



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 16, 2021 – 02:15 pm BST

PDB ID : 7OPN
Title : Human Aldehyde Oxidase SNP R1231H in complex with Raloxifene
Authors : Mota, C.; Coelho, C.; Santos Silva, T.; Romao, M.J.
Deposited on : 2021-06-01
Resolution : 2.60 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

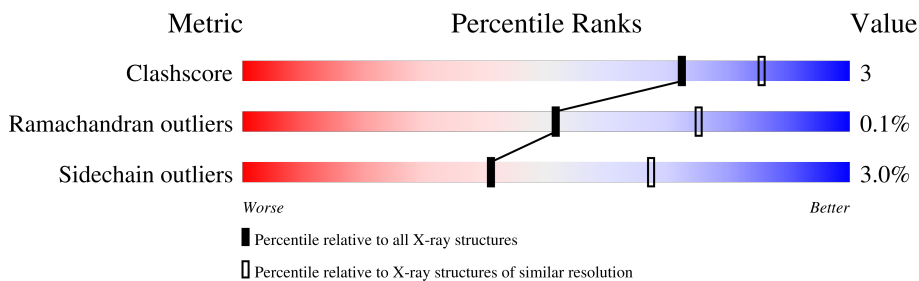
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	1338	86% 10% .
1	B	1338	86% 11% .

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
10	DMS	B	3008	-	X	-	-

2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 20650 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

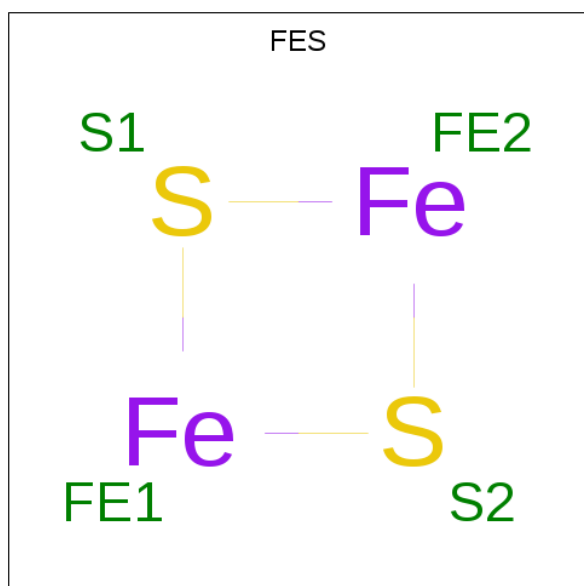
- Molecule 1 is a protein called Aldehyde oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1295	10055	6389	1731	1855	80	0	0	0
1	B	1295	10064	6397	1731	1856	80	0	1	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1231	HIS	ARG	engineered mutation	UNP Q06278
B	1231	HIS	ARG	engineered mutation	UNP Q06278

- Molecule 2 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



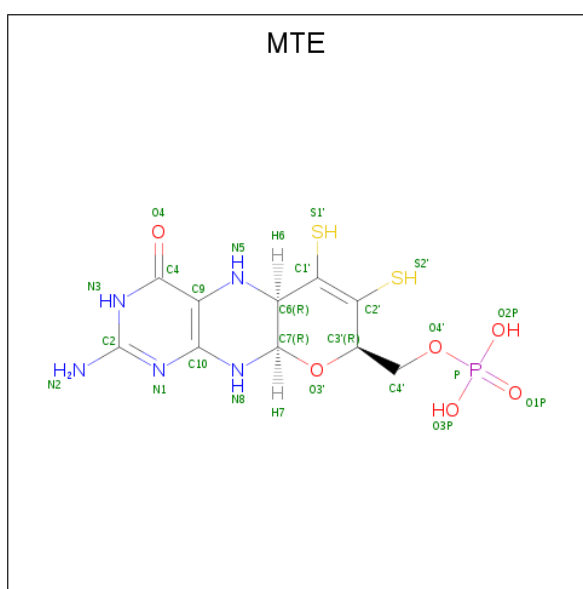
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
2	A	1	4	2	2	0	0

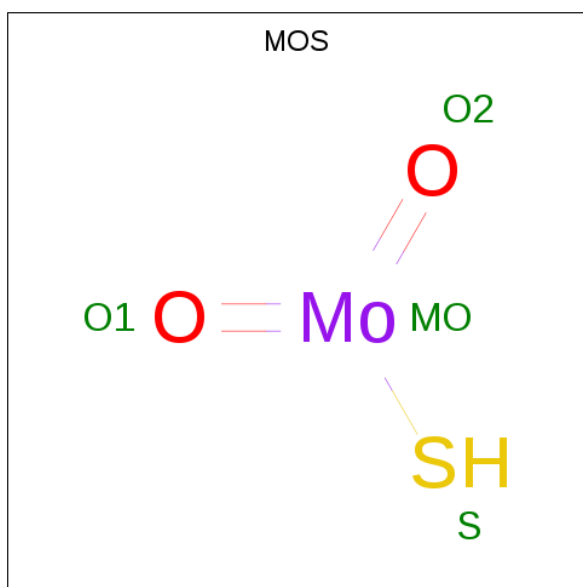
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	Fe	S	0	0
			4	2	2		
2	B	1	Total	Fe	S	0	0
			4	2	2		
2	B	1	Total	Fe	S	0	0
			4	2	2		

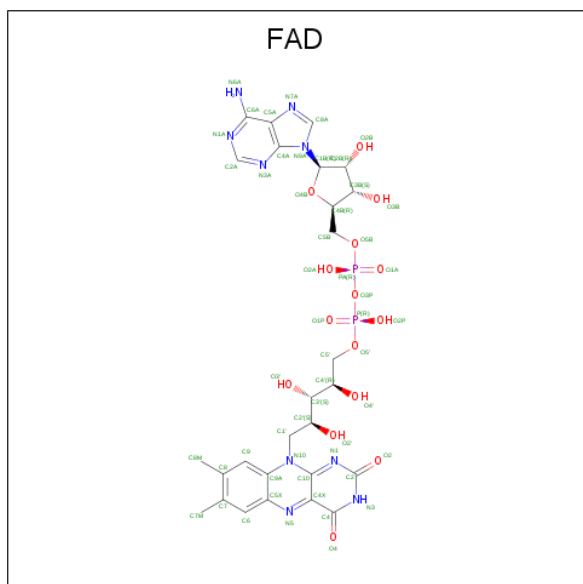
- Molecule 3 is PHOSPHONIC ACIDMONO-(2-AMINO-5,6-DIMERCAPTO-4-OXO-3,7,8A, 9,10,10A-HEXAHYDRO-4H-8-OXA-1,3,9,10-TETRAAZA-ANTHRACEN-7-YLMETHYL) ESTER (three-letter code: MTE) (formula: C₁₀H₁₄N₅O₆P₂S₂).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	Mo	O	S		
4	A	1	4	1	2	1	0	0
4	B	1	4	1	2	1	0	0

- Molecule 5 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



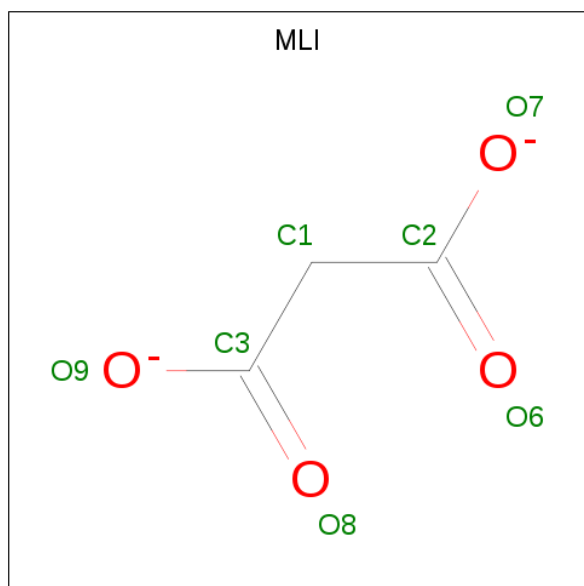
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
5	A	1	53	27	9	15	2	0	0

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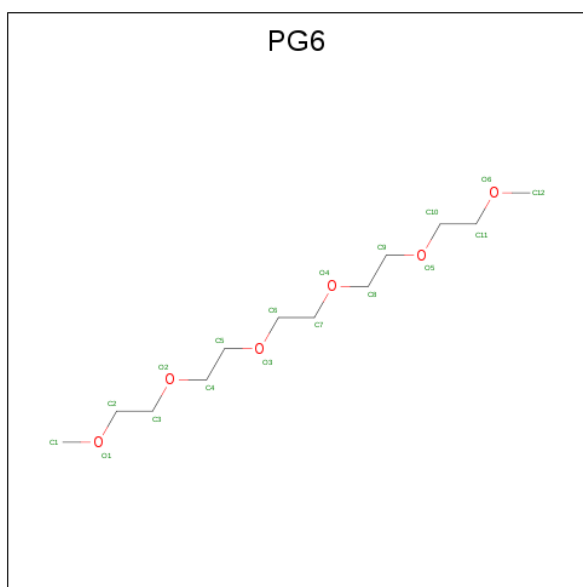
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
5	B	1	53	27	9	15	2	0	0

- Molecule 6 is MALONATE ION (three-letter code: MLI) (formula: $C_3H_2O_4$).



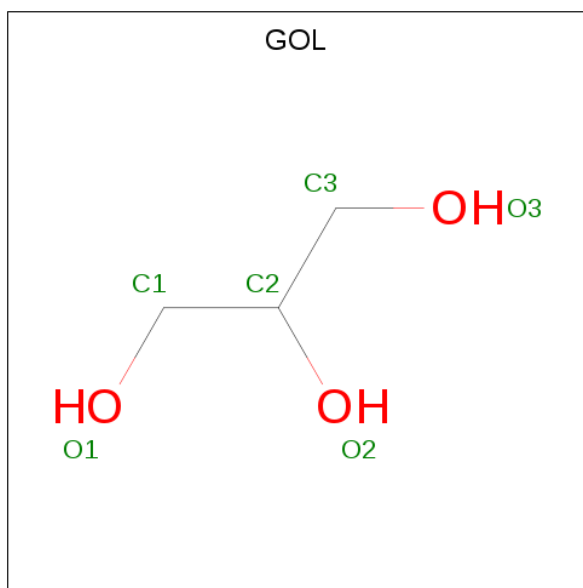
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	7	3	4	0	0
6	B	1	7	3	4	0	0

- Molecule 7 is 1-(2-METHOXY-ETHOXY)-2-{2-[2-(2-METHOXY-ETHOXY)-ETHOXY]-ETHOXY}-ETHANE (three-letter code: PG6) (formula: $C_{12}H_{26}O_6$).



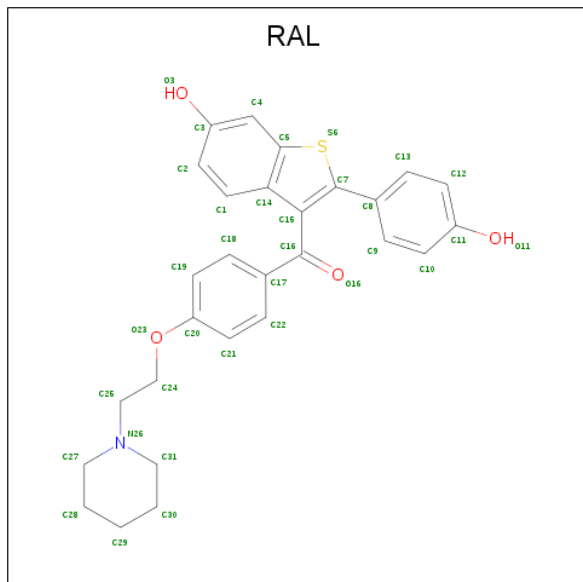
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			18	12	6		

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



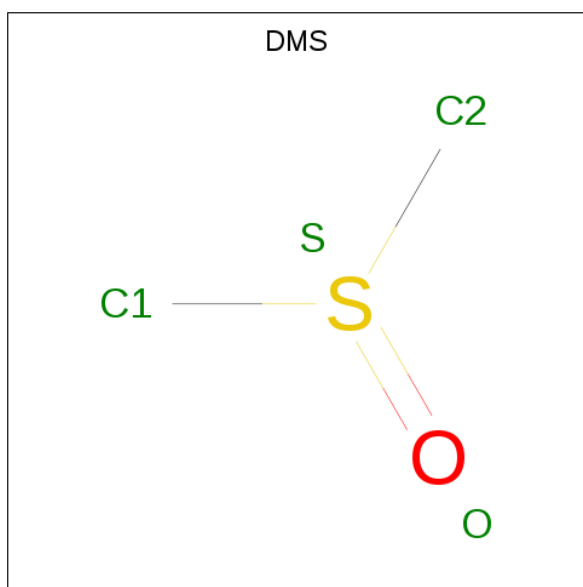
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			6	3	3		
8	A	1	Total	C	O	0	0
			6	3	3		
8	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is RALOXIFENE (three-letter code: RAL) (formula: $C_{28}H_{27}NO_4S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
9	A	1	Total 34	28	1	4	1	0	0
9	A	1	Total 34	28	1	4	1	0	0
9	B	1	Total 34	28	1	4	1	0	0
9	B	1	Total 34	28	1	4	1	0	0

- Molecule 10 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C_2H_6OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	B	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 11 is water.


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	91	Total	O	0	0
			91	91		
11	B	72	Total	O	0	0
			72	72		

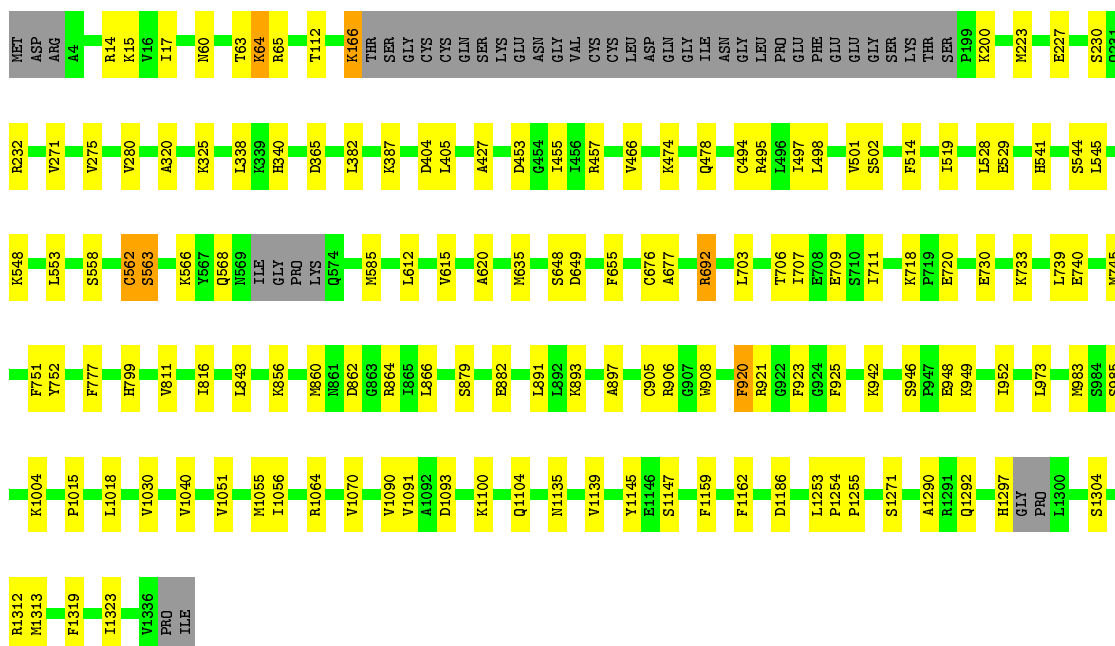
3 Residue-property plots i

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.


Note EDS was not executed.

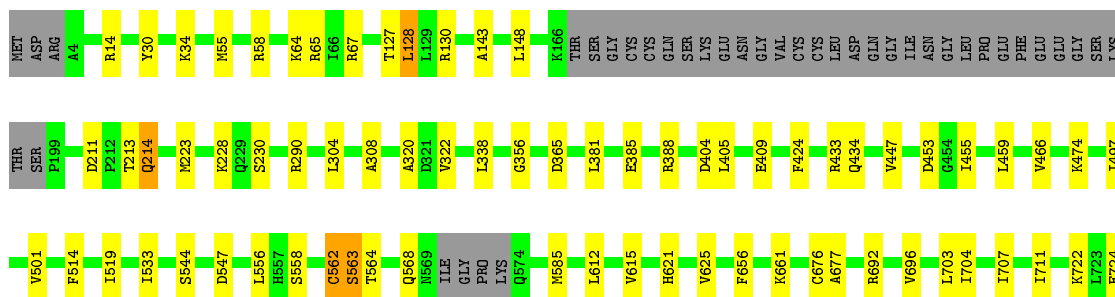
- Molecule 1: Aldehyde oxidase

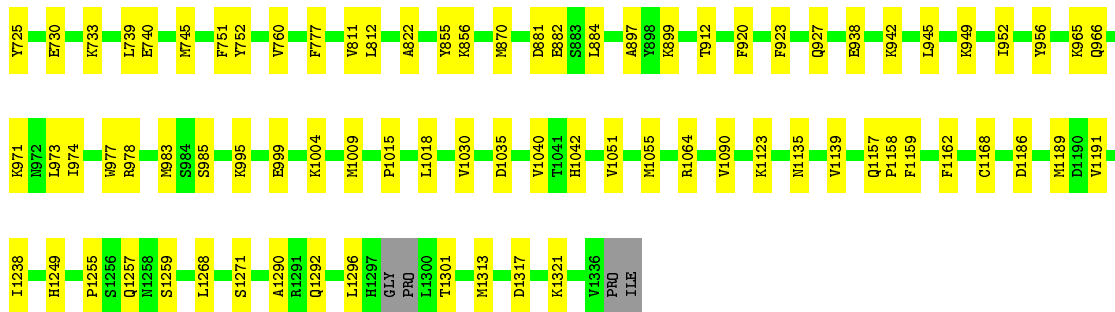
Chain A: 



- Molecule 1: Aldehyde oxidase

Chain B: 





4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	149.53Å 149.53Å 269.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.01 – 2.60	Depositor
% Data completeness (in resolution range)	99.9 (49.01-2.60)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PHENIX 1.19_4092	Depositor
R, R_{free}	0.206 , 0.241	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	20650	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MLI, MTE, GOL, FES, MOS, FAD, PG6, RAL, DMS

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.25	0/10269	0.48	0/13887
1	B	0.25	0/10282	0.48	0/13905
All	All	0.25	0/20551	0.48	0/27792

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	10055	0	10093	69	0
1	B	10064	0	10102	70	0
2	A	8	0	0	0	0
2	B	8	0	0	0	0
3	A	24	0	10	0	0
3	B	24	0	10	0	0
4	A	4	0	0	0	0
4	B	4	0	0	0	0
5	A	53	0	31	0	0
5	B	53	0	31	0	0
6	A	7	0	2	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	7	0	2	0	0
7	A	18	0	26	2	0
8	A	12	0	16	0	0
8	B	6	0	8	1	0
9	A	68	0	52	0	0
9	B	68	0	52	1	0
10	B	4	0	6	0	0
11	A	91	0	0	0	0
11	B	72	0	0	0	0
All	All	20650	0	20441	139	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (139) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:995:LYS:NZ	1:B:999:GLU:OE2	2.24	0.70
1:B:564:THR:OG1	1:B:1249:HIS:ND1	2.27	0.67
1:A:862:ASP:OD2	1:A:864:ARG:NH1	2.29	0.65
1:B:945:LEU:HD22	1:B:949:LYS:HE2	1.78	0.65
1:A:200:LYS:H	1:A:200:LYS:HD2	1.62	0.64
1:A:64:LYS:O	1:A:64:LYS:HG2	1.96	0.64
1:B:58:ARG:HH11	1:B:290:ARG:HH21	1.47	0.63
1:B:211:ASP:OD2	1:B:214:GLN:NE2	2.32	0.62
1:A:740:GLU:HG3	1:A:856:LYS:HG3	1.80	0.62
1:A:612:LEU:HD11	1:A:677:ALA:HB1	1.81	0.62
1:A:15:LYS:HD3	1:A:17:ILE:HD11	1.82	0.62
1:B:55:MET:HE1	1:B:130:ARG:HG3	1.82	0.60
1:B:739:LEU:HD12	1:B:942:LYS:HD3	1.83	0.60
1:A:453:ASP:HB2	1:A:455:ILE:HD12	1.84	0.59
1:B:497:ILE:O	1:B:501:VAL:HG22	2.04	0.58
1:B:1257:GLN:HE22	1:B:1259:SER:HB3	1.69	0.58
1:B:740:GLU:HG2	1:B:856:LYS:HG3	1.86	0.57
1:A:648:SER:OG	1:A:649:ASP:N	2.38	0.56
1:B:1009:MET:HE2	1:B:1168:CYS:HB2	1.88	0.56
1:A:568:GLN:HG3	1:A:1255:PRO:HD3	1.87	0.56
1:B:612:LEU:HD11	1:B:677:ALA:HB1	1.88	0.56
1:A:1018:LEU:HD21	1:A:1090:VAL:HG21	1.88	0.55
1:B:434:GLN:NE2	1:B:556:LEU:O	2.32	0.55
1:B:568:GLN:HG3	1:B:1255:PRO:HD3	1.87	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1004:LYS:HG3	1:B:1290:ALA:HB2	1.89	0.54
1:A:1135:ASN:HD21	1:B:1139:VAL:HG11	1.73	0.54
1:A:799:HIS:HB3	7:A:3007:PG6:H13	1.90	0.53
1:A:497:ILE:O	1:A:501:VAL:HG22	2.08	0.53
1:A:1139:VAL:HG11	1:B:1135:ASN:HD21	1.73	0.53
1:B:447:VAL:HG12	1:B:459:LEU:HD13	1.89	0.53
1:B:1051:VAL:O	1:B:1055:MET:HG2	2.09	0.53
1:B:661:LYS:H	1:B:661:LYS:HD2	1.72	0.53
1:A:1253:LEU:HG	1:A:1254:PRO:HD2	1.89	0.53
1:B:433:ARG:NH1	1:B:1238:ILE:O	2.41	0.53
1:B:952:ILE:HD11	1:B:977:TRP:HE1	1.73	0.53
1:A:635:MET:SD	1:A:692:ARG:HD2	2.49	0.52
1:B:381:LEU:HD13	1:B:405:LEU:HG	1.92	0.52
1:A:739:LEU:HD12	1:A:942:LYS:HG3	1.91	0.52
1:B:625:VAL:HB	1:B:696:VAL:HG12	1.91	0.52
1:A:275:VAL:HG12	1:A:280:VAL:HG12	1.93	0.51
1:B:501:VAL:O	1:B:501:VAL:HG23	2.11	0.51
1:A:382:LEU:HD13	1:A:387:LYS:HG2	1.93	0.50
1:B:304:LEU:HD11	1:B:322:VAL:HG21	1.92	0.50
1:A:948:GLU:O	1:A:952:ILE:HG13	2.11	0.50
1:B:855:TYR:HB3	1:B:870:MET:SD	2.50	0.50
1:A:615:VAL:HB	1:A:676:CYS:HB2	1.94	0.50
1:A:1100:LYS:HE2	1:A:1104:GLN:NE2	2.27	0.50
1:B:974:ILE:O	1:B:978:ARG:HG3	2.11	0.49
1:A:1312:ARG:HG3	1:A:1313:MET:HE1	1.93	0.49
1:B:453:ASP:HB2	1:B:455:ILE:HD13	1.94	0.49
1:B:1018:LEU:HD11	1:B:1090:VAL:HG21	1.94	0.49
1:A:1004:LYS:HG3	1:A:1290:ALA:HB2	1.95	0.48
1:B:65:ARG:HD3	1:B:67:ARG:NH2	2.27	0.48
1:A:1051:VAL:O	1:A:1055:MET:HG2	2.14	0.48
1:A:1093:ASP:OD1	1:A:1145:TYR:OH	2.32	0.48
1:B:1015:PRO:HB3	1:B:1162:PHE:CE2	2.49	0.48
1:B:564:THR:HG1	1:B:1249:HIS:CE1	2.32	0.47
1:A:620:ALA:HB3	1:A:703:LEU:HD11	1.97	0.47
1:A:514:PHE:HA	1:A:1313:MET:HE3	1.97	0.47
1:B:1015:PRO:HB2	1:B:1159:PHE:CG	2.50	0.47
1:B:983:MET:HE3	1:B:1186:ASP:HB3	1.97	0.47
1:A:1015:PRO:HB3	1:A:1162:PHE:CE2	2.50	0.47
1:B:128:LEU:HD13	1:B:143:ALA:HB2	1.96	0.47
1:A:706:THR:OG1	1:A:709:GLU:HG3	2.15	0.47
1:A:733:LYS:HB2	1:A:733:LYS:HE2	1.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:725:TYR:HE1	1:B:965:LYS:HD3	1.80	0.46
1:A:200:LYS:HD2	1:A:200:LYS:N	2.29	0.46
1:A:730:GLU:OE1	1:A:733:LYS:NZ	2.48	0.46
9:B:3009:RAL:H21	9:B:3009:RAL:H241	1.74	0.46
1:A:528:LEU:HD22	1:A:545:LEU:HD11	1.98	0.45
1:A:1015:PRO:HB2	1:A:1159:PHE:CG	2.51	0.45
1:B:760:VAL:HG11	1:B:822:ALA:HA	1.97	0.45
1:B:466:VAL:HG11	1:B:519:ILE:HD11	1.99	0.45
1:B:739:LEU:HD11	1:B:938:GLU:HB3	1.98	0.45
1:B:966:GLN:HG3	1:B:1157:GLN:OE1	2.16	0.45
1:B:730:GLU:HA	1:B:733:LYS:HE2	1.99	0.45
1:A:707:ILE:O	1:A:711:ILE:HG13	2.16	0.45
1:A:1030:VAL:HG22	1:A:1040:VAL:HG23	1.98	0.45
1:B:656:PHE:CE2	1:B:881:ASP:HB3	2.52	0.45
1:A:60:ASN:HB3	1:A:63:THR:HG22	1.97	0.45
1:B:704:ILE:HG22	1:B:912:THR:HG22	2.00	0.44
1:A:745:MET:HG3	1:A:1304:SER:HB3	1.99	0.44
1:B:404:ASP:OD1	1:B:405:LEU:N	2.49	0.44
1:B:308:ALA:HB1	1:B:356:GLY:HA3	1.99	0.44
1:A:1051:VAL:HG21	1:A:1091:VAL:HG12	1.98	0.44
1:B:228:LYS:O	1:B:228:LYS:HD3	2.17	0.44
1:A:946:SER:OG	1:A:949:LYS:HG3	2.16	0.44
1:A:501:VAL:HG23	1:A:501:VAL:O	2.17	0.44
1:A:860:MET:HG2	1:A:866:LEU:CD2	2.48	0.44
1:B:707:ILE:O	1:B:711:ILE:HG13	2.18	0.44
1:B:424:PHE:CE1	1:B:533:ILE:HD13	2.53	0.44
1:A:897:ALA:HB1	1:A:973:LEU:HD21	2.00	0.43
1:A:466:VAL:HG11	1:A:519:ILE:HD11	2.00	0.43
1:B:148:LEU:HD11	8:B:3006:GOL:H2	2.00	0.43
1:B:722:LYS:HE2	1:B:724:GLU:HG3	2.01	0.43
1:B:388:ARG:NH1	1:B:409:GLU:OE1	2.51	0.43
1:B:897:ALA:HB1	1:B:973:LEU:HD21	2.01	0.43
1:B:1191:VAL:HG12	1:B:1268:LEU:HD11	1.99	0.43
1:A:320:ALA:HA	1:A:338:LEU:HD11	2.01	0.43
1:A:562:CYS:SG	1:A:563:SER:N	2.92	0.43
1:A:983:MET:HE3	1:A:1186:ASP:HB3	2.00	0.43
1:B:745:MET:SD	1:B:927:GLN:HA	2.59	0.43
1:B:899:LYS:HB2	1:B:956:TYR:CD1	2.54	0.43
1:B:1191:VAL:CG1	1:B:1268:LEU:HD11	2.49	0.43
1:B:514:PHE:HA	1:B:1313:MET:HE2	2.01	0.43
1:B:562:CYS:SG	1:B:563:SER:N	2.91	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:404:ASP:OD1	1:A:405:LEU:N	2.49	0.42
1:A:232:ARG:HH11	1:A:232:ARG:HG2	1.83	0.42
1:A:720:GLU:OE2	1:A:906:ARG:NE	2.35	0.42
1:B:621:HIS:HB3	1:B:703:LEU:HD12	2.00	0.42
1:A:223:MET:O	1:A:227:GLU:HG2	2.18	0.42
1:A:232:ARG:HG2	1:A:232:ARG:NH1	2.35	0.42
1:A:14:ARG:HE	1:A:14:ARG:HB3	1.71	0.42
1:B:320:ALA:HA	1:B:338:LEU:HD11	2.02	0.42
1:B:1317:ASP:O	1:B:1321:LYS:HD2	2.19	0.42
1:B:1042:HIS:NE2	1:B:1055:MET:HG3	2.35	0.42
1:A:494:CYS:O	1:A:498:LEU:HD12	2.19	0.42
1:A:891:LEU:HD22	1:A:905:CYS:SG	2.60	0.41
1:B:30:TYR:CE1	1:B:34:LYS:HG2	2.55	0.41
1:B:228:LYS:HD3	1:B:228:LYS:C	2.41	0.41
1:A:1056:ILE:HG23	1:A:1070:VAL:HB	2.02	0.41
1:A:271:VAL:O	1:A:275:VAL:HG13	2.20	0.41
1:A:718:LYS:HD3	1:A:908:TRP:HB3	2.03	0.41
1:A:529:GLU:HG2	1:A:553:LEU:HD22	2.01	0.41
1:A:166:LYS:HB2	1:A:166:LYS:HE2	1.71	0.41
7:A:3007:PG6:H61	7:A:3007:PG6:H81	1.87	0.41
1:B:615:VAL:HB	1:B:676:CYS:HB2	2.02	0.41
1:B:1035:ASP:HA	1:B:1123:LYS:HG3	2.02	0.41
1:A:843:LEU:HA	1:A:843:LEU:HD23	1.82	0.41
1:B:966:GLN:OE1	1:B:1158:PRO:HD2	2.21	0.41
1:B:1030:VAL:HG22	1:B:1040:VAL:HG23	2.03	0.41
1:A:655:PHE:CZ	1:A:816:ILE:HD11	2.56	0.41
1:A:1319:PHE:O	1:A:1323:ILE:HG23	2.21	0.41
1:A:860:MET:SD	1:A:866:LEU:HD23	2.61	0.40
1:A:893:LYS:HB3	1:A:925:PHE:HD1	1.86	0.40
1:A:340:HIS:CE1	1:A:427:ALA:HB1	2.56	0.40
1:A:920:PHE:HD1	1:A:921:ARG:N	2.19	0.40
1:B:55:MET:CE	1:B:127:THR:HA	2.50	0.40
1:A:566:LYS:HD2	1:A:566:LYS:HA	1.92	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	1287/1338 (96%)	1256 (98%)	30 (2%)	1 (0%)	51 75
1	B	1288/1338 (96%)	1258 (98%)	29 (2%)	1 (0%)	51 75
All	All	2575/2676 (96%)	2514 (98%)	59 (2%)	2 (0%)	51 75

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	811	VAL
1	B	811	VAL

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	1100/1136 (97%)	1067 (97%)	33 (3%)	41 67
1	B	1101/1136 (97%)	1068 (97%)	33 (3%)	41 67
All	All	2201/2272 (97%)	2135 (97%)	66 (3%)	41 67

All (66) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	64	LYS
1	A	65	ARG
1	A	112	THR
1	A	166	LYS

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Mol	Chain	Res	Type
1	A	230	SER
1	A	325	LYS
1	A	365	ASP
1	A	457	ARG
1	A	474	LYS
1	A	478	GLN
1	A	495	ARG
1	A	502	SER
1	A	541	HIS
1	A	544	SER
1	A	548	LYS
1	A	558	SER
1	A	562	CYS
1	A	563	SER
1	A	585	MET
1	A	692	ARG
1	A	751	PHE
1	A	752	TYR
1	A	777	PHE
1	A	879	SER
1	A	882	GLU
1	A	920	PHE
1	A	923	PHE
1	A	985	SER
1	A	1064	ARG
1	A	1147	SER
1	A	1271	SER
1	A	1292	GLN
1	A	1297	HIS
1	B	14	ARG
1	B	64	LYS
1	B	128	LEU
1	B	213	THR
1	B	214	GLN
1	B	223	MET
1	B	230	SER
1	B	365	ASP
1	B	385	GLU
1	B	474	LYS
1	B	544	SER
1	B	547	ASP
1	B	558	SER

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Mol	Chain	Res	Type
1	B	562	CYS
1	B	563	SER
1	B	585	MET
1	B	692	ARG
1	B	751	PHE
1	B	752	TYR
1	B	777	PHE
1	B	812	LEU
1	B	882	GLU
1	B	884	LEU
1	B	920	PHE
1	B	923	PHE
1	B	971	LYS
1	B	985	SER
1	B	1064	ARG
1	B	1189	MET
1	B	1271	SER
1	B	1292	GLN
1	B	1296	LEU
1	B	1301	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	69	HIS
1	B	214	GLN
1	B	298	ASN
1	B	415	ASN
1	B	1292	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

21 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	MTE	A	3003	4	21,26,26	0.98	1 (4%)	21,40,40	2.03	7 (33%)
2	FES	A	3001	1	0,4,4	0.00	-	-		
8	GOL	A	3008	-	5,5,5	0.90	0	5,5,5	0.99	0
4	MOS	B	3004	3	0,3,3	0.00	-	-		
9	RAL	A	3011	-	33,38,38	0.60	1 (3%)	43,53,53	0.88	2 (4%)
6	MLI	A	3006	-	0,6,6	0.00	-	0,7,7	0.00	-
5	FAD	B	3005	-	51,58,58	1.08	2 (3%)	60,89,89	1.73	7 (11%)
2	FES	B	3002	1	0,4,4	0.00	-	-		
10	DMS	B	3008	-	3,3,3	0.73	0	3,3,3	3.24	3 (100%)
7	PG6	A	3007	-	17,17,17	0.53	0	16,16,16	0.18	0
4	MOS	A	3004	3	0,3,3	0.00	-	-		
2	FES	A	3002	1	0,4,4	0.00	-	-		
9	RAL	B	3010	-	33,38,38	0.54	1 (3%)	43,53,53	0.96	2 (4%)
8	GOL	B	3006	-	5,5,5	0.92	0	5,5,5	1.01	0
6	MLI	B	3007	-	0,6,6	0.00	-	0,7,7	0.00	-
9	RAL	B	3009	-	33,38,38	0.63	1 (3%)	43,53,53	0.83	2 (4%)
3	MTE	B	3003	4	21,26,26	0.99	1 (4%)	21,40,40	2.00	7 (33%)
2	FES	B	3001	1	0,4,4	0.00	-	-		
5	FAD	A	3005	-	51,58,58	1.07	2 (3%)	60,89,89	1.72	7 (11%)
8	GOL	A	3009	-	5,5,5	0.92	0	5,5,5	0.98	0
9	RAL	A	3010	-	33,38,38	0.60	1 (3%)	43,53,53	0.86	2 (4%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	FAD	B	3005	-	-	1/30/50/50	0/6/6/6
9	RAL	B	3009	-	-	2/15/26/26	0/5/5/5
3	MTE	B	3003	4	-	1/6/34/34	0/3/3/3
2	FES	B	3002	1	-	-	0/1/1/1
2	FES	B	3001	1	-	-	0/1/1/1
3	MTE	A	3003	4	-	1/6/34/34	0/3/3/3
7	PG6	A	3007	-	-	9/15/15/15	-
9	RAL	A	3010	-	-	0/15/26/26	0/5/5/5
8	GOL	A	3008	-	-	2/4/4/4	-
2	FES	A	3001	1	-	-	0/1/1/1
9	RAL	A	3011	-	-	0/15/26/26	0/5/5/5
2	FES	A	3002	1	-	-	0/1/1/1
6	MLI	A	3006	-	-	0/0/4/4	-
9	RAL	B	3010	-	-	1/15/26/26	0/5/5/5
8	GOL	B	3006	-	-	2/4/4/4	-
5	FAD	A	3005	-	-	1/30/50/50	0/6/6/6
6	MLI	B	3007	-	-	0/0/4/4	-
8	GOL	A	3009	-	-	1/4/4/4	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	3005	FAD	C4X-C10	5.74	1.44	1.38
5	A	3005	FAD	C4X-C10	5.62	1.44	1.38
3	B	3003	MTE	C4-N3	3.41	1.39	1.33
3	A	3003	MTE	C4-N3	3.38	1.38	1.33
9	B	3009	RAL	C15-C16	-3.08	1.47	1.50
9	A	3010	RAL	C15-C16	-2.91	1.47	1.50
9	A	3011	RAL	C15-C16	-2.90	1.47	1.50
5	A	3005	FAD	C4-N3	2.71	1.37	1.33
5	B	3005	FAD	C4-N3	2.66	1.37	1.33
9	B	3010	RAL	C15-C16	-2.53	1.47	1.50

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	3005	FAD	C4-N3-C2	8.06	121.94	115.14
5	A	3005	FAD	C4-N3-C2	8.04	121.93	115.14
5	A	3005	FAD	C10-C4X-N5	5.23	124.87	121.26
3	A	3003	MTE	C4-C9-C10	5.22	119.21	114.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	3005	FAD	C4-C4X-C10	-5.20	116.51	119.95
5	B	3005	FAD	C10-C4X-N5	5.19	124.84	121.26
3	B	3003	MTE	C4-C9-C10	5.12	119.12	114.57
5	A	3005	FAD	C4-C4X-C10	-5.03	116.62	119.95
10	B	3008	DMS	C2-S-C1	4.22	120.15	98.44
5	A	3005	FAD	C4X-C4-N3	-4.16	117.74	123.43
5	B	3005	FAD	C4X-C4-N3	-4.11	117.81	123.43
5	A	3005	FAD	C4X-C10-N10	-3.86	116.34	120.30
9	B	3010	RAL	C15-C16-C17	3.85	124.90	119.53
3	B	3003	MTE	C4-N3-C2	3.85	122.04	115.93
5	B	3005	FAD	C4X-C10-N10	-3.84	116.36	120.30
3	A	3003	MTE	C4-N3-C2	3.82	121.99	115.93
9	A	3011	RAL	C15-C16-C17	3.44	124.33	119.53
9	A	3010	RAL	C15-C16-C17	3.32	124.16	119.53
9	B	3009	RAL	C15-C16-C17	3.01	123.74	119.53
9	B	3010	RAL	C1-C14-C15	-2.68	130.17	135.49
10	B	3008	DMS	O-S-C2	2.65	120.08	106.54
3	A	3003	MTE	C4-C9-N5	2.63	121.33	119.12
3	B	3003	MTE	C4-C9-N5	2.63	121.33	119.12
9	A	3011	RAL	C1-C14-C15	-2.60	130.33	135.49
9	B	3009	RAL	C1-C14-C15	-2.59	130.34	135.49
10	B	3008	DMS	O-S-C1	2.59	119.77	106.54
3	A	3003	MTE	C9-C4-N3	-2.59	116.66	124.01
3	B	3003	MTE	C9-C4-N3	-2.58	116.67	124.01
3	A	3003	MTE	C9-C10-N8	2.56	120.47	118.13
9	A	3010	RAL	C1-C14-C15	-2.55	130.44	135.49
3	B	3003	MTE	N3-C2-N1	-2.49	121.51	125.42
3	B	3003	MTE	C9-C10-N8	2.44	120.36	118.13
3	A	3003	MTE	N3-C2-N1	-2.44	121.60	125.42
5	B	3005	FAD	C5A-C6A-N6A	2.27	123.80	120.35
5	A	3005	FAD	C5A-C6A-N6A	2.26	123.79	120.35
5	B	3005	FAD	O4B-C1B-C2B	-2.25	103.63	106.93
5	A	3005	FAD	O4B-C1B-C2B	-2.20	103.71	106.93
3	B	3003	MTE	N2-C2-N1	2.15	120.59	117.25
3	A	3003	MTE	N2-C2-N1	2.14	120.58	117.25

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	3003	MTE	C3'-C4'-O4'-P
9	B	3009	RAL	O23-C24-C25-N26

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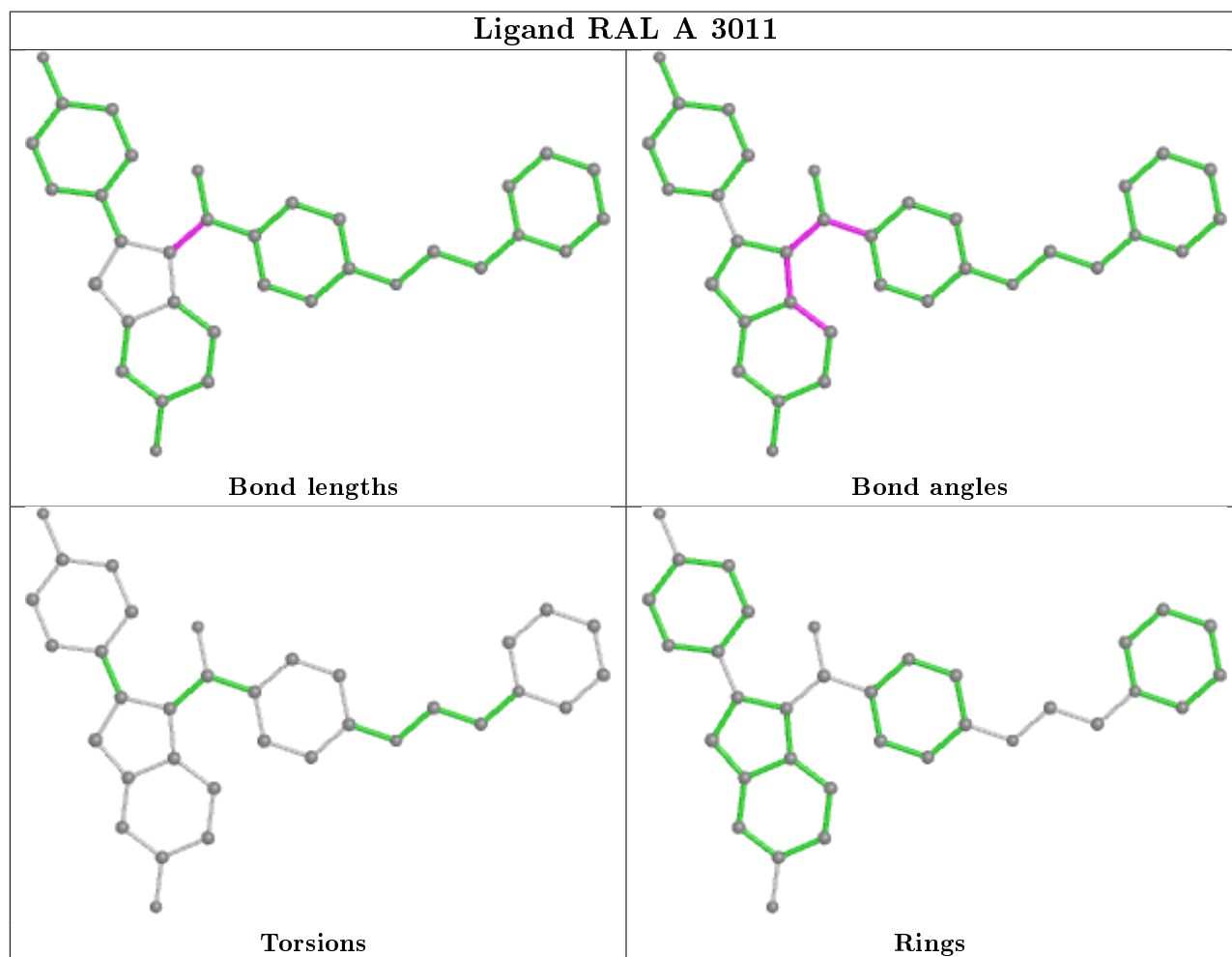
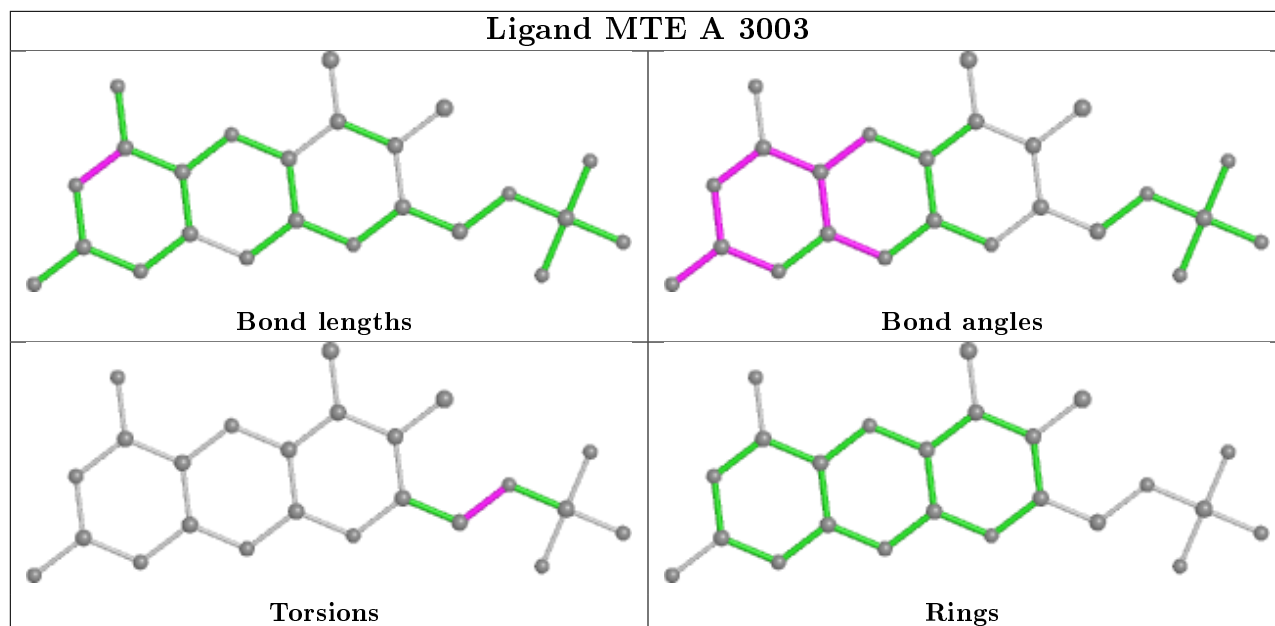
Mol	Chain	Res	Type	Atoms
7	A	3007	PG6	O1-C2-C3-O2
7	A	3007	PG6	O5-C10-C11-O6
7	A	3007	PG6	C2-C3-O2-C4
7	A	3007	PG6	O2-C4-C5-O3
3	B	3003	MTE	C3'-C4'-O4'-P
8	A	3008	GOL	O1-C1-C2-C3
8	A	3009	GOL	O1-C1-C2-C3
8	B	3006	GOL	O1-C1-C2-C3
8	B	3006	GOL	O1-C1-C2-O2
9	B	3009	RAL	C25-C24-O23-C20
9	B	3010	RAL	C25-C24-O23-C20
7	A	3007	PG6	C10-C11-O6-C12
7	A	3007	PG6	C3-C2-O1-C1
8	A	3008	GOL	O1-C1-C2-O2
7	A	3007	PG6	C11-C10-O5-C9
7	A	3007	PG6	O4-C8-C9-O5
5	B	3005	FAD	C4'-C5'-O5'-P
5	A	3005	FAD	C4'-C5'-O5'-P
7	A	3007	PG6	C6-C7-O4-C8

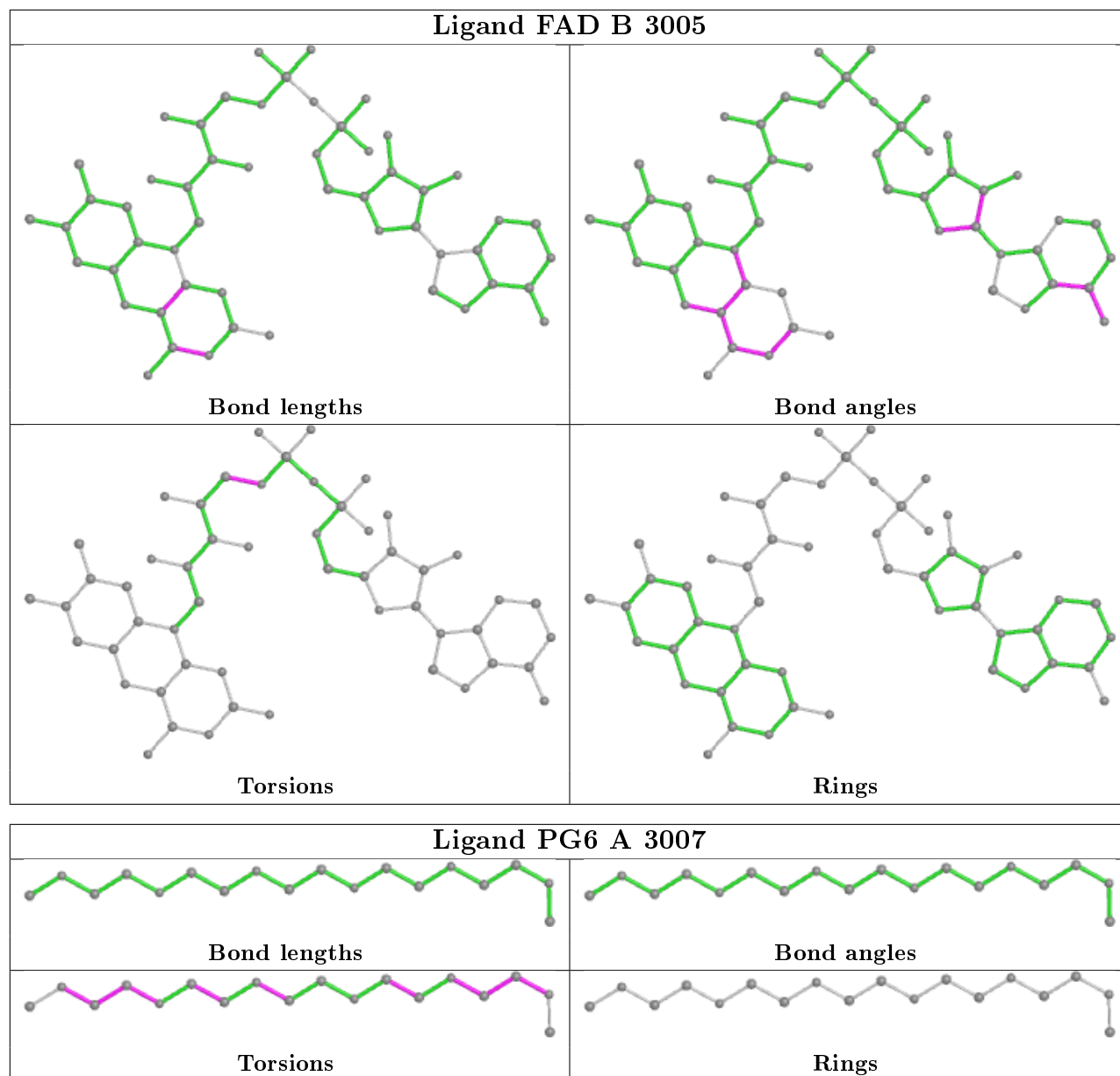
There are no ring outliers.

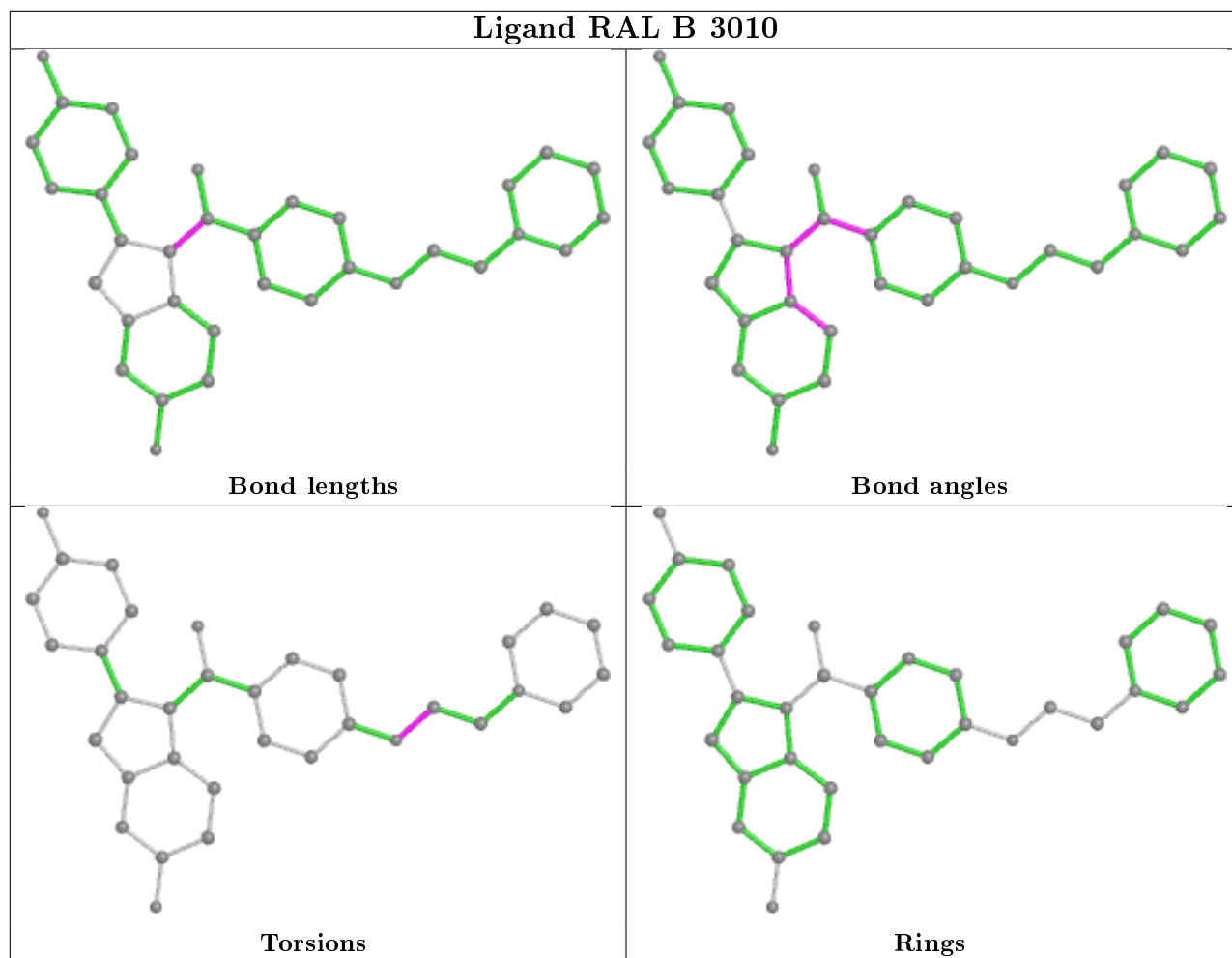
3 monomers are involved in 4 short contacts:

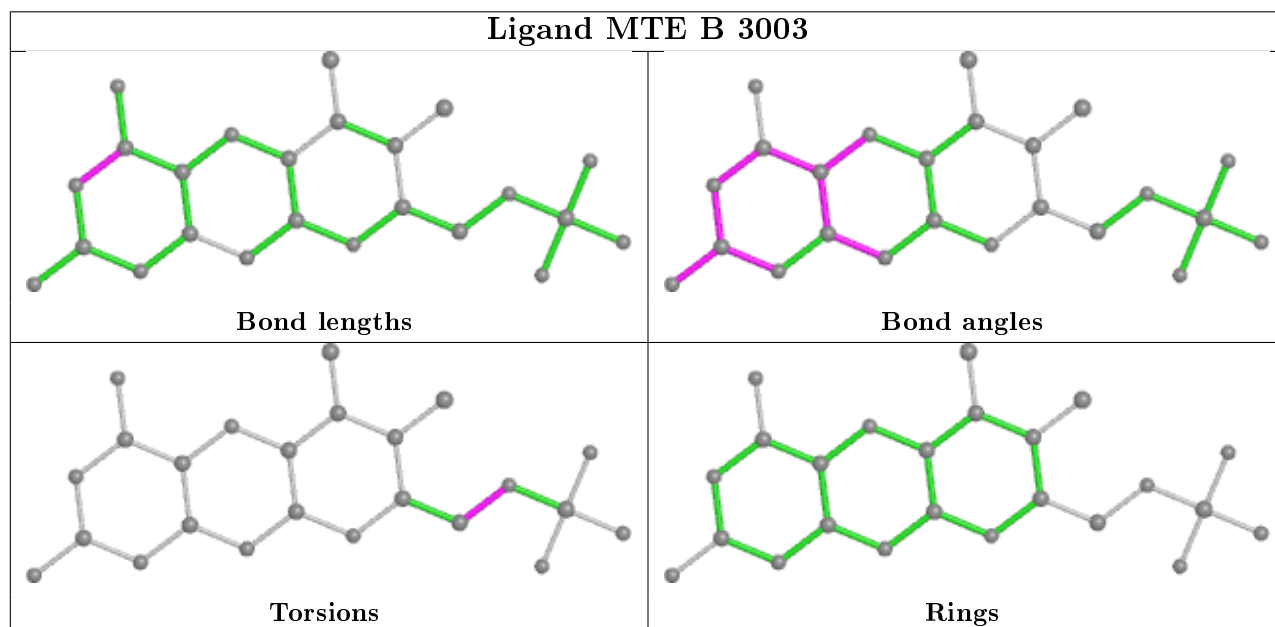
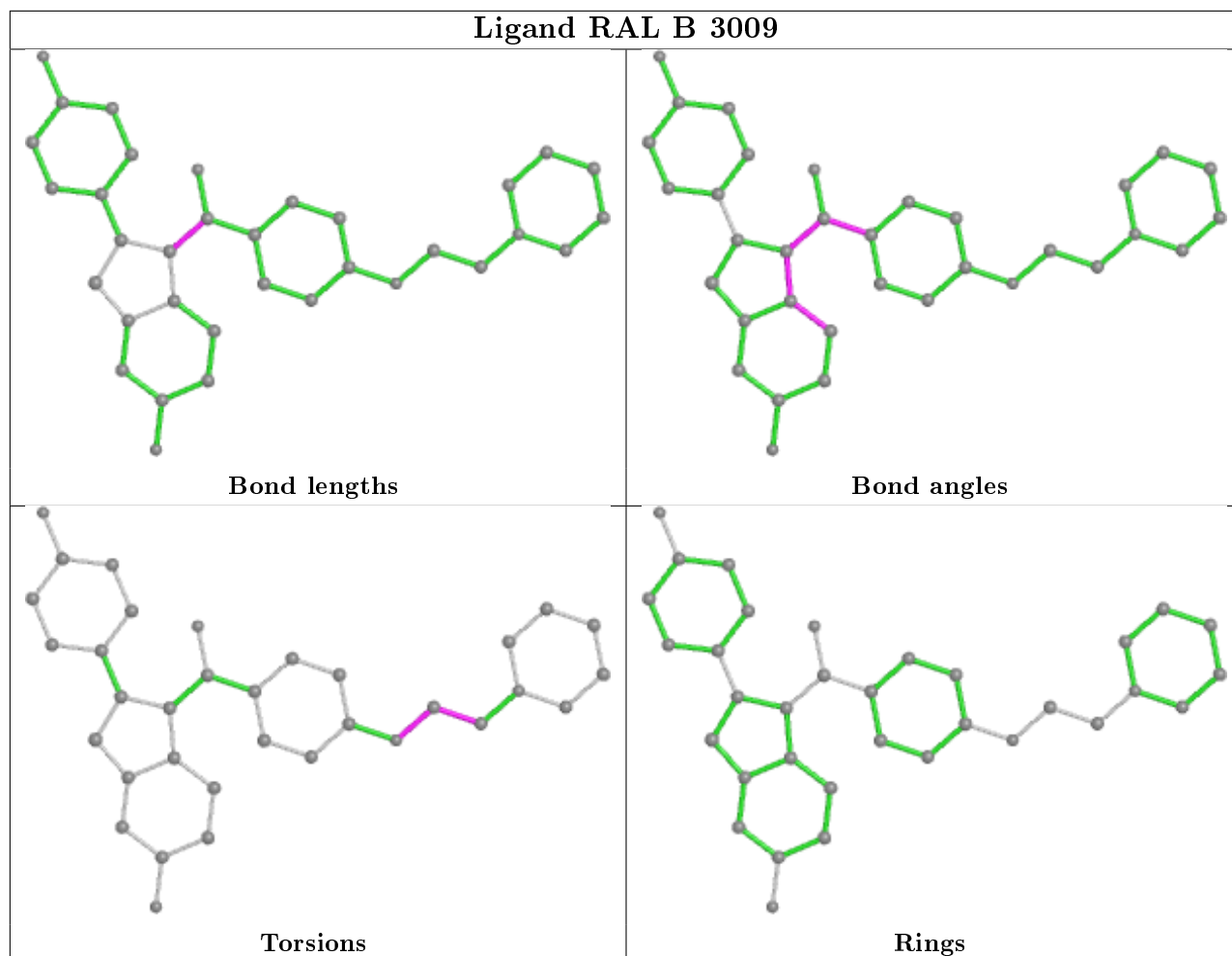
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	3007	PG6	2	0
8	B	3006	GOL	1	0
9	B	3009	RAL	1	0

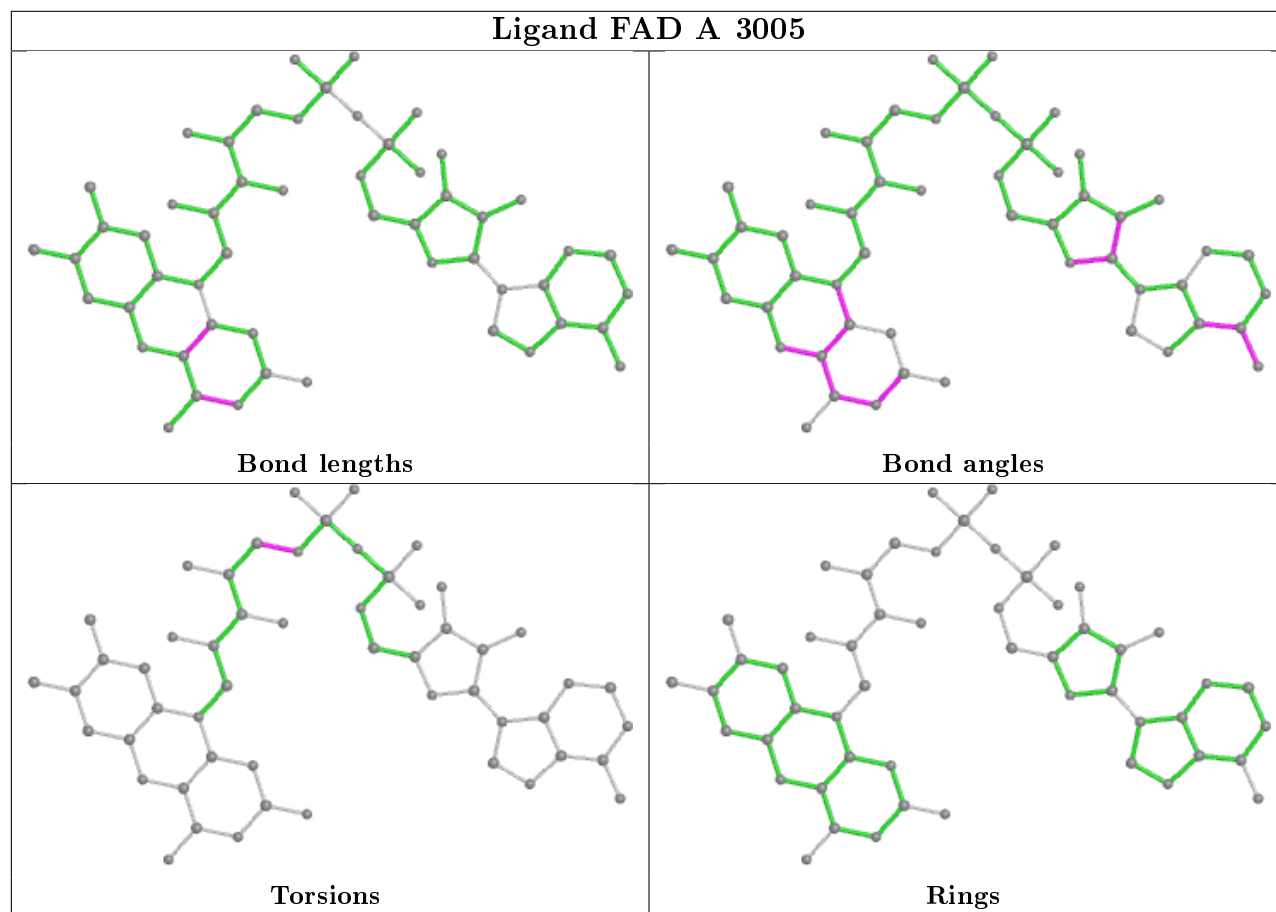
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

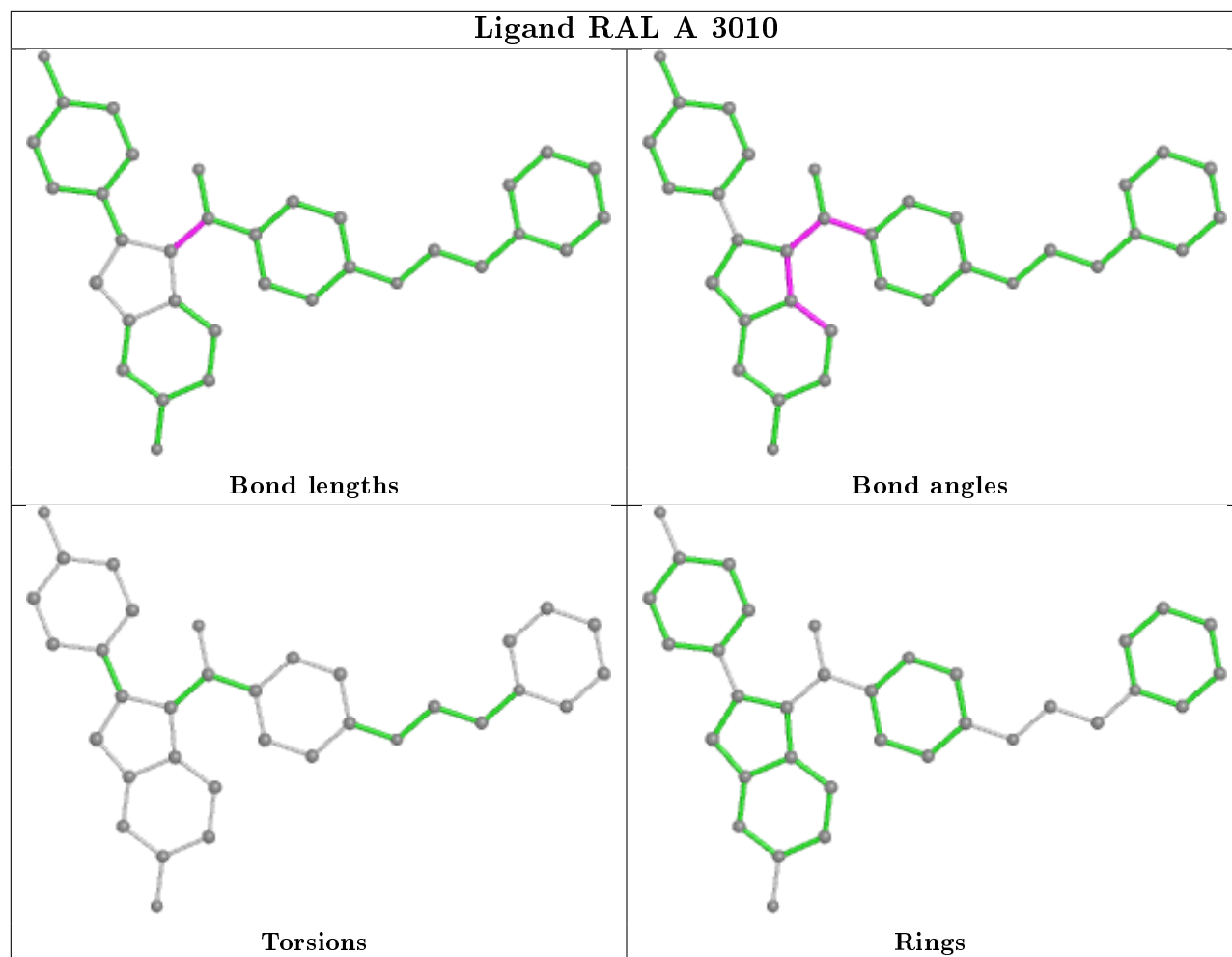












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.