Full wwPDB X-ray Structure Validation Report ⓘ

Jul 17, 2024 – 01:53 pm BST

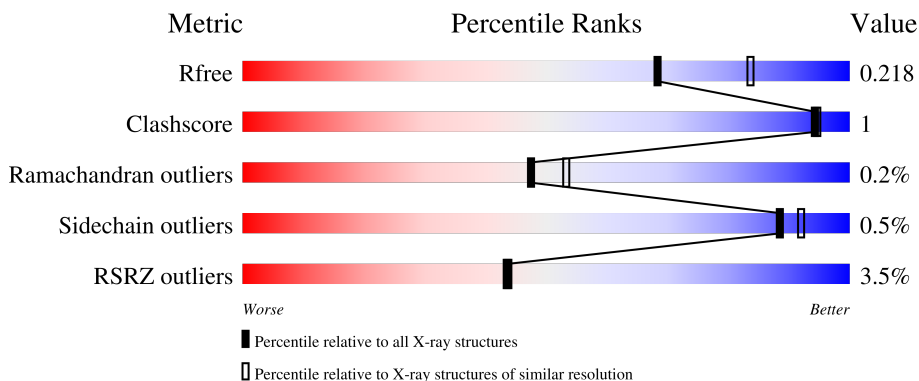|		
PDB ID	:	8PF8
Title	:	Structure of Mycobacterium tuberculosis beta-oxidation trifunctional enzyme in complex with Fragment-M-72
Authors	:	Dalwani, S.; Wierenga, R.K.; Venkatesan, R.
Deposited on	:	2023-06-15
Resolution	:	2.23 Å(reported)

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 2.23 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	Percentile Ranks	Value
Rfree		0.218
Clashscore		1
Ramachandran outliers		0.2%
Sidechain outliers		0.5%
RSRZ outliers		3.5%

Worse *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	2391 (2.26-2.22)
Clashscore	141614	2539 (2.26-2.22)
Ramachandran outliers	138981	2489 (2.26-2.22)
Sidechain outliers	138945	2490 (2.26-2.22)
RSRZ outliers	127900	2353 (2.26-2.22)

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 <=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	7% / 97% · ·
1	B	736	2% / 95% · ·
2	C	403	% / 95% 5%
2	D	403	2% / 94% 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	SO4	D	505	-	-	-	X

2　Entry composition ⓘ

There are 9 unique types of molecules in this entry. The entry contains 17613 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 Probable fatty oxidation protein FadB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	729	Total	C	N	O	S	0	0	0
			5429	3434	936	1038	21			
1	B	732	Total	C	N	O	S	0	0	0
			5450	3445	940	1044	21			

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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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
2	C	402	Total 2966	C 1853	N 525	O 573	S 15	0	0	0
2	D	403	Total 2971	C 1856	N 526	O 574	S 15	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).
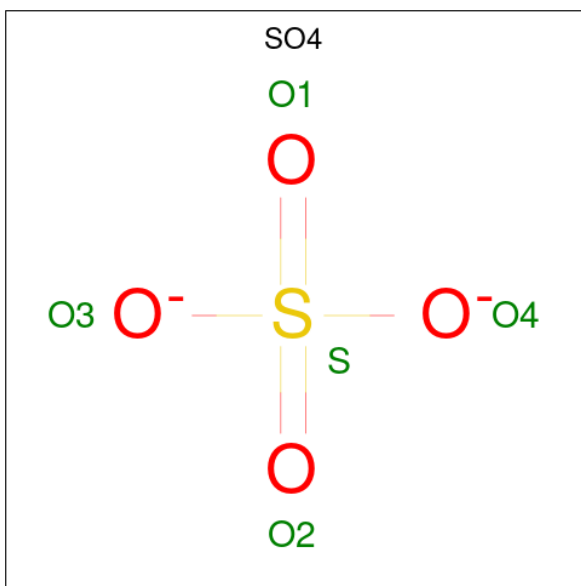
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 5	O 4	S 1	0	0
3	A	1	Total 5	O 4	S 1	0	0
3	A	1	Total 5	O 4	S 1	0	0
3	A	1	Total 5	O 4	S 1	0	0

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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

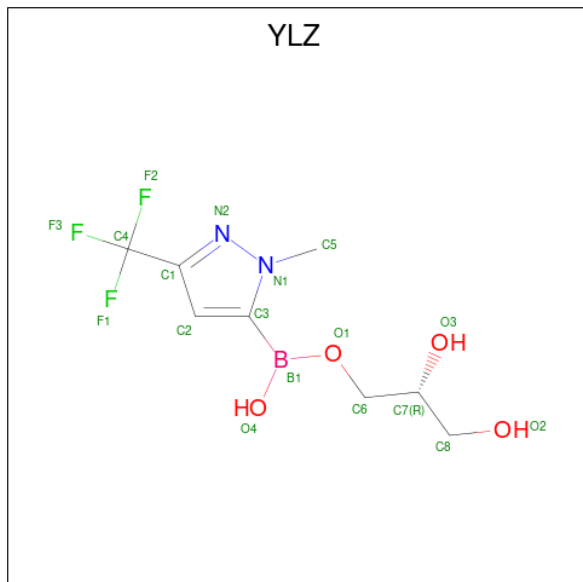| Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is (2 {R})-3-bis[2-methyl-5-(trifluoromethyl)pyrazol-3-yl]boranyloxypropane-1,2 -diol (three-letter code: YMK) (formula: $C_{13}H_{15}BF_6N_4O_3$) (labeled as "Ligand of Interest" by depositor).

YMK
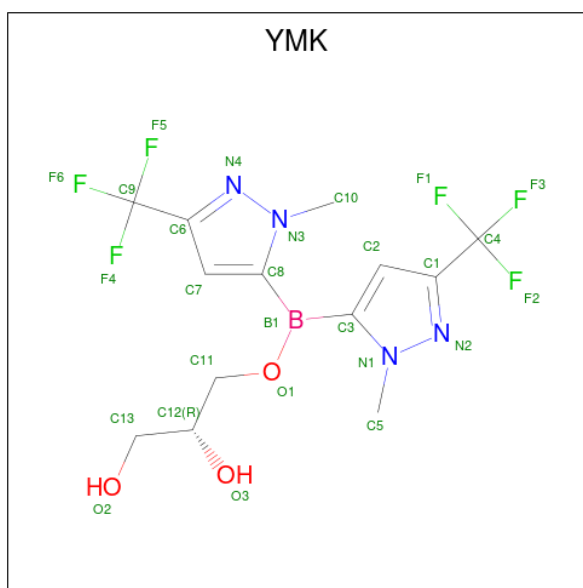
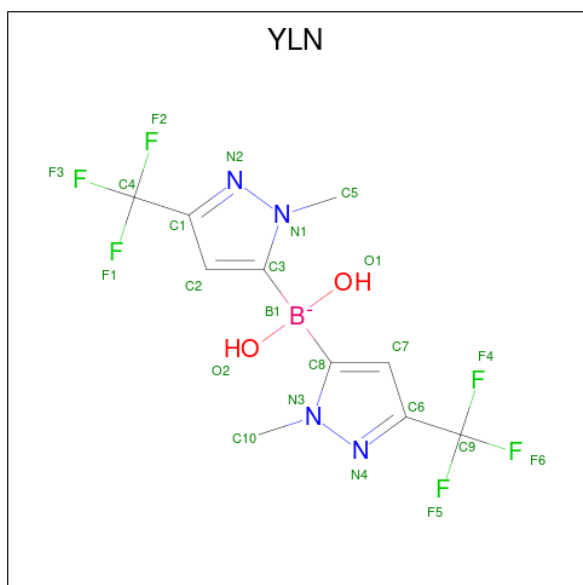| Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total	B	C	F	N	O	0	0
			27	1	13	6	4	3		

- Molecule 6 is [(2 {R})-2,3-bis(oxidanyl)propoxy]-[2-methyl-5-(trifluoromethyl)pyrazol-3

-yl]borinic acid (three-letter code: YLZ) (formula: $C_8H_{12}BF_3N_2O_4$) (labeled as "Ligand of Interest" by depositor).
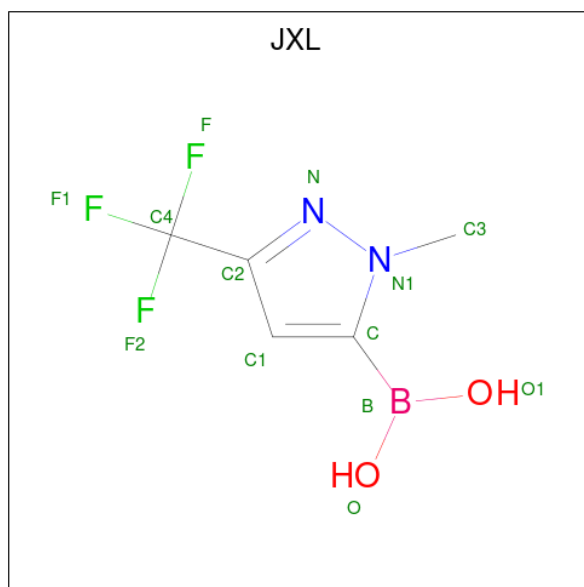

YLZ

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
6	A	1	Total	B	C	F	N	O	0	0
			18	1	8	3	2	4		
6	B	1	Total	B	C	F	N	O	0	0
			18	1	8	3	2	4		

- Molecule 7 is bis[2-methyl-5-(trifluoromethyl)pyrazol-3-yl]-bis(oxidanyl)boranuide (three-letter code: YLN) (formula: $C_{10}H_{10}BF_6N_4O_2$) (labeled as "Ligand of Interest" by depositor).

YLN

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
7	A	1	Total	B	C	F	N	O	0	0
			22	1	10	6	4	1		
7	B	1	Total	B	C	F	N	O	0	0
			22	1	10	6	4	1		

- Molecule 8 is [2-methyl-5-(trifluoromethyl)pyrazol-3-yl]boronic acid (three-letter code: JXL) (formula: $C_5H_6BF_3N_2O_2$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
8	A	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		
8	A	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		
8	A	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		
8	B	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		
8	B	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		
8	B	1	Total	B	C	F	N	O	0	0
			13	1	5	3	2	2		

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	116	Total	O	0	0
			116	116		

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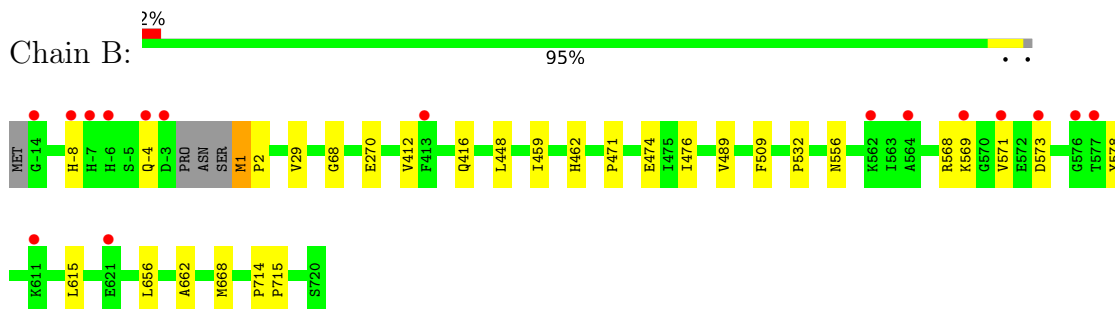| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	B	171	Total O 171 171		0	0
9	C	111	Total O 111 111		0	0
9	D	93	Total O 93 93		0	0

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.
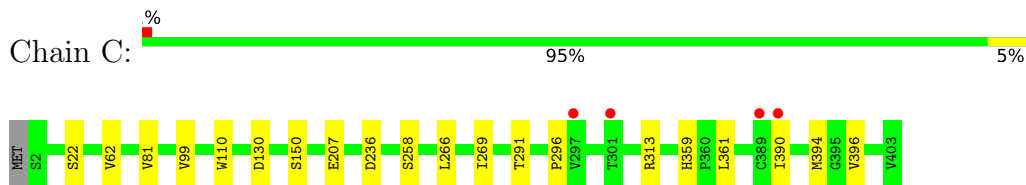
• Molecule 1: Probable fatty oxidation protein FadB
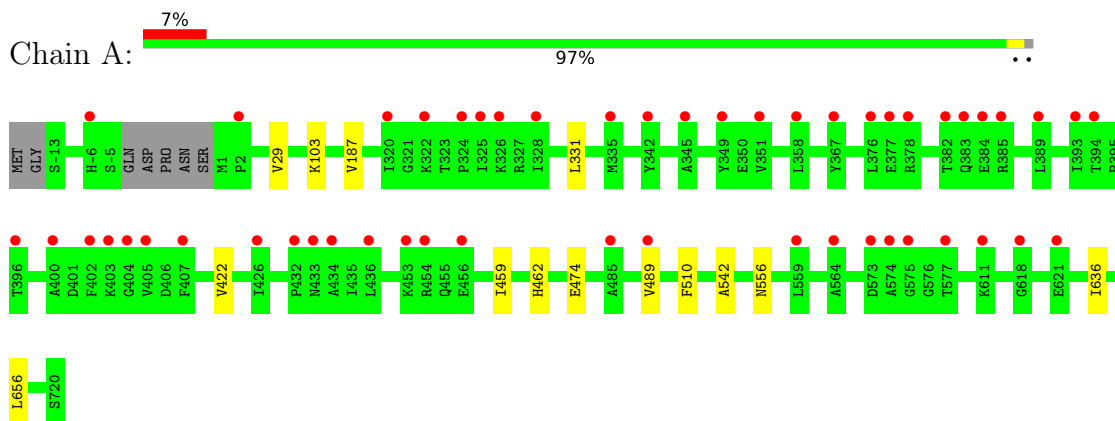
Chain A:

• Molecule 1: Probable fatty oxidation protein FadB

Chain B:

• Molecule 2: Putative acyltransferase Rv0859

Chain C:

• Molecule 2: Putative acyltransferase Rv0859

Chain D:

M1 K27 V32 L56 V62 V81 F91 V99 W110 A116 D130 S150 F225 D235 V267 M268 I269 P296 V297 I298 M299 L300 T301 G302 P303 R313 E346 L361 I390 G391 M394 V403

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	250.96Å 134.61Å 119.97Å 90.00° 110.44° 90.00°	Depositor
Resolution (Å)	112.42 – 2.23 112.42 – 2.23	Depositor EDS
% Data completeness (in resolution range)	72.7 (112.42-2.23) 72.7 (112.42-2.23)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.86 (at 2.22Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.189 , 0.219 0.189 , 0.218	Depositor DCC
R_{free} test set	6595 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	46.8	Xtriage
Anisotropy	0.028	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 30.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.50, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	17613	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.72% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \|L\| >$, $< L^2 >$ 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: YLN, JXL, SO4, YLZ, GOL, YMK

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$ >5	RMSZ	#$|Z|$ >5
1	A	0.25	0/5532	0.47	0/7486
1	B	0.25	0/5553	0.47	0/7514
2	C	0.24	0/3011	0.51	0/4077
2	D	0.25	0/3016	0.50	0/4084
All	All	0.25	0/17112	0.48	0/23161

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 ⓘ

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	5429	0	5467	6	0
1	B	5450	0	5482	15	0
2	C	2966	0	2986	13	0
2	D	2971	0	2991	14	0
3	A	20	0	0	0	0
3	B	25	0	0	1	0
3	C	35	0	0	0	0
3	D	35	0	0	0	0
4	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	27	0	0	0	0
6	A	18	0	0	0	0
6	B	18	0	0	0	0
7	A	22	0	0	0	0
7	B	22	0	0	1	0
8	A	39	0	0	0	0
8	B	39	0	0	0	0
9	A	116	0	0	0	0
9	B	171	0	0	0	0
9	C	111	0	0	0	0
9	D	93	0	0	0	0
All	All	17613	0	16934	43	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 1.

All (43) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:-8:HIS:HB2	1:B:-4:GLN:HE21	1.47	0.77
2:C:110:TRP:CD1	2:D:313:ARG:HD3	2.37	0.59
1:B:462:HIS:HB3	1:B:474:GLU:HB3	1.85	0.57
2:D:390:ILE:HB	2:D:394:MET:HG3	1.86	0.57
2:C:62:VAL:HG12	2:D:62:VAL:HG12	1.87	0.56
2:C:81:VAL:HG11	2:D:296:PRO:HD3	1.87	0.56
2:C:296:PRO:HD3	2:D:81:VAL:HG11	1.89	0.55
2:C:99:VAL:HG13	2:C:269:ILE:HD11	1.89	0.55
2:C:313:ARG:HD3	2:D:110:TRP:CD1	2.42	0.54
1:B:270:GLU:HG2	2:D:27:LYS:HE2	1.90	0.54
2:C:291:THR:HG22	2:C:396:VAL:HG22	1.92	0.51
1:A:462:HIS:HB3	1:A:474:GLU:HB3	1.93	0.50
1:B:29:VAL:HG13	1:B:68:GLY:HA2	1.94	0.49
2:C:22:SER:OG	2:C:207:GLU:OE2	2.23	0.49
2:D:302:GLY:N	2:D:303:PRO:HD2	2.27	0.49
2:C:390:ILE:HD11	2:C:396:VAL:HG23	1.95	0.48
2:D:99:VAL:HG13	2:D:269:ILE:HD11	1.96	0.48
2:C:62:VAL:HG11	2:C:130:ASP:HA	1.96	0.47
1:B:-8:HIS:HB3	3:B:807:SO4:O3	2.15	0.47
2:D:150:SER:HB2	2:D:225:PHE:CG	2.50	0.46
1:A:459:ILE:HG21	1:A:489:VAL:HG21	1.97	0.45
2:D:62:VAL:HG11	2:D:130:ASP:HA	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:471:PRO:HG2	1:B:668:MET:HB3	1.98	0.45
1:A:510:PHE:CD1	1:A:656:LEU:HD11	2.52	0.45
1:B:714:PRO:HA	1:B:715:PRO:HD3	1.91	0.44
1:B:569:LYS:O	1:B:573:ASP:N	2.31	0.44
2:D:116:ALA:O	2:D:267:VAL:N	2.44	0.44
2:D:32:VAL:HG11	2:D:56:LEU:HD11	2.00	0.44
1:B:1:MET:HA	1:B:2:PRO:HD3	1.83	0.43
2:C:258:SER:HB2	2:C:359:HIS:HB2	2.00	0.43
2:C:390:ILE:HB	2:C:394:MET:HB2	2.01	0.43
1:B:568:ARG:HD3	1:B:578:TYR:CD2	2.53	0.43
1:B:416:GLN:HG3	1:B:448:LEU:HD23	2.01	0.43
2:C:266:LEU:HD23	2:C:266:LEU:HA	1.82	0.43
2:D:91:PHE:HB2	2:D:390:ILE:CG2	2.49	0.43
1:B:459:ILE:HG21	1:B:489:VAL:HG21	2.01	0.42
7:B:806:YLN:C7	7:B:806:YLN:C3	2.95	0.42
1:B:532:PRO:HB2	1:B:615:LEU:HD13	2.02	0.41
1:A:331:LEU:HD13	1:A:422:VAL:HG12	2.02	0.41
1:A:542:ALA:HB2	1:A:636:ILE:HG23	2.02	0.41
1:B:476:ILE:HG21	1:B:509:PHE:CE1	2.56	0.41
1:B:656:LEU:HD13	1:B:662:ALA:HB2	2.02	0.41
1:A:103:LYS:HE2	1:A:103:LYS:HB3	1.92	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	725/736 (98%)	701 (97%)	23 (3%)	1 (0%)	51	58
1	B	728/736 (99%)	707 (97%)	19 (3%)	2 (0%)	41	44
2	C	400/403 (99%)	387 (97%)	12 (3%)	1 (0%)	41	44
2	D	401/403 (100%)	390 (97%)	10 (2%)	1 (0%)	47	53

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	2254/2278 (99%)	2185 (97%)	64 (3%)	5 (0%)	47 53

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	361	LEU
2	C	361	LEU
1	A	556	ASN
1	B	556	ASN
1	B	412	VAL

5.3.2 Protein sidechains ⓘ

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	560/566 (99%)	558 (100%)	2 (0%)	91 93
1	B	562/566 (99%)	560 (100%)	2 (0%)	91 93
2	C	309/310 (100%)	307 (99%)	2 (1%)	86 90
2	D	309/310 (100%)	306 (99%)	3 (1%)	76 82
All	All	1740/1752 (99%)	1731 (100%)	9 (0%)	88 92

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	VAL
1	A	187	VAL
1	B	1	MET
1	B	571	VAL
2	C	150	SER
2	C	236	ASP
2	D	235	ASP
2	D	298	ILE
2	D	346	GLU

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

Mol	Chain	Res	Type
1	B	-4	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

35 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	B	803	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	A	801	-	4,4,4	0.14	0	6,6,6	0.05	0
8	JXL	B	809	-	11,13,13	0.50	0	15,20,20	0.35	0
3	SO4	C	504	-	4,4,4	0.13	0	6,6,6	0.06	0
8	JXL	A	810	-	11,13,13	0.49	0	15,20,20	0.35	0
3	SO4	B	804	-	4,4,4	0.14	0	6,6,6	0.06	0
7	YLN	A	808	1	19,23,24	2.42	3 (15%)	24,37,40	1.17	2 (8%)
3	SO4	C	502	-	4,4,4	0.14	0	6,6,6	0.05	0
8	JXL	A	811	-	11,13,13	0.52	0	15,20,20	0.37	0
8	JXL	B	810	-	11,13,13	0.48	0	15,20,20	0.36	0
4	GOL	A	805	-	5,5,5	0.93	0	5,5,5	0.96	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z|$ > 2	Counts	RMSZ	#$|Z|$ > 2
3	SO4	C	503	-	4,4,4	0.15	0	6,6,6	0.08	0
3	SO4	B	801	-	4,4,4	0.13	0	6,6,6	0.10	0
3	SO4	D	504	-	4,4,4	0.13	0	6,6,6	0.06	0
3	SO4	D	502	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	D	506	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	B	807	-	4,4,4	0.14	0	6,6,6	0.10	0
8	JXL	B	808	-	11,13,13	0.47	0	15,20,20	0.36	0
3	SO4	D	507	-	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
6	YLZ	B	805	-	14,18,18	0.44	0	18,26,26	0.35	0
3	SO4	D	501	-	4,4,4	0.14	0	6,6,6	0.06	0
8	JXL	A	809	-	11,13,13	0.47	0	15,20,20	0.42	0
3	SO4	C	506	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	D	503	-	4,4,4	0.14	0	6,6,6	0.05	0
7	YLN	B	806	1	19,23,24	2.43	3 (15%)	24,37,40	1.18	2 (8%)
3	SO4	D	505	-	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	0.04	0
3	SO4	A	802	-	4,4,4	0.14	0	6,6,6	0.07	0
3	SO4	C	501	-	4,4,4	0.15	0	6,6,6	0.05	0
3	SO4	B	802	-	4,4,4	0.14	0	6,6,6	0.05	0
5	YMK	A	806	-	22,28,28	0.51	0	29,43,43	0.35	0
6	YLZ	A	807	-	14,18,18	0.45	0	18,26,26	0.34	0
3	SO4	A	803	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	A	804	-	4,4,4	0.15	0	6,6,6	0.05	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
6	YLZ	B	805	-	-	8/10/17/17	0/1/1/1
8	JXL	A	811	-	-	0/6/10/10	0/1/1/1
8	JXL	B	810	-	-	0/6/10/10	0/1/1/1
6	YLZ	A	807	-	-	8/10/17/17	0/1/1/1
4	GOL	A	805	-	-	0/4/4/4	-
5	YMK	A	806	-	-	2/18/27/27	0/2/2/2
8	JXL	A	809	-	-	1/6/10/10	0/1/1/1
8	JXL	B	809	-	-	0/6/10/10	0/1/1/1
8	JXL	A	810	-	-	0/6/10/10	0/1/1/1
7	YLN	B	806	1	-	4/12/20/24	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	YLN	A	808	1	-	<mark>3/12/20/24</mark>	0/2/2/2
8	JXL	B	808	-	-	0/6/10/10	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	806	YLN	B1-O1	10.06	1.51	1.36
7	A	808	YLN	B1-O1	10.02	1.51	1.36
7	B	806	YLN	C2-C3	2.10	1.42	1.39
7	A	808	YLN	C2-C3	2.08	1.42	1.39
7	B	806	YLN	C7-C8	2.05	1.42	1.39
7	A	808	YLN	C7-C8	2.05	1.42	1.39

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	808	YLN	C6-N4-N3	3.79	107.21	104.37
7	B	806	YLN	C6-N4-N3	3.74	107.18	104.37
7	B	806	YLN	C1-N2-N1	3.65	107.11	104.37
7	A	808	YLN	C1-N2-N1	3.54	107.03	104.37

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	806	YMK	C3-B1-O1-C11
5	A	806	YMK	C8-B1-O1-C11
6	A	807	YLZ	C6-C7-C8-O2
6	B	805	YLZ	C6-C7-C8-O2
6	A	807	YLZ	N2-C1-C4-F2
6	B	805	YLZ	C2-C1-C4-F2
6	B	805	YLZ	N2-C1-C4-F2
6	B	805	YLZ	O3-C7-C8-O2
6	A	807	YLZ	C2-C1-C4-F1
6	A	807	YLZ	C2-C1-C4-F2
6	A	807	YLZ	C2-C1-C4-F3
6	A	807	YLZ	N2-C1-C4-F1
6	A	807	YLZ	N2-C1-C4-F3
6	B	805	YLZ	C2-C1-C4-F1
6	B	805	YLZ	C2-C1-C4-F3
6	B	805	YLZ	N2-C1-C4-F1

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Mol	Chain	Res	Type	Atoms
6	B	805	YLZ	N2-C1-C4-F3
7	B	806	YLN	N2-C1-C4-F2
6	A	807	YLZ	O3-C7-C8-O2
7	A	808	YLN	N2-C1-C4-F2
7	B	806	YLN	N2-C1-C4-F1
7	B	806	YLN	N2-C1-C4-F3
7	A	808	YLN	N2-C1-C4-F1
7	A	808	YLN	N2-C1-C4-F3
7	B	806	YLN	C2-C1-C4-F1
8	A	809	JXL	N-C2-C4-F

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	807	SO4	1	0
7	B	806	YLN	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 then 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.

Ligand JXL B 809

Bond lengths

Bond angles

Torsions

Rings

Ligand JXL A 810

Bond lengths

Bond angles

Torsions

Rings

Ligand YLN A 808

Bond lengths

Bond angles

Torsions

Rings

Ligand JXL A 811

Bond lengths

Bond angles

Torsions

Rings

Ligand JXL B 810

Bond lengths

Bond angles

Torsions

Rings

Ligand JXL B 808

Bond lengths

Bond angles

Torsions

Rings

Ligand YLZ B 805

Bond lengths

Bond angles

Torsions

Rings

Ligand JXL A 809

Bond lengths

Bond angles

Torsions

Rings

Ligand YLN B 806

Bond lengths

Bond angles

Torsions

Rings

Ligand YMK A 806

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	729/736 (99%)	0.33	51 (6%)	16	15	35, 58, 103, 153	0
1	B	732/736 (99%)	0.06	16 (2%)	62	63	34, 52, 92, 145	0
2	C	402/403 (99%)	0.05	4 (0%)	82	83	33, 48, 83, 114	0
2	D	403/403 (100%)	0.10	8 (1%)	65	66	32, 48, 87, 156	0
All	All	2266/2278 (99%)	0.15	79 (3%)	44	43	32, 52, 95, 156	0

All (79) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	1	MET	7.3
2	D	391	GLY	5.9
1	B	577	THR	5.4
1	A	575	GLY	4.6
1	A	433	ASN	4.4
2	D	296	PRO	4.3
2	D	390	ILE	4.2
1	A	434	ALA	4.2
1	B	-4	GLN	4.2
1	A	378	ARG	3.9
1	B	576	GLY	3.7
1	A	577	THR	3.7
1	A	382	THR	3.6
1	A	403	LYS	3.6
2	D	301	THR	3.5
1	B	-14	GLY	3.5
1	A	325	ILE	3.5
1	A	349	TYR	3.5
1	B	573	ASP	3.4
1	A	454	ARG	3.4
1	B	-3	ASP	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	456	GLU	3.1
2	C	390	ILE	3.1
1	A	351	VAL	3.0
1	A	400	ALA	3.0
1	A	573	ASP	2.9
2	C	301	THR	2.9
2	D	299	MET	2.8
1	A	436	LEU	2.8
1	A	376	LEU	2.8
1	A	326	LYS	2.7
1	A	453	LYS	2.7
2	D	297	VAL	2.7
1	A	426	ILE	2.7
1	A	574	ALA	2.7
1	A	385	ARG	2.7
1	A	618	GLY	2.7
1	A	402	PHE	2.7
1	B	611	LYS	2.6
1	A	320	ILE	2.5
1	A	485	ALA	2.5
2	C	389	CYS	2.5
1	B	562	LYS	2.5
1	A	322	LYS	2.5
1	B	564	ALA	2.4
1	B	569	LYS	2.4
1	A	405	VAL	2.4
1	A	564	ALA	2.4
1	B	621	GLU	2.4
1	A	621	GLU	2.4
1	A	367	TYR	2.3
1	A	393	ILE	2.3
1	A	345	ALA	2.3
1	A	559	LEU	2.3
1	B	-6	HIS	2.3
1	A	389	LEU	2.2
1	A	-6	HIS	2.2
1	A	383	GLN	2.2
1	A	328	ILE	2.2
1	A	384	GLU	2.2
1	A	396	THR	2.2
1	A	2	PRO	2.2
1	A	404	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
2	C	297	VAL	2.2
1	A	432	PRO	2.2
1	A	489	VAL	2.2
1	A	358	LEU	2.2
1	B	571	VAL	2.1
1	A	407	PHE	2.1
1	B	413	PHE	2.1
1	A	394	THR	2.1
1	A	377	GLU	2.1
1	A	335	MET	2.1
1	B	-8	HIS	2.1
1	B	-7	HIS	2.1
1	A	342	TYR	2.1
1	A	324	PRO	2.1
1	A	611	LYS	2.0
2	D	303	PRO	2.0

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

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

6.3　Carbohydrates ⓘ

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
3	SO4	C	501	5/5	0.71	0.29	102,112,126,155	0
3	SO4	B	802	5/5	0.74	0.23	76,76,82,85	5
3	SO4	D	505	5/5	0.77	0.41	68,72,91,98	5
8	JXL	A	809	13/13	0.81	0.21	79,91,110,113	0
3	SO4	D	506	5/5	0.85	0.32	103,107,125,129	1
3	SO4	B	803	5/5	0.86	0.18	108,130,147,166	0
8	JXL	B	808	13/13	0.86	0.17	81,98,107,109	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	SO4	C	504	5/5	0.87	0.15	88,94,106,134	0
4	GOL	A	805	6/6	0.89	0.16	66,75,82,90	0
3	SO4	D	503	5/5	0.90	0.19	84,84,97,123	0
8	JXL	B	809	13/13	0.90	0.14	69,84,98,98	0
8	JXL	A	810	13/13	0.92	0.16	68,78,93,94	0
6	YLZ	B	805	18/18	0.92	0.16	62,73,83,86	0
5	YMK	A	806	27/27	0.92	0.20	66,84,105,107	0
3	SO4	B	807	5/5	0.93	0.14	89,91,95,99	0
3	SO4	C	505	5/5	0.93	0.16	98,102,112,122	0
3	SO4	A	802	5/5	0.93	0.11	93,95,108,128	0
3	SO4	B	801	5/5	0.94	0.12	67,69,93,98	0
3	SO4	A	801	5/5	0.94	0.13	70,80,101,112	0
3	SO4	C	502	5/5	0.94	0.18	71,92,98,98	0
3	SO4	A	804	5/5	0.94	0.23	57,61,66,66	5
3	SO4	B	804	5/5	0.94	0.13	51,51,59,60	5
8	JXL	B	810	13/13	0.94	0.15	63,68,78,82	0
8	JXL	A	811	13/13	0.95	0.15	58,63,68,72	0
3	SO4	C	503	5/5	0.95	0.10	74,87,96,99	0
3	SO4	D	507	5/5	0.95	0.14	69,75,98,103	0
6	YLZ	A	807	18/18	0.95	0.13	63,70,80,88	0
7	YLN	A	808	22/23	0.96	0.15	50,56,61,66	0
7	YLN	B	806	22/23	0.96	0.16	53,58,68,68	0
3	SO4	C	506	5/5	0.96	0.13	85,95,97,107	0
3	SO4	C	507	5/5	0.96	0.17	68,80,92,95	0
3	SO4	D	504	5/5	0.97	0.15	78,88,100,102	0
3	SO4	D	502	5/5	0.97	0.16	67,72,93,96	0
3	SO4	A	803	5/5	0.98	0.14	82,88,93,95	0
3	SO4	D	501	5/5	0.98	0.11	91,93,97,97	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 JXL A 809:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
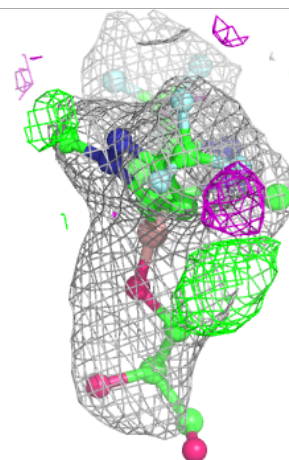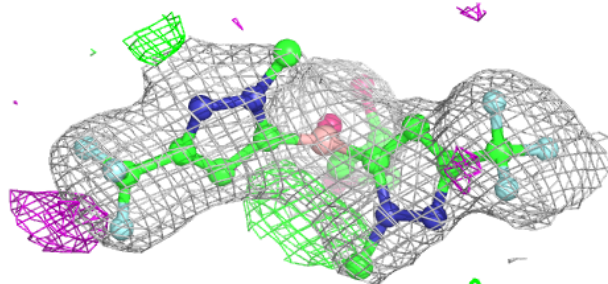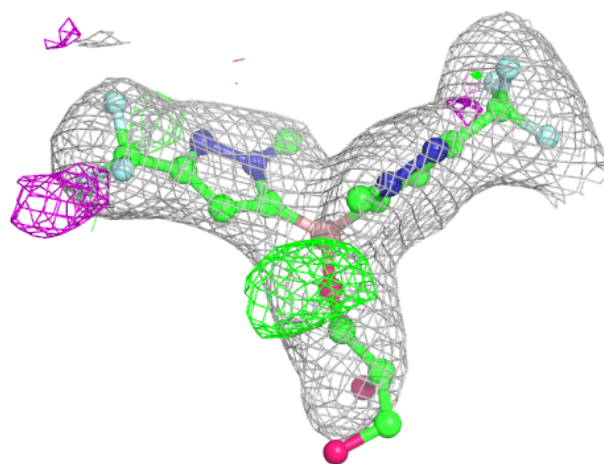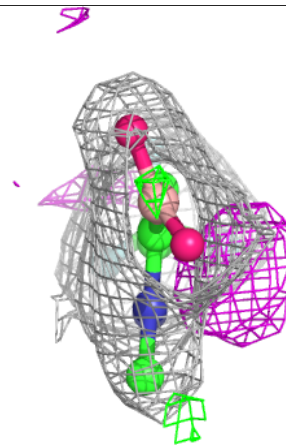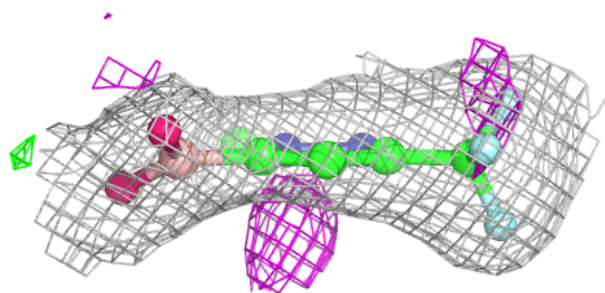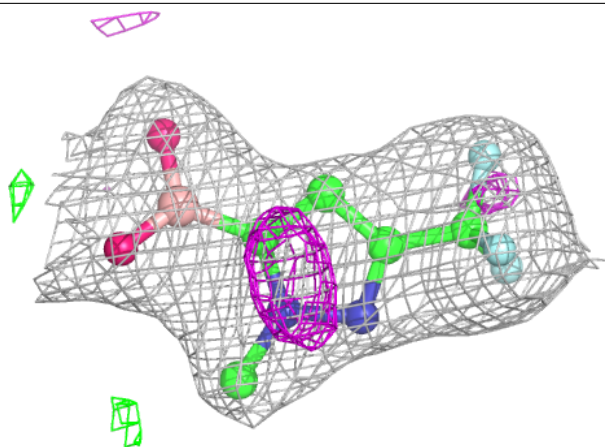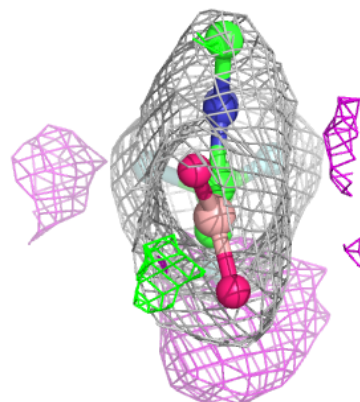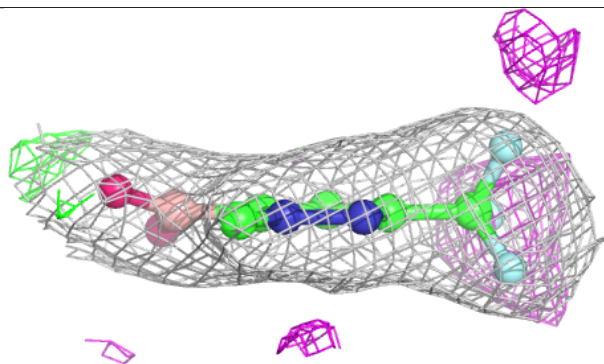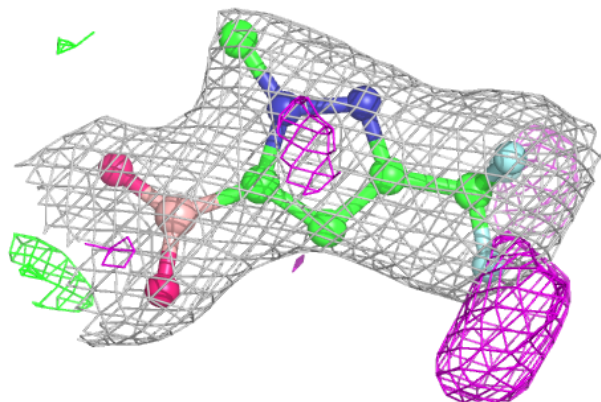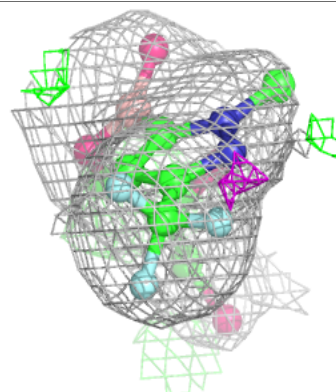mF_o-DF_c (at 3 rmsd) in purple (negative)
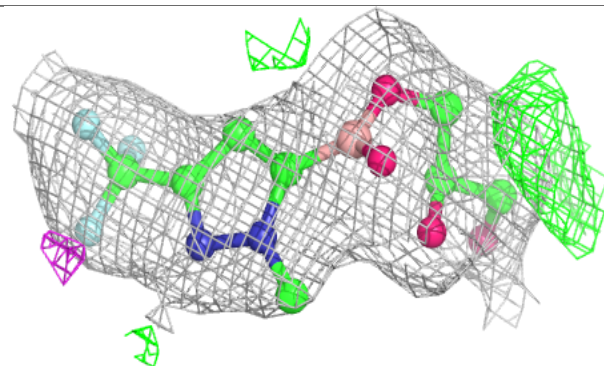and green (positive)
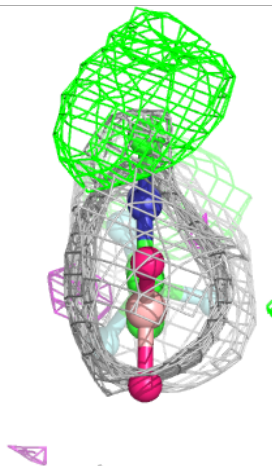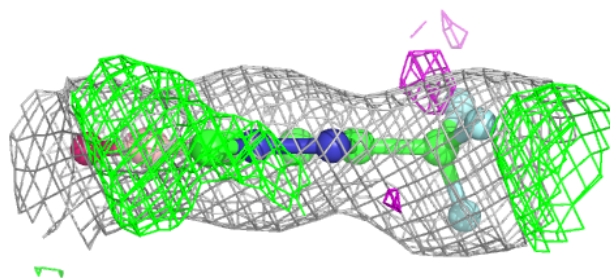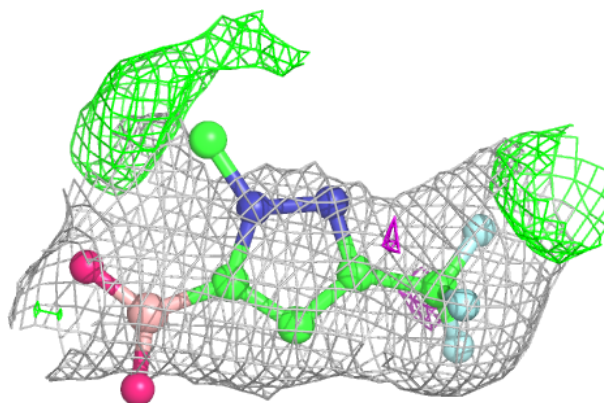
Electron density around JXL B 808:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
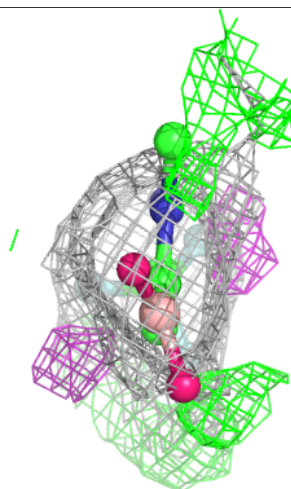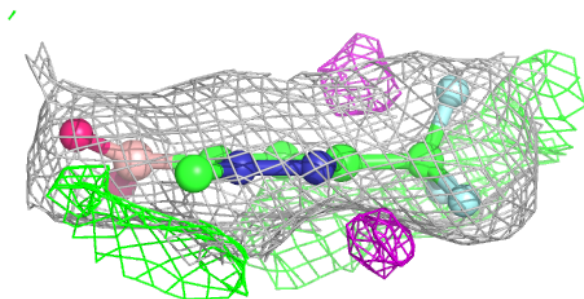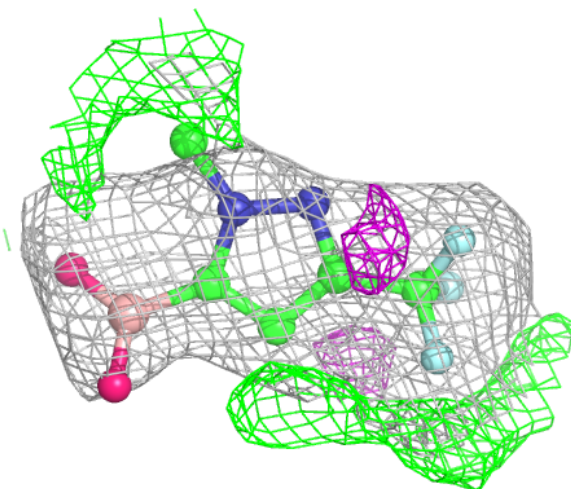
Electron density around JXL B 809:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
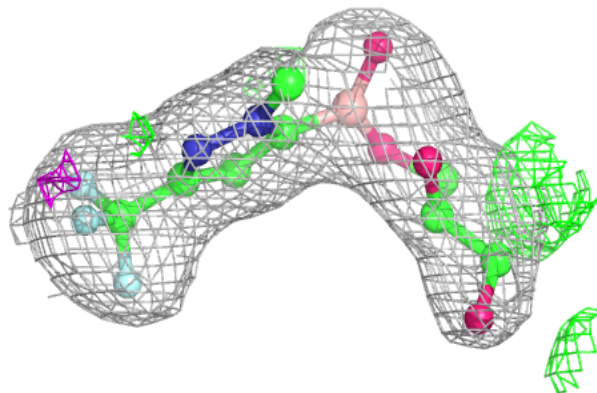and green (positive)
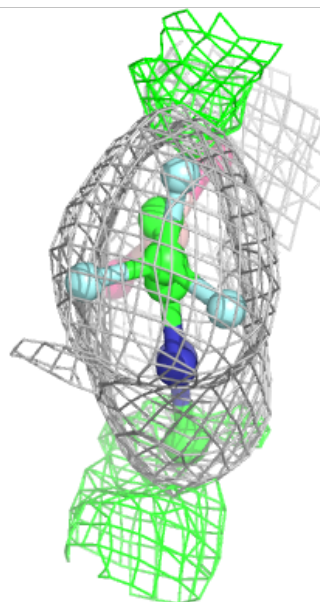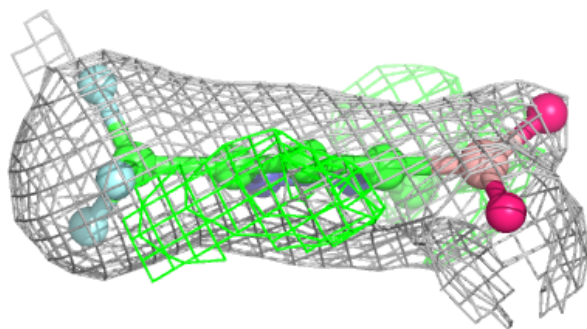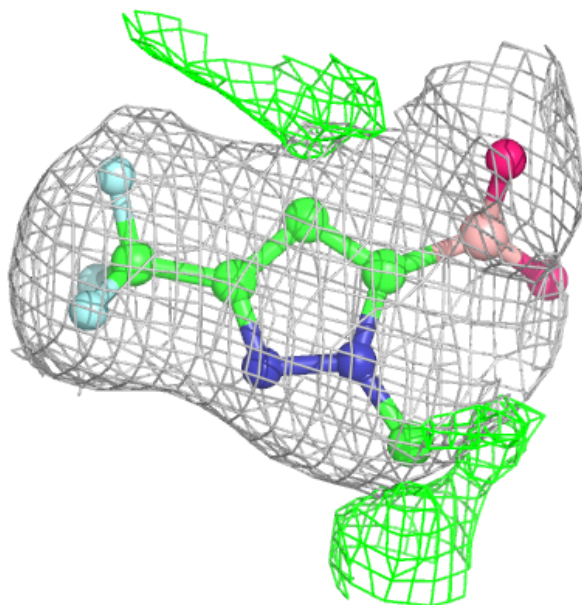
Electron density around JXL A 810:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
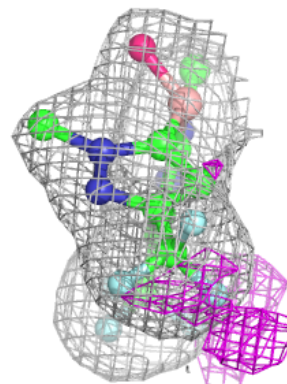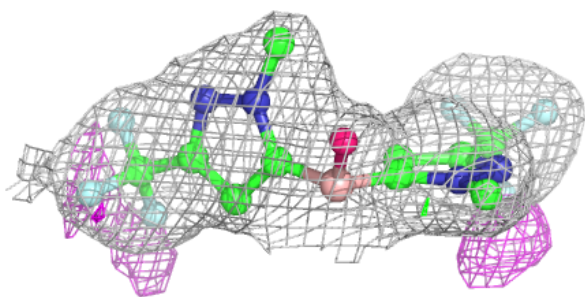and green (positive)
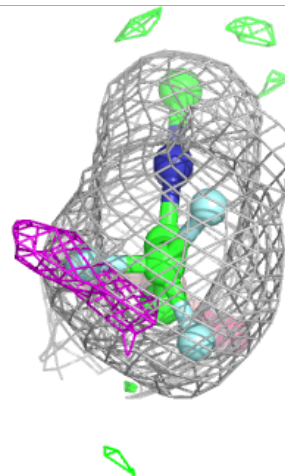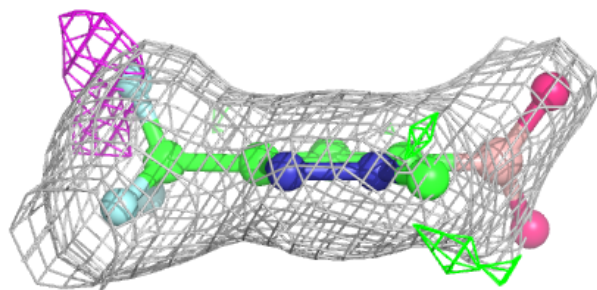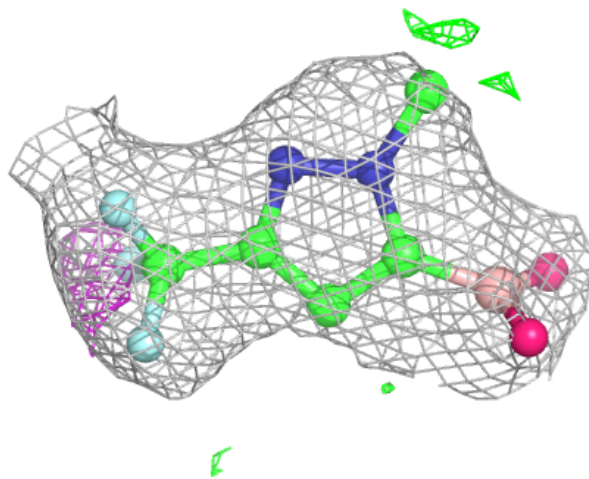
Electron density around YLZ B 805:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
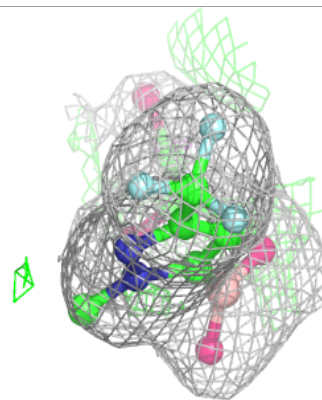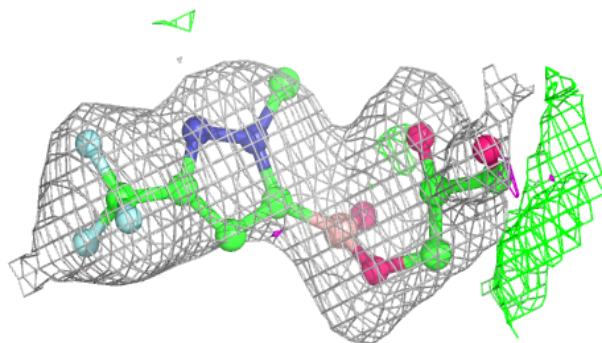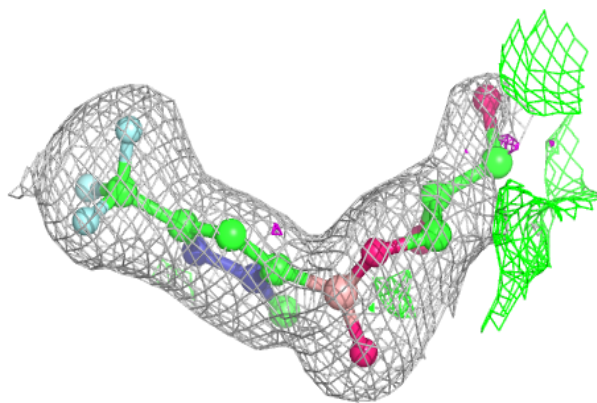
Electron density around YMK A 806:

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

Electron density around JXL B 810:

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

Electron density around JXL A 811:

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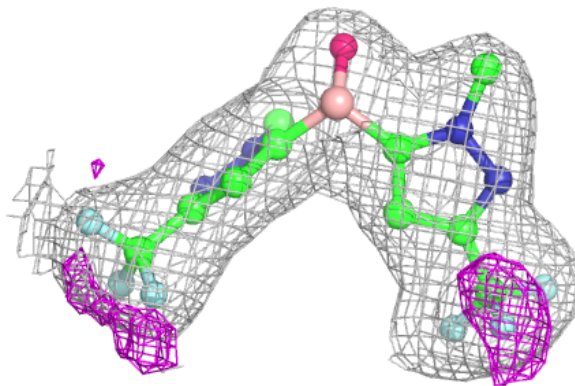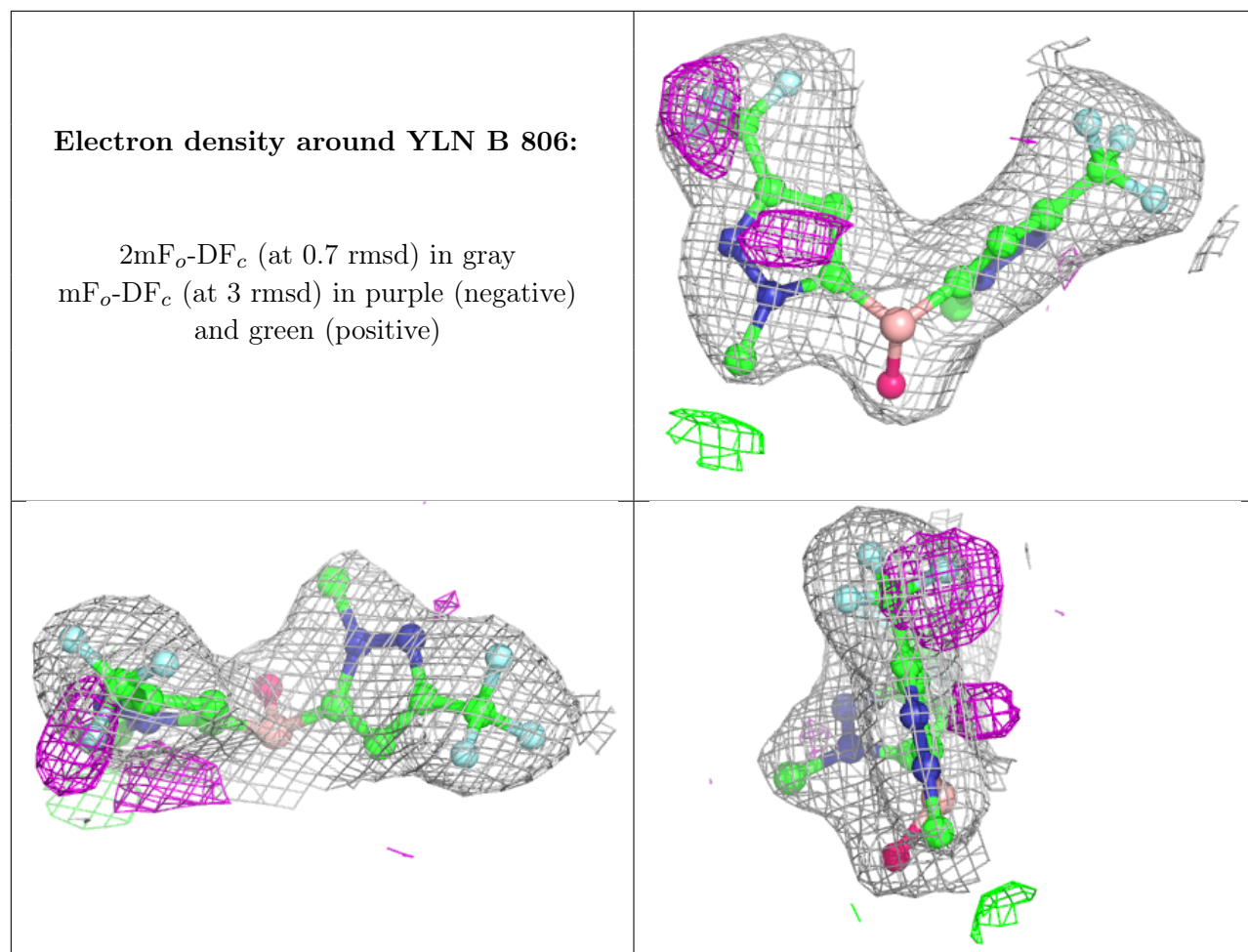and green (positive)

Electron density around YLZ A 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 YLN A 808:

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

Electron density around YLN B 806:

$2mF_o$-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 ⓘ

There are no such residues in this entry.