



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 01:03 PM UTC

PDB ID : 7T08 / pdb_00007t08
Title : Cryptococcus neoformans protein farnesyltransferase in complex with FPP and inhibitor 2q
Authors : Wang, Y.; Shi, Y.; Beese, L.S.
Deposited on : 2021-11-29
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

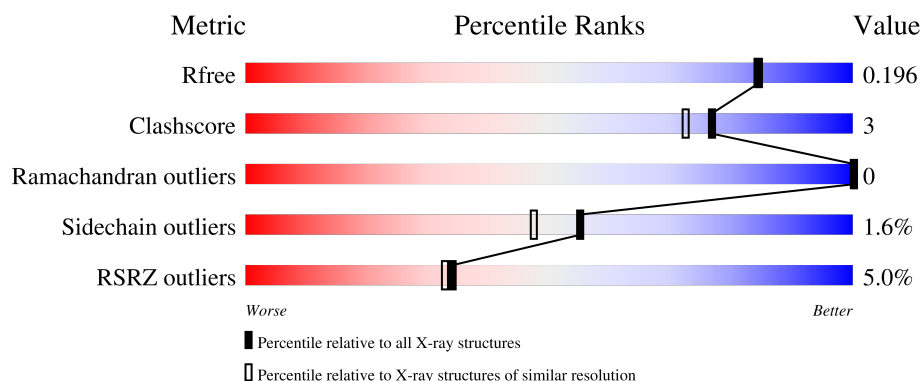
1 Overall quality at a glance

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	349	5% 87% • 9%
2	B	520	4% 87% 5% • 7%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7373 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 Protein farnesyltransferase/geranylgeranyltransferase type-1 subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	316	Total	C	N	O	S	0	1	0
			2633	1698	447	477	11			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-13	MET	-	expression tag	UNP J9VSJ6
A	-12	GLY	-	expression tag	UNP J9VSJ6
A	-11	SER	-	expression tag	UNP J9VSJ6
A	-10	SER	-	expression tag	UNP J9VSJ6
A	-9	HIS	-	expression tag	UNP J9VSJ6
A	-8	HIS	-	expression tag	UNP J9VSJ6
A	-7	HIS	-	expression tag	UNP J9VSJ6
A	-6	HIS	-	expression tag	UNP J9VSJ6
A	-5	HIS	-	expression tag	UNP J9VSJ6
A	-4	HIS	-	expression tag	UNP J9VSJ6
A	-3	SER	-	expression tag	UNP J9VSJ6
A	-2	GLN	-	expression tag	UNP J9VSJ6
A	-1	ASP	-	expression tag	UNP J9VSJ6
A	0	LEU	-	expression tag	UNP J9VSJ6

- Molecule 2 is a protein called Protein farnesyltransferase subunit beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	485	Total	C	N	O	S	0	2	0
			3731	2366	649	702	14			

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



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

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

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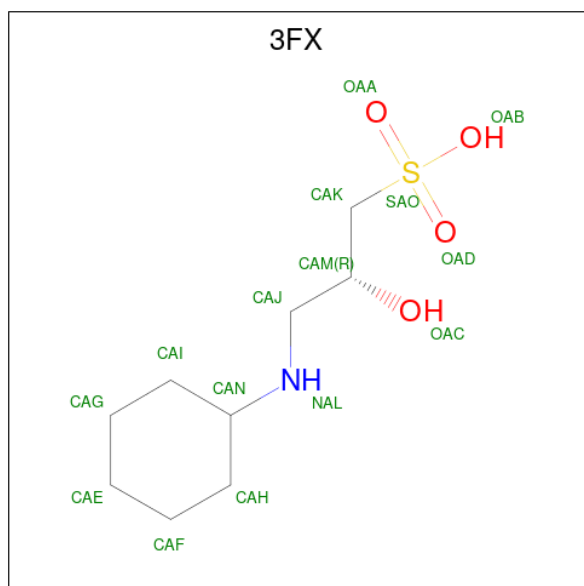
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

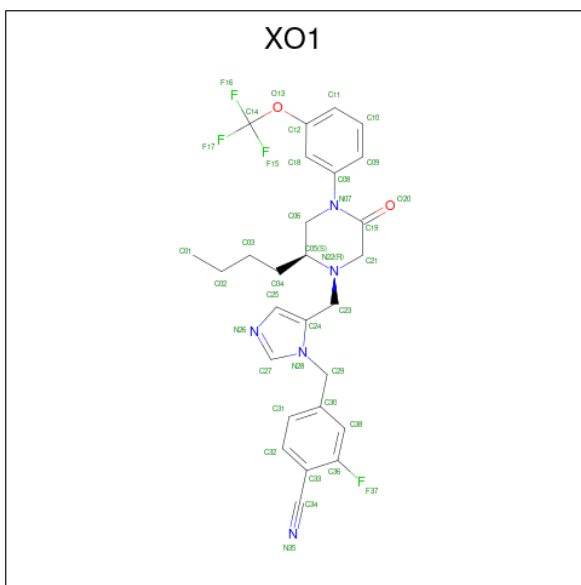
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Zn	0	0
			1	1		

- Molecule 5 is (2R)-3-(cyclohexylamino)-2-hydroxypropane-1-sulfonic acid (CCD ID: 3FX) (formula: C₉H₁₉NO₄S).



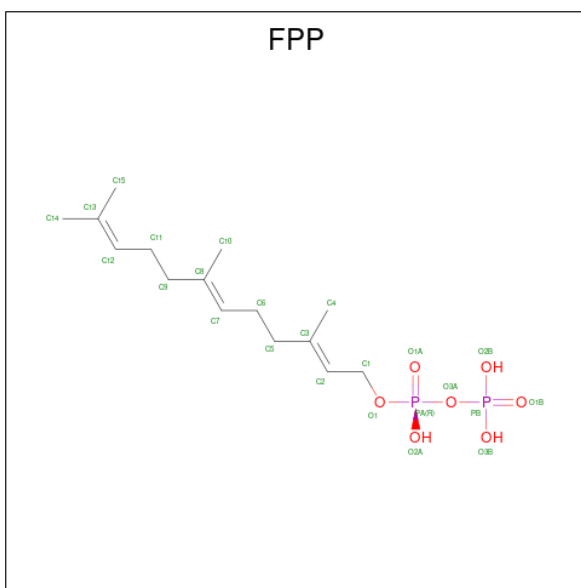
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		

- Molecule 6 is 4-{[5-({(2S)-2-butyl-5-oxo-4-[3-(trifluoromethoxy)phenyl]piperazin-1-yl}methyl)-1H-imidazol-1-yl]methyl}-2-fluorobenzonitrile (CCD ID: XO1) (formula: C₂₇H₂₇F₄N₅O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	F	N	O	0	0
			38	27	4	5	2		

- Molecule 7 is FARNESYL DIPHOSPHATE (CCD ID: FPP) (formula: $\text{C}_{15}\text{H}_{28}\text{O}_7\text{P}_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	B	1	Total	C	O	P	0	0
			24	15	7	2		

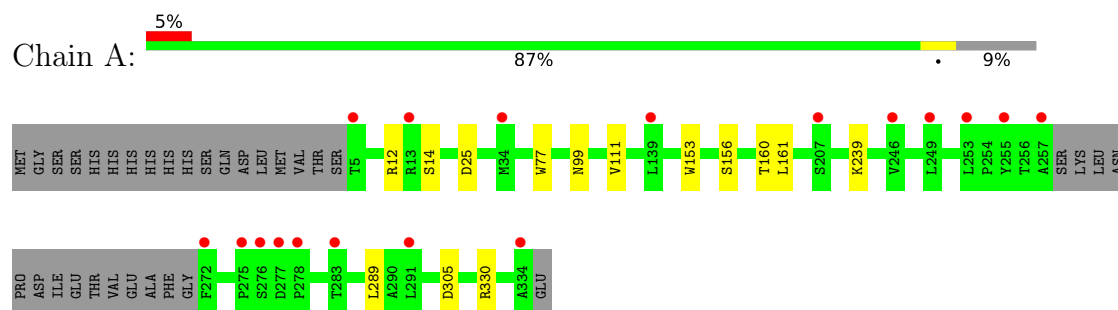
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	271	Total 271	O 271	0	0
8	B	402	Total 402	O 402	0	0

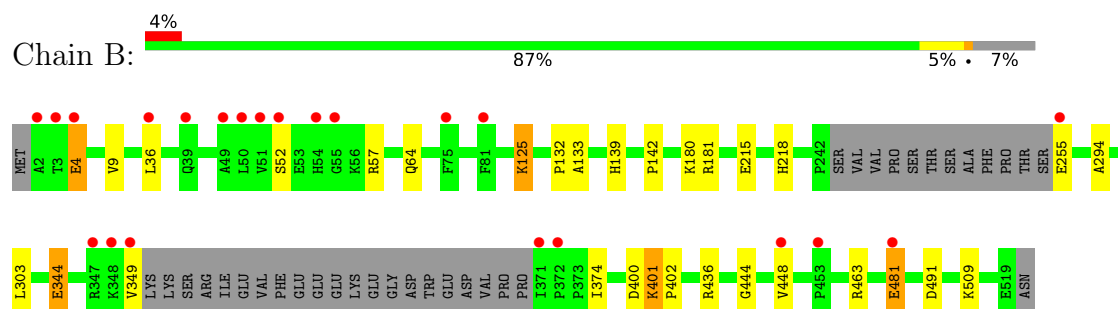
3 Residue-property plots

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: Protein farnesyltransferase/geranylgeranyltransferase type-1 subunit alpha



- Molecule 2: Protein farnesyltransferase subunit beta



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	141.91Å 141.91Å 130.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.17 – 1.80 50.17 – 1.80	Depositor EDS
% Data completeness (in resolution range)	98.5 (50.17-1.80) 93.5 (50.17-1.80)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.83 (at 1.81Å)	Xtriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.175 , 0.194 0.178 , 0.196	Depositor DCC
R_{free} test set	6073 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	28.2	Xtriage
Anisotropy	0.582	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 41.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7373	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.31% 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: 3FX, XO1, ZN, EDO, FPP

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	0.29	0/2719	0.45	0/3705
2	B	0.40	0/3831	0.54	1/5204 (0.0%)
All	All	0.36	0/6550	0.50	1/8909 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	4	GLU	CB-CG-CD	5.50	121.94	112.60

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	2633	0	2555	14	0
2	B	3731	0	3658	21	0
3	A	112	0	168	11	0
3	B	116	0	174	9	0
4	B	1	0	0	0	0
5	B	45	0	57	4	0
6	B	38	0	0	0	0
7	B	24	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	A	271	0	0	1	0
8	B	402	0	0	6	0
All	All	7373	0	6637	38	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 (38) 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:25:ASP:HB3	2:B:132:PRO:HG3	1.67	0.76
1:A:305:ASP:H	3:A:422:EDO:H12	1.57	0.69
1:A:14:SER:HB2	3:A:419:EDO:H11	1.78	0.64
1:A:239:LYS:NZ	8:A:502:HOH:O	2.31	0.64
2:B:481:GLU:H	2:B:481:GLU:CD	2.06	0.63
2:B:344:GLU:HG3	3:B:633:EDO:H22	1.83	0.59
2:B:181:ARG:HH22	3:B:634:EDO:H12	1.68	0.58
1:A:156:SER:O	1:A:160[A]:THR:HG23	2.04	0.58
1:A:161:LEU:HD21	3:A:427:EDO:H12	1.86	0.56
2:B:36:LEU:HD21	2:B:402:PRO:O	2.07	0.54
2:B:139:HIS:HB3	2:B:142:PRO:HG2	1.90	0.54
3:A:404:EDO:H12	2:B:303:LEU:HD22	1.92	0.52
1:A:330:ARG:HH11	3:A:426:EDO:H22	1.74	0.51
3:A:427:EDO:H21	3:B:635:EDO:O1	2.11	0.50
2:B:294:ALA:HB3	3:B:633:EDO:H21	1.95	0.49
2:B:400:ASP:OD1	2:B:401:LYS:HG3	2.13	0.49
1:A:153:TRP:HB2	3:A:425:EDO:H21	1.93	0.49
2:B:463:ARG:HD3	3:B:614:EDO:H21	1.93	0.49
2:B:444:GLY:O	3:B:621:EDO:H12	2.13	0.48
2:B:436:ARG:HH22	3:B:625:EDO:H12	1.78	0.48
2:B:509:LYS:NZ	8:B:719:HOH:O	2.47	0.48
2:B:218:HIS:HD2	8:B:878:HOH:O	1.97	0.48
1:A:99:ASN:HB3	3:A:417:EDO:H21	1.95	0.48
1:A:111:VAL:HG12	3:A:418:EDO:H21	1.97	0.47
1:A:330:ARG:HD2	3:A:426:EDO:H11	1.98	0.46
3:B:623:EDO:H12	8:B:839:HOH:O	2.14	0.46
2:B:180:LYS:HE2	2:B:215:GLU:O	2.17	0.45
5:B:602:3FX:HAJA	8:B:1035:HOH:O	2.18	0.44
2:B:133:ALA:O	5:B:604:3FX:HAJ	2.18	0.43
3:B:632:EDO:H22	8:B:819:HOH:O	2.17	0.43
2:B:125:LYS:HA	2:B:125:LYS:HD2	1.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:77:TRP:CZ2	1:A:111:VAL:HG22	2.54	0.42
2:B:400:ASP:OD1	2:B:401:LYS:NZ	2.50	0.42
2:B:57:ARG:NH1	8:B:713:HOH:O	2.40	0.41
1:A:12:ARG:HB3	3:A:419:EDO:H22	2.03	0.41
2:B:491:ASP:OD2	5:B:602:3FX:NAL	2.51	0.41
2:B:64:GLN:HB2	5:B:603:3FX:HAK	2.01	0.40
1:A:289:LEU:HD23	1:A:289:LEU:HA	1.91	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	313/349 (90%)	305 (97%)	8 (3%)	0	100	100
2	B	481/520 (92%)	472 (98%)	9 (2%)	0	100	100
All	All	794/869 (91%)	777 (98%)	17 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	287/316 (91%)	287 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	405/436 (93%)	394 (97%)	11 (3%)	39	27
All	All	692/752 (92%)	681 (98%)	11 (2%)	55	47

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	4	GLU
2	B	9	VAL
2	B	52	SER
2	B	125	LYS
2	B	255	GLU
2	B	344	GLU
2	B	349	VAL
2	B	374	ILE
2	B	401	LYS
2	B	448	VAL
2	B	481	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	113	HIS
1	A	168	GLN
1	A	187	ASN
2	B	218	HIS
2	B	413	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 63 ligands modelled in this entry, 1 is monoatomic - leaving 62 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	EDO	A	401	-	3,3,3	0.41	0	2,2,2	0.57	0
3	EDO	A	426	-	3,3,3	0.40	0	2,2,2	0.49	0
3	EDO	B	613	-	3,3,3	0.44	0	2,2,2	0.27	0
3	EDO	A	418	-	3,3,3	0.46	0	2,2,2	0.44	0
3	EDO	B	623	-	3,3,3	0.45	0	2,2,2	0.39	0
6	XO1	B	628	4	41,41,41	2.49	13 (31%)	48,58,58	1.10	3 (6%)
3	EDO	B	609	-	3,3,3	0.47	0	2,2,2	0.09	0
3	EDO	B	627	-	3,3,3	0.49	0	2,2,2	0.22	0
3	EDO	B	615	-	3,3,3	0.42	0	2,2,2	0.30	0
3	EDO	B	618	-	3,3,3	0.39	0	2,2,2	0.58	0
3	EDO	A	413	-	3,3,3	0.47	0	2,2,2	0.33	0
3	EDO	A	407	-	3,3,3	0.46	0	2,2,2	0.48	0
3	EDO	B	634	-	3,3,3	0.45	0	2,2,2	0.30	0
7	FPP	B	629	-	22,23,23	1.45	1 (4%)	27,31,31	0.93	1 (3%)
3	EDO	A	424	-	3,3,3	0.47	0	2,2,2	0.23	0
5	3FX	B	602	-	14,15,15	1.05	2 (14%)	16,20,20	1.80	2 (12%)
3	EDO	B	626	-	3,3,3	0.41	0	2,2,2	0.49	0
3	EDO	A	403	-	3,3,3	0.43	0	2,2,2	0.40	0
3	EDO	A	406	-	3,3,3	0.42	0	2,2,2	0.18	0
3	EDO	B	621	-	3,3,3	0.44	0	2,2,2	0.33	0
3	EDO	B	631	-	3,3,3	0.43	0	2,2,2	0.44	0
3	EDO	A	405	-	3,3,3	0.35	0	2,2,2	0.50	0
3	EDO	A	409	-	3,3,3	0.43	0	2,2,2	0.33	0
3	EDO	A	415	-	3,3,3	0.42	0	2,2,2	0.49	0
3	EDO	A	416	-	3,3,3	0.45	0	2,2,2	0.36	0
3	EDO	A	428	-	3,3,3	0.42	0	2,2,2	0.45	0
3	EDO	B	616	-	3,3,3	0.41	0	2,2,2	0.39	0
3	EDO	A	414	-	3,3,3	0.41	0	2,2,2	0.48	0
3	EDO	B	608	-	3,3,3	0.47	0	2,2,2	0.39	0
3	EDO	B	617	-	3,3,3	0.44	0	2,2,2	0.29	0
3	EDO	B	630	-	3,3,3	0.44	0	2,2,2	0.34	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	B	607	-	3,3,3	0.44	0	2,2,2	0.29	0
3	EDO	A	412	-	3,3,3	0.51	0	2,2,2	0.25	0
3	EDO	B	635	-	3,3,3	0.43	0	2,2,2	0.36	0
3	EDO	A	408	-	3,3,3	0.43	0	2,2,2	0.61	0
3	EDO	A	421	-	3,3,3	0.40	0	2,2,2	0.46	0
3	EDO	A	419	-	3,3,3	0.45	0	2,2,2	0.22	0
3	EDO	B	606	-	3,3,3	0.48	0	2,2,2	0.31	0
3	EDO	B	614	-	3,3,3	0.54	0	2,2,2	0.11	0
3	EDO	B	620	-	3,3,3	0.50	0	2,2,2	0.31	0
3	EDO	B	625	-	3,3,3	0.43	0	2,2,2	0.39	0
3	EDO	B	611	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	A	410	-	3,3,3	0.50	0	2,2,2	0.26	0
3	EDO	A	411	-	3,3,3	0.43	0	2,2,2	0.36	0
3	EDO	A	417	-	3,3,3	0.41	0	2,2,2	0.41	0
3	EDO	B	612	-	3,3,3	0.42	0	2,2,2	0.35	0
3	EDO	B	619	-	3,3,3	0.43	0	2,2,2	0.32	0
5	3FX	B	603	-	14,15,15	1.05	2 (14%)	16,20,20	1.69	3 (18%)
3	EDO	B	632	-	3,3,3	0.51	0	2,2,2	0.37	0
3	EDO	A	423	-	3,3,3	0.45	0	2,2,2	0.45	0
3	EDO	B	610	-	3,3,3	0.34	0	2,2,2	0.69	0
3	EDO	B	624	-	3,3,3	0.47	0	2,2,2	0.31	0
3	EDO	A	420	-	3,3,3	0.38	0	2,2,2	0.40	0
3	EDO	B	633	-	3,3,3	0.41	0	2,2,2	0.46	0
3	EDO	A	402	-	3,3,3	0.45	0	2,2,2	0.26	0
5	3FX	B	604	-	14,15,15	1.09	2 (14%)	16,20,20	1.73	4 (25%)
3	EDO	B	622	-	3,3,3	0.45	0	2,2,2	0.38	0
3	EDO	A	427	-	3,3,3	0.46	0	2,2,2	0.08	0
3	EDO	A	425	-	3,3,3	0.36	0	2,2,2	0.48	0
3	EDO	A	404	-	3,3,3	0.42	0	2,2,2	0.33	0
3	EDO	A	422	-	3,3,3	0.45	0	2,2,2	0.29	0
3	EDO	B	605	-	3,3,3	0.61	0	2,2,2	0.34	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
3	EDO	A	401	-	-	0/1/1/1	-
3	EDO	A	426	-	-	0/1/1/1	-
3	EDO	B	613	-	-	0/1/1/1	-
3	EDO	A	418	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	623	-	-	1/1/1/1	-
6	XO1	B	628	4	-	2/23/39/39	0/4/4/4
3	EDO	B	609	-	-	0/1/1/1	-
3	EDO	B	627	-	-	0/1/1/1	-
3	EDO	B	615	-	-	0/1/1/1	-
3	EDO	B	618	-	-	0/1/1/1	-
3	EDO	A	413	-	-	0/1/1/1	-
3	EDO	A	407	-	-	0/1/1/1	-
3	EDO	B	634	-	-	1/1/1/1	-
7	FPP	B	629	-	-	1/25/25/25	-
3	EDO	A	424	-	-	1/1/1/1	-
5	3FX	B	602	-	-	3/10/18/18	0/1/1/1
3	EDO	B	626	-	-	0/1/1/1	-
3	EDO	A	403	-	-	1/1/1/1	-
3	EDO	A	406	-	-	0/1/1/1	-
3	EDO	B	621	-	-	0/1/1/1	-
3	EDO	B	631	-	-	1/1/1/1	-
3	EDO	A	405	-	-	0/1/1/1	-
3	EDO	A	409	-	-	1/1/1/1	-
3	EDO	A	415	-	-	0/1/1/1	-
3	EDO	A	416	-	-	0/1/1/1	-
3	EDO	A	428	-	-	1/1/1/1	-
3	EDO	B	616	-	-	0/1/1/1	-
3	EDO	A	414	-	-	0/1/1/1	-
3	EDO	B	608	-	-	0/1/1/1	-
3	EDO	B	617	-	-	0/1/1/1	-
3	EDO	B	630	-	-	1/1/1/1	-
3	EDO	B	607	-	-	0/1/1/1	-
3	EDO	A	412	-	-	0/1/1/1	-
3	EDO	B	635	-	-	1/1/1/1	-
3	EDO	A	408	-	-	0/1/1/1	-
3	EDO	A	421	-	-	0/1/1/1	-
3	EDO	A	419	-	-	0/1/1/1	-
3	EDO	B	606	-	-	0/1/1/1	-
3	EDO	B	614	-	-	0/1/1/1	-
3	EDO	B	620	-	-	1/1/1/1	-
3	EDO	B	625	-	-	0/1/1/1	-
3	EDO	B	611	-	-	0/1/1/1	-
3	EDO	A	410	-	-	1/1/1/1	-
3	EDO	A	411	-	-	1/1/1/1	-
3	EDO	A	417	-	-	0/1/1/1	-
3	EDO	B	612	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	619	-	-	0/1/1/1	-
5	3FX	B	603	-	-	8/10/18/18	0/1/1/1
3	EDO	B	632	-	-	0/1/1/1	-
3	EDO	A	423	-	-	0/1/1/1	-
3	EDO	B	610	-	-	1/1/1/1	-
3	EDO	B	624	-	-	0/1/1/1	-
3	EDO	A	420	-	-	0/1/1/1	-
3	EDO	B	633	-	-	1/1/1/1	-
3	EDO	A	402	-	-	0/1/1/1	-
5	3FX	B	604	-	-	2/10/18/18	0/1/1/1
3	EDO	B	622	-	-	0/1/1/1	-
3	EDO	A	427	-	-	0/1/1/1	-
3	EDO	A	425	-	-	0/1/1/1	-
3	EDO	A	404	-	-	0/1/1/1	-
3	EDO	A	422	-	-	1/1/1/1	-
3	EDO	B	605	-	-	0/1/1/1	-

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	628	XO1	C23-N22	-6.55	1.31	1.47
6	B	628	XO1	C33-C34	6.32	1.53	1.44
6	B	628	XO1	C19-N07	5.90	1.47	1.36
6	B	628	XO1	C23-C24	5.76	1.57	1.50
6	B	628	XO1	C21-C19	4.47	1.59	1.51
7	B	629	FPP	PA-O3A	4.01	1.63	1.59
6	B	628	XO1	C05-N22	-3.64	1.42	1.48
6	B	628	XO1	C21-N22	-3.59	1.39	1.47
6	B	628	XO1	C08-N07	2.98	1.49	1.43
6	B	628	XO1	C24-N28	-2.66	1.35	1.38
6	B	628	XO1	C29-C30	2.56	1.56	1.51
5	B	604	3FX	OAD-SAO	2.33	1.51	1.45
5	B	603	3FX	OAD-SAO	2.32	1.51	1.45
5	B	604	3FX	OAA-SAO	2.31	1.51	1.45
5	B	602	3FX	OAA-SAO	2.28	1.51	1.45
6	B	628	XO1	C25-C24	2.27	1.39	1.36
5	B	603	3FX	OAA-SAO	2.26	1.51	1.45
5	B	602	3FX	OAD-SAO	2.26	1.51	1.45
6	B	628	XO1	C04-C05	2.19	1.61	1.52
6	B	628	XO1	C25-N26	-2.11	1.34	1.37

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	602	3FX	OAD-SAO-CAK	5.33	114.72	106.76
5	B	603	3FX	OAA-SAO-CAK	4.21	113.04	106.76
5	B	604	3FX	OAD-SAO-OAA	-3.79	101.50	113.82
5	B	603	3FX	OAB-SAO-OAD	-3.77	101.98	111.40
5	B	602	3FX	OAB-SAO-OAA	-3.63	102.31	111.40
5	B	604	3FX	OAA-SAO-CAK	3.11	111.40	106.76
5	B	604	3FX	OAB-SAO-CAK	2.91	111.60	105.97
6	B	628	XO1	C25-N26-C27	2.69	108.76	105.24
7	B	629	FPP	C6-C7-C8	-2.69	121.48	127.62
6	B	628	XO1	C06-N07-C19	-2.22	119.04	122.27
5	B	603	3FX	OAD-SAO-CAK	2.07	109.85	106.76
6	B	628	XO1	C27-N28-C24	2.06	108.90	106.30
5	B	604	3FX	OAD-SAO-CAK	2.03	109.79	106.76

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	602	3FX	CAM-CAK-SAO-OAB
5	B	603	3FX	NAL-CAJ-CAM-OAC
5	B	603	3FX	NAL-CAJ-CAM-CAK
5	B	603	3FX	CAM-CAK-SAO-OAA
5	B	603	3FX	CAM-CAK-SAO-OAB
5	B	603	3FX	CAM-CAK-SAO-OAD
5	B	604	3FX	SAO-CAK-CAM-OAC
5	B	604	3FX	SAO-CAK-CAM-CAJ
3	A	424	EDO	O1-C1-C2-O2
3	A	422	EDO	O1-C1-C2-O2
3	B	633	EDO	O1-C1-C2-O2
5	B	603	3FX	CAI-CAN-NAL-CAJ
3	A	403	EDO	O1-C1-C2-O2
3	B	610	EDO	O1-C1-C2-O2
3	B	623	EDO	O1-C1-C2-O2
3	B	635	EDO	O1-C1-C2-O2
3	B	620	EDO	O1-C1-C2-O2
5	B	602	3FX	SAO-CAK-CAM-OAC
3	A	428	EDO	O1-C1-C2-O2
3	A	409	EDO	O1-C1-C2-O2
6	B	628	XO1	C18-C12-O13-C14
5	B	603	3FX	CAH-CAN-NAL-CAJ
6	B	628	XO1	C11-C12-O13-C14
3	A	410	EDO	O1-C1-C2-O2
3	A	411	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
3	B	631	EDO	O1-C1-C2-O2
5	B	602	3FX	NAL-CAJ-CAM-OAC
5	B	603	3FX	SAO-CAK-CAM-OAC
3	B	630	EDO	O1-C1-C2-O2
3	B	634	EDO	O1-C1-C2-O2
7	B	629	FPP	PB-O3A-PA-O2A

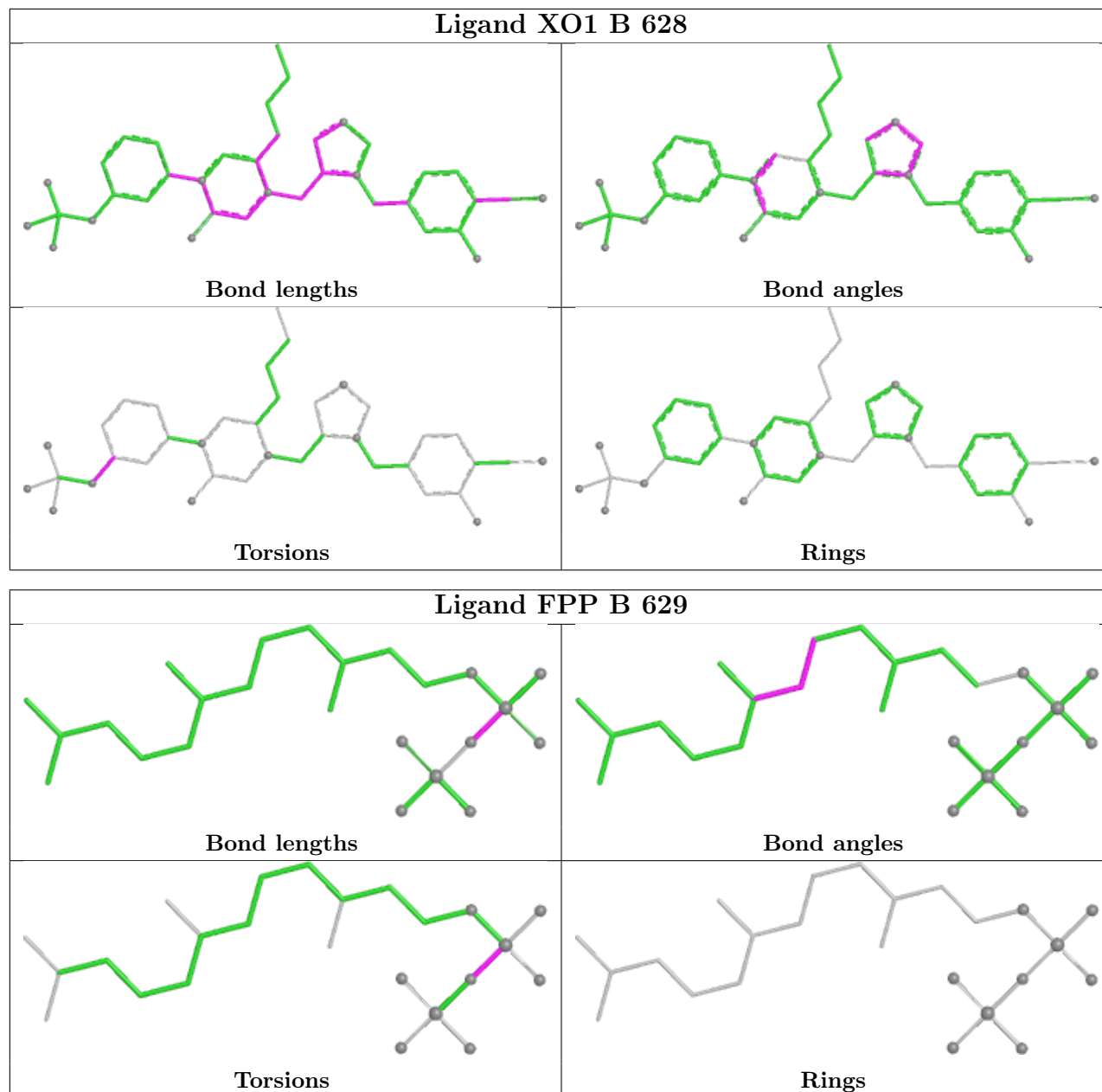
There are no ring outliers.

19 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	426	EDO	2	0
3	A	418	EDO	1	0
3	B	623	EDO	1	0
3	B	634	EDO	1	0
5	B	602	3FX	2	0
3	B	621	EDO	1	0
3	B	635	EDO	1	0
3	A	419	EDO	2	0
3	B	614	EDO	1	0
3	B	625	EDO	1	0
3	A	417	EDO	1	0
5	B	603	3FX	1	0
3	B	632	EDO	1	0
3	B	633	EDO	2	0
5	B	604	3FX	1	0
3	A	427	EDO	2	0
3	A	425	EDO	1	0
3	A	404	EDO	1	0
3	A	422	EDO	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	316/349 (90%)	0.56	18 (5%) 29 28	20, 37, 59, 101	1 (0%)
2	B	485/520 (93%)	0.21	22 (4%) 38 37	19, 31, 54, 99	2 (0%)
All	All	801/869 (92%)	0.34	40 (4%) 34 33	19, 33, 58, 101	3 (0%)

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	50	LEU	6.3
2	B	2	ALA	6.2
2	B	51	VAL	5.8
2	B	371	ILE	5.4
1	A	13	ARG	5.0
2	B	349	VAL	4.7
1	A	278	PRO	4.5
2	B	75	PHE	4.4
2	B	52	SER	4.1
1	A	334	ALA	3.8
1	A	272	PHE	3.4
1	A	5	THR	3.3
2	B	49	ALA	3.3
2	B	54	HIS	3.1
2	B	347	ARG	3.0
1	A	257	ALA	2.8
2	B	255	GLU	2.7
2	B	55	GLY	2.6
2	B	348	LYS	2.6
2	B	372	PRO	2.6
1	A	249	LEU	2.6
2	B	4	GLU	2.6
1	A	276	SER	2.6
1	A	255	TYR	2.6

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Mol	Chain	Res	Type	RSRZ
2	B	481	GLU	2.4
1	A	283	THR	2.3
2	B	448	VAL	2.3
2	B	3	THR	2.3
1	A	246	VAL	2.3
1	A	253	LEU	2.2
1	A	291	LEU	2.2
2	B	36	LEU	2.2
2	B	39	GLN	2.2
1	A	34	MET	2.2
1	A	207	SER	2.2
1	A	275	PRO	2.2
1	A	277	ASP	2.1
2	B	81	PHE	2.0
2	B	453	PRO	2.0
1	A	139	LEU	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	EDO	A	416	4/4	0.72	0.22	59,59,62,68	0
3	EDO	A	427	4/4	0.72	0.24	60,61,61,63	0
3	EDO	A	428	4/4	0.74	0.20	55,58,67,69	0
3	EDO	B	620	4/4	0.74	0.21	48,55,59,60	0
3	EDO	B	621	4/4	0.74	0.16	59,60,62,66	0
3	EDO	B	635	4/4	0.74	0.21	60,62,66,69	0
3	EDO	B	616	4/4	0.77	0.21	50,57,63,63	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	A	422	4/4	0.77	0.17	64,66,68,70	0
3	EDO	B	626	4/4	0.78	0.16	56,56,60,71	0
3	EDO	B	625	4/4	0.79	0.17	56,58,59,63	0
3	EDO	A	424	4/4	0.80	0.21	56,61,61,67	0
3	EDO	A	419	4/4	0.81	0.18	52,54,57,59	0
3	EDO	A	421	4/4	0.81	0.20	48,52,57,65	0
3	EDO	A	410	4/4	0.81	0.17	43,48,56,65	0
3	EDO	A	426	4/4	0.82	0.17	59,63,63,71	0
3	EDO	A	417	4/4	0.82	0.16	45,56,58,66	0
3	EDO	B	624	4/4	0.82	0.17	55,62,62,64	0
5	3FX	B	604	15/15	0.83	0.16	37,61,88,89	0
3	EDO	B	615	4/4	0.85	0.19	51,57,58,62	0
3	EDO	A	409	4/4	0.85	0.18	46,46,49,50	0
3	EDO	A	420	4/4	0.85	0.17	45,45,48,51	0
3	EDO	B	614	4/4	0.85	0.14	45,45,47,54	0
3	EDO	B	622	4/4	0.85	0.15	48,50,51,61	0
3	EDO	A	411	4/4	0.86	0.17	45,45,51,53	0
3	EDO	B	619	4/4	0.86	0.14	50,51,56,58	0
3	EDO	B	623	4/4	0.87	0.19	38,42,43,51	0
3	EDO	B	618	4/4	0.87	0.14	35,43,46,52	0
3	EDO	A	405	4/4	0.87	0.15	37,40,40,45	0
3	EDO	A	425	4/4	0.87	0.18	38,44,48,49	0
3	EDO	B	627	4/4	0.87	0.17	38,49,51,53	0
3	EDO	B	632	4/4	0.87	0.18	35,38,41,43	0
3	EDO	A	401	4/4	0.87	0.14	29,32,41,47	0
3	EDO	A	413	4/4	0.87	0.15	46,57,58,59	0
3	EDO	B	631	4/4	0.88	0.14	48,49,49,51	0
3	EDO	B	634	4/4	0.88	0.15	44,45,46,52	0
3	EDO	B	633	4/4	0.89	0.15	45,50,54,57	0
3	EDO	B	613	4/4	0.89	0.17	42,43,47,50	0
3	EDO	B	610	4/4	0.89	0.16	34,44,54,66	0
3	EDO	B	617	4/4	0.89	0.14	44,54,57,57	0
3	EDO	A	414	4/4	0.90	0.14	45,48,50,57	0
3	EDO	A	415	4/4	0.90	0.14	43,46,50,54	0
3	EDO	B	612	4/4	0.90	0.14	43,53,60,65	0
3	EDO	A	408	4/4	0.90	0.12	40,43,43,48	0
3	EDO	B	606	4/4	0.91	0.13	37,40,41,41	0
3	EDO	A	423	4/4	0.91	0.12	32,36,41,43	0
3	EDO	B	609	4/4	0.92	0.13	36,37,39,42	0
3	EDO	A	403	4/4	0.92	0.13	41,45,45,49	0
3	EDO	A	418	4/4	0.93	0.14	36,38,39,44	0
3	EDO	A	406	4/4	0.93	0.11	39,44,45,45	0

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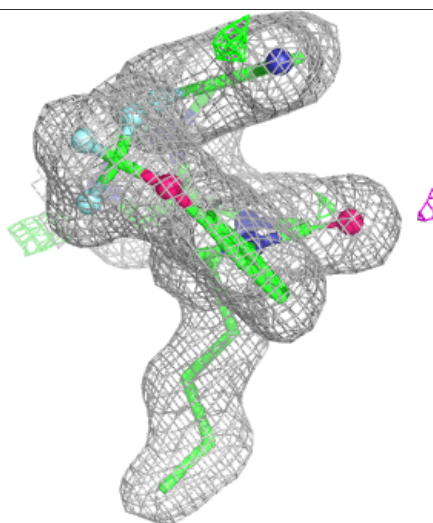
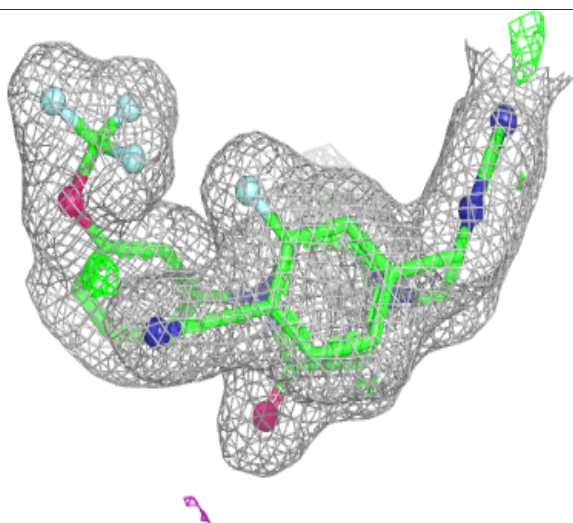
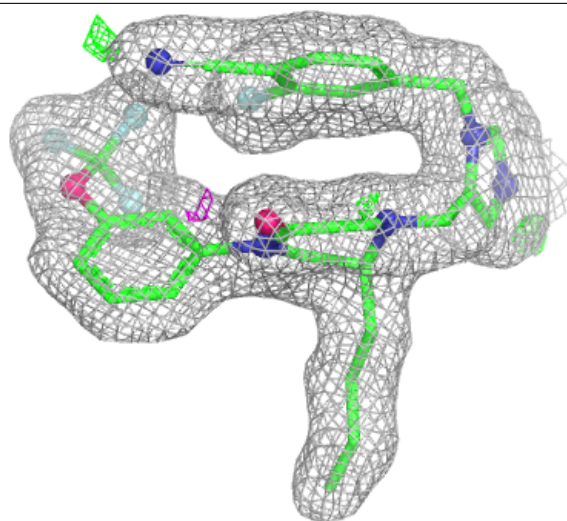
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	B	630	4/4	0.93	0.14	40,52,52,52	0
3	EDO	B	611	4/4	0.94	0.11	36,47,50,53	0
3	EDO	A	404	4/4	0.94	0.10	40,40,46,48	0
3	EDO	A	412	4/4	0.94	0.13	38,41,42,43	0
5	3FX	B	603	15/15	0.94	0.12	36,53,59,60	0
3	EDO	A	402	4/4	0.94	0.11	35,36,38,38	0
3	EDO	B	607	4/4	0.95	0.10	33,38,41,45	0
5	3FX	B	602	15/15	0.96	0.09	28,32,35,38	0
3	EDO	B	608	4/4	0.96	0.08	29,29,31,31	0
3	EDO	B	605	4/4	0.96	0.09	31,31,31,34	0
6	XO1	B	628	38/38	0.97	0.06	23,26,31,34	0
3	EDO	A	407	4/4	0.98	0.06	29,30,31,32	0
7	FPP	B	629	24/24	0.98	0.07	21,27,28,30	0
4	ZN	B	601	1/1	1.00	0.02	26,26,26,26	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.

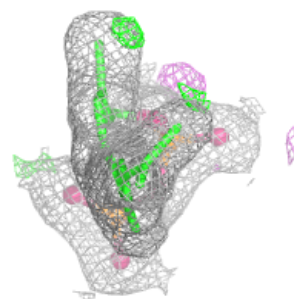
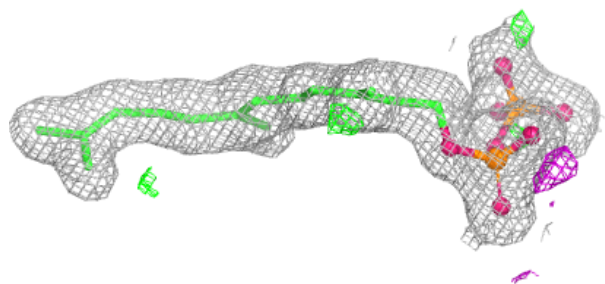
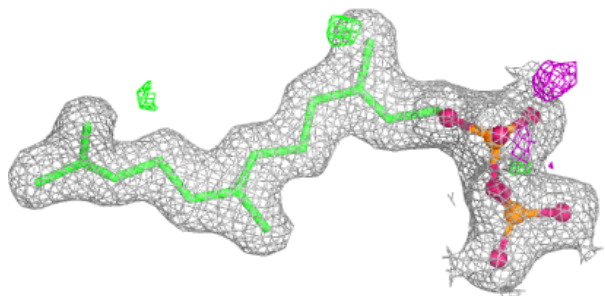
Electron density around XO1 B 628:

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



Electron density around FPP B 629:

$2mF_o-DF_c$ (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.