



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:53 AM UTC

PDB ID : 8F87 / pdb_00008f87
Title : Crystal structure of Ebola Zaire envelope glycoprotein GP in complex with compound ARN75092
Authors : Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on : 2022-11-21
Resolution : 2.60 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

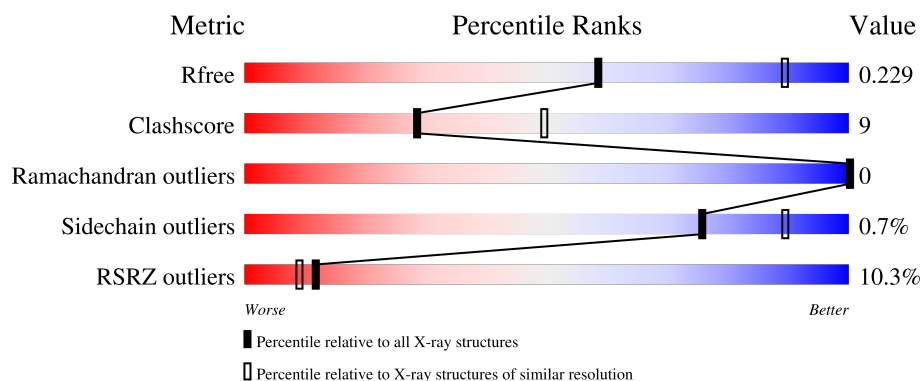
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	291	7% 69% 13% 18%
2	B	168	9% 56% 13% 30%
3	C	5	20% 60% 20%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 2886 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 GP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	239	Total	C	N	O	S	0	1	0
			1814	1160	307	342	5			

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	28	GLU	-	cloning artifact	UNP Q05320
A	29	THR	-	cloning artifact	UNP Q05320
A	30	GLY	-	cloning artifact	UNP Q05320
A	31	ARG	-	cloning artifact	UNP Q05320
A	42	ALA	THR	engineered mutation	UNP Q05320
A	352	UNK	ASN	conflict	UNP Q05320
A	353	UNK	GLY	conflict	UNP Q05320
A	354	UNK	ALA	conflict	UNP Q05320
A	355	UNK	LYS	conflict	UNP Q05320
A	356	UNK	ASN	conflict	UNP Q05320
A	357	UNK	ILE	conflict	UNP Q05320

- Molecule 2 is a protein called GP2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	117	Total	C	N	O	S	0	1	0
			910	580	161	163	6			

There are 38 discrepancies between the modelled and reference sequences:

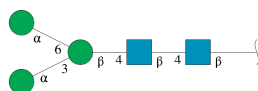
Chain	Residue	Modelled	Actual	Comment	Reference
B	613	ALA	HIS	engineered mutation	UNP Q05320
B	633	GLY	-	expression tag	UNP Q05320
B	634	SER	-	expression tag	UNP Q05320
B	635	GLY	-	expression tag	UNP Q05320
B	636	TYR	-	expression tag	UNP Q05320

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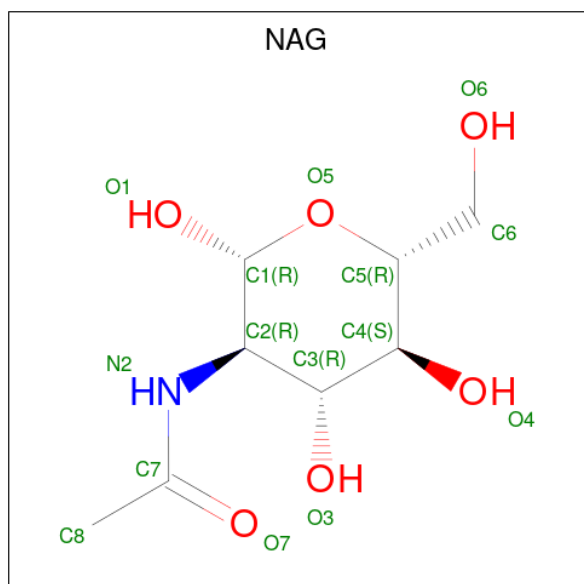
Chain	Residue	Modelled	Actual	Comment	Reference
B	637	ILE	-	expression tag	UNP Q05320
B	638	PRO	-	expression tag	UNP Q05320
B	639	GLU	-	expression tag	UNP Q05320
B	640	ALA	-	expression tag	UNP Q05320
B	641	PRO	-	expression tag	UNP Q05320
B	642	ARG	-	expression tag	UNP Q05320
B	643	ASP	-	expression tag	UNP Q05320
B	644	GLY	-	expression tag	UNP Q05320
B	645	GLN	-	expression tag	UNP Q05320
B	646	ALA	-	expression tag	UNP Q05320
B	647	TYR	-	expression tag	UNP Q05320
B	648	VAL	-	expression tag	UNP Q05320
B	649	ARG	-	expression tag	UNP Q05320
B	650	LYS	-	expression tag	UNP Q05320
B	651	ASP	-	expression tag	UNP Q05320
B	652	GLY	-	expression tag	UNP Q05320
B	653	GLU	-	expression tag	UNP Q05320
B	654	TRP	-	expression tag	UNP Q05320
B	655	VAL	-	expression tag	UNP Q05320
B	656	LEU	-	expression tag	UNP Q05320
B	657	LEU	-	expression tag	UNP Q05320
B	658	SER	-	expression tag	UNP Q05320
B	659	THR	-	expression tag	UNP Q05320
B	660	PHE	-	expression tag	UNP Q05320
B	661	LEU	-	expression tag	UNP Q05320
B	662	GLY	-	expression tag	UNP Q05320
B	663	THR	-	expression tag	UNP Q05320
B	664	HIS	-	expression tag	UNP Q05320
B	665	HIS	-	expression tag	UNP Q05320
B	666	HIS	-	expression tag	UNP Q05320
B	667	HIS	-	expression tag	UNP Q05320
B	668	HIS	-	expression tag	UNP Q05320
B	669	HIS	-	expression tag	UNP Q05320

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



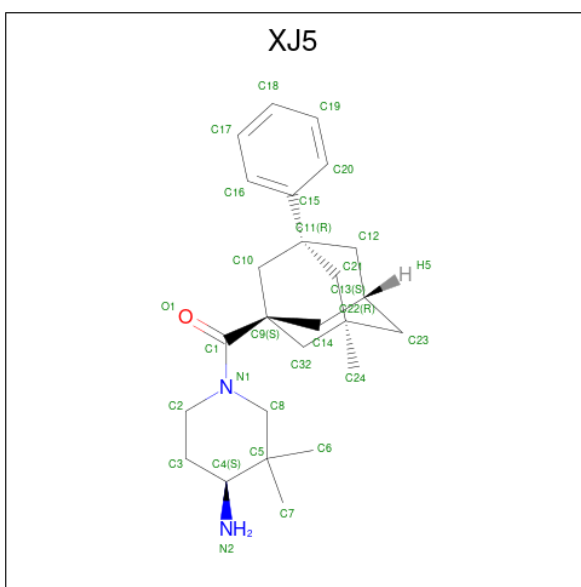
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	5	Total	C	N	O	0	0	0
			61	34	2	25			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



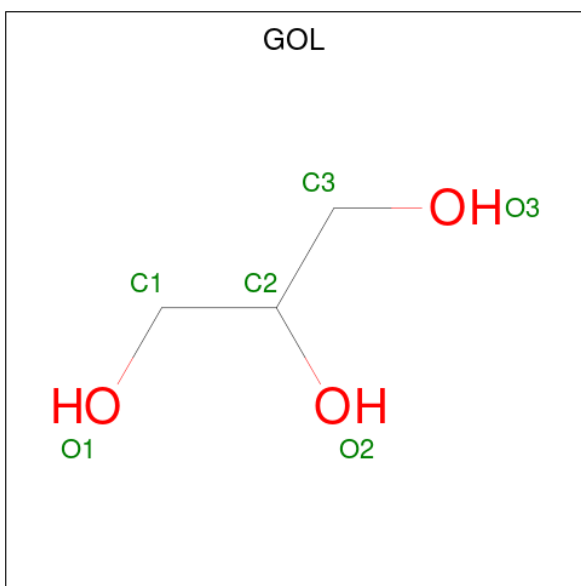
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 5 is [(4S)-4-amino-3,3-dimethylpiperidin-1-yl][(1S,3R,5R,7S)-3-methyl-5-phenyladamantan-1-yl]methanone (CCD ID: XJ5) (formula: $C_{25}H_{36}N_2O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			28	25	2	1		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

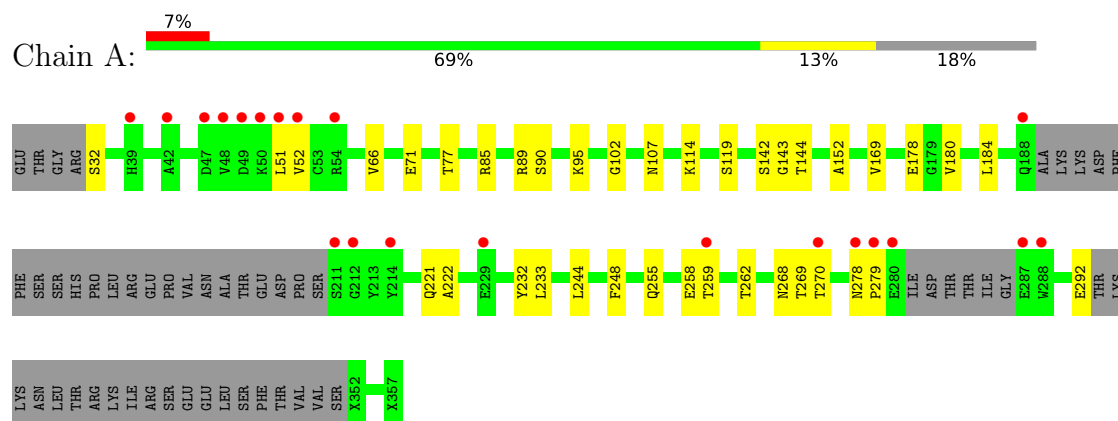
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	9	Total 9	O 9	0	0
7	B	2	Total 2	O 2	0	0

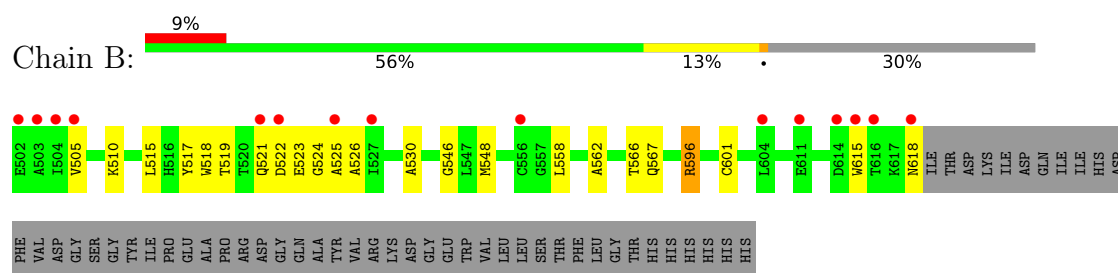
3 Residue-property plots [i](#)

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: GP1



• Molecule 2: GP2



• Molecule 3: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]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	H 3 2	Depositor
Cell constants a, b, c, α , β , γ	113.20Å 113.20Å 306.02Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	51.00 – 2.60 51.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.8 (51.00-2.60) 94.7 (51.00-2.60)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.37 (at 2.62Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.218 , 0.228 0.221 , 0.229	Depositor DCC
R_{free} test set	1115 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å ²)	61.7	Xtriage
Anisotropy	0.502	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 63.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2886	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.43% 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: XJ5, NAG, MAN, GOL, BMA

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	0.15	0/1832	0.34	0/2499
2	B	0.14	0/936	0.28	0/1277
All	All	0.15	0/2768	0.32	0/3776

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	596[A]	ARG	Sidechain
2	B	596[B]	ARG	Sidechain

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	1814	0	1685	30	1
2	B	910	0	870	23	1
3	C	61	0	52	1	0
4	A	56	0	52	4	0
5	A	28	0	0	8	0
6	B	6	0	8	0	0
7	A	9	0	0	0	0
7	B	2	0	0	0	0
All	All	2886	0	2667	49	1

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 9.

All (49) 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)
4:A:404:NAG:C1	4:A:404:NAG:H82	2.08	0.82
5:A:405:XJ5:C23	2:B:548:MET:HE1	2.13	0.79
5:A:405:XJ5:C19	2:B:515:LEU:HD21	2.16	0.76
1:A:292:GLU:OE2	2:B:510:LYS:NZ	2.21	0.74
4:A:404:NAG:C1	4:A:404:NAG:C8	2.67	0.72
2:B:526:ALA:HB1	2:B:530:ALA:HB3	1.73	0.71
5:A:405:XJ5:C13	2:B:548:MET:HE1	2.23	0.69
1:A:71:GLU:OE2	1:A:107:ASN:N	2.25	0.68
1:A:244:LEU:HD12	1:A:248:PHE:HD2	1.64	0.63
1:A:51:LEU:HD11	2:B:596[A]:ARG:HG2	1.82	0.62
1:A:52:VAL:O	2:B:596[B]:ARG:NH2	2.35	0.60
1:A:66:VAL:HG13	5:A:405:XJ5:C18	2.33	0.59
2:B:615:TRP:CZ3	2:B:618:ASN:ND2	2.71	0.58
1:A:184:LEU:CD2	2:B:558:LEU:HD11	2.32	0.58
1:A:51:LEU:HD11	2:B:596[B]:ARG:HG2	1.84	0.58
4:A:404:NAG:H83	4:A:404:NAG:H3	1.86	0.57
1:A:66:VAL:HG11	5:A:405:XJ5:C19	2.36	0.56
1:A:152:ALA:O	1:A:169:VAL:HA	2.06	0.55
1:A:66:VAL:CG1	5:A:405:XJ5:C19	2.86	0.54
2:B:596[A]:ARG:HH11	2:B:596[A]:ARG:HG3	1.72	0.54
1:A:85:ARG:NH2	1:A:178:GLU:OE1	2.31	0.52
1:A:255:GLN:O	1:A:259:THR:HG23	2.11	0.50
1:A:269:THR:OG1	1:A:270:THR:N	2.47	0.48
1:A:184:LEU:HD23	2:B:558:LEU:HD11	1.95	0.47
5:A:405:XJ5:C20	2:B:515:LEU:HD21	2.45	0.47
2:B:521:GLN:OE1	2:B:522:ASP:N	2.42	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:244:LEU:HD12	1:A:248:PHE:CD2	2.47	0.46
1:A:142:SER:O	1:A:221[A]:GLN:HA	2.15	0.46
1:A:89:ARG:HG3	1:A:90:SER:N	2.31	0.46
1:A:142:SER:O	1:A:221[B]:GLN:HA	2.16	0.45
1:A:258:GLU:O	1:A:262:THR:HG23	2.17	0.45
2:B:521:GLN:OE1	2:B:521:GLN:HA	2.16	0.44
5:A:405:XJ5:C6	2:B:519:THR:HG21	2.48	0.44
1:A:232:TYR:O	1:A:233:LEU:HD12	2.18	0.44
2:B:505:VAL:O	2:B:505:VAL:HG23	2.17	0.44
1:A:114:LYS:O	1:A:144:THR:HA	2.17	0.44
1:A:102:GLY:HA3	2:B:518:TRP:CZ2	2.52	0.43
2:B:566:THR:O	2:B:567:GLN:C	2.60	0.43
1:A:268:ASN:OD1	4:A:404:NAG:O5	2.36	0.43
1:A:278:ASN:O	1:A:279:PRO:C	2.62	0.43
1:A:71:GLU:HG2	1:A:77:THR:HG21	2.00	0.42
2:B:517:TYR:CZ	2:B:546:GLY:HA3	2.53	0.42
3:C:3:BMA:H61	3:C:5:MAN:H2	1.72	0.42
1:A:143:GLY:HA3	1:A:222:ALA:O	2.19	0.42
1:A:95:LYS:HD3	1:A:95:LYS:HA	1.93	0.41
1:A:268:ASN:OD1	1:A:268:ASN:N	2.51	0.41
2:B:524:GLY:O	2:B:525:ALA:C	2.65	0.40
2:B:505:VAL:O	2:B:505:VAL:CG2	2.70	0.40
1:A:180:VAL:HG23	2:B:562:ALA:HB1	2.04	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:32:SER:N	2:B:523:GLU:OE1[3_455]	2.07	0.13

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	228/291 (78%)	220 (96%)	8 (4%)	0	100	100
2	B	116/168 (69%)	107 (92%)	9 (8%)	0	100	100
All	All	344/459 (75%)	327 (95%)	17 (5%)	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	184/245 (75%)	183 (100%)	1 (0%)	81	92
2	B	91/139 (66%)	90 (99%)	1 (1%)	65	84
All	All	275/384 (72%)	273 (99%)	2 (1%)	76	89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	119	SER
2	B	601	CYS

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

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 ⓘ

5 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
3	NAG	C	1	3,2	14,14,15	0.36	0	17,19,21	0.70	1 (5%)
3	NAG	C	2	3	14,14,15	0.39	0	17,19,21	0.53	0
3	BMA	C	3	3	11,11,12	1.17	2 (18%)	15,15,17	0.92	0
3	MAN	C	4	3	11,11,12	1.15	1 (9%)	15,15,17	0.79	0
3	MAN	C	5	3	11,11,12	1.03	0	15,15,17	0.79	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	NAG	C	1	3,2	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
3	BMA	C	3	3	-	2/2/19/22	0/1/1/1
3	MAN	C	4	3	-	2/2/19/22	0/1/1/1
3	MAN	C	5	3	-	2/2/19/22	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	3	BMA	C2-C3	2.77	1.56	1.52
3	C	3	BMA	C1-C2	2.41	1.58	1.52
3	C	4	MAN	C2-C3	2.01	1.55	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	NAG	C1-O5-C5	2.24	115.19	112.19

There are no chirality outliers.

All (8) torsion outliers are listed below:

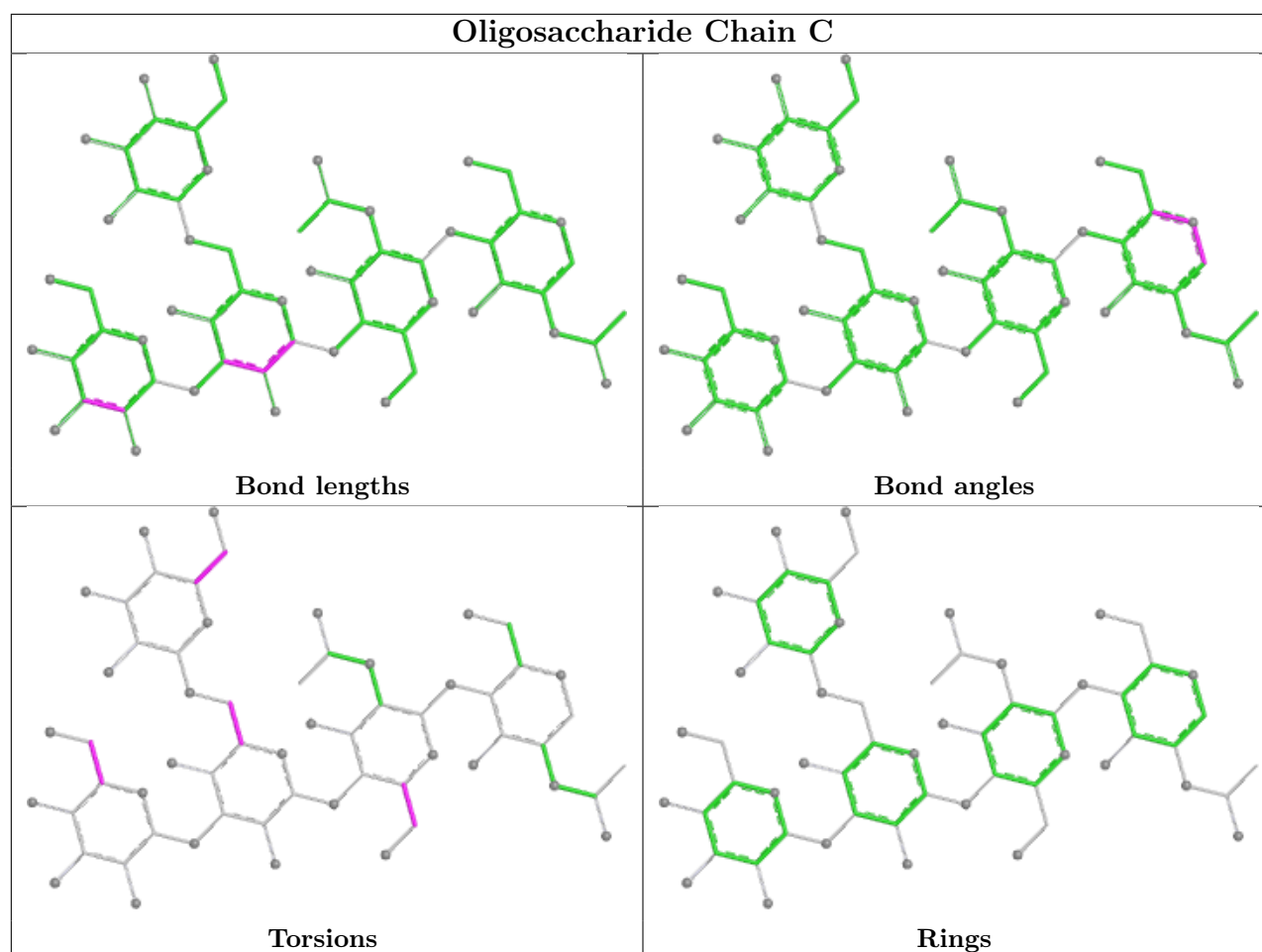
Mol	Chain	Res	Type	Atoms
3	C	3	BMA	O5-C5-C6-O6
3	C	3	BMA	C4-C5-C6-O6
3	C	2	NAG	O5-C5-C6-O6
3	C	4	MAN	C4-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6
3	C	5	MAN	C4-C5-C6-O6
3	C	4	MAN	O5-C5-C6-O6
3	C	5	MAN	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	5	MAN	1	0
3	C	3	BMA	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 oligosaccharide.



5.6 Ligand geometry [i](#)

6 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	$\# Z > 2$
4	NAG	A	404	1	14,14,15	0.22	0	17,19,21	0.60	0
6	GOL	B	901	-	5,5,5	0.97	0	5,5,5	1.05	0
4	NAG	A	403	1	14,14,15	0.39	0	17,19,21	0.46	0
5	XJ5	A	405	-	29,32,32	0.41	0	49,53,53	0.54	0
4	NAG	A	402	1	14,14,15	0.40	0	17,19,21	0.35	0
4	NAG	A	401	1	14,14,15	0.40	0	17,19,21	0.43	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
4	NAG	A	404	1	-	3/6/23/26	0/1/1/1
6	GOL	B	901	-	-	0/4/4/4	-
4	NAG	A	403	1	-	1/6/23/26	0/1/1/1
5	XJ5	A	405	-	-	8/16/65/65	1/6/5/5
4	NAG	A	402	1	-	0/6/23/26	0/1/1/1
4	NAG	A	401	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	404	NAG	C1-C2-N2-C7
5	A	405	XJ5	O1-C1-N1-C8
4	A	404	NAG	C8-C7-N2-C2
4	A	404	NAG	O7-C7-N2-C2
4	A	403	NAG	O5-C5-C6-O6
5	A	405	XJ5	C9-C1-N1-C8
5	A	405	XJ5	C12-C11-C15-C20
5	A	405	XJ5	C12-C11-C15-C16
5	A	405	XJ5	C21-C11-C15-C20
5	A	405	XJ5	C10-C11-C15-C20
5	A	405	XJ5	C21-C11-C15-C16
5	A	405	XJ5	C10-C11-C15-C16

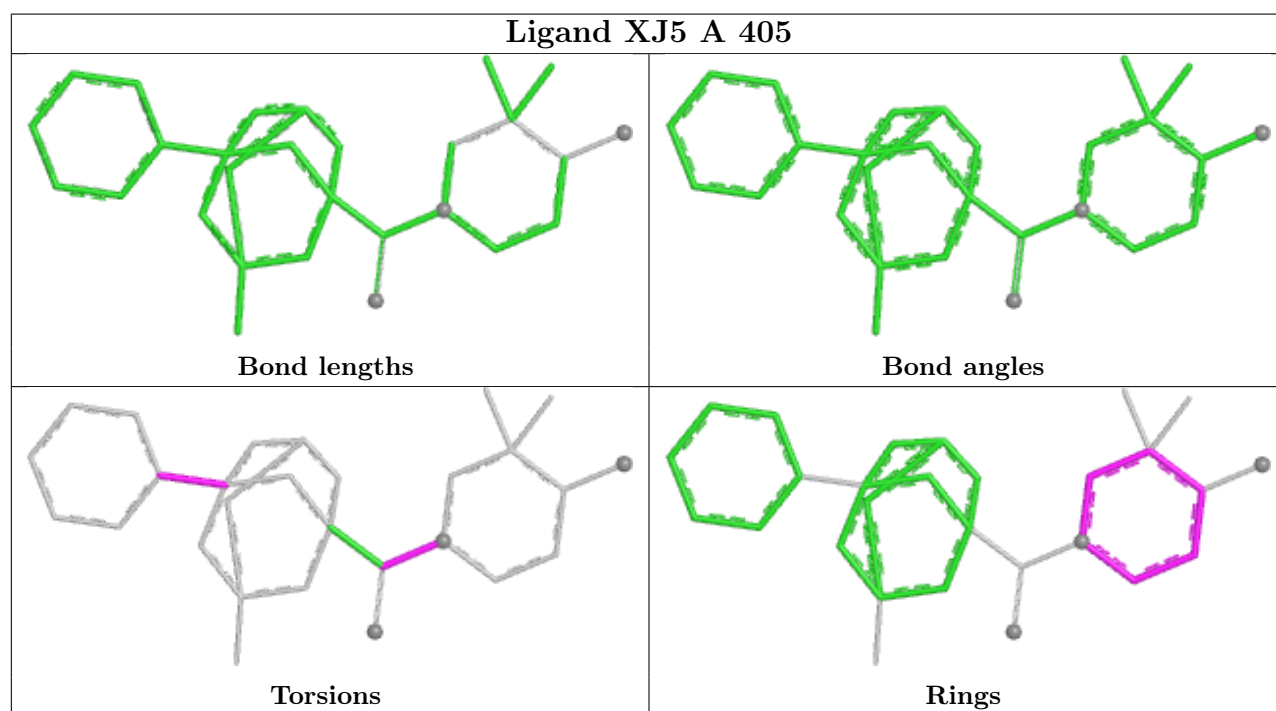
All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	405	XJ5	C2-C3-C4-C5-C8-N1

2 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	404	NAG	4	0
5	A	405	XJ5	8	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	233/291 (80%)	0.45	21 (9%) 15 11	43, 69, 124, 168	1 (0%)
2	B	117/168 (69%)	0.71	15 (12%) 7 6	44, 67, 153, 173	1 (0%)
All	All	350/459 (76%)	0.53	36 (10%) 12 9	43, 69, 136, 173	2 (0%)

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	522	ASP	6.6
2	B	615	TRP	6.4
1	A	188	GLN	5.1
1	A	48	VAL	4.8
1	A	278	ASN	4.7
1	A	47	ASP	4.5
1	A	279	PRO	4.2
2	B	616	THR	4.1
2	B	618	ASN	3.6
1	A	211	SER	3.6
2	B	527	ILE	3.4
1	A	214	TYR	3.3
2	B	503	ALA	3.2
1	A	50	LYS	3.2
1	A	212	GLY	3.1
2	B	604	LEU	2.9
2	B	505	VAL	2.9
1	A	259	THR	2.8
2	B	502	GLU	2.8
1	A	52	VAL	2.7
1	A	49	ASP	2.6
1	A	280	GLU	2.6
1	A	288	TRP	2.6
2	B	614	ASP	2.5

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Mol	Chain	Res	Type	RSRZ
2	B	525	ALA	2.5
1	A	54	ARG	2.4
2	B	521	GLN	2.4
1	A	39	HIS	2.4
1	A	42	ALA	2.4
2	B	611	GLU	2.3
1	A	287	GLU	2.3
2	B	556	CYS	2.2
1	A	51	LEU	2.2
1	A	270	THR	2.1
2	B	504	ILE	2.1
1	A	229	GLU	2.1

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

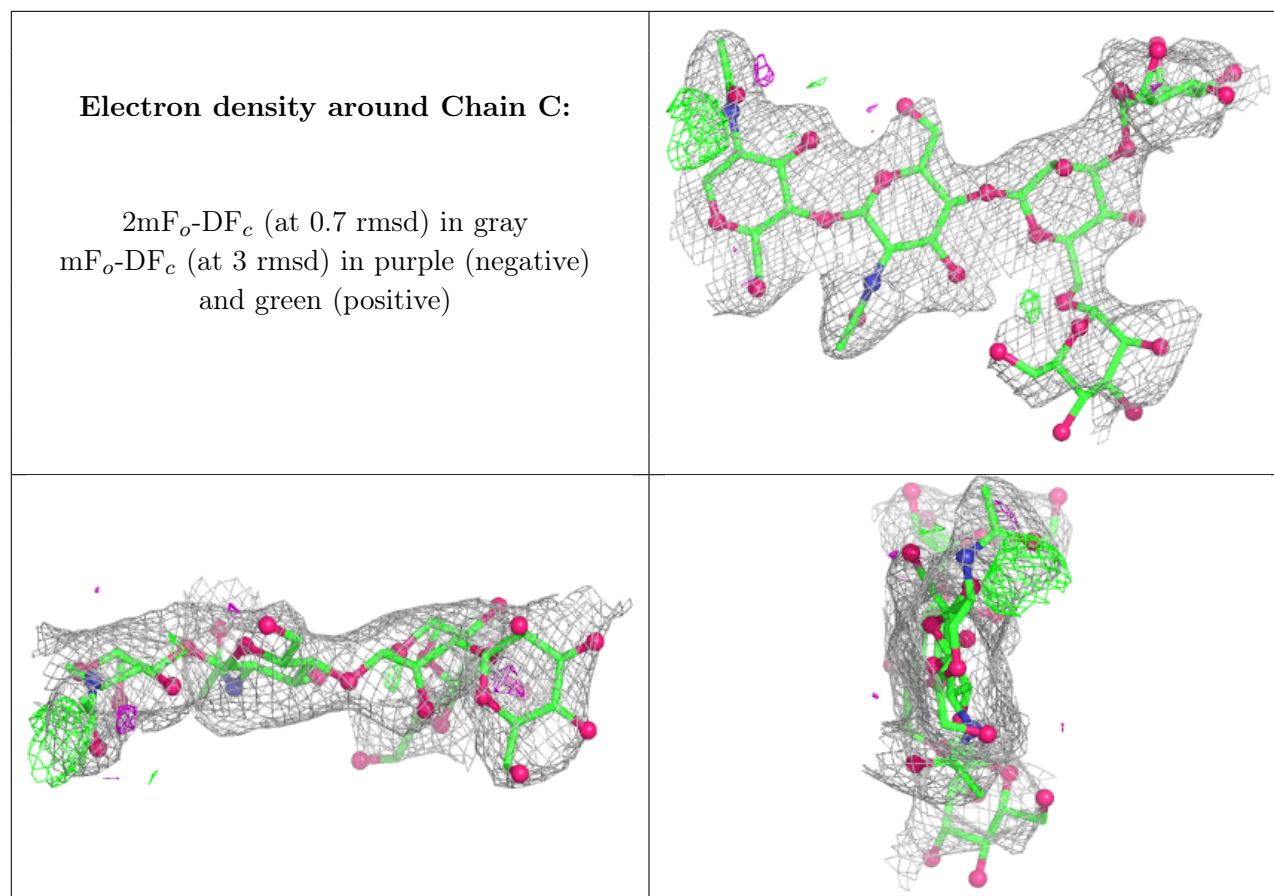
There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MAN	C	5	11/12	0.35	0.18	141,153,163,165	0
3	MAN	C	4	11/12	0.59	0.17	125,140,145,145	0
3	BMA	C	3	11/12	0.79	0.14	118,136,143,146	0
3	NAG	C	2	14/15	0.90	0.14	74,89,100,114	0
3	NAG	C	1	14/15	0.92	0.13	57,72,77,81	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 ⓘ

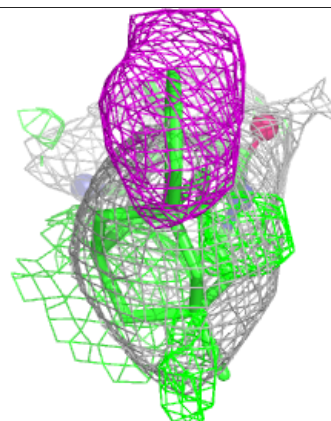
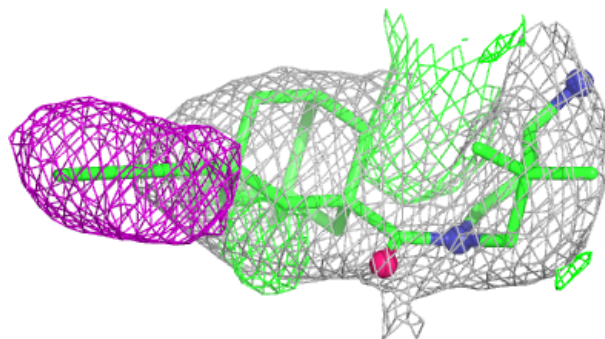
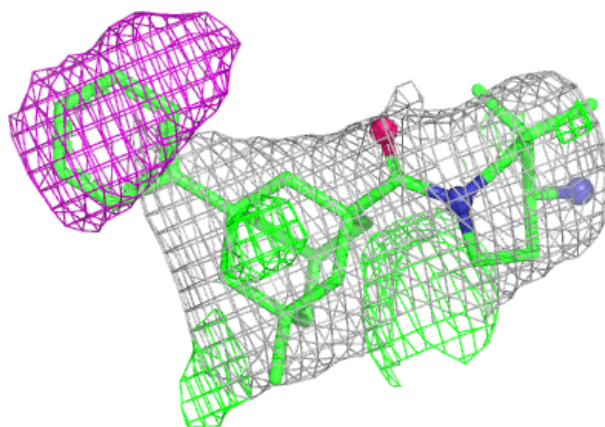
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	A	403	14/15	0.21	0.21	142,165,169,170	0
4	NAG	A	404	14/15	0.61	0.22	127,131,137,138	0
5	XJ5	A	405	28/28	0.83	0.28	76,90,100,104	0
4	NAG	A	402	14/15	0.85	0.13	99,115,119,120	0
4	NAG	A	401	14/15	0.91	0.15	87,92,101,103	0
6	GOL	B	901	6/6	0.95	0.18	66,77,81,84	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 XJ5 A 405:

$2mF_o - DF_c$ (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.