



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 17, 2023 – 06:25 PM EDT

PDB ID : 1J06
Title : Crystal structure of mouse acetylcholinesterase in the apo form
Authors : Bourne, Y.; Taylor, P.; Radic, Z.; Marchot, P.
Deposited on : 2002-11-07
Resolution : 2.35 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

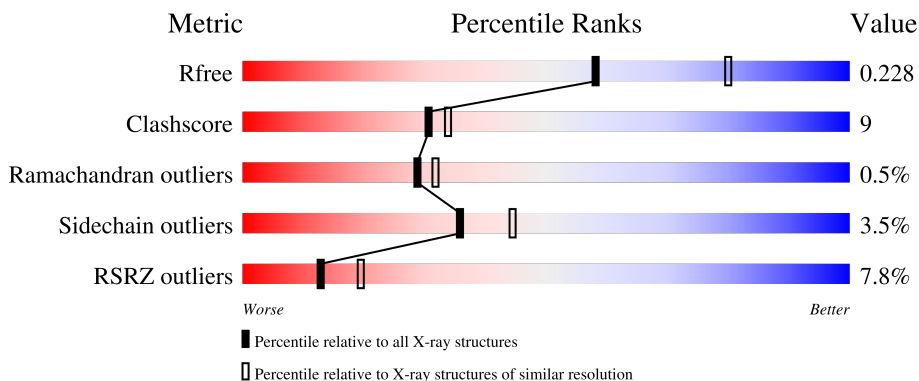
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

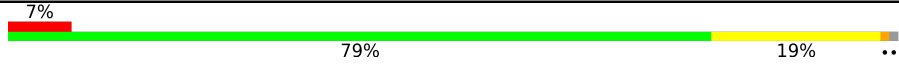
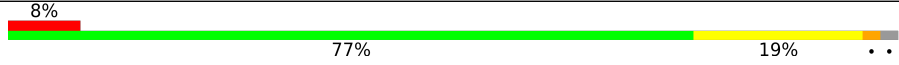
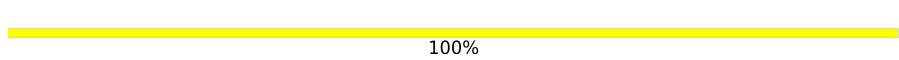
The reported resolution of this entry is 2.35 Å.

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	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	543	
1	B	543	
2	C	2	

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
6	AE3	A	902	-	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 8804 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 acetylcholinesterase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	535	4177	2679	725	759	14	0	0	0
1	B	533	4159	2670	718	757	14	0	0	0

- Molecule 2 is an oligosaccharide called alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose.



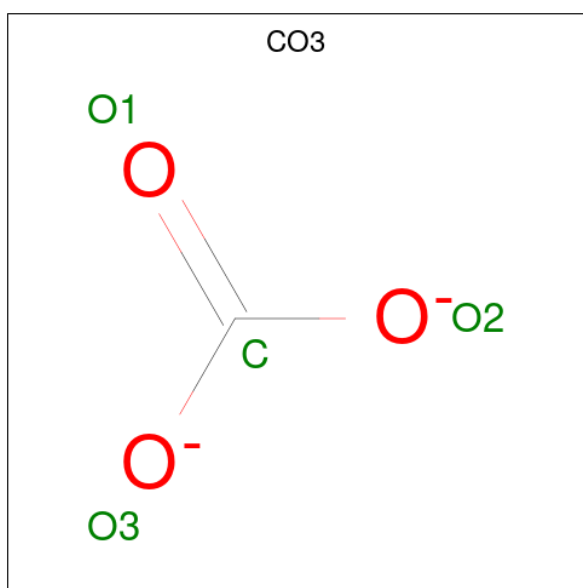
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	2	24	14	1	9	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



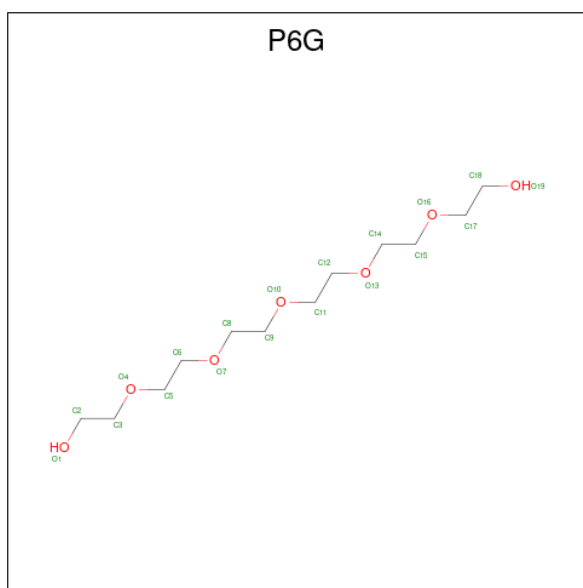
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
3	A	1	14	8	1	5	0	0
3	B	1	14	8	1	5	0	0

- Molecule 4 is CARBONATE ION (three-letter code: CO3) (formula: CO_3).



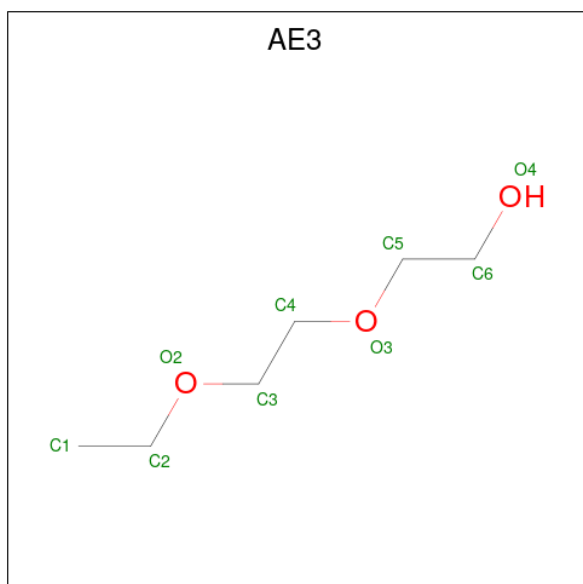
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	C O		
4	A	1	4	1 3	0	0
4	B	1	4	1 3	0	0

- Molecule 5 is HEXAETHYLENE GLYCOL (three-letter code: P6G) (formula: $C_{12}H_{26}O_7$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			19	12	7		

- Molecule 6 is 2-(2-ETHOXYETHOXY)ETHANOL (three-letter code: AE3) (formula: $C_6H_{14}O_3$).



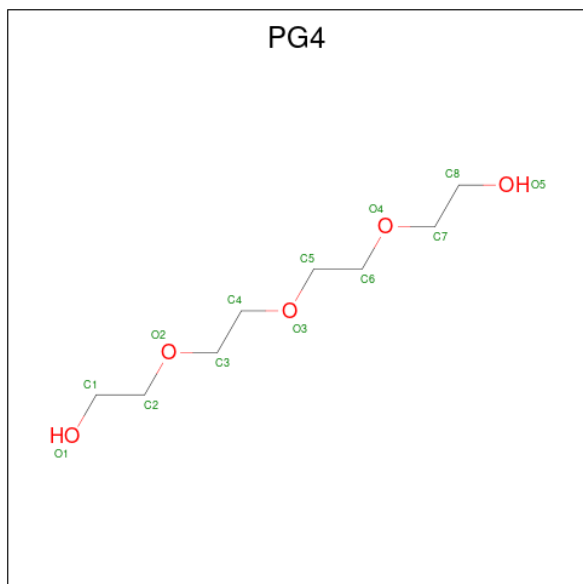
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			9	6	3		

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

- Molecule 7 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C₈H₁₈O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	O	0	0
			11	8	3		

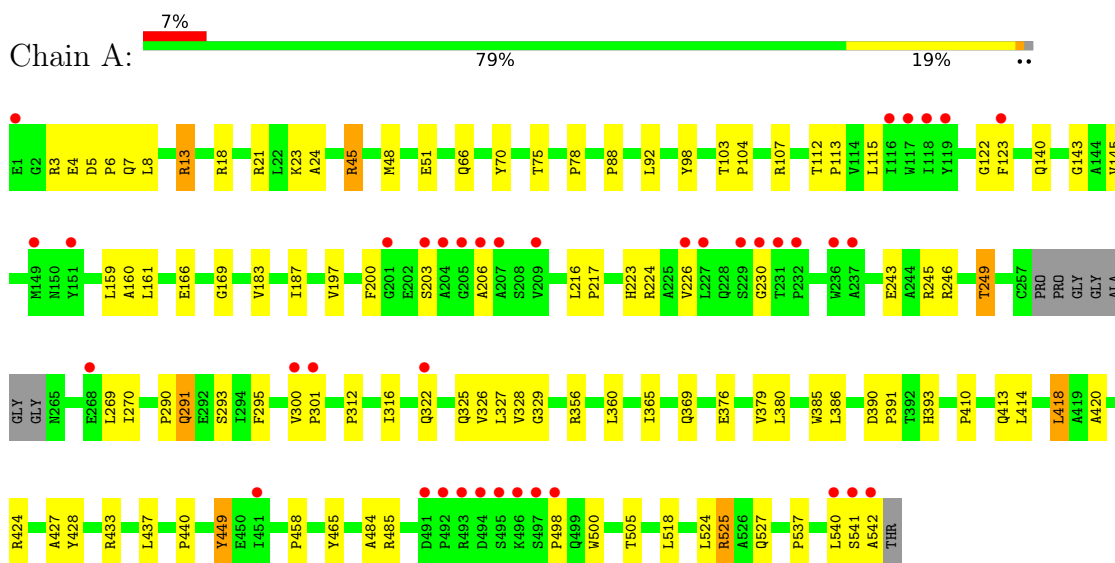
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	210	Total	O	0	0
			210	210		
8	B	150	Total	O	0	0
			150	150		

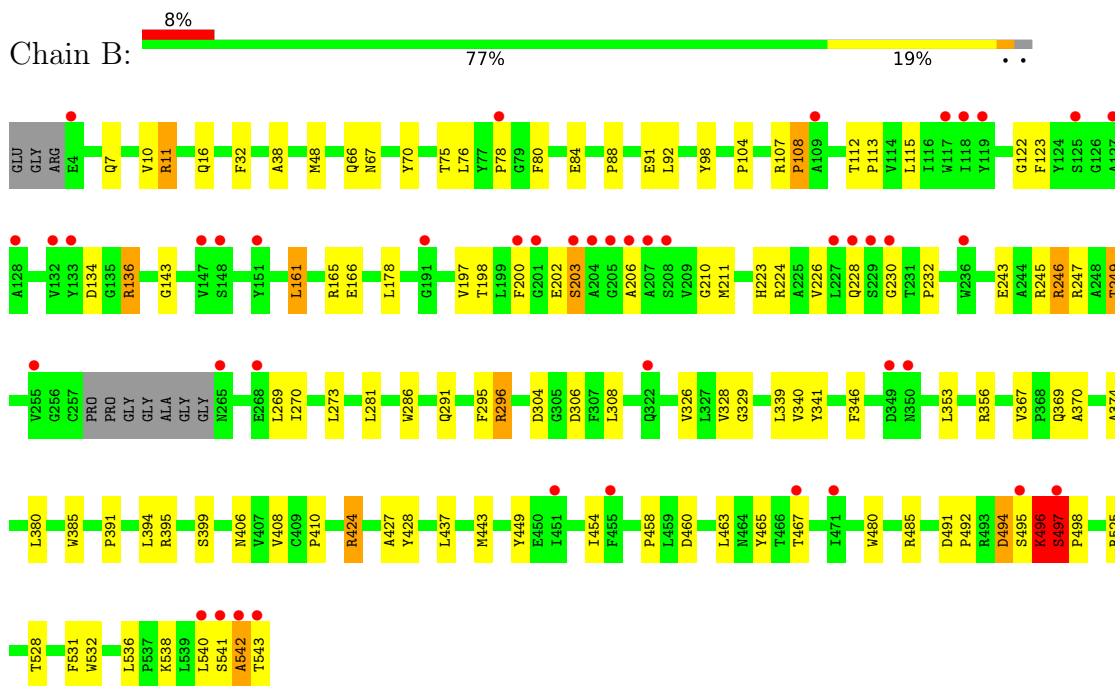
3 Residue-property plots

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: acetylcholinesterase



- Molecule 1: acetylcholinesterase



- Molecule 2: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:

100%

MGI
FUC2

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	79.20Å 111.97Å 226.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.35 39.84 – 2.35	Depositor EDS
% Data completeness (in resolution range)	(Not available) (20.00-2.35) 99.0 (39.84-2.35)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.25 (at 2.34Å)	Xtrriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.209 , 0.232 0.202 , 0.228	Depositor DCC
R_{free} test set	1692 reflections (2.02%)	wwPDB-VP
Wilson B-factor (Å ²)	41.9	Xtrriage
Anisotropy	0.847	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 40.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8804	wwPDB-VP
Average B, all atoms (Å ²)	49.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.88% 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: CO3, AE3, NAG, P6G, FUC, PG4

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	0.69	0/4300	0.80	0/5875
1	B	0.61	0/4282	0.78	1/5851 (0.0%)
All	All	0.65	0/8582	0.79	1/11726 (0.0%)

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
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	161	LEU	N-CA-C	-5.82	95.28	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	449	TYR	Sidechain
1	B	70	TYR	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	4177	0	4063	72	0
1	B	4159	0	4046	85	0
2	C	24	0	22	0	0
3	A	14	0	13	0	0
3	B	14	0	13	0	0
4	A	4	0	0	1	0
4	B	4	0	0	1	0
5	A	19	0	26	1	0
6	A	9	0	14	0	0
6	B	9	0	14	2	0
7	B	11	0	12	0	0
8	A	210	0	0	6	0
8	B	150	0	0	2	0
All	All	8804	0	8223	154	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 9.

All (154) 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:48:MET:HE3	1:A:166:GLU:HA	1.29	1.09
1:B:48:MET:HE1	1:B:166:GLU:HA	1.32	1.09
1:A:197:VAL:H	1:A:223:HIS:HD2	1.14	0.94
1:B:197:VAL:H	1:B:223:HIS:HD2	1.03	0.93
1:A:485:ARG:HG3	8:A:1107:HOH:O	1.70	0.92
1:B:497:SER:HB2	1:B:498:PRO:O	1.72	0.90
1:A:4:GLU:OE2	1:A:18:ARG:HD3	1.73	0.88
1:B:245:ARG:O	1:B:249:THR:HG23	1.80	0.82
1:B:197:VAL:H	1:B:223:HIS:CD2	1.94	0.80
1:B:497:SER:HB2	1:B:498:PRO:C	2.02	0.79
1:A:197:VAL:H	1:A:223:HIS:CD2	1.99	0.78
1:A:245:ARG:O	1:A:249:THR:HG23	1.85	0.77
1:A:113:PRO:HG2	1:A:485:ARG:HG2	1.73	0.70
1:B:424:ARG:HG3	1:B:424:ARG:NH1	2.06	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:424:ARG:HG3	1:B:424:ARG:HH11	1.55	0.70
1:A:203:SER:OG	4:A:951:CO3:C	2.39	0.70
1:B:112:THR:HG21	1:B:143:GLY:O	1.92	0.69
1:A:48:MET:CE	1:A:166:GLU:HA	2.18	0.66
1:B:203:SER:OG	4:B:952:CO3:C	2.43	0.66
1:B:243:GLU:OE1	1:B:246:ARG:NH1	2.29	0.65
1:B:161:LEU:HD11	1:B:269:LEU:HD22	1.79	0.64
1:A:243:GLU:OE1	1:A:246:ARG:NH1	2.31	0.64
1:B:48:MET:CE	1:B:166:GLU:HA	2.18	0.62
1:A:376:GLU:HG2	1:B:538:LYS:NZ	2.15	0.61
1:A:376:GLU:HG2	1:B:538:LYS:CE	2.29	0.61
1:B:460:ASP:HB3	1:B:463:LEU:HD12	1.83	0.61
1:A:115:LEU:HD21	1:A:484:ALA:HB2	1.83	0.60
1:A:161:LEU:HD12	1:A:270:ILE:HD11	1.83	0.60
1:B:458:PRO:HA	1:B:465:TYR:CD2	2.37	0.60
1:A:88:PRO:HD3	8:A:1062:HOH:O	2.01	0.59
1:A:433:ARG:HD3	8:A:1080:HOH:O	2.02	0.59
1:B:353:LEU:HB3	1:B:391:PRO:HB2	1.84	0.58
1:A:161:LEU:HD12	1:A:270:ILE:CG1	2.32	0.58
1:A:112:THR:HG21	1:A:143:GLY:O	2.03	0.58
1:B:374:ALA:HB2	1:B:540:LEU:HD21	1.86	0.57
1:B:11:ARG:NH1	1:B:16:GLN:HG2	2.19	0.57
1:A:13:ARG:NH2	8:A:1029:HOH:O	2.38	0.57
1:A:537:PRO:O	1:A:540:LEU:HB3	2.04	0.57
1:B:495:SER:O	1:B:496:LYS:O	2.23	0.57
1:A:414:LEU:HG	1:A:418:LEU:HD22	1.86	0.56
1:A:161:LEU:HD11	1:A:269:LEU:HD22	1.88	0.56
1:B:11:ARG:HH12	1:B:16:GLN:CG	2.20	0.54
1:B:161:LEU:HD12	1:B:270:ILE:CG1	2.38	0.54
1:A:245:ARG:O	1:A:249:THR:CG2	2.55	0.54
1:B:437:LEU:HD11	1:B:449:TYR:CD2	2.43	0.53
1:B:80:PHE:O	1:B:84:GLU:HG2	2.09	0.53
1:B:408:VAL:HG11	1:B:525:ARG:HG3	1.90	0.53
1:A:541:SER:O	1:A:542:ALA:CB	2.57	0.53
1:A:458:PRO:HA	1:A:465:TYR:CD2	2.44	0.52
1:B:424:ARG:HH11	1:B:424:ARG:CG	2.20	0.52
1:B:304:ASP:OD2	1:B:306:ASP:HB3	2.09	0.52
1:A:541:SER:O	1:A:542:ALA:HB2	2.10	0.52
1:B:340:VAL:HG11	1:B:443:MET:CE	2.40	0.51
1:A:420:ALA:HB2	1:A:505:THR:HG21	1.92	0.51
1:B:122:GLY:O	1:B:123:PHE:HB2	2.09	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:210:GLY:HA3	1:B:232:PRO:HD3	1.93	0.51
1:A:75:THR:O	1:A:78:PRO:HD3	2.11	0.51
1:A:224:ARG:HH11	1:A:224:ARG:HG3	1.75	0.51
1:A:326:VAL:HG12	1:A:328:VAL:HG13	1.93	0.51
1:A:527:GLN:HE21	5:A:901:P6G:H21	1.77	0.50
1:B:224:ARG:NH1	1:B:224:ARG:HG3	2.26	0.50
1:A:329:GLY:HA3	1:A:428:TYR:CZ	2.47	0.50
1:B:296:ARG:NH2	1:B:406:ASN:OD1	2.46	0.49
1:B:328:VAL:O	1:B:427:ALA:HA	2.12	0.49
1:B:67:ASN:OD1	1:B:91:GLU:HB2	2.11	0.49
1:B:11:ARG:NH1	1:B:16:GLN:CG	2.74	0.49
1:B:243:GLU:O	1:B:247:ARG:HG3	2.13	0.49
1:A:216:LEU:HB3	1:A:217:PRO:HD3	1.94	0.49
1:B:104:PRO:HG2	1:B:108:PRO:HD3	1.94	0.49
1:A:161:LEU:HD12	1:A:270:ILE:CD1	2.42	0.49
1:A:224:ARG:HG2	1:A:325:GLN:HB2	1.95	0.48
1:A:380:LEU:HD22	1:A:385:TRP:CZ2	2.49	0.48
1:B:369:GLN:HB2	8:B:988:HOH:O	2.12	0.48
1:B:541:SER:O	1:B:542:ALA:HB2	2.13	0.48
1:A:498:PRO:HG2	1:A:518:LEU:HB2	1.96	0.48
1:A:5:ASP:HB3	1:A:8:LEU:HD12	1.96	0.48
1:A:312:PRO:O	1:A:316:ILE:HG23	2.14	0.48
1:B:66:GLN:HG3	1:B:98:TYR:CD1	2.49	0.47
1:B:329:GLY:HA3	1:B:428:TYR:CZ	2.49	0.47
1:A:24:ALA:HB3	1:A:140:GLN:HG3	1.96	0.47
1:B:7:GLN:OE1	1:B:107:ARG:N	2.43	0.47
1:B:346:PHE:HE2	1:B:395:ARG:HG2	1.80	0.47
1:A:393:HIS:HB2	8:A:1033:HOH:O	2.14	0.47
1:B:211:MET:HG2	1:B:308:LEU:HD21	1.97	0.47
1:B:10:VAL:HG23	1:B:32:PHE:CE2	2.50	0.47
1:A:122:GLY:O	1:A:123:PHE:HB2	2.14	0.47
1:A:369:GLN:HB2	8:A:1027:HOH:O	2.14	0.46
1:A:66:GLN:HG3	1:A:98:TYR:CD1	2.51	0.46
1:A:159:LEU:C	1:A:159:LEU:HD23	2.36	0.46
1:A:88:PRO:HG2	1:A:92:LEU:HD21	1.97	0.46
1:A:224:ARG:HG3	1:A:224:ARG:NH1	2.29	0.46
1:B:206:ALA:HB3	1:B:230:GLY:HA3	1.97	0.46
1:A:300:VAL:HB	1:A:301:PRO:HD2	1.98	0.46
1:A:380:LEU:HD22	1:A:385:TRP:HZ2	1.81	0.46
1:A:327:LEU:HD11	1:A:500:TRP:CZ2	2.51	0.45
1:A:166:GLU:HB2	1:A:270:ILE:HD13	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:532:TRP:CE3	1:B:536:LEU:HD12	2.51	0.45
1:B:75:THR:O	1:B:78:PRO:HD3	2.17	0.45
1:A:45:ARG:CZ	1:A:51:GLU:OE1	2.64	0.45
1:A:104:PRO:HG3	1:A:143:GLY:HA2	1.98	0.45
1:B:367:VAL:HG12	1:B:370:ALA:HB2	1.98	0.45
1:B:339:LEU:HD11	1:B:399:SER:HA	1.99	0.45
1:A:433:ARG:NH2	1:A:440:PRO:O	2.50	0.45
1:B:286:TRP:CD2	6:B:903:AE3:H3C1	2.52	0.44
1:B:296:ARG:HG2	8:B:1066:HOH:O	2.16	0.44
1:B:200:PHE:HB2	1:B:226:VAL:HB	1.99	0.44
1:A:293:SER:HA	1:A:365:ILE:HG23	2.00	0.44
1:B:66:GLN:HG3	1:B:98:TYR:CG	2.52	0.44
1:B:161:LEU:HD12	1:B:270:ILE:HD11	2.00	0.44
1:B:496:LYS:HB2	1:B:496:LYS:NZ	2.33	0.44
1:B:528:THR:O	1:B:531:PHE:HB3	2.17	0.44
1:A:7:GLN:O	1:A:107:ARG:NH1	2.52	0.43
1:A:386:LEU:HD23	1:A:386:LEU:HA	1.78	0.43
1:B:536:LEU:HD23	1:B:536:LEU:HA	1.83	0.43
1:B:197:VAL:N	1:B:223:HIS:HD2	1.88	0.43
1:B:202:GLU:HA	1:B:228:GLN:O	2.18	0.43
1:B:224:ARG:HG3	1:B:224:ARG:HH11	1.84	0.43
1:A:200:PHE:HB2	1:A:226:VAL:HB	2.01	0.43
1:B:113:PRO:HG3	1:B:485:ARG:HG2	2.01	0.43
1:B:326:VAL:HG12	1:B:328:VAL:HG13	2.01	0.43
1:B:497:SER:CB	1:B:498:PRO:C	2.82	0.42
1:A:103:THR:HG22	1:A:145:VAL:HG22	2.00	0.42
1:A:360:LEU:CD2	1:A:379:VAL:HG11	2.49	0.42
1:B:161:LEU:CD1	1:B:269:LEU:HD22	2.48	0.42
1:A:376:GLU:HG2	1:B:538:LYS:HE3	2.00	0.42
1:B:76:LEU:HD22	1:B:341:TYR:CE2	2.54	0.42
1:A:243:GLU:CD	1:A:246:ARG:NH1	2.73	0.42
1:B:356:ARG:HA	1:B:394:LEU:HD13	2.02	0.42
1:B:491:ASP:HA	1:B:492:PRO:HD3	1.66	0.42
1:B:107:ARG:HA	1:B:108:PRO:HD3	1.94	0.42
1:A:200:PHE:CB	1:A:226:VAL:HB	2.50	0.41
1:A:328:VAL:O	1:A:427:ALA:HA	2.19	0.41
1:B:491:ASP:HB3	1:B:494:ASP:HB3	2.02	0.41
1:B:496:LYS:HB2	1:B:496:LYS:HZ1	1.85	0.41
1:A:290:PRO:HG2	1:A:291:GLN:NE2	2.36	0.41
1:B:48:MET:HE1	1:B:165:ARG:O	2.21	0.41
1:B:88:PRO:HG2	1:B:92:LEU:HD21	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:161:LEU:HD23	1:B:161:LEU:HA	1.88	0.41
1:B:495:SER:C	1:B:496:LYS:O	2.58	0.41
1:A:5:ASP:HA	1:A:6:PRO:HD2	1.96	0.41
1:A:160:ALA:HB2	1:A:169:GLY:HA2	2.02	0.41
1:B:38:ALA:HB2	1:B:178:LEU:HD23	2.02	0.41
1:B:104:PRO:CG	1:B:108:PRO:HG3	2.50	0.41
1:B:115:LEU:HD23	1:B:198:THR:HB	2.03	0.41
1:B:286:TRP:CE2	6:B:903:AE3:H3C1	2.55	0.41
1:A:206:ALA:HB3	1:A:230:GLY:HA3	2.03	0.41
1:B:273:LEU:HD23	1:B:273:LEU:HA	1.93	0.40
1:A:524:LEU:O	1:A:525:ARG:C	2.60	0.40
1:B:454:ILE:HD12	1:B:480:TRP:CE2	2.57	0.40
1:B:380:LEU:HD22	1:B:385:TRP:CZ2	2.57	0.40
1:A:437:LEU:HD11	1:A:449:TYR:CD2	2.57	0.40
1:A:183:VAL:HG13	1:A:187:ILE:HB	2.04	0.40
1:A:390:ASP:HA	1:A:391:PRO:HD3	1.95	0.40
1:B:134:ASP:OD1	1:B:136:ARG:HD2	2.20	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	531/543 (98%)	506 (95%)	25 (5%)	0	100	100
1	B	529/543 (97%)	507 (96%)	17 (3%)	5 (1%)	17	17
All	All	1060/1086 (98%)	1013 (96%)	42 (4%)	5 (0%)	29	32

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	542	ALA

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Mol	Chain	Res	Type
1	B	496	LYS
1	B	494	ASP
1	B	497	SER
1	B	108	PRO

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	439/443 (99%)	423 (96%)	16 (4%)	35	43
1	B	438/443 (99%)	423 (97%)	15 (3%)	37	46
All	All	877/886 (99%)	846 (96%)	31 (4%)	36	44

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ARG
1	A	13	ARG
1	A	21	ARG
1	A	23	LYS
1	A	45	ARG
1	A	70	TYR
1	A	249	THR
1	A	291	GLN
1	A	295	PHE
1	A	322	GLN
1	A	356	ARG
1	A	410	PRO
1	A	413	GLN
1	A	418	LEU
1	A	424	ARG
1	A	525	ARG
1	B	11	ARG
1	B	136	ARG
1	B	203	SER

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Mol	Chain	Res	Type
1	B	246	ARG
1	B	249	THR
1	B	281	LEU
1	B	291	GLN
1	B	295	PHE
1	B	296	ARG
1	B	410	PRO
1	B	424	ARG
1	B	467	THR
1	B	496	LYS
1	B	497	SER
1	B	543	THR

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	223	HIS
1	A	291	GLN
1	A	527	GLN
1	B	223	HIS
1	B	291	GLN
1	B	499	GLN

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](#)

2 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	C	1	2,1	14,14,15	0.96	1 (7%)	17,19,21	1.17	3 (17%)
2	FUC	C	2	2	10,10,11	0.78	0	14,14,16	0.85	1 (7%)

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	C	1	2,1	-	2/6/23/26	0/1/1/1
2	FUC	C	2	2	-	-	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1	NAG	C1-C2	2.31	1.55	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	NAG	C4-C3-C2	-2.32	107.62	111.02
2	C	1	NAG	C2-N2-C7	-2.32	119.60	122.90
2	C	1	NAG	C1-O5-C5	2.22	115.20	112.19
2	C	2	FUC	C1-C2-C3	2.02	112.15	109.67

There are no chirality outliers.

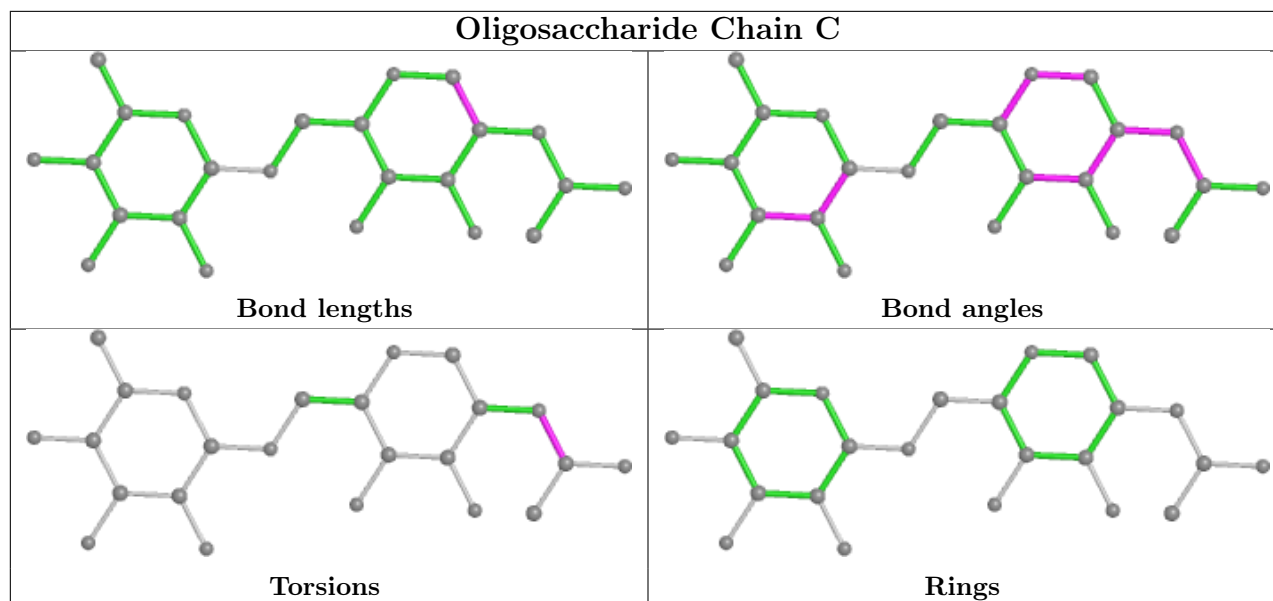
All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1	NAG	C8-C7-N2-C2
2	C	1	NAG	O7-C7-N2-C2

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](#)

8 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$
3	NAG	A	701	1	14,14,15	0.78	0	17,19,21	0.81	1 (5%)
4	CO3	B	952	-	2,3,3	0.33	0	2,3,3	0.16	0
6	AE3	A	902	-	8,8,8	1.57	2 (25%)	7,7,7	1.38	1 (14%)
6	AE3	B	903	-	8,8,8	1.69	2 (25%)	7,7,7	1.51	1 (14%)
7	PG4	B	904	-	10,10,12	1.87	2 (20%)	9,9,11	0.85	0
5	P6G	A	901	-	18,18,18	2.06	6 (33%)	17,17,17	1.16	1 (5%)
4	CO3	A	951	-	2,3,3	0.28	0	2,3,3	0.07	0
3	NAG	B	601	1	14,14,15	1.02	1 (7%)	17,19,21	0.82	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	701	1	-	2/6/23/26	0/1/1/1
6	AE3	A	902	-	-	2/6/6/6	-
6	AE3	B	903	-	-	3/6/6/6	-
7	PG4	B	904	-	-	5/8/8/10	-
5	P6G	A	901	-	-	5/16/16/16	-
3	NAG	B	601	1	-	4/6/23/26	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	904	PG4	O2-C3	4.72	1.62	1.42
5	A	901	P6G	O10-C9	4.00	1.59	1.42
5	A	901	P6G	O13-C12	3.63	1.57	1.42
5	A	901	P6G	O16-C15	3.52	1.57	1.42
6	B	903	AE3	O3-C5	3.50	1.57	1.42
5	A	901	P6G	O4-C3	3.30	1.56	1.42
6	A	902	AE3	O3-C5	3.26	1.56	1.42
5	A	901	P6G	O19-C18	3.22	1.58	1.42
6	B	903	AE3	O2-C3	2.94	1.54	1.42
5	A	901	P6G	O7-C6	2.83	1.54	1.42
7	B	904	PG4	O3-C5	2.76	1.54	1.42
6	A	902	AE3	O2-C3	2.58	1.53	1.42
3	B	601	NAG	C1-C2	2.04	1.55	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	901	P6G	O1-C2-C3	3.39	131.48	111.81
6	B	903	AE3	O4-C6-C5	3.30	130.98	111.81
6	A	902	AE3	O4-C6-C5	3.09	129.76	111.81
3	A	701	NAG	C2-N2-C7	-2.39	119.50	122.90

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	601	NAG	O5-C5-C6-O6
3	B	601	NAG	C8-C7-N2-C2
3	B	601	NAG	O7-C7-N2-C2
3	B	601	NAG	C4-C5-C6-O6
5	A	901	P6G	O1-C2-C3-O4

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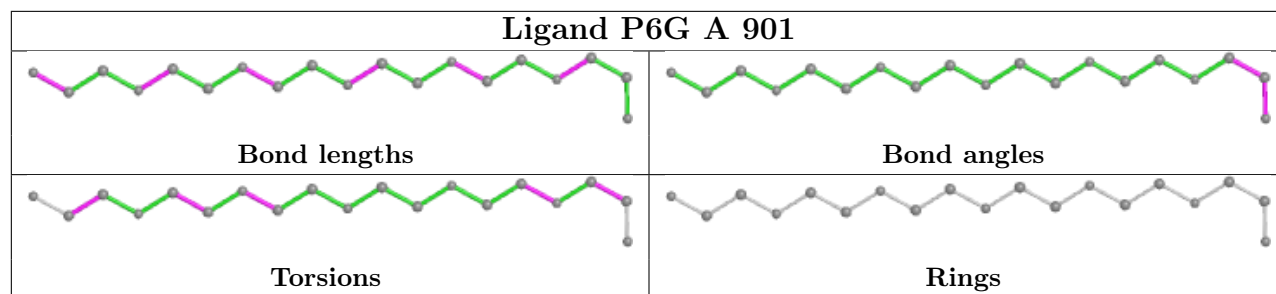
Mol	Chain	Res	Type	Atoms
7	B	904	PG4	O2-C3-C4-O3
3	A	701	NAG	C8-C7-N2-C2
7	B	904	PG4	C4-C3-O2-C2
7	B	904	PG4	O3-C5-C6-O4
3	A	701	NAG	O7-C7-N2-C2
5	A	901	P6G	O13-C14-C15-O16
6	B	903	AE3	O2-C3-C4-O3
5	A	901	P6G	O16-C17-C18-O19
6	B	903	AE3	O3-C5-C6-O4
7	B	904	PG4	C8-C7-O4-C6
7	B	904	PG4	C5-C6-O4-C7
5	A	901	P6G	C11-C12-O13-C14
5	A	901	P6G	C6-C5-O4-C3
6	B	903	AE3	C3-C4-O3-C5
6	A	902	AE3	C3-C4-O3-C5
6	A	902	AE3	O2-C3-C4-O3

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	952	CO3	1	0
6	B	903	AE3	2	0
5	A	901	P6G	1	0
4	A	951	CO3	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	535/543 (98%)	0.12	39 (7%) 15 22	30, 44, 66, 98	0
1	B	533/543 (98%)	0.31	44 (8%) 11 16	35, 49, 71, 99	0
All	All	1068/1086 (98%)	0.22	83 (7%) 13 19	30, 46, 69, 99	0

All (83) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	543	THR	6.4
1	B	497	SER	5.6
1	B	118	ILE	5.2
1	B	540	LEU	4.5
1	B	117	TRP	4.4
1	A	495	SER	4.3
1	A	118	ILE	4.3
1	B	541	SER	4.2
1	B	204	ALA	4.0
1	B	207	ALA	4.0
1	A	493	ARG	3.8
1	B	542	ALA	3.8
1	B	227	LEU	3.7
1	B	200	PHE	3.6
1	B	119	TYR	3.5
1	A	540	LEU	3.4
1	A	497	SER	3.4
1	A	494	ASP	3.4
1	A	496	LYS	3.3
1	A	230	GLY	3.3
1	A	117	TRP	3.3
1	B	201	GLY	3.3
1	A	492	PRO	3.3
1	A	207	ALA	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	236	TRP	3.2
1	B	109	ALA	3.1
1	B	467	THR	3.0
1	B	78	PRO	3.0
1	B	230	GLY	2.9
1	A	206	ALA	2.9
1	B	229	SER	2.9
1	B	228	GLN	2.9
1	A	542	ALA	2.9
1	B	349	ASP	2.9
1	B	203	SER	2.9
1	A	204	ALA	2.9
1	B	206	ALA	2.8
1	B	265	ASN	2.8
1	A	268	GLU	2.8
1	B	495	SER	2.7
1	B	451	ILE	2.7
1	A	1	GLU	2.7
1	B	208	SER	2.7
1	B	255	VAL	2.7
1	A	541	SER	2.7
1	A	119	TYR	2.6
1	B	133	TYR	2.6
1	B	205	GLY	2.6
1	A	229	SER	2.6
1	A	300	VAL	2.6
1	B	236	TRP	2.6
1	B	471	ILE	2.6
1	B	151	TYR	2.6
1	A	237	ALA	2.6
1	A	498	PRO	2.5
1	A	201	GLY	2.5
1	A	231	THR	2.5
1	A	116	ILE	2.4
1	B	4	GLU	2.4
1	B	268	GLU	2.3
1	B	147	VAL	2.3
1	B	132	VAL	2.3
1	A	227	LEU	2.3
1	A	322	GLN	2.3
1	B	322	GLN	2.3
1	A	203	SER	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	127	ALA	2.2
1	B	455	PHE	2.2
1	B	191	GLY	2.2
1	A	491	ASP	2.2
1	B	350	ASN	2.2
1	A	151	TYR	2.1
1	A	209	VAL	2.1
1	A	123	PHE	2.1
1	A	149	MET	2.1
1	B	128	ALA	2.1
1	A	451	ILE	2.1
1	B	125	SER	2.1
1	B	148	SER	2.1
1	A	301	PRO	2.1
1	A	205	GLY	2.0
1	A	232	PRO	2.0
1	A	226	VAL	2.0

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

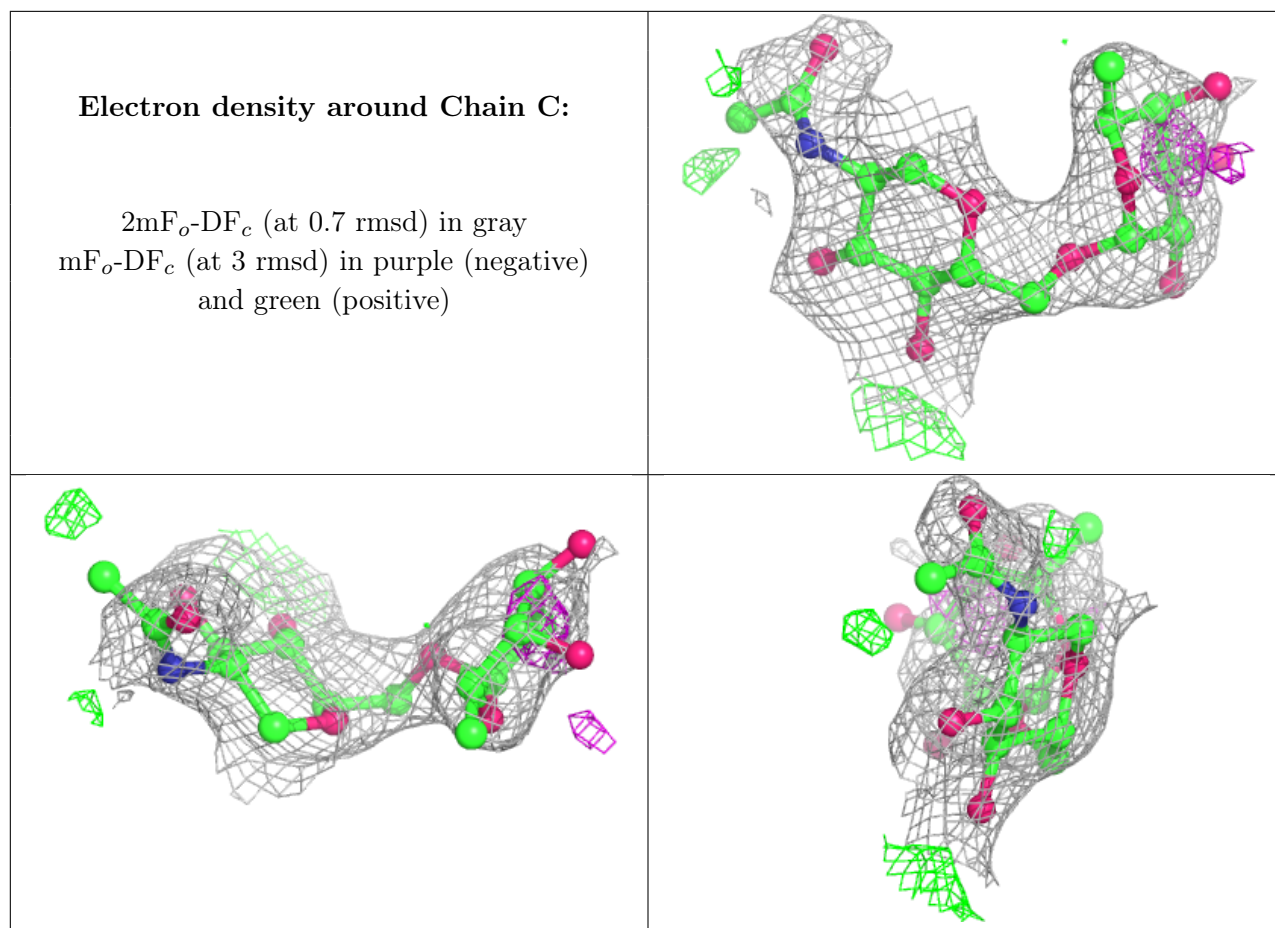
There are no non-standard protein/DNA/RNA residues in this entry.

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(\AA^2)	Q<0.9
2	NAG	C	1	14/15	0.82	0.40	76,79,85,89	0
2	FUC	C	2	10/11	0.86	0.53	91,93,95,95	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.



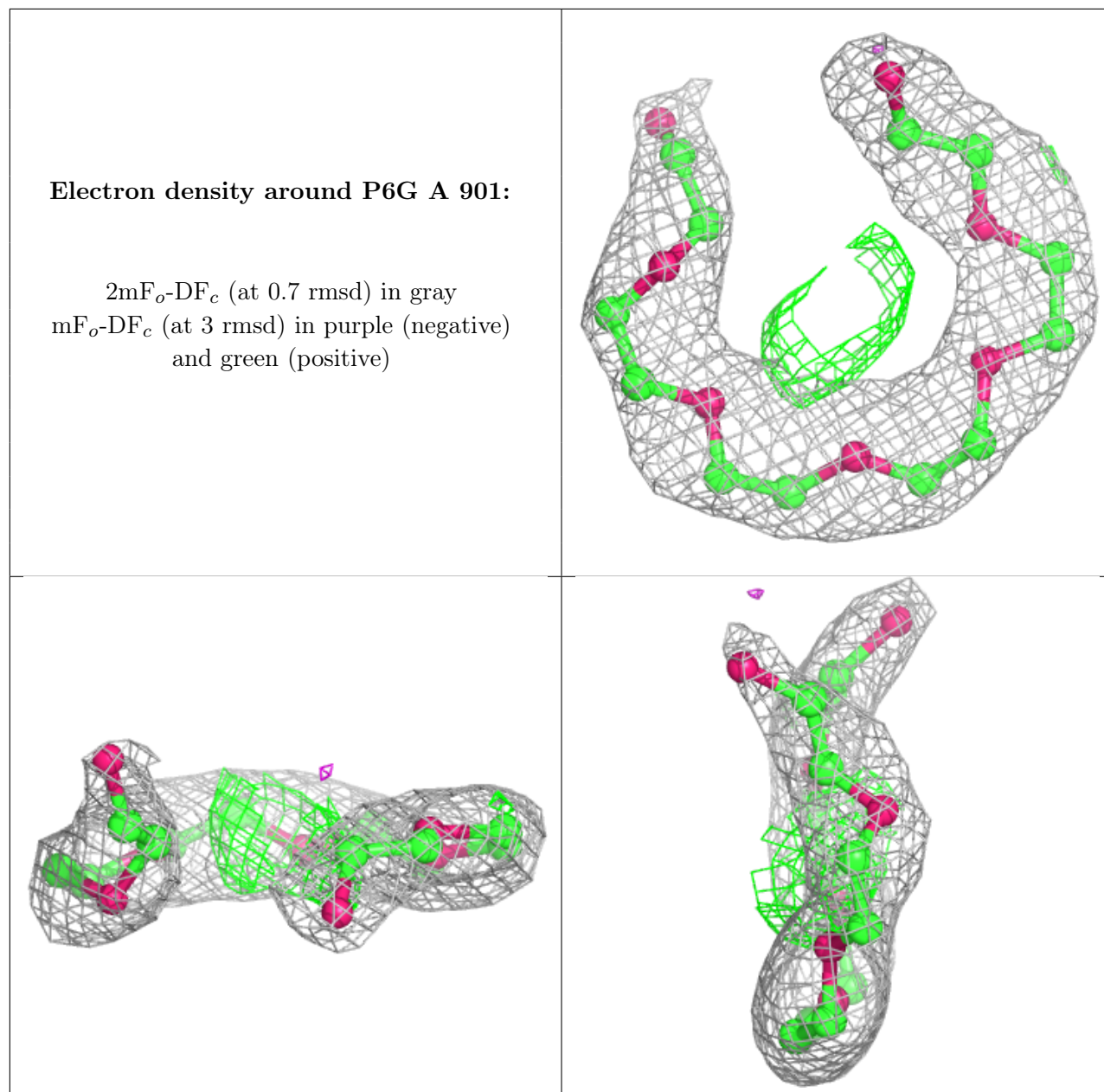
6.4 Ligands [i](#)

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
3	NAG	B	601	14/15	0.62	0.39	87,89,91,92	0
6	AE3	B	903	9/9	0.68	0.39	83,87,89,89	0
6	AE3	A	902	9/9	0.80	0.46	81,82,83,83	0
7	PG4	B	904	11/13	0.83	0.18	87,88,90,90	0
3	NAG	A	701	14/15	0.85	0.33	81,85,88,89	0
4	CO3	B	952	4/4	0.91	0.34	63,64,64,65	0
4	CO3	A	951	4/4	0.91	0.31	50,50,51,52	0
5	P6G	A	901	19/19	0.92	0.17	61,71,75,76	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.