



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 11:52 AM UTC

PDB ID : 7F9T / pdb_00007f9t
Title : Toxoplasma gondii Prolyl-tRNA Synthetase (TgPRS) in Complex with inhibitor L97 and Halofuginone
Authors : Malhotra, N.; Manickam, Y.; Sharma, A.
Deposited on : 2021-07-04
Resolution : 1.49 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

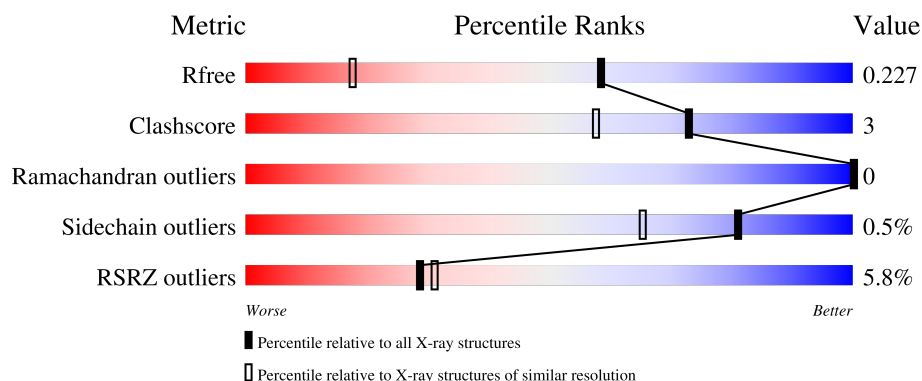
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.49 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	6779 (1.50-1.46)
Clashscore	190562	7025 (1.50-1.46)
Ramachandran outliers	187476	6917 (1.50-1.46)
Sidechain outliers	187428	6914 (1.50-1.46)
RSRZ outliers	180081	6781 (1.50-1.46)

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	500	6% 90% 5%
1	B	500	5% 89% 6%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 8836 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.

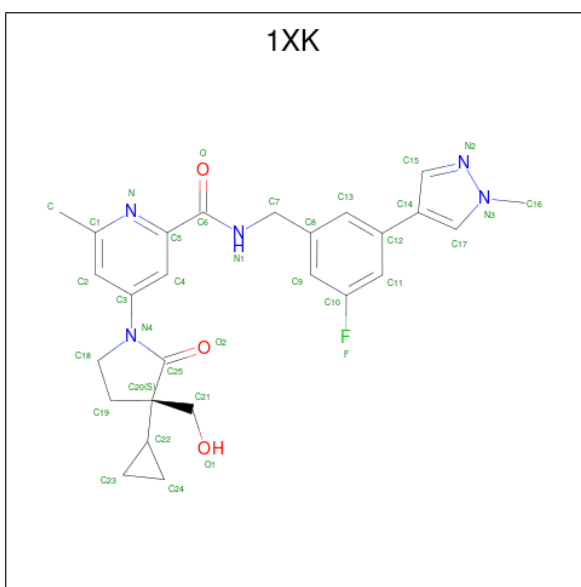
- Molecule 1 is a protein called Prolyl-tRNA synthetase (ProRS).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	478	Total	C	N	O	S	0	7	0
			3910	2516	665	705	24			
1	B	480	Total	C	N	O	S	0	7	0
			3918	2520	665	710	23			

There are 6 discrepancies between the modelled and reference sequences:

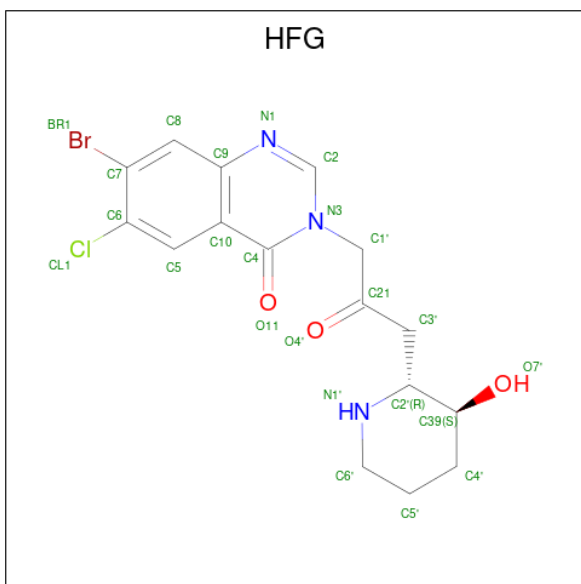
Chain	Residue	Modelled	Actual	Comment	Reference
A	331	GLY	-	expression tag	UNP A0A7J6JUK2
A	332	ALA	-	expression tag	UNP A0A7J6JUK2
A	333	MET	-	expression tag	UNP A0A7J6JUK2
B	331	GLY	-	expression tag	UNP A0A7J6JUK2
B	332	ALA	-	expression tag	UNP A0A7J6JUK2
B	333	MET	-	expression tag	UNP A0A7J6JUK2

- Molecule 2 is 4-[(3S)-3-cyclopropyl-3-(hydroxymethyl)-2-oxidanlydene-pyrrolidin-1-yl]-N-[[3-fluoranyl-5-(1-methylpyrazol-4-yl)phenyl]methyl]-6-methyl-pyridine-2-carboxamide (CCD ID: 1XK) (formula: C₂₆H₂₈FN₅O₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			35	26	1	5	3		
2	B	1	Total	C	F	N	O	0	0
			35	26	1	5	3		

- Molecule 3 is 7-bromo-6-chloro-3-{3-[(2R,3S)-3-hydroxypiperidin-2-yl]-2-oxopropyl}quinazolin-4(3H)-one (CCD ID: HFG) (formula: $C_{16}H_{17}BrClN_3O_3$).



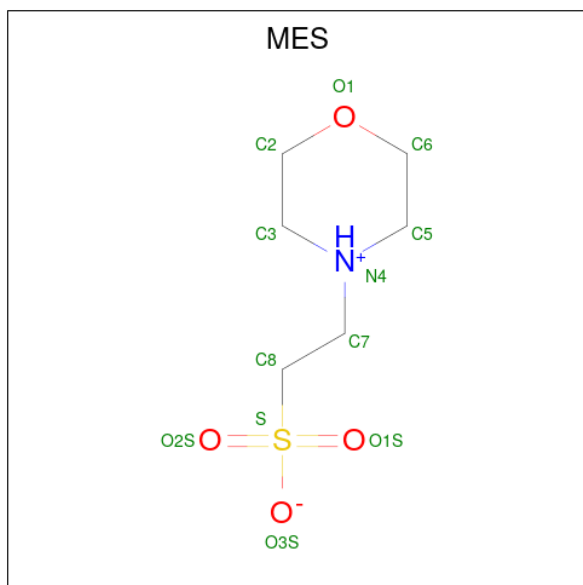
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	Br	C	Cl	N	O	0	0
			24	1	16	1	3	3		

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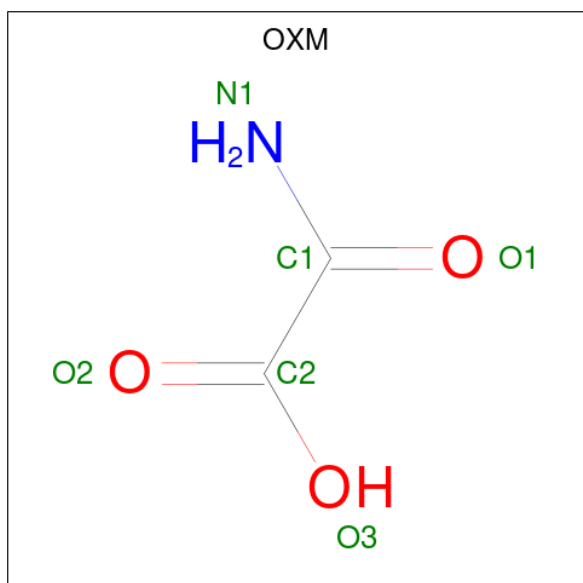
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	Br	C	Cl	N	O		
3	B	1	24	1	16	1	3	3	0	0

- Molecule 4 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



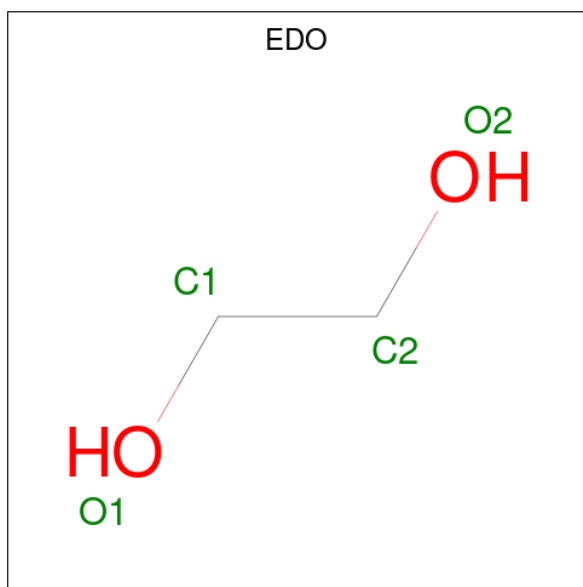
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
4	A	1	12	6	1	4	1	0	0

- Molecule 5 is OXAMIC ACID (CCD ID: OXM) (formula: $C_2H_3NO_3$).



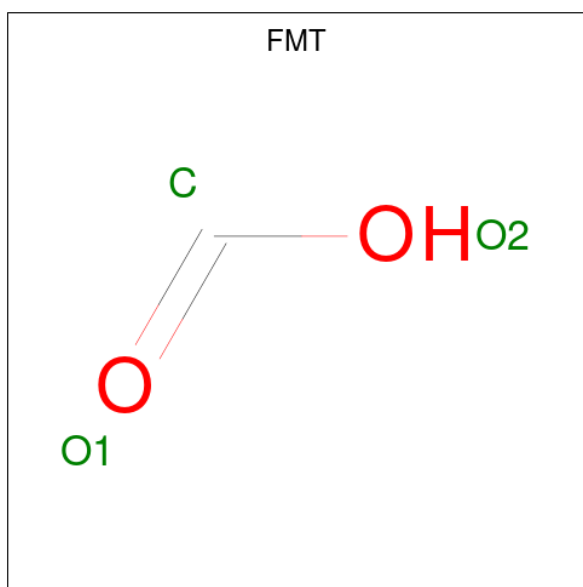
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			6	2	1	3		
5	B	1	Total	C	N	O	0	0
			6	2	1	3		

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



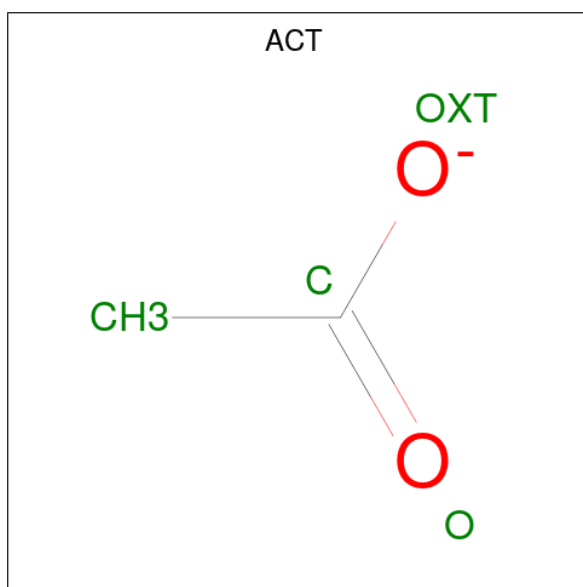
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



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

- Molecule 8 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



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

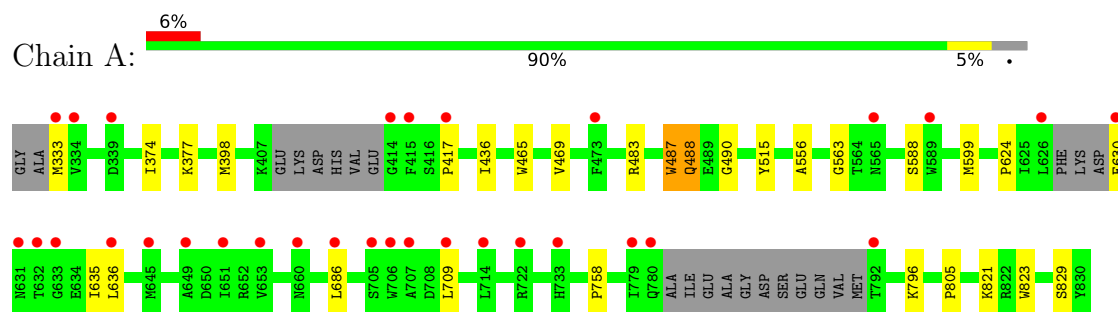
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	410	Total	O	0	20
			421	421		
9	B	363	Total	O	0	20
			378	378		

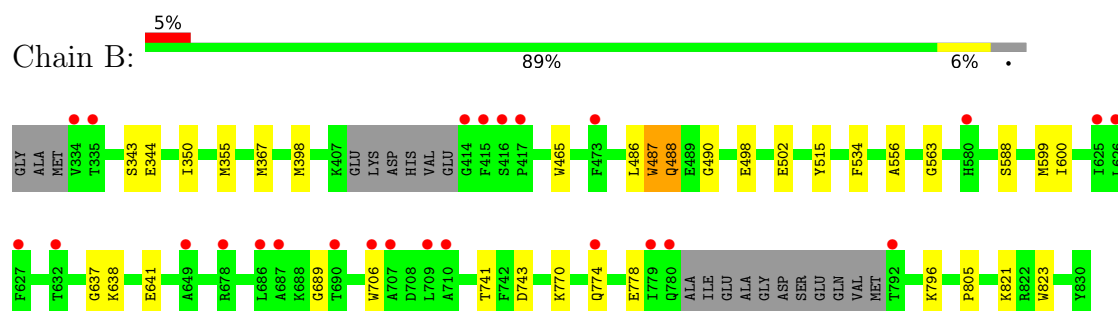
3 Residue-property plots

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: Prolyl-tRNA synthetase (ProRS)



• Molecule 1: Prolyl-tRNA synthetase (ProRS)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	70.59Å 70.63Å 76.48Å 101.05° 92.19° 115.84°	Depositor
Resolution (Å)	45.07 – 1.49 45.07 – 1.49	Depositor EDS
% Data completeness (in resolution range)	96.1 (45.07-1.49) 96.1 (45.07-1.49)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 1.49Å)	Xtriage
Refinement program	PHENIX 1.15rc1_3423	Depositor
R, R_{free}	0.173 , 0.191 (Not available) , 0.227	Depositor DCC
R_{free} test set	10134 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	23.0	Xtriage
Anisotropy	0.302	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 42.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	8836	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.67% 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: EDO, 1XK, FMT, OXM, HFG, ACT, MES

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	0.30	0/4035	0.57	0/5457
1	B	0.36	2/4044 (0.0%)	0.55	0/5474
All	All	0.33	2/8079 (0.0%)	0.56	0/10931

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	343	SER	C-N	-9.86	1.20	1.33
1	B	344	GLU	C-N	-6.19	1.26	1.33

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	3910	0	3867	24	0
1	B	3918	0	3846	28	0
2	A	35	0	0	0	0
2	B	35	0	0	0	0
3	A	24	0	17	0	0
3	B	24	0	17	1	0
4	A	12	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	6	0	2	0	0
5	B	6	0	2	0	0
6	A	16	0	24	3	0
6	B	8	0	12	2	0
7	A	21	0	7	1	0
7	B	18	0	6	1	0
8	B	4	0	3	1	0
9	A	421	0	0	4	0
9	B	378	0	0	3	0
All	All	8836	0	7815	51	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 (51) 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:483:ARG:HH22	6:A:1007:EDO:H12	1.53	0.72
1:B:534:PHE:HA	8:B:1005:ACT:H1	1.76	0.67
1:A:515:TYR:CZ	1:A:556:ALA:HB1	2.37	0.60
1:B:367:MET:HE2	6:B:1012:EDO:H11	1.84	0.60
1:A:377:LYS:NZ	9:A:1102:HOH:O	2.34	0.60
1:B:637:GLY:O	1:B:641:GLU:HG3	2.03	0.59
1:A:635:ILE:HD13	1:A:686:LEU:HD22	1.85	0.59
1:B:367:MET:HE1	1:B:486:LEU:HD12	1.85	0.59
1:B:355[A]:MET:HE1	1:B:600:ILE:HD11	1.86	0.58
1:B:774:GLN:HE21	1:B:778:GLU:HG3	1.69	0.58
1:B:515:TYR:CZ	1:B:556:ALA:HB1	2.39	0.58
1:A:398[A]:MET:HE2	1:A:436[A]:ILE:HD12	1.85	0.57
1:B:367:MET:HE2	6:B:1012:EDO:C1	2.36	0.56
1:B:502:GLU:HG2	7:B:1011:FMT:C	2.35	0.56
1:B:563:GLY:HA2	9:B:1101[B]:HOH:O	2.05	0.56
1:A:630:GLU:HG3	1:A:630:GLU:O	2.06	0.55
1:B:487:TRP:CD1	1:B:487:TRP:C	2.85	0.55
1:B:498:GLU:CD	1:B:498:GLU:H	2.15	0.55
1:A:333:MET:N	9:A:1107:HOH:O	2.39	0.55
1:A:821:LYS:NZ	9:A:1106:HOH:O	2.39	0.54
1:A:487:TRP:C	1:A:487:TRP:CD1	2.86	0.54
1:A:624:PRO:HG3	1:A:636:LEU:HD21	1.90	0.52
1:A:465:TRP:CE3	1:A:488:GLN:HB3	2.45	0.51
1:B:465:TRP:CE3	1:B:488:GLN:HB3	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:805:PRO:HG2	1:A:823:TRP:CD1	2.47	0.50
1:B:689:GLY:HA2	1:B:706:TRP:CH2	2.47	0.48
1:B:350:ILE:HG22	1:B:600:ILE:HD13	1.96	0.48
1:B:770:LYS:HE3	1:B:796:LYS:HB3	1.96	0.47
1:A:796:LYS:HE2	1:A:829[A]:SER:OG	2.13	0.47
1:B:367:MET:CE	1:B:486:LEU:HD12	2.45	0.47
1:A:483:ARG:NH2	6:A:1007:EDO:H12	2.27	0.45
1:B:805:PRO:HG2	1:B:823:TRP:CD1	2.53	0.44
1:B:741:THR:OG1	1:B:743:ASP:OD1	2.24	0.43
1:A:417:PRO:CB	7:A:1009:FMT:H	2.49	0.43
1:A:483:ARG:HH22	6:A:1007:EDO:C1	2.29	0.43
1:A:563:GLY:HA2	9:A:1103[B]:HOH:O	2.20	0.42
1:A:398[A]:MET:HE1	1:B:398:MET:SD	2.59	0.42
1:A:599[B]:MET:HE3	1:A:599[B]:MET:HB3	1.98	0.41
1:B:821:LYS:NZ	9:B:1125:HOH:O	2.54	0.41
1:B:487:TRP:CH2	3:B:1002:HFG:H8	2.56	0.41
1:A:374:ILE:HD13	1:A:599[A]:MET:HE1	2.02	0.41
1:A:469:VAL:HA	1:A:483:ARG:O	2.21	0.41
1:B:355[A]:MET:CE	1:B:600:ILE:HD11	2.50	0.41
1:B:502:GLU:HG3	9:B:1313:HOH:O	2.21	0.41
1:B:515:TYR:CE1	1:B:556:ALA:HB1	2.56	0.41
1:B:490:GLY:O	1:B:588:SER:HA	2.20	0.41
1:B:638:LYS:HD3	1:B:638:LYS:HA	1.78	0.41
1:A:490:GLY:O	1:A:588:SER:HA	2.21	0.40
1:A:709:LEU:HD23	1:A:709:LEU:HA	1.87	0.40
1:A:758:PRO:HD3	1:A:823:TRP:CZ3	2.56	0.40
1:B:599[A]:MET:HE3	1:B:599[A]:MET:HB3	1.92	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	477/500 (95%)	472 (99%)	5 (1%)	0	100	100
1	B	481/500 (96%)	477 (99%)	4 (1%)	0	100	100
All	All	958/1000 (96%)	949 (99%)	9 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	417/436 (96%)	415 (100%)	2 (0%)	81	65
1	B	415/436 (95%)	413 (100%)	2 (0%)	81	65
All	All	832/872 (95%)	828 (100%)	4 (0%)	81	65

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	487	TRP
1	A	488	GLN
1	B	487	TRP
1	B	488	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	488	GLN
1	A	586	GLN
1	A	750	ASN
1	A	780	GLN
1	B	488	GLN
1	B	750	ASN
1	B	780	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

27 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	1XK	B	1001	-	37,39,39	0.26	0	46,58,58	0.49	0
7	FMT	B	1009	-	2,2,2	0.73	0	1,1,1	0.23	0
7	FMT	B	1010	-	2,2,2	0.73	0	1,1,1	0.23	0
7	FMT	B	1007	-	2,2,2	0.73	0	1,1,1	0.22	0
7	FMT	A	1010	-	2,2,2	0.69	0	1,1,1	0.20	0
8	ACT	B	1005	-	3,3,3	0.84	0	3,3,3	0.72	0
6	EDO	B	1012	-	3,3,3	0.39	0	2,2,2	0.36	0
3	HFG	A	1002	-	26,26,26	0.30	0	29,37,37	0.51	0
7	FMT	A	1014	-	2,2,2	0.74	0	1,1,1	0.25	0
7	FMT	A	1012	-	2,2,2	0.74	0	1,1,1	0.25	0
3	HFG	B	1002	-	26,26,26	0.25	0	29,37,37	0.54	0
2	1XK	A	1001	-	37,39,39	0.22	0	46,58,58	0.52	1 (2%)
7	FMT	A	1013	-	2,2,2	0.67	0	1,1,1	0.19	0
4	MES	A	1003	-	12,12,12	2.24	1 (8%)	15,16,16	2.41	4 (26%)
7	FMT	B	1008	-	2,2,2	0.70	0	1,1,1	0.21	0
6	EDO	A	1007	-	3,3,3	0.43	0	2,2,2	0.37	0
5	OXM	B	1003	-	5,5,5	3.25	2 (40%)	2,6,6	0.60	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	FMT	A	1008	-	2,2,2	0.73	0	1,1,1	0.22	0
7	FMT	A	1011	-	2,2,2	0.75	0	1,1,1	0.28	0
6	EDO	A	1005	-	3,3,3	0.42	0	2,2,2	0.50	0
7	FMT	A	1009	-	2,2,2	0.71	0	1,1,1	0.16	0
6	EDO	B	1004	-	3,3,3	0.45	0	2,2,2	0.54	0
5	OXM	A	1004	-	5,5,5	3.00	1 (20%)	2,6,6	0.45	0
6	EDO	A	1006	-	3,3,3	0.38	0	2,2,2	0.25	0
7	FMT	B	1011	-	2,2,2	0.73	0	1,1,1	0.22	0
7	FMT	B	1006	-	2,2,2	0.72	0	1,1,1	0.20	0
6	EDO	A	1015	-	3,3,3	0.39	0	2,2,2	0.49	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
2	1XK	B	1001	-	-	0/24/44/44	0/5/5/5
6	EDO	A	1007	-	-	1/1/1/1	-
5	OXM	B	1003	-	-	0/4/4/4	-
3	HFG	B	1002	-	-	0/8/19/19	0/3/3/3
2	1XK	A	1001	-	-	0/24/44/44	0/5/5/5
5	OXM	A	1004	-	-	0/4/4/4	-
6	EDO	A	1006	-	-	0/1/1/1	-
6	EDO	B	1004	-	-	0/1/1/1	-
6	EDO	A	1015	-	-	0/1/1/1	-
4	MES	A	1003	-	-	5/6/14/14	0/1/1/1
6	EDO	A	1005	-	-	1/1/1/1	-
6	EDO	B	1012	-	-	0/1/1/1	-
3	HFG	A	1002	-	-	0/8/19/19	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1003	MES	C8-S	-7.51	1.67	1.77
5	B	1003	OXM	C1-C2	-6.81	1.47	1.55
5	A	1004	OXM	C1-C2	-6.38	1.47	1.55
5	B	1003	OXM	O3-C2	-2.19	1.24	1.30

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1003	MES	C5-N4-C3	7.53	125.05	108.84
4	A	1003	MES	O2S-S-C8	2.70	110.80	106.73
4	A	1003	MES	C7-N4-C3	2.43	117.71	111.24
2	A	1001	1XK	C3-N4-C25	2.06	127.93	126.39
4	A	1003	MES	C7-N4-C5	2.03	116.65	111.24

There are no chirality outliers.

All (7) torsion outliers are listed below:

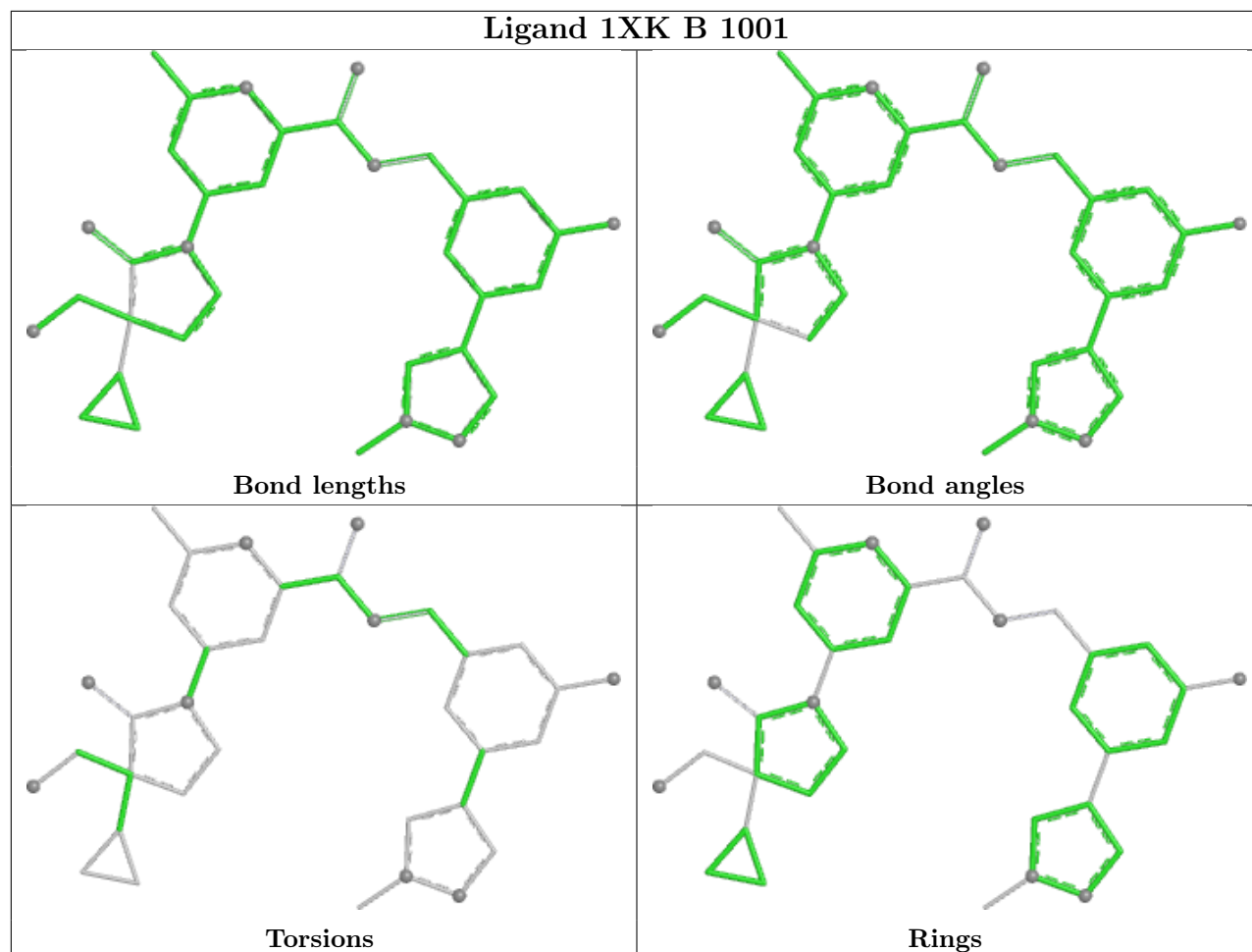
Mol	Chain	Res	Type	Atoms
4	A	1003	MES	C8-C7-N4-C3
4	A	1003	MES	C7-C8-S-O3S
4	A	1003	MES	C7-C8-S-O1S
4	A	1003	MES	C7-C8-S-O2S
4	A	1003	MES	C8-C7-N4-C5
6	A	1005	EDO	O1-C1-C2-O2
6	A	1007	EDO	O1-C1-C2-O2

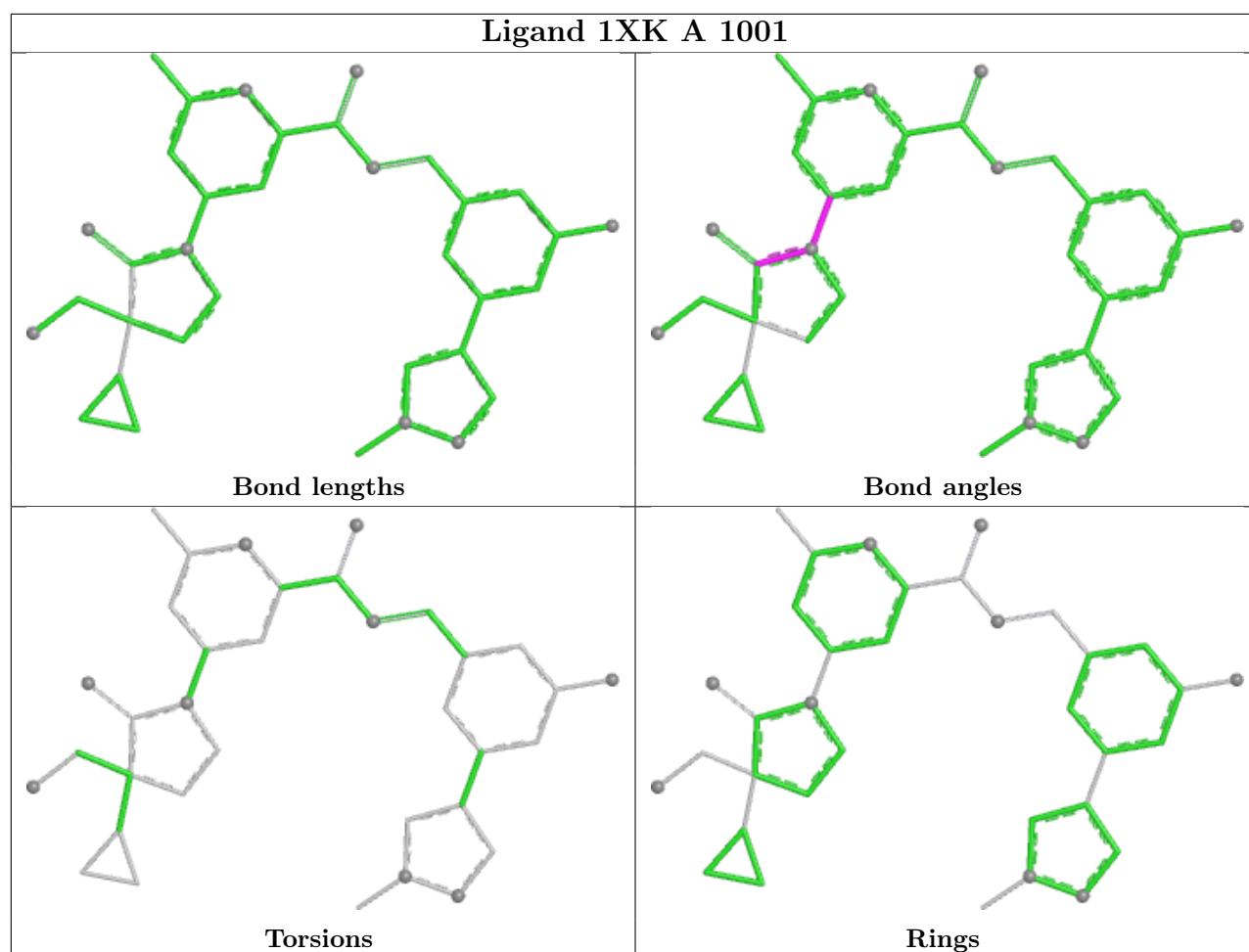
There are no ring outliers.

6 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	1005	ACT	1	0
6	B	1012	EDO	2	0
3	B	1002	HFG	1	0
6	A	1007	EDO	3	0
7	A	1009	FMT	1	0
7	B	1011	FMT	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	478/500 (95%)	0.30	31 (6%) 25 27	12, 29, 51, 88	8 (1%)
1	B	480/500 (96%)	0.31	25 (5%) 33 35	12, 29, 55, 77	9 (1%)
All	All	958/1000 (95%)	0.31	56 (5%) 29 31	12, 29, 54, 88	17 (1%)

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	334	VAL	5.2
1	B	334	VAL	4.6
1	B	415	PHE	4.5
1	A	473	PHE	4.3
1	A	415	PHE	4.2
1	B	473	PHE	4.0
1	A	779	ILE	3.9
1	A	626	LEU	3.8
1	B	779	ILE	3.7
1	A	792	THR	3.6
1	B	792	THR	3.5
1	B	709	LEU	3.4
1	A	589	TRP	3.2
1	A	706	TRP	3.2
1	B	414	GLY	3.1
1	A	649	ALA	3.1
1	B	416	SER	3.0
1	A	333	MET	3.0
1	B	417	PRO	3.0
1	A	417	PRO	2.9
1	B	686	LEU	2.8
1	A	733	HIS	2.8
1	B	780	GLN	2.8
1	B	774	GLN	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	706	TRP	2.7
1	A	707	ALA	2.7
1	B	626	LEU	2.6
1	A	630	GLU	2.6
1	A	686	LEU	2.6
1	A	780	GLN	2.6
1	B	335	THR	2.5
1	B	690	THR	2.5
1	A	645	MET	2.5
1	A	705	SER	2.5
1	B	625	ILE	2.5
1	B	707	ALA	2.4
1	A	636	LEU	2.4
1	B	710	ALA	2.3
1	B	678	ARG	2.3
1	A	722	ARG	2.2
1	B	627	PHE	2.2
1	B	632	THR	2.2
1	A	633	GLY	2.2
1	A	339	ASP	2.2
1	B	649	ALA	2.2
1	A	632	THR	2.1
1	A	651	ILE	2.1
1	A	660	ASN	2.1
1	B	580	HIS	2.1
1	B	687	ALA	2.1
1	A	631	ASN	2.1
1	A	565	ASN	2.0
1	A	414	GLY	2.0
1	A	653	VAL	2.0
1	A	709	LEU	2.0
1	A	714	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 ⓘ

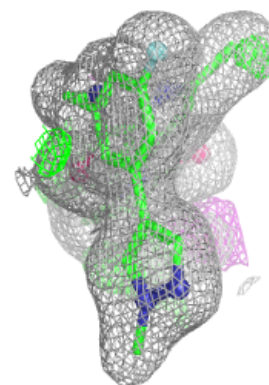
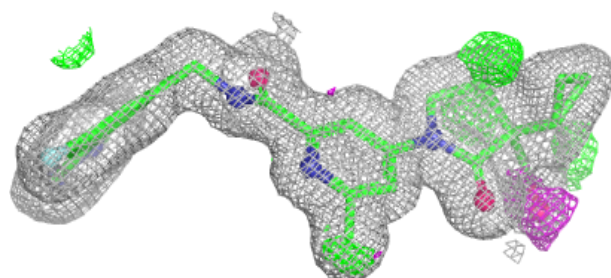
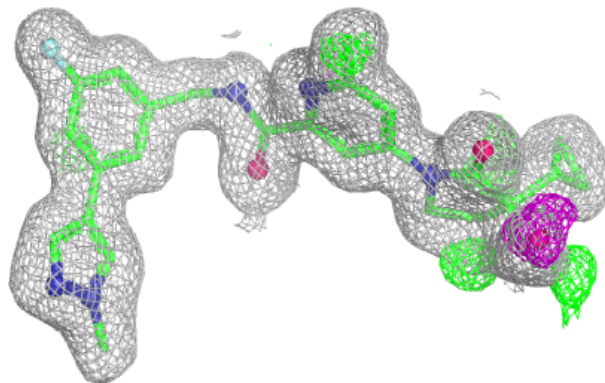
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
7	FMT	B	1011	3/3	0.71	0.23	58,58,60,62	3
7	FMT	A	1014	3/3	0.81	0.16	64,64,64,65	0
7	FMT	B	1010	3/3	0.81	0.18	40,40,40,45	3
6	EDO	A	1015	4/4	0.81	0.18	34,36,40,42	4
8	ACT	B	1005	4/4	0.81	0.14	43,48,49,51	4
7	FMT	A	1009	3/3	0.82	0.14	31,31,31,40	3
7	FMT	A	1012	3/3	0.82	0.17	65,65,66,66	0
7	FMT	A	1010	3/3	0.87	0.12	46,46,47,52	3
7	FMT	B	1007	3/3	0.88	0.14	65,65,65,67	0
7	FMT	A	1011	3/3	0.88	0.14	59,59,60,60	0
7	FMT	B	1009	3/3	0.89	0.12	59,59,59,60	0
7	FMT	B	1006	3/3	0.89	0.12	60,60,60,61	0
4	MES	A	1003	12/12	0.90	0.13	25,44,52,58	0
6	EDO	A	1007	4/4	0.90	0.13	53,54,55,56	0
7	FMT	A	1008	3/3	0.91	0.11	59,59,59,60	0
6	EDO	A	1005	4/4	0.91	0.12	30,33,37,38	4
3	HFG	B	1002	24/24	0.92	0.13	18,22,48,197	0
6	EDO	A	1006	4/4	0.92	0.12	33,36,42,43	0
5	OXM	B	1003	6/6	0.92	0.13	24,35,42,51	6
7	FMT	B	1008	3/3	0.92	0.14	51,51,54,57	0
3	HFG	A	1002	24/24	0.93	0.14	18,21,58,210	0
7	FMT	A	1013	3/3	0.93	0.09	32,32,36,37	3
6	EDO	B	1004	4/4	0.94	0.09	32,32,35,45	0
6	EDO	B	1012	4/4	0.94	0.16	27,49,54,68	0
5	OXM	A	1004	6/6	0.95	0.11	25,34,46,49	6
2	1XK	B	1001	35/35	0.96	0.07	17,20,29,32	0
2	1XK	A	1001	35/35	0.96	0.07	18,21,36,38	0

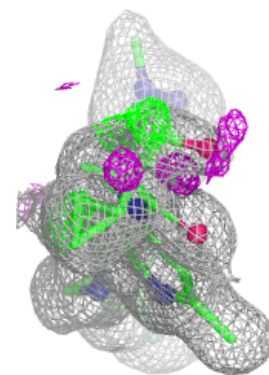
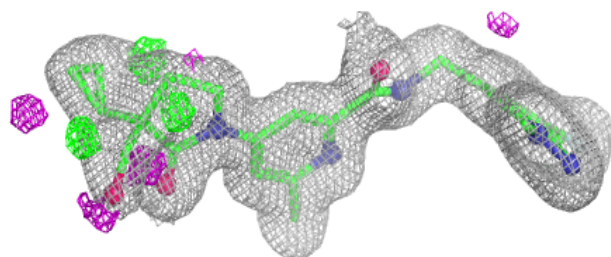
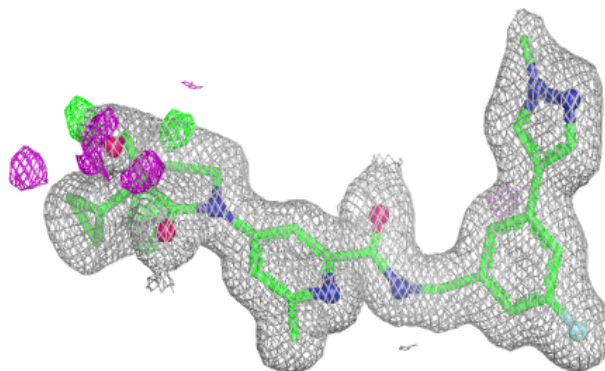
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around 1XK B 1001:

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

**Electron density around 1XK A 1001:**

$2mF_o-DF_c$ (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.