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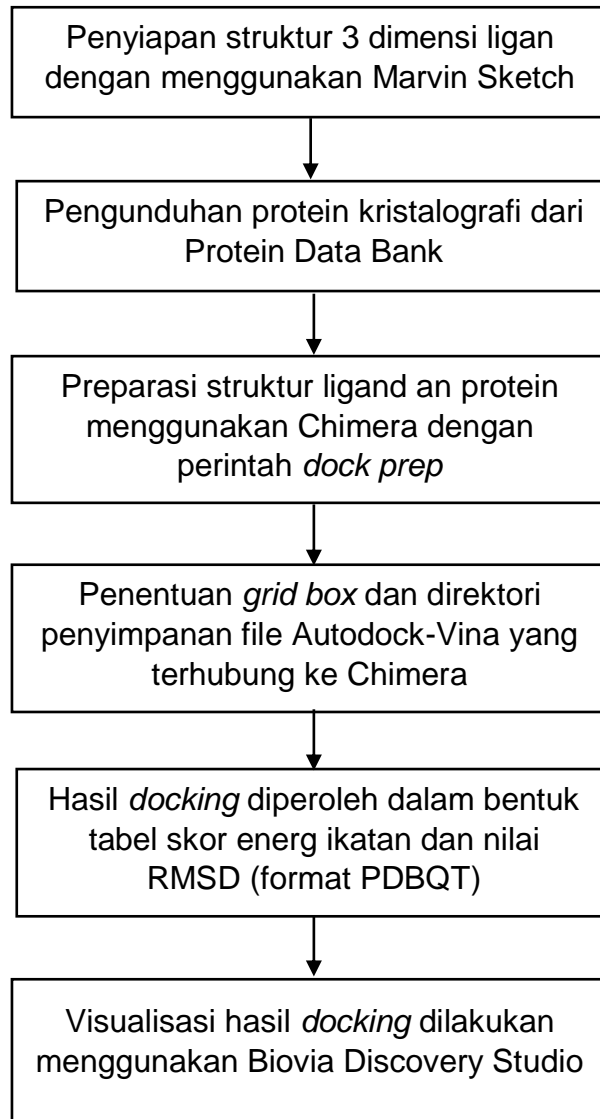
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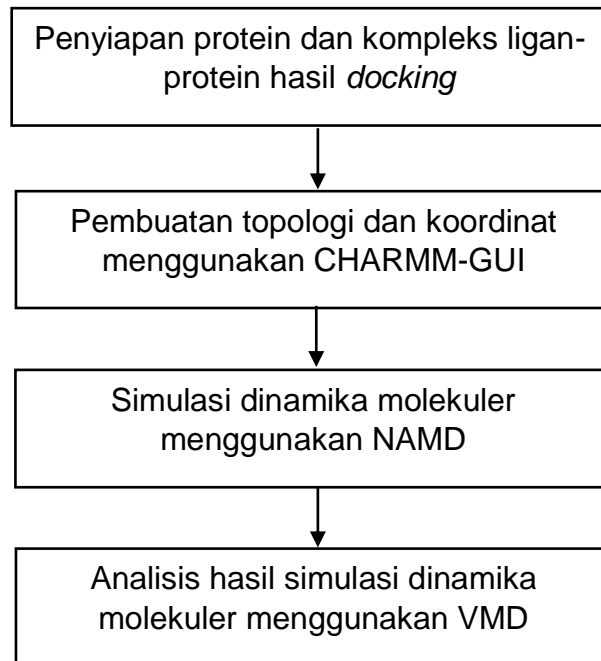
LAMPIRAN

Lampiran 1. Skema kerja

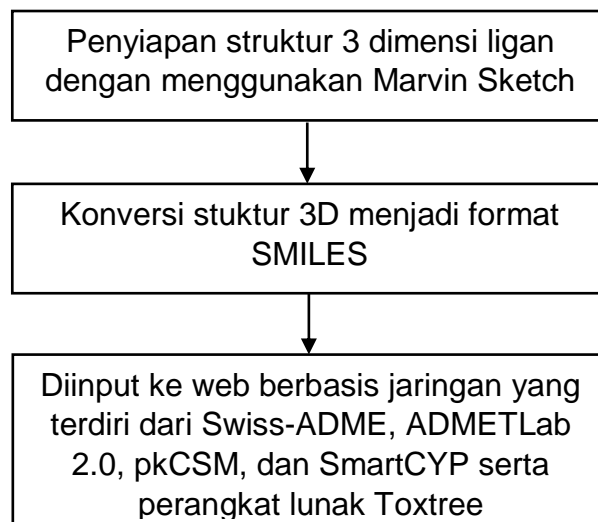
a. *Molecular docking*



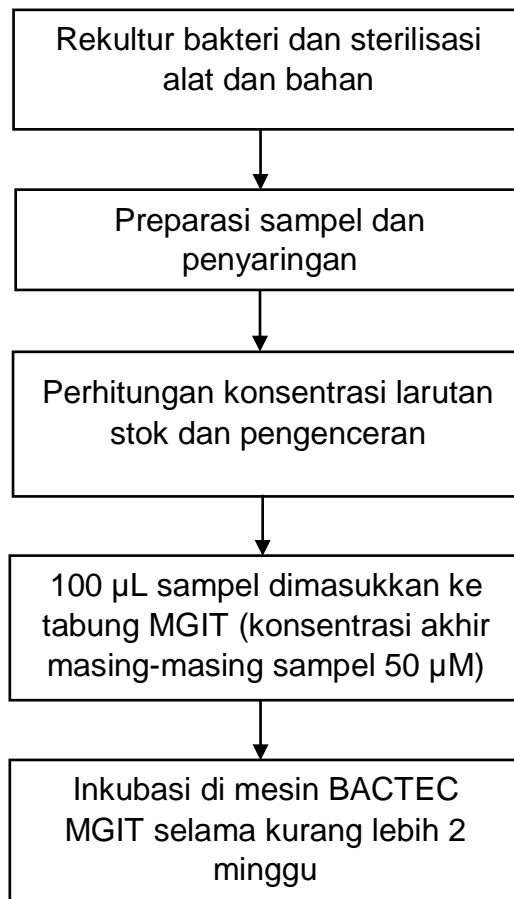
b. *Molecular dynamic*



c. Prediksi profil farmakokinetik dan toksisitas

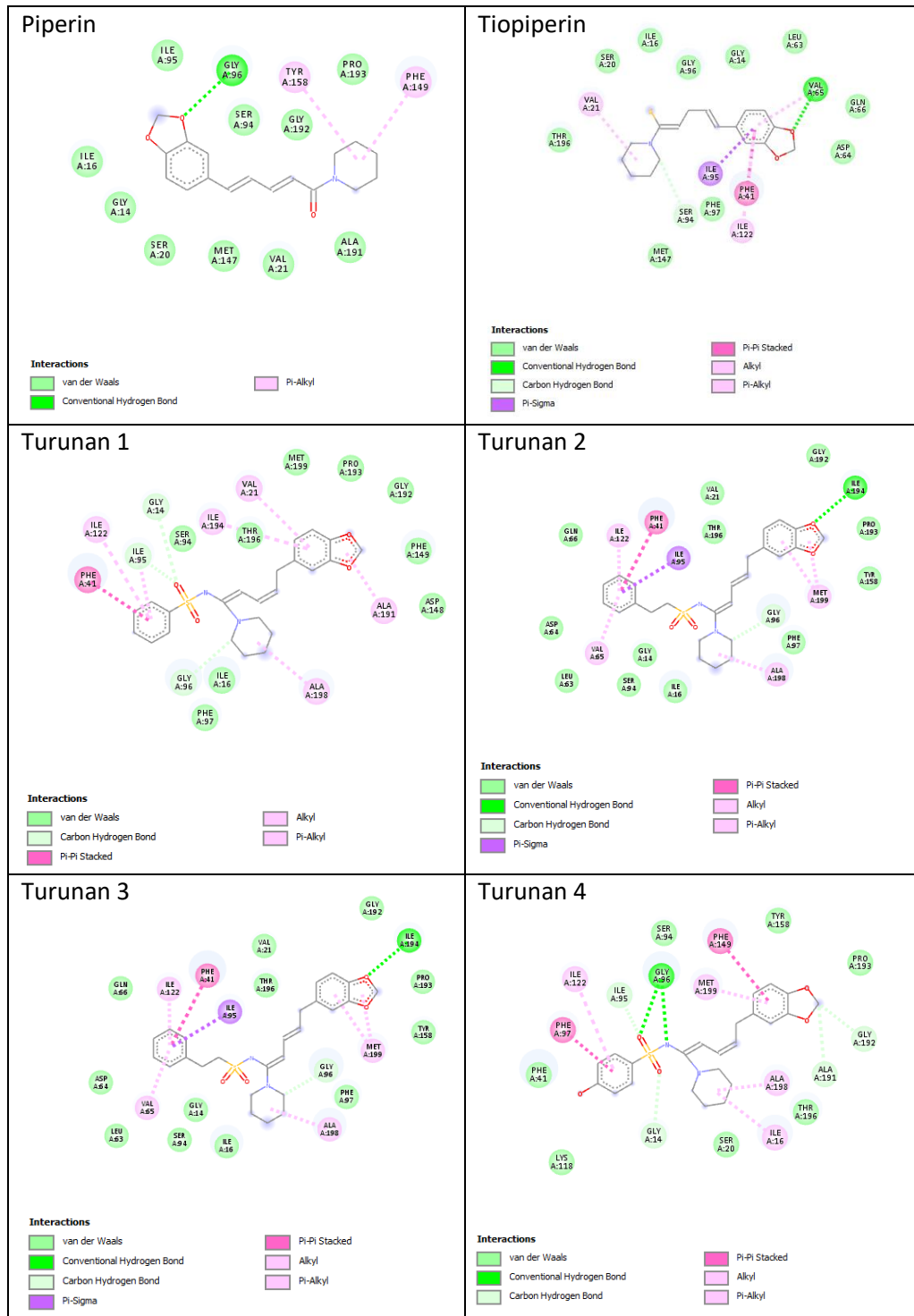


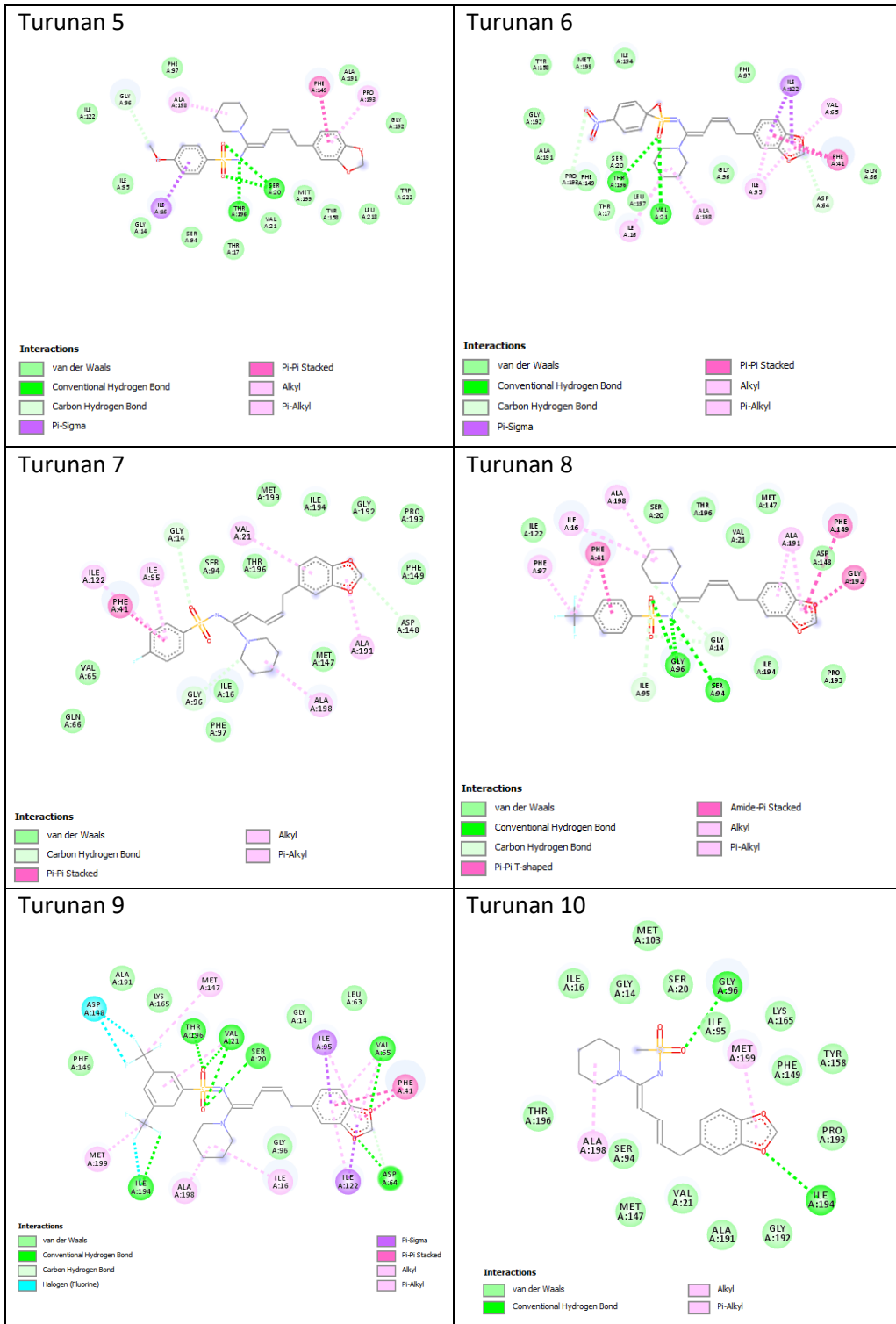
d. Uji aktivitas antibakteri terhadap *M.tuberculosis*



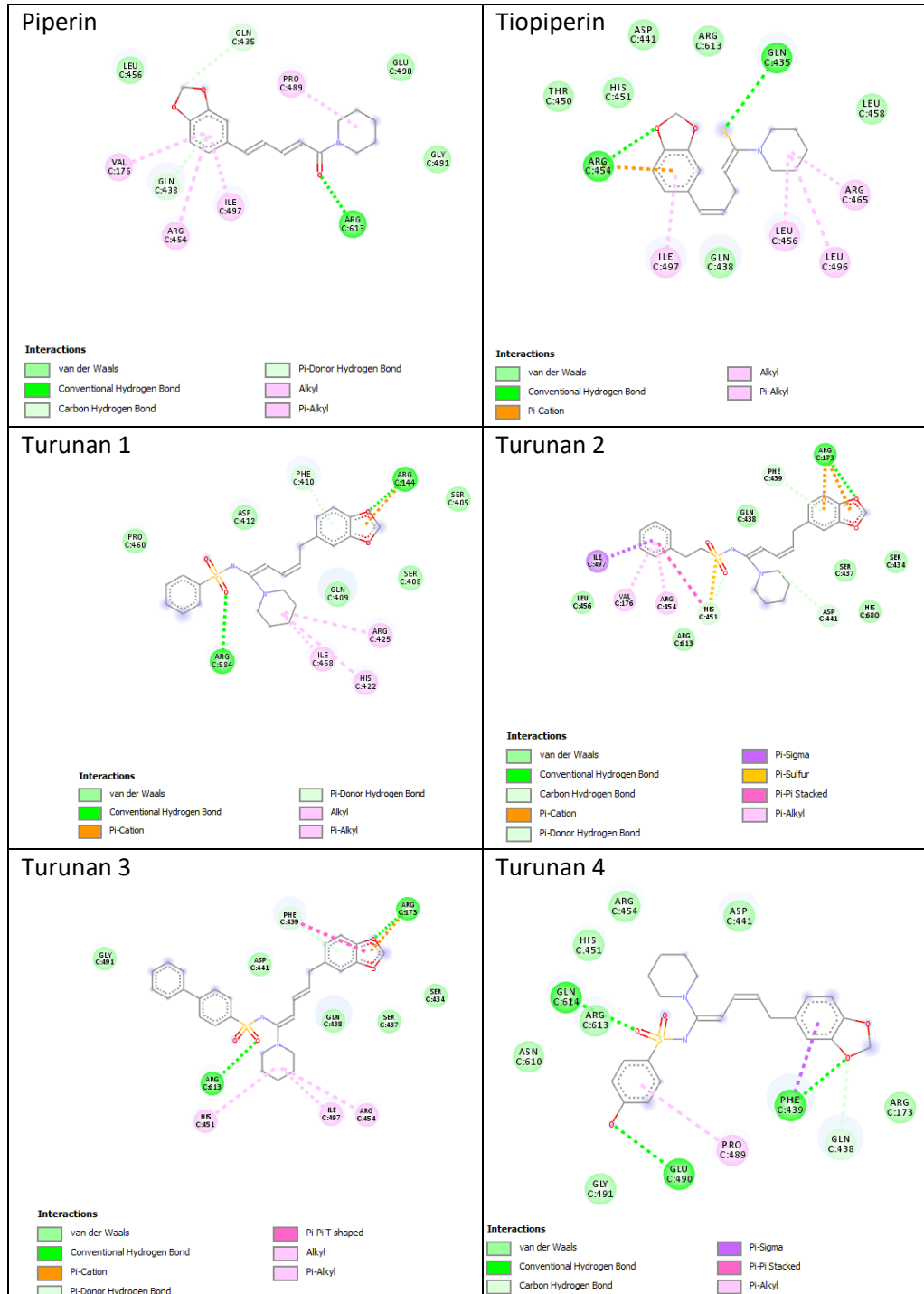
Lampiran 2 : Visualisasi interaksi ligan dan asam amino

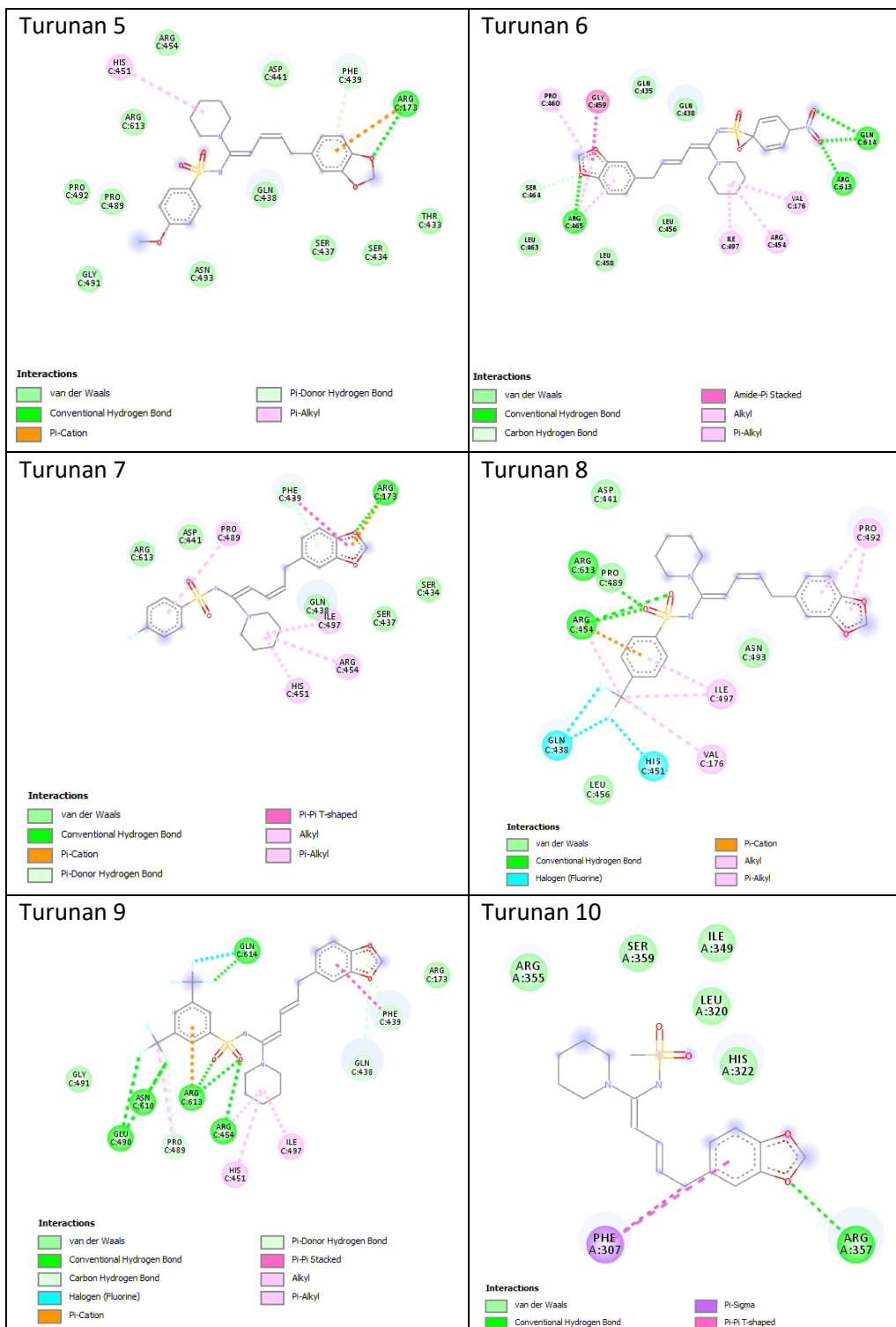
1. Interaksi antara senyawa *sulfonyl-amidine* turunan piperin dengan residu asam amino protein 2ie0



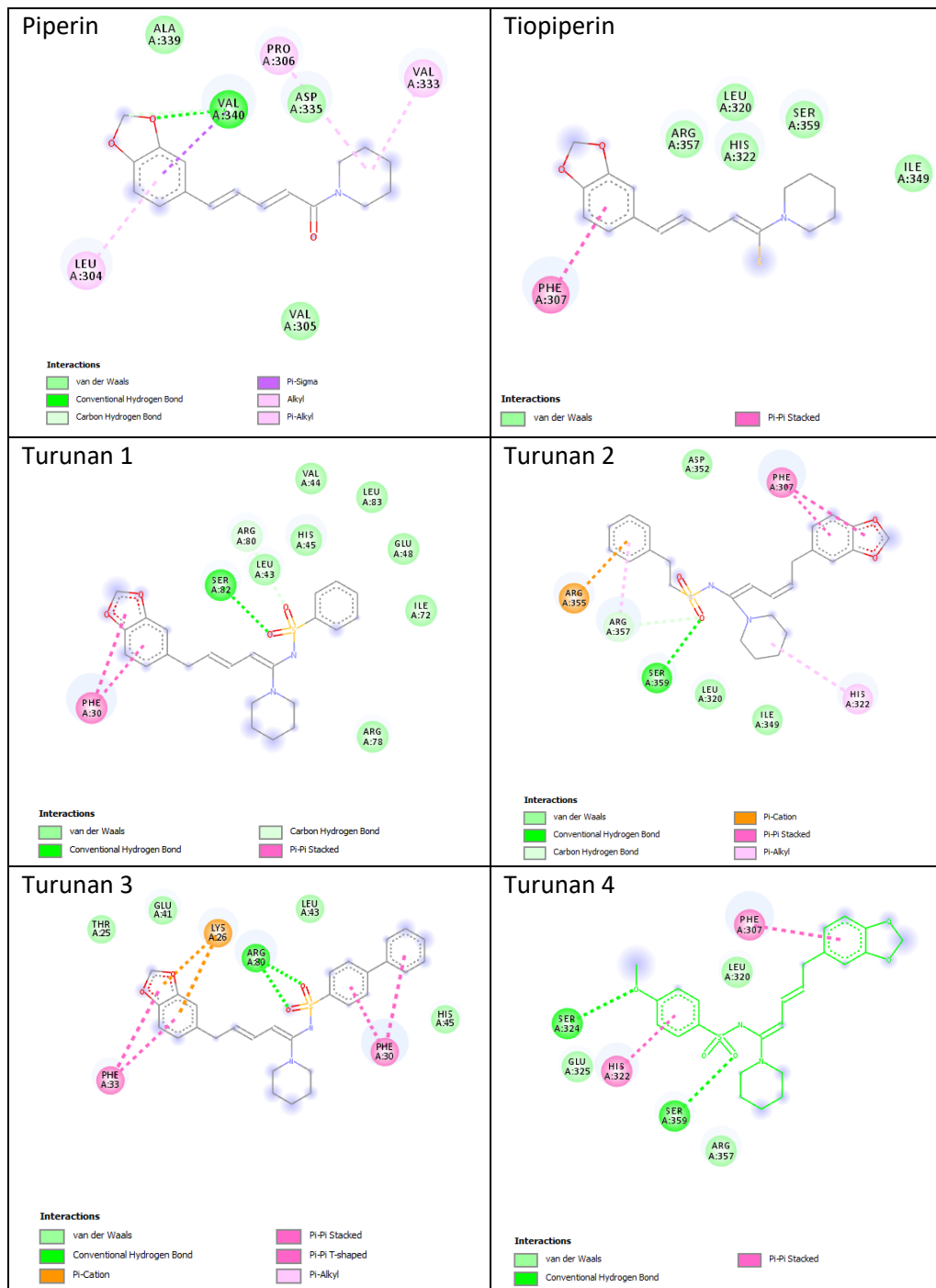


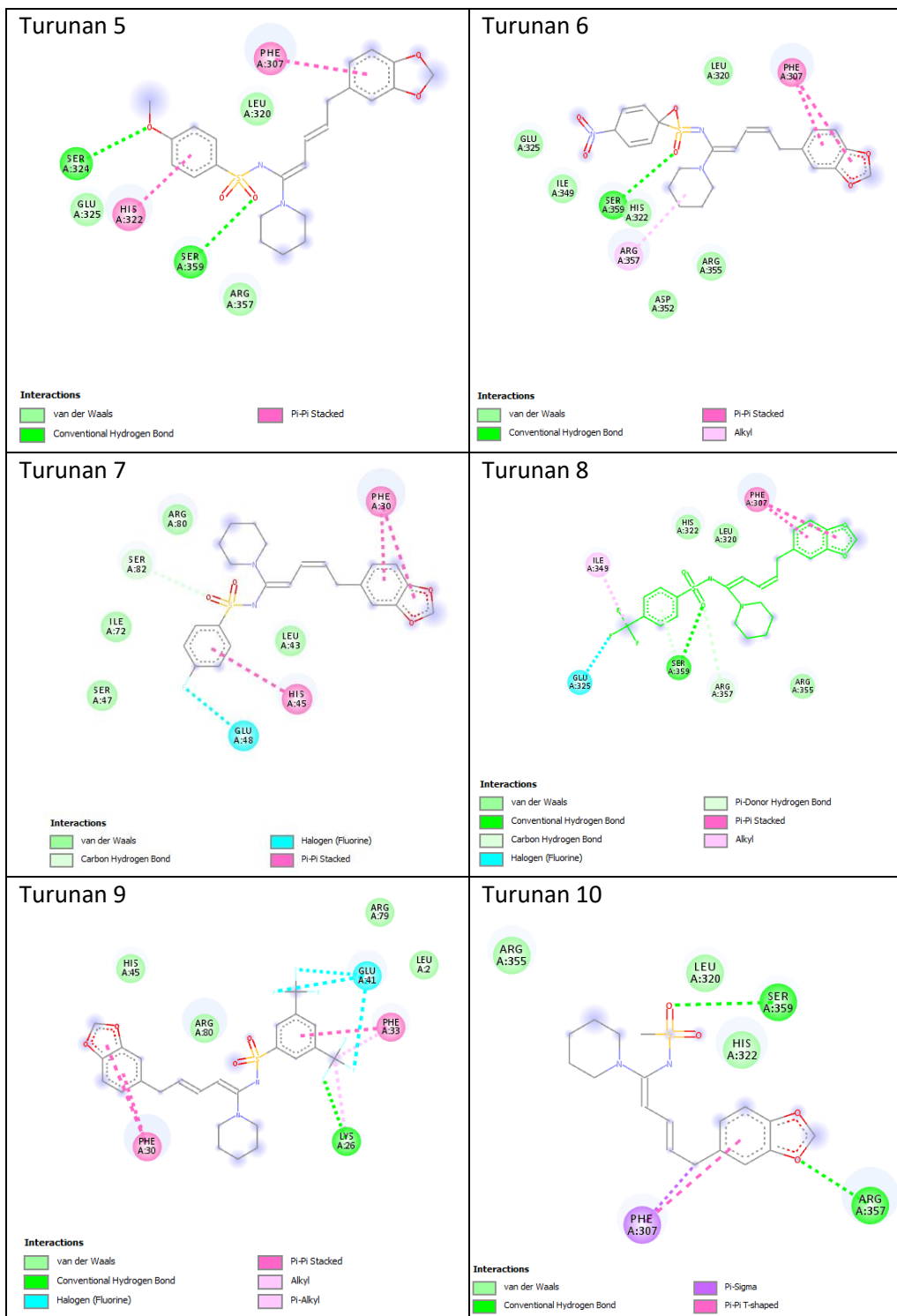
2. Interaksi antara senyawa *sulfonyl-amidine* turunan piperin dengan residu asam amino protein 6vzv



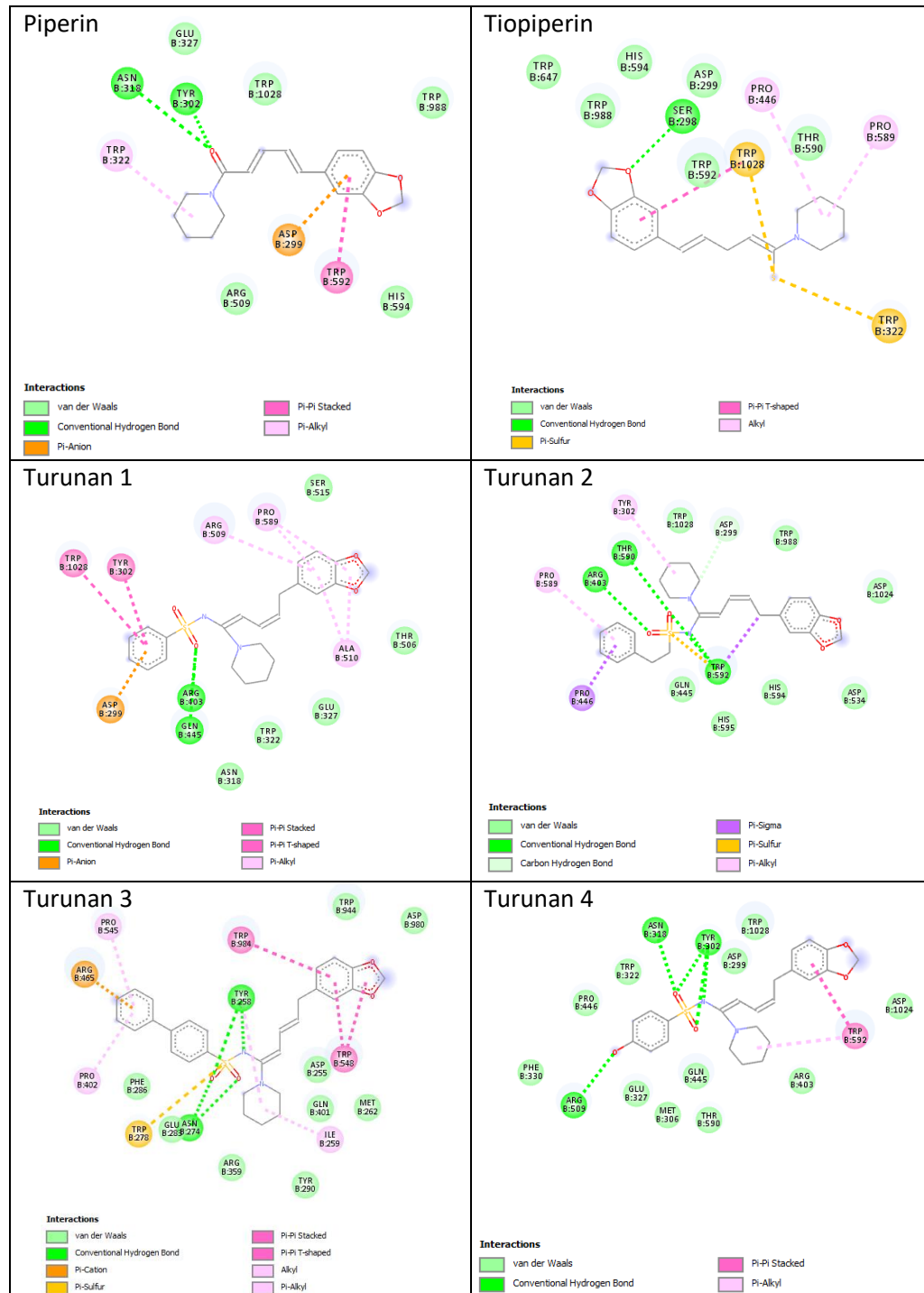


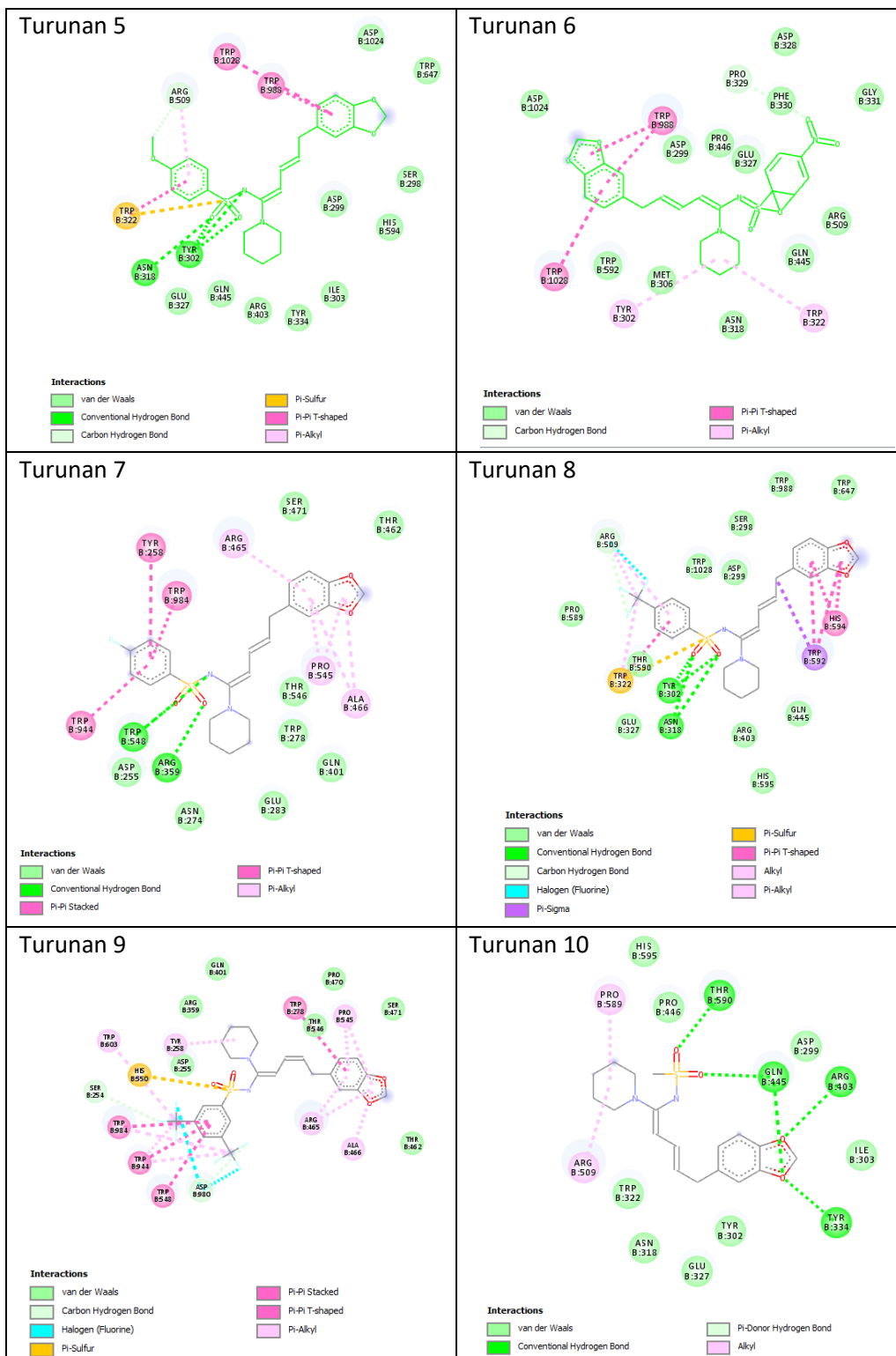
3. Interaksi antara senyawa *sulfonyl-amidine* turunan piperin dengan residu asam amino protein 4nng



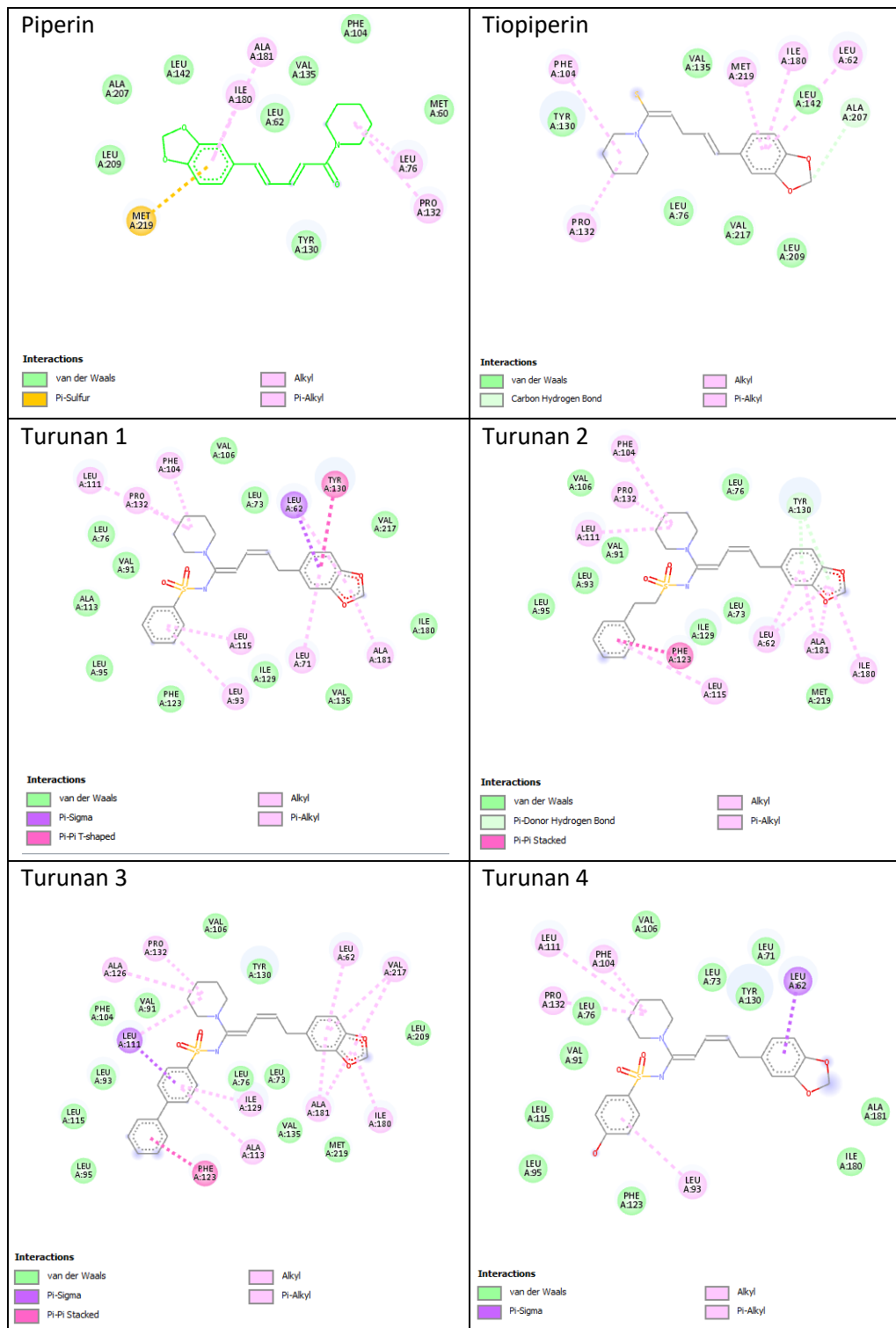


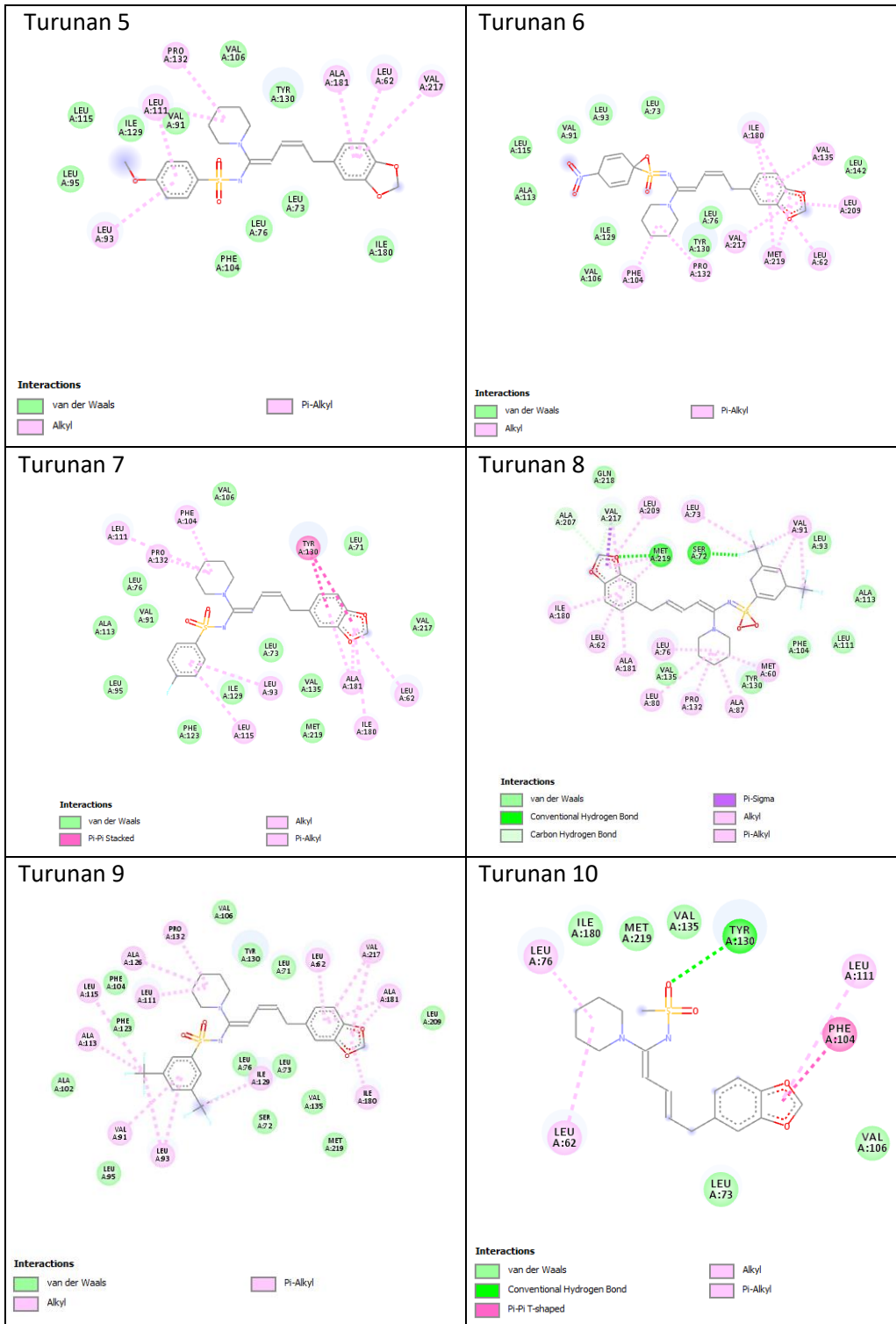
4. Interaksi antara senyawa *sulfonyl-amidine* turunan piperin dengan residu asam amino protein 7bv





5. Interaksi antara senyawa *sulfonyl-amidine* turunan piperin dengan residu asam amino protein 4zra





Lampiran 3 : Uji Aktivitas antibakteri terhadap bakteri *M.tuberculosis*

C/R12 80 S 100.0 ug/mL Growth Control Pyrazinamide ✓

H37RV

Sequence No: 439550125247 TIP: 8;20 SOP: 10/25/22 09:08 Removed Date: 11/04/22

Access No: 001.PM.2022 Isolate No: 1

Tube Position	Growth Unit	Status	Concentration	Drug Name
C/S06	400	C		Growth Control
C/S07	400	C	ug/mL	Undefined Drug #1
C/S08	400	R	ug/mL	Undefined Drug #2
C/S09	400	R	ug/mL	Undefined Drug #3
C/S10	400	R	ug/mL	Undefined Drug #4

Obat 1
2
3
DMSO

Sequence No: 439550125108 TIP: 6;9 SOP: 10/25/22 09:08 Removed Date: 11/01/22

Access No: 001.PM.2022 ISOLAT MOR Isolate No: 2

Tube Position	Growth Unit	Status	Concentration	Drug Name
C/N01	400	C		Growth Control
C/N02	400	C	ug/mL	Undefined Drug #1
C/N03	400	R	ug/mL	Undefined Drug #2
C/N04	400	R	ug/mL	Undefined Drug #3
C/N05	400	R	ug/mL	Undefined Drug #4

DMSO

Sequence No: 439220127399 TIP: 7;13 SOP: 10/24/22 10:29 Removed Date: 11/01/22

Access No: 2070.M.22 Isolate No: 3

20 to 35g

Tube Position	Growth Unit	Status	Concentration	Drug Name
C/E06	400	C		Growth Control

Lampiran 4 : Perhitungan konsentrasi senyawa uji

1. Piperin

a. Larutan stok

6 mg piperin dilarutkan dalam 1 mL DMSO.

- Konsentrasi dalam PPM

$$\text{PPM} = \frac{\text{mg}}{\text{L}} = \frac{\mu\text{g}}{\text{mL}} = \frac{6000}{1} = 6000 \text{ ppm}$$

- Konsentrasi dalam μM

$$\text{BM} = 285,34 \text{ g/mol}$$

$$V = 1 \text{ mL}$$

$$n = \frac{m}{\text{mr}} = \frac{6 \text{ mg}}{285,34 \text{ g/mol}} = \frac{0,006 \text{ g}}{285,34 \text{ g/mol}} = 0,000021 \text{ mol} = 21 \mu\text{mol}$$

$$M = \frac{\text{mol}}{\text{L}} = \frac{\text{mmol}}{\text{mL}} = \frac{\mu\text{mol}}{\mu\text{L}} = \frac{21}{1000} = 0,021 \text{ M} = 21 \text{ mM} = 21000 \mu\text{M}$$

b. Pengenceran 4150 μM dalam 2,5 mL DMSO

- Perhitungan pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$V_1 \times 21.000 = 2,5 \times 4150$$

$$V_1 \times 21.000 = 10.375$$

$$V_1 = 0,494 \text{ mL} = 494 \mu\text{L}$$

- Konsentrasi sampel dalam PPM setelah pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,494 \times 6000 = 2,5 \times M_2$$

$$2964 = 2,5 \times M_2$$

$$M_2 = 1185 \text{ ppm}$$

c. Konsentrasi akhir dalam tabung MGIT (100 μL \rightarrow 8,3 mL)

- Konsentrasi dalam μM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 4150 = 8,3 \times M_2$$

$$415 = 8,3 \times M_2$$

$$M_2 = \frac{41,5}{8,3} = 50 \mu\text{M}$$

- Konsentrasi dalam PPM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 1158 = 8,3 \times M_2$$

$$115,8 = 8,3 \times M_2$$

$$M_2 = \frac{115,8}{8,3} = 13,9 \text{ ppm}$$

2. Tiopiperin

a. Larutan stok

4 mg piperin dilarutkan dalam 1 mL DMSO.

- Konsentrasi dalam PPM

$$\text{PPM} = \frac{\text{mg}}{\text{L}} = \frac{\mu\text{g}}{\text{mL}} = \frac{4000}{1} = 4000 \text{ ppm}$$

- Konsentrasi dalam μM

$$\text{BM} = 301,4 \text{ g/mol}$$

$$V = 1 \text{ mL}$$

$$n = \frac{m}{\text{mr}} = \frac{4 \text{ mg}}{301,4 \text{ g/mol}} = \frac{0,004 \text{ g}}{301,4 \text{ g/mol}} = 0,0000133 \text{ mol} = 13,3 \mu\text{mol}$$

$$M = \frac{\text{mol}}{\text{L}} = \frac{\text{mmol}}{\text{mL}} = \frac{\mu\text{mol}}{\mu\text{L}} = \frac{13,3}{1000} = 0,0133 \text{ M} = 13,3 \text{ mM} = 13.300 \mu\text{M}$$

b. Pengenceran 4150 μM dalam 2,5 mL DMSO

- Perhitungan pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$V_1 \times 13.300 = 2,5 \times 4150$$

$$V_1 \times 13.300 = 10.375$$

$$V_1 = 0,780 \text{ mL} = 780 \mu\text{L}$$

- Konsentrasi sampel dalam PPM setelah pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,780 \times 4000 = 2,5 \times M_2$$

$$3120 = 2,5 \times M_2$$

$$M_2 = 1248 \text{ ppm}$$

c. Konsentrasi akhir dalam tabung MGIT (100 μL \rightarrow 8,3 mL)

- Konsentrasi dalam μM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 4150 = 8,3 \times M_2$$

$$415 = 8,3 \times M_2$$

$$M_2 = \frac{41,5}{8,3} = 50 \mu\text{M}$$

- Konsentrasi dalam PPM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 1248 = 8,3 \times M_2$$

$$124,8 = 8,3 \times M_2$$

$$M_2 = \frac{124,8}{8,3} = 15 \text{ ppm}$$

3. Turunan 10

a. Larutan stok

10,1 mg piperin dilarutkan dalam 1 mL DMSO.

- Konsentrasi dalam PPM

$$\text{PPM} = \frac{\text{mg}}{\text{L}} = \frac{\mu\text{g}}{\text{mL}} = \frac{10000}{1} = 10000 \text{ ppm}$$

- Konsentrasi dalam μM

$$\text{BM} = 362,44 \text{ g/mol}$$

$$V = 1 \text{ mL}$$

$$n = \frac{m}{\text{mr}} = \frac{10,1 \text{ mg}}{362,44 \text{ g/mol}} = \frac{0,0101 \text{ g}}{362,44 \text{ g/mol}} = 0,000028 \text{ mol} = 28 \mu\text{mol}$$

$$M = \frac{\text{mol}}{\text{L}} = \frac{\text{mmol}}{\text{mL}} = \frac{\mu\text{mol}}{\mu\text{L}} = \frac{28}{1000} = 0,028 \text{ M} = 28 \text{ mM} = 28.000 \mu\text{M}$$

b. Pengenceran 4150 μM dalam 2,5 mL DMSO

- Perhitungan pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$V_1 \times 28.000 = 2,5 \times 4150$$

$$V_1 \times 28.000 = 10.375$$

$$V_1 = 0,370 \text{ mL} = 370 \mu\text{L}$$

- Konsentrasi sampel dalam PPM setelah pengenceran

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,370 \times 10.000 = 2,5 \times M_2$$

$$3700 = 2,5 \times M_2$$

$$M_2 = 1480 \text{ ppm}$$

c. Konsentrasi akhir dalam tabung MGIT (100 μL \rightarrow 8,3 mL)

- Konsentrasi dalam μM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 4150 = 8,3 \times M_2$$

$$415 = 8,3 \times M_2$$

$$M_2 = \frac{41,5}{8,3} = 50 \mu\text{M}$$

- Konsentrasi dalam PPM

$$V_1 \times M_1 = V_2 \times M_2$$

$$0,1 \times 1480 = 8,3 \times M_2$$

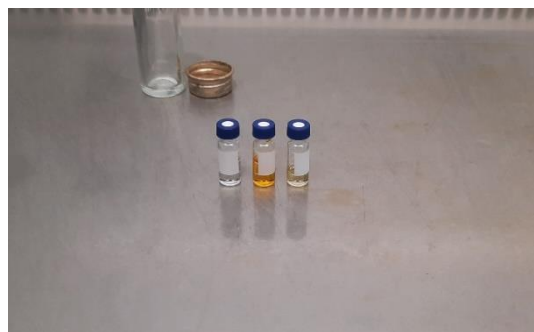
$$148 = 8,3 \times M_2$$

$$M_2 = \frac{148}{8,3} = 17,8 \text{ ppm}$$

Lampiran 5 : Hasil uji aktivitas piperin, tiopiperin, dan senyawa turunan 10 terhadap *M.tuberculosis* strain H37Rv dan MDR



Proses penimbangan sampel



Sampel dilarutkan dalam DMSO



Larutan stok



Proses filtrasi menggunakan filter syringe 0,45 mikron



Penyiapan bakteri dan OAT lini 1



Inokulasi sampel, kontrol positif, dan kontrol negatif ke dalam tabung MGIT



Inokulasi bakteri ke dalam tabung MGIT



Tabung MGIT diinkubasi di mesin BACTEC MGIT