



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 20, 2020 – 02:02 PM BST

PDB ID : 5M0M  
Title : Structure-based evolution of a hybrid steroid series of Autotaxin inhibitors  
Authors : Keune, W.-J.; Heidebrecht, T.; Perrakis, A.  
Deposited on : 2016-10-05  
Resolution : 2.10 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.

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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 : 2.13.1  
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) : 2.13.1

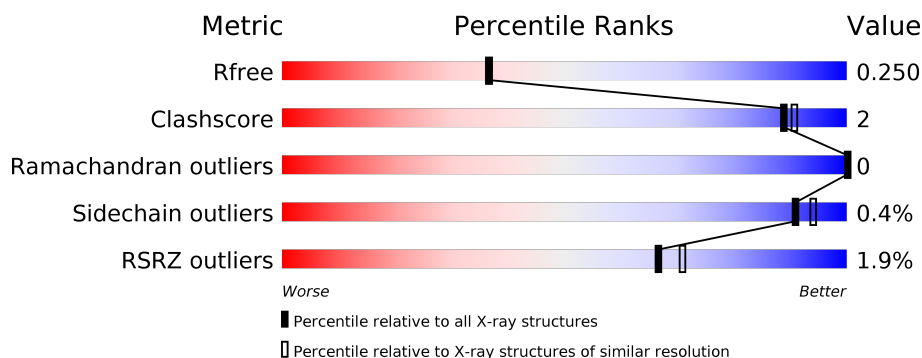
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 on 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	827	<div> <div>2%</div> <div>88%</div> <div>5%</div> <div>6%</div> </div>
2	B	9	<div> <div>11%</div> <div>89%</div> </div>

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
8	SCN	A	942	-	-	X	-
9	GOL	A	939	-	-	-	X

## 2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 6598 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.

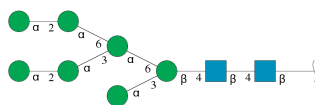
- Molecule 1 is a protein called Ectonucleotide pyrophosphatase/phosphodiesterase family member 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	774	6242	3959	1075	1160	48	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	410	ALA	ASN	engineered mutation	UNP Q64610
A	581	PHE	LEU	engineered mutation	UNP Q64610
A	591	THR	ARG	engineered mutation	UNP Q64610
A	806	ALA	ASN	engineered mutation	UNP Q64610

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	9	105	58	2	45	0	0	0

- Molecule 3 is IODIDE ION (three-letter code: IOD) (formula: I).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	12	Total	I	0	0
			12	12		

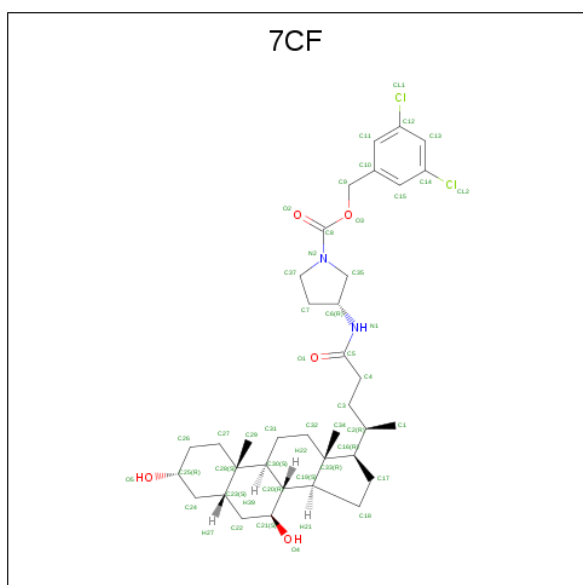
- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Zn	0	0
			2	2		

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Ca	0	0
			1	1		

- Molecule 6 is [3,5-bis(chloranyl)phenyl]methyl (3 {R})-3-[(4 {R})-4-[(3 {R},5 {S},7 {S},8 {R},9 {S},10 {S},13 {R},14 {S},17 {R})-10,13-dimethyl-3,7-bis(oxidanyl)-2,3,4,5,6,7,8,9,11,12,14,15,16,17-tetradecahydro-1 {H}-cyclopenta[a]phenanthren-17-yl]pentanoyl]amino]pyrrolidine-1-carboxylate (three-letter code: 7CF) (formula: C<sub>36</sub>H<sub>52</sub>Cl<sub>2</sub>N<sub>2</sub>O<sub>5</sub>).





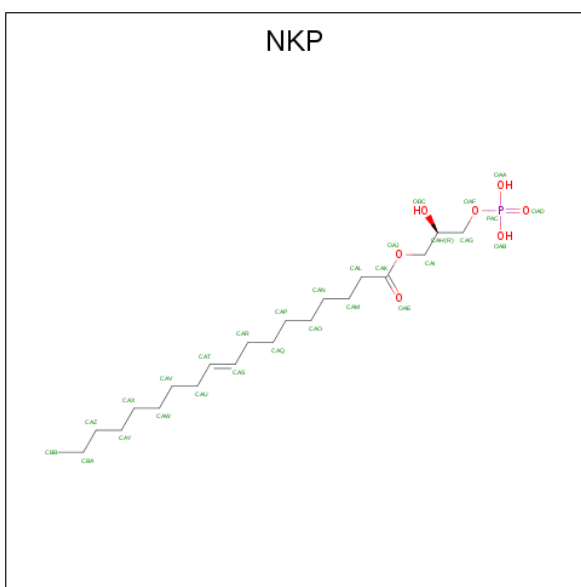
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		
8	A	1	Total	C	N	S	0	0
			3	1	1	1		

- Molecule 9 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	A	1	Total	C	O	0	0
			6	3	3		
9	A	1	Total	C	O	0	0
			6	3	3		
9	A	1	Total	C	O	0	0
			6	3	3		
9	A	1	Total	C	O	0	0
			6	3	3		
9	A	1	Total	C	O	0	0
			6	3	3		
9	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 10 is (2R)-2-hydroxy-3-(phosphonoxy)propyl (9E)-octadec-9-enoate (three-letter code: NKP) (formula: C<sub>21</sub>H<sub>41</sub>O<sub>7</sub>P).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	A	1	Total	C	O	P	0	0
			29	21	7	1		

- Molecule 11 is water.

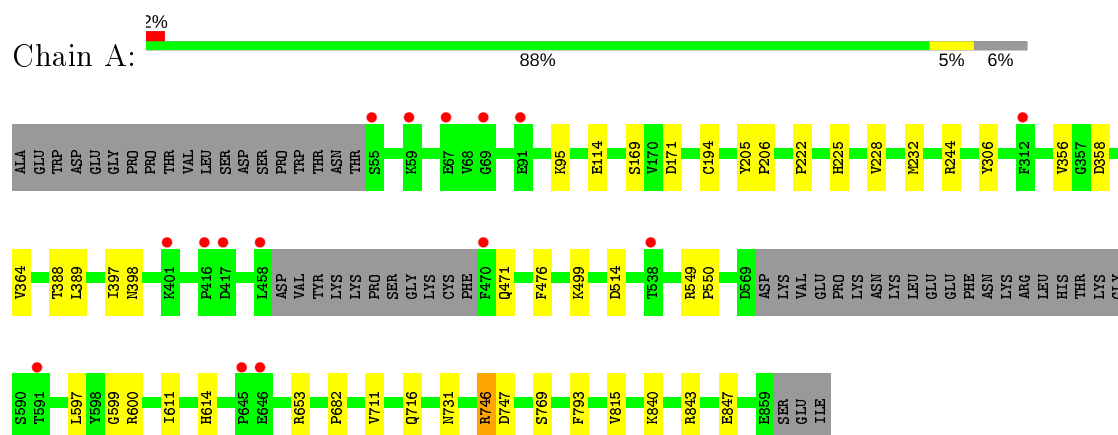
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	A	88	Total O 88 88	0	0



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

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Ectonucleotide pyrophosphatase/phosphodiesterase family member 2



- Molecule 2: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.99Å 89.17Å 77.29Å 90.00° 103.12° 90.00°	Depositor
Resolution (Å)	75.27 – 2.10 46.14 – 2.10	Depositor EDS
% Data completeness (in resolution range)	97.9 (75.27-2.10) 97.9 (46.14-2.10)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.04 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0155	Depositor
R, $R_{free}$	0.201 , 0.249 0.208 , 0.250	Depositor DCC
$R_{free}$ test set	2343 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.0	Xtriage
Anisotropy	0.851	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 40.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6598	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.26% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, ZN, BMA, NAG, NA, CA, NKP, SCN, 7CF, IOD, MAN

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	0.56	0/6419	0.77	7/8708 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	244	ARG	NE-CZ-NH1	6.70	123.65	120.30
1	A	746	ARG	NE-CZ-NH2	-6.34	117.13	120.30
1	A	653	ARG	NE-CZ-NH1	5.73	123.17	120.30
1	A	358	ASP	CB-CG-OD2	-5.46	113.39	118.30
1	A	746	ARG	NE-CZ-NH1	5.26	122.93	120.30
1	A	514	ASP	CB-CG-OD1	5.21	122.98	118.30
1	A	244	ARG	NE-CZ-NH2	-5.16	117.72	120.30

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	6242	0	5994	23	0
2	B	105	0	88	0	0
3	A	12	0	0	2	0
4	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	1	0	0	0	0
6	A	45	0	0	0	0
7	A	2	0	0	0	0
8	A	30	0	0	4	0
9	A	42	0	56	0	0
10	A	29	0	39	1	0
11	A	88	0	0	0	0
All	All	6598	0	6177	24	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 2.

All (24) 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:847:GLU:OE1	3:A:912:IOD:I	2.80	0.70
1:A:711:VAL:HG13	1:A:815:VAL:HG13	1.78	0.65
1:A:499:LYS:HE3	3:A:921:IOD:I	2.76	0.55
10:A:945:NKP:CAQ	10:A:945:NKP:HAM	2.41	0.51
1:A:843:ARG:NH1	1:A:847:GLU:OE1	2.45	0.49
1:A:747:ASP:O	8:A:942:SCN:S	2.71	0.49
1:A:171:ASP:OD2	1:A:306:TYR:OH	2.19	0.48
1:A:206:PRO:HB3	1:A:389:LEU:HD23	1.95	0.47
1:A:746:ARG:HG3	8:A:942:SCN:C	2.45	0.46
1:A:597:LEU:HD12	1:A:731:ASN:HB2	1.98	0.46
1:A:364:VAL:O	1:A:471:GLN:HA	2.17	0.45
1:A:599:GLY:HA3	1:A:840:LYS:HB2	1.99	0.44
1:A:600:ARG:HD2	1:A:611:ILE:HD11	1.99	0.44
1:A:769:SER:HB2	1:A:793:PHE:CZ	2.51	0.44
1:A:205:TYR:O	8:A:941:SCN:S	2.75	0.44
1:A:397:ILE:HD12	1:A:398:ASN:N	2.32	0.44
1:A:95:LYS:HE2	1:A:114:GLU:O	2.18	0.43
1:A:682:PRO:HB3	1:A:716:GLN:HB3	2.01	0.42
1:A:169:SER:HA	1:A:356:VAL:O	2.19	0.42
1:A:388:THR:HG22	1:A:476:PHE:CZ	2.55	0.42
1:A:550:PRO:HB2	1:A:611:ILE:HG12	2.02	0.42
1:A:222:PRO:HA	1:A:225:HIS:CE1	2.54	0.42
1:A:228:VAL:HG22	1:A:232:MET:SD	2.61	0.40
1:A:716:GLN:OE1	8:A:929:SCN:S	2.80	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	768/827 (93%)	736 (96%)	32 (4%)	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	699/749 (93%)	696 (100%)	3 (0%)	91	94

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	194	CYS
1	A	549	ARG
1	A	614	HIS

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

Mol	Chain	Res	Type
1	A	716	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 ⓘ

9 monosaccharides 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	NAG	B	1	1,2	14,14,15	0.68	0	17,19,21	1.31	3 (17%)
2	NAG	B	2	2	14,14,15	0.60	0	17,19,21	0.90	0
2	BMA	B	3	2	11,11,12	0.58	0	15,15,17	0.97	1 (6%)
2	MAN	B	4	2	11,11,12	0.39	0	15,15,17	1.55	3 (20%)
2	MAN	B	5	2	11,11,12	0.69	0	15,15,17	1.17	2 (13%)
2	MAN	B	6	2	11,11,12	0.38	0	15,15,17	1.19	2 (13%)
2	MAN	B	7	2	11,11,12	0.51	0	15,15,17	1.49	4 (26%)
2	MAN	B	8	2	11,11,12	0.52	0	15,15,17	1.19	2 (13%)
2	MAN	B	9	2	11,11,12	0.61	0	15,15,17	1.93	4 (26%)

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	NAG	B	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
2	BMA	B	3	2	-	0/2/19/22	0/1/1/1
2	MAN	B	4	2	-	2/2/19/22	0/1/1/1
2	MAN	B	5	2	-	0/2/19/22	0/1/1/1
2	MAN	B	6	2	-	0/2/19/22	0/1/1/1
2	MAN	B	7	2	-	1/2/19/22	0/1/1/1
2	MAN	B	8	2	-	0/2/19/22	0/1/1/1
2	MAN	B	9	2	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	9	MAN	C1-C2-C3	3.79	114.32	109.67
2	B	9	MAN	C2-C3-C4	3.27	116.56	110.89
2	B	4	MAN	C1-C2-C3	-3.22	105.71	109.67
2	B	7	MAN	O5-C5-C6	3.17	112.17	107.20
2	B	5	MAN	C1-C2-C3	3.16	113.55	109.67
2	B	6	MAN	C1-O5-C5	3.10	116.39	112.19
2	B	9	MAN	C3-C4-C5	2.99	115.58	110.24
2	B	1	NAG	O5-C1-C2	-2.71	107.02	111.29
2	B	8	MAN	C1-O5-C5	2.58	115.69	112.19
2	B	8	MAN	O5-C5-C6	2.55	111.20	107.20
2	B	4	MAN	C1-O5-C5	2.43	115.48	112.19
2	B	4	MAN	O4-C4-C3	-2.40	104.81	110.35
2	B	5	MAN	O2-C2-C1	-2.39	104.27	109.15
2	B	7	MAN	O5-C5-C4	-2.38	105.04	110.83
2	B	6	MAN	O3-C3-C2	-2.29	105.61	109.99
2	B	3	BMA	C1-C2-C3	2.23	112.40	109.67
2	B	1	NAG	O4-C4-C3	-2.16	105.36	110.35
2	B	7	MAN	C6-C5-C4	2.13	117.99	113.00
2	B	1	NAG	O4-C4-C5	-2.05	104.20	109.30
2	B	9	MAN	O2-C2-C1	2.05	113.35	109.15
2	B	7	MAN	C3-C4-C5	-2.04	106.61	110.24

There are no chirality outliers.

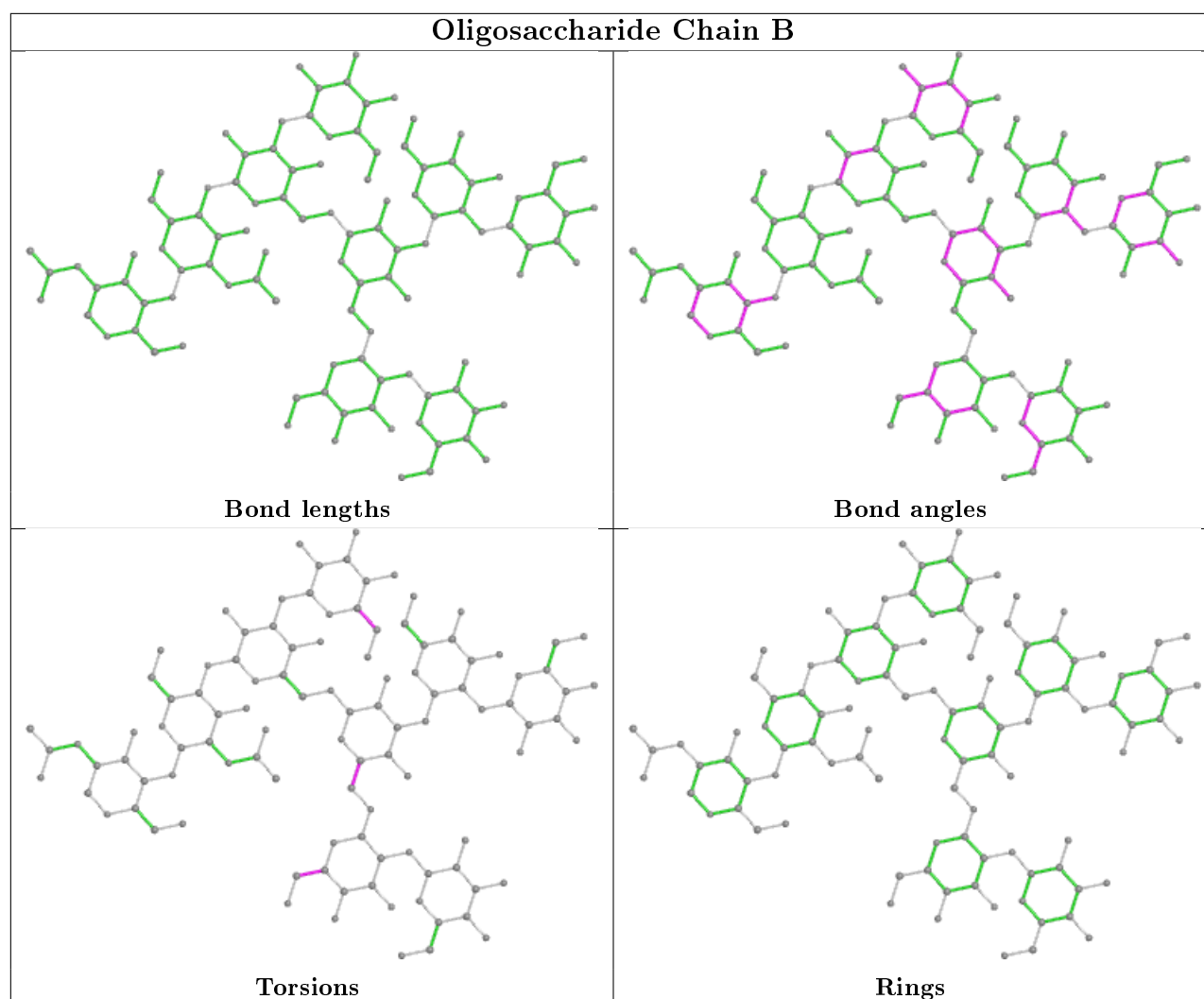
All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	9	MAN	O5-C5-C6-O6
2	B	4	MAN	O5-C5-C6-O6
2	B	4	MAN	C4-C5-C6-O6
2	B	7	MAN	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



## 5.6 Ligand geometry [i](#)

Of 36 ligands modelled in this entry, 17 are monoatomic - leaving 19 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	$\# Z  > 2$
6	7CF	A	925	-	50,50,50	0.45	0	73,76,76	0.66	1 (1%)
9	GOL	A	939	-	5,5,5	0.25	0	5,5,5	0.19	0
8	SCN	A	930	-	1,2,2	0.20	0	0,1,1	0.00	-
8	SCN	A	943	-	1,2,2	0.29	0	0,1,1	0.00	-



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
9	GOL	A	935	-	5,5,5	0.40	0	5,5,5	0.41	0
9	GOL	A	934	-	5,5,5	0.47	0	5,5,5	0.50	0
10	NKP	A	945	-	28,28,28	0.42	0	31,32,32	0.43	0
8	SCN	A	933	-	1,2,2	0.28	0	0,1,1	0.00	-
8	SCN	A	944	-	1,2,2	0.09	0	0,1,1	0.00	-
8	SCN	A	928	-	1,2,2	0.17	0	0,1,1	0.00	-
9	GOL	A	938	-	5,5,5	0.39	0	5,5,5	0.12	0
8	SCN	A	929	-	1,2,2	0.31	0	0,1,1	0.00	-
9	GOL	A	936	-	5,5,5	0.31	0	5,5,5	0.10	0
9	GOL	A	940	-	5,5,5	0.16	0	5,5,5	0.21	0
9	GOL	A	937	-	5,5,5	0.21	0	5,5,5	0.13	0
8	SCN	A	932	-	1,2,2	0.32	0	0,1,1	0.00	-
8	SCN	A	941	-	1,2,2	0.11	0	0,1,1	0.00	-
8	SCN	A	931	-	1,2,2	0.33	0	0,1,1	0.00	-
8	SCN	A	942	-	1,2,2	0.38	0	0,1,1	0.00	-

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
6	7CF	A	925	-	-	2/22/92/92	0/6/6/6
9	GOL	A	939	-	-	2/4/4/4	-
9	GOL	A	936	-	-	2/4/4/4	-
9	GOL	A	935	-	-	2/4/4/4	-
10	NKP	A	945	-	-	16/28/28/28	-
9	GOL	A	938	-	-	2/4/4/4	-
9	GOL	A	934	-	-	2/4/4/4	-
9	GOL	A	940	-	-	0/4/4/4	-
9	GOL	A	937	-	-	2/4/4/4	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	925	7CF	C11-C12-CL1	2.00	121.65	119.15

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	A	945	NKP	CAG-OAF-PAC-OAA
10	A	945	NKP	CAG-OAF-PAC-OAB
9	A	934	GOL	C1-C2-C3-O3
9	A	934	GOL	O2-C2-C3-O3
9	A	936	GOL	O1-C1-C2-C3
9	A	935	GOL	C1-C2-C3-O3
9	A	937	GOL	C1-C2-C3-O3
10	A	945	NKP	OAE-CAK-OAJ-CAI
10	A	945	NKP	CAL-CAK-OAJ-CAI
10	A	945	NKP	CAM-CAN-CAO-CAP
10	A	945	NKP	CAG-CAH-CAI-OAJ
10	A	945	NKP	CAK-CAL-CAM-CAN
9	A	935	GOL	O2-C2-C3-O3
10	A	945	NKP	CAP-CAQ-CAR-CAS
10	A	945	NKP	OBC-CAH-CAI-OAJ
6	A	925	7CF	C3-C4-C5-N1
6	A	925	7CF	C3-C4-C5-O1
10	A	945	NKP	CAO-CAP-CAQ-CAR
9	A	938	GOL	O1-C1-C2-C3
9	A	936	GOL	O1-C1-C2-O2
9	A	937	GOL	O2-C2-C3-O3
10	A	945	NKP	CAG-OAF-PAC-OAD
10	A	945	NKP	CAL-CAM-CAN-CAO
9	A	938	GOL	O1-C1-C2-O2
10	A	945	NKP	CAU-CAV-CAW-CAX
10	A	945	NKP	CAT-CAU-CAV-CAW
10	A	945	NKP	CAY-CAZ-CBA-CBB
9	A	939	GOL	O1-C1-C2-O2
10	A	945	NKP	CAN-CAO-CAP-CAQ
9	A	939	GOL	O1-C1-C2-C3

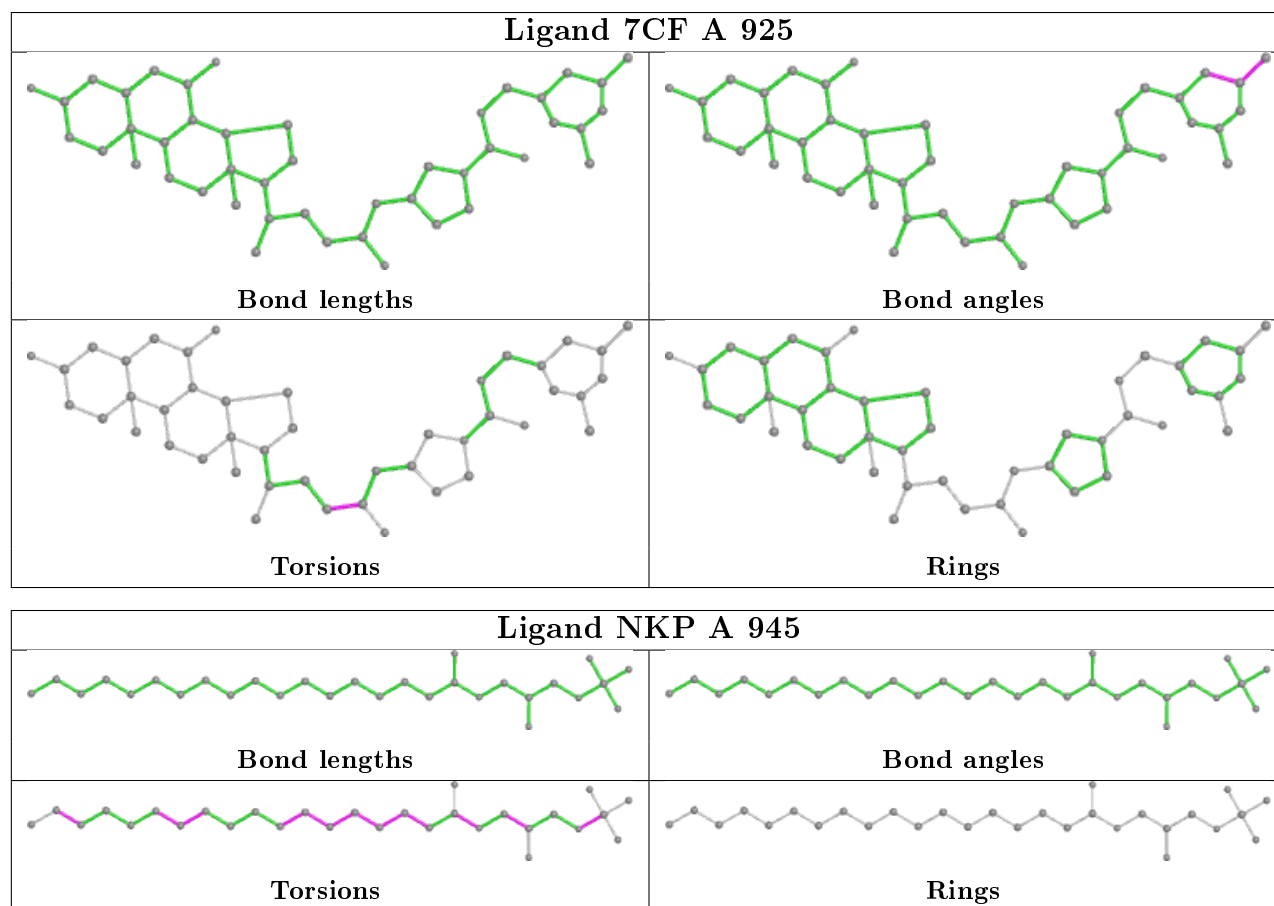
There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	A	945	NKP	1	0
8	A	929	SCN	1	0
8	A	941	SCN	1	0
8	A	942	SCN	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	774/827 (93%)	0.20	15 (1%) 66 71	19, 35, 59, 73	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	55	SER	3.9
1	A	417	ASP	2.9
1	A	470	PHE	2.7
1	A	458	LEU	2.6
1	A	91	GLU	2.5
1	A	59	LYS	2.4
1	A	67	GLU	2.4
1	A	312	PHE	2.4
1	A	646	GLU	2.4
1	A	645	PRO	2.3
1	A	401	LYS	2.3
1	A	69	GLY	2.2
1	A	416	PRO	2.2
1	A	538	THR	2.2
1	A	591	THR	2.1

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

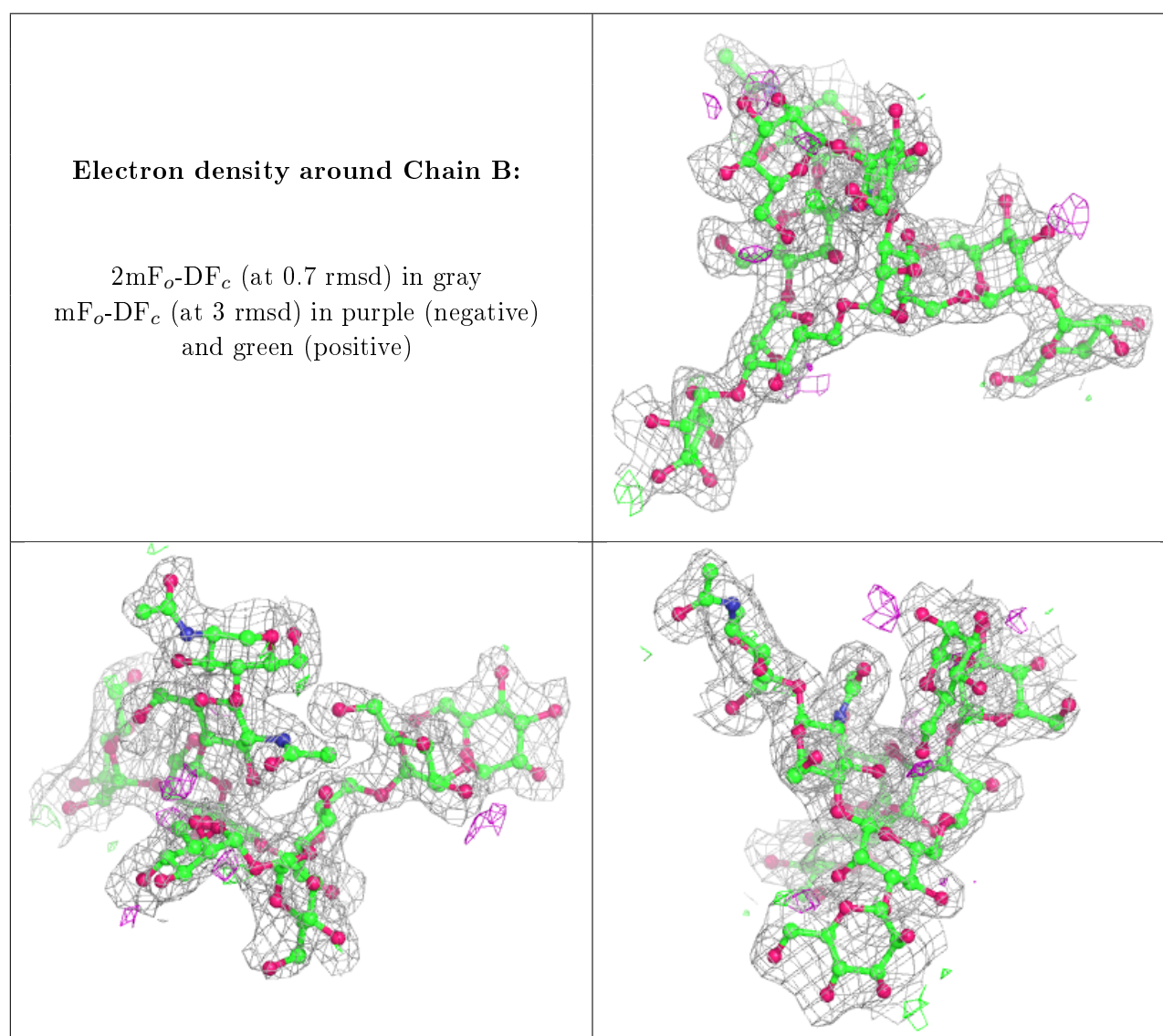
There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

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( $\text{\AA}^2$ )	Q<0.9
2	MAN	B	9	11/12	0.84	0.13	44,47,48,50	0
2	MAN	B	4	11/12	0.88	0.13	37,39,40,41	0
2	MAN	B	7	11/12	0.88	0.13	38,39,41,43	0
2	MAN	B	5	11/12	0.89	0.13	37,39,43,45	0
2	MAN	B	6	11/12	0.91	0.14	32,34,35,36	0
2	BMA	B	3	11/12	0.91	0.12	34,38,40,42	0
2	MAN	B	8	11/12	0.94	0.10	44,46,47,48	0
2	NAG	B	1	14/15	0.96	0.15	22,23,24,25	0
2	NAG	B	2	14/15	0.97	0.12	26,27,30,31	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

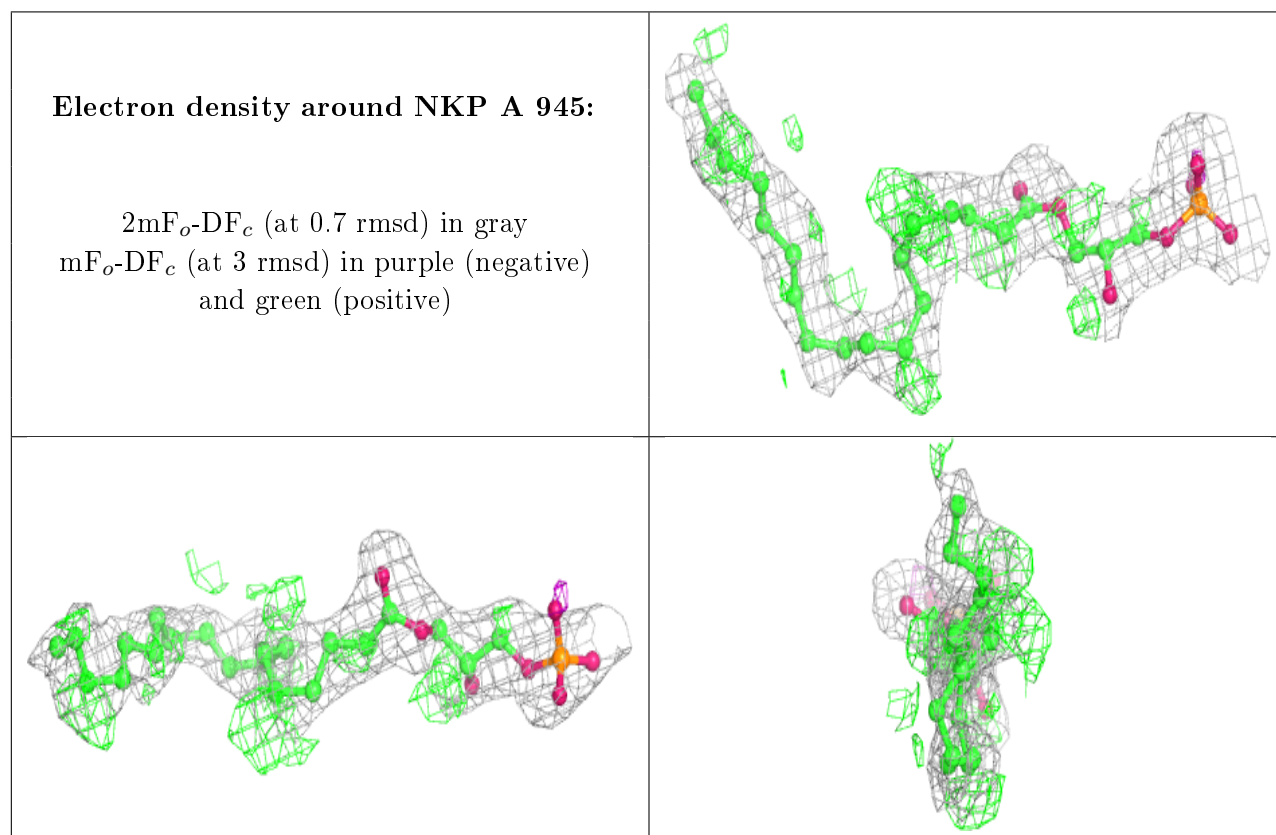


## 6.4 Ligands ⓘ

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.

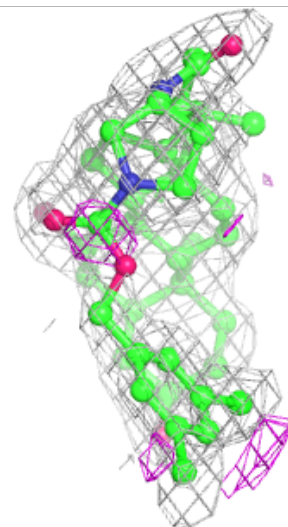
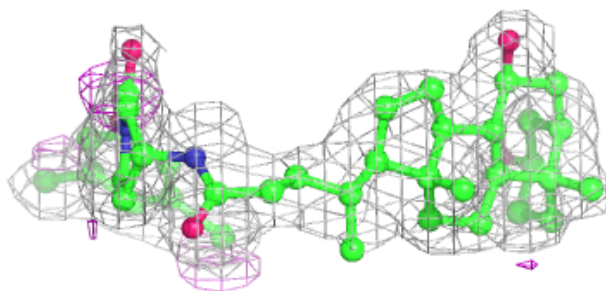
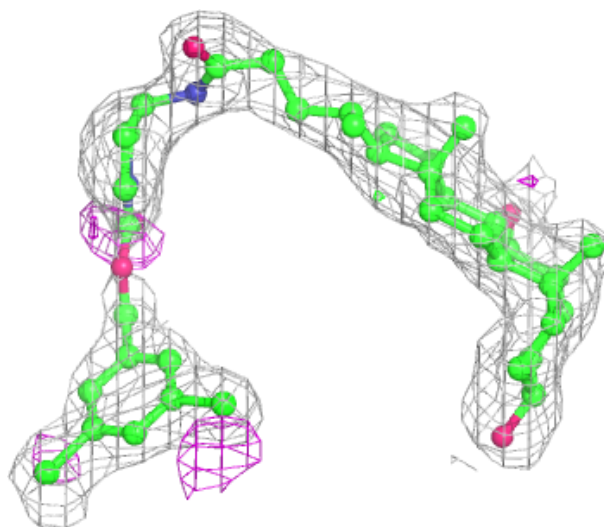
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
9	GOL	A	936	6/6	0.54	0.28	64,67,68,68	0
9	GOL	A	939	6/6	0.68	0.42	50,55,57,62	0
9	GOL	A	938	6/6	0.74	0.28	53,56,57,57	0
9	GOL	A	934	6/6	0.75	0.33	37,43,45,47	0
10	NKP	A	945	29/29	0.78	0.20	52,60,64,70	0
8	SCN	A	931	3/3	0.81	0.39	63,63,65,66	0
8	SCN	A	933	3/3	0.81	0.22	63,63,66,71	0
8	SCN	A	932	3/3	0.81	0.17	58,58,59,60	0
8	SCN	A	942	3/3	0.82	0.23	38,38,43,48	0
7	NA	A	926	1/1	0.82	0.09	60,60,60,60	0
9	GOL	A	935	6/6	0.83	0.25	46,48,49,53	0
8	SCN	A	944	3/3	0.83	0.38	38,38,43,48	0
9	GOL	A	940	6/6	0.83	0.24	40,44,44,51	0
6	7CF	A	925	45/45	0.84	0.15	40,42,57,65	0
9	GOL	A	937	6/6	0.86	0.26	57,58,59,60	0
7	NA	A	927	1/1	0.88	0.16	53,53,53,53	0
8	SCN	A	941	3/3	0.89	0.13	33,33,36,45	0
8	SCN	A	943	3/3	0.91	0.13	48,48,50,55	0
8	SCN	A	929	3/3	0.93	0.13	48,48,49,50	0
3	IOD	A	914	1/1	0.93	0.09	90,90,90,90	1
3	IOD	A	920	1/1	0.94	0.04	77,77,77,77	1
8	SCN	A	930	3/3	0.95	0.12	61,61,61,62	0
3	IOD	A	913	1/1	0.97	0.05	62,62,62,62	1
8	SCN	A	928	3/3	0.97	0.16	49,49,50,52	0
3	IOD	A	921	1/1	0.97	0.07	72,72,72,72	1
3	IOD	A	919	1/1	0.97	0.04	81,81,81,81	1
3	IOD	A	916	1/1	0.98	0.06	50,50,50,50	1
3	IOD	A	917	1/1	0.98	0.05	63,63,63,63	1
4	ZN	A	923	1/1	0.99	0.06	54,54,54,54	0
3	IOD	A	912	1/1	0.99	0.04	66,66,66,66	1
3	IOD	A	911	1/1	0.99	0.05	70,70,70,70	1
3	IOD	A	915	1/1	0.99	0.06	60,60,60,60	1
4	ZN	A	922	1/1	0.99	0.10	30,30,30,30	0
3	IOD	A	918	1/1	0.99	0.10	65,65,65,65	1
5	CA	A	924	1/1	1.00	0.14	24,24,24,24	0
3	IOD	A	910	1/1	1.00	0.10	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 7CF A 925:**

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers ⓘ

There are no such residues in this entry.