



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 16, 2024 – 01:56 am GMT

PDB ID : 8OQV
Title : Structure of Mycobacterium tuberculosis beta-oxidation trifunctional enzyme in complex with Fragment-M-109
Authors : Dalwani, S.; Wierenga, R.K.; Venkatesan, R.
Deposited on : 2023-04-12
Resolution : 2.78 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 ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (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

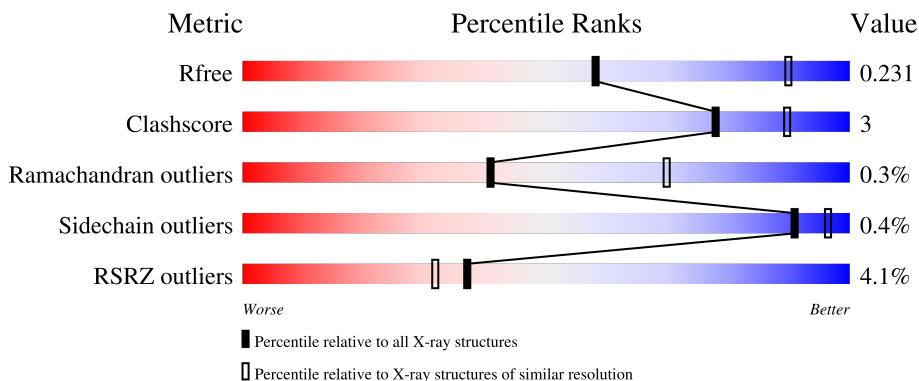
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.78 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	4107 (2.80-2.76)
Clashscore	141614	4575 (2.80-2.76)
Ramachandran outliers	138981	4487 (2.80-2.76)
Sidechain outliers	138945	4489 (2.80-2.76)
RSRZ outliers	127900	4027 (2.80-2.76)

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	736	5% (poor fit), 91% (0-1 outliers), 7% (2-3 outliers), 0% (4+ outliers)
1	B	736	2% (poor fit), 94% (0-1 outliers), 5% (2-3 outliers), 0% (4+ outliers)
2	C	403	4% (poor fit), 87% (0-1 outliers), 12% (2-3 outliers), 0% (4+ outliers)
2	D	403	5% (poor fit), 87% (0-1 outliers), 12% (2-3 outliers), 0% (4+ outliers)

2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 16917 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 3-hydroxyacyl-CoA dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	726	5396	3413	928	1034	21	0	0	0
1	B	728	5396	3414	929	1032	21	0	1	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	MET	-	initiating methionine	UNP O53872
A	-14	GLY	-	expression tag	UNP O53872
A	-13	SER	-	expression tag	UNP O53872
A	-12	SER	-	expression tag	UNP O53872
A	-11	HIS	-	expression tag	UNP O53872
A	-10	HIS	-	expression tag	UNP O53872
A	-9	HIS	-	expression tag	UNP O53872
A	-8	HIS	-	expression tag	UNP O53872
A	-7	HIS	-	expression tag	UNP O53872
A	-6	HIS	-	expression tag	UNP O53872
A	-5	SER	-	expression tag	UNP O53872
A	-4	GLN	-	expression tag	UNP O53872
A	-3	ASP	-	expression tag	UNP O53872
A	-2	PRO	-	expression tag	UNP O53872
A	-1	ASN	-	expression tag	UNP O53872
A	0	SER	-	expression tag	UNP O53872
B	-15	MET	-	initiating methionine	UNP O53872
B	-14	GLY	-	expression tag	UNP O53872
B	-13	SER	-	expression tag	UNP O53872
B	-12	SER	-	expression tag	UNP O53872
B	-11	HIS	-	expression tag	UNP O53872
B	-10	HIS	-	expression tag	UNP O53872
B	-9	HIS	-	expression tag	UNP O53872
B	-8	HIS	-	expression tag	UNP O53872
B	-7	HIS	-	expression tag	UNP O53872

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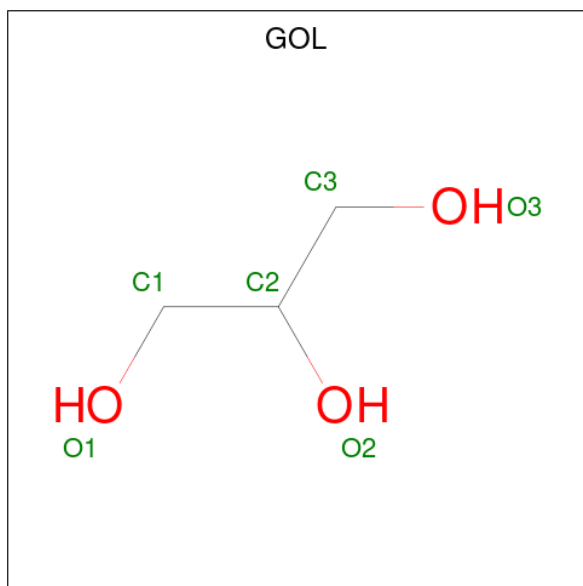
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	HIS	-	expression tag	UNP O53872
B	-5	SER	-	expression tag	UNP O53872
B	-4	GLN	-	expression tag	UNP O53872
B	-3	ASP	-	expression tag	UNP O53872
B	-2	PRO	-	expression tag	UNP O53872
B	-1	ASN	-	expression tag	UNP O53872
B	0	SER	-	expression tag	UNP O53872

- Molecule 2 is a protein called Putative acyltransferase Rv0859.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	399	Total 2943	C 1839	N 521	O 568	S 15	0	0	0
2	D	398	Total 2931	C 1828	N 521	O 567	S 15	0	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



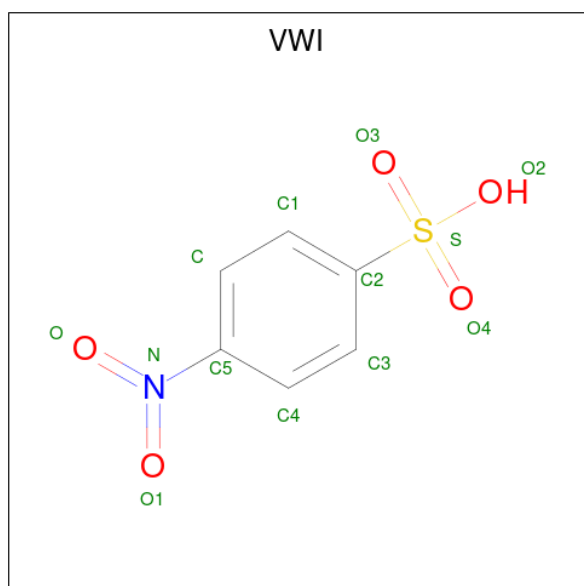
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is 4-nitrobenzenesulfonic acid (three-letter code: VWI) (formula: $C_6H_5NO_5S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
5	A	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	A	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	A	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	A	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	B	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	B	1	Total	C	N	O	S	0	0
			13	6	1	5	1		
5	B	1	Total	C	N	O	S	0	0
			13	6	1	5	1		

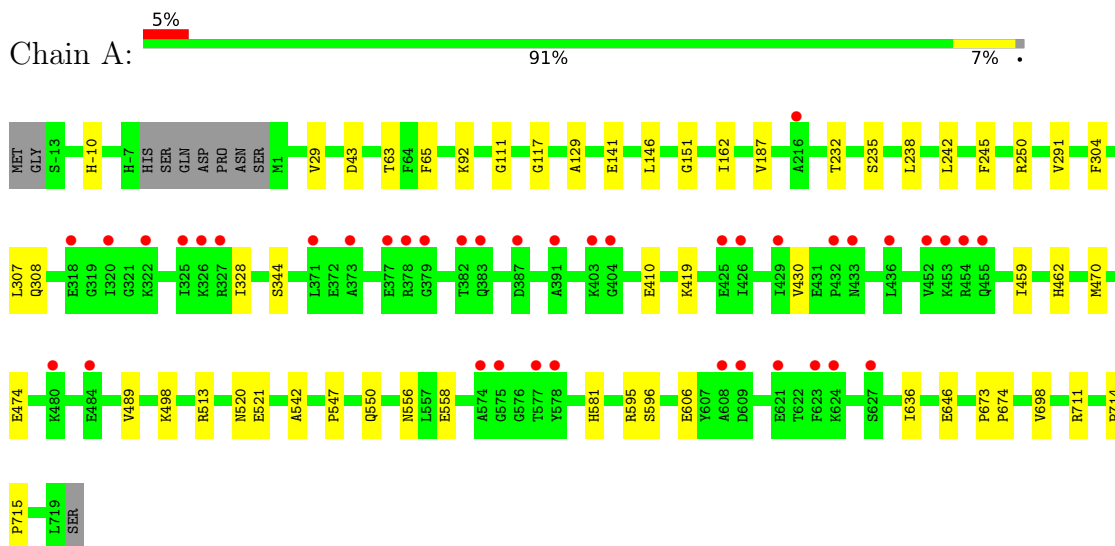
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	15	Total O 15 15	0	0
6	B	15	Total O 15 15	0	0
6	C	12	Total O 12 12	0	0
6	D	8	Total O 8 8	0	0

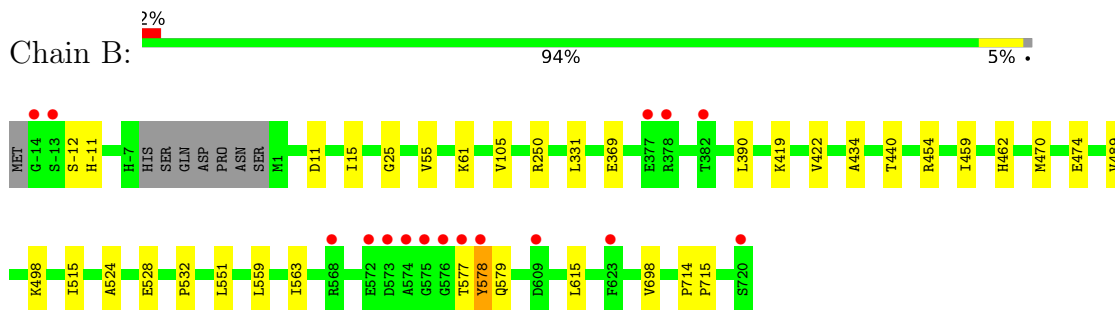
3 Residue-property plots [i](#)

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 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.

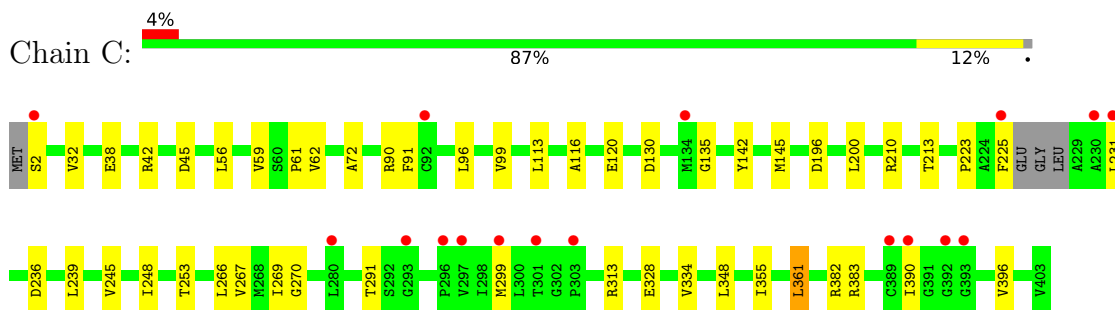
- Molecule 1: 3-hydroxyacyl-CoA dehydrogenase



- Molecule 1: 3-hydroxyacyl-CoA dehydrogenase



- Molecule 2: Putative acyltransferase Rv0859



- Molecule 2: Putative acyltransferase Rv0859



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	248.79Å 135.63Å 119.70Å 90.00° 110.63° 90.00°	Depositor
Resolution (Å)	45.51 – 2.78 45.51 – 2.78	Depositor EDS
% Data completeness (in resolution range)	85.9 (45.51-2.78) 86.0 (45.51-2.78)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.20 (at 2.77Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.200 , 0.234 0.198 , 0.231	Depositor DCC
R_{free} test set	3999 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å ²)	70.5	Xtrriage
Anisotropy	0.010	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 38.3	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	0.94	EDS
Total number of atoms	16917	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.62% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, VWI, SO4

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	0.24	0/5498	0.45	0/7444
1	B	0.24	0/5501	0.46	0/7449
2	C	0.24	0/2987	0.49	0/4044
2	D	0.24	0/2974	0.49	0/4026
All	All	0.24	0/16960	0.47	0/22963

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	5396	0	5417	26	0
1	B	5396	0	5416	20	0
2	C	2943	0	2958	30	0
2	D	2931	0	2944	29	0
3	A	6	0	8	0	0
3	B	6	0	8	0	0
4	A	20	0	0	0	0
4	B	10	0	0	0	0
4	C	30	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	25	0	0	0	0
5	A	65	0	0	0	0
5	B	39	0	0	0	0
6	A	15	0	0	0	0
6	B	15	0	0	0	0
6	C	12	0	0	0	0
6	D	8	0	0	0	0
All	All	16917	0	16751	97	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 (97) 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:250:ARG:NH1	2:D:142:TYR:O	2.20	0.75
1:B:250:ARG:NH1	2:C:142:TYR:O	2.23	0.71
1:A:462:HIS:HB3	1:A:474:GLU:HB3	1.83	0.59
2:D:62:VAL:HG21	2:D:130:ASP:HA	1.83	0.59
2:D:151:ILE:HD13	2:D:234:PHE:HB2	1.85	0.59
2:D:382:ARG:HG3	2:D:383:ARG:HG3	1.83	0.59
1:B:462:HIS:HB3	1:B:474:GLU:HB3	1.85	0.58
2:C:291:THR:HG22	2:C:396:VAL:HG23	1.85	0.58
2:C:90:ARG:NH2	2:D:53:ASP:OD2	2.35	0.57
2:C:96:LEU:HD23	2:C:396:VAL:HG13	1.87	0.56
2:C:62:VAL:HG12	2:D:62:VAL:HG22	1.89	0.55
2:C:72:ALA:HA	2:D:134:MET:HE3	1.89	0.55
1:A:146:LEU:HD22	1:A:291:VAL:HG22	1.90	0.54
1:B:470:MET:O	1:B:498:LYS:NZ	2.35	0.54
2:C:382:ARG:HG3	2:C:383:ARG:HG3	1.90	0.54
2:D:369:LEU:HD12	2:D:386:ILE:HD13	1.89	0.54
2:D:300:LEU:HD13	2:D:333:VAL:HG21	1.90	0.54
2:C:62:VAL:HG11	2:C:130:ASP:HA	1.90	0.53
2:D:99:VAL:HG13	2:D:269:ILE:HD11	1.89	0.53
1:A:-10:HIS:NE2	1:A:43:ASP:OD2	2.39	0.52
2:C:313:ARG:HD3	2:D:110:TRP:CD1	2.45	0.52
1:B:698:VAL:HG13	1:B:714:PRO:HG3	1.91	0.51
2:C:210:ARG:O	2:C:213:THR:OG1	2.23	0.51
1:A:129:ALA:HB2	1:A:187:VAL:HG21	1.92	0.51
1:B:434:ALA:O	1:B:454:ARG:NH2	2.39	0.51
2:D:293:GLY:HA2	2:D:302:GLY:HA2	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:459:ILE:HG21	1:A:489:VAL:HG21	1.93	0.50
1:A:304:PHE:O	1:A:308:GLN:HG2	2.11	0.50
2:D:241:LYS:HD3	2:D:297:VAL:HG21	1.95	0.48
1:B:55:VAL:HB	1:B:105:VAL:HG22	1.96	0.48
2:D:173:ARG:NH2	2:D:348:LEU:O	2.44	0.48
1:A:520:ASN:HB3	1:A:581:HIS:CE1	2.49	0.47
1:A:558:GLU:HG2	1:A:596:SER:HB2	1.95	0.47
2:C:91:PHE:HB2	2:C:390:ILE:HG23	1.96	0.47
1:B:250:ARG:NH1	2:C:145:MET:HG2	2.28	0.47
2:C:99:VAL:HG13	2:C:269:ILE:HD11	1.96	0.47
2:D:160:GLU:HG3	2:D:336:LYS:HG3	1.95	0.47
1:B:25:GLY:O	1:B:61:LYS:NZ	2.42	0.47
2:C:223:PRO:HB2	2:C:225:PHE:CD2	2.49	0.47
1:B:578:TYR:CG	1:B:579:GLN:N	2.82	0.47
2:C:116:ALA:O	2:C:267:VAL:N	2.44	0.47
2:C:2:SER:N	2:D:2:SER:HG	2.13	0.47
2:C:334:VAL:HG12	2:C:348:LEU:HD21	1.96	0.47
2:C:266:LEU:HD23	2:C:266:LEU:HA	1.82	0.47
1:B:331:LEU:HD13	1:B:422:VAL:HG12	1.96	0.46
2:D:38:GLU:HG3	2:D:42:ARG:HD2	1.97	0.46
2:C:38:GLU:HG3	2:C:42:ARG:HD2	1.96	0.46
2:C:59:VAL:HG21	2:C:361:LEU:HB3	1.99	0.45
2:D:147:VAL:HG21	2:D:238:ALA:HB2	1.96	0.45
2:D:390:ILE:HB	2:D:394:MET:HB2	1.98	0.45
1:A:470:MET:O	1:A:498:LYS:NZ	2.44	0.45
2:C:120:GLU:HG2	2:C:361:LEU:HB2	1.99	0.45
2:C:328:GLU:HB3	2:C:355:ILE:HG13	1.99	0.45
2:C:59:VAL:O	2:C:61:PRO:HD3	2.17	0.45
2:C:239:LEU:HD21	2:C:248:ILE:HG13	1.99	0.45
2:D:258:SER:HB2	2:D:359:HIS:HB2	1.99	0.45
1:B:459:ILE:HG21	1:B:489:VAL:HG21	1.98	0.45
2:C:32:VAL:HG11	2:C:56:LEU:HD11	1.99	0.44
2:C:196:ASP:OD1	2:C:200:LEU:N	2.49	0.44
1:B:-12:SER:OG	1:B:-11:HIS:N	2.51	0.44
2:D:210:ARG:O	2:D:213:THR:OG1	2.27	0.44
1:A:521:GLU:OE2	1:A:711:ARG:NE	2.36	0.43
1:A:232:THR:O	1:A:235:SER:OG	2.35	0.43
1:B:524:ALA:O	1:B:528:GLU:HG3	2.19	0.43
2:D:149:GLN:HG3	2:D:300:LEU:HD21	2.00	0.43
1:A:92:LYS:HD3	1:A:151:GLY:N	2.33	0.43
2:C:239:LEU:HD22	2:C:245:VAL:HG13	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:673:PRO:HA	1:A:674:PRO:HD3	1.92	0.43
1:B:714:PRO:HA	1:B:715:PRO:HD3	1.94	0.42
1:A:547:PRO:HG2	1:A:550:GLN:HB3	2.00	0.42
1:B:532:PRO:HB2	1:B:615:LEU:HD13	2.02	0.42
2:D:149:GLN:HG2	2:D:300:LEU:HD11	2.01	0.42
1:A:63:THR:HA	1:A:111:GLY:HA3	2.02	0.42
1:A:698:VAL:HG13	1:A:714:PRO:HG3	2.01	0.42
1:B:369:GLU:HG2	1:B:390:LEU:HD13	2.02	0.42
2:C:231:LEU:HD23	2:C:231:LEU:HA	1.85	0.42
1:A:513:ARG:NE	1:A:646:GLU:OE2	2.41	0.41
2:D:381:ALA:O	2:D:402:ARG:NE	2.43	0.41
1:B:11:ASP:OD1	1:B:15:ILE:N	2.49	0.41
2:D:252:HIS:CE1	2:D:330:PHE:HB3	2.55	0.41
1:A:410:GLU:OE2	1:A:419:LYS:NZ	2.54	0.41
1:B:559:LEU:O	1:B:563:ILE:HG13	2.20	0.41
1:B:515:ILE:HD11	1:B:551:LEU:HD21	2.02	0.41
1:A:242:LEU:HD12	1:A:245:PHE:CD2	2.56	0.41
1:B:419:LYS:HE2	1:B:440:THR:HB	2.02	0.41
2:D:253:THR:N	2:D:256:ASN:OD1	2.39	0.41
2:D:328:GLU:HB3	2:D:355:ILE:HG13	2.02	0.41
1:A:328:ILE:HD12	1:A:344:SER:HB3	2.02	0.41
1:A:542:ALA:HB2	1:A:636:ILE:HG23	2.03	0.41
2:C:223:PRO:HA	2:C:253:THR:HG22	2.03	0.41
2:D:155:LEU:HD23	2:D:298:ILE:HG13	2.03	0.41
1:A:162:ILE:HD12	1:A:238:LEU:HD21	2.03	0.41
1:A:65:PHE:HB3	1:A:117:GLY:CA	2.51	0.40
2:C:113:LEU:HD12	2:C:270:GLY:HA3	2.03	0.40
1:A:595:ARG:HH22	1:A:606:GLU:HG2	1.86	0.40
2:D:252:HIS:HE1	2:D:332:SER:H	1.70	0.40
1:A:714:PRO:HA	1:A:715:PRO:HD3	1.97	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	722/736 (98%)	689 (95%)	31 (4%)	2 (0%)	41	70
1	B	725/736 (98%)	698 (96%)	26 (4%)	1 (0%)	51	80
2	C	395/403 (98%)	376 (95%)	16 (4%)	3 (1%)	19	47
2	D	394/403 (98%)	375 (95%)	18 (5%)	1 (0%)	41	70
All	All	2236/2278 (98%)	2138 (96%)	91 (4%)	7 (0%)	41	70

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	361	LEU
1	B	578	TYR
2	D	361	LEU
2	C	135	GLY
1	A	556	ASN
2	C	299	MET
1	A	430	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	554/566 (98%)	551 (100%)	3 (0%)	88	95
1	B	553/566 (98%)	552 (100%)	1 (0%)	93	98
2	C	306/310 (99%)	304 (99%)	2 (1%)	84	94
2	D	305/310 (98%)	304 (100%)	1 (0%)	92	97
All	All	1718/1752 (98%)	1711 (100%)	7 (0%)	91	96

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	VAL

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Mol	Chain	Res	Type
1	A	141	GLU
1	A	307	LEU
1	B	577	THR
2	C	45	ASP
2	C	236	ASP
2	D	276	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	D	149	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](#)

27 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	SO4	D	501	-	4,4,4	0.14	0	6,6,6	0.05	0
4	SO4	D	505	-	4,4,4	0.15	0	6,6,6	0.05	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	C	502	-	4,4,4	0.14	0	6,6,6	0.05	0
5	VWI	B	806	-	13,13,13	0.18	0	19,19,19	0.19	0
5	VWI	A	806	-	13,13,13	0.25	0	19,19,19	0.18	0
4	SO4	A	805	-	4,4,4	0.14	0	6,6,6	0.04	0
5	VWI	A	807	-	13,13,13	0.24	0	19,19,19	0.19	0
4	SO4	C	503	-	4,4,4	0.14	0	6,6,6	0.05	0
5	VWI	A	808	-	13,13,13	0.25	0	19,19,19	0.19	0
4	SO4	B	802	-	4,4,4	0.14	0	6,6,6	0.04	0
5	VWI	A	810	-	13,13,13	0.21	0	19,19,19	0.19	0
4	SO4	C	505	-	4,4,4	0.14	0	6,6,6	0.05	0
4	SO4	A	802	-	4,4,4	0.14	0	6,6,6	0.04	0
3	GOL	B	801	-	5,5,5	0.92	0	5,5,5	1.00	0
5	VWI	B	804	-	13,13,13	0.25	0	19,19,19	0.18	0
4	SO4	D	502	-	4,4,4	0.14	0	6,6,6	0.05	0
4	SO4	C	504	-	4,4,4	0.14	0	6,6,6	0.05	0
4	SO4	A	804	-	4,4,4	0.14	0	6,6,6	0.06	0
4	SO4	D	504	-	4,4,4	0.14	0	6,6,6	0.26	0
4	SO4	D	503	-	4,4,4	0.14	0	6,6,6	0.05	0
4	SO4	C	501	-	4,4,4	0.14	0	6,6,6	0.06	0
4	SO4	C	506	-	4,4,4	0.14	0	6,6,6	0.05	0
5	VWI	A	809	-	13,13,13	0.22	0	19,19,19	0.18	0
4	SO4	A	803	-	4,4,4	0.14	0	6,6,6	0.06	0
5	VWI	B	805	-	13,13,13	0.26	0	19,19,19	0.19	0
4	SO4	B	803	-	4,4,4	0.14	0	6,6,6	0.05	0
3	GOL	A	801	-	5,5,5	0.91	0	5,5,5	1.00	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. ^{1,2} means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	VWI	B	806	-	-	0/10/10/10	0/1/1/1
5	VWI	A	806	-	-	0/10/10/10	0/1/1/1
3	GOL	B	801	-	-	2/4/4/4	-
5	VWI	A	809	-	-	0/10/10/10	0/1/1/1
5	VWI	A	807	-	-	0/10/10/10	0/1/1/1
5	VWI	B	805	-	-	0/10/10/10	0/1/1/1
5	VWI	A	808	-	-	0/10/10/10	0/1/1/1
5	VWI	B	804	-	-	0/10/10/10	0/1/1/1
5	VWI	A	810	-	-	0/10/10/10	0/1/1/1
3	GOL	A	801	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

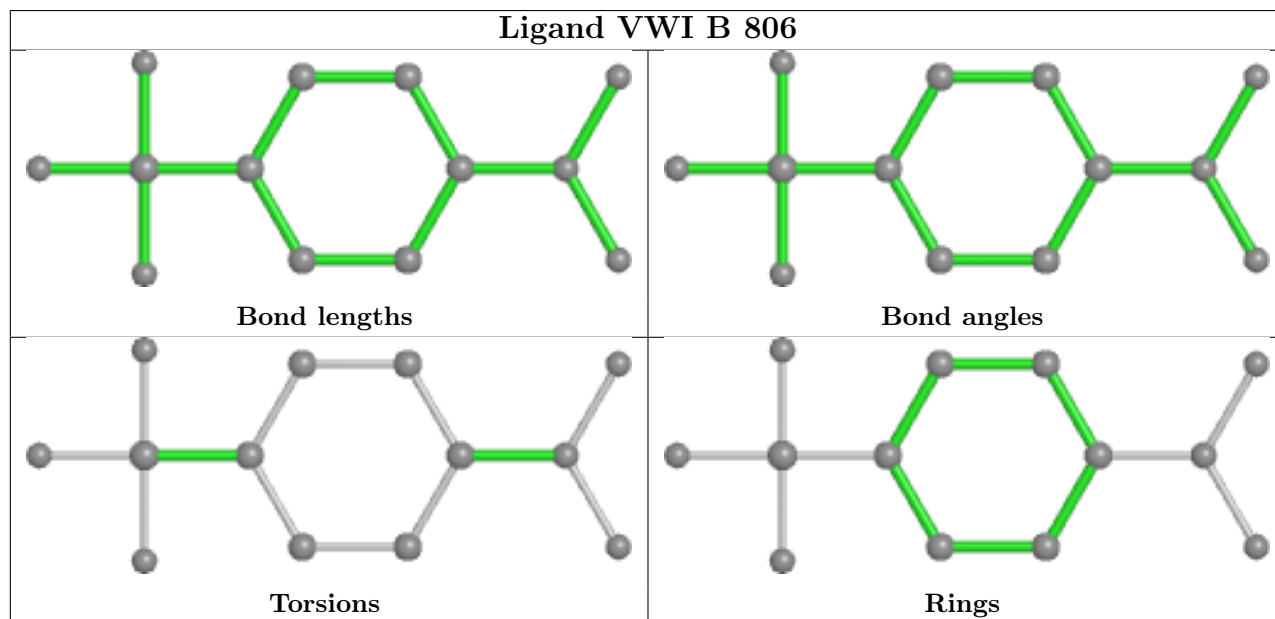
All (4) torsion outliers are listed below:

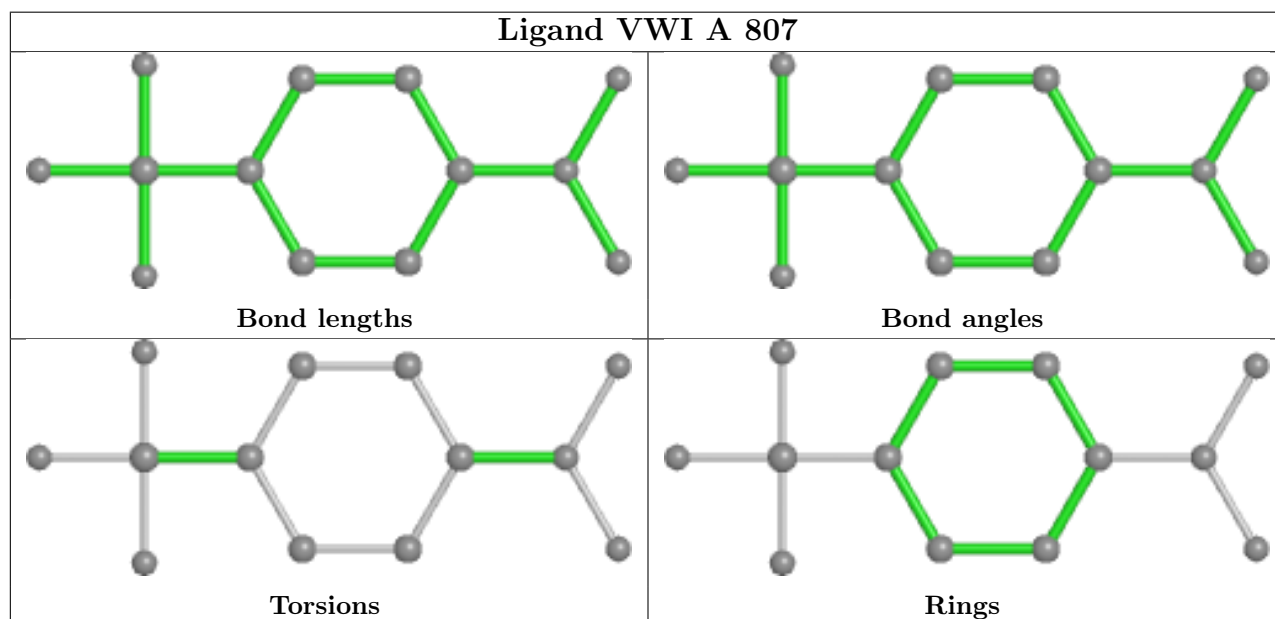
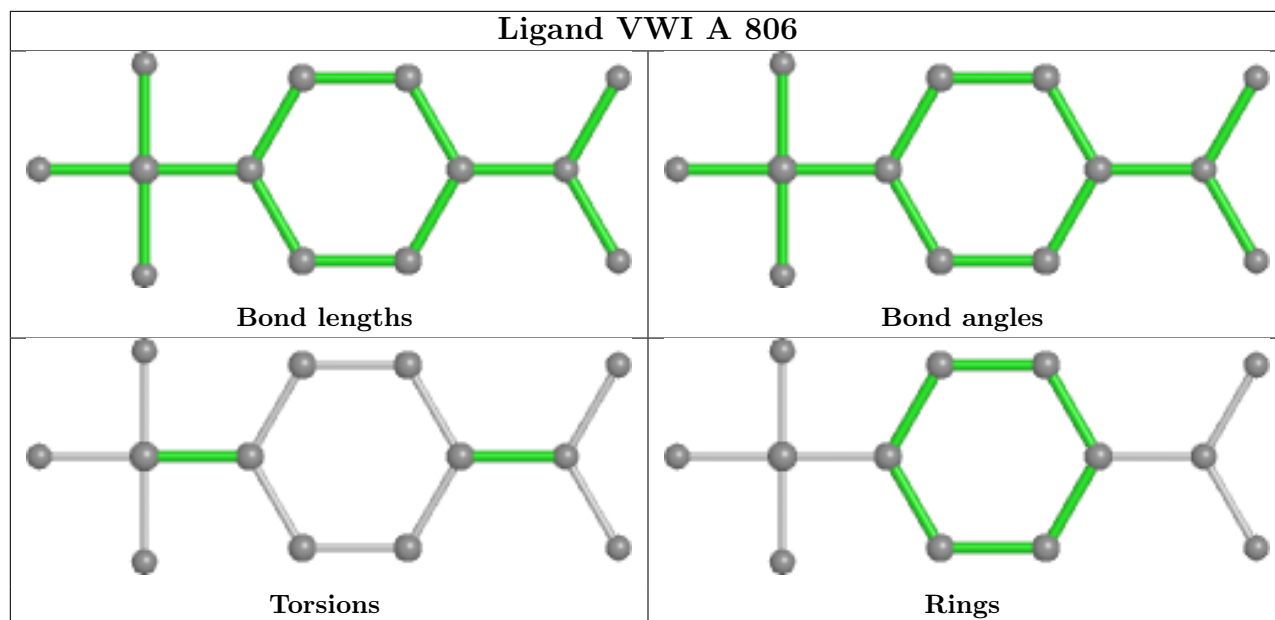
Mol	Chain	Res	Type	Atoms
3	A	801	GOL	C1-C2-C3-O3
3	A	801	GOL	O2-C2-C3-O3
3	B	801	GOL	O1-C1-C2-O2
3	B	801	GOL	O1-C1-C2-C3

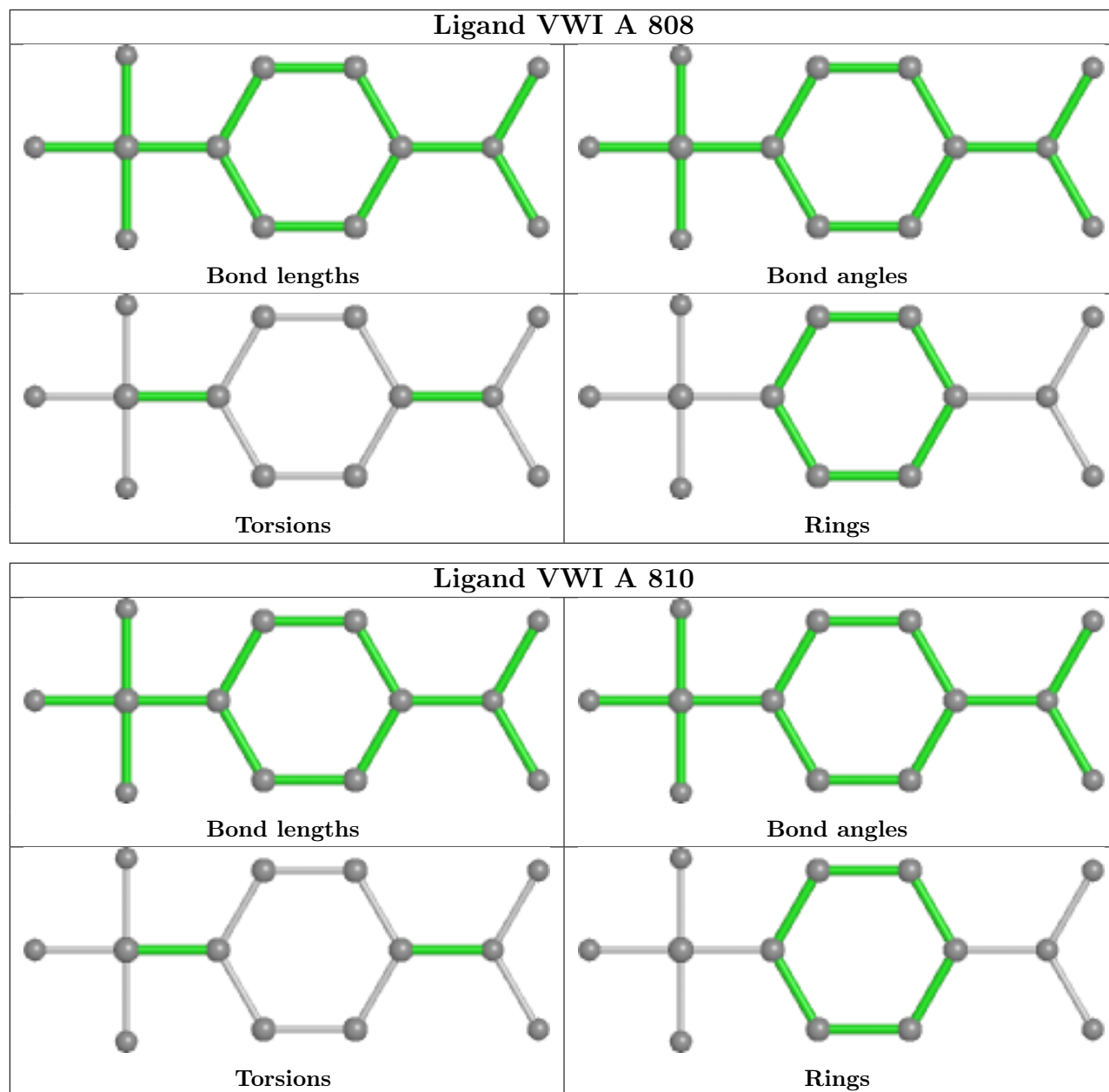
There are no ring outliers.

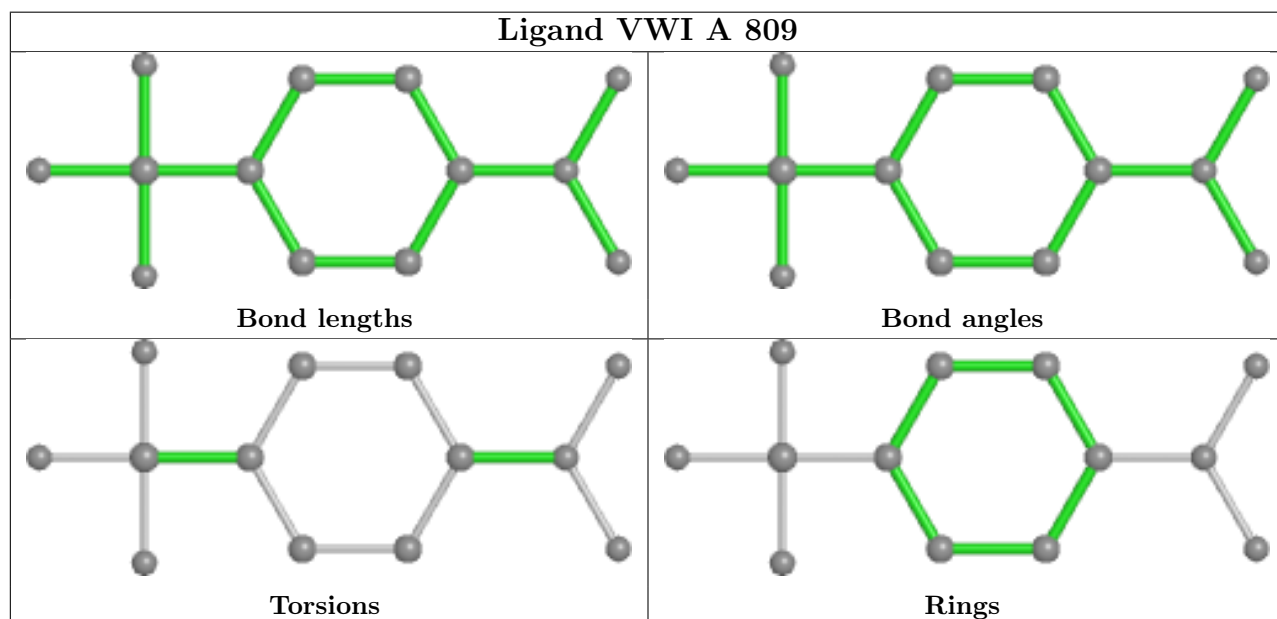
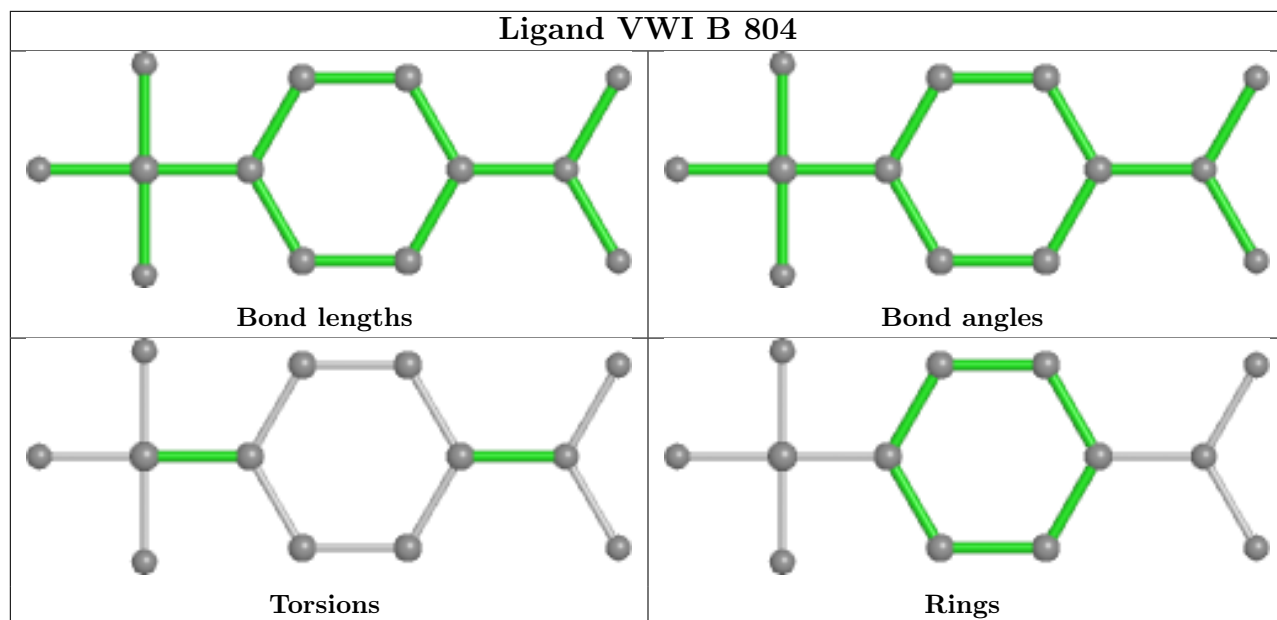
No monomer is involved in short contacts.

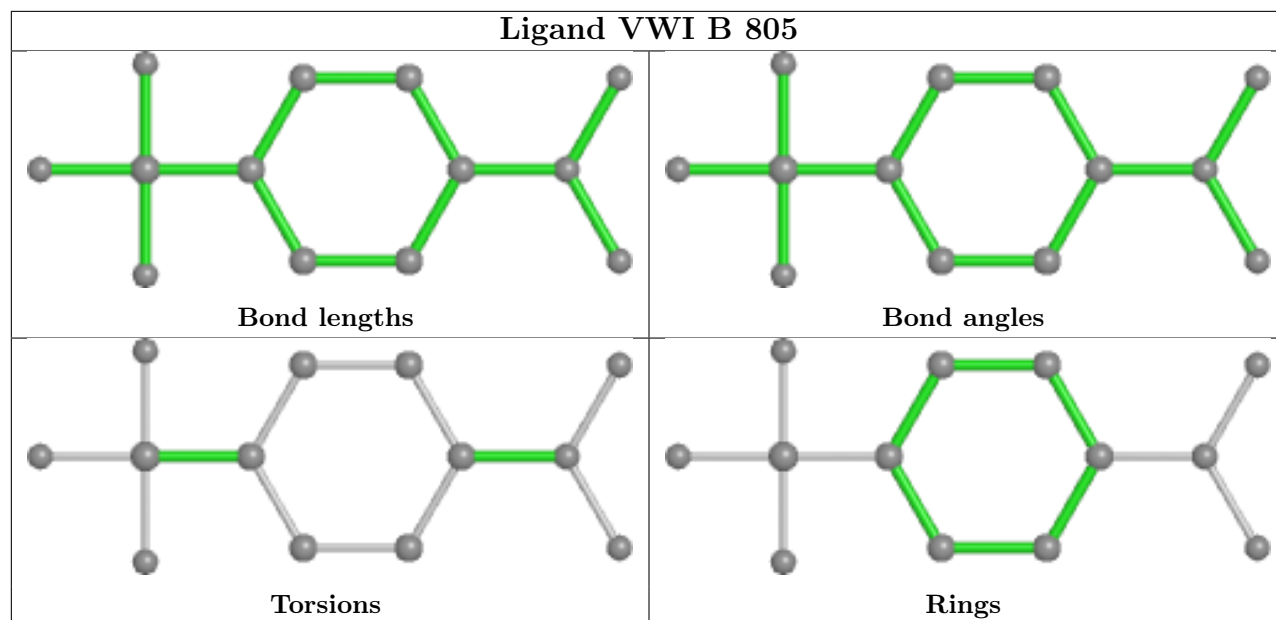
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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

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	726/736 (98%)	0.21	40 (5%) 25 19	41, 72, 125, 167	0
1	B	728/736 (98%)	0.04	16 (2%) 62 57	38, 65, 105, 246	0
2	C	399/403 (99%)	0.20	17 (4%) 35 30	41, 57, 99, 156	0
2	D	398/403 (98%)	0.26	19 (4%) 30 24	41, 62, 103, 207	0
All	All	2251/2278 (98%)	0.16	92 (4%) 37 32	38, 65, 117, 246	0

All (92) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	575	GLY	16.8
1	B	576	GLY	13.8
1	B	574	ALA	11.6
1	B	573	ASP	7.1
2	D	301	THR	6.8
2	D	296	PRO	6.1
2	D	294	ALA	6.1
1	B	578	TYR	5.6
1	A	575	GLY	5.3
2	C	390	ILE	5.0
1	A	320	ILE	4.6
2	C	231	LEU	4.6
1	B	572	GLU	4.6
2	D	392	GLY	4.6
1	B	577	THR	4.4
2	D	390	ILE	4.4
1	A	387	ASP	4.3
1	A	382	THR	4.1
1	A	378	ARG	3.9
1	A	454	ARG	3.8
2	D	389	CYS	3.7

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Mol	Chain	Res	Type	RSRZ
2	C	389	CYS	3.6
2	D	293	GLY	3.6
2	D	303	PRO	3.6
1	A	577	THR	3.5
1	A	452	VAL	3.5
1	A	433	ASN	3.5
1	B	377	GLU	3.5
2	C	293	GLY	3.4
1	A	403	LYS	3.4
2	C	392	GLY	3.3
2	D	302	GLY	3.3
1	A	578	TYR	3.3
1	A	574	ALA	3.3
1	A	608	ALA	3.2
2	C	296	PRO	3.2
2	D	295	ASP	3.2
1	A	432	PRO	3.2
2	D	299	MET	3.2
1	A	426	ILE	3.1
2	C	225	PHE	3.1
2	D	1	MET	3.1
1	A	325	ILE	3.1
1	A	383	GLN	3.0
1	A	377	GLU	3.0
2	D	297	VAL	3.0
2	C	2	SER	2.9
1	A	373	ALA	2.9
2	D	92	CYS	2.8
1	B	609	ASP	2.8
2	D	393	GLY	2.7
2	D	391	GLY	2.7
2	C	134	MET	2.7
1	A	371	LEU	2.7
1	A	322	LYS	2.7
2	D	134	MET	2.6
2	C	301	THR	2.6
1	B	378	ARG	2.6
1	A	609	ASP	2.6
1	A	326	LYS	2.5
2	C	280	LEU	2.5
1	A	327	ARG	2.5
1	A	623	PHE	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	379	GLY	2.5
2	C	303	PRO	2.5
1	B	568	ARG	2.4
1	B	720	SER	2.4
1	A	436	LEU	2.4
2	C	230	ALA	2.4
1	A	484	GLU	2.4
1	A	455	GLN	2.4
1	A	216	ALA	2.3
1	B	-14	GLY	2.3
2	C	393	GLY	2.3
1	A	391	ALA	2.3
1	A	318	GLU	2.2
2	D	93	ALA	2.2
2	C	92	CYS	2.2
1	A	627	SER	2.2
1	A	624	LYS	2.2
1	B	623	PHE	2.2
2	C	297	VAL	2.2
1	A	453	LYS	2.1
1	A	429	ILE	2.1
1	B	382	THR	2.1
1	B	-13	SER	2.1
1	A	480	LYS	2.1
2	C	299	MET	2.1
1	A	404	GLY	2.1
2	D	2	SER	2.1
1	A	425	GLU	2.0
1	A	621	GLU	2.0

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](#)

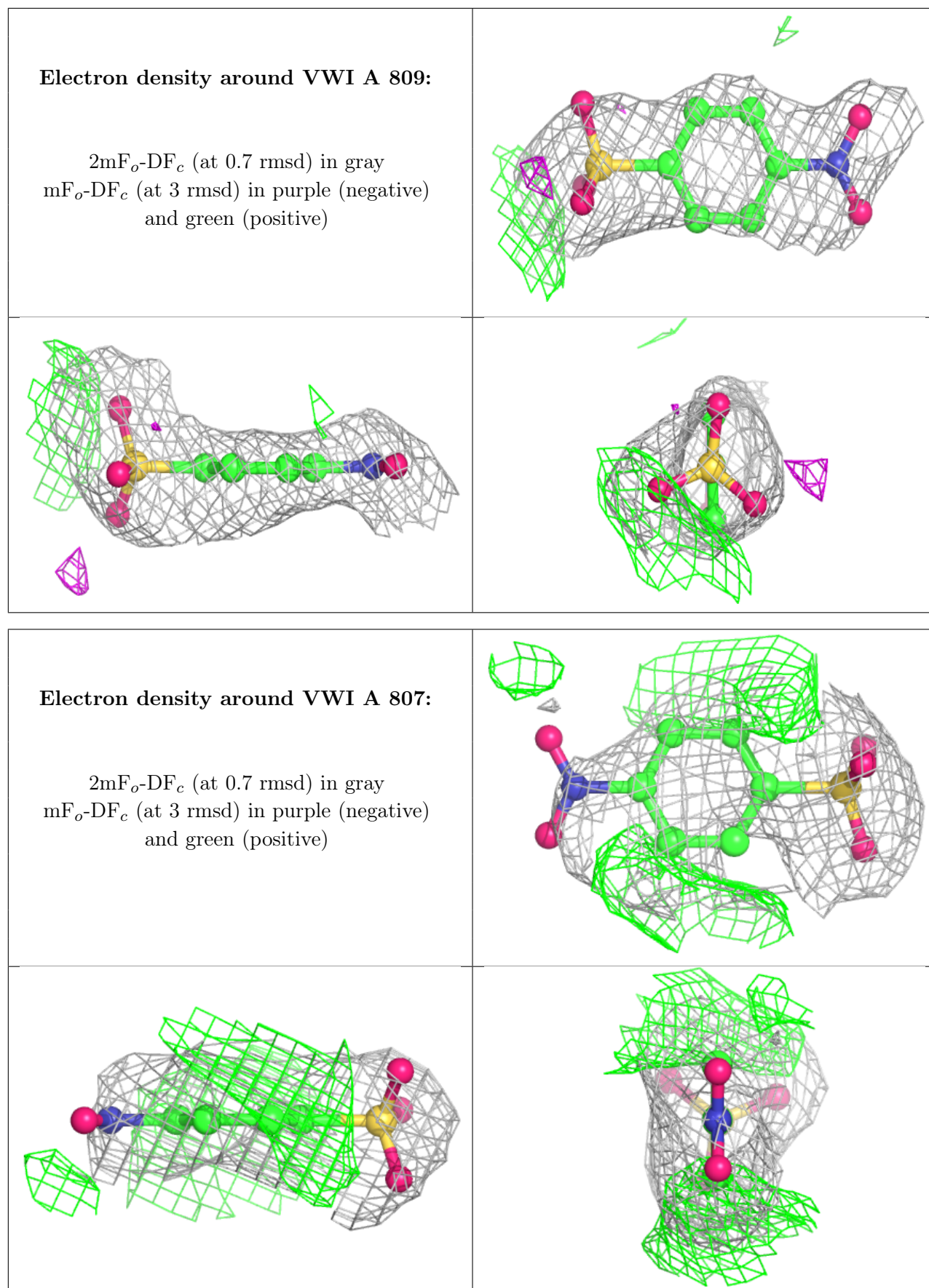
There are no monosaccharides in this entry.

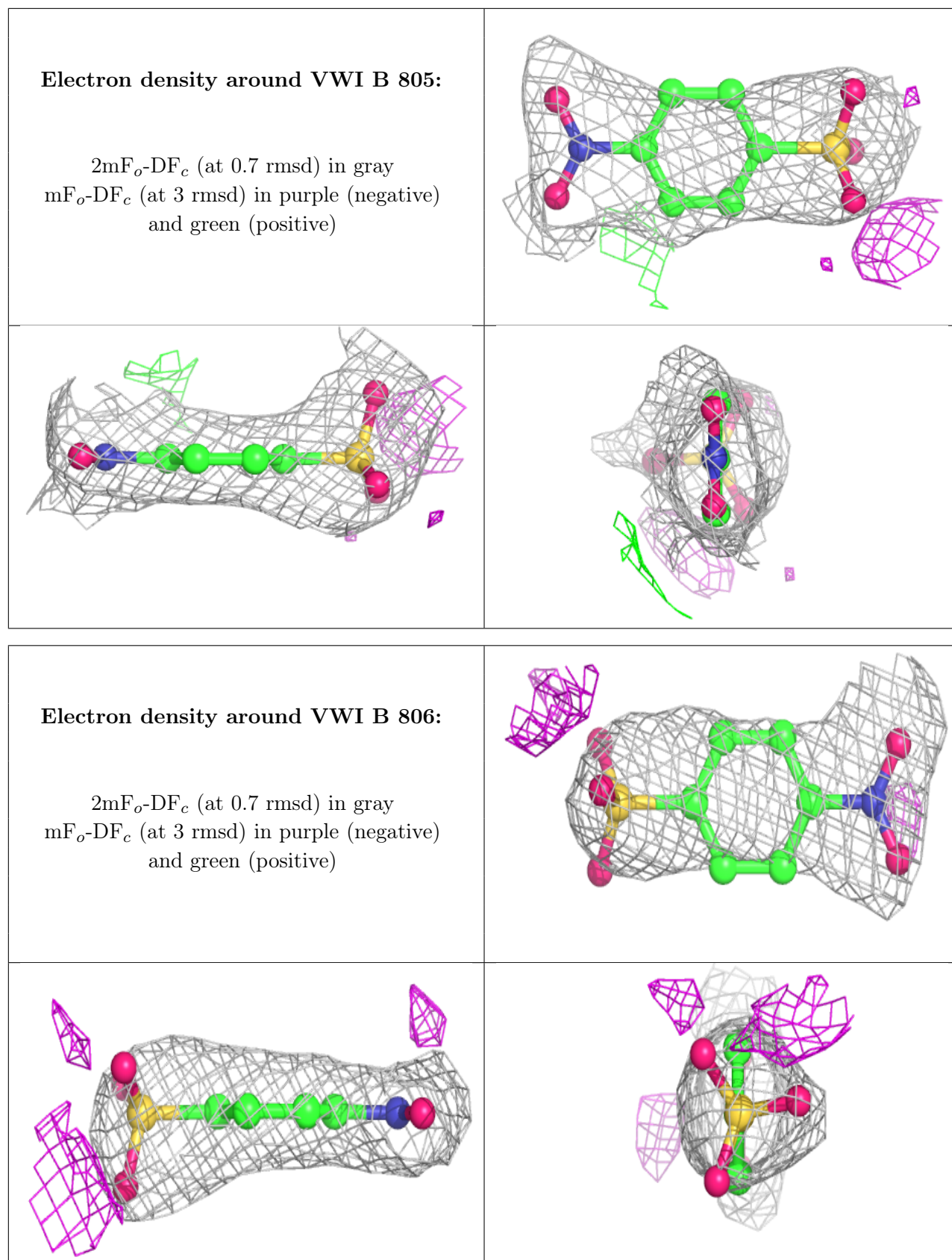
6.4 Ligands

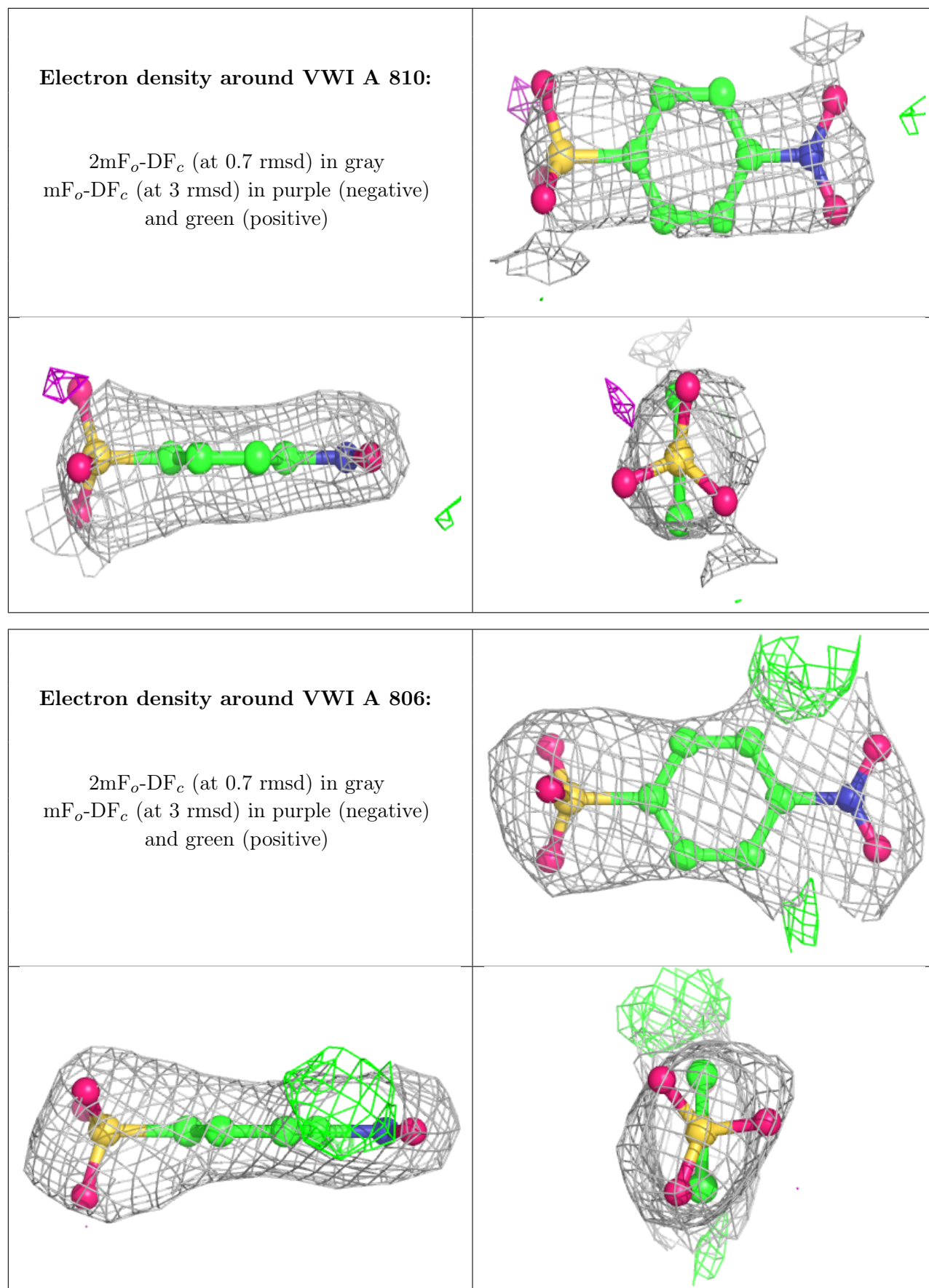
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

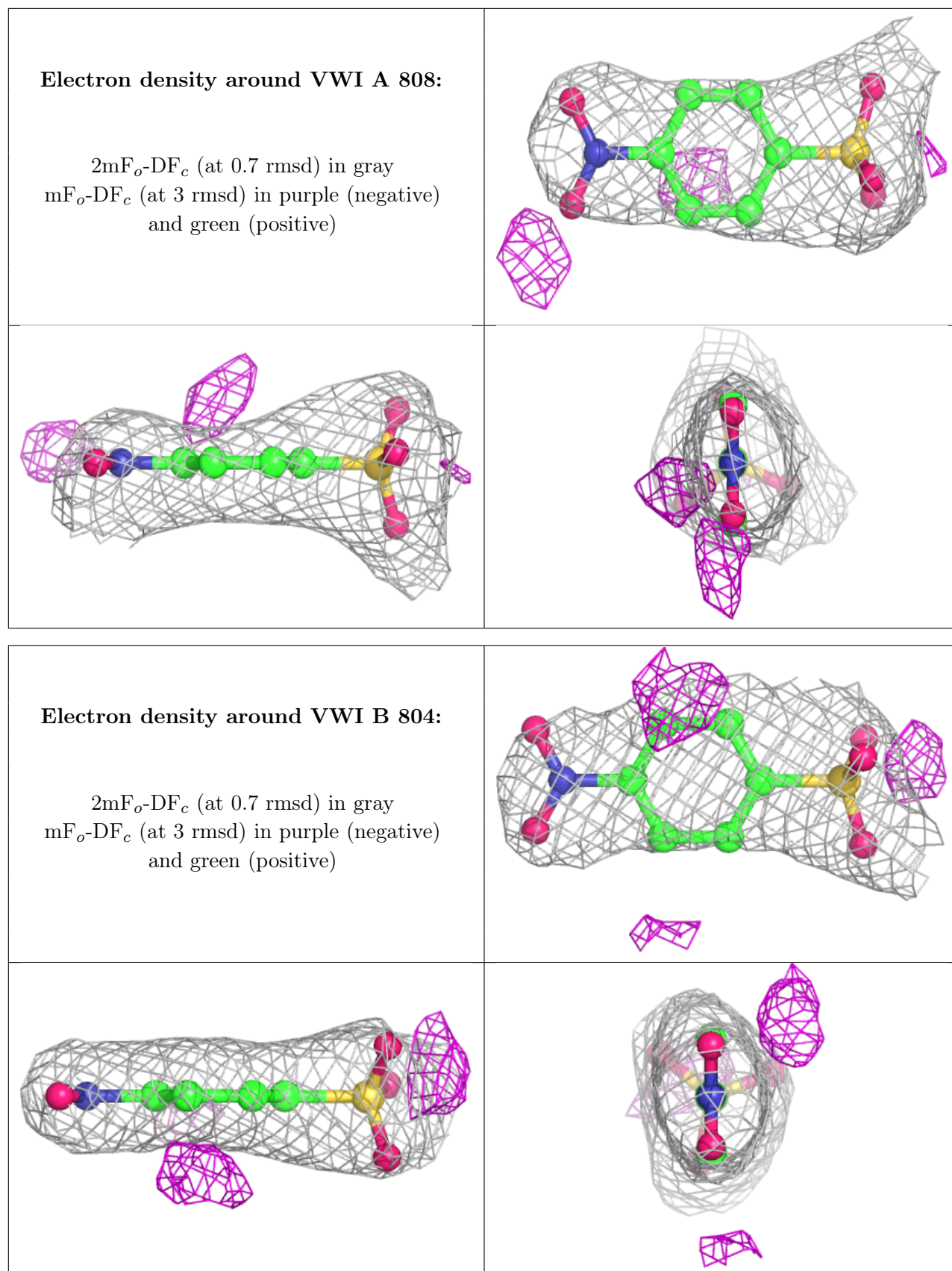
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	D	504	5/5	0.69	0.34	116,135,150,150	2
5	VWI	A	809	13/13	0.76	0.29	103,114,140,152	0
5	VWI	A	807	13/13	0.78	0.36	117,140,157,159	0
5	VWI	B	805	13/13	0.78	0.32	91,110,130,136	0
4	SO4	A	803	5/5	0.85	0.30	108,109,119,142	0
5	VWI	B	806	13/13	0.85	0.30	103,125,140,160	0
4	SO4	B	803	5/5	0.86	0.30	99,108,121,143	0
5	VWI	A	810	13/13	0.86	0.41	103,115,154,172	0
4	SO4	C	505	5/5	0.87	0.22	94,96,109,129	0
4	SO4	A	802	5/5	0.88	0.16	89,92,110,123	0
5	VWI	A	806	13/13	0.89	0.23	82,101,125,133	0
4	SO4	C	506	5/5	0.89	0.24	97,101,120,145	0
5	VWI	A	808	13/13	0.90	0.33	89,95,111,128	0
3	GOL	A	801	6/6	0.91	0.22	58,68,82,90	0
4	SO4	C	504	5/5	0.91	0.17	77,91,118,131	0
4	SO4	D	505	5/5	0.92	0.36	94,101,119,156	0
4	SO4	A	805	5/5	0.92	0.11	111,118,133,134	0
4	SO4	B	802	5/5	0.93	0.15	85,90,95,114	0
4	SO4	D	502	5/5	0.93	0.23	84,94,118,124	0
5	VWI	B	804	13/13	0.93	0.29	69,88,111,141	0
4	SO4	D	503	5/5	0.93	0.13	93,94,121,122	0
3	GOL	B	801	6/6	0.93	0.17	56,63,73,74	0
4	SO4	C	502	5/5	0.95	0.18	85,100,114,117	0
4	SO4	A	804	5/5	0.95	0.14	78,87,113,122	0
4	SO4	C	503	5/5	0.96	0.16	72,82,100,106	0
4	SO4	D	501	5/5	0.97	0.16	77,79,96,99	0
4	SO4	C	501	5/5	0.98	0.16	69,77,84,93	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.









6.5 Other polymers [i](#)

There are no such residues in this entry.