



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:30 AM UTC

PDB ID : 4MIG / pdb_00004mig
Title : Pyranose 2-oxidase from Phanerochaete chrysosporium, recombinant wild type
Authors : Hassan, N.; Tan, T.C.; Spadiut, O.; Pisanelli, I.; Fusco, L.; Haltrich, D.; Peterbauer, C.; Divne, C.
Deposited on : 2013-08-31
Resolution : 1.80 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

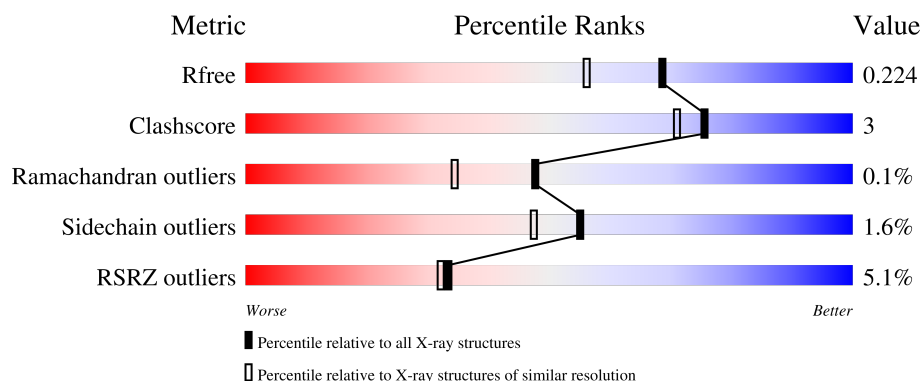
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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}	180053	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

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	648	<div> <div>5%</div> <div> <div></div> <div>79%</div> <div>9%</div> <div>12%</div> </div> </div>
1	B	648	<div> <div>5%</div> <div> <div></div> <div>79%</div> <div>9%</div> <div>11%</div> </div> </div>
1	C	648	<div> <div>5%</div> <div> <div></div> <div>79%</div> <div>10%</div> <div>11%</div> </div> </div>
1	D	648	<div> <div>3%</div> <div> <div></div> <div>78%</div> <div>10%</div> <div>12%</div> </div> </div>

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 20096 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 Pyranose 2-oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	570	Total	C	N	O	S	0	5	0
			4524	2879	781	838	26			
1	B	574	Total	C	N	O	S	0	3	0
			4543	2889	783	845	26			
1	C	579	Total	C	N	O	S	0	6	0
			4598	2923	796	853	26			
1	D	570	Total	C	N	O	S	0	4	0
			4519	2876	780	837	26			

There are 108 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-13	MET	-	initiating methionine	UNP Q6QWR1
A	-12	ALA	-	expression tag	UNP Q6QWR1
A	-11	SER	-	expression tag	UNP Q6QWR1
A	-10	MET	-	expression tag	UNP Q6QWR1
A	-9	THR	-	expression tag	UNP Q6QWR1
A	-8	GLY	-	expression tag	UNP Q6QWR1
A	-7	GLY	-	expression tag	UNP Q6QWR1
A	-6	GLN	-	expression tag	UNP Q6QWR1
A	-5	GLN	-	expression tag	UNP Q6QWR1
A	-4	MET	-	expression tag	UNP Q6QWR1
A	-3	GLY	-	expression tag	UNP Q6QWR1
A	-2	ARG	-	expression tag	UNP Q6QWR1
A	-1	GLY	-	expression tag	UNP Q6QWR1
A	0	SER	-	expression tag	UNP Q6QWR1
A	622	LYS	-	expression tag	UNP Q6QWR1
A	623	LEU	-	expression tag	UNP Q6QWR1
A	624	ALA	-	expression tag	UNP Q6QWR1
A	625	ALA	-	expression tag	UNP Q6QWR1
A	626	ALA	-	expression tag	UNP Q6QWR1
A	627	LEU	-	expression tag	UNP Q6QWR1
A	628	GLU	-	expression tag	UNP Q6QWR1

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Chain	Residue	Modelled	Actual	Comment	Reference
A	629	HIS	-	expression tag	UNP Q6QWR1
A	630	HIS	-	expression tag	UNP Q6QWR1
A	631	HIS	-	expression tag	UNP Q6QWR1
A	632	HIS	-	expression tag	UNP Q6QWR1
A	633	HIS	-	expression tag	UNP Q6QWR1
A	634	HIS	-	expression tag	UNP Q6QWR1
B	-13	MET	-	initiating methionine	UNP Q6QWR1
B	-12	ALA	-	expression tag	UNP Q6QWR1
B	-11	SER	-	expression tag	UNP Q6QWR1
B	-10	MET	-	expression tag	UNP Q6QWR1
B	-9	THR	-	expression tag	UNP Q6QWR1
B	-8	GLY	-	expression tag	UNP Q6QWR1
B	-7	GLY	-	expression tag	UNP Q6QWR1
B	-6	GLN	-	expression tag	UNP Q6QWR1
B	-5	GLN	-	expression tag	UNP Q6QWR1
B	-4	MET	-	expression tag	UNP Q6QWR1
B	-3	GLY	-	expression tag	UNP Q6QWR1
B	-2	ARG	-	expression tag	UNP Q6QWR1
B	-1	GLY	-	expression tag	UNP Q6QWR1
B	0	SER	-	expression tag	UNP Q6QWR1
B	622	LYS	-	expression tag	UNP Q6QWR1
B	623	LEU	-	expression tag	UNP Q6QWR1
B	624	ALA	-	expression tag	UNP Q6QWR1
B	625	ALA	-	expression tag	UNP Q6QWR1
B	626	ALA	-	expression tag	UNP Q6QWR1
B	627	LEU	-	expression tag	UNP Q6QWR1
B	628	GLU	-	expression tag	UNP Q6QWR1
B	629	HIS	-	expression tag	UNP Q6QWR1
B	630	HIS	-	expression tag	UNP Q6QWR1
B	631	HIS	-	expression tag	UNP Q6QWR1
B	632	HIS	-	expression tag	UNP Q6QWR1
B	633	HIS	-	expression tag	UNP Q6QWR1
B	634	HIS	-	expression tag	UNP Q6QWR1
C	-13	MET	-	initiating methionine	UNP Q6QWR1
C	-12	ALA	-	expression tag	UNP Q6QWR1
C	-11	SER	-	expression tag	UNP Q6QWR1
C	-10	MET	-	expression tag	UNP Q6QWR1
C	-9	THR	-	expression tag	UNP Q6QWR1
C	-8	GLY	-	expression tag	UNP Q6QWR1
C	-7	GLY	-	expression tag	UNP Q6QWR1
C	-6	GLN	-	expression tag	UNP Q6QWR1
C	-5	GLN	-	expression tag	UNP Q6QWR1

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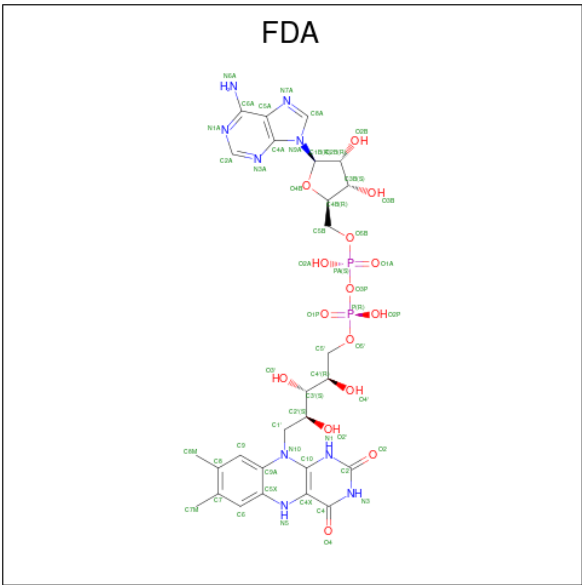
Chain	Residue	Modelled	Actual	Comment	Reference
C	-4	MET	-	expression tag	UNP Q6QWR1
C	-3	GLY	-	expression tag	UNP Q6QWR1
C	-2	ARG	-	expression tag	UNP Q6QWR1
C	-1	GLY	-	expression tag	UNP Q6QWR1
C	0	SER	-	expression tag	UNP Q6QWR1
C	622	LYS	-	expression tag	UNP Q6QWR1
C	623	LEU	-	expression tag	UNP Q6QWR1
C	624	ALA	-	expression tag	UNP Q6QWR1
C	625	ALA	-	expression tag	UNP Q6QWR1
C	626	ALA	-	expression tag	UNP Q6QWR1
C	627	LEU	-	expression tag	UNP Q6QWR1
C	628	GLU	-	expression tag	UNP Q6QWR1
C	629	HIS	-	expression tag	UNP Q6QWR1
C	630	HIS	-	expression tag	UNP Q6QWR1
C	631	HIS	-	expression tag	UNP Q6QWR1
C	632	HIS	-	expression tag	UNP Q6QWR1
C	633	HIS	-	expression tag	UNP Q6QWR1
C	634	HIS	-	expression tag	UNP Q6QWR1
D	-13	MET	-	initiating methionine	UNP Q6QWR1
D	-12	ALA	-	expression tag	UNP Q6QWR1
D	-11	SER	-	expression tag	UNP Q6QWR1
D	-10	MET	-	expression tag	UNP Q6QWR1
D	-9	THR	-	expression tag	UNP Q6QWR1
D	-8	GLY	-	expression tag	UNP Q6QWR1
D	-7	GLY	-	expression tag	UNP Q6QWR1
D	-6	GLN	-	expression tag	UNP Q6QWR1
D	-5	GLN	-	expression tag	UNP Q6QWR1
D	-4	MET	-	expression tag	UNP Q6QWR1
D	-3	GLY	-	expression tag	UNP Q6QWR1
D	-2	ARG	-	expression tag	UNP Q6QWR1
D	-1	GLY	-	expression tag	UNP Q6QWR1
D	0	SER	-	expression tag	UNP Q6QWR1
D	622	LYS	-	expression tag	UNP Q6QWR1
D	623	LEU	-	expression tag	UNP Q6QWR1
D	624	ALA	-	expression tag	UNP Q6QWR1
D	625	ALA	-	expression tag	UNP Q6QWR1
D	626	ALA	-	expression tag	UNP Q6QWR1
D	627	LEU	-	expression tag	UNP Q6QWR1
D	628	GLU	-	expression tag	UNP Q6QWR1
D	629	HIS	-	expression tag	UNP Q6QWR1
D	630	HIS	-	expression tag	UNP Q6QWR1
D	631	HIS	-	expression tag	UNP Q6QWR1

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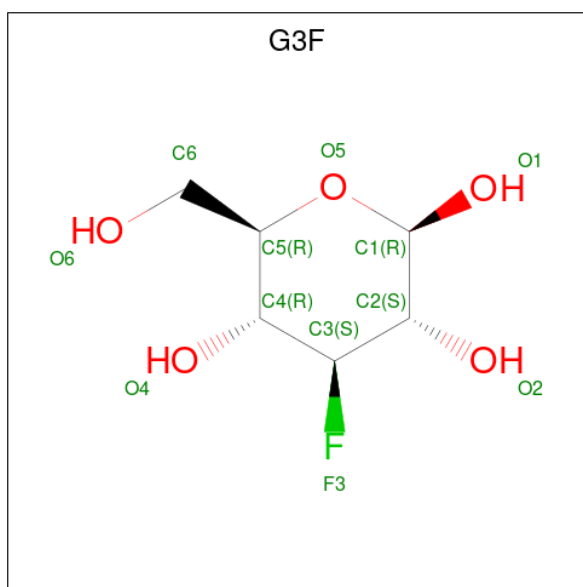
Chain	Residue	Modelled	Actual	Comment	Reference
D	632	HIS	-	expression tag	UNP Q6QWR1
D	633	HIS	-	expression tag	UNP Q6QWR1
D	634	HIS	-	expression tag	UNP Q6QWR1

- Molecule 2 is DIHYDROFLAVINE-ADENINE DINUCLEOTIDE (CCD ID: FDA) (formula: C₂₇H₃₅N₉O₁₅P₂).



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

- Molecule 3 is 3-deoxy-3-fluoro-beta-D-glucopyranose (CCD ID: G3F) (formula: C₆H₁₁FO₅).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	F	O	0	0
			12	6	1	5		
3	B	1	Total	C	F	O	0	0
			12	6	1	5		
3	C	1	Total	C	F	O	0	0
			12	6	1	5		
3	D	1	Total	C	F	O	0	0
			12	6	1	5		

- Molecule 4 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	467	Total	O	0	0
			467	467		

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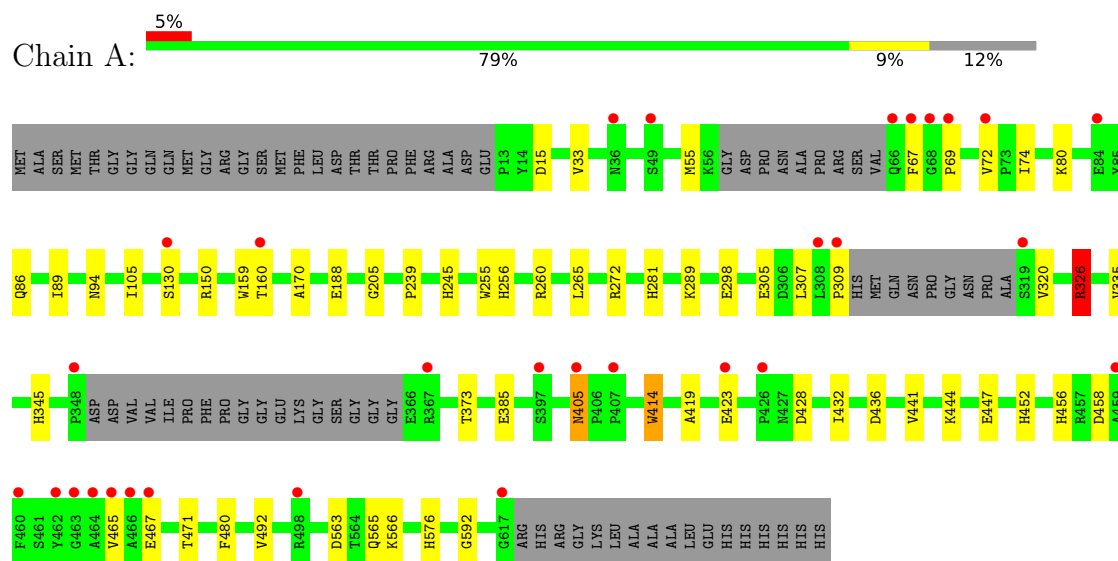
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	380	Total 380	O 380	0	0
5	C	340	Total 340	O 340	0	0
5	D	457	Total 457	O 457	0	0

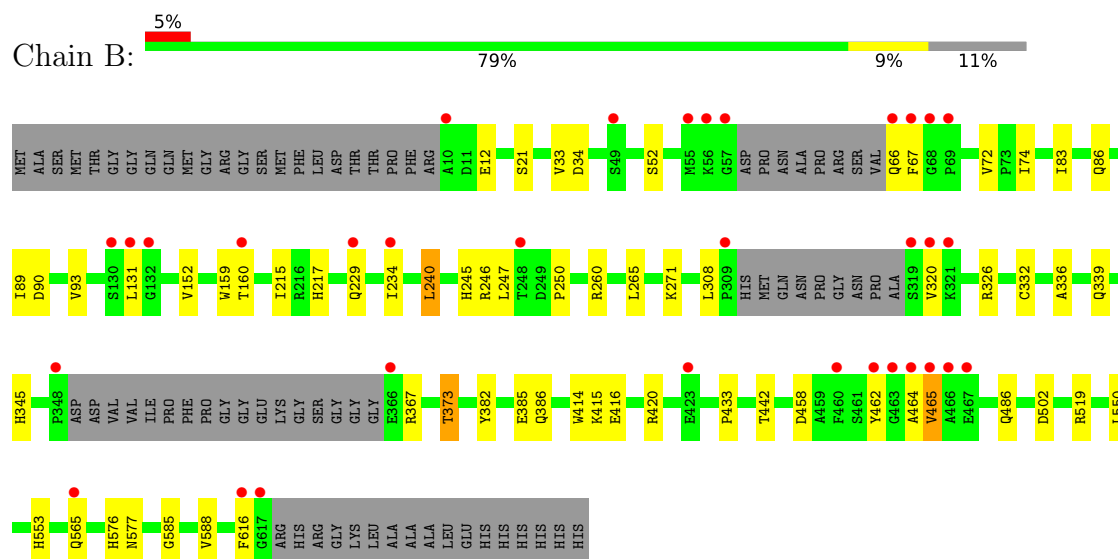
3 Residue-property plots [i](#)

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: Pyranose 2-oxidase

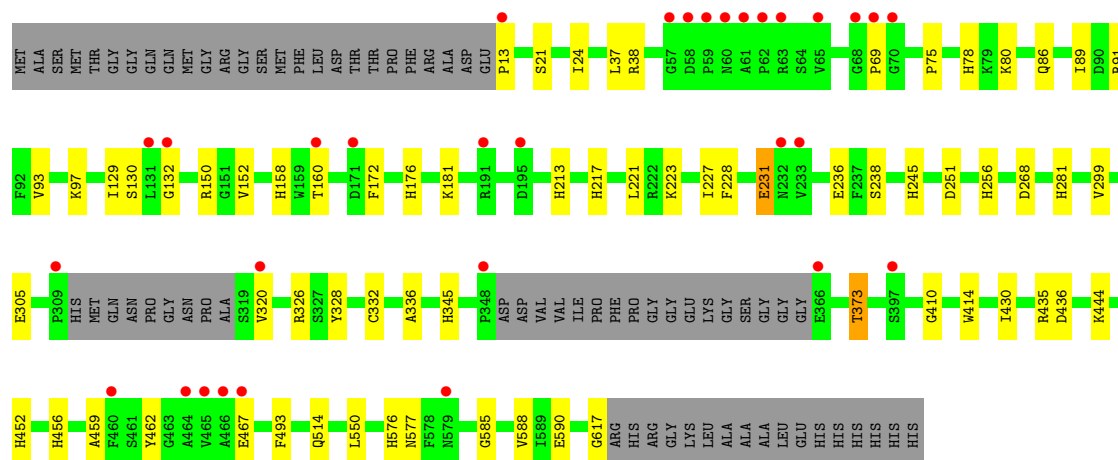


• Molecule 1: Pyranose 2-oxidase




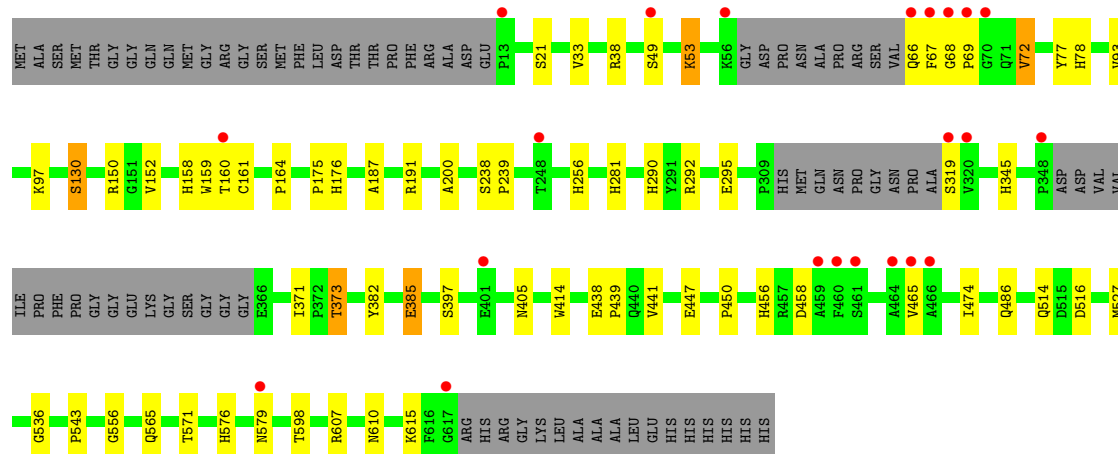
• Molecule 1: Pyranose 2-oxidase

Chain C: 



• Molecule 1: Pyranose 2-oxidase

Chain D: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.54Å 166.45Å 91.84Å 90.00° 106.41° 90.00°	Depositor
Resolution (Å)	44.05 – 1.80 44.05 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.0 (44.05-1.80) 99.0 (44.05-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.30 (at 1.79Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.173 , 0.214 0.183 , 0.224	Depositor DCC
R_{free} test set	1514 reflections (0.64%)	wwPDB-VP
Wilson B-factor (Å ²)	16.1	Xtriage
Anisotropy	0.092	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 40.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.107 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	20096	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.44% 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: G3F, MN, FDA

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	1.44	22/4661 (0.5%)	1.16	7/6342 (0.1%)
1	B	1.31	6/4674 (0.1%)	1.14	8/6360 (0.1%)
1	C	1.32	19/4741 (0.4%)	1.15	12/6453 (0.2%)
1	D	1.45	25/4653 (0.5%)	1.19	15/6331 (0.2%)
All	All	1.38	72/18729 (0.4%)	1.16	42/25486 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	C	0	1
All	All	0	3

All (72) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	256	HIS	ND1-CE1	9.23	1.41	1.32
1	C	452	HIS	ND1-CE1	7.50	1.40	1.32
1	A	239	PRO	C-O	7.29	1.32	1.23
1	A	452	HIS	CE1-NE2	7.12	1.39	1.32
1	D	175	PRO	C-O	-7.09	1.14	1.24
1	D	441	VAL	C-O	6.99	1.31	1.24
1	D	536	GLY	CA-C	-6.92	1.45	1.51
1	D	176	HIS	CG-ND1	-6.88	1.30	1.38
1	C	213	HIS	CG-CD2	6.83	1.43	1.35
1	A	255	TRP	NE1-CE2	-6.77	1.30	1.37
1	D	571	THR	C-O	6.68	1.32	1.24
1	A	492	VAL	C-O	6.62	1.30	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	335	VAL	C-O	6.49	1.31	1.24
1	A	456	HIS	CG-CD2	6.48	1.43	1.35
1	D	447	GLU	C-O	-6.29	1.15	1.24
1	A	281	HIS	CE1-NE2	6.29	1.38	1.32
1	C	78	HIS	CG-CD2	6.24	1.42	1.35
1	D	543	PRO	N-CA	-6.16	1.39	1.47
1	C	78	HIS	CE1-NE2	6.08	1.38	1.32
1	C	456	HIS	ND1-CE1	6.06	1.38	1.32
1	C	236[A]	GLU	C-O	-6.02	1.16	1.24
1	C	236[B]	GLU	C-O	-6.02	1.16	1.24
1	D	164	PRO	C-O	5.99	1.30	1.23
1	A	105	ILE	N-CA	5.98	1.50	1.46
1	A	245	HIS	CE1-NE2	5.93	1.38	1.32
1	A	86	GLN	CA-C	5.91	1.60	1.52
1	B	245	HIS	CE1-NE2	5.84	1.38	1.32
1	C	590	GLU	N-CA	5.83	1.53	1.46
1	A	480	PHE	N-CA	5.83	1.53	1.46
1	C	176	HIS	CE1-NE2	5.79	1.38	1.32
1	A	441	VAL	C-O	5.79	1.30	1.24
1	D	527	MET	C-O	5.76	1.30	1.24
1	D	290	HIS	ND1-CE1	5.72	1.38	1.32
1	D	176	HIS	ND1-CE1	5.71	1.38	1.32
1	B	83	ILE	N-CA	-5.66	1.39	1.46
1	D	474	ILE	N-CA	5.65	1.53	1.46
1	B	339	GLN	C-O	5.62	1.30	1.24
1	B	217	HIS	CE1-NE2	5.62	1.38	1.32
1	D	385	GLU	CD-OE2	-5.59	1.14	1.25
1	C	281	HIS	ND1-CE1	5.59	1.38	1.32
1	B	386	GLN	C-O	-5.57	1.18	1.24
1	D	456	HIS	ND1-CE1	5.56	1.38	1.32
1	C	256	HIS	ND1-CE1	5.56	1.38	1.32
1	C	452	HIS	CG-CD2	5.55	1.42	1.35
1	C	217	HIS	CE1-NE2	5.51	1.38	1.32
1	D	281	HIS	CD2-NE2	-5.47	1.31	1.37
1	A	245	HIS	CG-CD2	5.43	1.41	1.35
1	D	373	THR	C-O	-5.41	1.17	1.23
1	D	441	VAL	CA-C	5.41	1.59	1.52
1	A	432	ILE	CA-C	5.40	1.58	1.52
1	C	493	PHE	C-O	5.40	1.30	1.24
1	D	78	HIS	CD2-NE2	-5.31	1.32	1.37
1	A	170	ALA	C-O	-5.29	1.18	1.24
1	C	217	HIS	ND1-CE1	5.27	1.37	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	450	PRO	N-CA	-5.27	1.41	1.47
1	A	245	HIS	ND1-CE1	5.26	1.37	1.32
1	A	576	HIS	CE1-NE2	5.26	1.37	1.32
1	A	205	GLY	N-CA	5.25	1.52	1.45
1	D	256	HIS	ND1-CE1	5.21	1.37	1.32
1	D	610	ASN	CG-ND2	-5.21	1.22	1.33
1	C	281	HIS	CE1-NE2	5.21	1.37	1.32
1	D	576	HIS	ND1-CE1	5.17	1.37	1.32
1	A	188	GLU	C-O	-5.16	1.18	1.24
1	D	176	HIS	CG-CD2	5.11	1.41	1.35
1	A	159	TRP	NE1-CE2	-5.10	1.31	1.37
1	C	245	HIS	ND1-CE1	5.08	1.37	1.32
1	D	516	ASP	C-O	-5.08	1.18	1.24
1	C	221	LEU	CA-C	5.08	1.59	1.52
1	B	519	ARG	CZ-NH1	5.03	1.39	1.32
1	A	452	HIS	C-O	-5.02	1.18	1.24
1	C	444	LYS	C-O	-5.02	1.17	1.23
1	D	598	THR	CA-C	5.01	1.59	1.52

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	72	VAL	CA-C-N	9.80	130.19	119.90
1	D	72	VAL	C-N-CA	9.80	130.19	119.90
1	D	159	TRP	N-CA-C	7.29	119.98	110.43
1	D	371	ILE	CA-C-N	-6.98	112.74	120.14
1	D	371	ILE	C-N-CA	-6.98	112.74	120.14
1	B	385	GLU	CB-CG-CD	5.94	122.69	112.60
1	D	53	LYS	CA-C-N	-5.85	114.58	120.31
1	D	53	LYS	C-N-CA	-5.85	114.58	120.31
1	D	405	ASN	CA-C-N	-5.80	114.40	120.38
1	D	405	ASN	C-N-CA	-5.80	114.40	120.38
1	D	33	VAL	N-CA-C	5.68	115.87	110.42
1	D	556	GLY	N-CA-C	5.68	123.19	115.30
1	A	159	TRP	N-CA-C	5.65	117.84	110.43
1	C	238	SER	CA-C-N	-5.63	114.13	119.76
1	C	238	SER	C-N-CA	-5.63	114.13	119.76
1	C	410	GLY	N-CA-C	5.53	122.46	114.10
1	B	159	TRP	N-CA-C	5.44	117.35	110.33
1	B	74	ILE	CB-CA-C	-5.38	104.72	110.16
1	C	430	ILE	CA-C-N	-5.31	114.84	121.00
1	C	430	ILE	C-N-CA	-5.31	114.84	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	86	GLN	N-CA-C	-5.30	105.67	111.82
1	D	607	ARG	CG-CD-NE	5.25	123.56	112.00
1	B	373	THR	CA-C-N	5.25	124.86	119.56
1	B	373	THR	C-N-CA	5.25	124.86	119.56
1	A	436	ASP	CA-C-N	-5.24	114.31	119.92
1	A	436	ASP	C-N-CA	-5.24	114.31	119.92
1	D	200	ALA	N-CA-C	-5.23	105.66	111.36
1	C	373	THR	CA-C-N	5.21	124.82	119.56
1	C	373	THR	C-N-CA	5.21	124.82	119.56
1	B	86	GLN	N-CA-C	-5.20	105.78	111.82
1	D	68	GLY	CA-C-N	5.18	126.32	119.84
1	D	68	GLY	C-N-CA	5.18	126.32	119.84
1	C	69	PRO	CA-C-N	5.18	131.02	121.70
1	C	69	PRO	C-N-CA	5.18	131.02	121.70
1	C	436	ASP	CA-C-N	-5.13	114.95	120.03
1	C	436	ASP	C-N-CA	-5.13	114.95	120.03
1	A	428	ASP	CA-C-N	-5.09	114.83	119.82
1	A	428	ASP	C-N-CA	-5.09	114.83	119.82
1	A	592	GLY	N-CA-C	-5.06	101.18	113.18
1	B	240	LEU	CA-C-N	-5.00	114.48	120.13
1	B	240	LEU	C-N-CA	-5.00	114.48	120.13
1	A	385	GLU	CB-CG-CD	5.00	121.10	112.60

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	326	ARG	Sidechain
1	A	69	PRO	Peptide
1	C	132	GLY	Peptide

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	4524	0	4424	29	0
1	B	4543	0	4430	28	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	4598	0	4496	26	0
1	D	4519	0	4418	22	0
2	A	53	0	32	2	0
2	B	53	0	29	1	0
2	C	53	0	30	3	0
2	D	53	0	31	3	0
3	A	12	0	11	2	0
3	B	12	0	11	2	0
3	C	12	0	11	1	0
3	D	12	0	11	3	0
4	A	3	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	3	0	0	0	0
5	A	467	0	0	8	0
5	B	380	0	0	7	0
5	C	340	0	0	5	0
5	D	457	0	0	7	0
All	All	20096	0	17934	109	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 (109) 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:160[B]:THR:HG22	5:A:1007:HOH:O	1.57	1.03
1:B:160[B]:THR:HG22	5:B:1257:HOH:O	1.59	1.01
1:D:160[B]:THR:HG22	5:D:1044:HOH:O	1.74	0.87
1:A:15:ASP:HA	1:A:326:ARG:HG3	1.64	0.76
1:A:419:ALA:O	1:A:423:GLU:HG2	1.84	0.76
1:D:319:SER:HB3	5:D:1283:HOH:O	1.84	0.76
1:A:67:PHE:HA	5:A:1455:HOH:O	1.85	0.74
2:B:801:FDA:N5	3:B:802:G3F:H2	2.05	0.71
1:A:55:MET:SD	1:A:72:VAL:HG21	2.30	0.71
2:A:801:FDA:N5	3:A:802:G3F:H2	2.07	0.70
2:D:801:FDA:N5	3:D:802:G3F:H2	2.09	0.68
1:C:160[B]:THR:HG22	5:C:1184:HOH:O	1.94	0.66
1:A:563:ASP:OD2	1:A:566:LYS:HE2	1.97	0.64
2:C:801:FDA:N5	3:C:802:G3F:H2	2.12	0.63
1:D:465:VAL:HG12	5:D:1272:HOH:O	1.98	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:305:GLU:OE1	1:C:320:VAL:HG22	2.01	0.61
1:D:292:ARG:NH2	1:D:295:GLU:OE1	2.27	0.60
1:C:13:PRO:O	1:C:38:ARG:NH1	2.33	0.60
1:A:565:GLN:NE2	5:A:1445:HOH:O	2.32	0.60
1:B:160[B]:THR:HG21	1:B:458:ASP:OD2	2.04	0.58
1:A:150:ARG:HA	2:A:801:FDA:O2B	2.05	0.55
1:A:160[B]:THR:HG21	1:A:458:ASP:OD2	2.06	0.55
1:A:289:LYS:HG3	1:A:298:GLU:CG	2.37	0.55
1:A:55:MET:SD	1:A:72:VAL:CG2	2.94	0.55
1:B:33:VAL:HG11	1:B:265:LEU:HD22	1.91	0.53
1:B:415:LYS:HE3	5:B:1375:HOH:O	2.09	0.52
1:A:471:THR:HG23	5:A:1341:HOH:O	2.09	0.52
1:D:187:ALA:O	1:D:191:ARG:HG3	2.09	0.52
1:C:172:PHE:CE2	1:C:181:LYS:HE2	2.45	0.51
1:C:251:ASP:HA	5:C:1268:HOH:O	2.11	0.51
1:C:332:CYS:O	1:C:336:ALA:HB3	2.12	0.50
1:B:576:HIS:O	1:B:577:ASN:HB2	2.12	0.50
1:C:576:HIS:O	1:C:577:ASN:HB2	2.12	0.50
1:D:238:SER:HB2	1:D:239:PRO:HD2	1.93	0.50
1:B:345:HIS:CD2	1:B:373:THR:HA	2.47	0.49
1:B:416:GLU:OE1	5:B:1100:HOH:O	2.20	0.49
1:D:21:SER:OG	1:D:152:VAL:HA	2.11	0.49
1:C:150:ARG:HA	2:C:801:FDA:O2B	2.13	0.48
1:D:93:VAL:HG22	1:D:97:LYS:HE2	1.94	0.48
1:A:309:PRO:HG3	1:B:247:LEU:HD13	1.95	0.48
2:D:801:FDA:HN5	3:D:802:G3F:H2	1.77	0.48
1:A:94:ASN:ND2	5:A:1423:HOH:O	2.31	0.48
1:C:223:LYS:NZ	1:C:227:ILE:HD11	2.29	0.48
1:B:585:GLY:O	1:B:588:VAL:HG22	2.13	0.48
1:C:93:VAL:O	1:C:97:LYS:HG3	2.13	0.47
1:A:465:VAL:HG23	1:A:467:GLU:OE2	2.13	0.47
1:D:458:ASP:OD2	3:D:802:G3F:O4	2.24	0.47
1:A:289:LYS:HG3	1:A:298:GLU:HG3	1.94	0.47
1:C:345:HIS:CD2	1:C:373:THR:HA	2.49	0.47
1:D:579[A]:ASN:OD1	5:D:1256:HOH:O	2.20	0.47
1:A:260:ARG:HB2	5:A:1289:HOH:O	2.14	0.47
1:A:405:ASN:CG	1:A:405:ASN:O	2.57	0.46
1:C:80:LYS:HD3	1:C:89:ILE:HD11	1.96	0.46
1:B:160[B]:THR:CG2	5:B:1257:HOH:O	2.38	0.46
1:C:160[A]:THR:HB	2:C:801:FDA:O4	2.14	0.46
1:B:34:ASP:OD1	1:B:271:LYS:NZ	2.45	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:SER:HB3	1:B:66:GLN:NE2	2.31	0.46
1:D:438:GLU:HB2	1:D:439:PRO:HD2	1.98	0.46
1:C:435:ARG:NE	5:C:1186:HOH:O	2.48	0.46
1:A:444:LYS:HE2	5:A:1095:HOH:O	2.15	0.46
1:D:514:GLN:NE2	5:D:1137:HOH:O	2.46	0.45
1:C:585:GLY:O	1:C:588:VAL:HG22	2.17	0.45
1:C:37:LEU:HD21	1:C:617:GLY:HA3	1.98	0.45
1:A:414:TRP:CD1	1:A:414:TRP:C	2.95	0.45
1:D:345:HIS:CD2	1:D:373:THR:HA	2.52	0.45
1:A:80:LYS:HD2	1:A:89:ILE:HD11	1.99	0.45
1:C:91:ARG:NH2	5:C:1155:HOH:O	2.51	0.44
1:B:464:ALA:O	1:B:465:VAL:C	2.60	0.44
1:A:80:LYS:CD	1:A:89:ILE:HD11	2.47	0.44
1:B:246:ARG:NH1	1:B:250:PRO:O	2.43	0.44
1:B:553:HIS:CE1	3:B:802:G3F:O2	2.71	0.44
1:B:240:LEU:HD13	1:B:442:THR:HB	1.99	0.44
1:C:172:PHE:CZ	1:C:181:LYS:HE2	2.52	0.44
1:B:21:SER:OG	1:B:152:VAL:HA	2.18	0.43
1:A:345:HIS:CD2	1:A:373:THR:HA	2.53	0.43
1:C:158:HIS:CD2	1:C:158:HIS:C	2.95	0.43
1:A:130:SER:HB3	5:B:1280:HOH:O	2.17	0.43
1:B:462:TYR:CE1	1:B:550:LEU:HD21	2.53	0.43
1:C:21:SER:OG	1:C:152:VAL:HA	2.19	0.43
1:C:299:VAL:HB	1:C:328:TYR:CD1	2.54	0.43
1:D:382:TYR:HA	1:D:486:GLN:O	2.19	0.43
1:B:67:PHE:HB2	5:B:1260:HOH:O	2.18	0.43
1:C:462:TYR:CE1	1:C:550:LEU:HD21	2.53	0.43
1:D:615:LYS:HD2	5:D:1307:HOH:O	2.18	0.42
1:A:458:ASP:OD2	3:A:802:G3F:O4	2.35	0.42
1:D:150:ARG:HA	2:D:801:FDA:O2B	2.19	0.42
1:A:447:GLU:HG3	5:A:1387:HOH:O	2.19	0.41
1:C:268:ASP:OD1	1:C:268:ASP:C	2.63	0.41
1:B:90:ASP:O	1:B:93:VAL:HG12	2.21	0.41
1:C:228:PHE:HA	1:C:231:GLU:HG3	2.03	0.41
1:A:465:VAL:CG2	1:A:467:GLU:OE2	2.68	0.41
1:D:49[A]:SER:OG	1:D:77:TYR:O	2.28	0.41
1:B:326:ARG:NH2	1:B:616:PHE:O	2.53	0.41
1:B:332:CYS:O	1:B:336:ALA:HB3	2.20	0.41
1:D:158:HIS:CD2	1:D:158:HIS:C	2.98	0.41
1:A:33:VAL:HG11	1:A:265:LEU:CD2	2.51	0.41
1:A:305:GLU:HG2	1:A:307:LEU:HD23	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:131:LEU:HD12	1:B:131:LEU:HA	1.95	0.41
1:B:215:ILE:HD12	1:B:433:PRO:HD3	2.02	0.41
1:C:75:PRO:HB2	1:C:152:VAL:HG11	2.02	0.41
1:D:53:LYS:O	1:D:72:VAL:HG12	2.21	0.41
1:D:130:SER:CB	5:D:1335:HOH:O	2.69	0.41
1:D:438:GLU:CD	1:D:438:GLU:H	2.28	0.41
1:B:229:GLN:HG3	5:B:1279:HOH:O	2.21	0.41
1:B:416:GLU:CD	1:B:420:ARG:HH21	2.29	0.40
1:B:215:ILE:HD12	1:B:433:PRO:CD	2.52	0.40
1:B:382:TYR:HA	1:B:486:GLN:O	2.21	0.40
1:C:459:ALA:HA	5:C:1162:HOH:O	2.21	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	567/648 (88%)	553 (98%)	14 (2%)	0	100	100
1	B	569/648 (88%)	556 (98%)	12 (2%)	1 (0%)	43	31
1	C	579/648 (89%)	565 (98%)	14 (2%)	0	100	100
1	D	566/648 (87%)	553 (98%)	11 (2%)	2 (0%)	30	19
All	All	2281/2592 (88%)	2227 (98%)	51 (2%)	3 (0%)	48	34

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	465	VAL
1	D	69	PRO
1	D	67	PHE

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	495/548 (90%)	489 (99%)	6 (1%)	63	57
1	B	495/548 (90%)	484 (98%)	11 (2%)	45	34
1	C	503/548 (92%)	495 (98%)	8 (2%)	55	47
1	D	494/548 (90%)	486 (98%)	8 (2%)	55	47
All	All	1987/2192 (91%)	1954 (98%)	33 (2%)	55	45

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	74	ILE
1	A	272	ARG
1	A	320	VAL
1	A	326	ARG
1	A	405	ASN
1	A	414	TRP
1	B	12	GLU
1	B	72	VAL
1	B	89	ILE
1	B	234	ILE
1	B	260	ARG
1	B	308	LEU
1	B	320	VAL
1	B	367	ARG
1	B	414	TRP
1	B	502	ASP
1	B	565	GLN
1	C	24	ILE
1	C	129	ILE
1	C	130	SER
1	C	231	GLU
1	C	326	ARG
1	C	414	TRP
1	C	467	GLU

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Mol	Chain	Res	Type
1	C	514	GLN
1	D	38	ARG
1	D	66	GLN
1	D	130	SER
1	D	385	GLU
1	D	397[A]	SER
1	D	397[B]	SER
1	D	414	TRP
1	D	565	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	111	HIS
1	A	280	ASN
1	A	494	GLN
1	A	514	GLN
1	A	586	ASN
1	B	66	GLN
1	B	94	ASN
1	B	280	ASN
1	B	486	GLN
1	B	505	GLN
1	B	529	ASN
1	B	572	HIS
1	C	66	GLN
1	C	94	ASN
1	C	111	HIS
1	C	199	GLN
1	C	280	ASN
1	C	486	GLN
1	C	572	HIS
1	D	111	HIS
1	D	229	GLN
1	D	232	ASN
1	D	405	ASN
1	D	427	ASN
1	D	586	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 for Mogul analysis.

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	G3F	A	802	-	12,12,12	1.21	2 (16%)	17,17,17	2.69	4 (23%)
2	FDA	B	801	1	57,58,58	1.57	10 (17%)	78,89,89	2.34	23 (29%)
2	FDA	D	801	1	57,58,58	1.57	10 (17%)	78,89,89	1.95	17 (21%)
3	G3F	D	802	-	12,12,12	1.04	0	17,17,17	2.48	8 (47%)
3	G3F	C	802	-	12,12,12	1.28	1 (8%)	17,17,17	3.03	8 (47%)
3	G3F	B	802	-	12,12,12	1.22	1 (8%)	17,17,17	2.19	4 (23%)
2	FDA	C	801	1	57,58,58	1.71	14 (24%)	78,89,89	2.17	28 (35%)
2	FDA	A	801	1	57,58,58	1.82	11 (19%)	78,89,89	2.18	24 (30%)

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
3	G3F	A	802	-	-	0/2/22/22	0/1/1/1
2	FDA	B	801	1	-	1/34/50/50	0/6/6/6
2	FDA	D	801	1	-	1/34/50/50	0/6/6/6
3	G3F	D	802	-	-	0/2/22/22	0/1/1/1
3	G3F	C	802	-	-	0/2/22/22	0/1/1/1
3	G3F	B	802	-	-	0/2/22/22	0/1/1/1
2	FDA	C	801	1	-	1/34/50/50	0/6/6/6
2	FDA	A	801	1	-	2/34/50/50	0/6/6/6

All (49) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	FDA	C9-C8	5.04	1.46	1.39
2	D	801	FDA	C5X-N5	-4.97	1.31	1.39
2	A	801	FDA	C6-C5X	4.90	1.47	1.39
2	B	801	FDA	C6-C5X	4.54	1.46	1.39
2	D	801	FDA	C8A-N7A	4.40	1.40	1.31
2	A	801	FDA	PA-O3P	4.30	1.64	1.59
2	C	801	FDA	C8A-N7A	4.18	1.39	1.31
2	C	801	FDA	C2-N1	-4.04	1.30	1.37
2	A	801	FDA	C8A-N7A	3.83	1.39	1.31
2	A	801	FDA	C2B-C3B	-3.79	1.43	1.53
2	C	801	FDA	C2A-N1A	3.74	1.40	1.33
2	C	801	FDA	C2A-N3A	3.64	1.40	1.33
2	B	801	FDA	C5'-C4'	3.64	1.56	1.51
2	B	801	FDA	O2B-C2B	-3.42	1.34	1.43
2	A	801	FDA	C8A-N9A	-3.22	1.32	1.37
2	D	801	FDA	C6-C5X	3.15	1.44	1.39
2	D	801	FDA	C2-N1	-3.10	1.32	1.37
2	C	801	FDA	C8A-N9A	-3.07	1.32	1.37
2	C	801	FDA	C5X-N5	-3.05	1.34	1.39
2	B	801	FDA	C8A-N7A	2.95	1.37	1.31
2	A	801	FDA	O4B-C4B	-2.86	1.38	1.45
2	C	801	FDA	C5A-N7A	-2.85	1.33	1.39
2	C	801	FDA	P-O3P	2.81	1.62	1.59
2	D	801	FDA	C4X-C4	2.80	1.50	1.41
2	D	801	FDA	C9-C8	2.71	1.43	1.39
3	C	802	G3F	C3-C4	2.69	1.55	1.52
2	C	801	FDA	O3B-C3B	-2.64	1.36	1.43
2	D	801	FDA	C2B-C3B	-2.62	1.46	1.53
2	B	801	FDA	O3B-C3B	-2.57	1.36	1.43
2	D	801	FDA	C2A-N1A	2.56	1.38	1.33
3	B	802	G3F	O1-C1	2.50	1.47	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	801	FDA	C6A-N6A	2.42	1.40	1.34
2	A	801	FDA	C4X-C4	2.41	1.49	1.41
2	B	801	FDA	C5X-N5	-2.40	1.35	1.39
2	C	801	FDA	O4-C4	2.36	1.28	1.23
3	A	802	G3F	C1-C2	2.36	1.57	1.52
2	C	801	FDA	C2B-C3B	-2.28	1.47	1.53
2	B	801	FDA	C8M-C8	2.25	1.55	1.51
2	D	801	FDA	C5A-C6A	-2.18	1.34	1.41
2	B	801	FDA	C2B-C3B	-2.18	1.47	1.53
2	C	801	FDA	O4B-C4B	-2.15	1.40	1.45
2	B	801	FDA	P-O3P	2.14	1.61	1.59
2	A	801	FDA	C5A-C6A	-2.11	1.35	1.41
2	A	801	FDA	C5X-N5	-2.09	1.36	1.39
3	A	802	G3F	C3-C2	2.06	1.54	1.52
2	C	801	FDA	C5'-C4'	2.05	1.54	1.51
2	C	801	FDA	C2B-C1B	-2.04	1.47	1.53
2	B	801	FDA	C4X-C4	2.04	1.48	1.41
2	A	801	FDA	C3B-C4B	-2.01	1.47	1.53

All (116) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	801	FDA	C4A-N9A-C8A	8.53	114.70	105.74
3	A	802	G3F	F3-C3-C2	8.32	116.01	108.81
2	D	801	FDA	N3A-C2A-N1A	-8.02	116.44	128.58
2	B	801	FDA	N3A-C2A-N1A	-7.37	117.43	128.58
3	C	802	G3F	F3-C3-C2	7.20	115.05	108.81
2	B	801	FDA	N9A-C8A-N7A	-6.66	104.48	113.94
2	C	801	FDA	N3A-C2A-N1A	-6.63	118.54	128.58
3	B	802	G3F	C1-O5-C5	6.59	126.41	113.65
2	A	801	FDA	N3A-C2A-N1A	-6.05	119.42	128.58
2	A	801	FDA	O4B-C1B-N9A	5.83	119.29	108.09
2	C	801	FDA	N9A-C8A-N7A	-5.58	106.02	113.94
3	D	802	G3F	C4-C3-C2	-5.28	105.38	111.50
2	D	801	FDA	C4A-N9A-C8A	5.20	111.20	105.74
2	D	801	FDA	N9A-C8A-N7A	-5.18	106.58	113.94
2	A	801	FDA	C2A-N1A-C6A	5.11	127.13	118.73
2	B	801	FDA	O4B-C1B-N9A	5.08	117.85	108.09
2	B	801	FDA	O3B-C3B-C4B	5.01	125.46	111.08
3	C	802	G3F	F3-C3-C4	4.64	112.83	108.81
2	A	801	FDA	O4-C4-C4X	-4.61	116.15	127.26
2	C	801	FDA	C4A-N9A-C8A	4.59	110.56	105.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	802	G3F	F3-C3-C2	4.52	112.73	108.81
2	D	801	FDA	C2A-N1A-C6A	4.48	126.10	118.73
2	A	801	FDA	C4A-N9A-C8A	4.46	110.42	105.74
2	C	801	FDA	O4-C4-C4X	-4.44	116.56	127.26
3	C	802	G3F	C4-C3-C2	-4.26	106.55	111.50
2	B	801	FDA	N3A-C4A-N9A	4.09	134.13	127.17
2	C	801	FDA	C4-C4X-N5	4.00	126.60	116.37
2	A	801	FDA	N9A-C8A-N7A	-3.99	108.27	113.94
2	B	801	FDA	C2A-N1A-C6A	3.98	125.27	118.73
3	C	802	G3F	O5-C5-C4	3.75	116.45	109.70
2	B	801	FDA	O2B-C2B-C3B	3.74	123.80	111.82
3	D	802	G3F	C3-C4-C5	3.71	114.07	109.68
3	A	802	G3F	C3-C4-C5	3.68	114.03	109.68
2	A	801	FDA	O2'-C2'-C3'	3.60	117.66	109.25
2	B	801	FDA	C5A-N7A-C8A	3.58	109.08	103.45
3	A	802	G3F	C1-O5-C5	3.58	120.57	113.65
3	A	802	G3F	O1-C1-O5	-3.58	99.79	110.41
3	C	802	G3F	C1-O5-C5	3.57	120.55	113.65
2	C	801	FDA	C9A-C5X-N5	3.56	123.71	119.37
2	C	801	FDA	C5A-N7A-C8A	3.55	109.03	103.45
2	A	801	FDA	C4-N3-C2	-3.53	121.51	126.37
2	B	801	FDA	C5'-C4'-C3'	-3.33	105.93	112.22
2	C	801	FDA	O4B-C1B-N9A	3.33	114.48	108.09
3	D	802	G3F	F3-C3-C4	3.32	111.69	108.81
2	C	801	FDA	C2A-N3A-C4A	3.29	119.86	111.83
2	A	801	FDA	O2B-C2B-C1B	3.29	121.42	110.10
2	C	801	FDA	O2B-C2B-C3B	3.28	122.34	111.82
2	D	801	FDA	O4B-C1B-N9A	3.23	114.29	108.09
2	B	801	FDA	C1B-N9A-C8A	-3.23	119.93	127.09
2	C	801	FDA	O4B-C4B-C5B	3.22	119.66	109.33
2	B	801	FDA	C2A-N3A-C4A	3.22	119.69	111.83
3	B	802	G3F	C4-C3-C2	-3.21	107.77	111.50
3	D	802	G3F	C3-C2-C1	3.21	116.01	110.84
2	D	801	FDA	C5'-C4'-C3'	-3.17	106.24	112.22
2	A	801	FDA	C4A-C5A-N7A	-3.14	107.00	110.58
2	A	801	FDA	O3B-C3B-C4B	3.11	120.01	111.08
2	C	801	FDA	O2B-C2B-C1B	3.07	120.68	110.10
2	D	801	FDA	O4B-C4B-C5B	3.03	119.06	109.33
2	A	801	FDA	N3-C2-N1	3.00	120.45	115.74
2	B	801	FDA	O2P-P-O3P	-2.99	99.20	107.27
2	C	801	FDA	O2P-P-O3P	-2.99	99.20	107.27
2	D	801	FDA	C2A-N3A-C4A	2.97	119.09	111.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	801	FDA	C5A-C4A-N3A	-2.95	122.66	126.72
2	D	801	FDA	O4-C4-N3	-2.93	114.61	120.11
2	A	801	FDA	C1B-N9A-C8A	-2.92	120.62	127.09
3	C	802	G3F	C3-C2-C1	2.90	115.52	110.84
2	D	801	FDA	O4B-C4B-C3B	2.90	110.91	105.15
2	B	801	FDA	C5A-C4A-N3A	-2.90	122.72	126.72
3	C	802	G3F	C3-C4-C5	2.89	113.11	109.68
2	C	801	FDA	C4X-C4-N3	2.87	120.02	112.13
2	A	801	FDA	O2-C2-N3	-2.86	116.78	121.86
2	D	801	FDA	C4-C4X-N5	2.85	123.67	116.37
2	A	801	FDA	C4-C4X-N5	2.85	123.66	116.37
2	A	801	FDA	C5A-N7A-C8A	2.84	107.91	103.45
2	D	801	FDA	C2B-C1B-N9A	2.82	120.31	113.30
2	A	801	FDA	C5'-C4'-C3'	-2.82	106.90	112.22
2	A	801	FDA	C4X-C4-N3	2.79	119.80	112.13
2	A	801	FDA	C5A-C4A-N3A	-2.78	122.89	126.72
2	B	801	FDA	C4-C4X-N5	2.76	123.44	116.37
2	A	801	FDA	O4B-C4B-C3B	2.74	110.59	105.15
2	C	801	FDA	O4B-C4B-C3B	2.72	110.56	105.15
2	C	801	FDA	O2P-P-O1P	2.61	124.58	112.44
2	A	801	FDA	C2B-C1B-N9A	2.56	119.67	113.30
2	B	801	FDA	C5A-C4A-N9A	-2.55	103.03	105.81
2	C	801	FDA	C3B-C2B-C1B	2.52	106.22	101.46
3	B	802	G3F	F3-C3-C2	2.49	110.97	108.81
2	C	801	FDA	C2B-C1B-N9A	2.48	119.47	113.30
2	D	801	FDA	C5A-N7A-C8A	2.48	107.34	103.45
2	B	801	FDA	C2B-C1B-N9A	2.47	119.45	113.30
2	C	801	FDA	C2A-N1A-C6A	2.44	122.75	118.73
2	C	801	FDA	O2-C2-N1	-2.40	117.60	121.86
2	C	801	FDA	O3B-C3B-C4B	2.38	117.92	111.08
2	B	801	FDA	O4B-C4B-C5B	2.38	116.96	109.33
3	B	802	G3F	O5-C5-C4	2.34	113.91	109.70
3	D	802	G3F	C1-O5-C5	2.31	118.13	113.65
2	D	801	FDA	C3B-C2B-C1B	2.31	105.83	101.46
2	C	801	FDA	O3P-PA-O1A	-2.31	103.77	110.70
2	C	801	FDA	C4A-C5A-N7A	-2.30	107.95	110.58
2	D	801	FDA	O3B-C3B-C4B	2.28	117.63	111.08
2	B	801	FDA	C9A-C5X-N5	-2.24	116.64	119.37
3	D	802	G3F	O1-C1-O5	-2.23	103.79	110.41
2	B	801	FDA	C4-N3-C2	2.23	129.44	126.37
2	C	801	FDA	N3A-C4A-N9A	2.22	130.95	127.17
3	C	802	G3F	O6-C6-C5	-2.22	103.78	111.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	802	G3F	O5-C1-C2	-2.21	106.41	110.30
2	B	801	FDA	C3B-C2B-C1B	2.20	105.63	101.46
2	C	801	FDA	C6-C5X-C9A	-2.20	117.39	119.80
2	C	801	FDA	O3'-C3'-C2'	-2.17	104.00	108.93
2	A	801	FDA	C6-C5X-C9A	2.15	122.15	119.80
2	B	801	FDA	O4B-C4B-C3B	2.14	109.40	105.15
2	C	801	FDA	C1B-N9A-C8A	-2.09	122.45	127.09
2	A	801	FDA	C6A-C5A-C4A	2.07	120.00	117.18
2	D	801	FDA	C1B-N9A-C8A	-2.06	122.52	127.09
2	B	801	FDA	O3P-P-O1P	2.04	116.84	110.70
2	A	801	FDA	N3A-C4A-N9A	2.03	130.62	127.17
2	D	801	FDA	C4A-C5A-N7A	-2.03	108.26	110.58

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	FDA	PA-O3P-P-O5'
2	C	801	FDA	PA-O3P-P-O5'
2	D	801	FDA	PA-O3P-P-O5'
2	B	801	FDA	O4B-C4B-C5B-O5B
2	A	801	FDA	P-O3P-PA-O2A

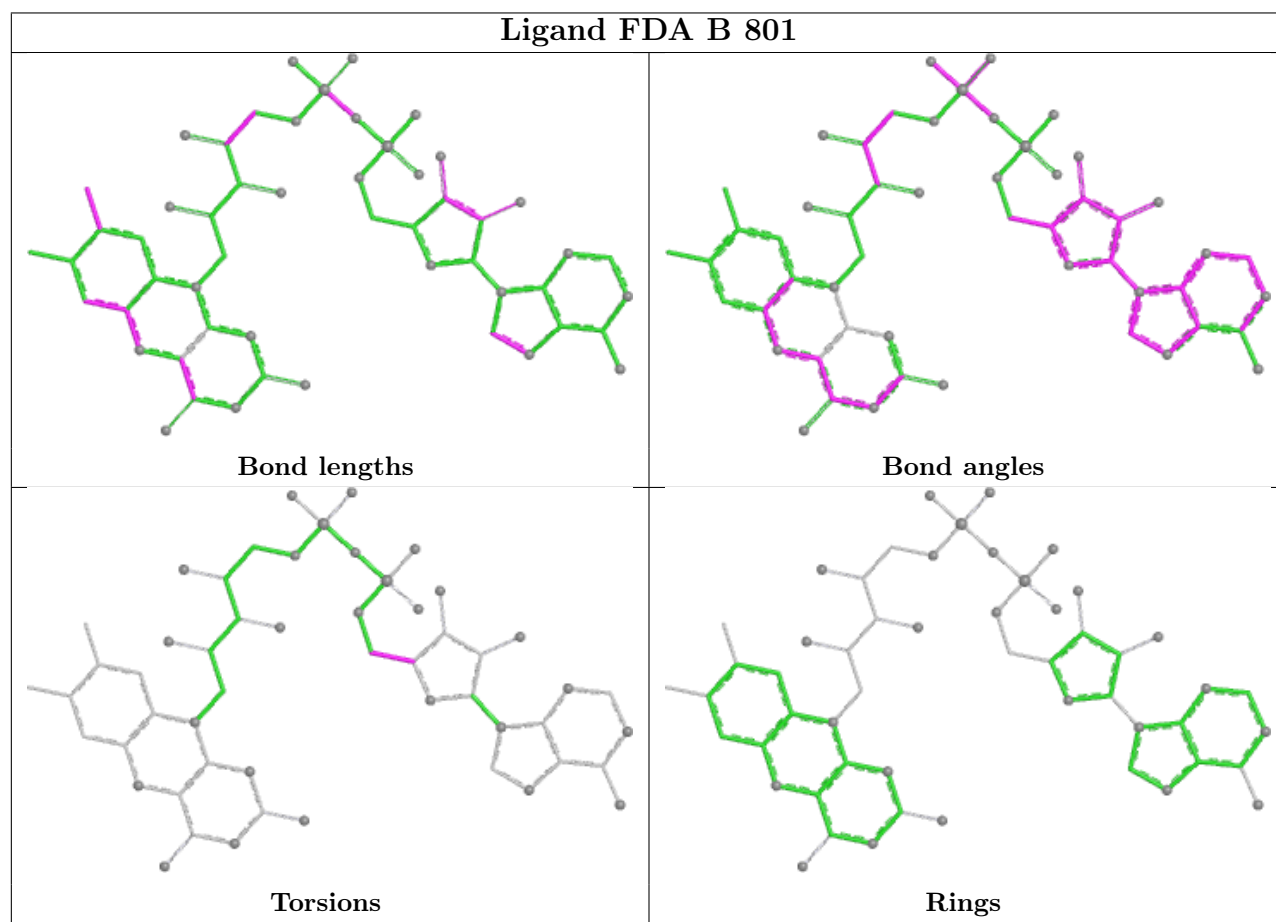
There are no ring outliers.

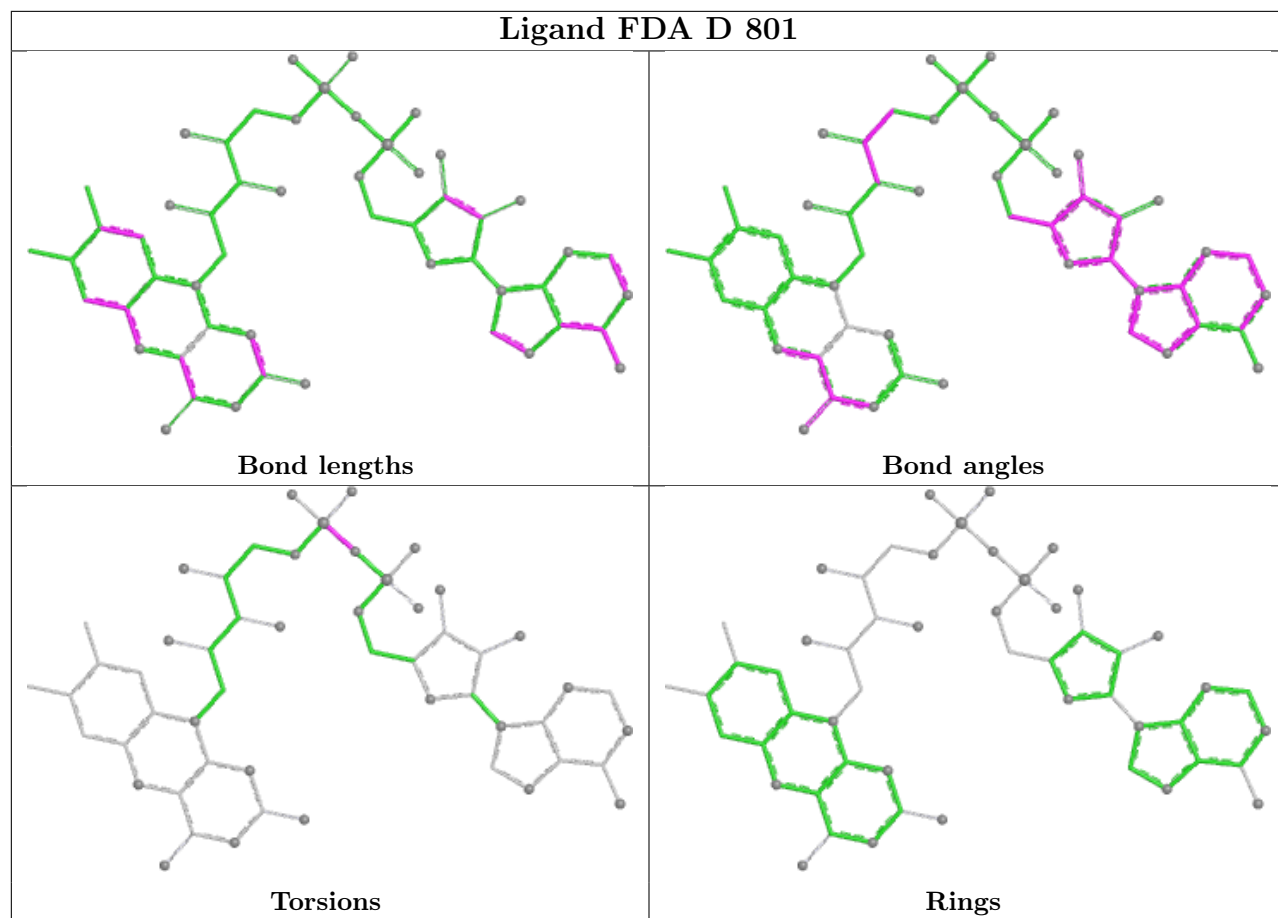
8 monomers are involved in 12 short contacts:

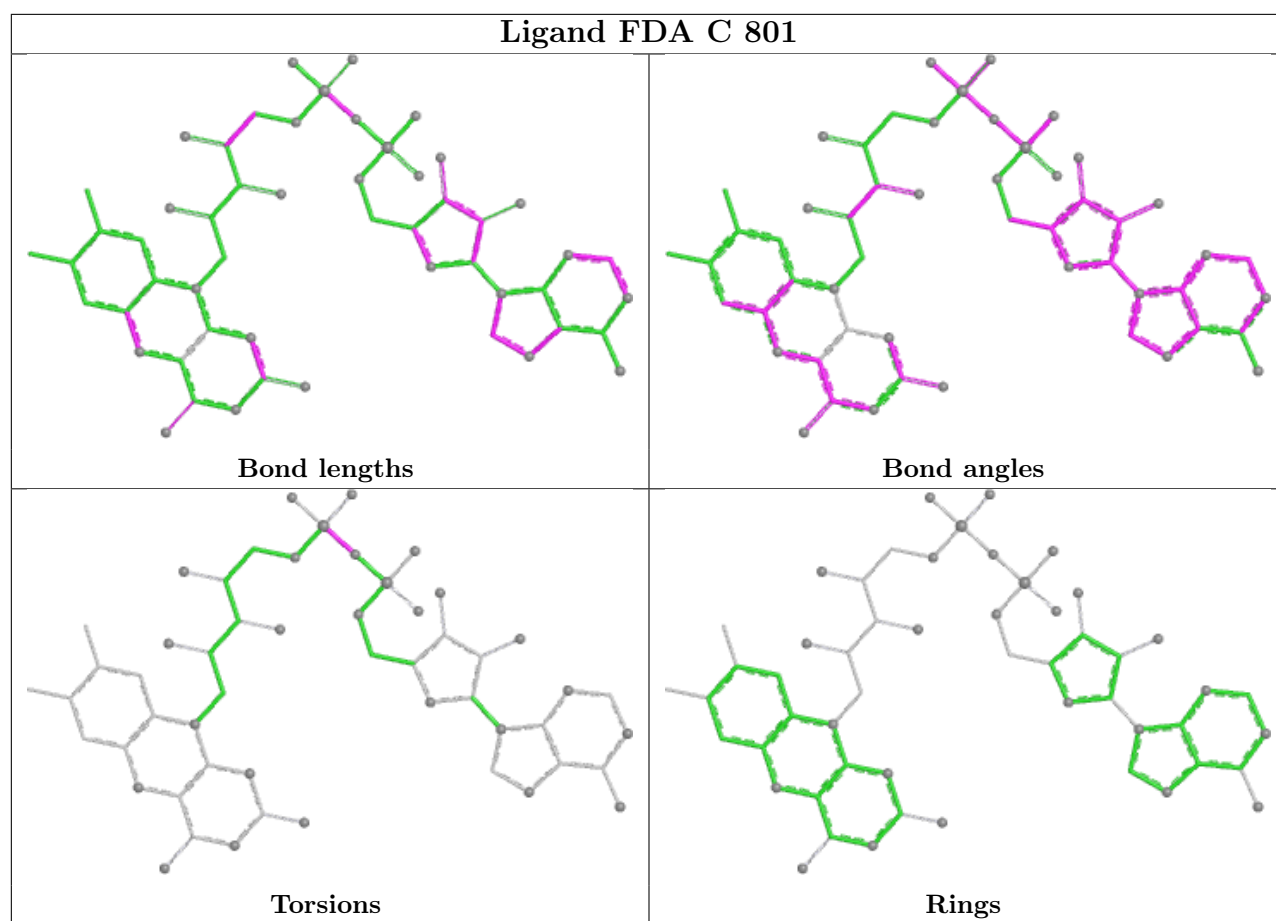
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	802	G3F	2	0
2	B	801	FDA	1	0
2	D	801	FDA	3	0
3	D	802	G3F	3	0
3	C	802	G3F	1	0
3	B	802	G3F	2	0
2	C	801	FDA	3	0
2	A	801	FDA	2	0

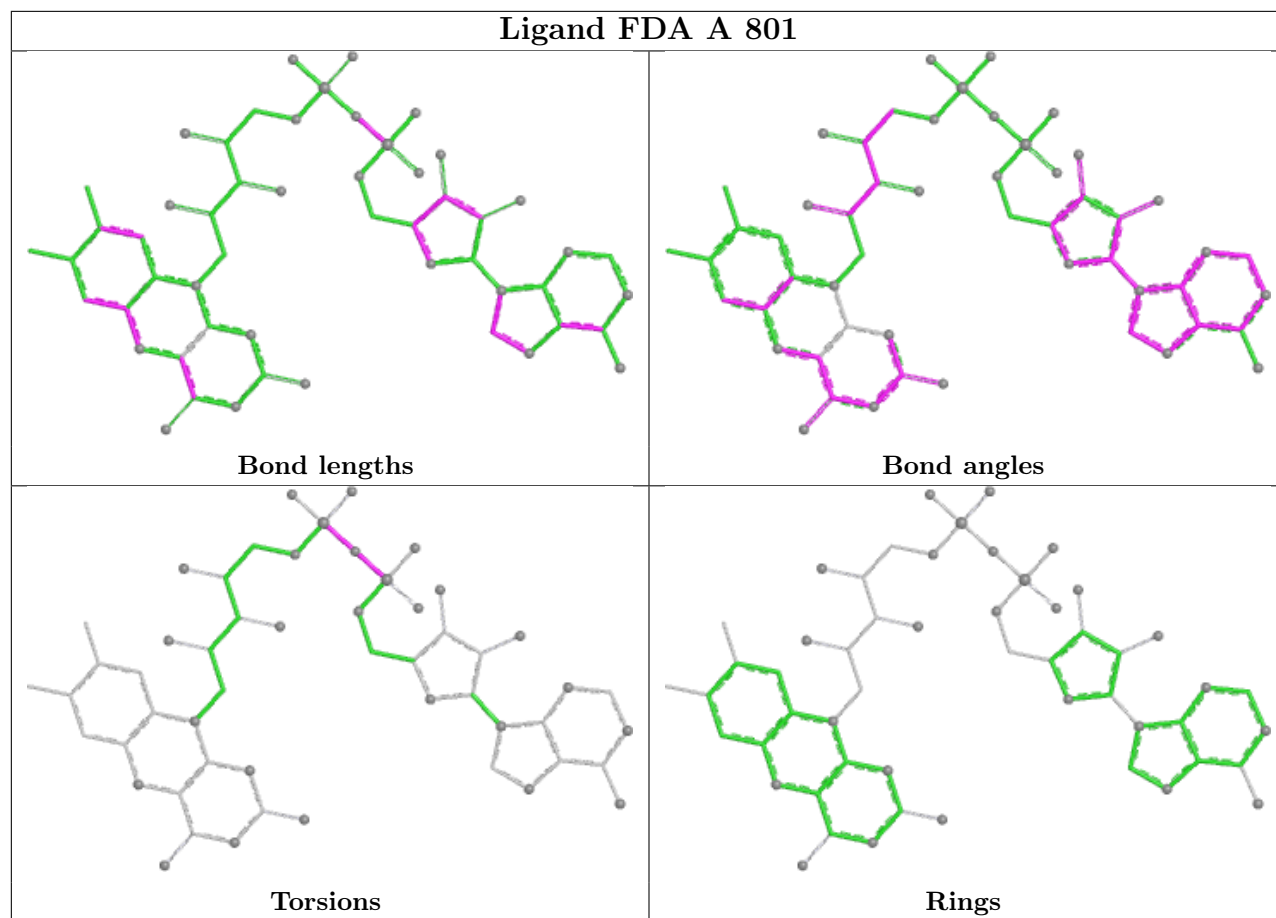
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be

highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ > 2			OWAB(Å ²)	Q < 0.9
1	A	570/648 (87%)	-0.13	30 (5%)	32	31	6, 16, 39, 69	5 (0%)
1	B	574/648 (88%)	0.04	33 (5%)	29	28	6, 20, 42, 72	3 (0%)
1	C	579/648 (89%)	0.06	31 (5%)	31	30	6, 20, 45, 71	6 (1%)
1	D	570/648 (87%)	-0.15	22 (3%)	43	43	5, 16, 37, 78	4 (0%)
All	All	2293/2592 (88%)	-0.05	116 (5%)	33	32	5, 18, 41, 78	18 (0%)

All (116) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	465	VAL	6.8
1	D	68	GLY	5.8
1	D	69	PRO	5.6
1	A	68	GLY	5.4
1	D	466	ALA	5.4
1	D	67	PHE	5.2
1	B	67	PHE	5.1
1	C	13	PRO	5.0
1	C	62	PRO	5.0
1	A	66	GLN	4.9
1	C	131	LEU	4.8
1	C	465	VAL	4.7
1	B	466	ALA	4.7
1	A	465	VAL	4.7
1	B	69	PRO	4.6
1	A	67	PHE	4.6
1	D	465	VAL	4.5
1	A	397[A]	SER	4.5
1	C	191[A]	ARG	4.0
1	C	466	ALA	4.0
1	A	309	PRO	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	466	ALA	3.9
1	C	59	PRO	3.9
1	C	397[A]	SER	3.9
1	D	49[A]	SER	3.8
1	B	464	ALA	3.8
1	D	70	GLY	3.7
1	D	459	ALA	3.6
1	A	348	PRO	3.5
1	A	464	ALA	3.5
1	C	69	PRO	3.5
1	C	70	GLY	3.4
1	C	61	ALA	3.4
1	D	579[A]	ASN	3.4
1	B	617	GLY	3.3
1	C	464	ALA	3.3
1	C	460	PHE	3.3
1	B	68	GLY	3.3
1	B	132	GLY	3.2
1	A	160[A]	THR	3.2
1	B	57	GLY	3.2
1	D	160[A]	THR	3.1
1	B	319	SER	3.1
1	A	423	GLU	3.1
1	B	423	GLU	3.1
1	B	66	GLN	3.1
1	D	66	GLN	3.1
1	A	405	ASN	3.1
1	C	160[A]	THR	3.1
1	A	69	PRO	3.1
1	A	36[A]	ASN	3.0
1	C	579[A]	ASN	3.0
1	C	132	GLY	3.0
1	C	232	ASN	3.0
1	B	462	TYR	2.9
1	B	463	GLY	2.9
1	B	309	PRO	2.9
1	A	460	PHE	2.8
1	D	248	THR	2.8
1	C	63	ARG	2.8
1	C	60	ASN	2.8
1	B	131	LEU	2.8
1	B	467	GLU	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	320	VAL	2.8
1	B	229	GLN	2.7
1	B	348	PRO	2.7
1	B	49[A]	SER	2.6
1	D	13	PRO	2.6
1	C	65	VAL	2.6
1	A	459	ALA	2.6
1	C	57	GLY	2.6
1	A	407	PRO	2.5
1	D	464	ALA	2.5
1	A	49[A]	SER	2.5
1	A	84	GLU	2.5
1	D	348	PRO	2.5
1	A	463	GLY	2.4
1	A	462	TYR	2.4
1	B	616	PHE	2.4
1	D	319	SER	2.4
1	C	467	GLU	2.4
1	B	460	PHE	2.4
1	C	68	GLY	2.4
1	D	460	PHE	2.4
1	B	10	ALA	2.4
1	A	308	LEU	2.3
1	B	160[A]	THR	2.3
1	C	320	VAL	2.3
1	C	348	PRO	2.3
1	A	319	SER	2.3
1	A	72	VAL	2.3
1	C	366	GLU	2.3
1	B	56	LYS	2.3
1	A	130	SER	2.2
1	B	234	ILE	2.2
1	C	195[A]	ASP	2.2
1	C	233	VAL	2.2
1	D	56	LYS	2.2
1	B	366	GLU	2.2
1	B	130	SER	2.2
1	C	58	ASP	2.2
1	B	321	LYS	2.2
1	B	248	THR	2.2
1	A	467	GLU	2.2
1	D	401	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	461	SER	2.1
1	A	617	GLY	2.1
1	C	309	PRO	2.1
1	B	55	MET	2.1
1	B	565	GLN	2.1
1	D	320	VAL	2.1
1	A	498	ARG	2.1
1	D	617	GLY	2.1
1	C	171	ASP	2.1
1	A	367	ARG	2.0
1	A	426	PRO	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 oligosaccharides 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.

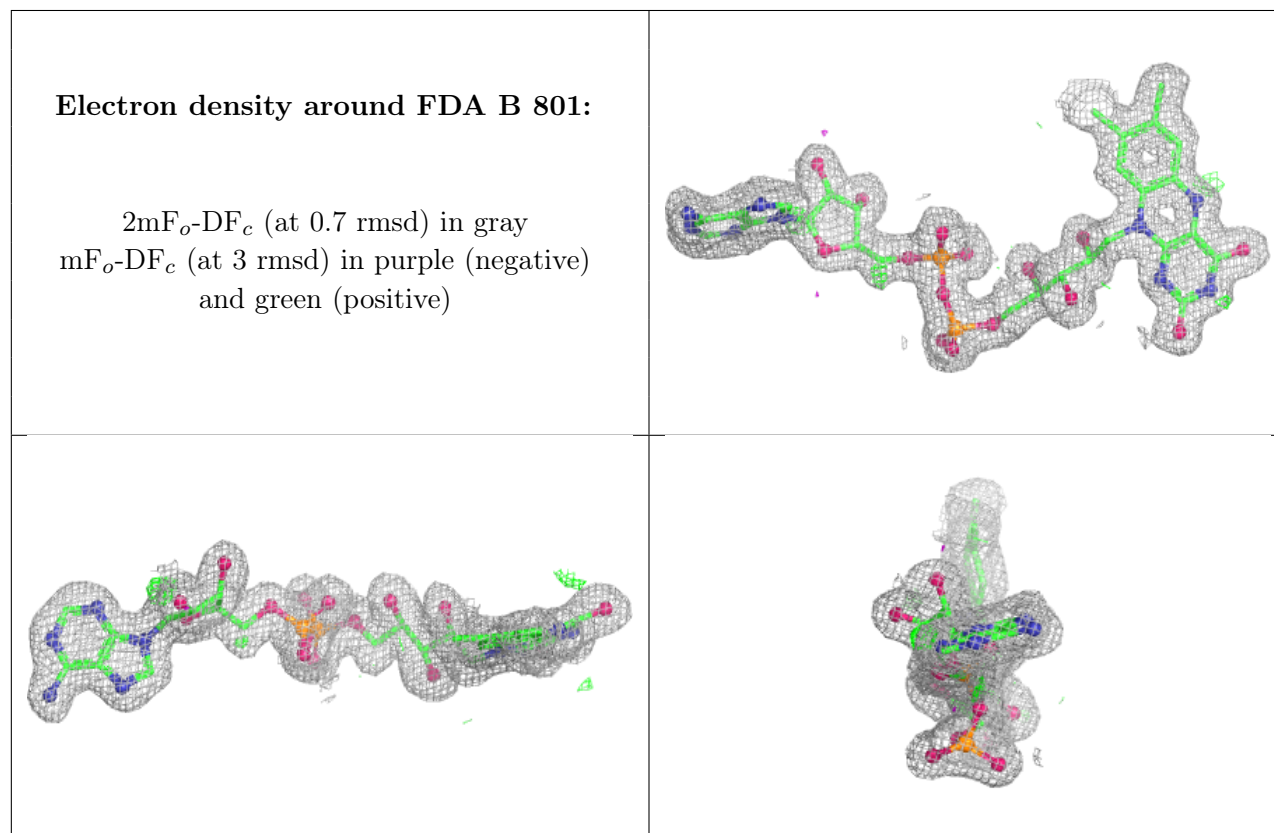
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	G3F	B	802	12/12	0.81	0.12	29,32,34,38	0
3	G3F	A	802	12/12	0.83	0.12	27,30,33,34	0
3	G3F	D	802	12/12	0.84	0.10	23,31,33,35	0
3	G3F	C	802	12/12	0.87	0.10	26,30,32,36	0
4	MN	D	803	1/1	0.97	0.04	13,13,13,13	1
2	FDA	B	801	53/53	0.98	0.05	10,15,17,18	0
2	FDA	C	801	53/53	0.98	0.05	10,14,17,18	0
2	FDA	D	801	53/53	0.98	0.04	9,11,15,15	0
4	MN	A	803	1/1	0.98	0.12	33,33,33,33	0
4	MN	A	805	1/1	0.98	0.12	34,34,34,34	0
4	MN	B	803	1/1	0.98	0.18	38,38,38,38	0
2	FDA	A	801	53/53	0.98	0.04	8,11,15,16	0

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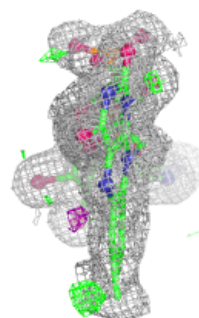
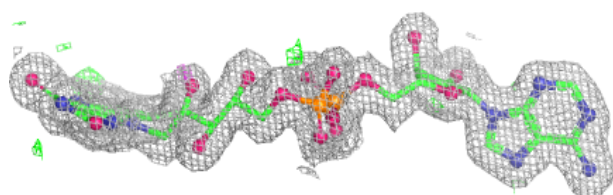
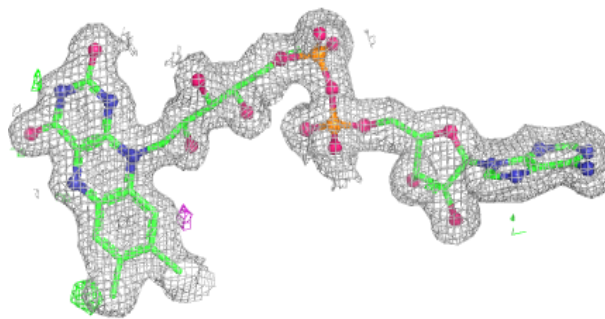
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	MN	C	803	1/1	0.99	0.13	35,35,35,35	0
4	MN	A	804	1/1	0.99	0.11	30,30,30,30	0
4	MN	D	804	1/1	0.99	0.07	32,32,32,32	0
4	MN	D	805	1/1	0.99	0.14	33,33,33,33	0

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.

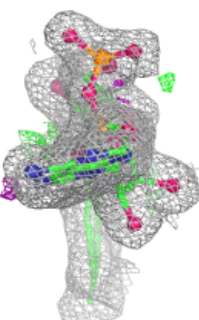
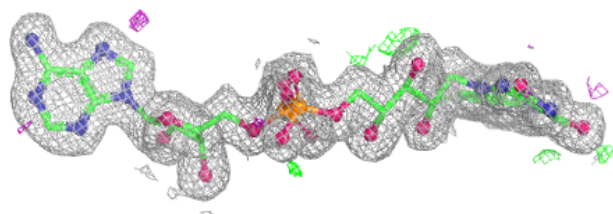
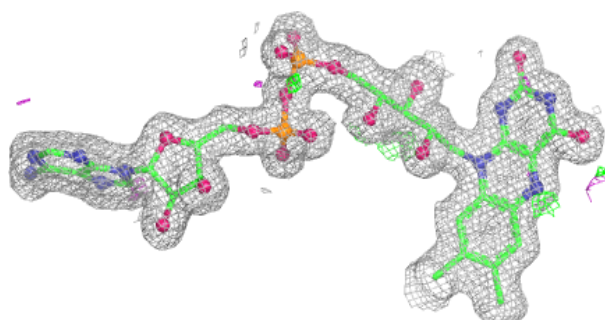


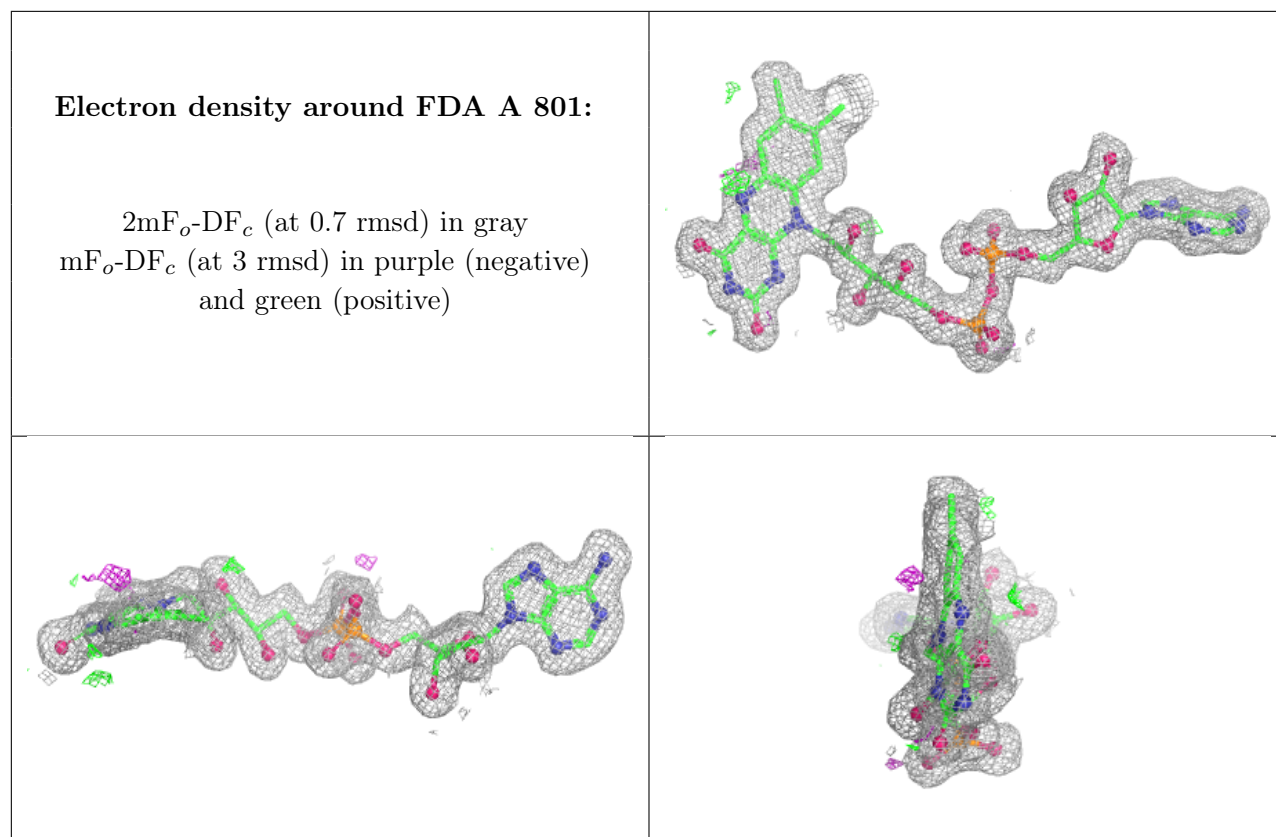
Electron density around FDA C 801:

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

**Electron density around FDA D 801:**

$2mF_o-DF_c$ (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.