



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 16, 2024 – 02:31 am GMT

PDB ID : 8OQU
Title : Structure of Mycobacterium tuberculosis beta-oxidation trifunctional enzyme in complex with Fragment-M-92
Authors : Dalwani, S.; Wierenga, R.K.; Venkatesan, R.
Deposited on : 2023-04-12
Resolution : 2.89 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

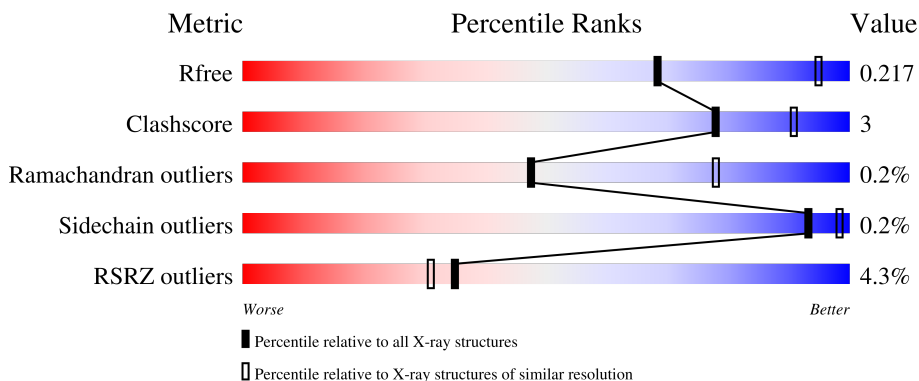
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.89 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	736	 6% (red), 93% (green), 6% (yellow)
1	B	736	 2% (red), 92% (green), 7% (yellow)
2	C	403	 4% (red), 89% (green), 10% (yellow)
2	D	403	 6% (red), 89% (green), 11% (yellow)

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 16971 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	730	5421	3428	934	1038	21	0	0	0
1	B	727	5383	3406	926	1030	21	0	0	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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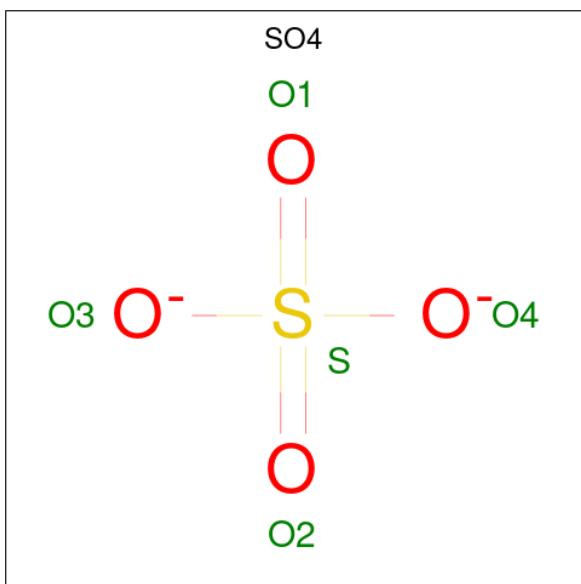
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	HIS	-	expression tag	UNP O53872
B	-5	SER	-	expression tag	UNP O53872
B	-4	GLN	-	expression tag	UNP O53872
B	-3	ASP	-	expression tag	UNP O53872
B	-2	PRO	-	expression tag	UNP O53872
B	-1	ASN	-	expression 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	400	Total 2952	C 1844	N 522	O 571	S 15	0	0	0
2	D	401	Total 2949	C 1840	N 524	O 570	S 15	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

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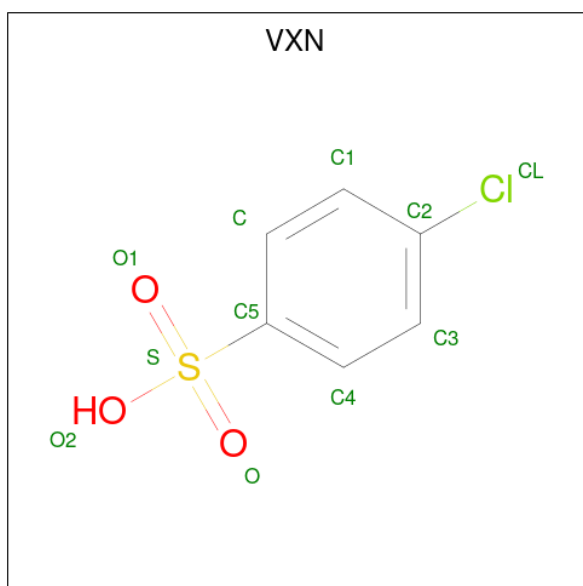
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 5 is 4-chloranylbenzenesulfonic acid (three-letter code: VXN) (formula: $C_6H_5ClO_3S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		
5	A	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		
5	A	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		
5	B	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		
5	B	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		
5	B	1	Total	C	Cl	O	S	0	0
			11	6	1	3	1		

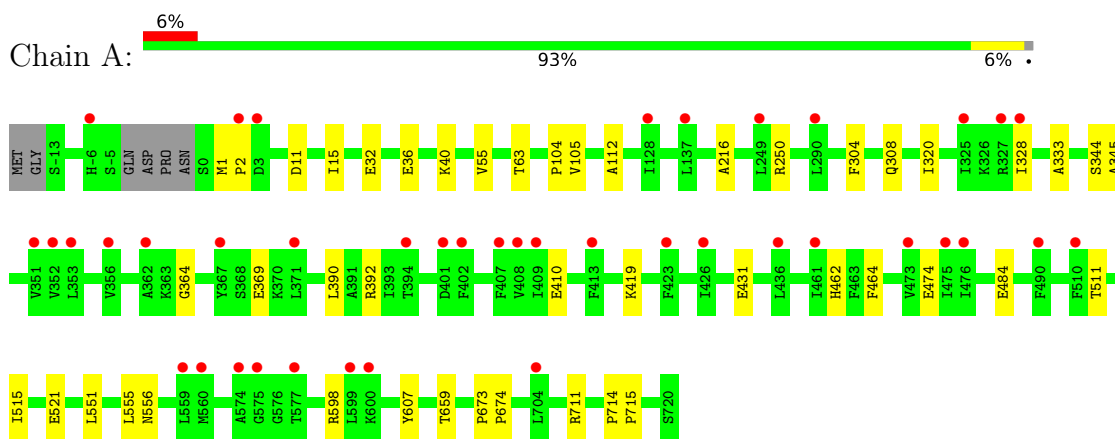
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	16	Total	O	0	0
			16	16		
6	B	27	Total	O	0	0
			27	27		
6	C	15	Total	O	0	0
			15	15		
6	D	13	Total	O	0	0
			13	13		

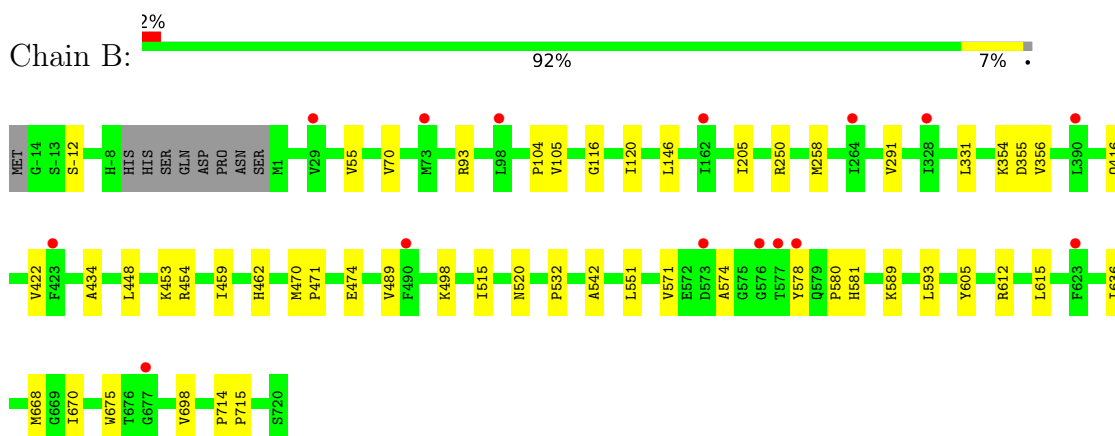
3 Residue-property plots [i](#)

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.

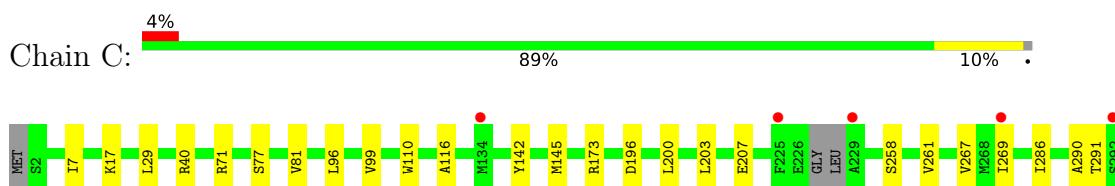
- Molecule 1: 3-hydroxyacyl-CoA dehydrogenase



- 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	249.46Å 134.89Å 119.48Å 90.00° 110.47° 90.00°	Depositor
Resolution (Å)	116.86 – 2.89 116.86 – 2.89	Depositor EDS
% Data completeness (in resolution range)	77.4 (116.86-2.89) 77.4 (116.86-2.89)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 2.91Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.180 , 0.217 0.180 , 0.217	Depositor DCC
R_{free} test set	3284 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	77.7	Xtrriage
Anisotropy	0.030	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 36.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	16971	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.75% 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: VXN, SO4, GOL

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	0/5524	0.46	0/7480
1	B	0.25	0/5484	0.46	0/7426
2	C	0.24	0/2996	0.49	0/4056
2	D	0.24	0/2992	0.49	0/4051
All	All	0.24	0/16996	0.47	0/23013

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	5421	0	5433	24	0
1	B	5383	0	5404	31	0
2	C	2952	0	2964	26	0
2	D	2949	0	2965	28	0
3	A	25	0	0	1	0
3	B	20	0	0	0	0
3	C	35	0	0	0	0
3	D	25	0	0	0	0
4	A	12	0	16	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	12	0	16	0	0
5	A	33	0	0	0	0
5	B	33	0	0	1	0
6	A	16	0	0	0	0
6	B	27	0	0	1	0
6	C	15	0	0	0	0
6	D	13	0	0	0	0
All	All	16971	0	16798	98	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 (98) 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)
2:D:390:ILE:HD12	2:D:394:MET:HB2	1.71	0.73
1:A:250:ARG:NH1	2:D:142:TYR:O	2.24	0.71
1:B:462:HIS:HB3	1:B:474:GLU:HB3	1.78	0.65
1:B:250:ARG:NH1	2:C:142:TYR:O	2.31	0.64
1:A:1:MET:HB3	1:A:2:PRO:HD2	1.83	0.60
1:A:462:HIS:HB3	1:A:474:GLU:HB3	1.84	0.59
1:B:354:LYS:NZ	6:B:901:HOH:O	2.36	0.59
2:C:173:ARG:NH2	2:C:348:LEU:O	2.37	0.58
2:C:258:SER:HB3	2:C:329:ALA:HA	1.87	0.55
2:D:328:GLU:HB3	2:D:355:ILE:HG13	1.87	0.55
1:A:598:ARG:HG2	1:A:607:TYR:CZ	2.41	0.55
2:C:96:LEU:HD23	2:C:396:VAL:HG13	1.89	0.54
1:B:589:LYS:HE3	1:B:593:LEU:HD11	1.90	0.54
1:B:698:VAL:HG13	1:B:714:PRO:HG3	1.89	0.54
1:A:410:GLU:OE2	1:A:419:LYS:NZ	2.41	0.53
2:C:81:VAL:HG11	2:D:296:PRO:HD3	1.91	0.53
2:C:291:THR:HG22	2:C:396:VAL:HG23	1.92	0.52
1:B:434:ALA:O	1:B:454:ARG:NH2	2.42	0.52
1:B:520:ASN:HB3	1:B:581:HIS:CE1	2.45	0.52
1:B:70:VAL:HG22	5:B:809:VXN:CL	2.47	0.51
2:D:99:VAL:HG13	2:D:269:ILE:HD11	1.92	0.51
1:B:470:MET:O	1:B:498:LYS:NZ	2.36	0.51
2:C:382:ARG:HG3	2:C:383:ARG:HG3	1.93	0.50
2:C:116:ALA:O	2:C:267:VAL:N	2.44	0.49
1:B:471:PRO:HG2	1:B:668:MET:HB3	1.94	0.49
2:D:38:GLU:HG3	2:D:42:ARG:HD2	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:515:ILE:HD11	1:A:551:LEU:HD21	1.96	0.48
2:C:328:GLU:HB3	2:C:355:ILE:HG13	1.95	0.48
2:C:196:ASP:OD1	2:C:200:LEU:N	2.46	0.47
2:C:71:ARG:CZ	2:D:394:MET:HG2	2.44	0.47
2:C:313:ARG:HD3	2:D:110:TRP:CD1	2.50	0.47
1:B:55:VAL:HB	1:B:105:VAL:HG22	1.97	0.47
2:D:302:GLY:N	2:D:303:PRO:HD2	2.29	0.47
1:A:63:THR:HB	1:A:112:ALA:HB3	1.96	0.47
2:C:99:VAL:HG13	2:C:269:ILE:HD11	1.96	0.47
1:B:355:ASP:OD1	1:B:356:VAL:N	2.47	0.47
1:B:532:PRO:HB2	1:B:615:LEU:HD13	1.98	0.47
2:D:252:HIS:HE1	2:D:332:SER:H	1.61	0.47
1:B:104:PRO:HG2	1:B:205:ILE:HG23	1.97	0.46
2:C:290:ALA:HB1	2:C:309:LYS:HD3	1.97	0.46
1:B:250:ARG:NH1	2:C:145:MET:HG2	2.30	0.46
2:D:253:THR:H	2:D:256:ASN:HD21	1.65	0.45
1:A:304:PHE:O	1:A:308:GLN:HG2	2.16	0.45
1:A:345:ALA:O	1:A:392:ARG:NH1	2.50	0.45
1:B:459:ILE:HG21	1:B:489:VAL:HG21	1.98	0.45
1:B:331:LEU:HD13	1:B:422:VAL:HG12	1.97	0.45
2:C:7:ILE:HD11	2:C:286:ILE:HD11	1.98	0.45
2:C:110:TRP:CD1	2:D:313:ARG:HD3	2.52	0.44
2:C:309:LYS:HE2	2:C:313:ARG:NH2	2.32	0.44
2:D:196:ASP:OD1	2:D:200:LEU:N	2.51	0.44
1:B:116:GLY:O	1:B:120:ILE:HG12	2.17	0.44
2:D:286:ILE:HD13	2:D:400:ILE:HG22	2.00	0.44
1:B:146:LEU:HD22	1:B:291:VAL:HG22	2.00	0.44
1:A:555:LEU:HD22	4:A:807:GOL:H2	2.00	0.43
1:B:515:ILE:HD11	1:B:551:LEU:HD21	2.00	0.43
1:A:320:ILE:HG21	1:A:484:GLU:HA	2.00	0.43
1:B:578:TYR:O	1:B:580:PRO:HD3	2.19	0.43
2:D:290:ALA:HB1	2:D:309:LYS:HE2	2.01	0.43
1:A:659:THR:N	3:A:805:SO4:O4	2.43	0.43
1:B:258:MET:HG2	1:B:675:TRP:HB3	2.00	0.43
1:A:250:ARG:NH1	2:D:145:MET:HG2	2.34	0.43
2:D:40:ARG:NH1	2:D:77:SER:O	2.46	0.43
1:A:673:PRO:HA	1:A:674:PRO:HD3	1.91	0.43
1:A:11:ASP:OD1	1:A:15:ILE:N	2.51	0.42
1:A:104:PRO:HG3	1:A:216:ALA:HB1	2.01	0.42
1:A:464:PHE:HZ	1:A:511:THR:HG21	1.83	0.42
1:B:416:GLN:HG3	1:B:448:LEU:HD23	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:17:LYS:HA	2:C:261:VAL:HG12	2.02	0.42
2:D:276:LYS:HE2	2:D:276:LYS:HB3	1.80	0.42
1:B:542:ALA:HB2	1:B:636:ILE:HG23	2.01	0.42
2:C:29:LEU:HD22	2:D:133:ALA:HB1	2.02	0.42
2:D:253:THR:H	2:D:256:ASN:ND2	2.17	0.42
1:A:369:GLU:HG2	1:A:390:LEU:HD13	2.01	0.42
1:B:331:LEU:HD23	1:B:354:LYS:HD3	2.02	0.42
2:C:326:LEU:HD13	2:C:387:THR:HG23	2.02	0.42
1:A:55:VAL:HB	1:A:105:VAL:HG22	2.02	0.42
1:A:328:ILE:HD12	1:A:344:SER:HB3	2.02	0.42
1:A:521:GLU:OE2	1:A:711:ARG:NE	2.43	0.41
2:C:203:LEU:HD11	2:C:207:GLU:HG3	2.02	0.41
2:C:390:ILE:HD12	2:C:394:MET:HB3	2.02	0.41
1:A:714:PRO:HA	1:A:715:PRO:HD3	1.95	0.41
2:D:236:ASP:O	2:D:240:GLN:HG3	2.21	0.41
2:D:376:LEU:HD21	2:D:384:ALA:HB2	2.03	0.41
1:A:333:ALA:HB1	1:A:364:GLY:HA3	2.02	0.41
2:C:313:ARG:NH1	2:D:110:TRP:O	2.54	0.41
2:D:16:GLY:HA2	2:D:207:GLU:HG2	2.02	0.41
2:C:110:TRP:CZ2	2:D:288:ALA:HA	2.56	0.41
2:D:252:HIS:CE1	2:D:330:PHE:HB3	2.55	0.41
2:D:58:CYS:SG	2:D:65:GLN:NE2	2.94	0.40
1:B:571:VAL:HA	1:B:574:ALA:HB3	2.02	0.40
1:B:605:TYR:CG	1:B:612:ARG:HD2	2.56	0.40
1:B:515:ILE:HD12	1:B:670:ILE:HB	2.04	0.40
1:B:714:PRO:HA	1:B:715:PRO:HD3	1.96	0.40
2:D:242:TYR:OH	2:D:298:ILE:HB	2.21	0.40
1:A:36:GLU:HG3	1:A:40:LYS:HE3	2.03	0.40
1:B:-12:SER:O	1:B:93:ARG:HD2	2.22	0.40
1:B:453:LYS:HE2	1:B:453:LYS:HB3	1.97	0.40
2:C:40:ARG:NH1	2:C:77:SER:O	2.46	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	726/736 (99%)	685 (94%)	40 (6%)	1 (0%)	51	82
1	B	723/736 (98%)	697 (96%)	26 (4%)	0	100	100
2	C	396/403 (98%)	381 (96%)	14 (4%)	1 (0%)	41	71
2	D	397/403 (98%)	377 (95%)	18 (4%)	2 (0%)	29	61
All	All	2242/2278 (98%)	2140 (96%)	98 (4%)	4 (0%)	47	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	135	GLY
2	D	361	LEU
1	A	556	ASN
2	C	361	LEU

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	556/566 (98%)	554 (100%)	2 (0%)	91	97
1	B	551/566 (97%)	551 (100%)	0	100	100
2	C	307/310 (99%)	306 (100%)	1 (0%)	92	98
2	D	306/310 (99%)	305 (100%)	1 (0%)	92	98
All	All	1720/1752 (98%)	1716 (100%)	4 (0%)	93	98

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	32	GLU
1	A	431	GLU
2	C	345	ASP
2	D	69	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	-8	HIS
1	A	561	HIS
1	B	28	ASN
1	B	455	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](#)

31 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	SO4	A	801	-	4,4,4	0.15	0	6,6,6	0.04	0
3	SO4	C	501	-	4,4,4	0.14	0	6,6,6	0.06	0
4	GOL	A	807	-	5,5,5	0.93	0	5,5,5	0.94	0
3	SO4	B	801	-	4,4,4	0.14	0	6,6,6	0.05	0
4	GOL	B	805	-	5,5,5	0.91	0	5,5,5	0.98	0
3	SO4	D	505	-	4,4,4	0.14	0	6,6,6	0.06	0
5	VXN	B	807	-	11,11,11	0.24	0	16,16,16	0.12	0
3	SO4	D	504	-	4,4,4	0.14	0	6,6,6	0.06	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	VXN	A	808	-	11,11,11	0.26	0	16,16,16	0.18	0
3	SO4	A	802	-	4,4,4	0.14	0	6,6,6	0.05	0
5	VXN	A	809	-	11,11,11	0.30	0	16,16,16	0.18	0
5	VXN	A	810	-	11,11,11	0.18	0	16,16,16	0.13	0
3	SO4	B	802	-	4,4,4	0.14	0	6,6,6	0.09	0
3	SO4	D	503	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	C	505	-	4,4,4	0.14	0	6,6,6	0.05	0
5	VXN	B	808	-	11,11,11	0.25	0	16,16,16	0.12	0
3	SO4	C	504	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	C	507	-	4,4,4	0.14	0	6,6,6	0.05	0
4	GOL	A	806	-	5,5,5	0.91	0	5,5,5	1.01	0
3	SO4	A	803	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	C	506	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	A	804	-	4,4,4	0.14	0	6,6,6	0.04	0
3	SO4	D	502	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	C	503	-	4,4,4	0.14	0	6,6,6	0.06	0
5	VXN	B	809	-	11,11,11	0.19	0	16,16,16	0.20	0
3	SO4	D	501	-	4,4,4	0.14	0	6,6,6	0.07	0
4	GOL	B	806	-	5,5,5	0.90	0	5,5,5	0.98	0
3	SO4	A	805	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	B	804	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	B	803	-	4,4,4	0.14	0	6,6,6	0.08	0
3	SO4	C	502	-	4,4,4	0.14	0	6,6,6	0.06	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	B	806	-	-	2/4/4/4	-
5	VXN	B	808	-	-	0/6/6/6	0/1/1/1
4	GOL	A	807	-	-	2/4/4/4	-
4	GOL	A	806	-	-	0/4/4/4	-
5	VXN	A	809	-	-	0/6/6/6	0/1/1/1
4	GOL	B	805	-	-	2/4/4/4	-
5	VXN	B	807	-	-	0/6/6/6	0/1/1/1
5	VXN	A	810	-	-	0/6/6/6	0/1/1/1
5	VXN	B	809	-	-	0/6/6/6	0/1/1/1
5	VXN	A	808	-	-	0/6/6/6	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

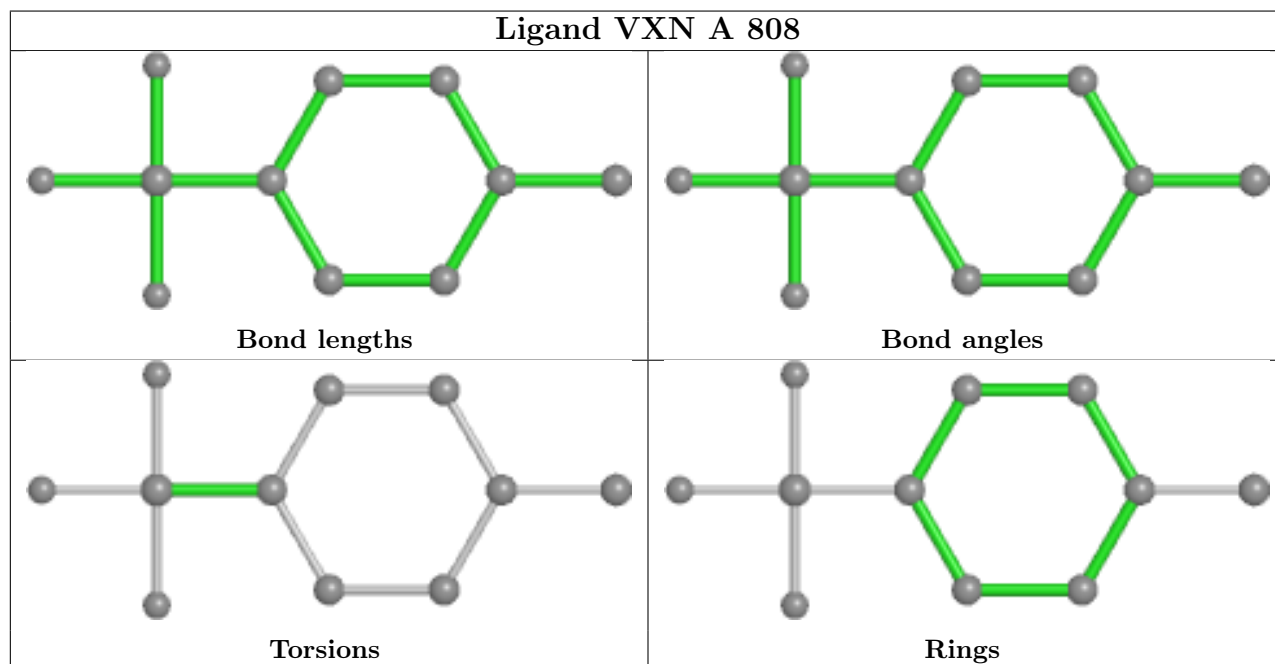
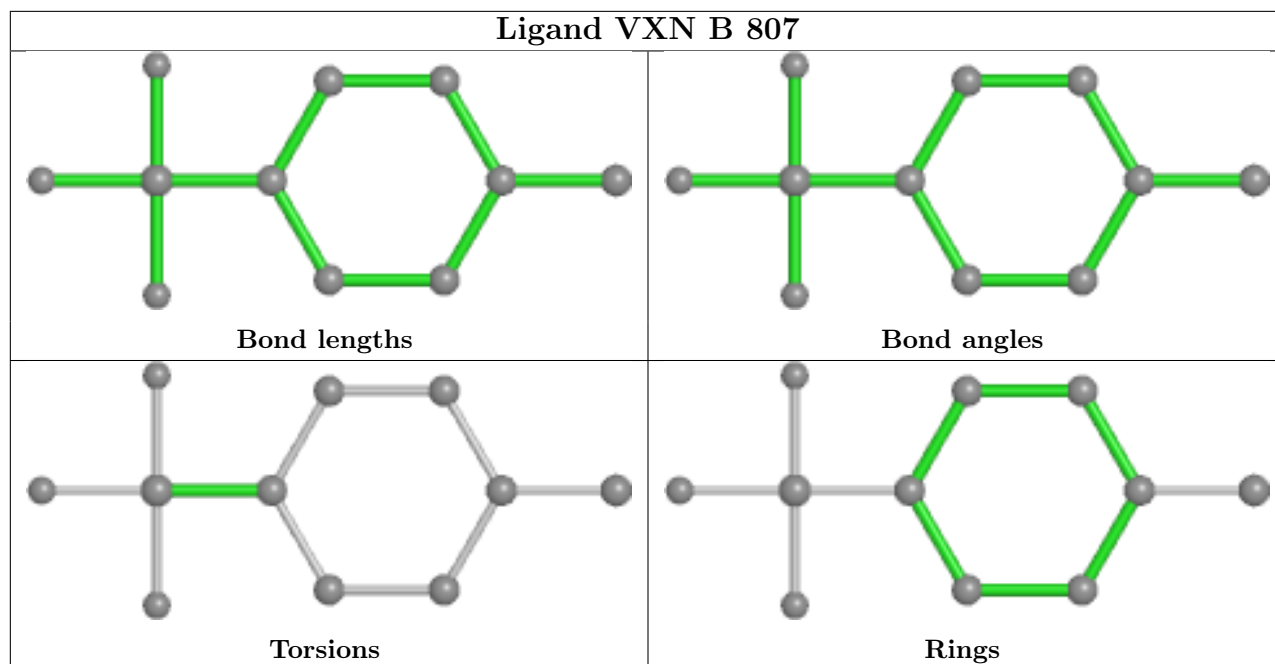
Mol	Chain	Res	Type	Atoms
4	B	806	GOL	O1-C1-C2-C3
4	A	807	GOL	C1-C2-C3-O3
4	B	806	GOL	O1-C1-C2-O2
4	B	805	GOL	O1-C1-C2-O2
4	B	805	GOL	O1-C1-C2-C3
4	A	807	GOL	O2-C2-C3-O3

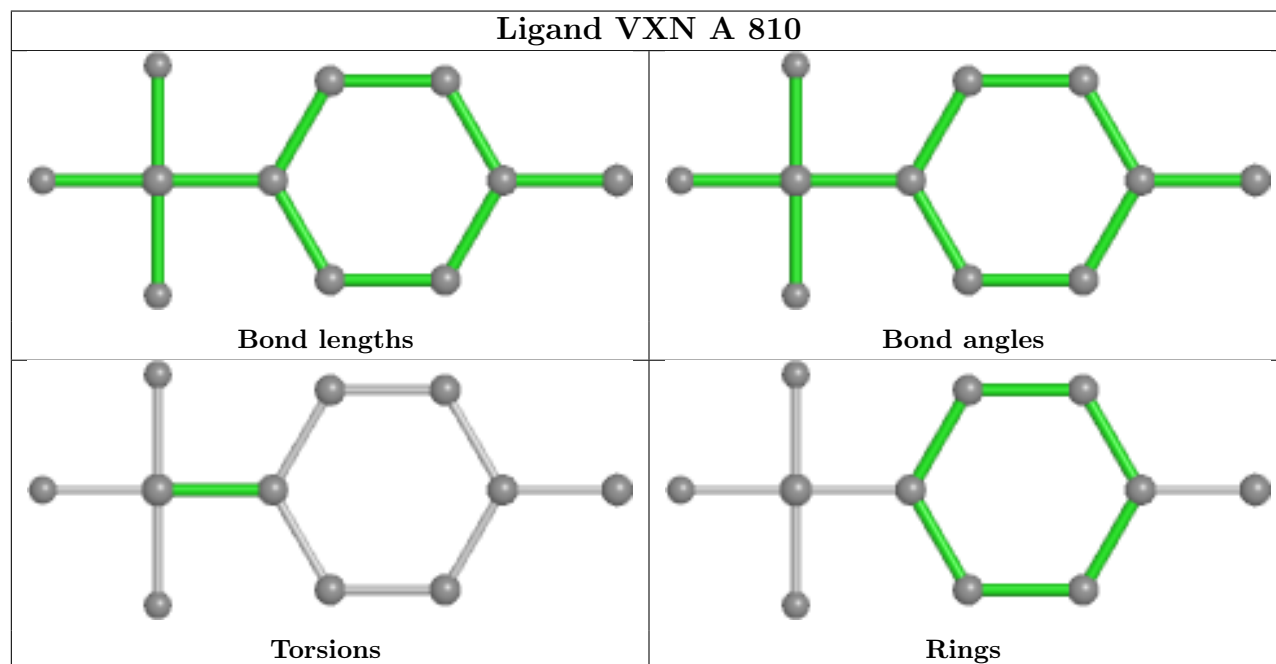
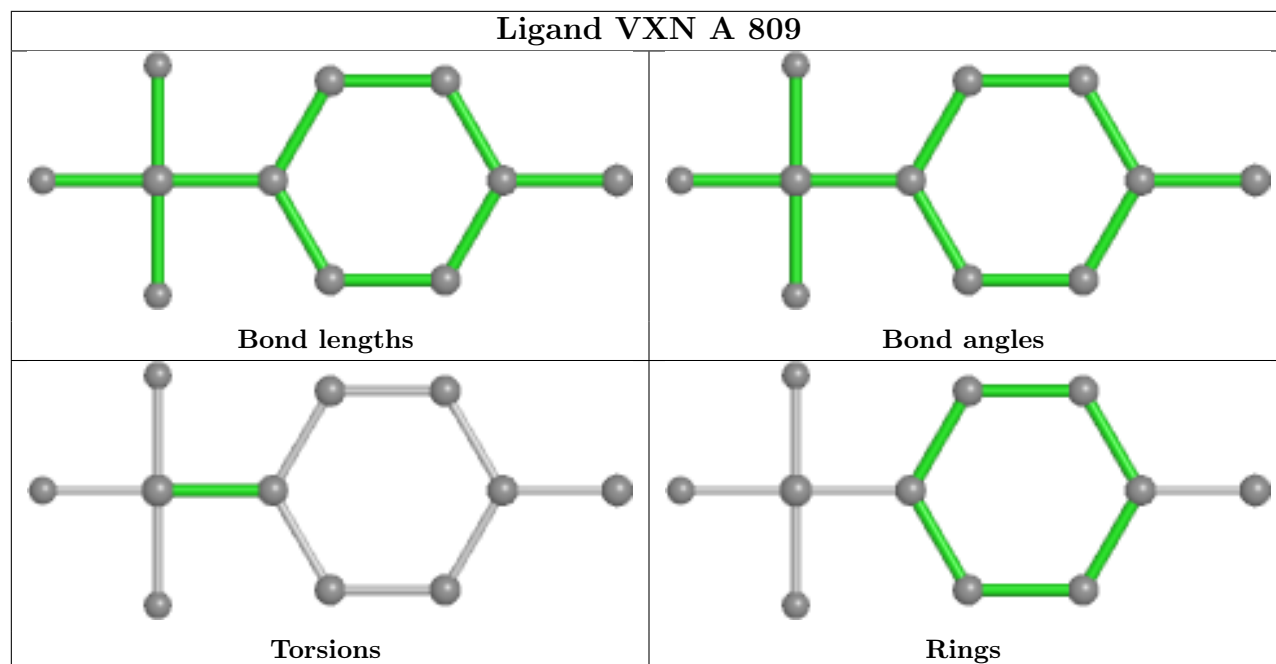
There are no ring outliers.

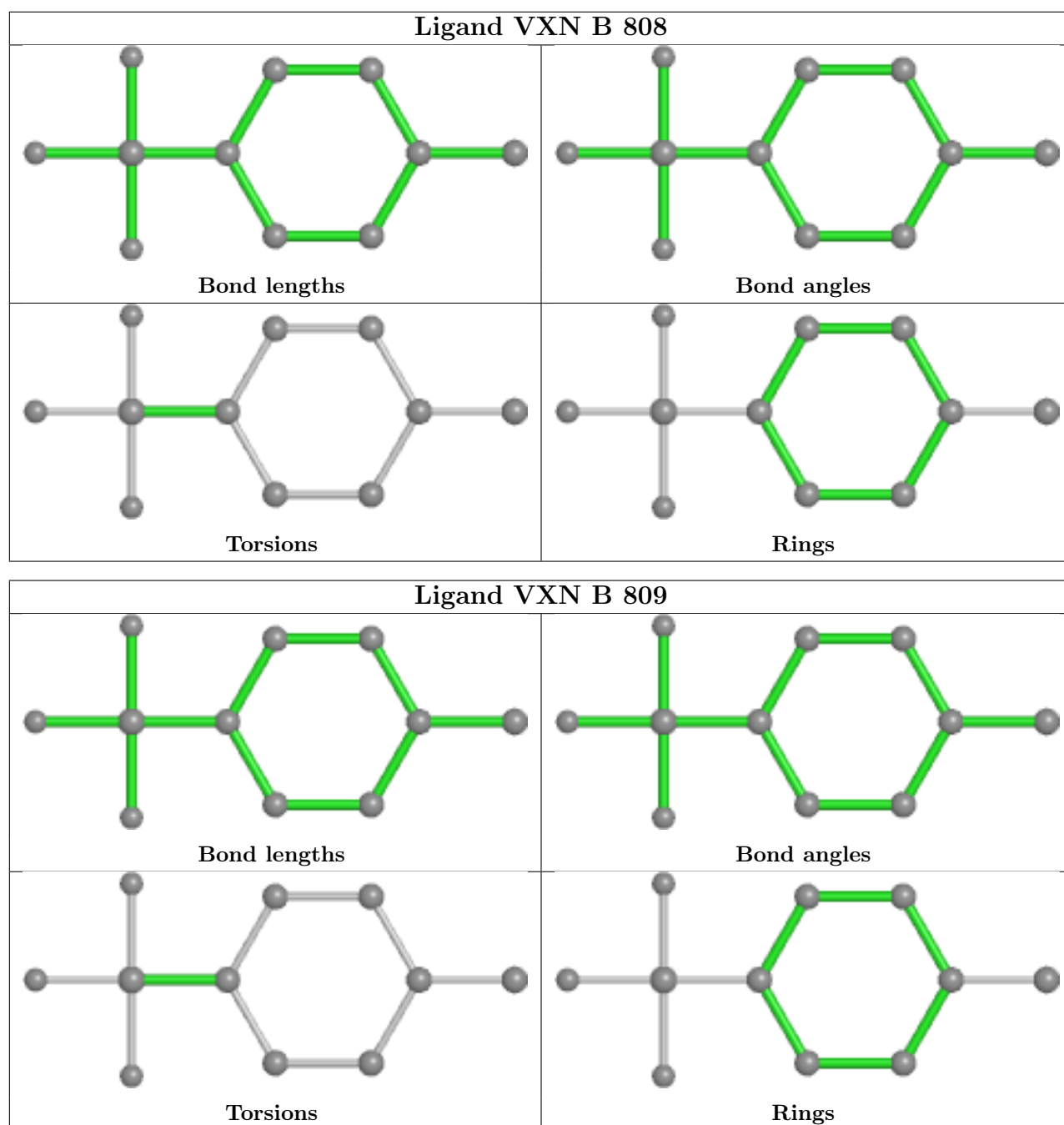
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	807	GOL	1	0
5	B	809	VXN	1	0
3	A	805	SO4	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

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	730/736 (99%)	0.64	41 (5%) 24 20	48, 77, 124, 188	0
1	B	727/736 (98%)	0.52	15 (2%) 63 61	46, 69, 106, 153	0
2	C	400/403 (99%)	0.69	15 (3%) 40 36	45, 66, 102, 160	0
2	D	401/403 (99%)	0.82	26 (6%) 18 14	41, 67, 108, 170	0
All	All	2258/2278 (99%)	0.64	97 (4%) 35 31	41, 70, 117, 188	0

All (97) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	301	THR	10.8
1	A	575	GLY	8.0
2	D	296	PRO	7.0
2	D	228	LEU	6.7
2	C	296	PRO	5.9
1	A	367	TYR	5.6
2	D	294	ALA	5.6
2	C	300	LEU	5.3
2	D	390	ILE	5.2
2	D	299	MET	5.1
2	D	391	GLY	4.8
2	C	134	MET	4.8
2	C	297	VAL	4.7
2	D	1	MET	4.5
2	D	300	LEU	4.2
1	A	328	ILE	4.2
2	D	297	VAL	4.2
2	D	229	ALA	4.1
2	C	295	ASP	4.0
2	C	294	ALA	3.8
1	B	577	THR	3.7

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Mol	Chain	Res	Type	RSRZ
2	C	293	GLY	3.6
2	D	298	ILE	3.5
1	A	407	PHE	3.5
1	A	401	ASP	3.4
1	A	600	LYS	3.3
2	D	295	ASP	3.2
1	A	371	LEU	3.2
1	B	578	TYR	3.1
1	A	423	PHE	3.0
1	A	3	ASP	2.9
2	C	298	ILE	2.9
2	C	390	ILE	2.8
1	A	2	PRO	2.8
1	A	402	PHE	2.8
1	B	576	GLY	2.7
1	A	426	ILE	2.7
1	B	677	GLY	2.7
2	D	111	ASP	2.7
1	A	436	LEU	2.7
2	D	134	MET	2.6
1	A	408	VAL	2.6
2	C	229	ALA	2.6
2	C	301	THR	2.6
1	A	461	ILE	2.6
1	B	423	PHE	2.5
1	A	128	ILE	2.5
1	A	559	LEU	2.5
1	A	577	THR	2.5
1	A	413	PHE	2.5
2	D	385	LEU	2.5
2	D	98	ALA	2.5
1	A	473	VAL	2.5
1	A	325	ILE	2.5
1	A	-6	HIS	2.5
1	A	409	ILE	2.4
2	D	286	ILE	2.4
1	A	574	ALA	2.4
1	A	599	LEU	2.4
2	D	321	ILE	2.4
1	B	623	PHE	2.4
1	A	560	MET	2.4
1	A	475	ILE	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	704	LEU	2.3
2	C	269	ILE	2.3
1	A	351	VAL	2.3
1	B	328	ILE	2.3
1	B	573	ASP	2.3
2	D	110	TRP	2.3
1	A	394	THR	2.3
1	A	137	LEU	2.3
2	C	225	PHE	2.3
1	B	264	ILE	2.2
1	A	510	PHE	2.2
1	B	98	LEU	2.2
1	B	390	LEU	2.2
1	A	290	LEU	2.2
1	A	353	LEU	2.2
2	D	146	PHE	2.2
2	D	304	THR	2.2
1	B	29	VAL	2.2
2	C	373	VAL	2.1
1	A	352	VAL	2.1
1	A	249	LEU	2.1
1	A	490	PHE	2.1
1	B	73	MET	2.1
2	C	292	SER	2.1
2	D	388	LEU	2.1
1	A	356	VAL	2.1
1	A	362	ALA	2.0
2	D	403	VAL	2.0
1	A	327	ARG	2.0
1	A	476	ILE	2.0
1	B	490	PHE	2.0
2	D	293	GLY	2.0
2	D	50	LEU	2.0
1	B	162	ILE	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](#)

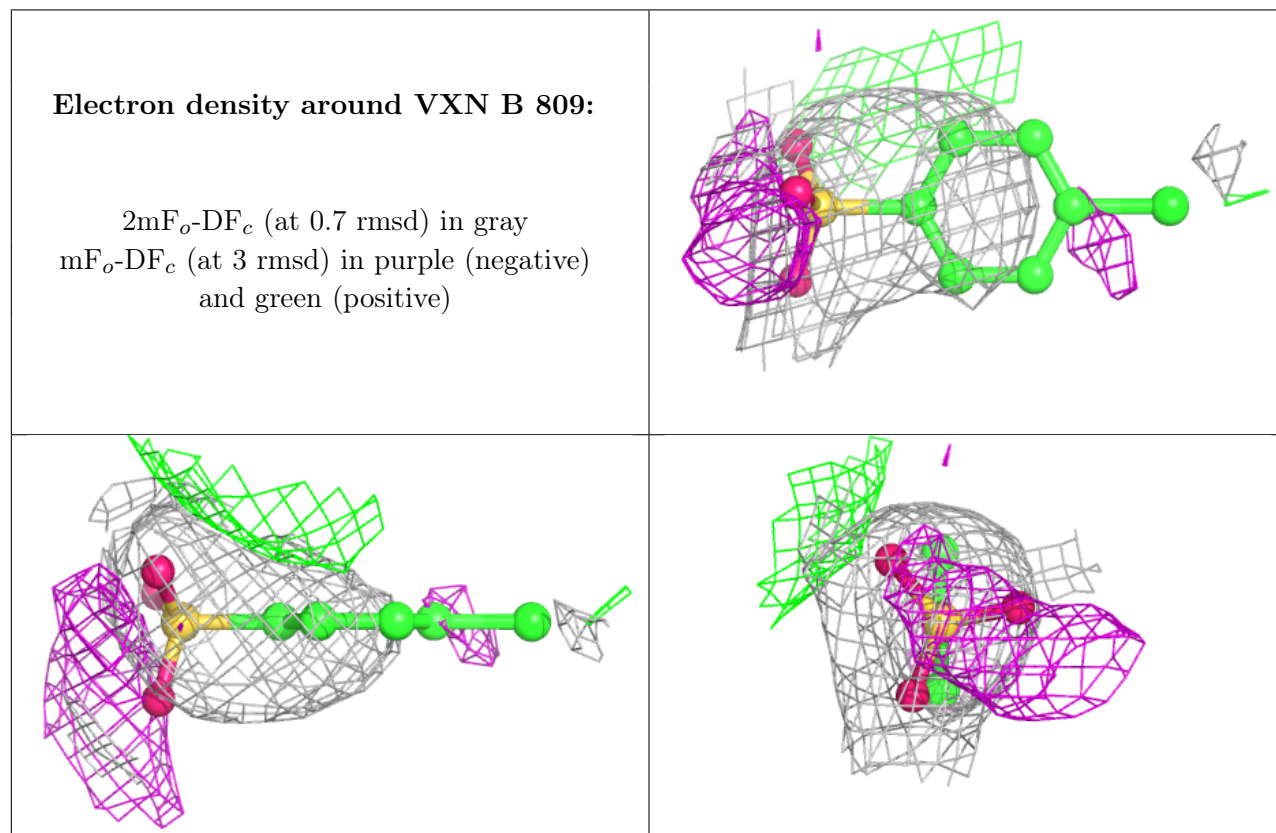
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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.

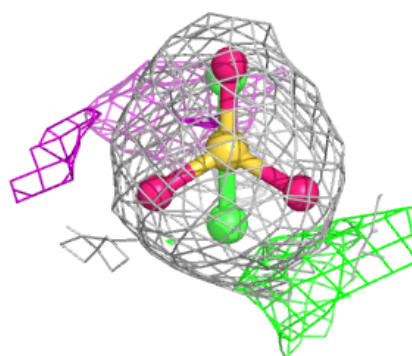
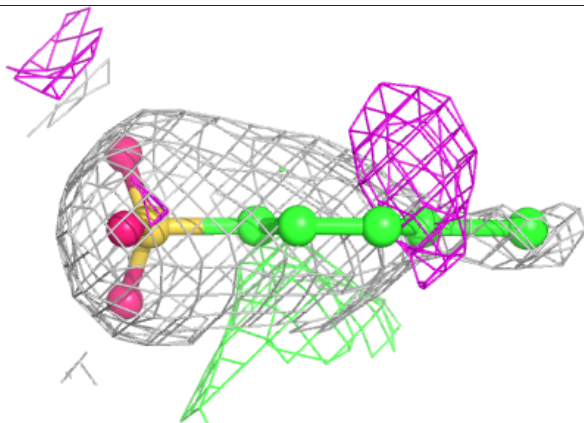
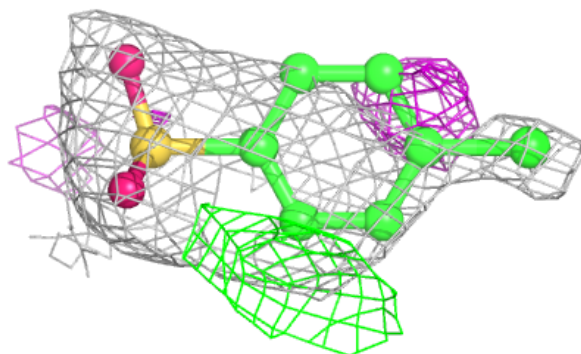
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	SO4	A	803	5/5	0.72	0.23	90,108,125,132	5
4	GOL	A	806	6/6	0.79	0.21	94,98,118,119	0
3	SO4	D	505	5/5	0.80	0.19	122,125,137,142	5
3	SO4	C	507	5/5	0.81	0.12	108,121,141,149	0
5	VXN	B	809	11/11	0.81	0.48	95,118,151,182	0
3	SO4	C	502	5/5	0.82	0.24	121,129,141,158	0
3	SO4	B	802	5/5	0.84	0.19	93,103,105,136	0
3	SO4	A	805	5/5	0.87	0.21	60,62,76,79	5
4	GOL	B	806	6/6	0.87	0.37	64,73,101,106	0
5	VXN	A	810	11/11	0.87	0.41	69,103,130,140	0
3	SO4	C	506	5/5	0.87	0.22	101,104,126,148	0
3	SO4	A	802	5/5	0.88	0.13	111,130,140,147	0
5	VXN	B	808	11/11	0.89	0.46	78,103,134,139	0
4	GOL	B	805	6/6	0.91	0.33	59,67,87,88	0
3	SO4	B	804	5/5	0.91	0.18	110,117,135,152	0
5	VXN	A	809	11/11	0.91	0.31	82,95,113,116	0
3	SO4	C	505	5/5	0.91	0.13	89,115,129,141	0
3	SO4	C	501	5/5	0.91	0.19	93,100,123,136	0
4	GOL	A	807	6/6	0.91	0.26	46,88,91,94	0
5	VXN	B	807	11/11	0.94	0.35	64,79,97,100	0
3	SO4	D	501	5/5	0.94	0.11	82,103,121,127	0
3	SO4	C	504	5/5	0.94	0.11	97,105,114,129	0
3	SO4	D	503	5/5	0.95	0.17	87,106,117,126	0
3	SO4	D	504	5/5	0.95	0.13	65,80,100,103	0
3	SO4	A	801	5/5	0.95	0.15	77,85,91,106	0
3	SO4	D	502	5/5	0.96	0.18	90,100,117,120	0
3	SO4	C	503	5/5	0.96	0.13	96,96,103,103	0
3	SO4	A	804	5/5	0.96	0.12	83,89,99,113	0
3	SO4	B	801	5/5	0.96	0.20	62,75,87,89	0
5	VXN	A	808	11/11	0.96	0.35	88,95,115,131	0
3	SO4	B	803	5/5	0.97	0.14	83,83,99,106	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.



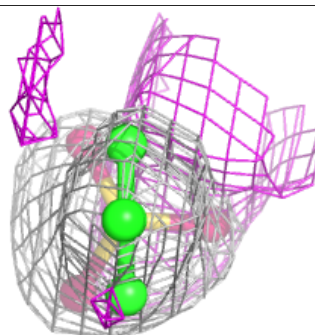
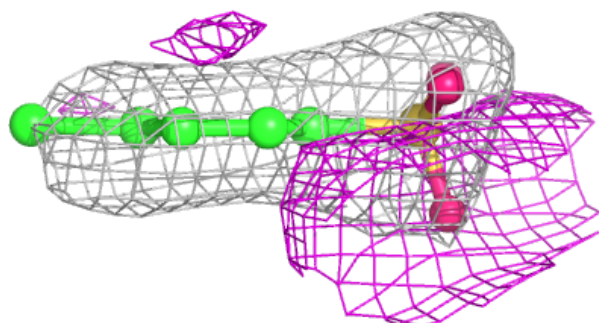
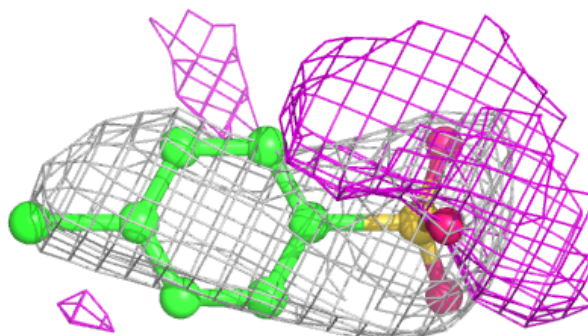
Electron density around VXN A 810:

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

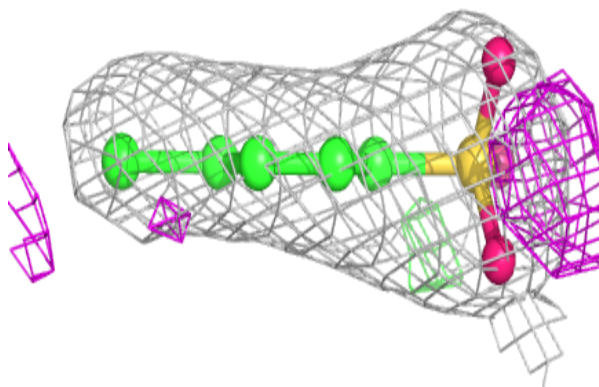
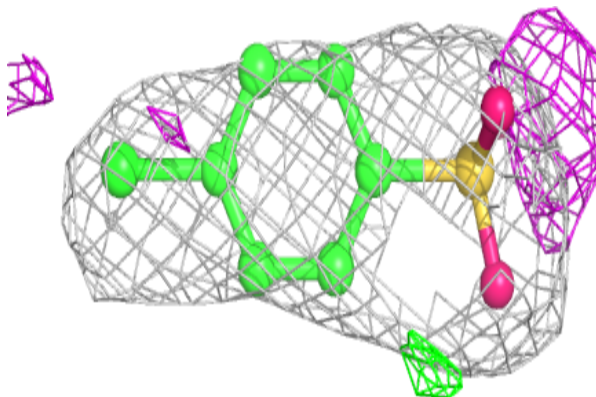


Electron density around VXN B 808:

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and green (positive)

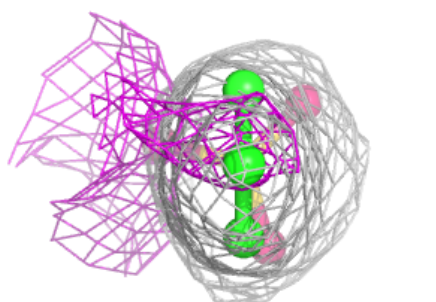
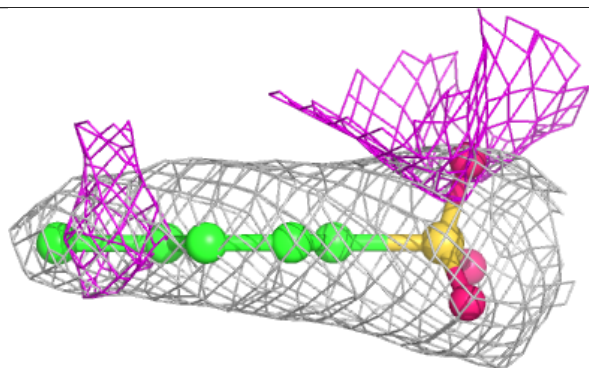
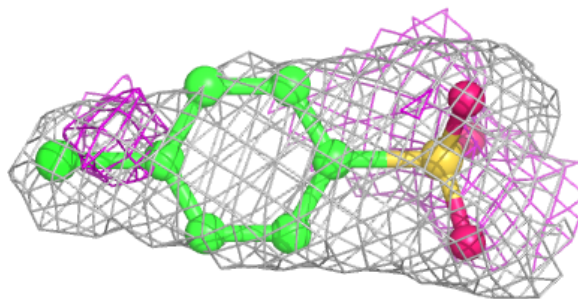
**Electron density around VXN A 809:**

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

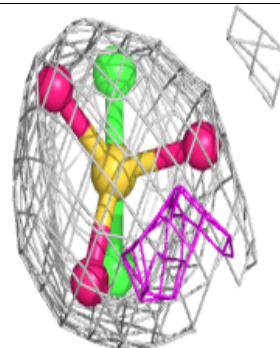
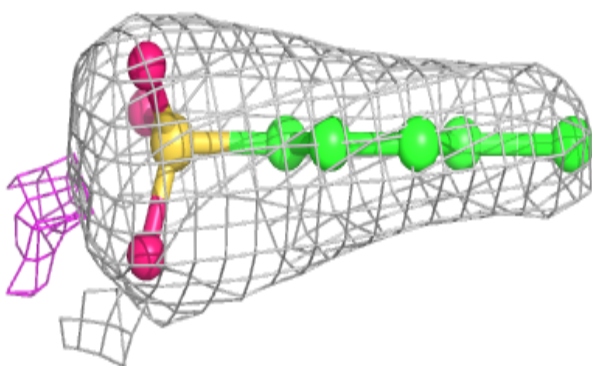
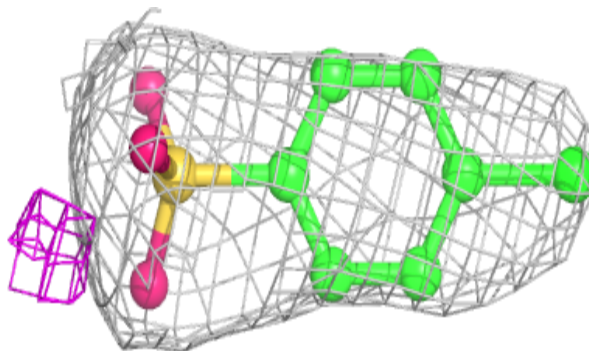


Electron density around VXN B 807:

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

**Electron density around VXN A 808:**

$2mF_o-DF_c$ (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.