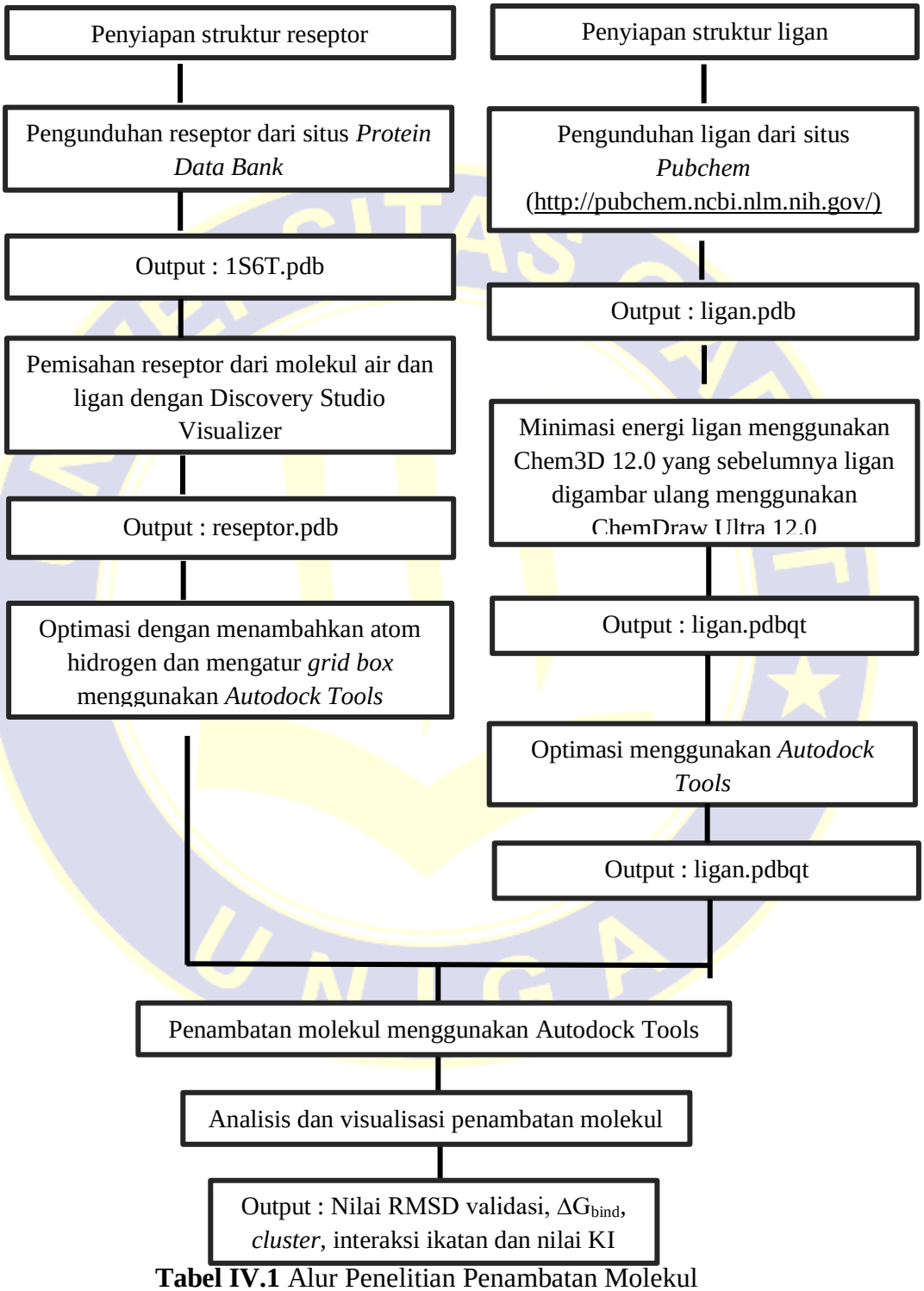
LAMPIRAN 1

SAMBILOTO (*Andrographis paniculata Ness.*)

Gambar 1.1 Sambiloto (*Andrographis paniculata Ness.)*

LAMPIRAN 2

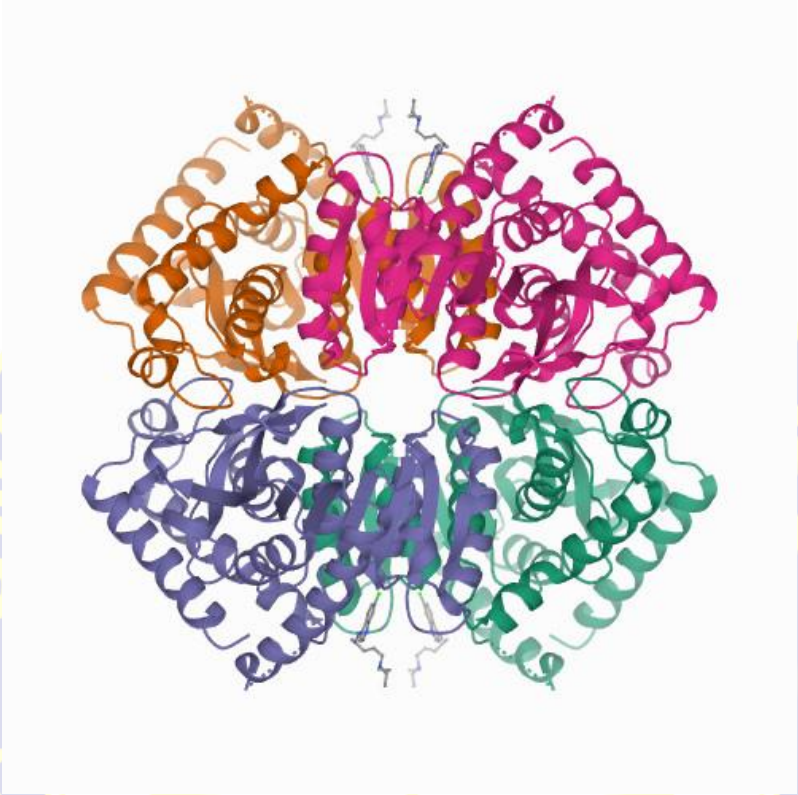
ALUR PENELITIAN PENAMBATAN MOLEKUL



Tabel IV.1 Alur Penelitian Penambatan Molekul

LAMPIRAN 3

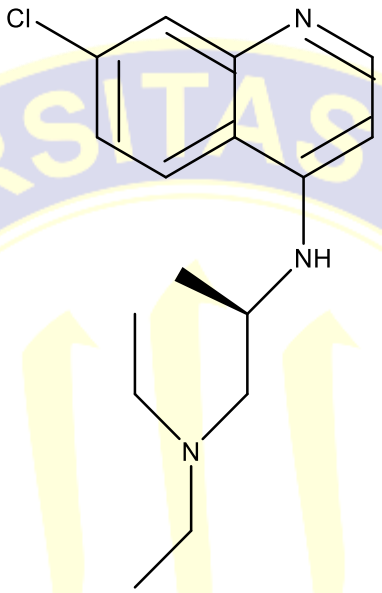
STRUKTUR 3D MAKROMOLEKUL



Gambar IV.2 Reseptor Lactate Dehydrogenase dengan PDB ID 1CET

LAMPIRAN 4

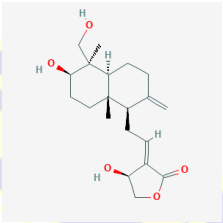
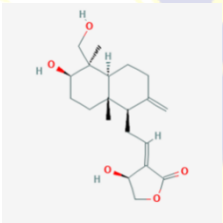
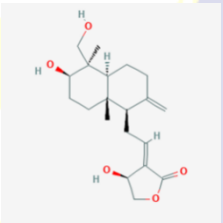
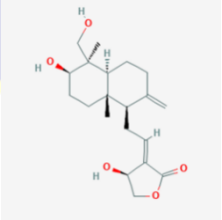
STRUKTUR 2D LIGAN ALAMI



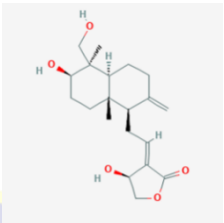
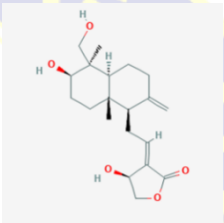
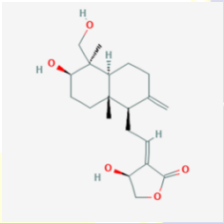
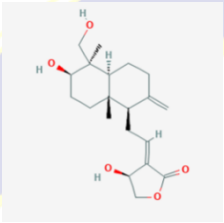
Gambar IV.3 Struktur 2D Ligan Alami

LAMPIRAN 5

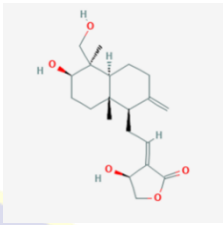
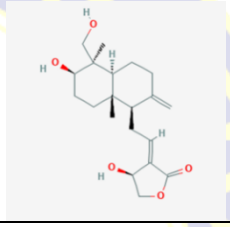
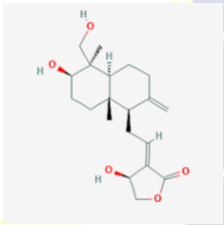
STRUKTUR 2D LIGAN UJI

No.	Nama Ligan Uji	Struktur 2D
1.	Andrographolide	
2.	Neoandrographolide	
3.	14-Deoxyandrographolide	
4.	Andrograpanin	

LAMPIRAN 5
LANJUTAN

No.	Nama Ligan Uji	Struktur 2D
5.	Isoandrographolide	
6.	5-Hydroxy-7,8,2’5’-Tetramethoxyflavone	
7.	5-Hydroxy-7,8-Dimethoxyflavone	
8.	5-Hydroxy-7,8-Dimethoxyflavanone	

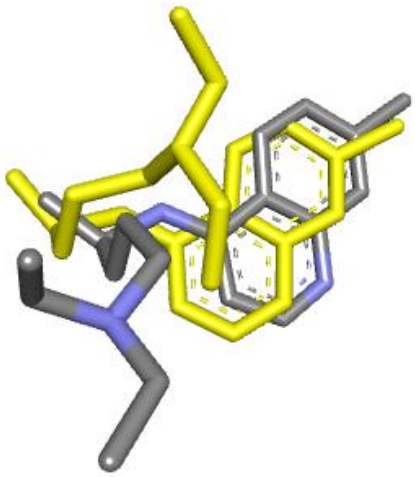
LAMPIRAN 5
LANJUTAN

No.	Nama Ligan Uji	Struktur 2D
9.	14-Deoxy-11,12-Didehydro- Andrographolide	
10.	19-O-Acetyl-14-Deoxy-11,12- Didehydroandrographolide	
11.	14-Acetylandrographolide	

Gambar IV.4 Struktur 2D Ligan Uji

LAMPIRAN 6

VALIDASI METODE



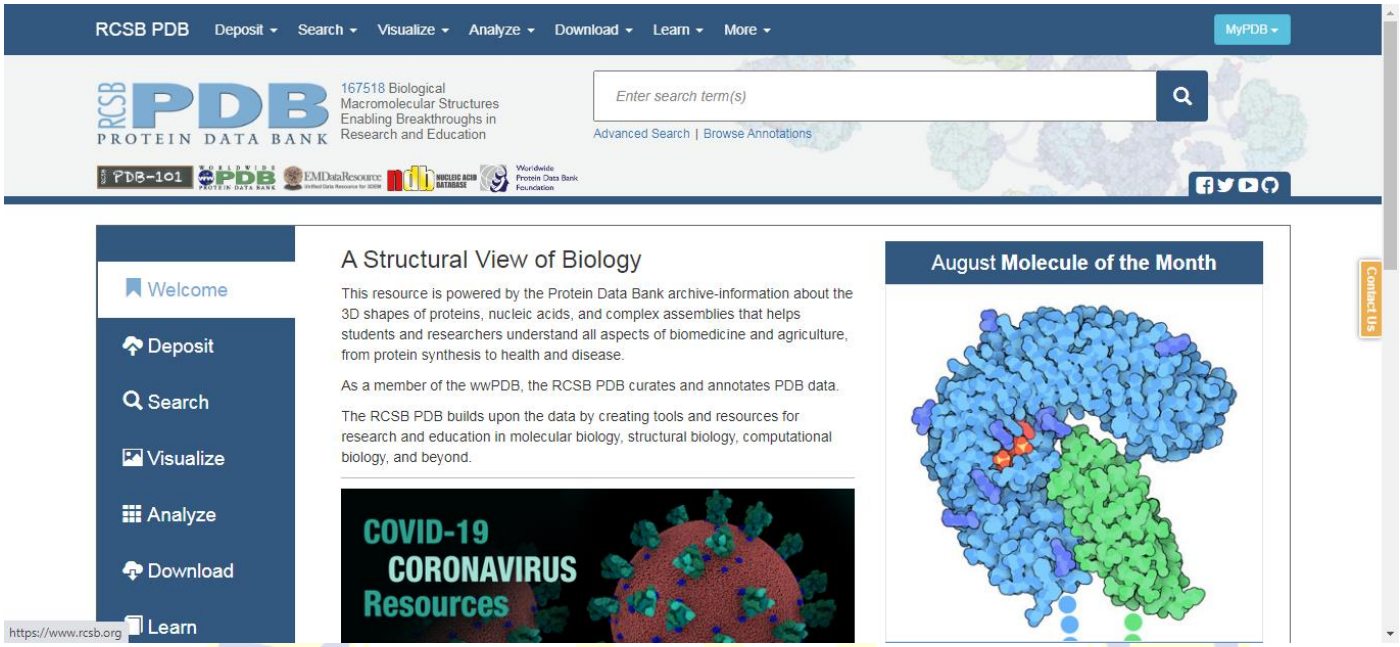
Gambar V.1 Visualisasi tumpang tindih ligan alami dengan ligan hasil *redocking*

Tabel V.2 Hasil validasi metode dengan *redocking* ligan alaminya didapatkan nilai RMSD <2 Å yaitu1.688 Å menunjukkan validitas metode dan reseptor yang sudah valid

Kode PDB	Grid Box	Tingkat Validasi	Validasi		Ikatan Energi (kkal/mol)
			RMSD CLUSTER (Å)	RMSD Refernce (Å)	
1CET	X: 36.211 Y: 10.539 Z: 19.83	2.500.000	0.00	1.688	-4.81

LAMPIRAN 7

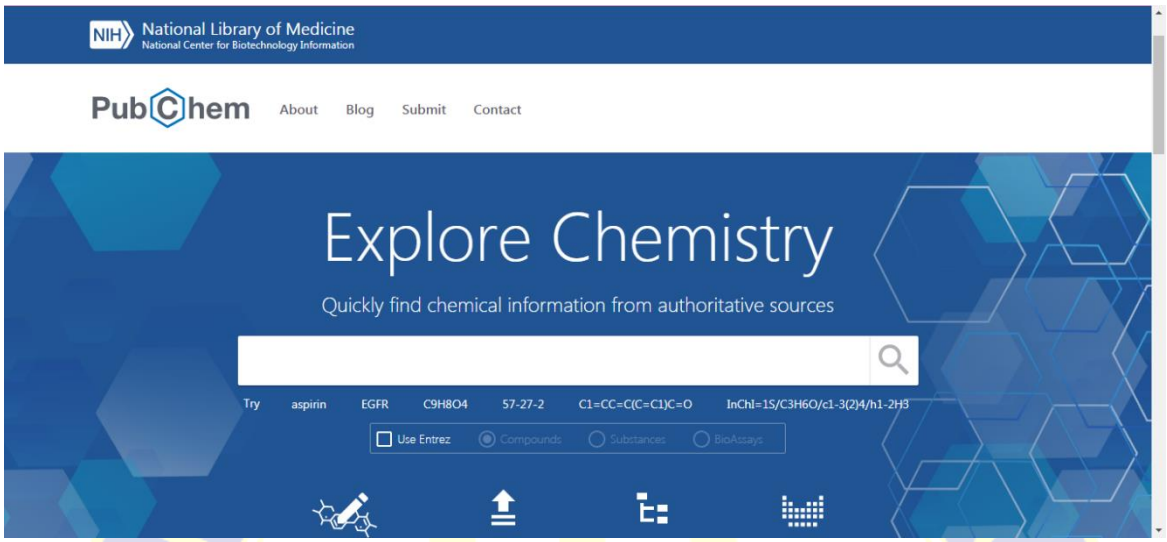
SITUS PROTEIN DATA BANK



Gambar IV.5 Tampilan situs *Protein Data Bank* (PDB) sebagai tempat pengunduhan reseptor.

LAMPIRAN 8

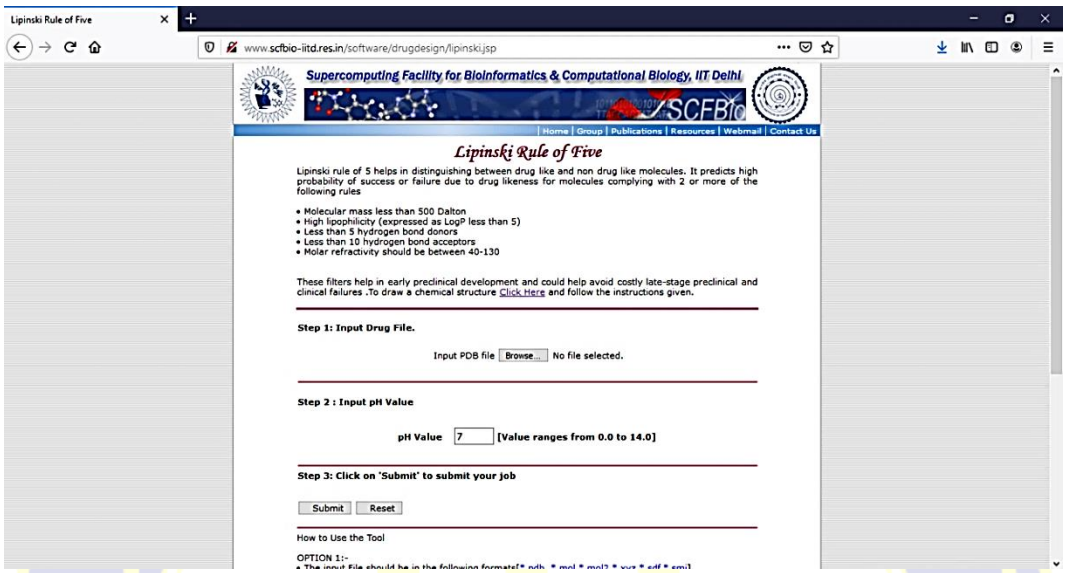
SITUS PUBCHEM



Gambar IV.6 Tampilan utama situs PubChem sebagai tempat pengunduhan beberapa
senyawa dalam fromat .pdb

LAMPIRAN 9

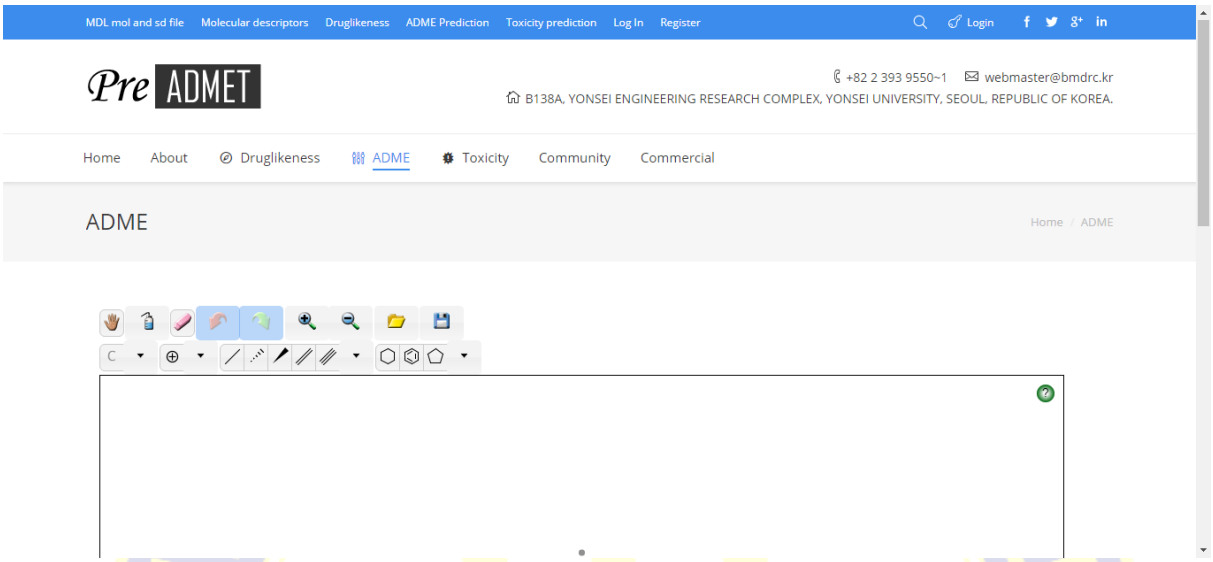
SITUS LIPINSKI RULE OF FIVE



Gambar IV.7 Tampilan situs Lipinski rule of five untuk pengujian sifat fisikokimia

LAMPIRAN 10

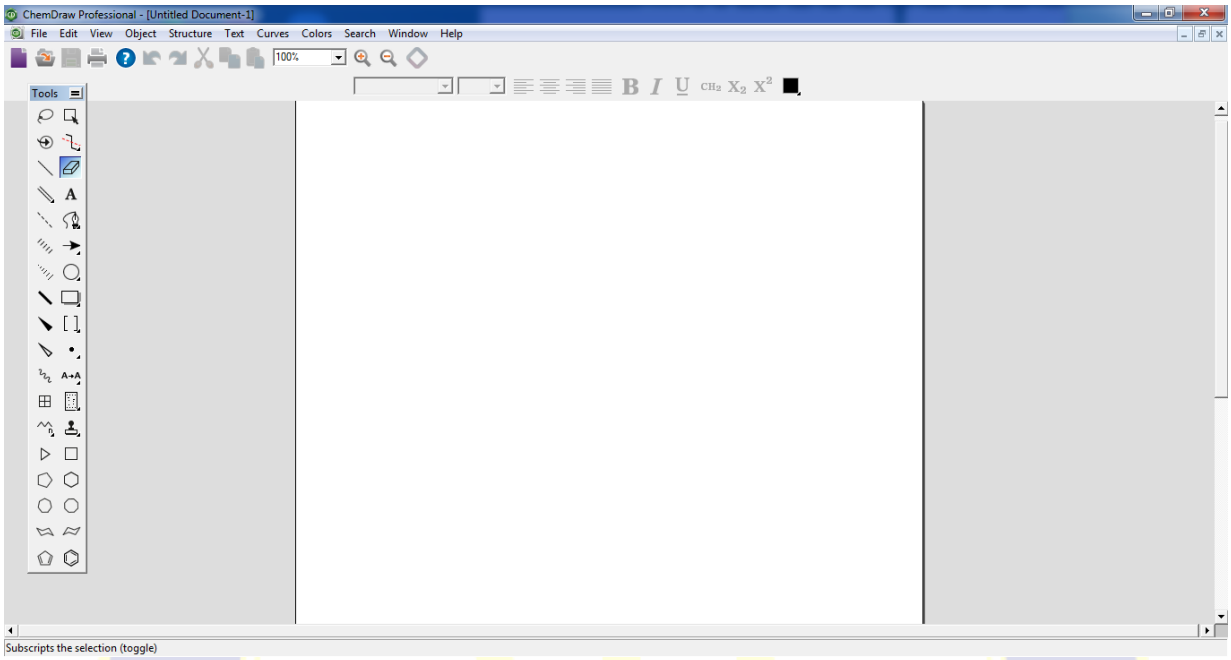
SITUS PREADMET



Gambar IV.8 Tampilan situs PreADMET

LAMPIRAN 11

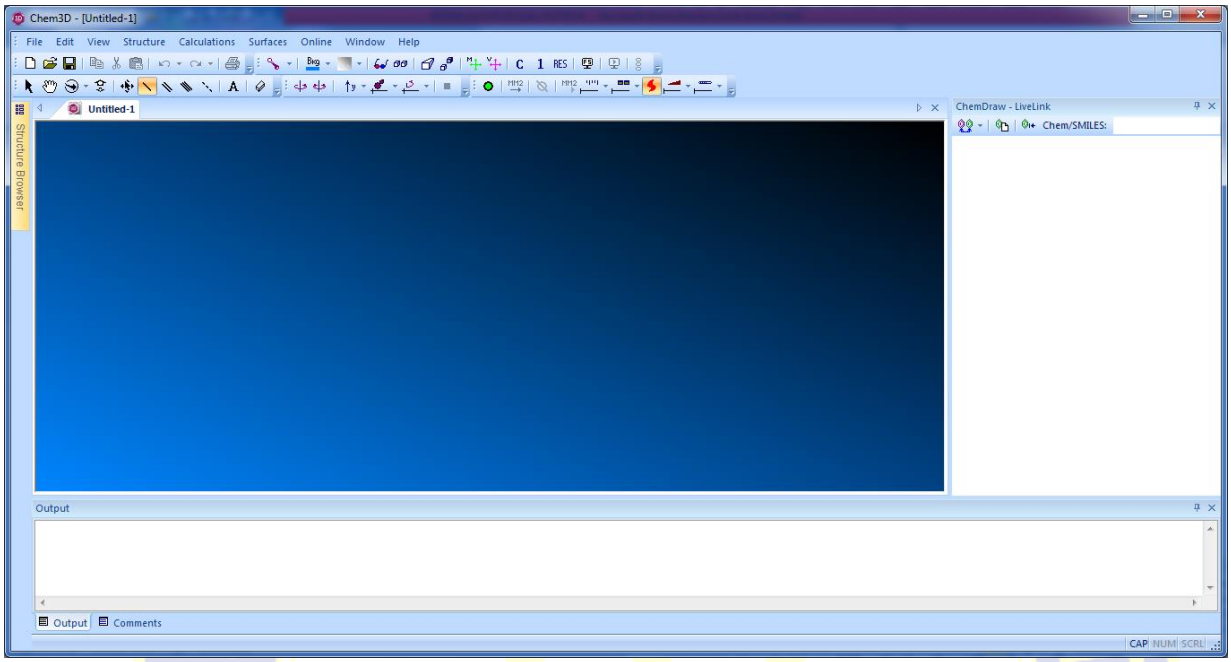
PERANGKAT LUNAK CHEMDRAW ULTRA 15.0



Gambar IV.9 Tampilan utama perangkat lunak ChemDraw Ultra 15.0

LAMPIRAN 12

PERANGKAT LUNAK CHEM3D PRO 12.0

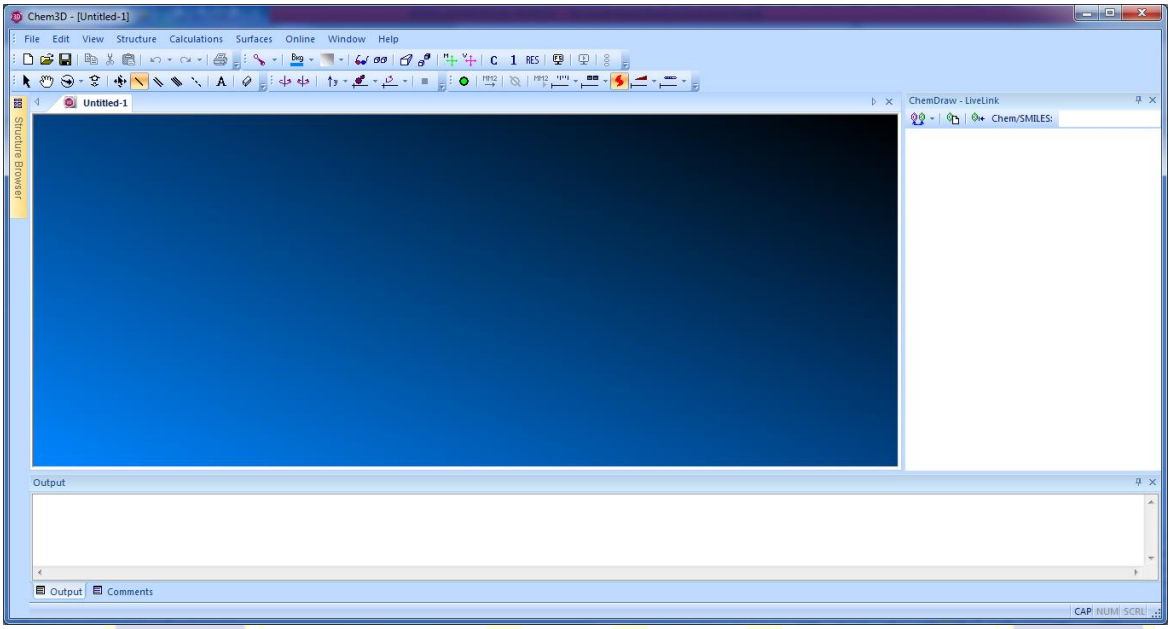


Gambar IV.10 Tampilan utama perangkat lunak Chem3D Pro 12.0

LAMPIRAN 13

PERANGKAT LUNAK DISCOVERY STUDIO VISUALIZER 2016

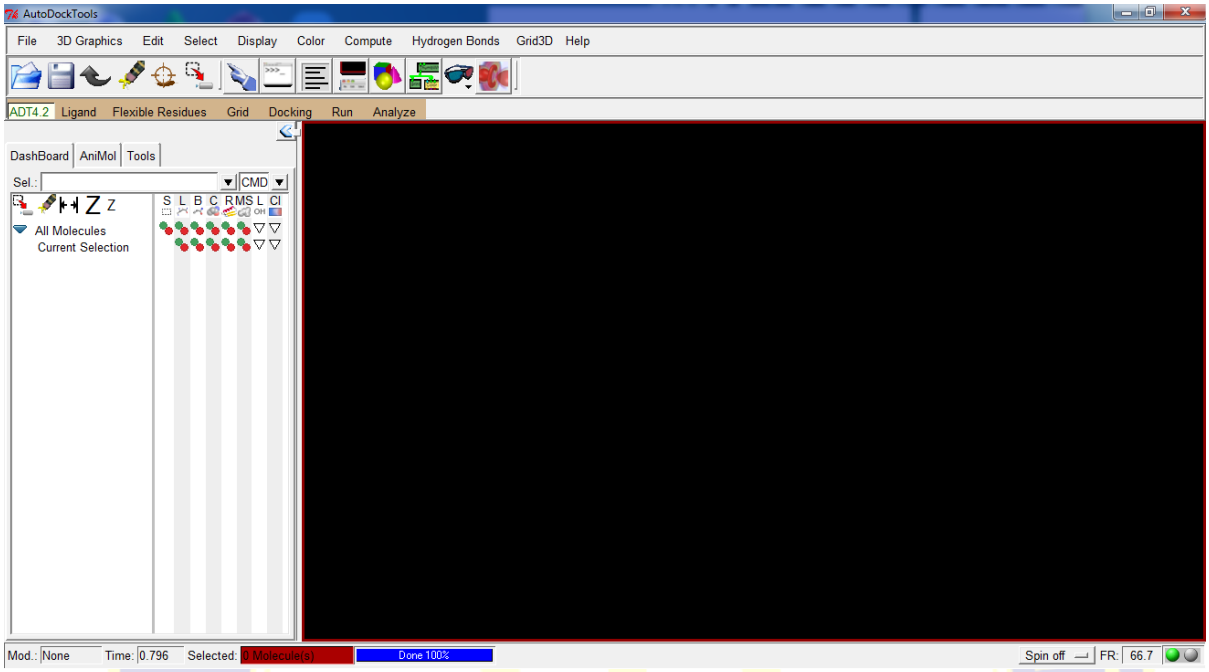
CLIENT



Gambar IV.11 Tampilan utama perangkat lunak *Discovery studio visalizer*

LAMPIRAN 14

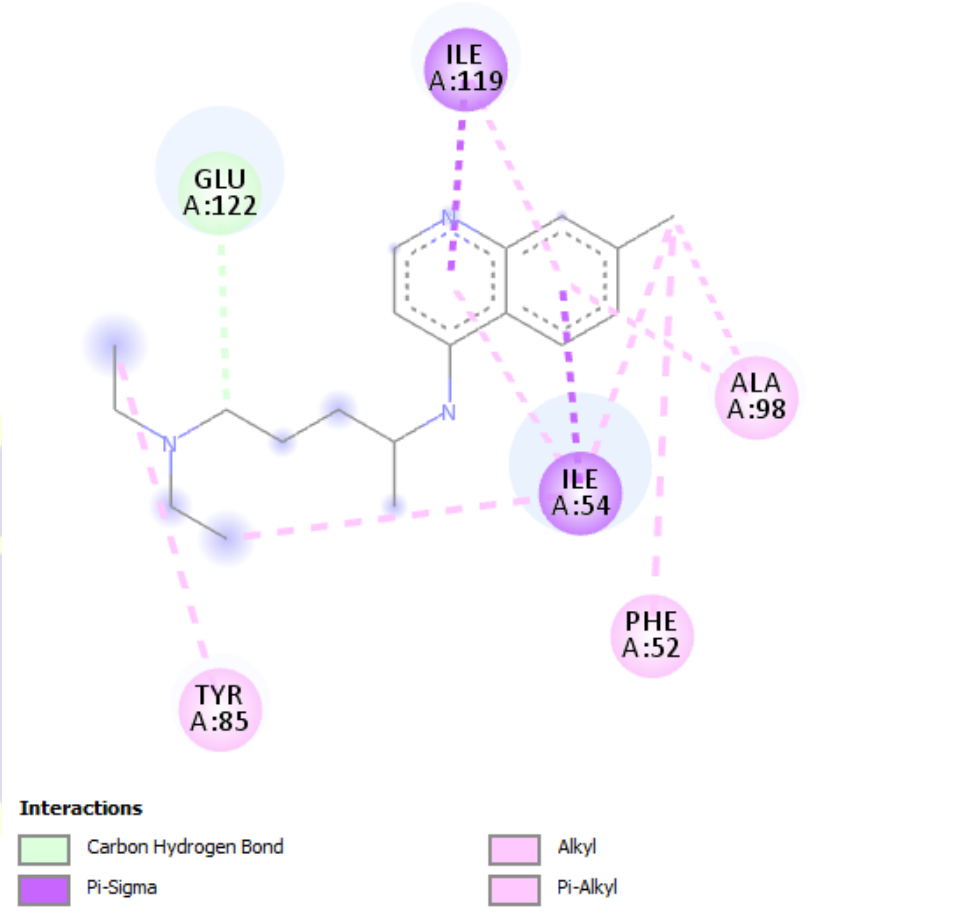
PERANGKAT LUNAK AUTODOCK TOOLS



Gambar IV. 12 Tampilan perangkat lunak AutoDock Tools sebagai tempat penambatan molekul antara ligan dengan reseptor

LAMPIRAN 15

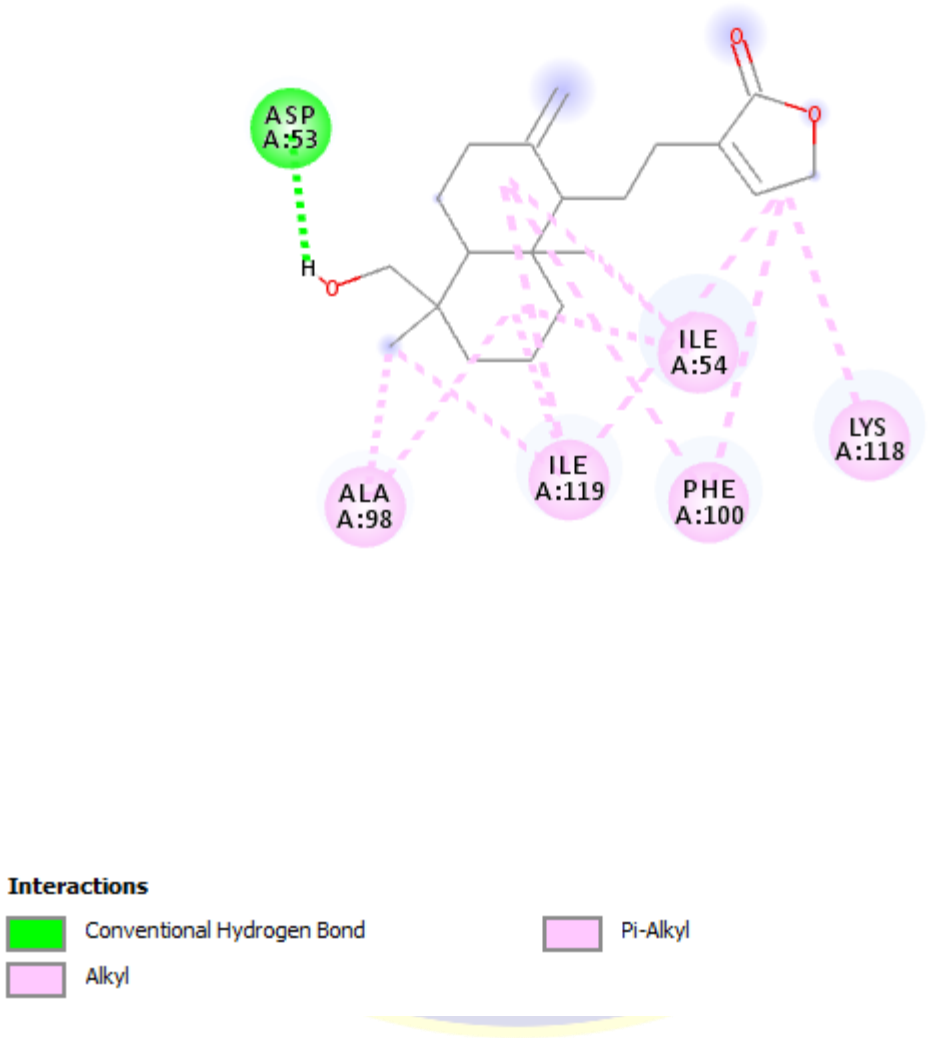
VISUALISASI PENAMBATAN MOLEKUL LIGAN ALAMI DENGAN RESEPTOR



Gambar V.2 Visualisasi residu asam amino dengan ikatan hidrogen pada ligan alami

LAMPIRAN 16

VISUALISASI PENAMBATAN ANDROGRAPANIN DENGAN RESEPTOR LACTASE DEHYDROGENASE



Gambar V.3 Tampilan visualisasi ikatan dan residu asam amino hasil penambatan molekul *Andrograpanin* dengan Reseptor

LAMPIRAN 17

HASIL PENAMBATAN MOLEKUL

Tabel V.3 Nilai Ikatan Energi dari Ligan Alami dan Senyawa Uji Pada Enzim Lactate Dehydrogenase

No	Senyawa /Ligan Uji	ΔG (kkal/ mol)	Jumlah Ikatan Hidrogen	Residu Asam Amino	KI
Ligan Alami					
Ligan Alami		-4.81	1	GLU122	297.06 µM
Senyawa Aktif Sambiloto (*Andrographis paniculata Ness.*)					
1	Andrographolide	-5.32	1	GLU122	245.47 µM
2	Neoandrographolide	-4.93	2	GLU122, ASP53	245.41 µM
3	14-Deoxyandrographolide	-3.85	1	GLU122	1.51 mM
4	Andrograpanin	-6.78	1	ASP53	10.66 µM
5	Isoandrographolide	-2.07	1	GLY99	30.44 mM
6	5-Hydroxy-7,8,2’5’-Tetramethoxyflavone	-5.52	2	GLU122	90.41 µM
7	5-Hydroxy-7,8-Dimethoxyflavone	-5.74	1	TYR85, LYS118	62.52 µM
8	5-Hydroxy-7,8-Dimethoxyflavanone	-5.77	1	LYS118	59.46 µM
9	14-Deoxy-11,12-Didehydro-Andrographolide	-5.25	1	LYS118	142.03 µM

LAMPIRAN 17
(Lanjutan)

No	Senyawa /Ligan Uji	ΔG (kkal/ mol)	Jumlah Ikatan Hidrogen	Residu Asam Amino	KI
10	19-O-Acetyl-14-Deoxy-11,12-Didehydro-Andrographolide	-4.53	1	ASP53	476.84 µM
11	14-Acetylandrographolide	-4.46	-	-	400.07 µM

LAMPIRAN 18

SIFAT FISIKOKIMIA SENYAWA SAMBILOTO BERDASARKAN LIPINSKI *RULE OF FIVE*

Tabel V.4 Sifat Fisikokimia Senyawa yang Terkandung Didalam Daun Sirsak Berdasarkan Aturan 5 Lipinski

No	Senyawa/Ligan uji	Bobot molekul (<500 Da)	Akseptor Hidrogen (<10)	Donor Hidrogen (<5)	Log P (<5)	Memenuhi/Tidak Memenuhi Syarat
1	Andrographolide	350.4 g/mol	5	3	2.2	Memenuhi Syarat
2	Neoandrographolide	480.6 g/mol	8	4	2.6	Memenuhi Syarat
3	14-Deoxyandrographolide	334.4 g/mol	4	2	3.4	Memenuhi Syarat
4	Andrograpanin	318.4 g/mol	3	1	4.2	Memenuhi Syarat
5	Isoandrographolide	350.4 g/mol	5	3	2.2	Memenuhi Syarat
6	5-Hydroxy-7,8,2’5’-Tetramethoxyflavone	358.3 g/mol	7	1	3.3	Memenuhi Syarat
7	5-Hydroxy-7,8-Dimethoxyflavone	298.29 g/mol	5	1	3.3	Memenuhi Syarat
8	5-Hydroxy-7,8-Dimethoxyflavanone	300.3 g/mol	5	1	3	Memenuhi Syarat
9	14-Deoxy-11,12-Didehydro-Andrographolide	332.4 g/mol	4	2	3.2	Memenuhi Syarat
10	19-O-Acetyl-14-Deoxy-11,12-Didehydroandrographolide	374.5 g/mol	5	1	3.3	Memenuhi Syarat
11	14-Acetylandrographolide	392.5 g/mo	6	2	2.7	Memenuhi Syarat

LAMPIRAN 19

HASIL UJI PREADMET (ABSORPSI DAN DISTRIBUSI)

Tabel V.5 Uji PreADME (Absorpsi dan Distribusi)

No	Nama Senyawa	Caco-2 cell (nm^{sec-1})	HIA (%)	Protein Plasma Binding
1	Andrographolide	19.0405	88.332869	94.701705
2	Neoandrographolide	22.4103	95.366863	100.000000
3	14-Deoxyandrographolide	20.6118	92.673309	100.000000
4	Andrograpanin	22.4103	95.366863	100.000000
5	Isoandrographolide	19.488	91.737239	79.948049
6	5-Hydroxy-7,8,2'5'-Tetramethoxyflavone	41.0893	95.702075	96.792730
7	5-Hydroxy-7,8-Dimethoxyflavone	32.4067	95.507984	95.659075
8	5-Hydroxy-7,8-Dimethoxyflavanone	32.863	95.394426	98.757010
9	14-Deoxy-11,12-Didehydro-Andrographolide	20.6014	92.957025	98.430214
10	19-O-Acetyl-14-Deoxy-11,12-Didehydro-Andrographolide	20.6014	93.009504	100.000000
11	14-Acetylandrographolide	21.0616	92.894783	99.743427

Keterangan :

% human intestinal absorption (% HIA) : 70-100% well absorbed (a),
20-70% moderately absorbed (b),
0-20% poorly absorbed (c);

In Vitro Caco-2 cell permeability (nm sec-1) : > 70 higher permeability (a),
4-70 medium permeability (b),
<4 low permeability (c)

% plasma protein binding : > 90% strongly bound (a),
<90% weakly bound (b).

LAMPIRAN 20

HASIL PENGUJIAN PREDIKSI TOKSISITAS

Tabel V.6 Uji Toksisitas

No	Nama Senyawa	Karsinogenik	Mutagenik
1	Andrographolide	Negative	Mutagenik
2	Neoandrographolide	Positive	Mutagenik
3	14-Deoxyandrographolide	Positive	Mutagenik
4	Andrograpanin	Negative	Non-Mutagenik
5	Isoandrographolide	Negative	Non-mutagen
6	5-Hydroxy-7,8,2’5’-Tetramethoxyflavone	Negative	Mutagenik
7	5-Hydroxy-7,8-Dimethoxyflavone	Positive	Mutagenik
8	5-Hydroxy-7,8-Dimethoxyflavanone	Positive	Mutagenik
9	14-Deoxy-11,12-Didehydro-Andrographolide	Positive	Mutagenik
10	19-O-Acetyl-14-Deoxy-11,12-Didehydro-Andrographolide	Positive	Mutagenik
11	14-Acetylandrographolide	Positive	Mutagenik