



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2023 – 12:24 pm GMT

PDB ID : 8OFA
Title : Crystal structure of human cathepsin L interacting with tosyl phenylalanyl chloromethyl ketone (TPCK)
Authors : Falke, S.; Lieske, J.; Guenther, S.; Ewert, W.; Reinke, P.Y.A.; Loboda, J.; Karnicar, K.; Usenik, A.; Lindic, N.; Sekirnik, A.; Chapman, H.N.; Hinrichs, W.; Turk, D.; Meents, A.
Deposited on : 2023-03-14
Resolution : 1.90 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

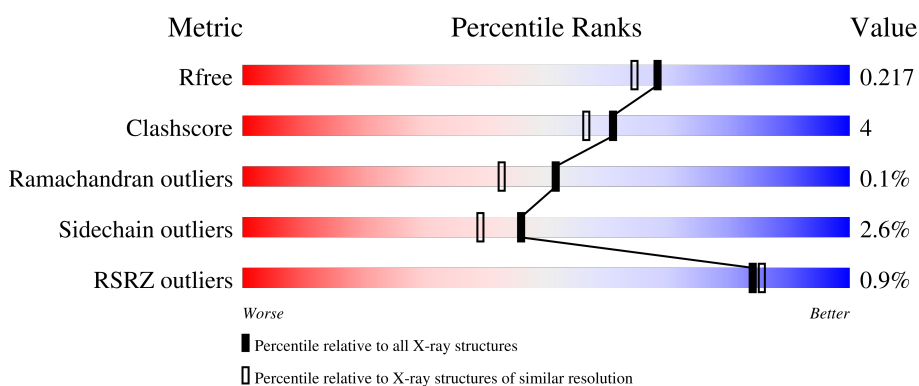
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	220	
1	B	220	
1	C	220	
1	D	220	

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 7609 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.

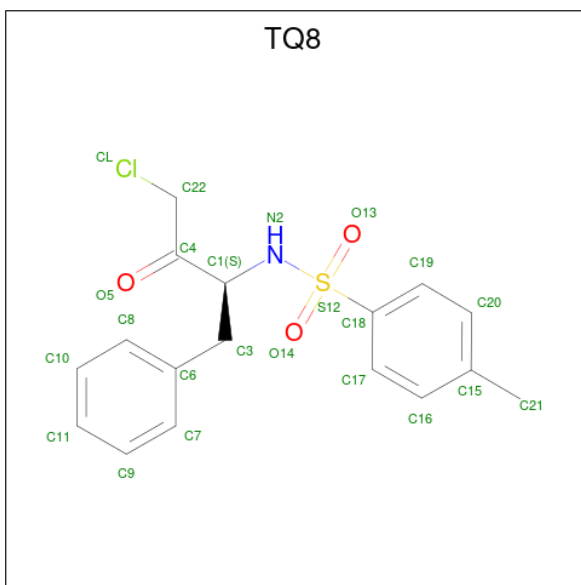
- Molecule 1 is a protein called Cathepsin L.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	220	1715	1071	284	345	15	6	3	0
1	B	212	1651	1038	273	326	14	0	2	0
1	C	212	1665	1047	276	326	16	0	4	0
1	D	220	1729	1079	286	348	16	0	5	0

There are 4 discrepancies between the modelled and reference sequences:

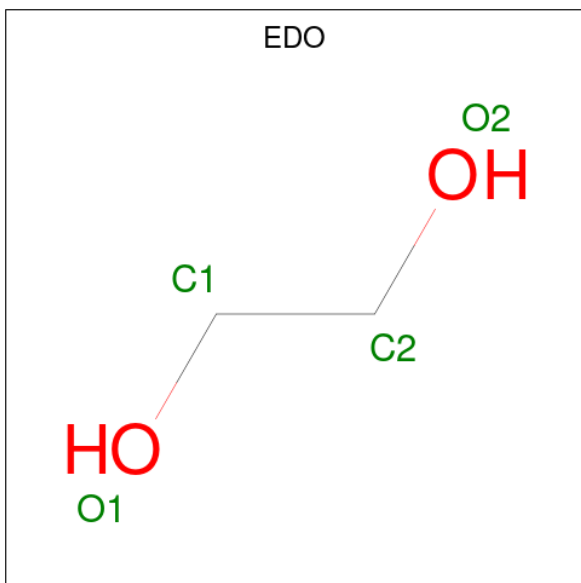
Chain	Residue	Modelled	Actual	Comment	Reference
A	110	ALA	THR	engineered mutation	UNP P07711
B	110	ALA	THR	engineered mutation	UNP P07711
C	110	ALA	THR	engineered mutation	UNP P07711
D	110	ALA	THR	engineered mutation	UNP P07711

- Molecule 2 is N-[(2S)-4-chloro-3-oxo-1-phenyl-butan-2-yl]-4-methyl-benzenesulfonamide (three-letter code: TQ8) (formula: C₁₇H₁₈ClNO₃S) (labeled as "Ligand of Interest" by depositor).



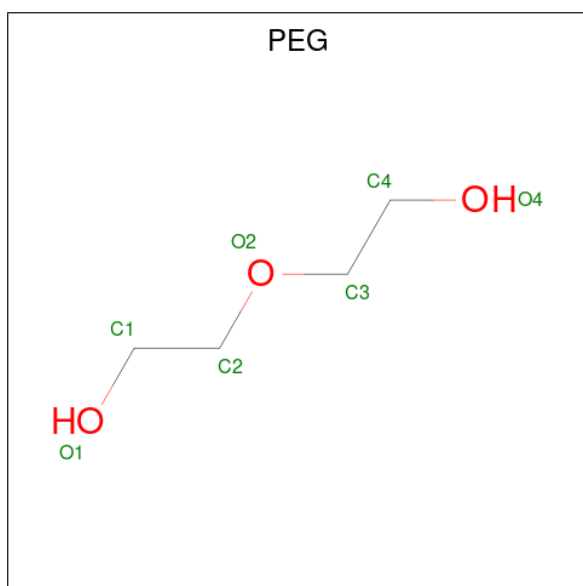
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	Total	C	N	O	S	0	0
			22	17	1	3	1		
2	B	1	Total	C	N	O	S	0	0
			22	17	1	3	1		
2	C	1	Total	C	N	O	S	0	0
			22	17	1	3	1		
2	D	1	Total	C	N	O	S	0	0
			22	17	1	3	1		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).



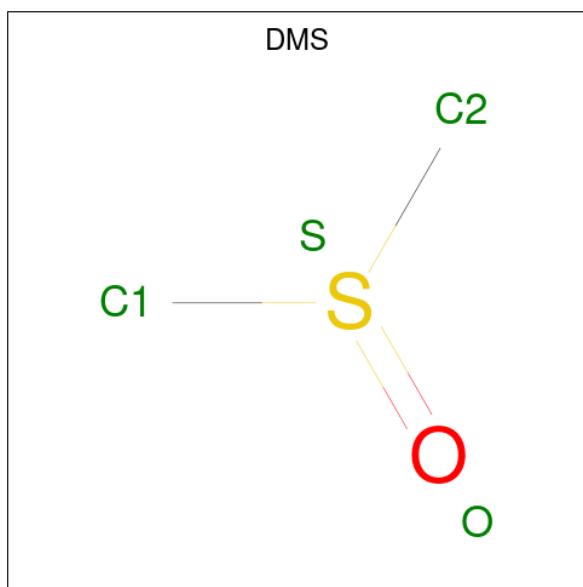
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	B	1	Total C O 7 4 3	0	0
4	C	1	Total C O 7 4 3	0	0
4	C	1	Total C O 7 4 3	0	0

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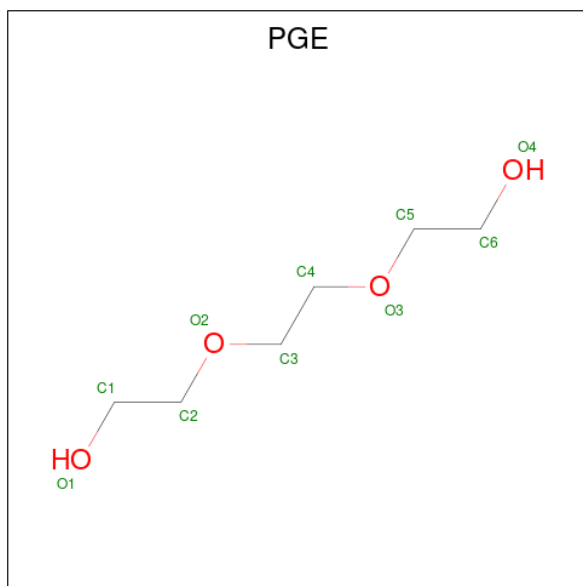
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total C O 7 4 3	0	0
4	D	1	Total C O 7 4 3	0	0

- Molecule 5 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C₂H₆OS).



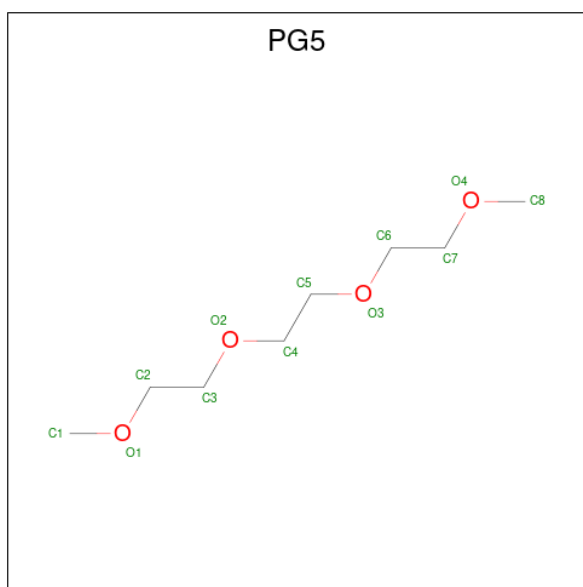
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O S 4 2 1 1	0	0
5	A	1	Total C O S 4 2 1 1	0	0
5	A	1	Total C O S 4 2 1 1	0	0
5	B	1	Total C O S 4 2 1 1	0	0
5	B	1	Total C O S 4 2 1 1	0	0
5	C	1	Total C O S 4 2 1 1	0	0
5	C	1	Total C O S 4 2 1 1	0	0
5	D	1	Total C O S 4 2 1 1	0	0
5	D	1	Total C O S 4 2 1 1	0	0

- Molecule 6 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$).



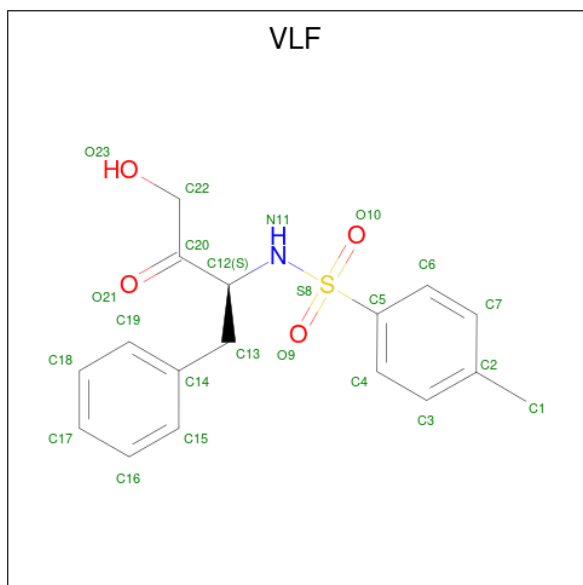
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 10 6 4	0	0
6	D	1	Total C O 10 6 4	0	0
6	D	1	Total C O 10 6 4	0	0

- Molecule 7 is 1-METHOXY-2-[2-(2-METHOXY-ETHOXY)]-ETHANE (three-letter code: PG5) (formula: $C_8H_{18}O_4$).



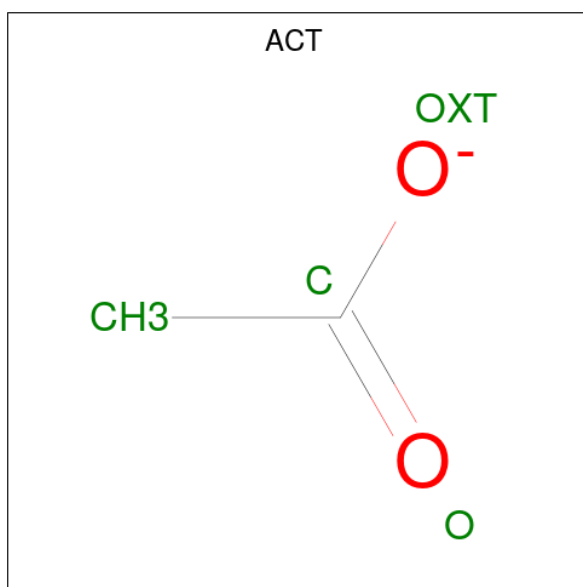
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			12	8	4		

- Molecule 8 is 4-methyl- {N}-[(2 {S})-4-oxidanyl-3-oxidanylidene-1-phenyl-butan-2-yl]benzenesulfonamide (three-letter code: VLF) (formula: C₁₇H₁₉NO₄S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	A	1	Total	C	N	O	S	0	0
			23	17	1	4	1		
8	D	1	Total	C	N	O	S	0	0
			23	17	1	4	1		

- Molecule 9 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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

- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	137	Total O 137 137	0	0
10	B	131	Total O 131 131	0	0
10	C	98	Total O 98 98	0	0
10	D	190	Total O 190 190	0	0

3 Residue-property plots


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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

- Molecule 1: Cathepsin L

Chain A:  92% 8%




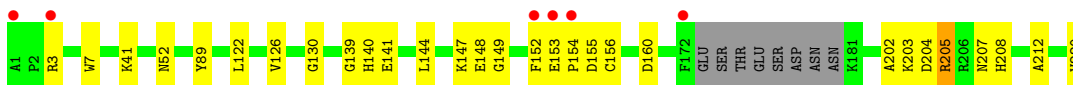
- Molecule 1: Cathepsin L

Chain B:  87% 10%




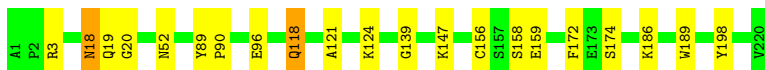
- Molecule 1: Cathepsin L

Chain C:  83% 13%



- Molecule 1: Cathepsin L

Chain D:  90% 9%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	56.96Å 62.73Å 67.37Å 105.06° 94.09° 115.54°	Depositor
Resolution (Å)	49.62 – 1.90 44.21 – 1.48	Depositor EDS
% Data completeness (in resolution range)	91.8 (49.62-1.90) 75.6 (44.21-1.48)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.42 (at 1.48Å)	Xtrriage
Refinement program	PHENIX 1.18_3861	Depositor
R, R_{free}	0.175 , 0.217 0.175 , 0.217	Depositor DCC
R_{free} test set	1977 reflections (1.65%)	wwPDB-VP
Wilson B-factor (Å ²)	12.6	Xtrriage
Anisotropy	0.185	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 42.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7609	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.38% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PG5, PEG, TQ8, DMS, ACT, PGE, VLF, EDO

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	0.39	0/1757	0.56	0/2374
1	B	0.45	0/1692	0.57	0/2284
1	C	0.37	0/1706	0.55	0/2301
1	D	0.43	0/1771	0.57	0/2392
All	All	0.41	0/6926	0.56	0/9351

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	206	ARG	Sidechain

5.2 Too-close contacts

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	1715	0	1583	12	0
1	B	1651	0	1535	13	0
1	C	1665	0	1553	17	0
1	D	1729	0	1595	16	0
2	A	22	0	16	1	0
2	B	22	0	16	0	0
2	C	22	0	16	1	0
2	D	22	0	16	1	0
3	A	4	0	6	2	0
3	B	4	0	6	0	0
3	C	4	0	6	0	0
3	D	16	0	24	2	0
4	A	14	0	20	1	0
4	B	7	0	10	0	0
4	C	21	0	30	0	0
4	D	7	0	10	2	0
5	A	12	0	18	0	0
5	B	8	0	12	0	0
5	C	8	0	12	0	0
5	D	8	0	12	0	0
6	A	10	0	14	2	0
6	D	20	0	28	4	0
7	A	12	0	18	1	0
8	A	23	0	0	0	0
8	D	23	0	0	0	0
9	B	4	0	3	0	0
10	A	137	0	0	0	0
10	B	131	0	0	0	0
10	C	98	0	0	0	0
10	D	190	0	0	1	0
All	All	7609	0	6559	61	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 4.

All (61) 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:A:207:ASN:HD21	1:A:212:ALA:H	1.13	0.94
1:C:152:PHE:O	1:C:208:HIS:NE2	2.10	0.85
1:C:41:LYS:HD3	1:C:220:VAL:HG12	1.57	0.85
1:C:207:ASN:HD21	1:C:212:ALA:H	1.28	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:207:ASN:HD21	1:B:212:ALA:H	1.33	0.76
1:A:207:ASN:ND2	1:A:212:ALA:H	1.89	0.66
1:D:118:GLN:HG2	1:D:121:ALA:H	1.61	0.65
1:B:101:ASN:OD1	1:B:103:LYS:HD3	1.97	0.65
1:C:147:LYS:HE3	1:D:147:LYS:HG2	1.80	0.64
1:A:2:PRO:HD3	3:A:302:EDO:H12	1.80	0.64
1:C:152:PHE:HA	1:C:208:HIS:CE1	2.34	0.62
1:D:90:PRO:HD2	6:D:308:PGE:H12	1.82	0.61
1:A:103:LYS:HZ3	7:A:306:PG5:H22	1.65	0.61
1:D:96:GLU:HB2	3:D:304:EDO:H11	1.82	0.59
1:A:153:GLU:H	1:A:208:HIS:CE1	2.20	0.59
1:A:128:THR:HG22	3:A:302:EDO:H21	1.83	0.58
1:A:139:GLY:HA2	2:A:301:TQ8:H212	1.86	0.58
1:D:18:ASN:ND2	1:D:20:GLY:H	2.04	0.55
1:B:153:GLU:H	1:B:208:HIS:CE1	2.26	0.54
1:B:124:LYS:HZ2	1:B:128:THR:HG21	1.73	0.53
6:D:308:PGE:H2	6:D:308:PGE:H62	1.89	0.52
1:B:124:LYS:NZ	1:B:128:THR:HG21	2.25	0.52
1:D:158[B]:SER:OG	1:D:159:GLU:OE2	2.28	0.52
1:C:203:LYS:NZ	1:C:204:ASP:OD2	2.43	0.51
1:B:52:ASN:HD21	1:B:100:TYR:HD1	1.57	0.51
1:D:18:ASN:HD22	1:D:20:GLY:H	1.57	0.51
1:B:148:GLU:HG2	1:B:149:GLY:N	2.27	0.50
1:B:52:ASN:ND2	1:B:84:ASP:H	2.09	0.50
1:D:189:TRP:NE1	4:D:302:PEG:H12	2.27	0.50
4:D:302:PEG:H42	4:D:302:PEG:H21	1.50	0.49
1:D:186:LYS:HG3	1:D:198:TYR:CZ	2.49	0.48
1:C:152:PHE:CE2	1:C:154:PRO:HA	2.49	0.48
1:C:140:HIS:N	1:C:140:HIS:CD2	2.82	0.48
1:C:148:GLU:HG2	1:C:149:GLY:N	2.29	0.48
1:D:96:GLU:CB	3:D:304:EDO:H11	2.44	0.47
1:B:207:ASN:ND2	1:B:212:ALA:H	2.07	0.47
1:C:202:ALA:HB3	1:C:208:HIS:ND1	2.30	0.47
1:D:3:ARG:HD3	1:D:172:PHE:CE1	2.50	0.47
1:A:7:TRP:CE2	1:A:130:GLY:HA2	2.49	0.46
1:B:146:TYR:CZ	1:B:199:VAL:HG23	2.50	0.46
1:C:122:LEU:O	1:C:126:VAL:HG23	2.15	0.46
1:A:88:SER:O	6:A:305:PGE:H32	2.16	0.46
4:A:303:PEG:H42	4:A:303:PEG:H21	1.74	0.45
1:A:148:GLU:HA	1:A:195[B]:MET:HE2	1.99	0.45
1:B:153:GLU:O	1:B:208:HIS:HE1	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:139:GLY:HA2	2:D:301:TQ8:H212	1.97	0.45
1:C:139:GLY:HA2	2:C:301:TQ8:H213	1.97	0.45
6:D:308:PGE:H2	6:D:308:PGE:H42	1.33	0.45
1:C:7:TRP:CE2	1:C:130:GLY:HA2	2.53	0.44
1:A:88:SER:O	6:A:305:PGE:H22	2.17	0.44
1:B:140:HIS:HE1	1:B:155:ASP:O	2.00	0.44
1:D:18:ASN:HD22	1:D:18:ASN:C	2.21	0.44
6:D:308:PGE:H62	6:D:308:PGE:H42	1.33	0.43
1:B:52:ASN:HD22	1:B:84:ASP:H	1.65	0.43
1:D:18:ASN:HD22	1:D:19:GLN:N	2.17	0.43
1:A:154:PRO:HG3	1:D:174:SER:HB2	2.01	0.42
1:D:124:LYS:HD3	10:D:471:HOH:O	2.18	0.42
1:C:152:PHE:O	1:C:208:HIS:CE1	2.71	0.42
1:C:152:PHE:CD1	1:C:205:ARG:NH1	2.88	0.41
1:C:141:GLU:HA	1:C:144:LEU:HD22	2.01	0.41
1:C:140:HIS:HE1	1:C:155:ASP:C	2.24	0.41

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	221/220 (100%)	216 (98%)	5 (2%)	0	100	100
1	B	210/220 (96%)	205 (98%)	5 (2%)	0	100	100
1	C	212/220 (96%)	206 (97%)	5 (2%)	1 (0%)	29	18
1	D	223/220 (101%)	217 (97%)	6 (3%)	0	100	100
All	All	866/880 (98%)	844 (98%)	21 (2%)	1 (0%)	51	42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	153	GLU

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	181/178 (102%)	178 (98%)	3 (2%)	60	57
1	B	172/178 (97%)	168 (98%)	4 (2%)	50	45
1	C	174/178 (98%)	168 (97%)	6 (3%)	37	28
1	D	183/178 (103%)	178 (97%)	5 (3%)	44	38
All	All	710/712 (100%)	692 (98%)	18 (2%)	46	41

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	ASN
1	A	89	TYR
1	A	156	CYS
1	B	89	TYR
1	B	117	LYS
1	B	156	CYS
1	B	160	ASP
1	C	3	ARG
1	C	52	ASN
1	C	89	TYR
1	C	156	CYS
1	C	160	ASP
1	C	205	ARG
1	D	18	ASN
1	D	52	ASN
1	D	89	TYR
1	D	118	GLN
1	D	156	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	75	GLN
1	A	118	GLN
1	A	207	ASN
1	B	52	ASN
1	B	207	ASN
1	C	75	GLN
1	C	80	ASN
1	C	207	ASN
1	D	18	ASN
1	D	19	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](#)

34 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	$\# Z > 2$
4	PEG	C	304	-	6,6,6	0.08	0	5,5,5	0.15	0
9	ACT	B	305	-	3,3,3	1.24	0	3,3,3	1.53	0
3	EDO	D	310	-	3,3,3	0.53	0	2,2,2	0.22	0
3	EDO	D	304	-	3,3,3	0.56	0	2,2,2	0.06	0
5	DMS	A	308	-	3,3,3	0.70	0	3,3,3	0.70	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PEG	A	309	-	6,6,6	0.06	0	5,5,5	0.30	0
3	EDO	D	307	-	3,3,3	0.53	0	2,2,2	0.29	0
6	PGE	A	305	-	9,9,9	0.19	0	8,8,8	0.13	0
8	VLF	A	310	-	24,24,24	0.16	0	30,33,33	0.43	0
3	EDO	B	303	-	3,3,3	0.49	0	2,2,2	0.28	0
3	EDO	C	307	-	3,3,3	0.51	0	2,2,2	0.27	0
5	DMS	C	305	-	3,3,3	0.67	0	3,3,3	0.67	0
6	PGE	D	305	-	9,9,9	0.18	0	8,8,8	0.08	0
2	TQ8	C	301	1	23,23,24	0.42	0	28,32,33	0.36	0
5	DMS	C	306	-	3,3,3	0.68	0	3,3,3	0.58	0
5	DMS	A	307	-	3,3,3	0.66	0	3,3,3	0.53	0
5	DMS	D	303	-	3,3,3	0.64	0	3,3,3	0.54	0
5	DMS	B	304	-	3,3,3	0.58	0	3,3,3	0.47	0
2	TQ8	A	301	1	23,23,24	0.16	0	28,32,33	0.25	0
5	DMS	B	306	-	3,3,3	0.67	0	3,3,3	0.70	0
4	PEG	C	303	-	6,6,6	0.11	0	5,5,5	0.13	0
4	PEG	D	302	-	6,6,6	0.62	0	5,5,5	0.74	0
4	PEG	C	302	-	6,6,6	0.14	0	5,5,5	0.14	0
2	TQ8	B	301	1	23,23,24	0.30	0	28,32,33	0.23	0
5	DMS	D	309	-	3,3,3	0.70	0	3,3,3	0.74	0
7	PG5	A	306	-	11,11,11	0.52	0	10,10,10	0.18	0
3	EDO	A	302	-	3,3,3	0.44	0	2,2,2	0.30	0
4	PEG	A	303	-	6,6,6	0.15	0	5,5,5	0.07	0
2	TQ8	D	301	1	23,23,24	0.20	0	28,32,33	0.29	0
4	PEG	B	302	-	6,6,6	0.15	0	5,5,5	0.11	0
8	VLF	D	311	-	24,24,24	0.18	0	30,33,33	0.43	0
6	PGE	D	308	-	9,9,9	0.38	0	8,8,8	1.14	0
3	EDO	D	306	-	3,3,3	0.44	0	2,2,2	0.38	0
5	DMS	A	304	-	3,3,3	0.66	0	3,3,3	0.62	0

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
4	PEG	C	304	-	-	1/4/4/4	-
3	EDO	D	310	-	-	1/1/1/1	-
3	EDO	D	304	-	-	0/1/1/1	-
4	PEG	A	309	-	-	2/4/4/4	-
3	EDO	D	307	-	-	0/1/1/1	-
6	PGE	A	305	-	-	7/7/7/7	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	VLF	A	310	-	-	7/20/21/21	0/2/2/2
3	EDO	B	303	-	-	0/1/1/1	-
3	EDO	C	307	-	-	0/1/1/1	-
6	PGE	D	305	-	-	3/7/7/7	-
2	TQ8	C	301	1	-	1/18/19/21	0/2/2/2
2	TQ8	A	301	1	-	1/18/19/21	0/2/2/2
4	PEG	C	303	-	-	0/4/4/4	-
4	PEG	D	302	-	-	3/4/4/4	-
4	PEG	C	302	-	-	2/4/4/4	-
2	TQ8	B	301	1	-	0/18/19/21	0/2/2/2
7	PG5	A	306	-	-	3/9/9/9	-
3	EDO	A	302	-	-	1/1/1/1	-
4	PEG	A	303	-	-	1/4/4/4	-
2	TQ8	D	301	1	-	0/18/19/21	0/2/2/2
4	PEG	B	302	-	-	2/4/4/4	-
8	VLF	D	311	-	-	4/20/21/21	0/2/2/2
6	PGE	D	308	-	-	4/7/7/7	-
3	EDO	D	306	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	D	311	VLF	C12-C20-C22-O23
8	D	311	VLF	O21-C20-C22-O23
7	A	306	PG5	O1-C2-C3-O2
4	B	302	PEG	C1-C2-O2-C3
6	A	305	PGE	O2-C3-C4-O3
4	A	303	PEG	C4-C3-O2-C2
4	B	302	PEG	O2-C3-C4-O4
8	A	310	VLF	C6-C5-S8-N11
4	A	309	PEG	O2-C3-C4-O4
6	D	308	PGE	C4-C3-O2-C2
8	A	310	VLF	C4-C5-S8-O10
8	A	310	VLF	C6-C5-S8-O10
8	A	310	VLF	C12-N11-S8-O9
6	D	308	PGE	C6-C5-O3-C4

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Mol	Chain	Res	Type	Atoms
3	A	302	EDO	O1-C1-C2-O2
3	D	310	EDO	O1-C1-C2-O2
8	A	310	VLF	C4-C5-S8-N11
4	C	302	PEG	O1-C1-C2-O2
6	D	308	PGE	O2-C3-C4-O3
8	A	310	VLF	C12-N11-S8-O10
4	D	302	PEG	O1-C1-C2-O2
4	D	302	PEG	O2-C3-C4-O4
6	A	305	PGE	O3-C5-C6-O4
6	A	305	PGE	O1-C1-C2-O2
4	D	302	PEG	C4-C3-O2-C2
8	A	310	VLF	C12-N11-S8-C5
6	A	305	PGE	C1-C2-O2-C3
7	A	306	PG5	C4-C5-O3-C6
6	D	305	PGE	C6-C5-O3-C4
6	D	305	PGE	C1-C2-O2-C3
6	A	305	PGE	C3-C4-O3-C5
6	D	308	PGE	O3-C5-C6-O4
6	A	305	PGE	C4-C3-O2-C2
2	A	301	TQ8	C3-C1-C4-O5
7	A	306	PG5	C6-C7-O4-C8
4	A	309	PEG	O1-C1-C2-O2
6	D	305	PGE	C4-C3-O2-C2
6	A	305	PGE	C6-C5-O3-C4
4	C	304	PEG	O2-C3-C4-O4
4	C	302	PEG	C4-C3-O2-C2
2	C	301	TQ8	C3-C1-C4-C22
8	D	311	VLF	C4-C5-S8-O9
8	D	311	VLF	C6-C5-S8-O9

There are no ring outliers.

10 monomers are involved in 17 short contacts:

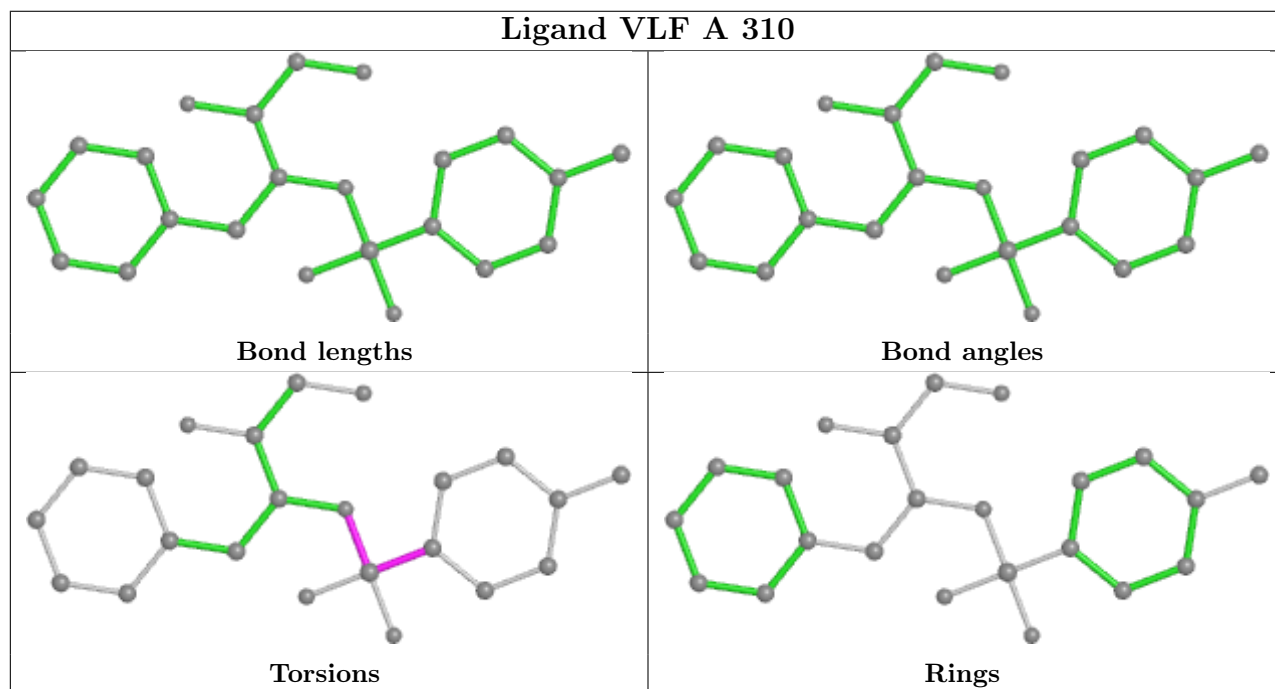
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	304	EDO	2	0
6	A	305	PGE	2	0
2	C	301	TQ8	1	0
2	A	301	TQ8	1	0
4	D	302	PEG	2	0
7	A	306	PG5	1	0
3	A	302	EDO	2	0
4	A	303	PEG	1	0

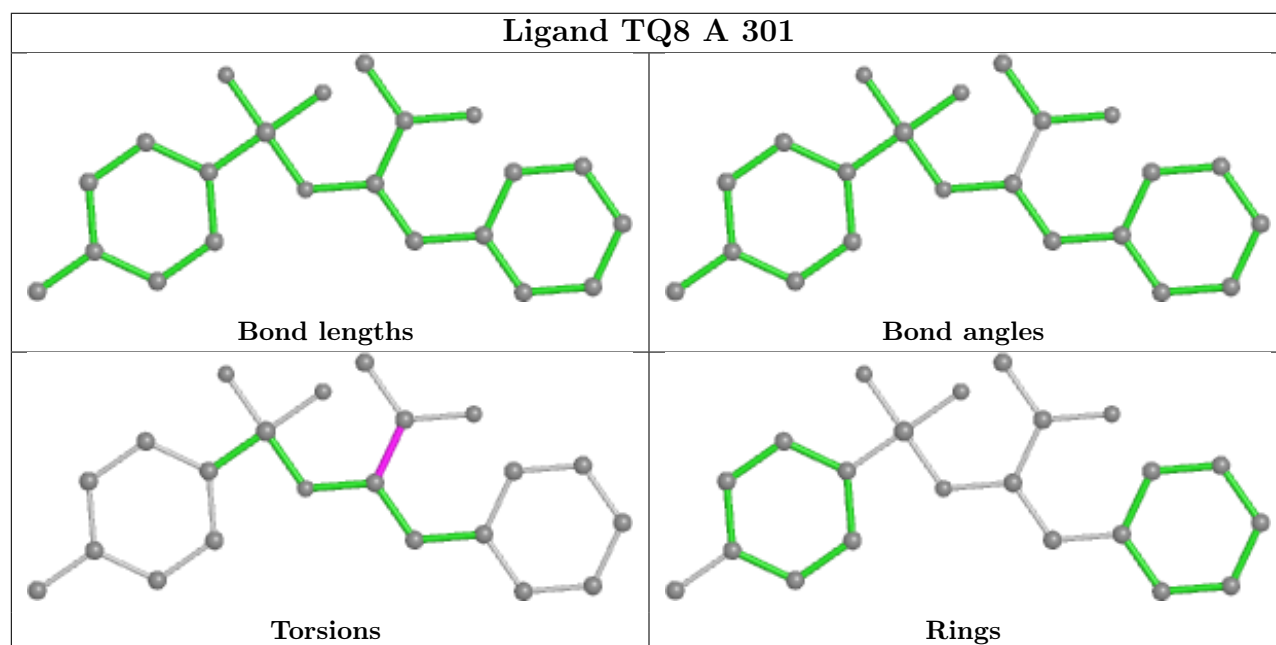
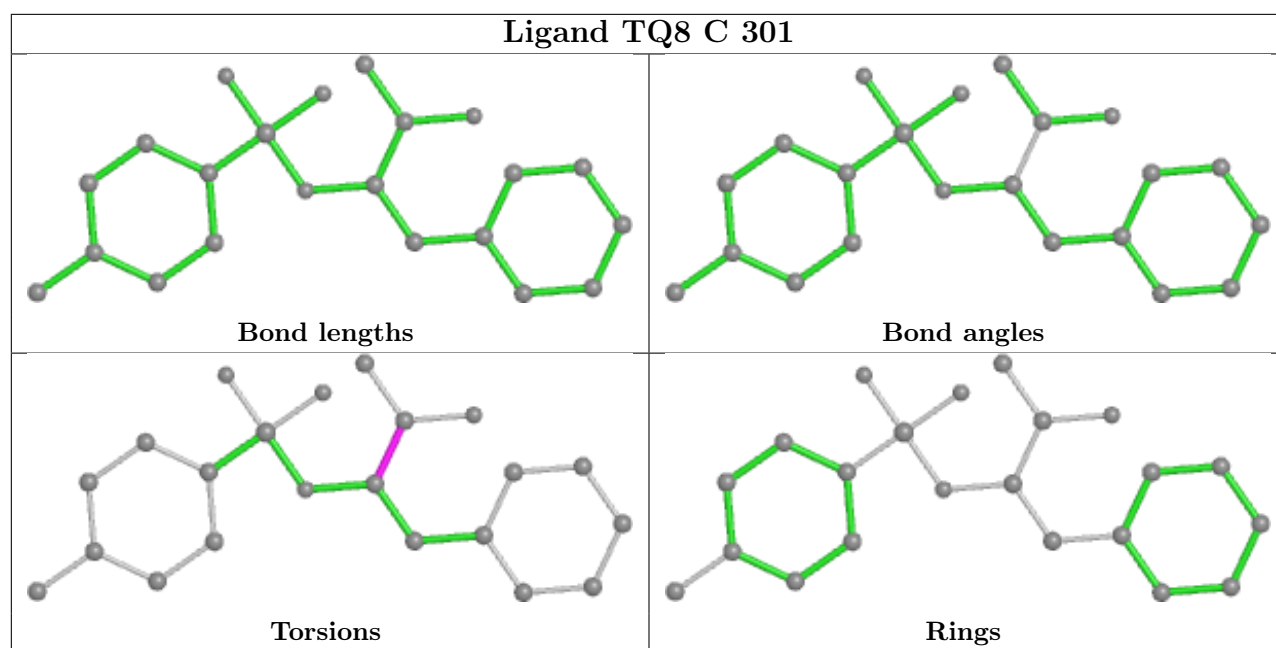
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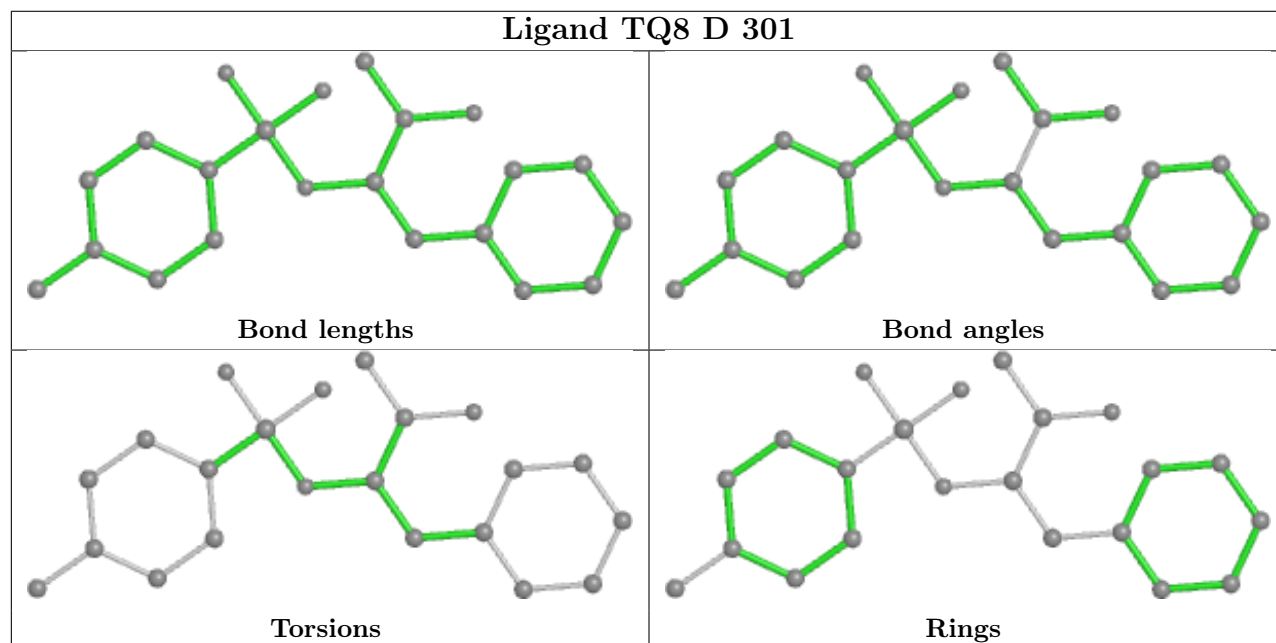
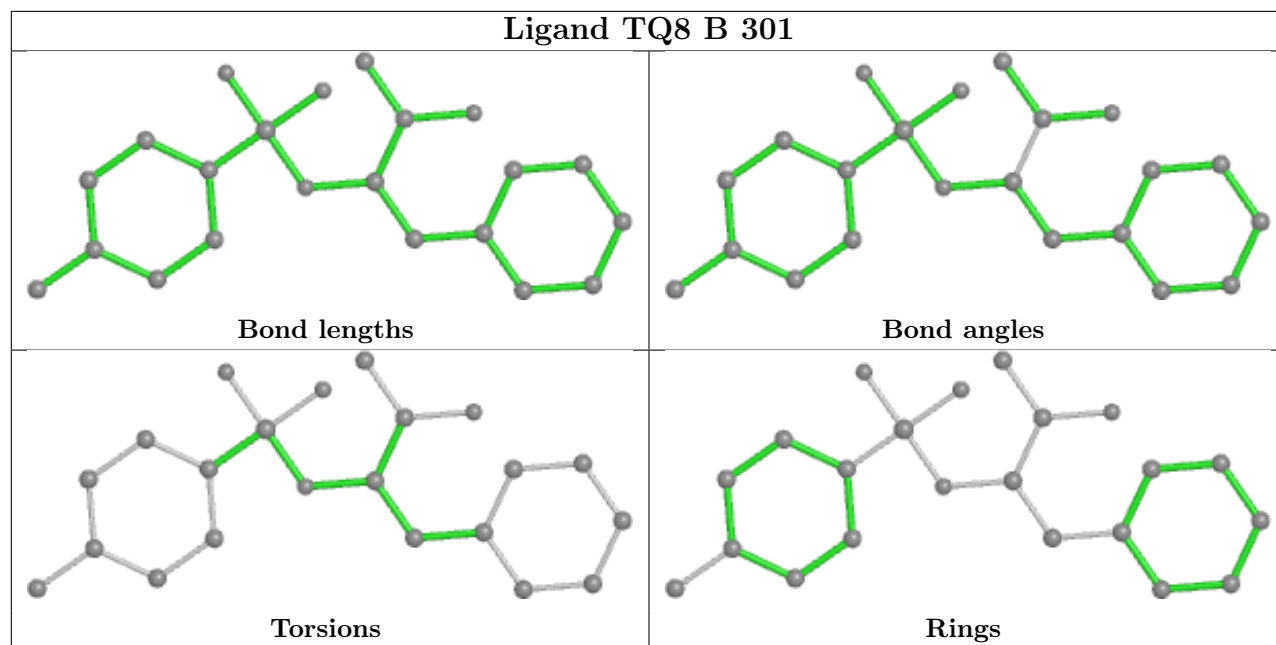
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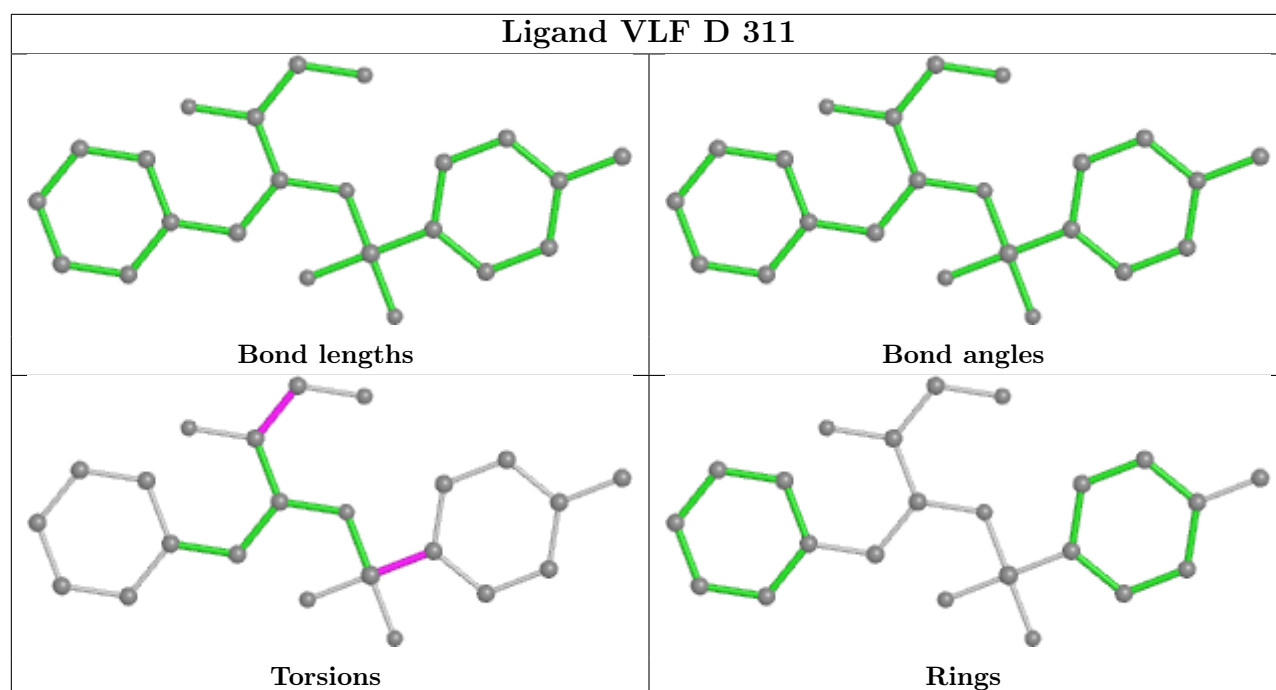
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	301	TQ8	1	0
6	D	308	PGE	4	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	220/220 (100%)	-0.36	0 100 100	12, 21, 34, 50	0
1	B	212/220 (96%)	-0.24	2 (0%) 84 85	11, 19, 37, 49	0
1	C	212/220 (96%)	-0.06	6 (2%) 53 56	13, 23, 47, 64	0
1	D	220/220 (100%)	-0.47	0 100 100	12, 17, 28, 42	0
All	All	864/880 (98%)	-0.28	8 (0%) 84 85	11, 20, 37, 64	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	1	ALA	5.0
1	C	154	PRO	4.2
1	C	172	PHE	3.6
1	C	152	PHE	3.5
1	C	3	ARG	3.4
1	B	154	PRO	2.8
1	B	155	ASP	2.8
1	C	153	GLU	2.2

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

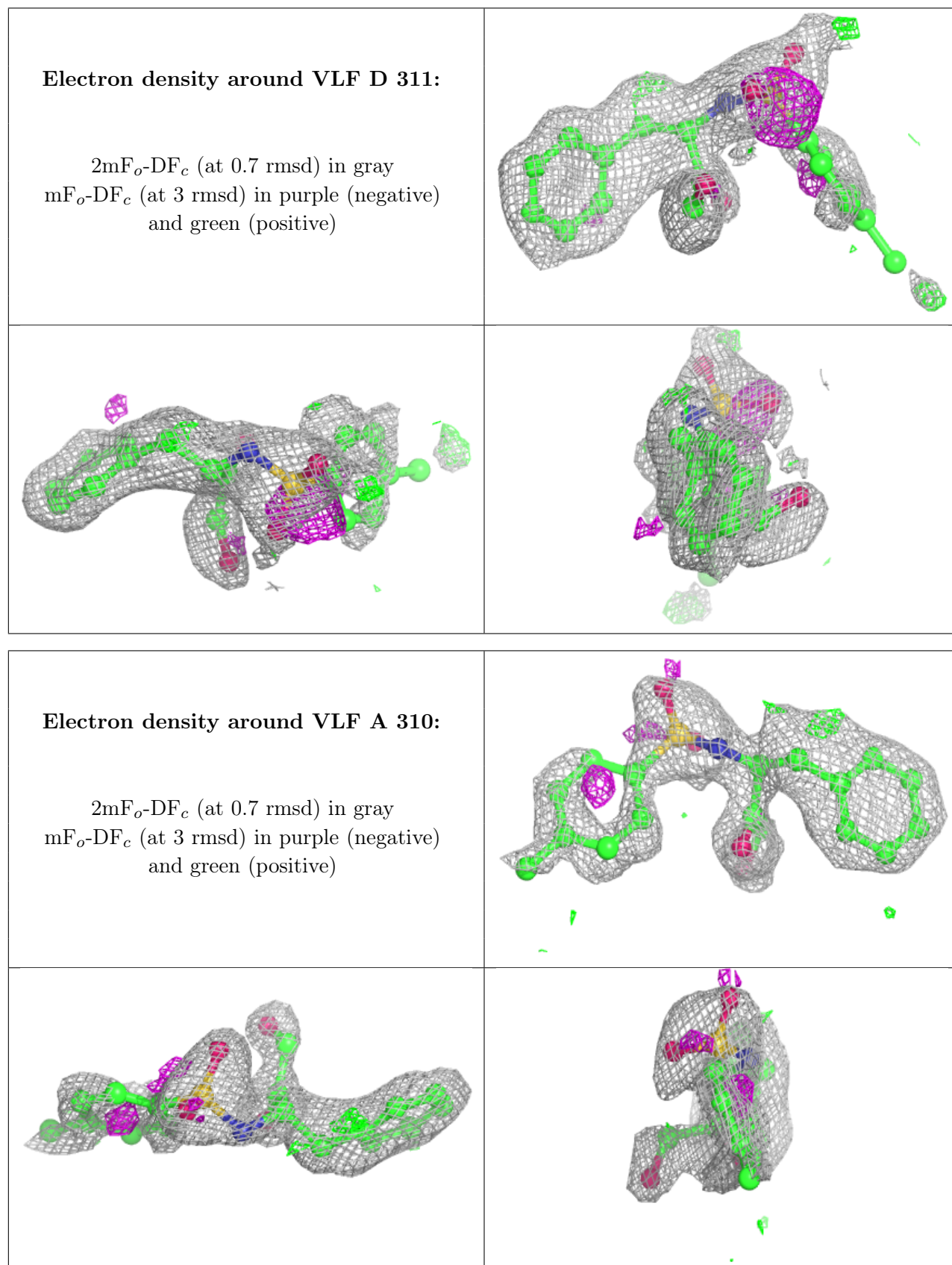
6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	PGE	D	308	10/10	0.73	0.20	34,47,60,61	0
4	PEG	D	302	7/7	0.76	0.16	29,36,38,43	0
8	VLF	D	311	23/23	0.77	0.27	27,39,57,62	0
6	PGE	D	305	10/10	0.80	0.13	28,34,39,49	0
4	PEG	A	303	7/7	0.80	0.15	33,36,46,49	0
7	PG5	A	306	12/12	0.80	0.16	28,39,46,46	0
3	EDO	D	310	4/4	0.80	0.19	35,37,41,42	0
4	PEG	C	302	7/7	0.81	0.15	35,37,47,47	0
4	PEG	B	302	7/7	0.81	0.19	26,35,39,45	0
3	EDO	D	307	4/4	0.82	0.11	27,32,35,37	0
3	EDO	C	307	4/4	0.82	0.15	37,39,43,43	0
3	EDO	D	304	4/4	0.83	0.18	27,33,38,43	0
4	PEG	C	303	7/7	0.84	0.18	32,37,43,43	0
5	DMS	A	307	4/4	0.84	0.35	29,36,53,56	0
3	EDO	B	303	4/4	0.85	0.11	29,32,36,40	0
8	VLF	A	310	23/23	0.85	0.25	32,42,49,52	0
6	PGE	A	305	10/10	0.85	0.17	29,37,40,45	0
9	ACT	B	305	4/4	0.85	0.14	29,32,34,34	0
5	DMS	A	308	4/4	0.87	0.13	39,41,47,67	0
5	DMS	B	306	4/4	0.88	0.12	38,41,52,63	0
4	PEG	C	304	7/7	0.88	0.11	29,31,37,38	0
4	PEG	A	309	7/7	0.89	0.26	28,35,39,48	0
3	EDO	A	302	4/4	0.90	0.21	38,40,40,43	0
5	DMS	B	304	4/4	0.90	0.15	30,37,44,53	0
5	DMS	C	305	4/4	0.91	0.10	35,36,56,58	0
5	DMS	C	306	4/4	0.91	0.14	30,37,41,53	0
3	EDO	D	306	4/4	0.91	0.20	21,27,31,37	0
2	TQ8	A	301	22/23	0.92	0.17	21,28,36,39	0
2	TQ8	C	301	22/23	0.93	0.15	20,33,38,41	0
5	DMS	D	303	4/4	0.93	0.11	24,30,30,42	0
2	TQ8	B	301	22/23	0.93	0.20	18,30,38,39	0
5	DMS	D	309	4/4	0.94	0.11	28,32,36,47	0
5	DMS	A	304	4/4	0.95	0.13	32,38,44,49	0
2	TQ8	D	301	22/23	0.95	0.14	19,24,30,36	0

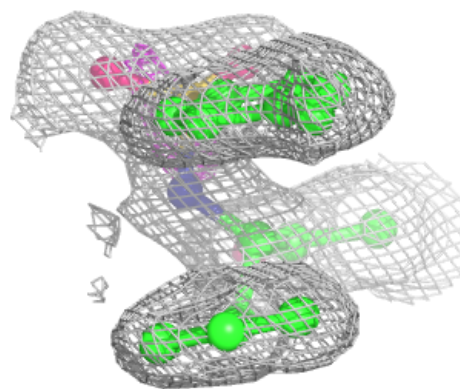
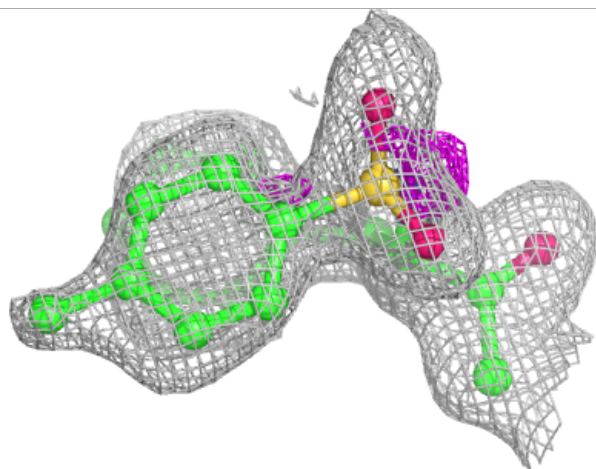
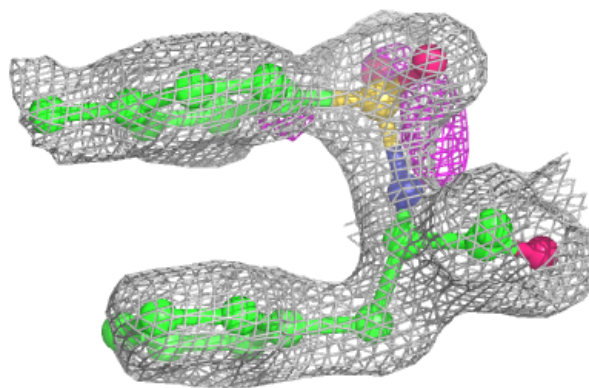
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers

as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



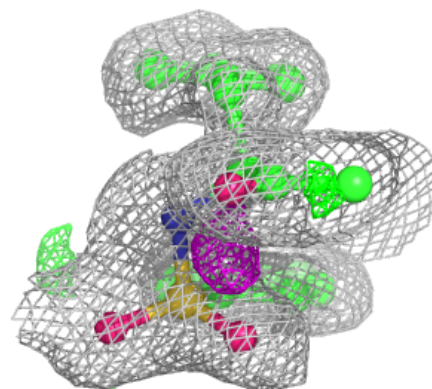
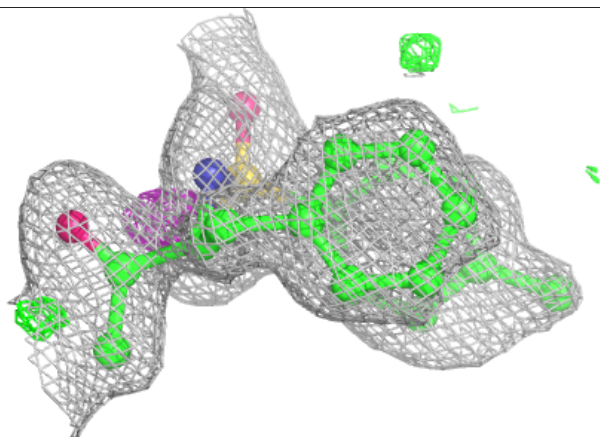
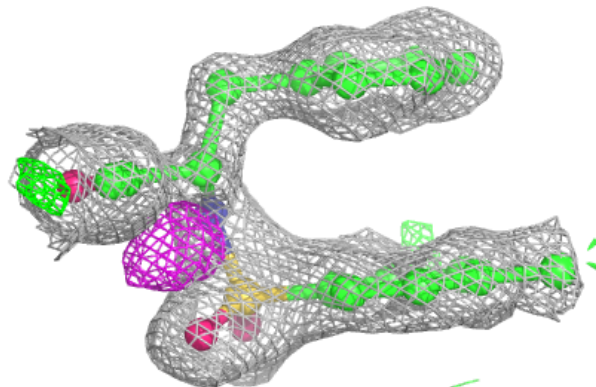
Electron density around TQ8 A 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



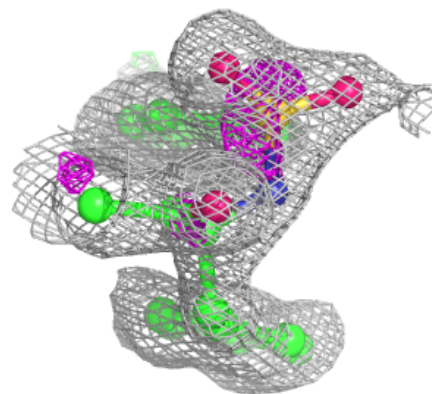
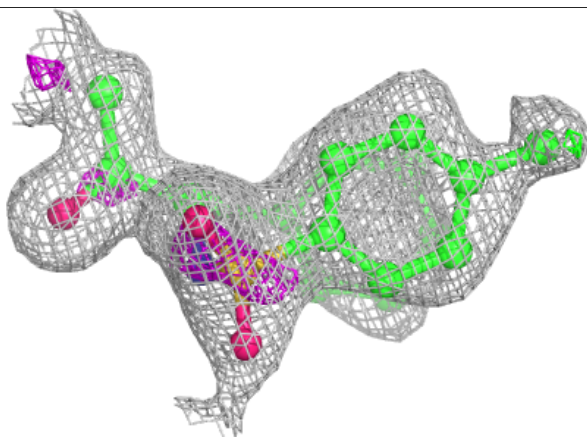
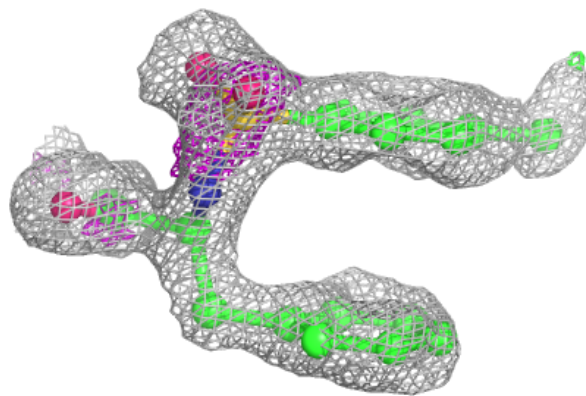
Electron density around TQ8 C 301:

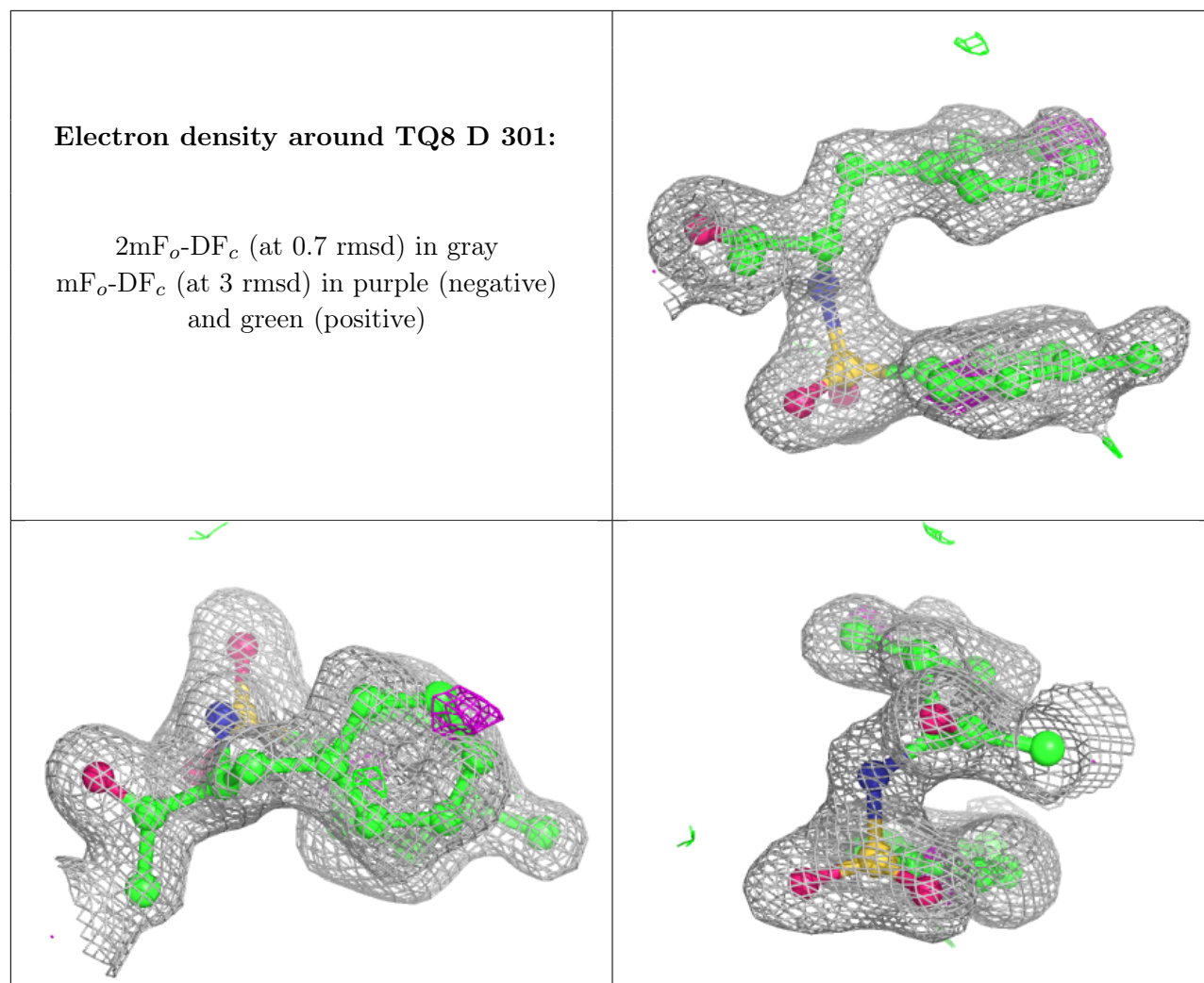
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around TQ8 B 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers [i](#)

There are no such residues in this entry.