



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 10:20 PM UTC

PDB ID : 7G4S / pdb_00007g4s
Title : Crystal Structure of rat Autotaxin in complex with 3-(4-chlorophenyl)-5-methyl-N-(oxolan-2-ylmethyl)pyrazolo[1,5-a]pyrimidin-7-amine, i.e. SMILES C12=C(C=NN1C(=CC(=N2)C)NC[C@@H]1OCCC1)c1ccc(cc1)Cl with IC50=0.95455 microM
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Deposited on : 2023-06-05
Resolution : 1.79 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](#) ①) 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

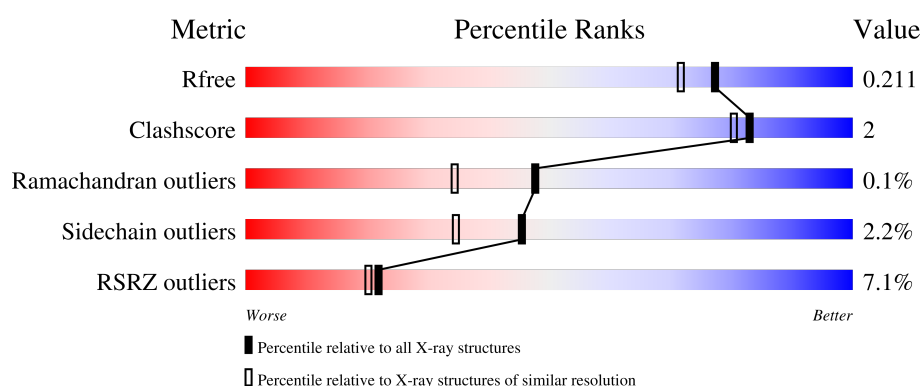
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

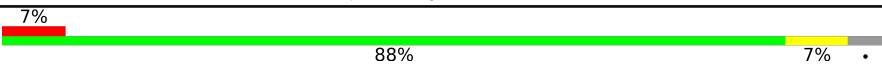
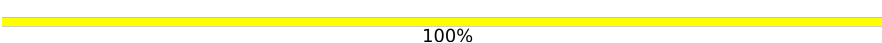
The reported resolution of this entry is 1.79 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	846	
2	B	7	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	MLI	A	907	-	-	X	-

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 7150 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.

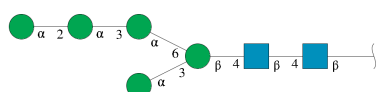
- Molecule 1 is a protein called Isoform 2 of Ectonucleotide pyrophosphatase/phosphodiesterase family member 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	808	6544	4151	1129	1215	49	0	4	0

There are 14 discrepancies between the modelled and reference sequences:

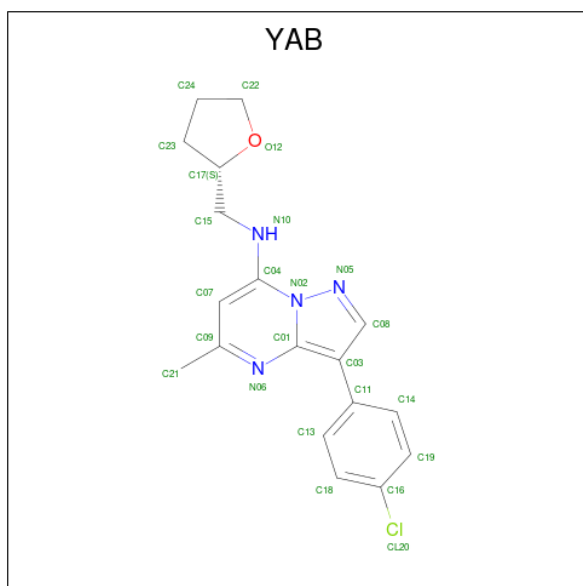
Chain	Residue	Modelled	Actual	Comment	Reference
A	53	ALA	ASN	engineered mutation	UNP Q64610
A	410	ALA	ASN	engineered mutation	UNP Q64610
A	591	THR	ARG	engineered mutation	UNP Q64610
A	863	GLY	-	expression tag	UNP Q64610
A	864	GLY	-	expression tag	UNP Q64610
A	865	ARG	-	expression tag	UNP Q64610
A	866	HIS	-	expression tag	UNP Q64610
A	867	HIS	-	expression tag	UNP Q64610
A	868	HIS	-	expression tag	UNP Q64610
A	869	HIS	-	expression tag	UNP Q64610
A	870	HIS	-	expression tag	UNP Q64610
A	871	HIS	-	expression tag	UNP Q64610
A	872	HIS	-	expression tag	UNP Q64610
A	873	HIS	-	expression tag	UNP Q64610

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-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.



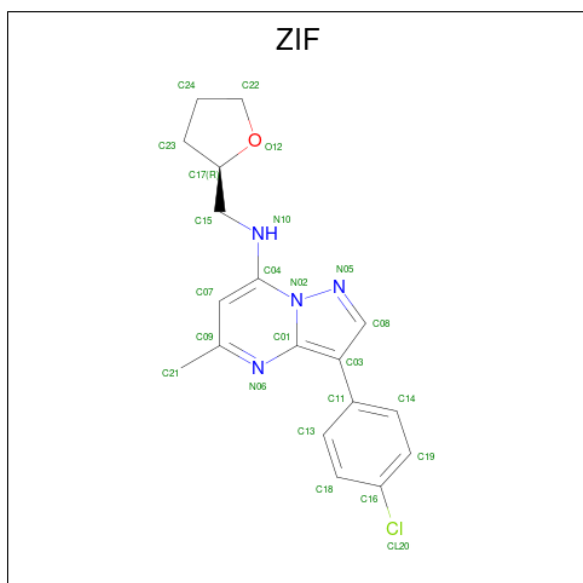
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	7	Total	C	N	O	0	0	0
			83	46	2	35			

- Molecule 3 is (8R)-3-(4-chlorophenyl)-5-methyl-N-{[(2S)-oxolan-2-yl]methyl}pyrazolo[1,5-a]pyrimidin-7-amine (CCD ID: YAB) (formula: $C_{18}H_{19}ClN_4O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	Cl	N	O	
			24	18	1	4	1	1

- Molecule 4 is (8R)-3-(4-chlorophenyl)-5-methyl-N-{[(2R)-oxolan-2-yl]methyl}pyrazolo[1,5-a]pyrimidin-7-amine (CCD ID: ZIF) (formula: $C_{18}H_{19}ClN_4O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	
			24	18	1	4	1	
							0	1

- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

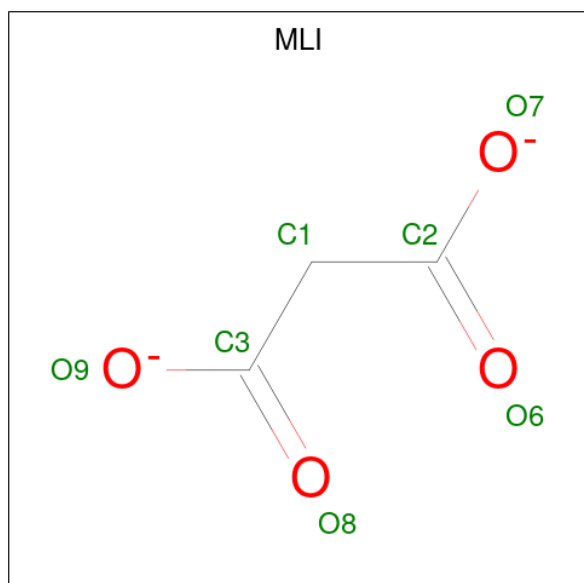
- Molecule 6 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	2	Total	Na		
			2	2	0	0

- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 8 is MALONATE ION (CCD ID: MLI) (formula: C₃H₂O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O		
			7	3	4	0	0

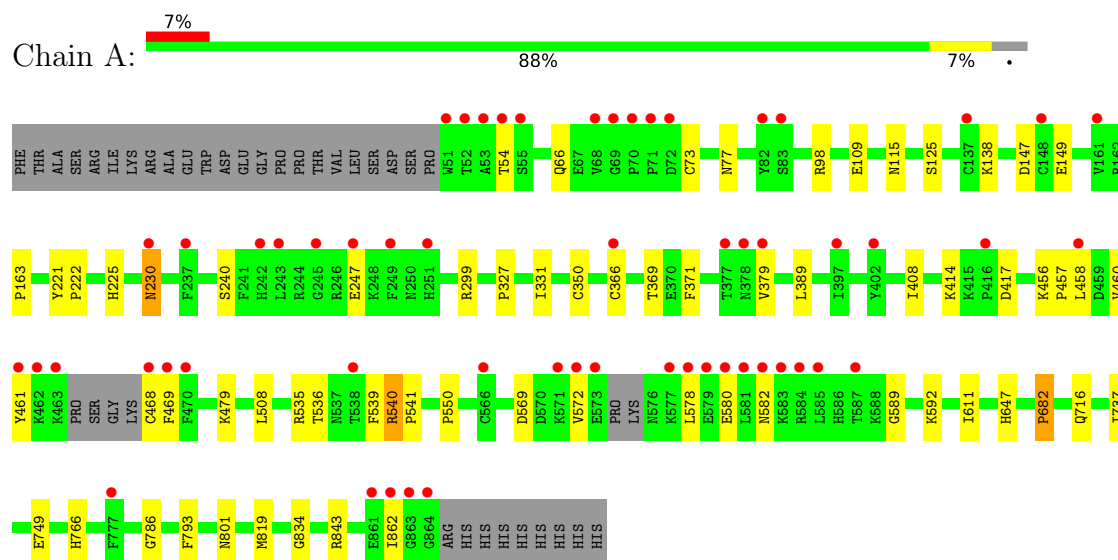
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	464	Total 464	O 464	0	0

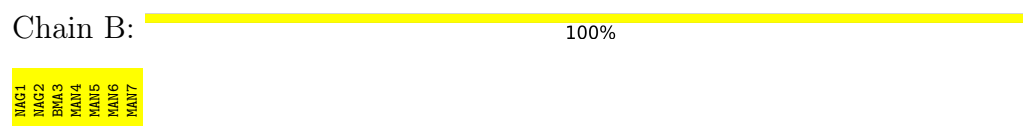
3 Residue-property plots

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

- Molecule 1: Isoform 2 of Ectonucleotide pyrophosphatase/phosphodiesterase family member 2



- Molecule 2: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-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 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	84.07Å 92.02Å 119.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.01 – 1.79 46.01 – 1.79	Depositor EDS
% Data completeness (in resolution range)	96.1 (46.01-1.79) 96.1 (46.01-1.79)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.41 (at 1.79Å)	Xtriage
Refinement program	REFMAC 5.7.0025	Depositor
R, R_{free}	0.190 , 0.225 (Not available) , 0.211	Depositor DCC
R_{free} test set	4476 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	23.8	Xtriage
Anisotropy	0.091	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 27.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7150	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: YAB, ZN, NAG, MAN, BMA, CA, MLI, NA, ZIF

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	0.99	4/6739 (0.1%)	1.03	6/9137 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	834	GLY	N-CA	6.44	1.54	1.45
1	A	682	PRO	CA-C	6.25	1.57	1.52
1	A	801	ASN	N-CA	-5.56	1.39	1.46
1	A	221	TYR	N-CA	5.37	1.51	1.45

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	147	ASP	CA-C-N	-5.91	111.96	122.07
1	A	147	ASP	C-N-CA	-5.91	111.96	122.07
1	A	540	ARG	CB-CA-C	5.28	116.14	110.65
1	A	149	GLU	N-CA-C	-5.17	99.54	108.69
1	A	299	ARG	CA-C-N	-5.09	114.99	120.03
1	A	299	ARG	C-N-CA	-5.09	114.99	120.03

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	6544	0	6301	31	0
2	B	83	0	70	0	0
3	A	24	0	0	0	0
4	A	24	0	0	0	0
5	A	1	0	0	0	0
6	A	2	0	0	0	0
7	A	1	0	0	0	0
8	A	7	0	2	2	0
9	A	464	0	0	4	0
All	All	7150	0	6373	31	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 (31) 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:230:ASN:H	1:A:230:ASN:HD22	1.20	0.87
1:A:539:PHE:O	1:A:541:PRO:HD3	1.91	0.71
1:A:98:ARG:HD2	9:A:1295:HOH:O	1.90	0.70
1:A:240:SER:O	1:A:247:GLU:HG2	1.93	0.68
1:A:230:ASN:HB3	8:A:907:MLI:O8	2.00	0.62
1:A:230:ASN:HD22	1:A:230:ASN:N	1.96	0.62
1:A:77[B]:ASN:OD1	9:A:1001:HOH:O	2.17	0.60
1:A:535:ARG:HG2	1:A:536:THR:HG23	1.84	0.60
1:A:163:PRO:HB3	1:A:350:CYS:O	2.06	0.56
1:A:327:PRO:O	1:A:331:ILE:HG12	2.07	0.54
1:A:222:PRO:HA	1:A:225:HIS:CE1	2.43	0.54
1:A:54:THR:HA	1:A:73:CYS:HB3	1.90	0.53
1:A:589:GLY:O	1:A:592:LYS:HG2	2.08	0.53
1:A:230:ASN:HB3	9:A:1009:HOH:O	2.09	0.53
1:A:371:PHE:CE1	1:A:457:PRO:HA	2.44	0.52
1:A:230:ASN:H	1:A:230:ASN:ND2	2.00	0.51
1:A:479:LYS:HE2	9:A:1073:HOH:O	2.13	0.48
1:A:550:PRO:HB2	1:A:611:ILE:HG12	1.96	0.48
1:A:786:GLY:HA2	1:A:843:ARG:NH1	2.29	0.47
1:A:230:ASN:CB	8:A:907:MLI:O8	2.62	0.47
1:A:468:CYS:SG	1:A:469:PHE:N	2.87	0.47
1:A:98:ARG:HG3	1:A:115:ASN:OD1	2.15	0.47
1:A:414:LYS:HD3	1:A:414:LYS:HA	1.67	0.46
1:A:793:PHE:CE2	1:A:819:MET:HE3	2.52	0.45
1:A:508:LEU:HD23	1:A:508:LEU:HA	1.84	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:682:PRO:HB3	1:A:716:GLN:HB3	1.99	0.43
1:A:737:ILE:HB	1:A:766:HIS:HB2	2.03	0.41
1:A:369:THR:HG21	1:A:460:VAL:HG21	2.02	0.41
1:A:458:LEU:HA	1:A:461[A]:TYR:CE2	2.56	0.40
1:A:540:ARG:HD3	1:A:540:ARG:HA	1.81	0.40
1:A:569:ASP:OD2	1:A:647:HIS:CD2	2.75	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	806/846 (95%)	783 (97%)	22 (3%)	1 (0%)	48 34

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	109	GLU

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	733/765 (96%)	717 (98%)	16 (2%)	45 34

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	GLN
1	A	125	SER
1	A	138	LYS
1	A	230	ASN
1	A	366	CYS
1	A	379	VAL
1	A	389	LEU
1	A	408	ILE
1	A	417	ASP
1	A	456	LYS
1	A	572	VAL
1	A	578	LEU
1	A	580	GLU
1	A	582	ASN
1	A	749	GLU
1	A	862	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	134	GLN
1	A	230	ASN
1	A	297	ASN
1	A	436	ASN
1	A	586	HIS
1	A	647	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

7 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	0.69	0	17,19,21	1.54	4 (23%)
2	NAG	B	2	2	14,14,15	0.83	0	17,19,21	1.23	2 (11%)
2	BMA	B	3	2	11,11,12	0.81	1 (9%)	15,15,17	1.20	2 (13%)
2	MAN	B	4	2	11,11,12	0.88	0	15,15,17	1.55	2 (13%)
2	MAN	B	5	2	11,11,12	0.85	1 (9%)	15,15,17	1.35	2 (13%)
2	MAN	B	6	2	11,11,12	0.80	0	15,15,17	1.35	3 (20%)
2	MAN	B	7	2	11,11,12	0.79	0	15,15,17	1.58	3 (20%)

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	-	1/2/19/22	0/1/1/1
2	MAN	B	4	2	-	0/2/19/22	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	-	2/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	5	MAN	C2-C3	2.14	1.55	1.52
2	B	3	BMA	C2-C3	2.02	1.55	1.52

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	7	MAN	C1-C2-C3	4.34	115.96	109.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	4	MAN	C1-O5-C5	4.30	117.95	112.19
2	B	6	MAN	C1-O5-C5	3.20	116.47	112.19
2	B	3	BMA	C1-O5-C5	3.13	116.38	112.19
2	B	2	NAG	O7-C7-C8	-2.90	116.89	122.05
2	B	1	NAG	O5-C1-C2	-2.90	106.81	111.29
2	B	4	MAN	O3-C3-C2	2.81	115.79	110.05
2	B	1	NAG	O5-C5-C6	2.71	112.94	107.66
2	B	1	NAG	O4-C4-C5	-2.53	103.09	109.32
2	B	6	MAN	C2-C3-C4	2.53	115.31	110.86
2	B	7	MAN	O5-C5-C6	2.52	112.56	107.66
2	B	5	MAN	C3-C4-C5	2.44	114.66	110.23
2	B	2	NAG	C1-O5-C5	2.35	115.33	112.19
2	B	7	MAN	C2-C3-C4	2.26	114.84	110.86
2	B	1	NAG	C1-O5-C5	2.26	115.21	112.19
2	B	6	MAN	O5-C5-C6	2.17	111.89	107.66
2	B	3	BMA	C1-C2-C3	2.05	112.63	109.64
2	B	5	MAN	C1-O5-C5	2.02	114.89	112.19

There are no chirality outliers.

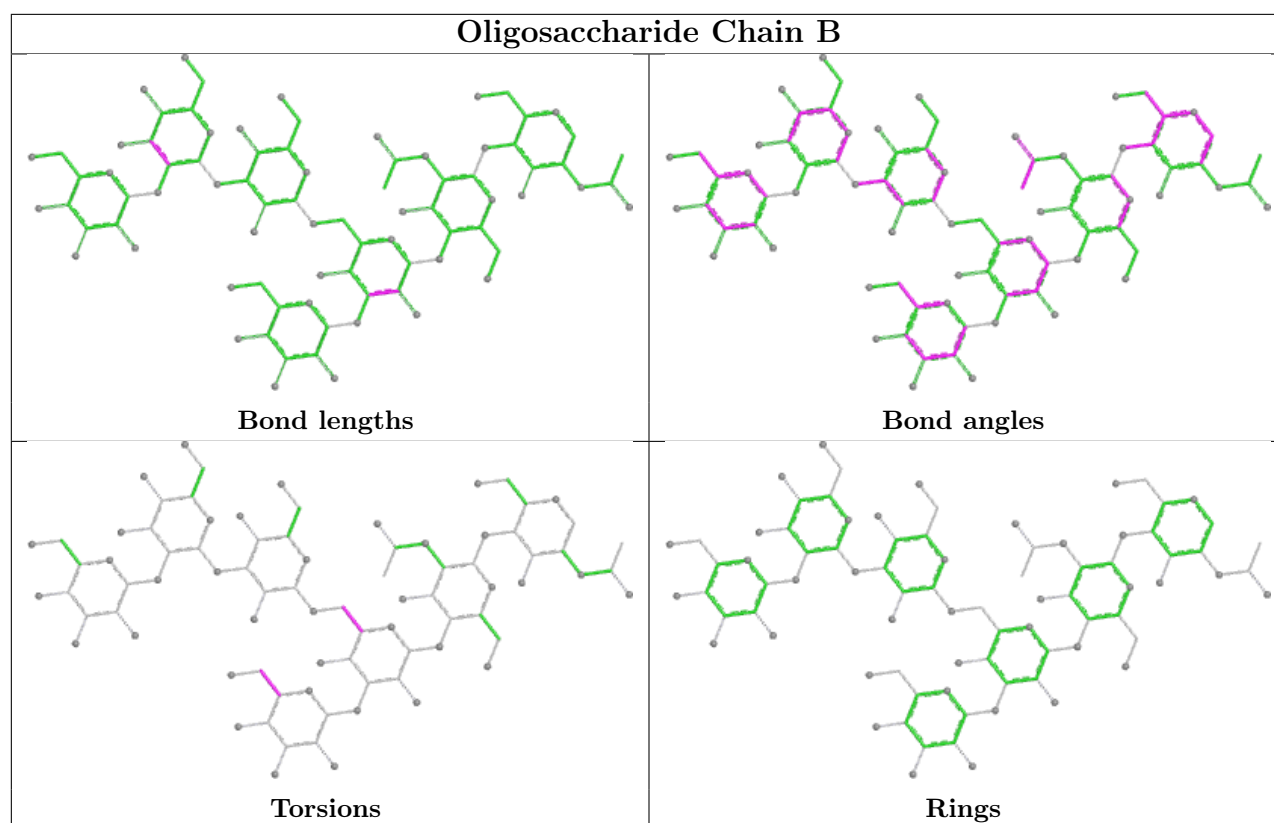
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	7	MAN	O5-C5-C6-O6
2	B	7	MAN	C4-C5-C6-O6
2	B	3	BMA	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 7 ligands modelled in this entry, 4 are monoatomic - leaving 3 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
4	ZIF	A	902[B]	-	26,27,27	2.65	7 (26%)	34,38,38	2.57	14 (41%)
8	MLI	A	907	5	6,6,6	1.76	3 (50%)	7,7,7	1.47	2 (28%)
3	YAB	A	901[A]	-	26,27,27	2.77	6 (23%)	34,38,38	2.67	12 (35%)

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
4	ZIF	A	902[B]	-	-	0/8/16/16	0/4/4/4
8	MLI	A	907	5	-	0/4/4/4	-
3	YAB	A	901[A]	-	-	2/8/16/16	0/4/4/4

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	901[A]	YAB	C04-N02	8.04	1.45	1.37
4	A	902[B]	ZIF	C04-N02	6.89	1.44	1.37
3	A	901[A]	YAB	C01-N06	6.05	1.48	1.34
4	A	902[B]	ZIF	C01-N06	6.01	1.48	1.34
4	A	902[B]	ZIF	C09-N06	5.92	1.41	1.33
3	A	901[A]	YAB	C09-N06	5.76	1.41	1.33
3	A	901[A]	YAB	C08-N05	5.31	1.40	1.32
4	A	902[B]	ZIF	C08-N05	5.17	1.40	1.32
4	A	902[B]	ZIF	C07-C04	3.98	1.44	1.38
3	A	901[A]	YAB	C07-C04	3.84	1.44	1.38
4	A	902[B]	ZIF	C03-C01	-2.47	1.39	1.43
8	A	907	MLI	C1-C3	2.40	1.54	1.51
3	A	901[A]	YAB	C03-C01	-2.28	1.40	1.43
4	A	902[B]	ZIF	C07-C09	2.05	1.45	1.41
8	A	907	MLI	O9-C3	-2.01	1.24	1.30
8	A	907	MLI	C1-C2	2.01	1.54	1.51

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	901[A]	YAB	C04-N02-N05	6.45	132.72	125.79
3	A	901[A]	YAB	C01-N06-C09	6.29	121.11	116.83
4	A	902[B]	ZIF	C01-N06-C09	6.06	120.96	116.83
3	A	901[A]	YAB	C08-N05-N02	5.37	107.21	103.43
4	A	902[B]	ZIF	C07-C04-N02	5.35	121.62	114.85
4	A	902[B]	ZIF	C04-N02-N05	5.31	131.50	125.79
3	A	901[A]	YAB	C07-C04-N02	4.93	121.08	114.85
4	A	902[B]	ZIF	C08-N05-N02	4.85	106.84	103.43
3	A	901[A]	YAB	C07-C09-N06	-4.26	118.51	122.71
4	A	902[B]	ZIF	C08-C03-C01	4.00	107.98	104.42
4	A	902[B]	ZIF	C07-C09-N06	-3.99	118.78	122.71
4	A	902[B]	ZIF	C03-C08-N05	-3.78	108.46	113.29
3	A	901[A]	YAB	C03-C08-N05	-3.57	108.72	113.29
3	A	901[A]	YAB	C01-N02-N05	-3.53	108.52	112.24
3	A	901[A]	YAB	C08-C03-C01	3.45	107.49	104.42
4	A	902[B]	ZIF	C03-C01-N06	3.36	132.39	125.03

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	901[A]	YAB	C03-C01-N06	3.00	131.58	125.03
4	A	902[B]	ZIF	C17-C15-N10	-2.84	106.33	111.98
4	A	902[B]	ZIF	C01-N02-N05	-2.78	109.31	112.24
3	A	901[A]	YAB	C13-C11-C03	-2.64	117.19	120.98
4	A	902[B]	ZIF	C13-C11-C03	-2.62	117.21	120.98
3	A	901[A]	YAB	C15-N10-C04	-2.61	110.63	126.04
3	A	901[A]	YAB	C07-C04-N10	-2.33	120.70	127.46
4	A	902[B]	ZIF	C21-C09-C07	2.28	123.41	120.44
8	A	907	MLI	O7-C2-C1	2.19	121.28	114.51
4	A	902[B]	ZIF	C14-C11-C13	2.08	121.21	118.57
8	A	907	MLI	O9-C3-O8	-2.06	118.05	123.33
4	A	902[B]	ZIF	C15-N10-C04	-2.01	114.22	126.04

There are no chirality outliers.

All (2) torsion outliers are listed below:

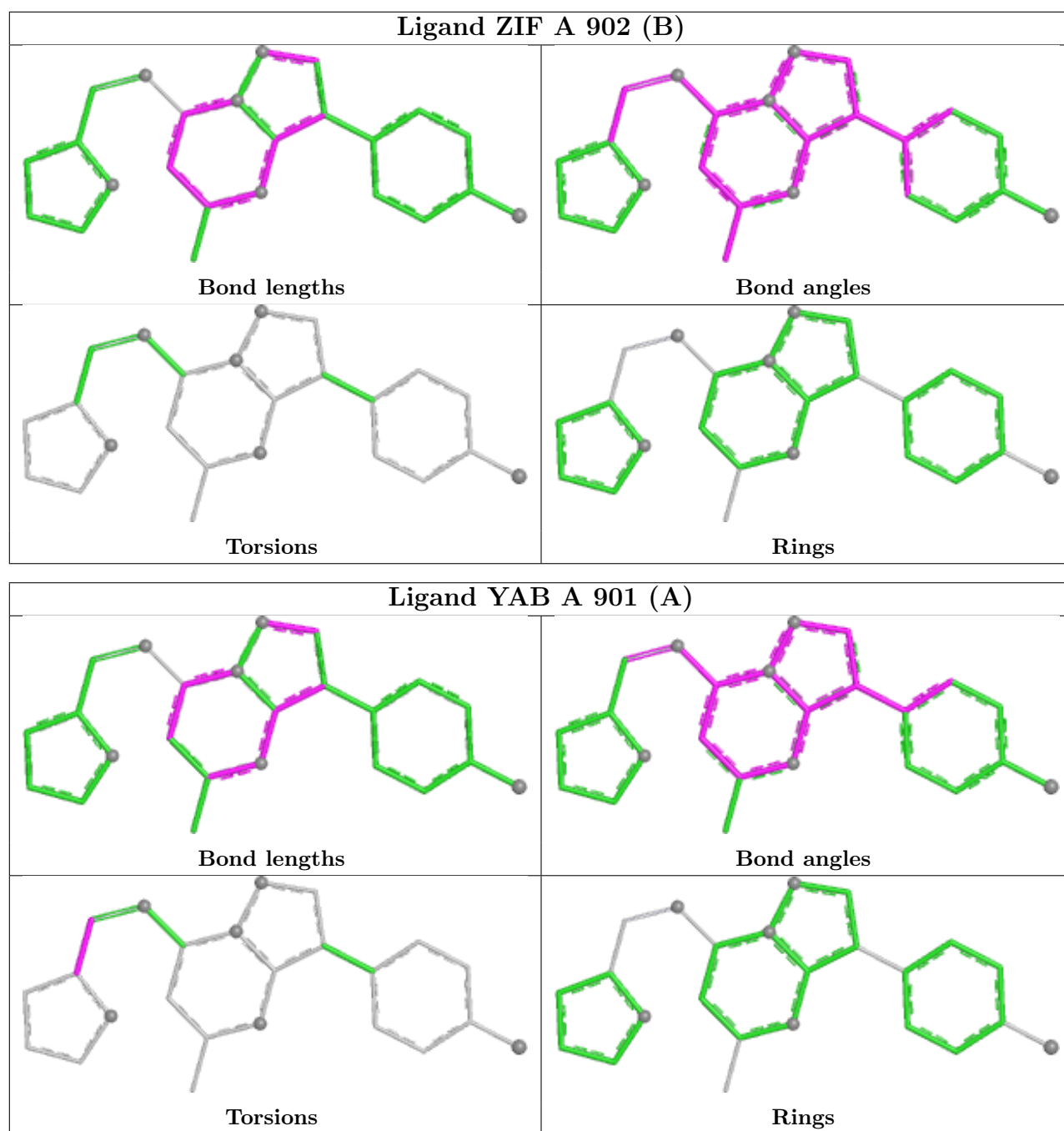
Mol	Chain	Res	Type	Atoms
3	A	901[A]	YAB	N10-C15-C17-C23
3	A	901[A]	YAB	N10-C15-C17-O12

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	907	MLI	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 ⓘ

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	808/846 (95%)	0.20	57 (7%) 22 20	11, 25, 60, 80	4 (0%)

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	469	PHE	7.6
1	A	578	LEU	6.9
1	A	572	VAL	6.5
1	A	864	GLY	5.9
1	A	51	TRP	5.8
1	A	862	ILE	5.7
1	A	581	LEU	5.2
1	A	863	GLY	5.1
1	A	468	CYS	5.0
1	A	68	VAL	4.4
1	A	54	THR	4.3
1	A	71	PRO	4.2
1	A	70	PRO	4.2
1	A	462	LYS	3.7
1	A	237	PHE	3.7
1	A	243	LEU	3.7
1	A	52	THR	3.7
1	A	249	PHE	3.5
1	A	585	LEU	3.4
1	A	580	GLU	3.1
1	A	463	LYS	3.1
1	A	55	SER	3.1
1	A	53	ALA	3.0
1	A	366	CYS	3.0
1	A	566	CYS	3.0
1	A	582	ASN	2.8
1	A	579	GLU	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	378	ASN	2.8
1	A	245	GLY	2.8
1	A	470	PHE	2.7
1	A	573	GLU	2.7
1	A	584	ARG	2.7
1	A	247	GLU	2.7
1	A	148	CYS	2.7
1	A	161	VAL	2.7
1	A	251	HIS	2.6
1	A	379	VAL	2.5
1	A	69	GLY	2.5
1	A	577	LYS	2.5
1	A	416	PRO	2.5
1	A	461[A]	TYR	2.5
1	A	137	CYS	2.4
1	A	777	PHE	2.4
1	A	397	ILE	2.4
1	A	587	THR	2.3
1	A	83	SER	2.3
1	A	402	TYR	2.3
1	A	72	ASP	2.3
1	A	230	ASN	2.2
1	A	583	LYS	2.2
1	A	861	GLU	2.1
1	A	242	HIS	2.1
1	A	377	THR	2.1
1	A	538	THR	2.1
1	A	571	LYS	2.1
1	A	82	TYR	2.1
1	A	458	LEU	2.0

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

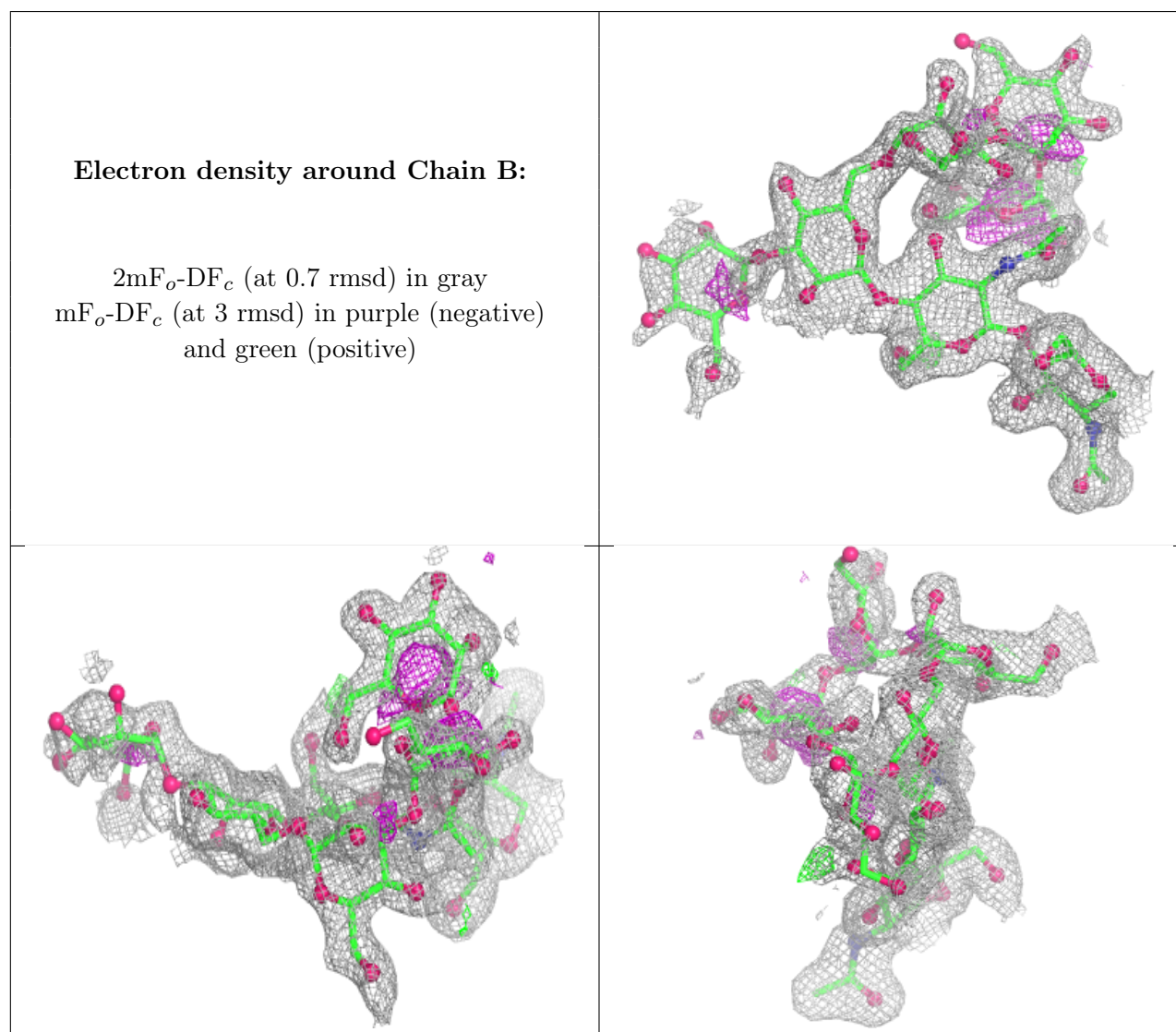
There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

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
2	MAN	B	7	11/12	0.43	0.17	79,80,80,80	0
2	BMA	B	3	11/12	0.59	0.16	65,71,77,80	0
2	MAN	B	4	11/12	0.74	0.13	58,65,68,68	0
2	MAN	B	5	11/12	0.79	0.15	55,63,66,75	0
2	MAN	B	6	11/12	0.80	0.17	33,53,56,56	0
2	NAG	B	2	14/15	0.90	0.09	27,35,50,61	0
2	NAG	B	1	14/15	0.97	0.06	15,18,22,23	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 [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

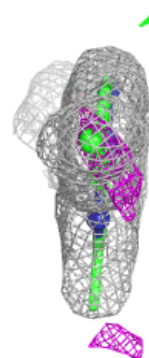
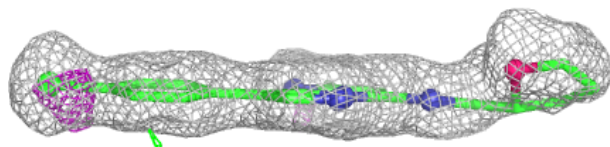
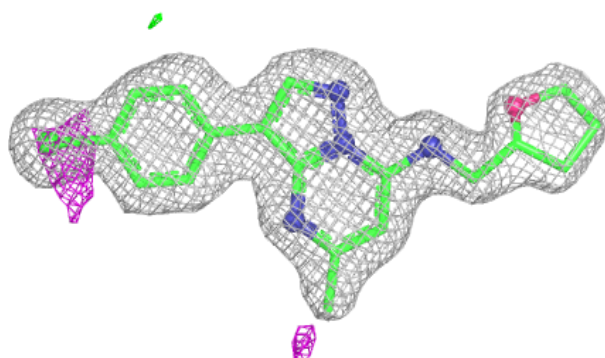
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

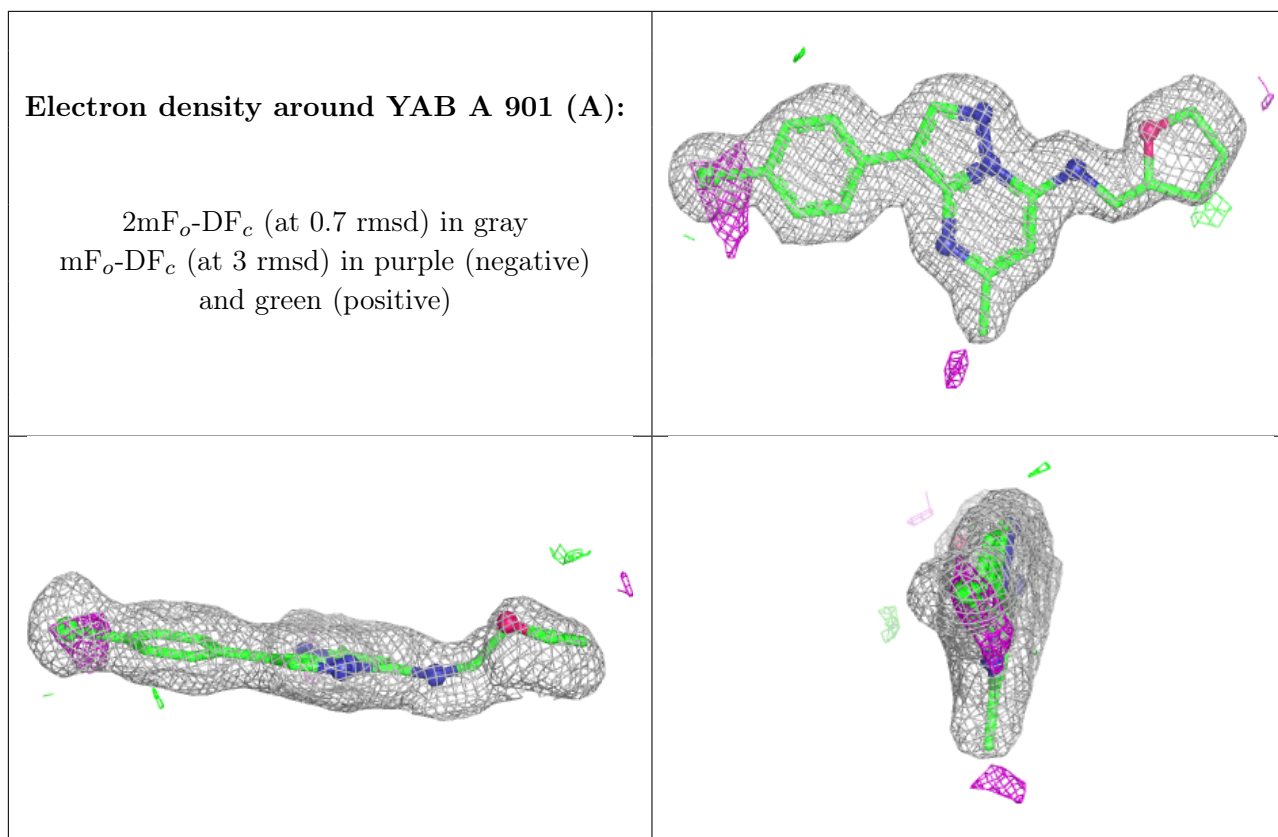
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
8	MLI	A	907	7/7	0.92	0.10	27,32,39,44	0
4	ZIF	A	902[B]	24/24	0.93	0.09	22,25,30,33	24
6	NA	A	904	1/1	0.94	0.09	33,33,33,33	0
3	YAB	A	901[A]	24/24	0.94	0.08	22,25,31,33	24
6	NA	A	906	1/1	0.95	0.06	48,48,48,48	0
7	CA	A	905	1/1	0.99	0.05	19,19,19,19	0
5	ZN	A	903	1/1	0.99	0.03	22,22,22,22	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 ZIF A 902 (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.