



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 2, 2022 – 06:42 PM EDT

PDB ID : 7T0E
Title : Cryptococcus neoformans protein farnesyltransferase in complex with FPP and inhibitor 2b
Authors : Wang, Y.; Shi, Y.; Beese, L.S.
Deposited on : 2021-11-29
Resolution : 2.22 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

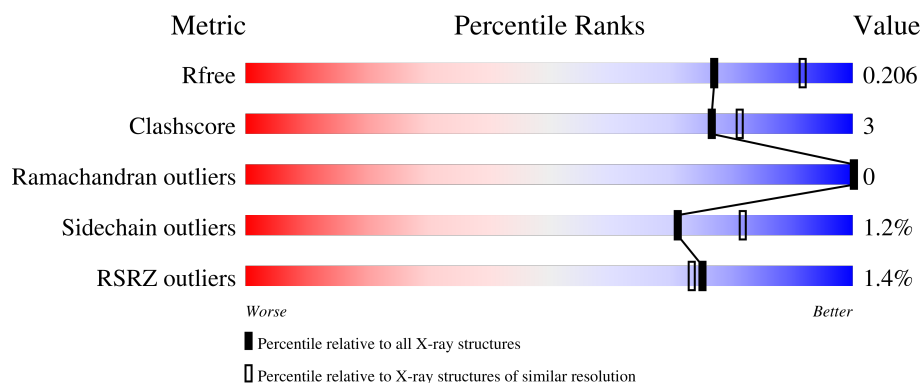
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION



The reported resolution of this entry is 2.22 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5912 (2.24-2.20)
Clashscore	141614	6646 (2.24-2.20)
Ramachandran outliers	138981	6543 (2.24-2.20)
Sidechain outliers	138945	6544 (2.24-2.20)
RSRZ outliers	127900	5797 (2.24-2.20)

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	 85% 6% 9%
2	B	520	 86% 7% 7%

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	EDO	A	416	-	-	-	X
3	EDO	B	634	-	-	-	X

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7069 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	318	Total	C	N	O	S	0	0	0
			2644	1706	449	478	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	3	0
			3736	2370	649	702	15			

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: 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		

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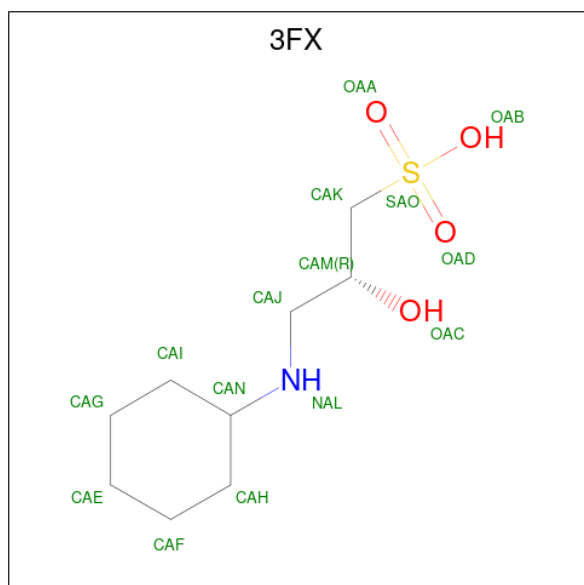
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

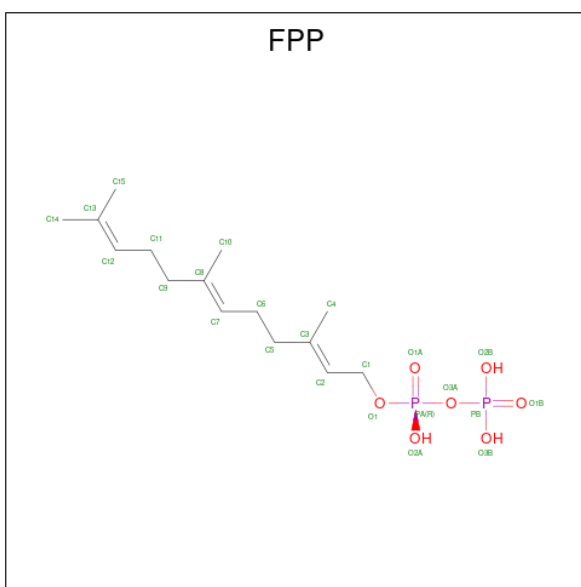
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Zn	0	0
			1	1		

- Molecule 5 is (2R)-3-(cyclohexylamino)-2-hydroxypropane-1-sulfonic acid (three-letter code: 3FX) (formula: C₉H₁₉NO₄S).



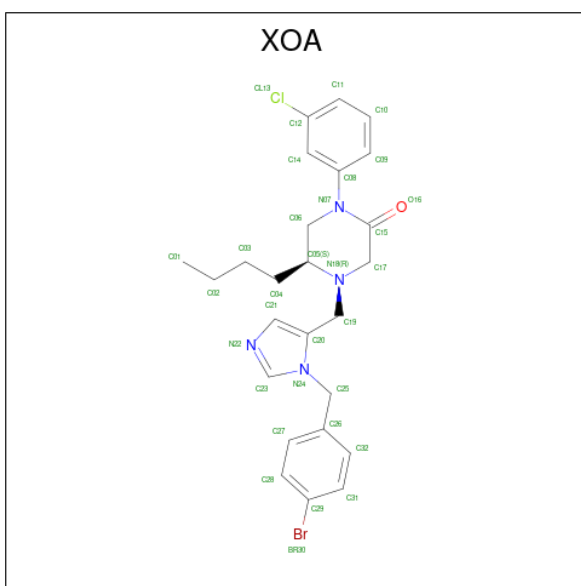
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
5	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		

- Molecule 6 is FARNESYL DIPHOSPHATE (three-letter code: FPP) (formula: C₁₅H₂₈O₇P₂).



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

- Molecule 7 is (5S)-4-({1-[(4-bromophenyl)methyl]-1H-imidazol-5-yl}methyl)-5-butyl-1-(3-chlorophenyl)piperazin-2-one (three-letter code: XOA) (formula: $C_{25}H_{28}BrClN_4O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
7	B	1	Total	Br	C	Cl	N	O	0	0
			32	1	25	1	4	1		

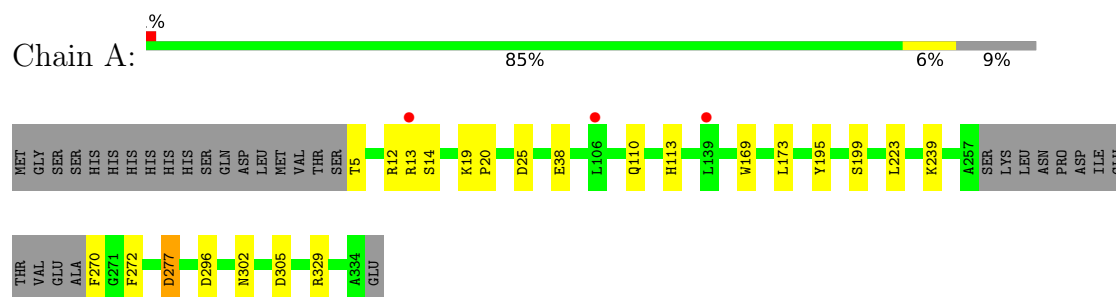
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	125	Total 125	O 125	0	0
8	B	230	Total 230	O 230	0	0

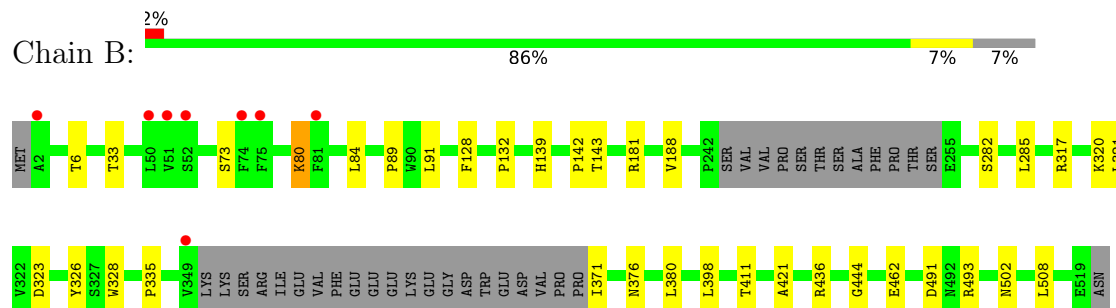
3 Residue-property plots

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	140.83Å 140.83Å 130.07Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.41 – 2.22 95.55 – 2.22	Depositor EDS
% Data completeness (in resolution range)	99.3 (37.41-2.22) 90.6 (95.55-2.22)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.75 (at 2.22Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.191 , 0.206 0.190 , 0.206	Depositor DCC
R_{free} test set	1995 reflections (3.10%)	wwPDB-VP
Wilson B-factor (Å ²)	38.1	Xtriage
Anisotropy	0.682	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 51.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7069	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.48% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, XOA, FPP, EDO, 3FX

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.24	0/2728	0.38	0/3716
2	B	0.25	0/3839	0.42	0/5214
All	All	0.24	0/6567	0.40	0/8930

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	2644	0	2560	16	0
2	B	3736	0	3667	25	0
3	A	104	0	156	9	0
3	B	128	0	192	8	0
4	B	1	0	0	0	0
5	B	45	0	57	1	0
6	B	24	0	25	0	0
7	B	32	0	0	0	0
8	A	125	0	0	0	0
8	B	230	0	0	2	0
All	All	7069	0	6657	40	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 (40) 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	1.68	0.75
1:A:305:ASP:H	3:A:421:EDO:H12	1.55	0.71
2:B:181:ARG:HG2	3:B:621:EDO:H11	1.70	0.71
2:B:335:PRO:HG3	3:B:612:EDO:H21	1.79	0.64
1:A:110:GLN:HG3	3:A:408:EDO:H21	1.81	0.62
1:A:14:SER:HB2	3:A:418:EDO:H12	1.83	0.61
2:B:491:ASP:OD2	5:B:602:3FX:NAL	2.30	0.60
2:B:285:LEU:HD13	3:B:626:EDO:H22	1.83	0.60
1:A:173:LEU:HD22	3:A:415:EDO:H21	1.84	0.60
2:B:84:LEU:HD13	2:B:91:LEU:HD21	1.84	0.59
2:B:444:GLY:H	3:B:638:EDO:H21	1.66	0.59
2:B:436:ARG:HH22	3:B:630:EDO:H12	1.67	0.58
1:A:12:ARG:HB3	3:A:418:EDO:H11	1.86	0.57
2:B:323:ASP:HB3	2:B:326:TYR:CD2	2.40	0.57
2:B:493:ARG:NH1	8:B:703:HOH:O	2.30	0.56
2:B:33:THR:HG21	2:B:321:LEU:HD13	1.87	0.56
1:A:277:ASP:OD1	1:A:277:ASP:N	2.35	0.54
1:A:19:LYS:HD2	1:A:20:PRO:HD2	1.93	0.51
2:B:317:ARG:HG3	2:B:320:LYS:HG3	1.94	0.49
2:B:508:LEU:HD23	3:B:628:EDO:H12	1.95	0.49
1:A:239:LYS:HA	3:A:422:EDO:H12	1.94	0.49
3:A:417:EDO:O1	2:B:132:PRO:HD2	2.14	0.47
1:A:38:GLU:OE2	1:A:38:GLU:N	2.45	0.47
2:B:139:HIS:HB3	2:B:142:PRO:HD2	1.96	0.47
2:B:128:PHE:HB2	2:B:143:THR:HA	1.96	0.47
2:B:398:LEU:HB2	2:B:411:THR:HA	1.99	0.45
2:B:139:HIS:CE1	2:B:188:VAL:HB	2.52	0.44
1:A:195:TYR:HA	1:A:199:SER:OG	2.17	0.44
1:A:270:PHE:CE2	1:A:272:PHE:HB2	2.52	0.44
2:B:80:LYS:HB2	2:B:80:LYS:HE2	1.81	0.44
1:A:12:ARG:NH1	3:A:413:EDO:O2	2.51	0.43
1:A:296:ASP:OD1	1:A:329:ARG:NH2	2.49	0.43
2:B:6:THR:HG22	2:B:376:ASN:HA	2.01	0.43
2:B:328:TRP:CZ2	2:B:502:ASN:HB2	2.55	0.42
1:A:169:TRP:HE1	3:A:423:EDO:H22	1.85	0.42
2:B:462:GLU:OE1	3:B:627:EDO:O2	2.29	0.42
2:B:282:SER:OG	8:B:701:HOH:O	2.22	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:89:PRO:HG2	2:B:142:PRO:HB3	2.01	0.41
1:A:113:HIS:CE1	3:B:611:EDO:H22	2.55	0.41
2:B:380:LEU:HD23	2:B:421:ALA:HB2	2.03	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	314/349 (90%)	306 (98%)	8 (2%)	0	100	100
2	B	482/520 (93%)	473 (98%)	9 (2%)	0	100	100
All	All	796/869 (92%)	779 (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%)	282 (98%)	5 (2%)	60	73
2	B	406/436 (93%)	403 (99%)	3 (1%)	84	91
All	All	693/752 (92%)	685 (99%)	8 (1%)	71	82

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	THR
1	A	13	ARG
1	A	223	LEU
1	A	277	ASP
1	A	302	ASN
2	B	73	SER
2	B	80	LYS
2	B	371	ILE

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

Mol	Chain	Res	Type
1	A	113	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 64 ligands modelled in this entry, 1 is monoatomic - leaving 63 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	414	-	3,3,3	0.46	0	2,2,2	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	A	419	-	3,3,3	0.45	0	2,2,2	0.35	0
3	EDO	A	425	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	A	411	-	3,3,3	0.46	0	2,2,2	0.29	0
3	EDO	B	624	-	3,3,3	0.46	0	2,2,2	0.37	0
3	EDO	A	416	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	B	618	-	3,3,3	0.45	0	2,2,2	0.36	0
3	EDO	B	619	-	3,3,3	0.45	0	2,2,2	0.36	0
3	EDO	A	415	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	A	420	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	B	608	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	B	635	-	3,3,3	0.44	0	2,2,2	0.34	0
3	EDO	A	424	-	3,3,3	0.46	0	2,2,2	0.35	0
3	EDO	B	609	-	3,3,3	0.45	0	2,2,2	0.32	0
3	EDO	A	404	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	B	626	-	3,3,3	0.46	0	2,2,2	0.36	0
3	EDO	B	638	-	3,3,3	0.47	0	2,2,2	0.29	0
3	EDO	A	421	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	A	426	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	A	402	-	3,3,3	0.45	0	2,2,2	0.38	0
3	EDO	B	628	-	3,3,3	0.44	0	2,2,2	0.31	0
3	EDO	B	636	-	3,3,3	0.48	0	2,2,2	0.28	0
3	EDO	B	607	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	A	410	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	B	620	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	B	630	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	B	617	-	3,3,3	0.46	0	2,2,2	0.31	0
3	EDO	B	615	-	3,3,3	0.46	0	2,2,2	0.31	0
3	EDO	A	422	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	A	406	-	3,3,3	0.45	0	2,2,2	0.33	0
3	EDO	A	409	-	3,3,3	0.45	0	2,2,2	0.38	0
3	EDO	A	407	-	3,3,3	0.45	0	2,2,2	0.34	0
3	EDO	A	417	-	3,3,3	0.42	0	2,2,2	0.37	0
3	EDO	B	627	-	3,3,3	0.45	0	2,2,2	0.35	0
6	FPP	B	632	-	21,23,23	0.94	1 (4%)	27,31,31	1.73	7 (25%)
3	EDO	B	610	-	3,3,3	0.47	0	2,2,2	0.30	0
3	EDO	B	616	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	B	629	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	B	611	-	3,3,3	0.46	0	2,2,2	0.30	0
5	3FX	B	602	-	15,15,15	1.04	2 (13%)	16,20,20	1.92	4 (25%)
5	3FX	B	604	-	15,15,15	1.04	2 (13%)	16,20,20	1.78	4 (25%)
3	EDO	A	403	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	B	606	-	3,3,3	0.45	0	2,2,2	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	A	423	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	B	612	-	3,3,3	0.44	0	2,2,2	0.36	0
3	EDO	A	412	-	3,3,3	0.46	0	2,2,2	0.31	0
3	EDO	B	605	-	3,3,3	0.46	0	2,2,2	0.36	0
3	EDO	B	637	-	3,3,3	0.47	0	2,2,2	0.30	0
3	EDO	A	413	-	3,3,3	0.46	0	2,2,2	0.36	0
3	EDO	B	625	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	B	623	-	3,3,3	0.45	0	2,2,2	0.33	0
7	XOA	B	633	4	32,35,35	2.97	10 (31%)	41,48,48	1.31	5 (12%)
3	EDO	A	405	-	3,3,3	0.45	0	2,2,2	0.38	0
3	EDO	A	418	-	3,3,3	0.46	0	2,2,2	0.31	0
3	EDO	A	401	-	3,3,3	0.45	0	2,2,2	0.32	0
3	EDO	B	613	-	3,3,3	0.46	0	2,2,2	0.34	0
3	EDO	B	631	-	3,3,3	0.46	0	2,2,2	0.31	0
3	EDO	B	614	-	3,3,3	0.46	0	2,2,2	0.37	0
3	EDO	A	408	-	3,3,3	0.45	0	2,2,2	0.35	0
3	EDO	B	634	-	3,3,3	0.47	0	2,2,2	0.32	0
3	EDO	B	621	-	3,3,3	0.44	0	2,2,2	0.35	0
5	3FX	B	603	-	15,15,15	1.05	2 (13%)	16,20,20	1.89	4 (25%)
3	EDO	B	622	-	3,3,3	0.46	0	2,2,2	0.31	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	414	-	-	0/1/1/1	-
3	EDO	A	419	-	-	0/1/1/1	-
3	EDO	A	425	-	-	0/1/1/1	-
3	EDO	A	411	-	-	0/1/1/1	-
3	EDO	B	624	-	-	0/1/1/1	-
3	EDO	A	416	-	-	0/1/1/1	-
3	EDO	B	618	-	-	0/1/1/1	-
3	EDO	B	619	-	-	0/1/1/1	-
3	EDO	A	415	-	-	0/1/1/1	-
3	EDO	A	420	-	-	0/1/1/1	-
3	EDO	B	608	-	-	0/1/1/1	-
3	EDO	B	635	-	-	0/1/1/1	-
3	EDO	A	424	-	-	0/1/1/1	-
3	EDO	B	609	-	-	0/1/1/1	-
3	EDO	A	404	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	626	-	-	0/1/1/1	-
3	EDO	B	638	-	-	0/1/1/1	-
3	EDO	A	421	-	-	1/1/1/1	-
3	EDO	A	426	-	-	0/1/1/1	-
3	EDO	A	402	-	-	0/1/1/1	-
3	EDO	B	628	-	-	0/1/1/1	-
3	EDO	B	636	-	-	0/1/1/1	-
3	EDO	B	607	-	-	0/1/1/1	-
3	EDO	A	410	-	-	0/1/1/1	-
3	EDO	B	620	-	-	0/1/1/1	-
3	EDO	B	630	-	-	0/1/1/1	-
3	EDO	B	617	-	-	0/1/1/1	-
3	EDO	B	615	-	-	0/1/1/1	-
3	EDO	A	422	-	-	0/1/1/1	-
3	EDO	A	406	-	-	0/1/1/1	-
3	EDO	A	409	-	-	0/1/1/1	-
3	EDO	A	407	-	-	0/1/1/1	-
3	EDO	A	417	-	-	0/1/1/1	-
3	EDO	B	627	-	-	0/1/1/1	-
6	FPP	B	632	-	-	4/25/25/25	-
3	EDO	B	610	-	-	0/1/1/1	-
3	EDO	B	616	-	-	0/1/1/1	-
3	EDO	B	629	-	-	0/1/1/1	-
3	EDO	B	611	-	-	0/1/1/1	-
5	3FX	B	602	-	-	4/10/18/18	0/1/1/1
5	3FX	B	604	-	-	0/10/18/18	0/1/1/1
3	EDO	A	403	-	-	0/1/1/1	-
3	EDO	B	606	-	-	0/1/1/1	-
3	EDO	A	423	-	-	0/1/1/1	-
3	EDO	B	612	-	-	1/1/1/1	-
3	EDO	A	412	-	-	0/1/1/1	-
3	EDO	B	605	-	-	0/1/1/1	-
3	EDO	B	637	-	-	0/1/1/1	-
3	EDO	A	413	-	-	0/1/1/1	-
3	EDO	B	625	-	-	0/1/1/1	-
3	EDO	B	623	-	-	0/1/1/1	-
7	XOA	B	633	4	-	2/16/32/32	0/4/4/4
3	EDO	A	405	-	-	0/1/1/1	-
3	EDO	A	418	-	-	0/1/1/1	-
3	EDO	A	401	-	-	0/1/1/1	-
3	EDO	B	613	-	-	0/1/1/1	-
3	EDO	B	631	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	614	-	-	0/1/1/1	-
3	EDO	A	408	-	-	0/1/1/1	-
3	EDO	B	634	-	-	0/1/1/1	-
3	EDO	B	621	-	-	0/1/1/1	-
5	3FX	B	603	-	-	7/10/18/18	0/1/1/1
3	EDO	B	622	-	-	0/1/1/1	-

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	633	XOA	C19-N18	-9.70	1.31	1.47
7	B	633	XOA	C15-N07	7.06	1.47	1.36
7	B	633	XOA	C05-N18	-5.17	1.39	1.48
7	B	633	XOA	C17-N18	-4.72	1.36	1.47
7	B	633	XOA	C19-C20	4.68	1.58	1.51
7	B	633	XOA	C17-C15	4.21	1.59	1.51
7	B	633	XOA	C08-N07	3.75	1.51	1.43
7	B	633	XOA	C04-C05	2.55	1.62	1.52
6	B	632	FPP	O1-C1	-2.31	1.40	1.43
7	B	633	XOA	C25-C26	2.28	1.56	1.51
5	B	604	3FX	OAA-SAO	2.23	1.51	1.45
5	B	603	3FX	OAA-SAO	2.19	1.51	1.45
5	B	603	3FX	OAD-SAO	2.18	1.51	1.45
5	B	602	3FX	OAD-SAO	2.18	1.51	1.45
5	B	604	3FX	OAD-SAO	2.16	1.51	1.45
5	B	602	3FX	OAA-SAO	2.12	1.51	1.45
7	B	633	XOA	BR30-C29	2.11	1.94	1.90

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	633	XOA	C05-C06-N07	4.95	116.58	109.68
5	B	602	3FX	OAB-SAO-OAA	-4.42	100.47	111.27
5	B	603	3FX	OAB-SAO-OAD	-4.36	100.61	111.27
5	B	603	3FX	OAD-SAO-CAK	3.80	111.45	106.94
6	B	632	FPP	C4-C3-C5	3.78	121.63	115.27
5	B	604	3FX	OAD-SAO-CAK	3.71	111.35	106.94
5	B	604	3FX	OAD-SAO-OAA	-3.64	101.36	113.95
5	B	604	3FX	OAA-SAO-CAK	3.59	111.21	106.94
5	B	602	3FX	OAB-SAO-CAK	3.55	111.40	105.74
5	B	602	3FX	OAD-SAO-CAK	3.45	111.04	106.94
5	B	602	3FX	OAA-SAO-CAK	3.30	110.86	106.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	603	3FX	OAB-SAO-CAK	3.26	110.94	105.74
5	B	603	3FX	OAA-SAO-CAK	3.11	110.64	106.94
6	B	632	FPP	C1-C2-C3	-3.11	120.66	126.04
6	B	632	FPP	C10-C8-C7	-3.10	115.72	123.68
6	B	632	FPP	C5-C6-C7	-2.90	102.34	111.88
7	B	633	XOA	C06-N07-C15	-2.89	117.56	122.21
5	B	604	3FX	OAB-SAO-CAK	2.78	110.17	105.74
6	B	632	FPP	PA-O3A-PB	-2.58	123.98	132.83
7	B	633	XOA	C19-C20-C21	-2.54	126.06	129.46
6	B	632	FPP	C11-C12-C13	-2.36	119.68	127.75
6	B	632	FPP	C9-C8-C7	2.26	125.69	121.12
7	B	633	XOA	C04-C05-C06	-2.18	108.01	112.35
7	B	633	XOA	N22-C23-N24	-2.12	109.11	112.26

There are no chirality outliers.

All (19) torsion outliers are listed below:

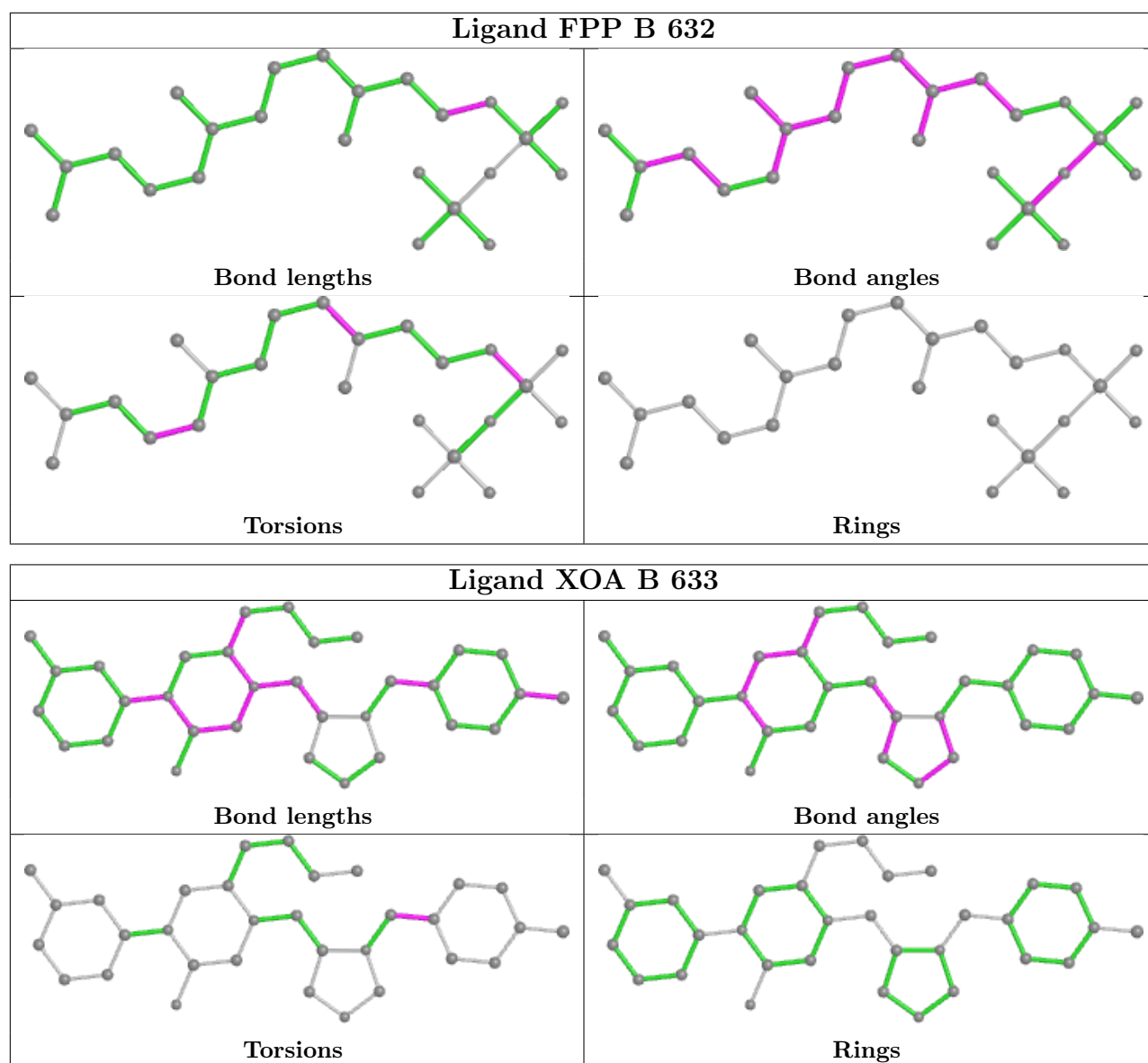
Mol	Chain	Res	Type	Atoms
5	B	602	3FX	CAM-CAK-SAO-OAB
5	B	603	3FX	NAL-CAJ-CAM-OAC
5	B	603	3FX	NAL-CAJ-CAM-CAK
5	B	603	3FX	CAM-CAK-SAO-OAA
5	B	603	3FX	CAM-CAK-SAO-OAB
5	B	603	3FX	CAM-CAK-SAO-OAD
6	B	632	FPP	C4-C3-C5-C6
6	B	632	FPP	C2-C3-C5-C6
6	B	632	FPP	C12-C11-C9-C8
5	B	603	3FX	CAI-CAN-NAL-CAJ
5	B	602	3FX	SAO-CAK-CAM-OAC
5	B	602	3FX	CAM-CAK-SAO-OAD
7	B	633	XOA	N24-C25-C26-C27
7	B	633	XOA	N24-C25-C26-C32
3	B	612	EDO	O1-C1-C2-O2
5	B	603	3FX	CAH-CAN-NAL-CAJ
5	B	602	3FX	SAO-CAK-CAM-CAJ
3	A	421	EDO	O1-C1-C2-O2
6	B	632	FPP	C1-O1-PA-O1A

There are no ring outliers.

17 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	415	EDO	1	0
3	B	626	EDO	1	0
3	B	638	EDO	1	0
3	A	421	EDO	1	0
3	B	628	EDO	1	0
3	B	630	EDO	1	0
3	A	422	EDO	1	0
3	A	417	EDO	1	0
3	B	627	EDO	1	0
3	B	611	EDO	1	0
5	B	602	3FX	1	0
3	A	423	EDO	1	0
3	B	612	EDO	1	0
3	A	413	EDO	1	0
3	A	418	EDO	2	0
3	A	408	EDO	1	0
3	B	621	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 [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	318/349 (91%)	0.19	3 (0%) 84 83	39, 56, 80, 107	0
2	B	485/520 (93%)	0.20	8 (1%) 72 70	36, 47, 72, 100	0
All	All	803/869 (92%)	0.19	11 (1%) 75 73	36, 51, 77, 107	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	2	ALA	6.4
2	B	50	LEU	3.6
2	B	75	PHE	3.4
1	A	139	LEU	3.0
2	B	74	PHE	3.0
2	B	81	PHE	2.9
1	A	106	LEU	2.9
2	B	51	VAL	2.9
2	B	349	VAL	2.3
1	A	13	ARG	2.2
2	B	52	SER	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	EDO	A	416	4/4	0.41	0.46	77,79,80,83	0
3	EDO	A	413	4/4	0.56	0.24	62,66,67,79	0
3	EDO	B	616	4/4	0.57	0.18	68,71,71,74	0
3	EDO	B	625	4/4	0.66	0.35	74,76,77,78	0
3	EDO	B	636	4/4	0.71	0.28	67,67,71,73	0
3	EDO	A	426	4/4	0.73	0.32	63,65,70,76	0
3	EDO	A	425	4/4	0.77	0.17	74,79,80,82	0
3	EDO	B	629	4/4	0.77	0.28	67,71,73,78	0
3	EDO	B	622	4/4	0.77	0.23	71,72,73,74	0
3	EDO	B	634	4/4	0.78	0.50	57,60,62,66	0
3	EDO	A	409	4/4	0.80	0.23	54,57,59,66	0
3	EDO	B	631	4/4	0.81	0.34	55,56,60,66	0
3	EDO	A	423	4/4	0.81	0.20	50,52,58,62	0
3	EDO	A	424	4/4	0.81	0.13	63,65,65,65	0
5	3FX	B	604	15/15	0.81	0.29	58,73,101,110	0
3	EDO	B	614	4/4	0.82	0.44	57,67,68,73	0
3	EDO	A	412	4/4	0.82	0.23	66,68,69,70	0
3	EDO	B	638	4/4	0.82	0.22	63,70,75,76	0
3	EDO	A	421	4/4	0.82	0.16	81,83,83,85	0
3	EDO	B	627	4/4	0.83	0.27	59,65,68,81	0
3	EDO	A	422	4/4	0.84	0.19	62,69,70,72	0
3	EDO	B	628	4/4	0.84	0.27	52,56,57,72	0
3	EDO	B	611	4/4	0.85	0.25	54,56,56,63	0
3	EDO	B	620	4/4	0.86	0.32	59,63,67,76	0
3	EDO	B	621	4/4	0.86	0.21	54,61,73,76	0
3	EDO	A	410	4/4	0.86	0.21	55,59,63,64	0
3	EDO	B	613	4/4	0.86	0.28	61,62,64,70	0
3	EDO	B	630	4/4	0.87	0.38	57,61,67,70	0
3	EDO	A	414	4/4	0.87	0.26	60,61,66,69	0
3	EDO	B	612	4/4	0.87	0.15	52,58,58,68	0
3	EDO	A	411	4/4	0.88	0.31	56,58,58,69	0
3	EDO	B	624	4/4	0.88	0.17	64,64,67,70	0
3	EDO	A	417	4/4	0.88	0.36	44,52,62,62	0
3	EDO	A	408	4/4	0.88	0.21	52,54,55,61	0
3	EDO	A	415	4/4	0.89	0.28	60,61,63,64	0
3	EDO	B	635	4/4	0.89	0.44	58,72,73,75	0
3	EDO	B	617	4/4	0.89	0.41	67,69,70,79	0

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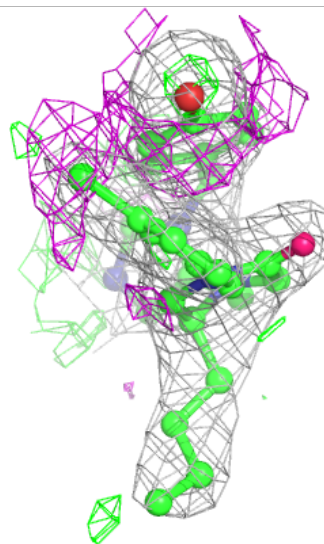
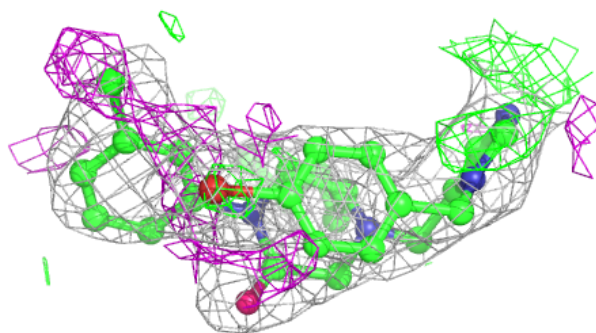
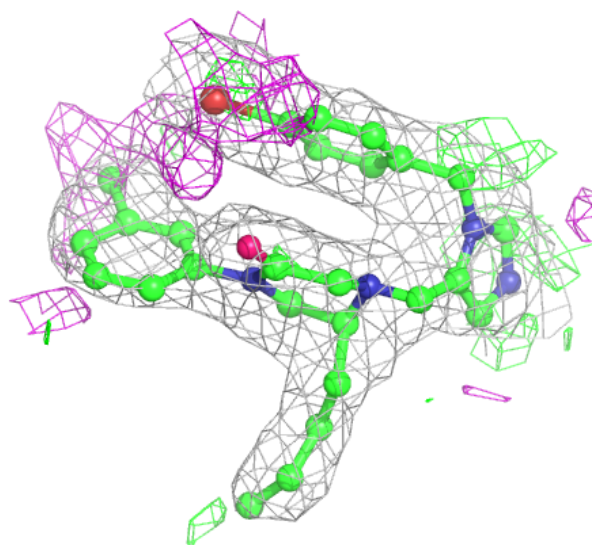
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	EDO	B	610	4/4	0.89	0.25	49,50,54,55	0
3	EDO	A	402	4/4	0.89	0.19	53,54,55,59	0
3	EDO	B	623	4/4	0.90	0.28	53,53,54,67	0
3	EDO	B	637	4/4	0.90	0.17	47,58,63,64	0
3	EDO	B	626	4/4	0.90	0.22	57,59,65,69	0
3	EDO	A	418	4/4	0.90	0.14	71,72,74,79	0
3	EDO	A	419	4/4	0.91	0.25	57,60,61,72	0
3	EDO	A	405	4/4	0.91	0.32	55,56,61,70	0
3	EDO	B	619	4/4	0.91	0.18	60,64,68,69	0
3	EDO	B	618	4/4	0.92	0.23	59,61,65,71	0
3	EDO	A	403	4/4	0.92	0.18	58,62,62,62	0
3	EDO	A	406	4/4	0.92	0.23	50,56,60,73	0
3	EDO	A	407	4/4	0.92	0.16	55,56,56,56	0
5	3FX	B	603	15/15	0.92	0.22	53,69,78,79	0
3	EDO	A	404	4/4	0.92	0.23	58,61,62,64	0
7	XOA	B	633	32/32	0.92	0.21	48,60,67,129	0
3	EDO	A	420	4/4	0.93	0.28	55,56,70,76	0
3	EDO	B	609	4/4	0.94	0.25	52,53,54,56	0
3	EDO	B	607	4/4	0.94	0.19	53,56,57,59	0
3	EDO	B	608	4/4	0.94	0.17	48,52,54,60	0
3	EDO	B	606	4/4	0.95	0.25	54,56,57,60	0
6	FPP	B	632	24/24	0.95	0.19	37,51,57,59	0
3	EDO	B	615	4/4	0.95	0.14	63,63,66,67	0
3	EDO	B	605	4/4	0.96	0.19	45,50,51,53	0
3	EDO	A	401	4/4	0.96	0.21	46,51,55,61	0
5	3FX	B	602	15/15	0.98	0.15	37,44,51,55	0
4	ZN	B	601	1/1	0.99	0.21	43,43,43,43	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.

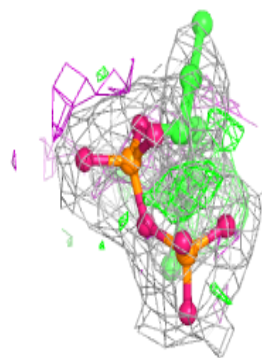
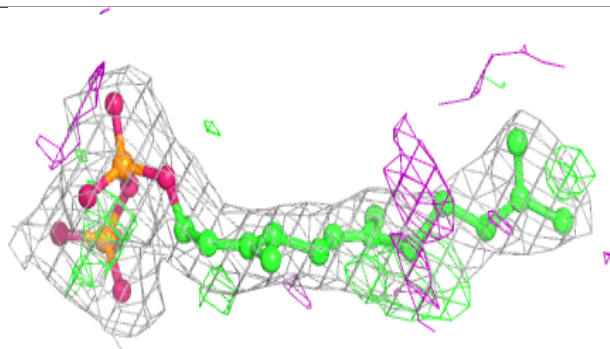
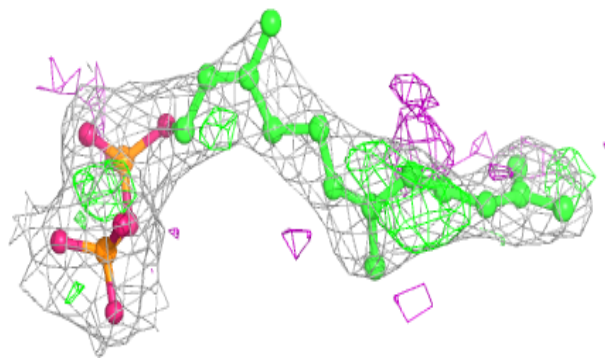
Electron density around XOA B 633:

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



Electron density around FPP B 632:

$2mF_o - DF_c$ (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.