



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 06:14 PM UTC

PDB ID : 1QW8 / pdb_00001qw8
Title : Crystal structure of a family 51 alpha-L-arabinofuranosidase in complex with Ara-alpha(1,3)-Xyl
Authors : Hoevel, K.; Shallom, D.; Niefind, K.; Belakhov, V.; Shoham, G.; Bassov, T.; Shoham, Y.; Schomburg, D.
Deposited on : 2003-09-01
Resolution : 1.80 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
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

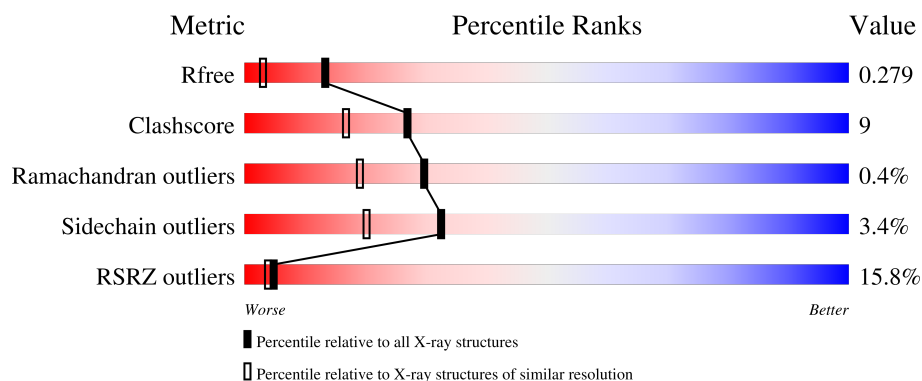
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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	502	22% 82% 15% ..
1	B	502	10% 86% 12% ..
2	C	2	50% 50%
2	D	2	100%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 8940 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 Alpha-L-arabinofuranosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	497	Total	C	N	O	S	0	0	0
			3986	2540	680	746	20			
1	B	497	Total	C	N	O	S	0	0	0
			3986	2540	680	746	20			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	175	ALA	GLU	engineered mutation	UNP Q9XBQ3
B	175	ALA	GLU	engineered mutation	UNP Q9XBQ3

- Molecule 2 is an oligosaccharide called alpha-L-arabinofuranose-(1-3)-beta-D-xylopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	C	2	Total	C	O	0	0	0
			19	10	9			
2	D	2	Total	C	O	0	0	0
			19	10	9			

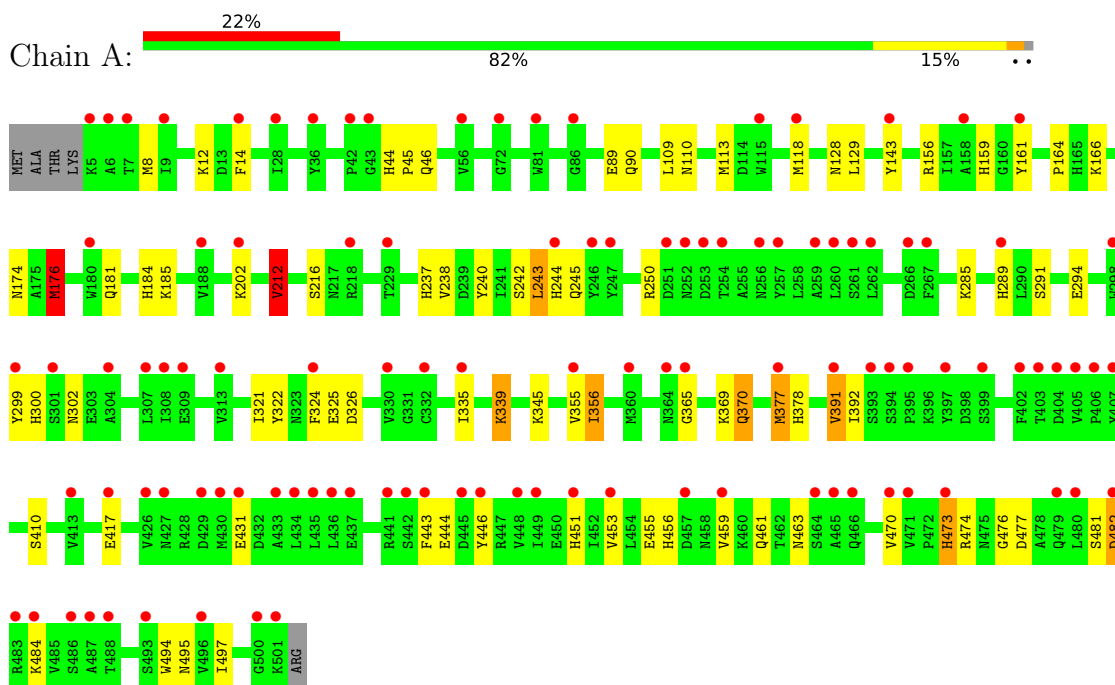
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	468	Total	O	0	0
			468	468		
3	B	462	Total	O	0	0
			462	462		

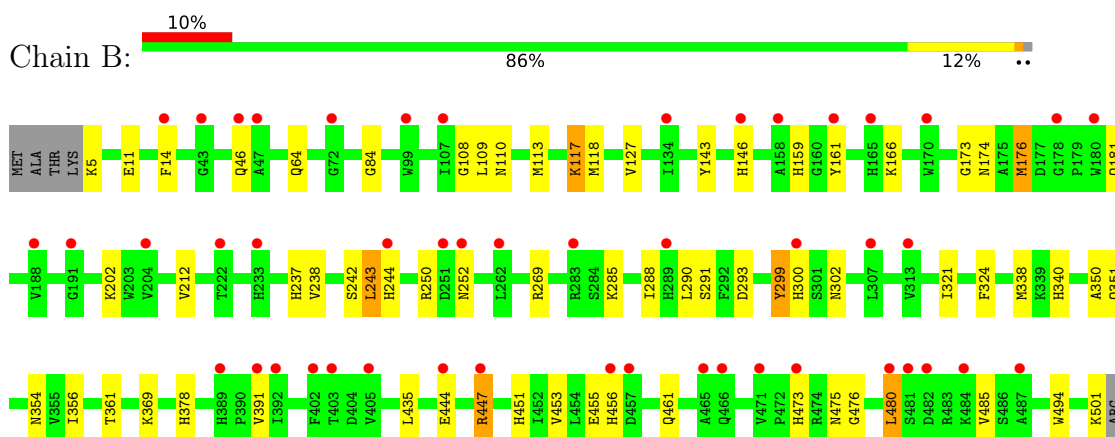
3 Residue-property plots [i](#)

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: Alpha-L-arabinofuranosidase



• Molecule 1: Alpha-L-arabinofuranosidase



• Molecule 2: alpha-L-arabinofuranose-(1-3)-beta-D-xylopyranose

Chain C:  50% 50%

XP1
AHR2

- Molecule 2: alpha-L-arabinofuranose-(1-3)-beta-D-xylopyranose

Chain D:  100%

XP1
AHR2

4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	179.43Å 179.43Å 100.23Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 1.80 20.00 – 1.80	Depositor EDS
% Data completeness (in resolution range)	97.2 (20.00-1.80) 96.5 (20.00-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.34 (at 1.79Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.174 , 0.213 0.254 , 0.279	Depositor DCC
R_{free} test set	5394 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	26.7	Xtriage
Anisotropy	0.007	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 46.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.012 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	8940	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.95% 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: AHR, XYP

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	0.77	1/4087 (0.0%)	0.87	1/5553 (0.0%)
1	B	0.75	2/4087 (0.0%)	0.87	0/5553
All	All	0.76	3/8174 (0.0%)	0.87	1/11106 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	176	MET	SD-CE	-7.12	1.61	1.79
1	A	176	MET	SD-CE	-5.87	1.64	1.79
1	B	338	MET	SD-CE	-5.67	1.65	1.79

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	212	VAL	CB-CA-C	-5.10	104.08	111.68

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	3986	0	3890	86	0
1	B	3986	0	3890	61	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	19	0	0	0	0
2	D	19	0	0	0	0
3	A	468	0	0	34	3
3	B	462	0	0	18	1
All	All	8940	0	7780	145	3

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 (145) 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:B:244:HIS:CE1	3:B:1364:HOH:O	1.65	1.28
1:A:216:SER:CB	3:A:1370:HOH:O	1.82	1.25
1:A:377:MET:SD	3:A:1369:HOH:O	2.08	1.08
1:A:216:SER:HB3	3:A:1370:HOH:O	1.42	1.07
1:B:118:MET:HG3	3:B:1373:HOH:O	1.57	1.03
1:A:451:HIS:ND1	1:A:476:GLY:HA3	1.81	0.95
1:A:129:LEU:O	1:A:176:MET:HE1	1.72	0.90
1:A:244:HIS:CE1	3:A:1404:HOH:O	2.25	0.89
1:B:354:ASN:HD21	1:B:361:THR:H	1.22	0.87
1:A:473:HIS:CE1	3:A:1374:HOH:O	2.27	0.86
1:A:377:MET:CG	3:A:1369:HOH:O	2.22	0.85
1:B:244:HIS:NE2	1:B:293:ASP:OD1	2.13	0.81
1:B:244:HIS:ND1	3:B:1364:HOH:O	1.81	0.81
1:A:8:MET:SD	3:A:1410:HOH:O	2.39	0.80
1:A:174:ASN:O	1:A:176:MET:HG2	1.82	0.80
1:A:250:ARG:HH21	1:A:302:ASN:HD21	1.31	0.78
1:B:300:HIS:HD2	1:B:321:ILE:O	1.66	0.76
1:B:378:HIS:HD2	1:B:494:TRP:HE1	1.33	0.74
1:A:44:HIS:HD2	1:A:46:GLN:H	1.33	0.74
1:B:456:HIS:CE1	1:B:461:GLN:HG2	2.22	0.74
1:B:243:LEU:O	1:B:244:HIS:HD2	1.72	0.73
1:A:174:ASN:C	3:A:1397:HOH:O	2.30	0.72
1:B:480:LEU:HD22	1:B:485:VAL:HG22	1.73	0.71
1:A:463:ASN:HD21	1:A:470:VAL:H	1.39	0.70
1:B:244:HIS:HE1	3:B:1364:HOH:O	1.31	0.70
1:A:473:HIS:ND1	3:A:1374:HOH:O	2.21	0.70
1:A:451:HIS:CD2	1:A:497:ILE:HG12	2.27	0.70
1:A:377:MET:HG2	3:A:1369:HOH:O	1.87	0.68
1:B:117:LYS:NZ	1:B:118:MET:HE3	2.10	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:456:HIS:HE1	1:B:461:GLN:HG2	1.58	0.67
1:B:117:LYS:HZ3	1:B:118:MET:HE3	1.59	0.67
1:A:473:HIS:CG	3:A:1374:HOH:O	2.49	0.66
1:A:118:MET:HE3	3:A:1187:HOH:O	1.95	0.66
1:B:118:MET:SD	3:B:1373:HOH:O	2.54	0.65
1:B:202:LYS:HD2	3:B:1293:HOH:O	1.97	0.65
1:A:451:HIS:CE1	1:A:495:ASN:HD22	2.15	0.64
1:B:300:HIS:CD2	1:B:321:ILE:O	2.49	0.63
1:A:300:HIS:HE1	1:A:326:ASP:OD2	1.81	0.63
1:B:176:MET:HG2	1:B:181:GLN:HG2	1.81	0.63
1:A:118:MET:HA	1:A:118:MET:HE2	1.81	0.63
1:B:174:ASN:HD22	1:B:181:GLN:HE22	1.48	0.61
1:A:174:ASN:O	3:A:1397:HOH:O	2.16	0.61
1:B:212:VAL:HG13	1:B:238:VAL:HG11	1.83	0.61
1:B:243:LEU:C	1:B:244:HIS:HD2	2.10	0.60
1:B:243:LEU:C	1:B:244:HIS:CD2	2.79	0.60
1:A:245:GLN:NE2	3:A:1122:HOH:O	2.35	0.60
1:B:250:ARG:HH21	1:B:302:ASN:HD21	1.48	0.59
1:B:299:TYR:CE1	1:B:300:HIS:CE1	2.90	0.59
1:B:143:TYR:OH	1:B:159:HIS:HD2	1.84	0.59
1:A:289:HIS:ND1	1:A:345:LYS:HE2	2.18	0.59
1:A:44:HIS:CD2	1:A:46:GLN:H	2.20	0.59
1:A:391:VAL:HB	1:B:14:PHE:CZ	2.38	0.59
1:A:174:ASN:HD22	1:A:181:GLN:HE22	1.50	0.58
1:A:143:TYR:OH	1:A:159:HIS:HD2	1.87	0.57
1:B:118:MET:CG	3:B:1373:HOH:O	2.26	0.57
1:B:369:LYS:NZ	3:B:1207:HOH:O	2.37	0.57
1:A:377:MET:CE	3:A:1369:HOH:O	2.46	0.57
1:A:377:MET:HE3	3:A:1369:HOH:O	2.05	0.56
1:B:456:HIS:HD2	3:B:1286:HOH:O	1.89	0.56
1:B:299:TYR:CZ	1:B:300:HIS:CE1	2.94	0.55
1:A:456:HIS:CE1	1:A:461:GLN:HG2	2.42	0.55
1:B:237:HIS:HE1	3:B:1306:HOH:O	1.89	0.55
1:A:166:LYS:HG2	3:A:1342:HOH:O	2.06	0.54
1:A:244:HIS:CE1	3:A:1382:HOH:O	2.61	0.54
1:A:237:HIS:HE1	3:A:1320:HOH:O	1.91	0.53
1:A:473:HIS:CE1	3:A:1403:HOH:O	2.60	0.53
1:A:244:HIS:HE1	3:A:1047:HOH:O	1.91	0.52
1:B:146:HIS:HD2	3:B:1058:HOH:O	1.92	0.52
1:A:129:LEU:C	1:A:176:MET:HE1	2.34	0.51
1:B:378:HIS:HE1	3:B:1163:HOH:O	1.94	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:354:ASN:ND2	1:B:361:THR:H	2.01	0.51
1:A:242:SER:C	1:A:243:LEU:HD12	2.36	0.50
1:A:392:ILE:HD11	3:A:1410:HOH:O	2.10	0.50
1:A:245:GLN:NE2	3:A:1314:HOH:O	2.45	0.50
1:B:146:HIS:HE1	3:B:1131:HOH:O	1.93	0.50
1:B:453:VAL:HB	1:B:473:HIS:CD2	2.47	0.50
1:B:378:HIS:CD2	1:B:494:TRP:HE1	2.22	0.50
1:A:44:HIS:HE1	1:A:365:GLY:O	1.94	0.49
1:A:250:ARG:HH21	1:A:302:ASN:ND2	2.07	0.48
1:A:324:PHE:CZ	1:A:455:GLU:HA	2.48	0.48
1:B:64:GLN:NE2	3:B:1047:HOH:O	2.46	0.48
1:B:269:ARG:HG3	1:B:340:HIS:HE1	1.78	0.48
1:A:176:MET:O	1:A:184:HIS:HD2	1.96	0.48
1:A:243:LEU:HD12	1:A:243:LEU:N	2.28	0.48
1:B:174:ASN:HD22	1:B:181:GLN:NE2	2.11	0.48
1:A:322:TYR:H	1:A:370:GLN:NE2	2.11	0.47
1:A:453:VAL:HB	1:A:473:HIS:CE1	2.50	0.47
1:A:477:ASP:OD1	1:A:477:ASP:C	2.57	0.47
1:B:110:ASN:HB3	1:B:161:TYR:CZ	2.49	0.47
1:B:447:ARG:NH2	3:B:1304:HOH:O	2.47	0.47
1:B:242:SER:HA	1:B:291:SER:O	2.14	0.47
1:B:127:VAL:O	1:B:173:GLY:HA2	2.16	0.46
1:A:212:VAL:HG13	1:A:238:VAL:HG11	1.97	0.46
1:A:129:LEU:O	1:A:185:LYS:HE3	2.16	0.46
1:B:451:HIS:CG	1:B:476:GLY:HA3	2.51	0.46
1:A:451:HIS:HD2	1:A:497:ILE:HG12	1.76	0.46
1:A:242:SER:HA	1:A:291:SER:O	2.16	0.46
1:A:322:TYR:H	1:A:370:GLN:HE22	1.64	0.46
1:A:245:GLN:CD	3:A:1314:HOH:O	2.60	0.45
1:A:181:GLN:NE2	3:A:1397:HOH:O	2.49	0.45
1:A:176:MET:O	1:A:184:HIS:CD2	2.70	0.45
1:A:369:LYS:NZ	3:A:1077:HOH:O	2.49	0.45
1:B:174:ASN:O	1:B:176:MET:HG3	2.16	0.45
1:B:480:LEU:HD22	1:B:485:VAL:CG2	2.43	0.45
1:A:240:TYR:HA	1:A:289:HIS:O	2.17	0.45
1:B:324:PHE:CZ	1:B:455:GLU:HA	2.51	0.45
1:A:159:HIS:HE1	3:A:1022:HOH:O	1.98	0.44
1:A:378:HIS:CD2	1:A:494:TRP:HE1	2.36	0.44
1:B:109:LEU:O	1:B:113:MET:HG2	2.17	0.44
1:B:11:GLU:CG	1:B:14:PHE:HD1	2.31	0.44
1:A:164:PRO:HG2	1:A:166:LYS:HE2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:473:HIS:CD2	3:A:1374:HOH:O	2.69	0.44
1:A:244:HIS:CE1	3:A:1047:HOH:O	2.69	0.44
1:A:446:TYR:OH	3:A:1386:HOH:O	2.21	0.43
1:A:325:GLU:HB3	1:A:459:VAL:HB	2.01	0.43
1:B:243:LEU:N	1:B:243:LEU:HD12	2.33	0.43
1:B:166:LYS:HG3	3:B:1209:HOH:O	2.18	0.43
1:B:473:HIS:CE1	1:B:475:ASN:HB2	2.54	0.43
1:A:89:GLU:HG2	1:A:90:GLN:NE2	2.33	0.43
1:A:289:HIS:CE1	1:A:345:LYS:HE2	2.54	0.43
1:A:110:ASN:HB3	1:A:161:TYR:CZ	2.54	0.42
1:A:321:ILE:HA	1:A:370:GLN:HE22	1.85	0.42
1:A:378:HIS:HE1	3:A:1162:HOH:O	2.02	0.42
1:A:451:HIS:CG	1:A:476:GLY:HA3	2.51	0.42
1:A:335:ILE:O	1:A:339:LYS:HG2	2.19	0.42
1:A:355:VAL:O	1:A:356:ILE:C	2.61	0.42
1:B:299:TYR:CZ	1:B:300:HIS:HE1	2.37	0.42
1:B:456:HIS:CD2	3:B:1286:HOH:O	2.68	0.42
1:A:184:HIS:HE1	3:A:1409:HOH:O	2.03	0.41
1:B:11:GLU:HG2	1:B:14:PHE:HD1	1.85	0.41
1:B:176:MET:HE3	3:B:1370:HOH:O	2.19	0.41
1:A:14:PHE:CE2	1:B:391:VAL:CG2	3.03	0.41
1:A:166:LYS:HG3	3:A:1108:HOH:O	2.20	0.41
1:A:174:ASN:HD22	1:A:181:GLN:NE2	2.16	0.41
1:A:482:ASP:CG	1:A:482:ASP:O	2.62	0.41
1:A:44:HIS:CD2	1:A:45:PRO:HD2	2.56	0.41
1:A:109:LEU:O	1:A:113:MET:HG2	2.21	0.41
1:B:84:GLY:O	1:B:108:GLY:HA3	2.20	0.41
1:A:143:TYR:O	1:A:156:ARG:HD3	2.21	0.41
1:B:350:ALA:HA	1:B:351:GLN:HA	1.86	0.41
1:A:128:ASN:OD1	1:A:128:ASN:C	2.64	0.40
1:A:410:SER:HB3	3:A:1410:HOH:O	2.21	0.40
1:A:244:HIS:CD2	1:A:294:GLU:HB2	2.56	0.40
1:A:12:LYS:HE2	1:A:443:PHE:CE2	2.57	0.40
1:B:243:LEU:HD11	1:B:290:LEU:HD23	2.02	0.40

All (3) 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)
3:A:1237:HOH:O	3:A:1390:HOH:O[3_665]	1.92	0.28

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1044:HOH:O	3:B:1301:HOH:O[1_554]	2.10	0.10
3:A:1116:HOH:O	3:A:1409:HOH:O[3_665]	2.15	0.05

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	495/502 (99%)	479 (97%)	14 (3%)	2 (0%)	30	19
1	B	495/502 (99%)	473 (96%)	20 (4%)	2 (0%)	30	19
All	All	990/1004 (99%)	952 (96%)	34 (3%)	4 (0%)	30	19

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	299	TYR
1	A	299	TYR
1	B	356	ILE
1	A	356	ILE

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	429/433 (99%)	412 (96%)	17 (4%)	28	15
1	B	429/433 (99%)	417 (97%)	12 (3%)	38	26

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	858/866 (99%)	829 (97%)	29 (3%)	32	20

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	176	MET
1	A	202	LYS
1	A	212	VAL
1	A	243	LEU
1	A	285	LYS
1	A	339	LYS
1	A	370	GLN
1	A	377	MET
1	A	391	VAL
1	A	417	GLU
1	A	431	GLU
1	A	444	GLU
1	A	473	HIS
1	A	474	ARG
1	A	481	SER
1	A	482	ASP
1	A	484	LYS
1	B	5	LYS
1	B	46	GLN
1	B	117	LYS
1	B	243	LEU
1	B	252	ASN
1	B	285	LYS
1	B	288	ILE
1	B	435	LEU
1	B	444	GLU
1	B	447	ARG
1	B	480	LEU
1	B	501	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	HIS
1	A	64	GLN
1	A	90	GLN

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Mol	Chain	Res	Type
1	A	159	HIS
1	A	181	GLN
1	A	184	HIS
1	A	237	HIS
1	A	244	HIS
1	A	245	GLN
1	A	300	HIS
1	A	302	ASN
1	A	370	GLN
1	A	378	HIS
1	A	451	HIS
1	A	456	HIS
1	A	461	GLN
1	A	463	ASN
1	A	495	ASN
1	B	64	GLN
1	B	146	HIS
1	B	159	HIS
1	B	181	GLN
1	B	184	HIS
1	B	252	ASN
1	B	300	HIS
1	B	302	ASN
1	B	340	HIS
1	B	354	ASN
1	B	378	HIS
1	B	475	ASN

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 ⓘ

4 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	XYP	C	1	2	10,10,10	0.77	0	14,14,14	1.83	2 (14%)
2	AHR	C	2	2	9,9,10	1.12	0	11,12,14	1.02	0
2	XYP	D	1	2	10,10,10	0.82	0	14,14,14	1.97	2 (14%)
2	AHR	D	2	2	9,9,10	1.22	1 (11%)	11,12,14	1.04	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	XYP	C	1	2	-	-	0/1/1/1
2	AHR	C	2	2	-	0/2/15/18	0/1/1/1
2	XYP	D	1	2	-	-	0/1/1/1
2	AHR	D	2	2	-	0/2/15/18	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	2	AHR	C1-C2	2.68	1.56	1.51

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1	XYP	O3-C3-C4	5.56	121.39	110.05
2	C	1	XYP	O3-C3-C4	4.37	118.98	110.05
2	D	1	XYP	C4-C3-C2	-2.43	106.59	110.86
2	C	1	XYP	C4-C3-C2	-2.18	107.02	110.86

There are no chirality outliers.

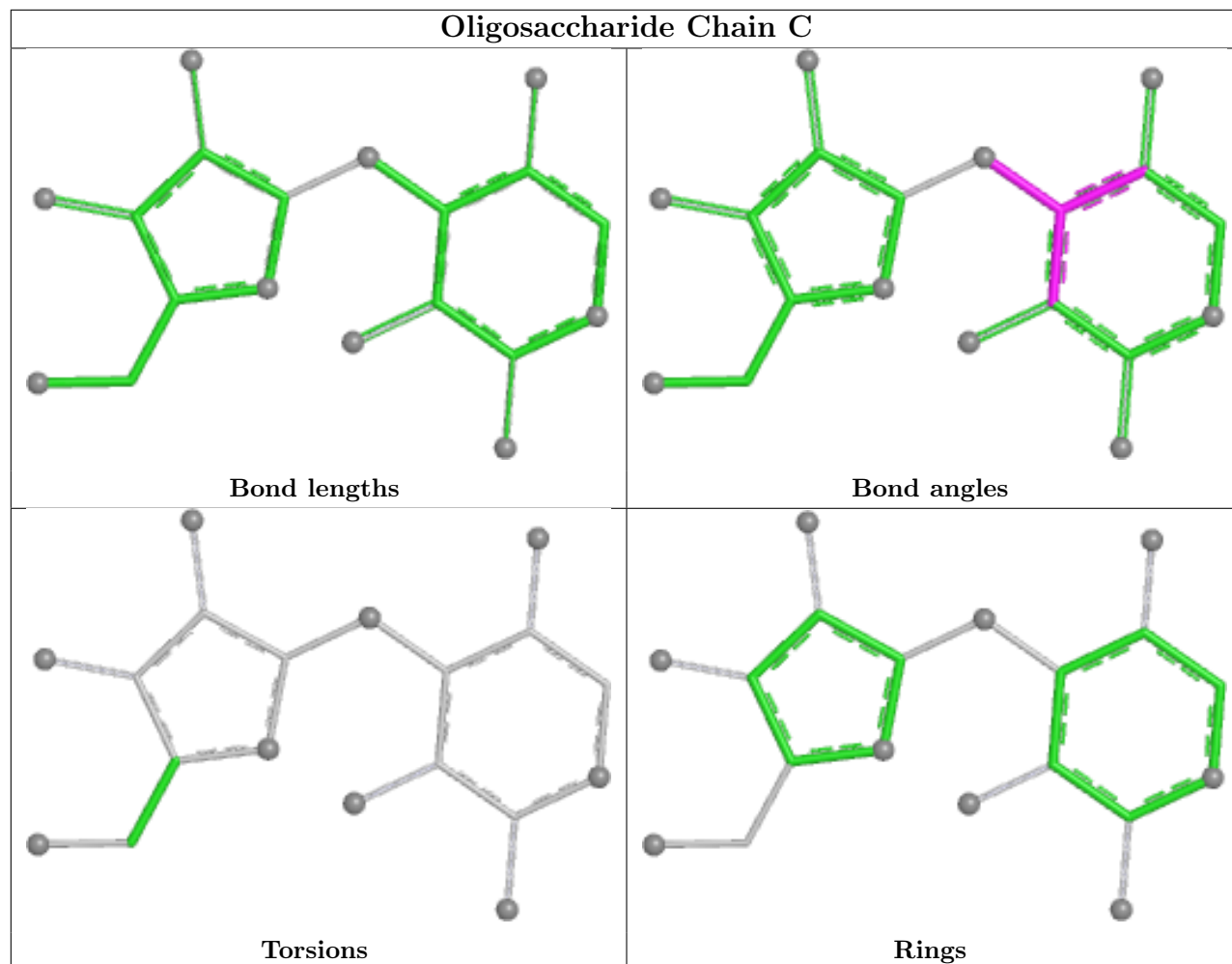
There are no torsion outliers.

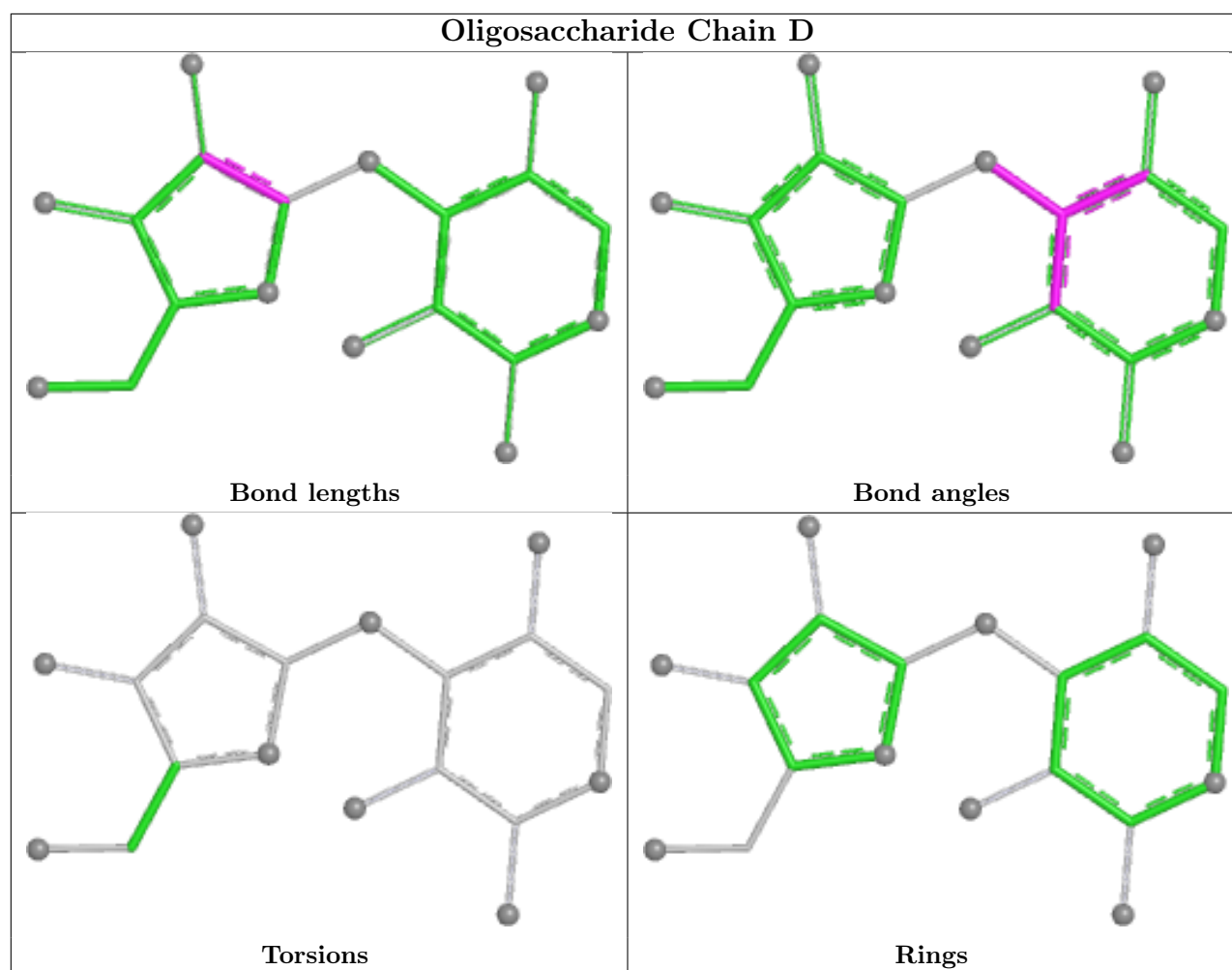
There are no ring outliers.

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](#)

There are no ligands in this entry.

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	497/502 (99%)	1.49	109 (21%) 2 2	17, 28, 48, 61	0
1	B	497/502 (99%)	1.17	48 (9%) 13 11	19, 27, 43, 57	0
All	All	994/1004 (99%)	1.33	157 (15%) 5 4	17, 28, 46, 61	0

All (157) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	482	ASP	5.8
1	A	402	PHE	5.3
1	A	14	PHE	4.8
1	A	473	HIS	4.4
1	B	482	ASP	4.1
1	A	435	LEU	4.1
1	A	259	ALA	4.0
1	A	434	LEU	4.0
1	B	14	PHE	3.9
1	B	473	HIS	3.9
1	A	180	TRP	3.9
1	A	251	ASP	3.9
1	A	307	LEU	3.7
1	B	165	HIS	3.5
1	A	262	LEU	3.5
1	B	480	LEU	3.5
1	A	459	VAL	3.5
1	A	252	ASN	3.4
1	B	180	TRP	3.4
1	A	6	ALA	3.4
1	B	233	HIS	3.4
1	B	392	ILE	3.4
1	A	441	ARG	3.4
1	A	448	VAL	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	456	HIS	3.3
1	B	47	ALA	3.3
1	B	300	HIS	3.2
1	A	465	ALA	3.2
1	B	307	LEU	3.2
1	B	466	GLN	3.2
1	A	405	VAL	3.1
1	A	403	THR	3.1
1	A	480	LEU	3.0
1	A	313	VAL	3.0
1	A	407	TYR	3.0
1	A	457	ASP	3.0
1	A	451	HIS	2.9
1	A	399	SER	2.9
1	A	406	PRO	2.9
1	A	5	LYS	2.9
1	A	445	ASP	2.9
1	A	486	SER	2.9
1	A	417	GLU	2.9
1	A	365	GLY	2.9
1	A	256	ASN	2.9
1	A	304	ALA	2.9
1	A	484	LYS	2.9
1	A	436	LEU	2.9
1	B	252	ASN	2.8
1	A	442	SER	2.8
1	B	99	TRP	2.8
1	A	289	HIS	2.8
1	A	257	TYR	2.7
1	B	244	HIS	2.7
1	A	7	THR	2.7
1	A	493	SER	2.7
1	A	466	GLN	2.7
1	A	360	MET	2.7
1	B	447	ARG	2.7
1	B	391	VAL	2.7
1	A	72	GLY	2.6
1	A	483	ARG	2.6
1	A	244	HIS	2.6
1	A	437	GLU	2.6
1	A	449	ILE	2.6
1	A	391	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	496	VAL	2.6
1	B	178	GLY	2.6
1	A	397	TYR	2.5
1	B	43	GLY	2.5
1	B	146	HIS	2.5
1	A	488	THR	2.5
1	A	9	ILE	2.5
1	A	218	ARG	2.5
1	A	464	SER	2.5
1	A	42	PRO	2.5
1	A	299	TYR	2.5
1	A	86	GLY	2.5
1	A	115	TRP	2.5
1	B	222	THR	2.5
1	A	266	ASP	2.5
1	A	479	GLN	2.4
1	A	377	MET	2.4
1	A	301	SER	2.4
1	A	161	TYR	2.4
1	B	457	ASP	2.4
1	A	393	SER	2.4
1	A	43	GLY	2.3
1	A	188	VAL	2.3
1	B	251	ASP	2.3
1	B	283	ARG	2.3
1	A	443	PHE	2.3
1	A	446	TYR	2.3
1	A	158	ALA	2.3
1	B	158	ALA	2.3
1	A	501	LYS	2.3
1	B	313	VAL	2.3
1	B	405	VAL	2.3
1	A	431	GLU	2.3
1	B	403	THR	2.3
1	A	430	MET	2.3
1	A	36	TYR	2.3
1	A	143	TYR	2.3
1	B	72	GLY	2.3
1	B	481	SER	2.3
1	A	471	VAL	2.3
1	B	204	VAL	2.3
1	B	484	LYS	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	402	PHE	2.2
1	A	308	ILE	2.2
1	A	429	ASP	2.2
1	B	107	ILE	2.2
1	A	427	ASN	2.2
1	A	309	GLU	2.2
1	A	395	PRO	2.2
1	B	191	GLY	2.2
1	B	465	ALA	2.2
1	A	330	VAL	2.2
1	A	253	ASP	2.2
1	A	247	TYR	2.2
1	B	161	TYR	2.2
1	A	364	ASN	2.2
1	A	260	LEU	2.2
1	A	433	ALA	2.2
1	B	289	HIS	2.1
1	A	298	TRP	2.1
1	A	413	VAL	2.1
1	A	332	CYS	2.1
1	A	246	TYR	2.1
1	A	254	THR	2.1
1	A	394	SER	2.1
1	B	170	TRP	2.1
1	A	426	VAL	2.1
1	A	500	GLY	2.1
1	A	118	MET	2.1
1	A	487	ALA	2.1
1	A	28	ILE	2.1
1	A	202	LYS	2.1
1	A	229	THR	2.1
1	A	81	TRP	2.1
1	A	453	VAL	2.1
1	B	188	VAL	2.1
1	B	46	GLN	2.1
1	A	267	PHE	2.0
1	B	389	HIS	2.0
1	A	470	VAL	2.0
1	B	471	VAL	2.0
1	B	262	LEU	2.0
1	B	487	ALA	2.0
1	A	404	ASP	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	444	GLU	2.0
1	A	261	SER	2.0
1	A	324	PHE	2.0
1	A	335	ILE	2.0
1	B	134	ILE	2.0
1	A	56	VAL	2.0
1	A	355	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](#)

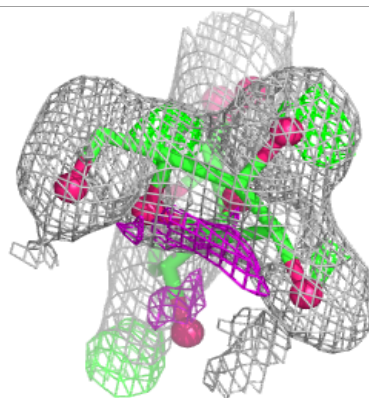
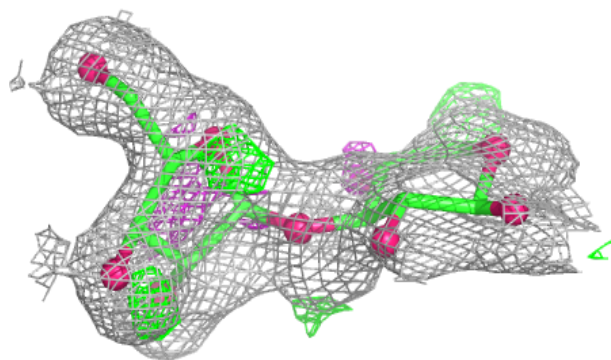
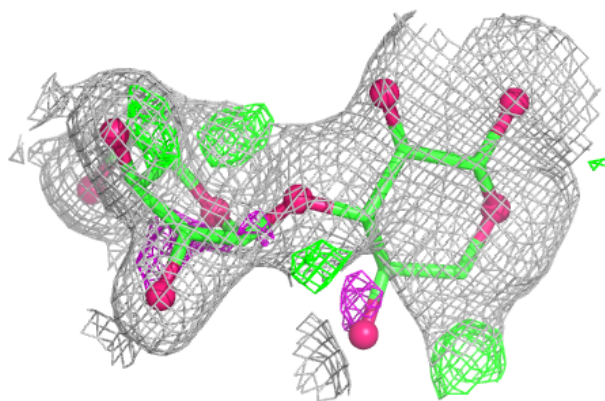
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	XYP	D	1	10/10	0.62	0.16	45,55,56,58	0
2	XYP	C	1	10/10	0.63	0.17	44,54,55,57	0
2	AHR	C	2	9/10	0.78	0.15	25,28,33,37	0
2	AHR	D	2	9/10	0.84	0.11	27,30,35,39	0

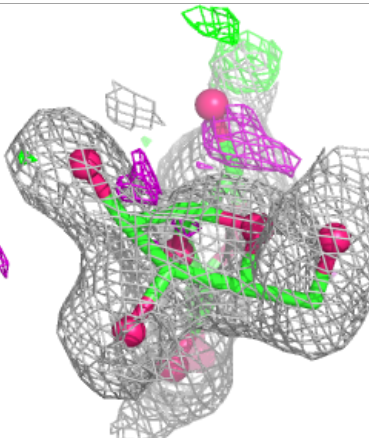
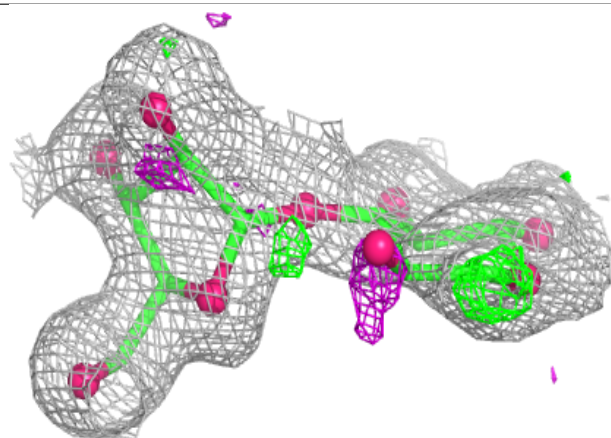
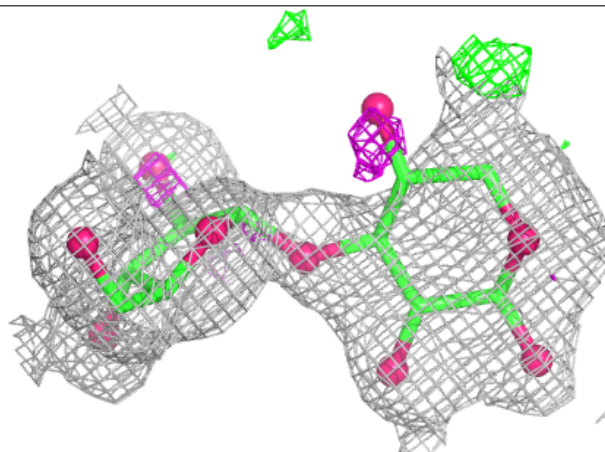
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

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

**Electron density around Chain D:**

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



6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.