



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 04:45 AM EDT

PDB ID : 7T0C  
Title : Cryptococcus neoformans protein farnesyltransferase in complex with FPP and inhibitor 2e  
Authors : Wang, Y.; Shi, Y.; Beese, L.S.  
Deposited on : 2021-11-29  
Resolution : 1.90 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](mailto: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>.

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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 : 2.35.1  
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) : 2.35.1

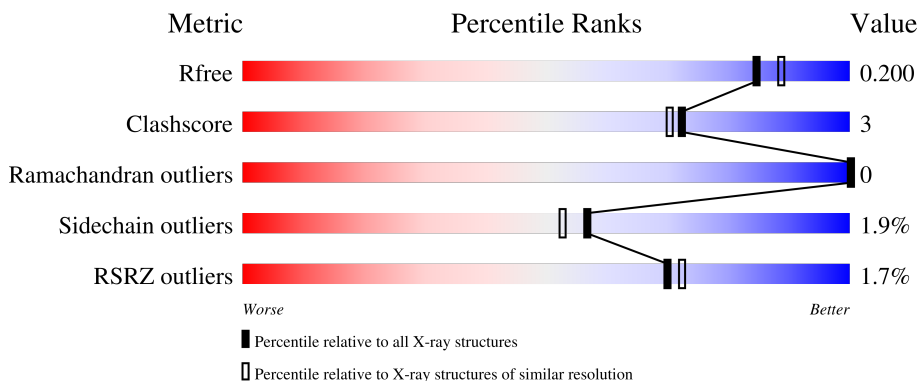
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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% 5% 9%
2	B	520	 87% 7% 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	A	414	-	-	X	-

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 7303 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
			Total	C	N	O	S			
1	A	316	2638	1700	449	478	11	0	1	0

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
			Total	C	N	O	S			
2	B	487	3748	2375	652	706	15	0	2	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

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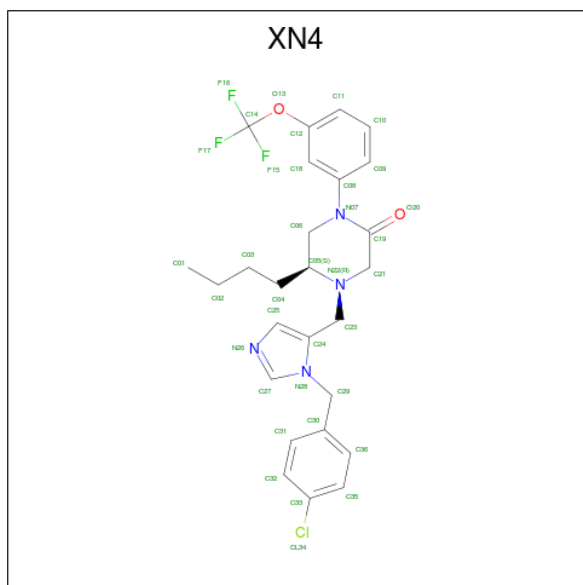
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0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

- 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		

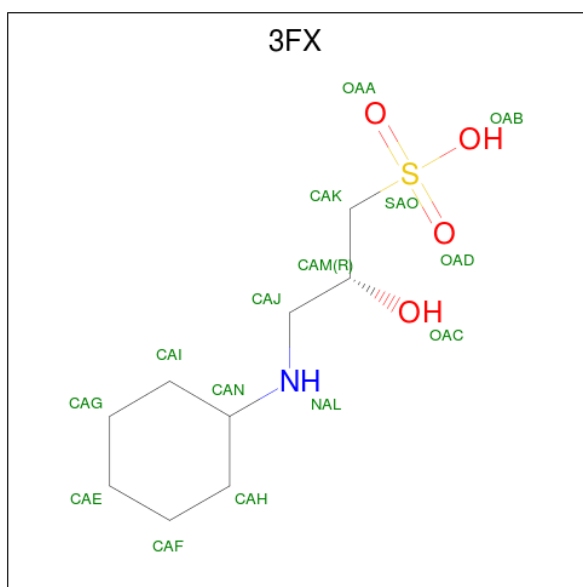
- Molecule 5 is (5S)-5-butyl-4-({1-[(4-chlorophenyl)methyl]-1H-imidazol-5-yl}methyl)-1-[3-(trifluoromethoxy)phenyl]piperazin-2-one (three-letter code: XN4) (formula: C<sub>26</sub>H<sub>28</sub>ClF<sub>3</sub>N<sub>4</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	F	N			O
5	B	1	72	52	2	6	8	4	0	1

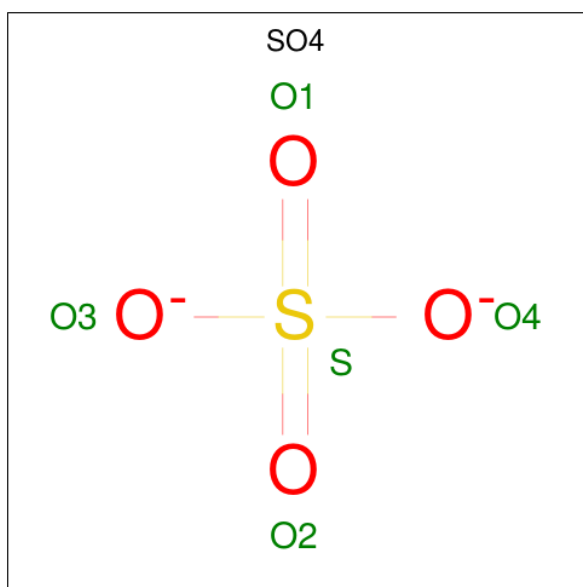
- Molecule 6 is (2R)-3-(cyclohexylamino)-2-hydroxypropane-1-sulfonic acid (three-letter code: 3FX) (formula: C<sub>9</sub>H<sub>19</sub>NO<sub>4</sub>S).





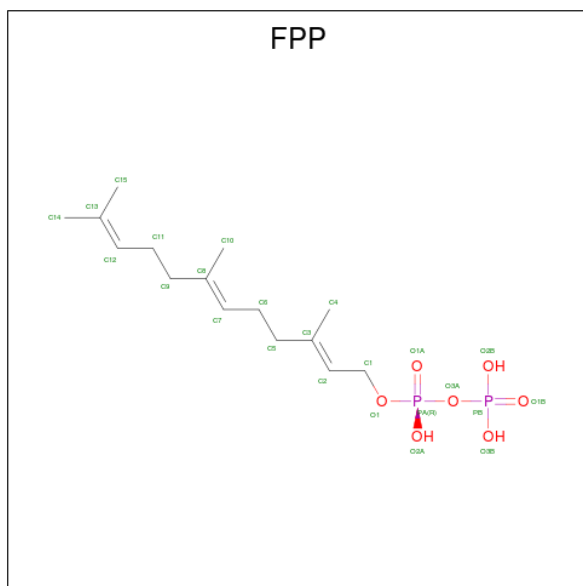
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
6	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		
6	B	1	Total	C	N	O	S	0	0
			15	9	1	4	1		

- Molecule 7 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	O	S	0	1
			5	4	1		

- Molecule 8 is FARNESYL DIPHOSPHATE (three-letter code: FPP) (formula:  $C_{15}H_{28}O_7P_2$ ).



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

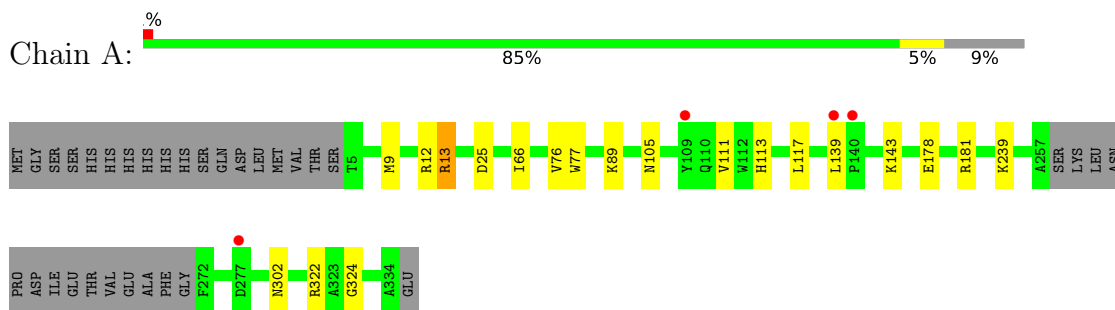
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	189	Total	O	0	0
			189	189		
9	B	365	Total	O	0	0
			365	365		

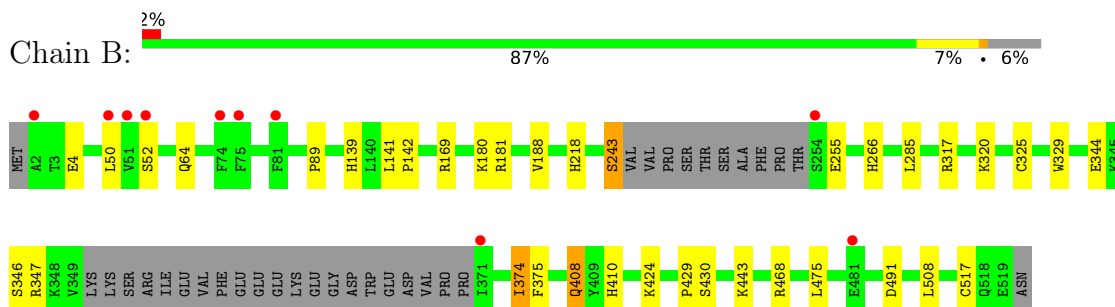
### 3 Residue-property plots [i](#)

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: 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, $\alpha$ , $\beta$ , $\gamma$	141.91Å 141.91Å 130.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	70.96 – 1.90 100.35 – 1.90	Depositor EDS
% Data completeness (in resolution range)	98.8 (70.96-1.90) 91.6 (100.35-1.90)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.72 (at 1.90Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, $R_{free}$	0.179 , 0.201 0.178 , 0.200	Depositor DCC
$R_{free}$ test set	5190 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	30.1	Xtrriage
Anisotropy	0.617	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 48.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7303	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.38% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: EDO, SO4, 3FX, XN4, FPP, ZN

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	0.35	0/2721	0.47	0/3707
2	B	0.46	0/3845	0.56	0/5222
All	All	0.42	0/6566	0.53	0/8929

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2638	0	2555	15	0
2	B	3748	0	3671	31	0
3	A	72	0	108	6	0
3	B	144	0	216	12	0
4	B	1	0	0	0	0
5	B	72	0	0	0	0
6	B	45	0	57	3	0
7	B	5	0	0	0	0
8	B	24	0	25	2	0
9	A	189	0	0	1	0
9	B	365	0	0	6	0
All	All	7303	0	6632	45	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 (45) 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:322:ARG:HA	3:A:414:EDO:H12	1.58	0.86
1:A:324:GLY:H	3:A:414:EDO:H21	1.43	0.81
1:A:117:LEU:HD21	3:B:630:EDO:H22	1.71	0.73
2:B:285:LEU:HD13	3:B:633:EDO:H21	1.69	0.72
1:A:143:LYS:HD3	2:B:320:LYS:HD3	1.74	0.69
2:B:181:ARG:HD3	9:B:702:HOH:O	1.94	0.68
2:B:429:PRO:HD2	3:B:605:EDO:H11	1.76	0.67
2:B:517:CYS:SG	9:B:975:HOH:O	2.52	0.66
2:B:317:ARG:HG3	2:B:320:LYS:HG3	1.79	0.64
2:B:424:LYS:HA	3:B:624:EDO:H22	1.81	0.63
2:B:443:LYS:HA	3:B:609:EDO:H21	1.80	0.62
2:B:408:GLN:NE2	9:B:701:HOH:O	2.32	0.61
1:A:239:LYS:NZ	9:A:501:HOH:O	2.32	0.59
2:B:344:GLU:HG2	2:B:347:ARG:HH21	1.69	0.56
3:A:414:EDO:H11	2:B:375:PHE:HA	1.88	0.56
1:A:13:ARG:HD2	1:A:13:ARG:H	1.71	0.55
2:B:430:SER:H	3:B:605:EDO:H12	1.71	0.55
2:B:89:PRO:HG2	2:B:142:PRO:HB3	1.89	0.53
2:B:218:HIS:HD2	9:B:826:HOH:O	1.91	0.53
1:A:113:HIS:HD1	3:A:411:EDO:H11	1.75	0.52
2:B:243:SER:O	2:B:243:SER:OG	2.25	0.51
1:A:324:GLY:N	3:A:414:EDO:H21	2.20	0.50
1:A:13:ARG:H	1:A:13:ARG:CD	2.25	0.49
1:A:143:LYS:CD	2:B:320:LYS:HD3	2.42	0.48
1:A:9:MET:HA	1:A:12:ARG:HG3	1.98	0.46
2:B:169:ARG:HB2	3:B:607:EDO:H21	1.96	0.46
2:B:475:LEU:HD22	3:B:611:EDO:H21	1.98	0.46
2:B:141:LEU:HB2	3:B:622:EDO:H22	1.98	0.46
2:B:508:LEU:HD23	3:B:611:EDO:H11	1.98	0.45
2:B:491:ASP:OD2	6:B:618:3FX:NAL	2.46	0.45
1:A:89:LYS:HD2	3:A:416:EDO:H21	1.98	0.45
2:B:139:HIS:HB3	2:B:142:PRO:HD2	1.97	0.45
1:A:77:TRP:CZ2	1:A:111:VAL:HG22	2.52	0.44
2:B:374:ILE:HA	2:B:374:ILE:HD12	1.66	0.44
2:B:64:GLN:HB2	6:B:619:3FX:HAK	2.01	0.43
2:B:266:HIS:CE1	8:B:643[A]:FPP:H62	2.53	0.43
2:B:468:ARG:HD3	9:B:753:HOH:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:66:ILE:HG21	1:A:76:VAL:HG21	2.01	0.42
2:B:329:TRP:CZ2	8:B:643[A]:FPP:H91	2.55	0.42
2:B:325:CYS:HB3	2:B:410:HIS:CD2	2.55	0.42
2:B:139:HIS:CE1	2:B:188:VAL:HB	2.55	0.42
2:B:180:LYS:HE3	9:B:852:HOH:O	2.20	0.42
2:B:430:SER:OG	3:B:605:EDO:H12	2.19	0.41
3:B:616:EDO:H21	6:B:618:3FX:OAA	2.20	0.41
1:A:178:GLU:OE2	1:A:181:ARG:NH2	2.44	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%)	306 (98%)	7 (2%)	0	100	100
2	B	483/520 (93%)	477 (99%)	6 (1%)	0	100	100
All	All	796/869 (92%)	783 (98%)	13 (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	57

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	407/436 (93%)	399 (98%)	8 (2%)	55	51
All	All	694/752 (92%)	681 (98%)	13 (2%)	57	53

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ARG
1	A	25	ASP
1	A	105	ASN
1	A	139	LEU
1	A	302	ASN
2	B	4	GLU
2	B	50	LEU
2	B	52	SER
2	B	243	SER
2	B	255	GLU
2	B	346	SER
2	B	374	ILE
2	B	408	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 62 ligands modelled in this entry, 1 is monoatomic - leaving 61 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	415	-	3,3,3	0.51	0	2,2,2	0.20	0
3	EDO	A	404	-	3,3,3	0.46	0	2,2,2	0.26	0
3	EDO	A	409	-	3,3,3	0.39	0	2,2,2	0.39	0
3	EDO	B	616	-	3,3,3	0.38	0	2,2,2	0.71	0
3	EDO	B	626	-	3,3,3	0.50	0	2,2,2	0.05	0
3	EDO	B	635	-	3,3,3	0.46	0	2,2,2	0.37	0
6	3FX	B	618	-	15,15,15	1.03	1 (6%)	16,20,20	2.34	3 (18%)
3	EDO	B	631	-	3,3,3	0.46	0	2,2,2	0.21	0
5	XN4	B	602[B]	4	36,39,39	2.62	8 (22%)	48,55,55	1.71	9 (18%)
3	EDO	A	412	-	3,3,3	0.57	0	2,2,2	0.27	0
3	EDO	B	630	-	3,3,3	0.43	0	2,2,2	0.24	0
3	EDO	B	624	-	3,3,3	0.45	0	2,2,2	0.42	0
3	EDO	A	402	-	3,3,3	0.44	0	2,2,2	0.27	0
3	EDO	B	611	-	3,3,3	0.44	0	2,2,2	0.10	0
3	EDO	B	614	-	3,3,3	0.45	0	2,2,2	0.29	0
3	EDO	A	401	-	3,3,3	0.48	0	2,2,2	0.21	0
3	EDO	A	417	-	3,3,3	0.48	0	2,2,2	0.14	0
3	EDO	B	625	-	3,3,3	0.45	0	2,2,2	0.37	0
7	SO4	B	642[B]	-	4,4,4	0.17	0	6,6,6	0.15	0
6	3FX	B	619	-	15,15,15	1.07	2 (13%)	16,20,20	2.06	3 (18%)
3	EDO	B	641	-	3,3,3	0.49	0	2,2,2	0.07	0
3	EDO	B	610	-	3,3,3	0.46	0	2,2,2	0.37	0
3	EDO	B	605	-	3,3,3	0.46	0	2,2,2	0.24	0
3	EDO	B	634	-	3,3,3	0.41	0	2,2,2	0.46	0
3	EDO	A	408	-	3,3,3	0.47	0	2,2,2	0.40	0
3	EDO	B	617	-	3,3,3	0.43	0	2,2,2	0.40	0
3	EDO	B	632	-	3,3,3	0.42	0	2,2,2	0.42	0
3	EDO	B	607	-	3,3,3	0.40	0	2,2,2	0.38	0
8	FPP	B	643[A]	-	21,23,23	0.96	0	27,31,31	1.23	2 (7%)
3	EDO	A	414	-	3,3,3	0.42	0	2,2,2	0.23	0
3	EDO	A	410	-	3,3,3	0.47	0	2,2,2	0.41	0
3	EDO	B	609	-	3,3,3	0.46	0	2,2,2	0.32	0
3	EDO	B	640	-	3,3,3	0.47	0	2,2,2	0.41	0
3	EDO	A	418	-	3,3,3	0.45	0	2,2,2	0.33	0
3	EDO	B	603	-	3,3,3	0.45	0	2,2,2	0.19	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	EDO	B	612	-	3,3,3	0.52	0	2,2,2	0.09	0
3	EDO	B	629	-	3,3,3	0.37	0	2,2,2	0.41	0
3	EDO	A	406	-	3,3,3	0.50	0	2,2,2	0.38	0
3	EDO	A	416	-	3,3,3	0.51	0	2,2,2	0.24	0
6	3FX	B	628	-	15,15,15	1.05	2 (13%)	16,20,20	1.87	4 (25%)
3	EDO	B	633	-	3,3,3	0.41	0	2,2,2	0.37	0
3	EDO	B	620	-	3,3,3	0.55	0	2,2,2	0.22	0
3	EDO	B	606	-	3,3,3	0.57	0	2,2,2	0.05	0
3	EDO	B	637	-	3,3,3	0.55	0	2,2,2	0.16	0
3	EDO	B	613	-	3,3,3	0.41	0	2,2,2	0.44	0
3	EDO	B	604	-	3,3,3	0.61	0	2,2,2	0.04	0
3	EDO	B	615	-	3,3,3	0.42	0	2,2,2	0.49	0
3	EDO	B	627	-	3,3,3	0.45	0	2,2,2	0.26	0
3	EDO	A	405	-	3,3,3	0.40	0	2,2,2	0.43	0
3	EDO	B	623	-	3,3,3	0.55	0	2,2,2	0.11	0
3	EDO	A	413	-	3,3,3	0.51	0	2,2,2	0.19	0
3	EDO	B	621	-	3,3,3	0.47	0	2,2,2	0.23	0
3	EDO	B	639	-	3,3,3	0.48	0	2,2,2	0.33	0
3	EDO	A	407	-	3,3,3	0.47	0	2,2,2	0.39	0
5	XN4	B	602[A]	4	36,39,39	2.68	9 (25%)	48,55,55	1.24	4 (8%)
3	EDO	B	608	-	3,3,3	0.51	0	2,2,2	0.14	0
3	EDO	B	622	-	3,3,3	0.46	0	2,2,2	0.44	0
3	EDO	A	403	-	3,3,3	0.47	0	2,2,2	0.39	0
3	EDO	A	411	-	3,3,3	0.44	0	2,2,2	0.41	0
3	EDO	B	638	-	3,3,3	0.39	0	2,2,2	0.34	0
3	EDO	B	636	-	3,3,3	0.43	0	2,2,2	0.37	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	415	-	-	0/1/1/1	-
3	EDO	A	404	-	-	1/1/1/1	-
3	EDO	A	409	-	-	1/1/1/1	-
3	EDO	B	616	-	-	0/1/1/1	-
3	EDO	B	626	-	-	0/1/1/1	-
3	EDO	B	635	-	-	0/1/1/1	-
6	3FX	B	618	-	-	4/10/18/18	0/1/1/1
3	EDO	B	631	-	-	0/1/1/1	-
5	XN4	B	602[B]	4	-	6/21/37/37	0/4/4/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	A	412	-	-	1/1/1/1	-
3	EDO	B	630	-	-	0/1/1/1	-
3	EDO	B	624	-	-	0/1/1/1	-
3	EDO	A	402	-	-	1/1/1/1	-
3	EDO	B	611	-	-	0/1/1/1	-
3	EDO	B	614	-	-	0/1/1/1	-
3	EDO	A	401	-	-	0/1/1/1	-
3	EDO	A	417	-	-	1/1/1/1	-
3	EDO	B	625	-	-	1/1/1/1	-
6	3FX	B	619	-	-	6/10/18/18	0/1/1/1
3	EDO	B	641	-	-	0/1/1/1	-
3	EDO	B	610	-	-	0/1/1/1	-
3	EDO	B	605	-	-	0/1/1/1	-
3	EDO	B	634	-	-	0/1/1/1	-
3	EDO	A	408	-	-	0/1/1/1	-
3	EDO	B	617	-	-	0/1/1/1	-
3	EDO	B	632	-	-	0/1/1/1	-
3	EDO	B	607	-	-	0/1/1/1	-
8	FPP	B	643[A]	-	-	4/25/25/25	-
3	EDO	A	414	-	-	1/1/1/1	-
3	EDO	A	410	-	-	0/1/1/1	-
3	EDO	B	609	-	-	1/1/1/1	-
3	EDO	B	640	-	-	0/1/1/1	-
3	EDO	A	418	-	-	0/1/1/1	-
3	EDO	B	603	-	-	0/1/1/1	-
3	EDO	B	612	-	-	0/1/1/1	-
3	EDO	B	629	-	-	1/1/1/1	-
3	EDO	A	406	-	-	1/1/1/1	-
3	EDO	A	416	-	-	1/1/1/1	-
6	3FX	B	628	-	-	3/10/18/18	0/1/1/1
3	EDO	B	633	-	-	0/1/1/1	-
3	EDO	B	620	-	-	0/1/1/1	-
3	EDO	B	606	-	-	1/1/1/1	-
3	EDO	B	637	-	-	0/1/1/1	-
3	EDO	B	613	-	-	0/1/1/1	-
3	EDO	B	604	-	-	0/1/1/1	-
3	EDO	B	615	-	-	0/1/1/1	-
3	EDO	B	627	-	-	0/1/1/1	-
3	EDO	A	405	-	-	0/1/1/1	-
3	EDO	B	623	-	-	0/1/1/1	-
3	EDO	A	413	-	-	0/1/1/1	-
3	EDO	B	621	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	639	-	-	1/1/1/1	-
3	EDO	A	407	-	-	1/1/1/1	-
5	XN4	B	602[A]	4	-	5/21/37/37	0/4/4/4
3	EDO	B	608	-	-	0/1/1/1	-
3	EDO	B	622	-	-	0/1/1/1	-
3	EDO	A	403	-	-	0/1/1/1	-
3	EDO	A	411	-	-	1/1/1/1	-
3	EDO	B	638	-	-	0/1/1/1	-
3	EDO	B	636	-	-	0/1/1/1	-

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	602[A]	XN4	C23-N22	-9.14	1.32	1.47
5	B	602[B]	XN4	C23-N22	-9.01	1.32	1.47
5	B	602[A]	XN4	C19-N07	8.43	1.50	1.36
5	B	602[B]	XN4	C19-N07	7.71	1.48	1.36
5	B	602[A]	XN4	C21-N22	-5.02	1.35	1.47
5	B	602[B]	XN4	C21-N22	-4.95	1.35	1.47
5	B	602[A]	XN4	C21-C19	4.26	1.59	1.51
5	B	602[B]	XN4	C21-C19	4.16	1.59	1.51
5	B	602[B]	XN4	C05-N22	-3.97	1.41	1.48
5	B	602[A]	XN4	C05-N22	-3.90	1.41	1.48
5	B	602[B]	XN4	C33-CL34	2.70	1.80	1.74
5	B	602[B]	XN4	C23-C24	2.60	1.55	1.51
5	B	602[B]	XN4	C18-C12	2.53	1.43	1.38
5	B	602[A]	XN4	C23-C24	2.36	1.54	1.51
5	B	602[A]	XN4	C18-C12	2.34	1.43	1.38
6	B	619	3FX	OAA-SAO	2.29	1.51	1.45
5	B	602[A]	XN4	C33-CL34	2.29	1.79	1.74
6	B	628	3FX	OAA-SAO	2.26	1.51	1.45
6	B	628	3FX	OAA-SAO	2.14	1.51	1.45
6	B	619	3FX	OAA-SAO	2.09	1.51	1.45
6	B	618	3FX	OAA-SAO	2.04	1.51	1.45
5	B	602[A]	XN4	C06-C05	-2.02	1.48	1.52

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	618	3FX	OAA-SAO-CAK	7.75	116.15	106.94
5	B	602[B]	XN4	C21-N22-C05	5.63	119.03	111.06
5	B	602[B]	XN4	C06-N07-C19	-5.61	113.19	122.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	619	3FX	OAB-SAO-OAA	-5.00	99.07	111.27
6	B	619	3FX	OAD-SAO-CAK	4.63	112.44	106.94
6	B	628	3FX	OAA-SAO-CAK	4.45	112.23	106.94
6	B	619	3FX	OAB-SAO-CAK	4.17	112.38	105.74
5	B	602[B]	XN4	C23-N22-C05	3.86	118.02	112.18
6	B	628	3FX	OAD-SAO-OAA	-3.75	100.99	113.95
5	B	602[A]	XN4	C05-C06-N07	3.64	114.75	109.68
8	B	643[A]	FPP	C6-C7-C8	-3.63	118.93	127.66
5	B	602[A]	XN4	C21-N22-C05	3.56	116.11	111.06
6	B	628	3FX	OAD-SAO-CAK	3.36	110.93	106.94
6	B	618	3FX	OAD-SAO-OAA	-3.19	102.91	113.95
6	B	618	3FX	OAD-SAO-CAK	3.14	110.67	106.94
5	B	602[A]	XN4	C06-N07-C19	-2.76	117.78	122.21
5	B	602[A]	XN4	N26-C27-N28	-2.43	108.65	112.26
5	B	602[B]	XN4	C04-C05-C06	-2.42	107.52	112.35
5	B	602[B]	XN4	O20-C19-C21	2.41	123.54	118.45
6	B	628	3FX	OAB-SAO-CAK	2.37	109.51	105.74
5	B	602[B]	XN4	C05-C06-N07	2.33	112.93	109.68
8	B	643[A]	FPP	C15-C13-C14	2.29	119.66	114.60
5	B	602[B]	XN4	C24-C23-N22	2.25	118.10	112.95
5	B	602[B]	XN4	C23-C24-C25	-2.08	126.68	129.46
5	B	602[B]	XN4	N26-C27-N28	-2.06	109.19	112.26

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	602[B]	XN4	C03-C04-C05-C06
5	B	602[B]	XN4	C03-C04-C05-N22
6	B	618	3FX	CAM-CAK-SAO-OAB
6	B	619	3FX	NAL-CAJ-CAM-OAC
6	B	619	3FX	NAL-CAJ-CAM-CAK
6	B	619	3FX	CAM-CAK-SAO-OAA
6	B	619	3FX	CAM-CAK-SAO-OAB
6	B	619	3FX	CAM-CAK-SAO-OAD
6	B	619	3FX	CAH-CAN-NAL-CAJ
6	B	628	3FX	SAO-CAK-CAM-OAC
6	B	628	3FX	SAO-CAK-CAM-CAJ
3	A	404	EDO	O1-C1-C2-O2
3	A	411	EDO	O1-C1-C2-O2
3	B	606	EDO	O1-C1-C2-O2
3	B	625	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
8	B	643[A]	FPP	C10-C8-C9-C11
8	B	643[A]	FPP	C7-C8-C9-C11
5	B	602[B]	XN4	C24-C23-N22-C21
8	B	643[A]	FPP	PB-O3A-PA-O1A
3	A	407	EDO	O1-C1-C2-O2
3	A	414	EDO	O1-C1-C2-O2
3	B	609	EDO	O1-C1-C2-O2
6	B	628	3FX	CAM-CAJ-NAL-CAN
5	B	602[B]	XN4	C24-C23-N22-C05
6	B	618	3FX	SAO-CAK-CAM-OAC
5	B	602[A]	XN4	C01-C02-C03-C04
5	B	602[B]	XN4	N28-C29-C30-C31
5	B	602[B]	XN4	N28-C29-C30-C36
5	B	602[A]	XN4	N28-C29-C30-C31
5	B	602[A]	XN4	N28-C29-C30-C36
3	A	402	EDO	O1-C1-C2-O2
5	B	602[A]	XN4	C11-C12-O13-C14
5	B	602[A]	XN4	C18-C12-O13-C14
3	A	409	EDO	O1-C1-C2-O2
3	A	412	EDO	O1-C1-C2-O2
3	A	417	EDO	O1-C1-C2-O2
3	B	629	EDO	O1-C1-C2-O2
6	B	618	3FX	NAL-CAJ-CAM-OAC
8	B	643[A]	FPP	C5-C6-C7-C8
3	A	406	EDO	O1-C1-C2-O2
3	A	416	EDO	O1-C1-C2-O2
3	B	639	EDO	O1-C1-C2-O2
6	B	618	3FX	CAM-CAK-SAO-OAD

There are no ring outliers.

15 monomers are involved in 22 short contacts:

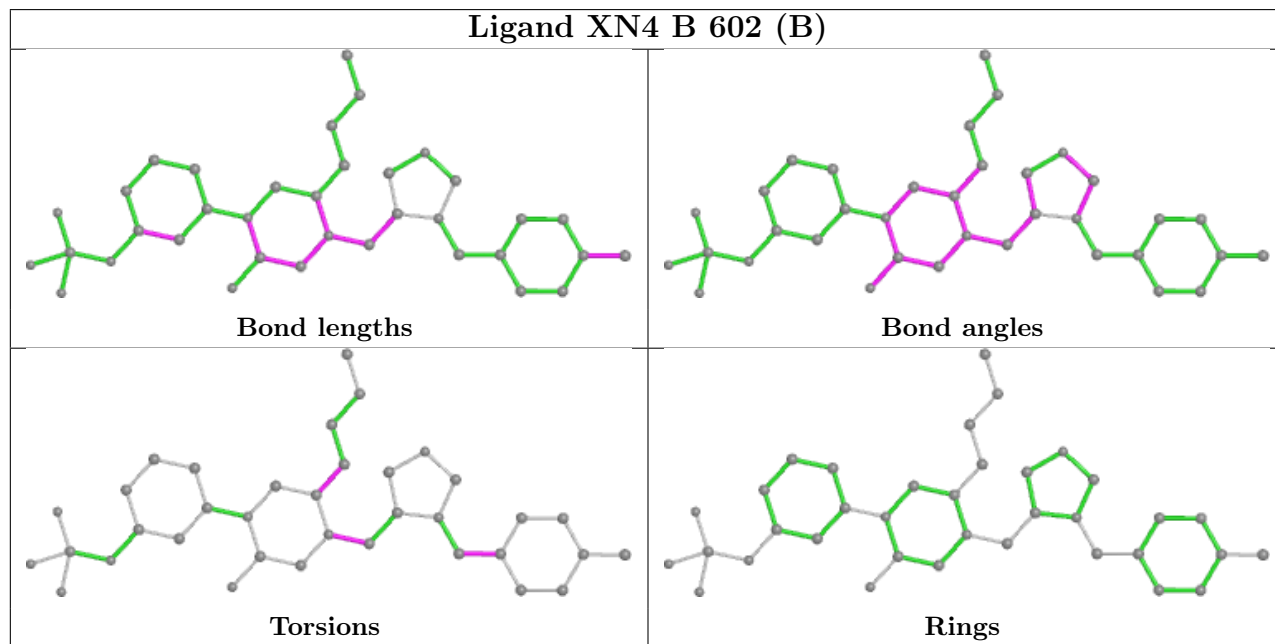
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	616	EDO	1	0
6	B	618	3FX	2	0
3	B	630	EDO	1	0
3	B	624	EDO	1	0
3	B	611	EDO	2	0
6	B	619	3FX	1	0
3	B	605	EDO	3	0
3	B	607	EDO	1	0
8	B	643[A]	FPP	2	0

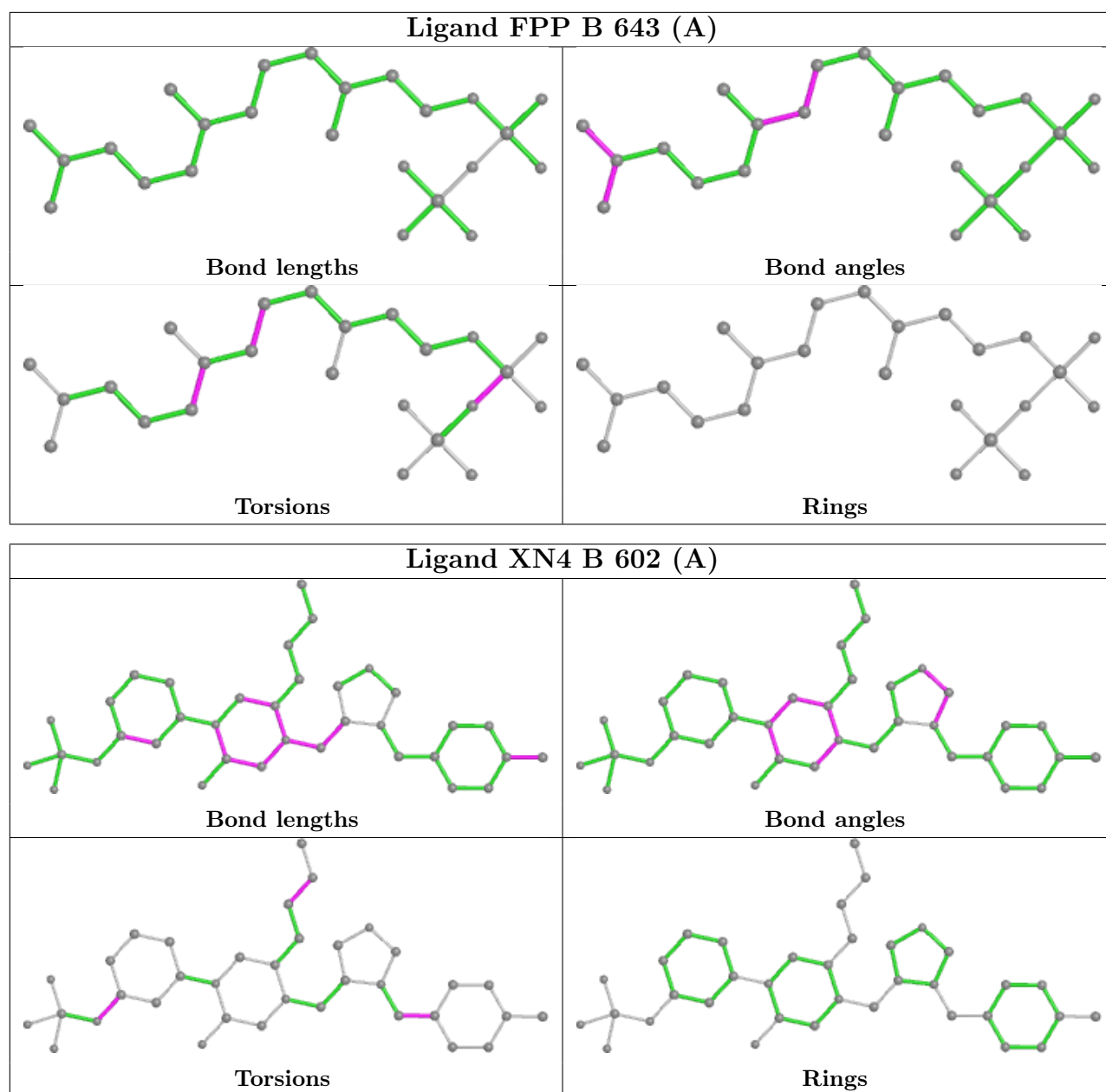
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	414	EDO	4	0
3	B	609	EDO	1	0
3	A	416	EDO	1	0
3	B	633	EDO	1	0
3	B	622	EDO	1	0
3	A	411	EDO	1	0

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	316/349 (90%)	-0.05	4 (1%) 77 79	29, 42, 65, 96	0
2	B	487/520 (93%)	0.01	10 (2%) 63 66	26, 35, 61, 95	0
All	All	803/869 (92%)	-0.01	14 (1%) 70 72	26, 38, 64, 96	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	2	ALA	7.3
2	B	50	LEU	6.1
2	B	74	PHE	5.0
2	B	75	PHE	4.7
2	B	52	SER	4.2
2	B	371	ILE	3.4
2	B	51	VAL	3.3
2	B	81	PHE	2.8
2	B	254	SER	2.5
1	A	140	PRO	2.4
1	A	139	LEU	2.3
2	B	481	GLU	2.2
1	A	277	ASP	2.1
1	A	109	TYR	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	EDO	B	608	4/4	0.66	0.23	59,65,68,69	0
3	EDO	A	415	4/4	0.74	0.15	51,55,59,66	0
3	EDO	A	417	4/4	0.76	0.27	64,65,65,67	0
3	EDO	B	636	4/4	0.76	0.15	50,53,57,58	0
3	EDO	B	606	4/4	0.77	0.24	49,54,55,55	0
3	EDO	A	416	4/4	0.78	0.25	46,60,60,65	0
3	EDO	B	641	4/4	0.78	0.33	54,55,60,62	0
3	EDO	B	605	4/4	0.81	0.21	48,48,56,71	0
3	EDO	B	635	4/4	0.81	0.31	55,59,62,64	0
3	EDO	A	412	4/4	0.82	0.19	47,53,57,57	0
3	EDO	A	418	4/4	0.82	0.49	50,56,56,60	0
3	EDO	B	604	4/4	0.82	0.17	37,41,42,45	0
3	EDO	A	407	4/4	0.83	0.37	53,56,58,58	0
3	EDO	B	609	4/4	0.83	0.22	58,59,63,67	0
3	EDO	B	612	4/4	0.83	0.21	47,53,54,56	0
3	EDO	B	616	4/4	0.84	0.49	43,44,48,52	0
3	EDO	B	640	4/4	0.85	0.20	52,53,53,59	0
3	EDO	B	617	4/4	0.85	0.35	59,64,65,69	0
6	3FX	B	628	15/15	0.85	0.22	47,63,94,96	0
3	EDO	B	614	4/4	0.86	0.20	53,56,57,58	0
3	EDO	B	603	4/4	0.86	0.18	41,46,53,56	0
3	EDO	B	634	4/4	0.88	0.28	51,51,55,57	0
3	EDO	B	610	4/4	0.88	0.20	49,53,60,70	0
3	EDO	B	627	4/4	0.88	0.13	46,47,49,56	0
3	EDO	A	409	4/4	0.89	0.19	48,48,52,54	0
3	EDO	A	411	4/4	0.89	0.15	43,44,49,52	0
3	EDO	B	639	4/4	0.89	0.18	50,54,56,57	0
3	EDO	B	607	4/4	0.89	0.25	46,48,54,57	0
3	EDO	B	633	4/4	0.89	0.22	45,46,50,56	0
3	EDO	A	405	4/4	0.89	0.13	44,46,48,53	0
3	EDO	B	637	4/4	0.90	0.24	45,46,48,49	0
3	EDO	A	408	4/4	0.90	0.19	47,52,53,56	0
3	EDO	A	414	4/4	0.90	0.48	45,45,48,50	0
3	EDO	B	624	4/4	0.90	0.14	37,46,47,57	0
3	EDO	B	615	4/4	0.90	0.23	50,55,56,57	0
3	EDO	B	631	4/4	0.91	0.17	47,50,50,56	0
3	EDO	B	629	4/4	0.91	0.25	33,43,43,46	0

*Continued on next page...*

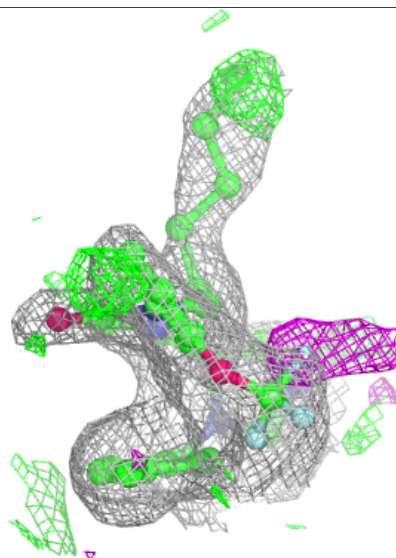
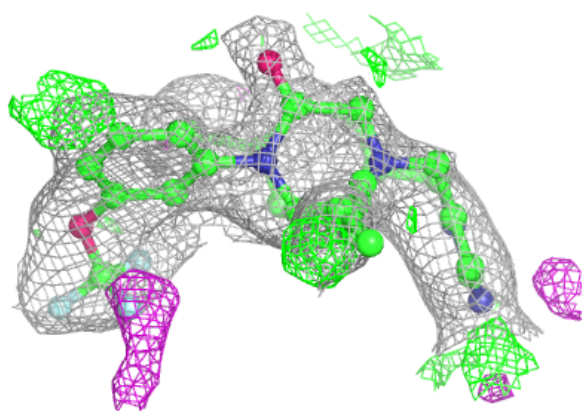
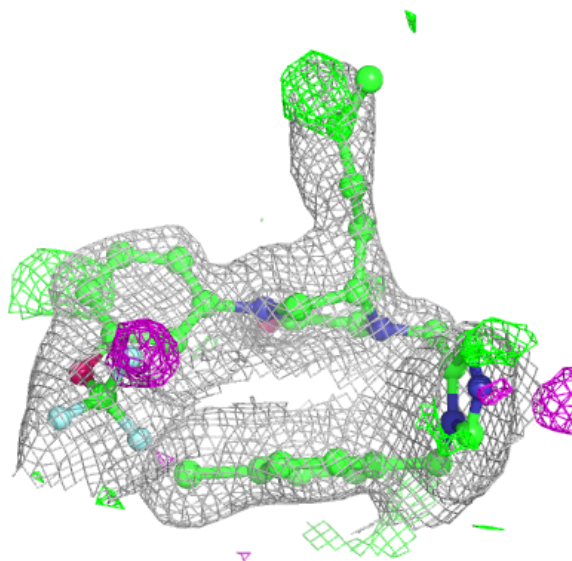
*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	EDO	B	625	4/4	0.92	0.16	43,46,46,47	0
3	EDO	B	638	4/4	0.92	0.26	45,46,48,55	0
3	EDO	A	406	4/4	0.92	0.11	47,51,54,62	0
3	EDO	B	621	4/4	0.93	0.13	36,41,41,50	0
3	EDO	B	632	4/4	0.93	0.12	50,52,57,58	0
3	EDO	B	623	4/4	0.93	0.18	38,43,46,49	0
3	EDO	B	613	4/4	0.93	0.17	49,52,57,59	0
3	EDO	B	622	4/4	0.94	0.17	37,40,41,43	0
3	EDO	A	413	4/4	0.94	0.13	43,44,47,48	0
3	EDO	A	410	4/4	0.94	0.13	50,54,54,60	0
3	EDO	B	611	4/4	0.94	0.26	41,44,46,58	0
3	EDO	A	402	4/4	0.94	0.14	37,43,48,55	0
5	XN4	B	602[A]	36/36	0.94	0.18	31,35,41,44	36
5	XN4	B	602[B]	36/36	0.94	0.18	32,34,38,38	36
3	EDO	A	401	4/4	0.94	0.10	41,43,44,47	0
3	EDO	B	630	4/4	0.96	0.41	39,52,53,54	0
3	EDO	A	403	4/4	0.96	0.11	43,44,46,46	0
6	3FX	B	619	15/15	0.96	0.17	38,58,66,66	0
3	EDO	A	404	4/4	0.96	0.14	43,44,47,47	0
8	FPP	B	643[A]	24/24	0.96	0.15	30,34,36,36	24
3	EDO	B	626	4/4	0.97	0.16	39,39,43,44	0
6	3FX	B	618	15/15	0.98	0.13	28,32,38,40	0
3	EDO	B	620	4/4	0.98	0.09	30,34,34,36	0
7	SO4	B	642[B]	5/5	0.99	0.15	31,33,33,34	5
4	ZN	B	601	1/1	1.00	0.15	32,32,32,32	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.

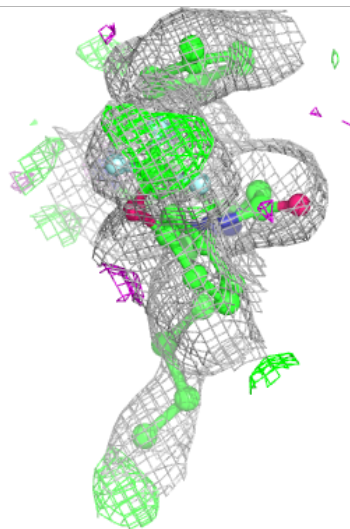
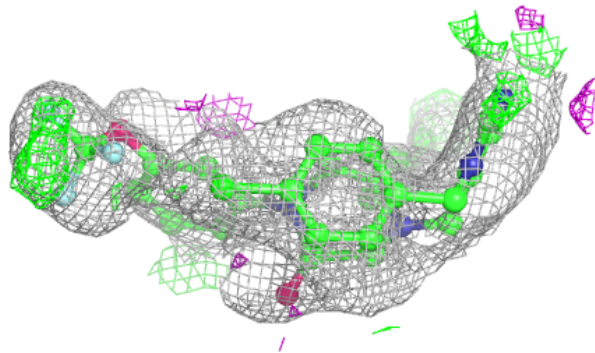
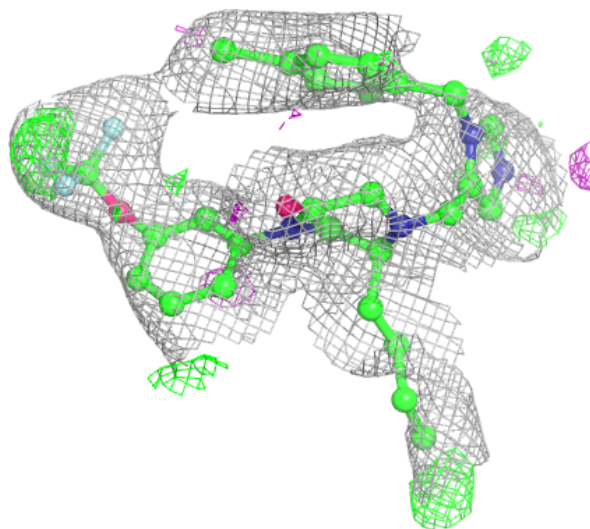
**Electron density around XN4 B 602 (A):**

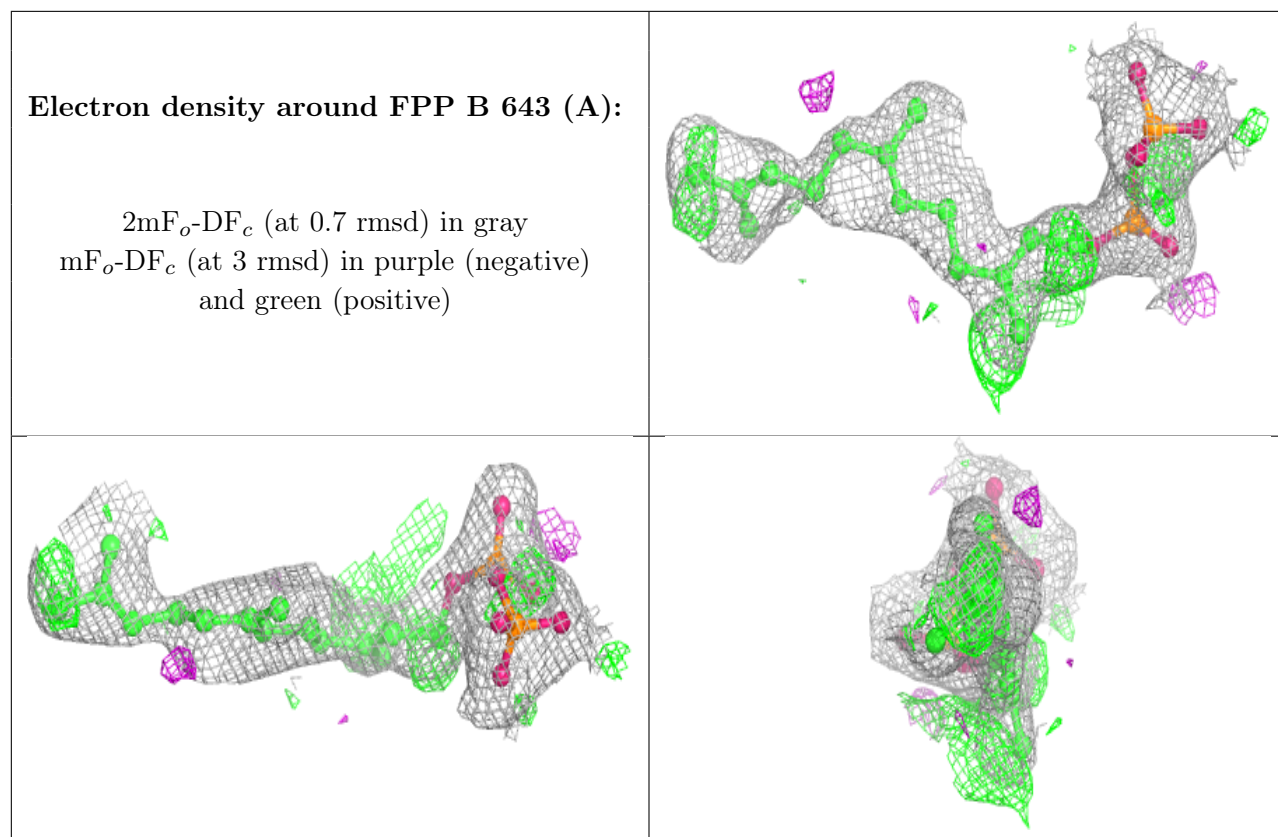
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around XN4 B 602 (B):**

$2mF_o-DF_c$  (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.