



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 01:27 AM UTC

PDB ID : 8W30 / pdb_00008w30
Title : Crystal structure of alpha-V beta-1 integrin headpiece in complex with TR01225179
Authors : Qin, L.; Lane, W.
Deposited on : 2024-02-21
Resolution : 2.45 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

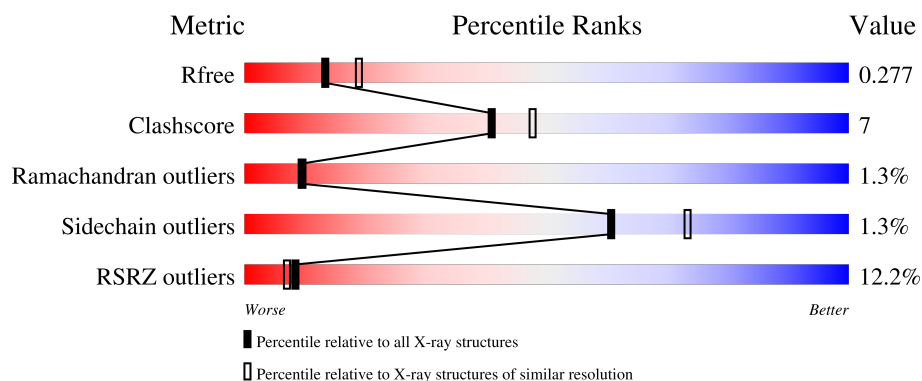
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.45 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	1190 (2.46-2.46)
Clashscore	190562	1229 (2.46-2.46)
Ramachandran outliers	187476	1218 (2.46-2.46)
Sidechain outliers	187428	1218 (2.46-2.46)
RSRZ outliers	180081	1190 (2.46-2.46)

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	605	14% 79% 17% ..
2	B	456	7% 67% 14% 19%
3	C	3	67% 33%
4	D	6	83% 17%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7551 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 Integrin alpha-V heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	584	Total	C	N	O	S	0	0	0
			4482	2847	745	869	21			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	596	GLY	-	expression tag	UNP P06756
A	597	THR	-	expression tag	UNP P06756
A	598	GLY	-	expression tag	UNP P06756
A	599	GLY	-	expression tag	UNP P06756
A	600	LEU	-	expression tag	UNP P06756
A	601	GLU	-	expression tag	UNP P06756
A	602	VAL	-	expression tag	UNP P06756
A	603	LEU	-	expression tag	UNP P06756
A	604	PHE	-	expression tag	UNP P06756
A	605	GLN	-	expression tag	UNP P06756

- Molecule 2 is a protein called Integrin beta-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	370	Total	C	N	O	S	0	0	0
			2836	1786	467	567	16			

There are 11 discrepancies between the modelled and reference sequences:

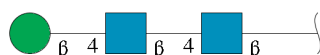
Chain	Residue	Modelled	Actual	Comment	Reference
B	446	ASP	-	expression tag	UNP P05556
B	447	THR	-	expression tag	UNP P05556
B	448	SER	-	expression tag	UNP P05556
B	449	GLY	-	expression tag	UNP P05556
B	450	LEU	-	expression tag	UNP P05556
B	451	GLU	-	expression tag	UNP P05556

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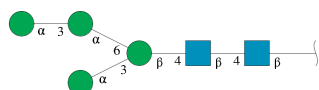
Chain	Residue	Modelled	Actual	Comment	Reference
B	452	ASN	-	expression tag	UNP P05556
B	453	LEU	-	expression tag	UNP P05556
B	454	TYR	-	expression tag	UNP P05556
B	455	PHE	-	expression tag	UNP P05556
B	456	GLN	-	expression tag	UNP P05556

- Molecule 3 is an oligosaccharide called 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	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is an oligosaccharide called 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
4	D	6	Total	C	N	O	0	0	0
			72	40	2	30			

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

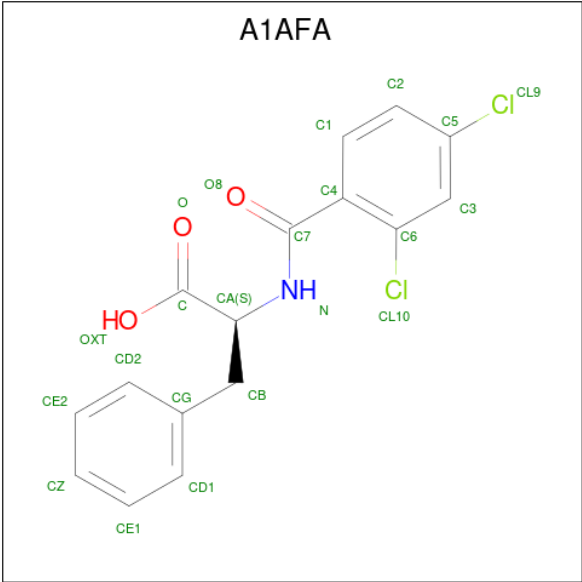
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	4	Total	Ca	0	0
			4	4		
5	B	2	Total	Ca	0	0
			2	2		

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 7 is N-(2,4-dichlorobenzoyl)-L-phenylalanine (CCD ID: A1AFA) (formula: $C_{16}H_{13}Cl_2NO_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	Cl	N	O	0	0
			22	16	2	1	3		

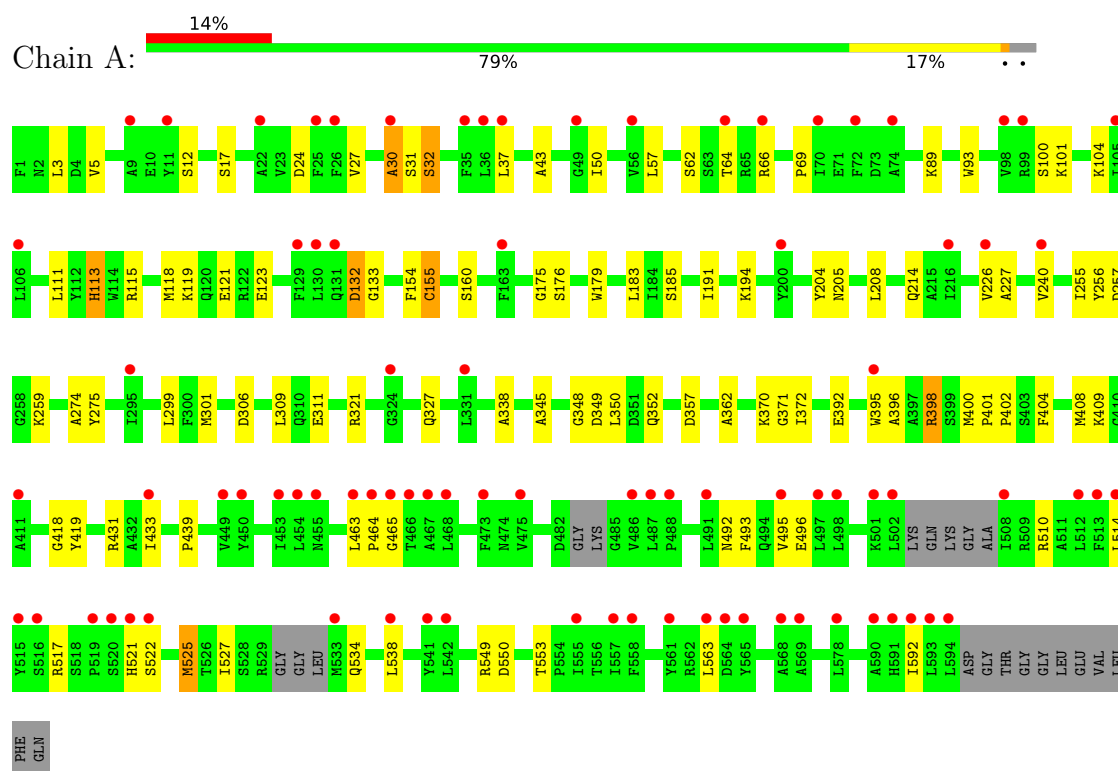
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	17	Total O	0	0
			17 17		
8	B	7	Total O	0	0
			7 7		

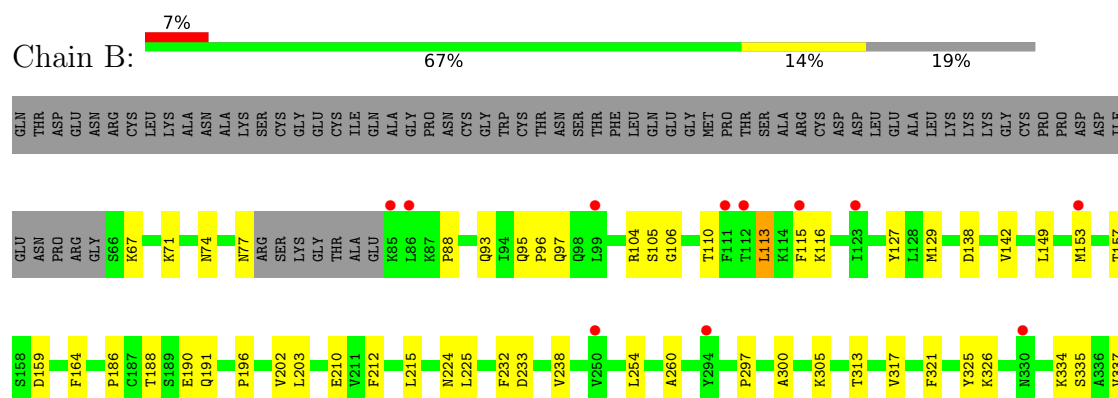
3 Residue-property plots [i](#)

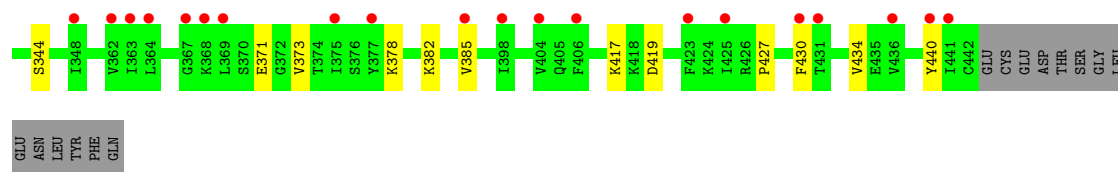
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Integrin alpha-V heavy chain



• Molecule 2: Integrin beta-1





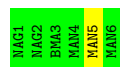
- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C: 67% 33%



- Molecule 4: 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

Chain D: 83% 17%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	199.18Å 148.21Å 53.41Å 90.00° 103.18° 90.00°	Depositor
Resolution (Å)	47.88 – 2.45 47.88 – 2.45	Depositor EDS
% Data completeness (in resolution range)	91.8 (47.88-2.45) 92.0 (47.88-2.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.30 (at 2.45Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.255 , 0.275 0.256 , 0.277	Depositor DCC
R_{free} test set	2586 reflections (4.67%)	wwPDB-VP
Wilson B-factor (Å ²)	68.0	Xtriage
Anisotropy	0.397	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 53.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.026 for -h-2*1,-k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7551	wwPDB-VP
Average B, all atoms (Å ²)	94.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.51% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: BMA, NAG, MAN, A1AFA, CA

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	0.21	0/4583	0.46	0/6217
2	B	0.18	0/2885	0.38	0/3911
All	All	0.20	0/7468	0.43	0/10128

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4482	0	4266	56	0
2	B	2836	0	2737	41	0
3	C	39	0	34	0	0
4	D	72	0	61	0	0
5	A	4	0	0	0	0
5	B	2	0	0	0	0
6	A	42	0	39	1	0
6	B	28	0	26	0	0
7	B	22	0	0	0	0
8	A	17	0	0	0	0
8	B	7	0	0	0	0
All	All	7551	0	7163	96	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 7.

All (96) 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)
2:B:157:THR:HG22	2:B:159:ASP:H	1.54	0.72
1:A:395:TRP:HZ3	1:A:433:ILE:HD11	1.59	0.66
1:A:352:GLN:NE2	1:A:418:GLY:O	2.28	0.66
2:B:71:LYS:HD3	2:B:97:GLN:HB2	1.77	0.66
1:A:321:ARG:NH1	1:A:327:GLN:OE1	2.28	0.65
1:A:301:MET:HE2	1:A:309:LEU:HB3	1.81	0.62
1:A:30:ALA:O	1:A:32:SER:N	2.30	0.61
1:A:64:THR:HG22	1:A:66:ARG:HG3	1.85	0.59
1:A:465:GLY:HA3	1:A:517:ARG:NH2	2.18	0.59
2:B:113:LEU:HD21	2:B:434:VAL:HG21	1.86	0.58
1:A:345:ALA:HB2	1:A:408:MET:HG3	1.84	0.58
1:A:370:LYS:HE2	1:A:396:ALA:HA	1.86	0.57
1:A:371:GLY:HA3	1:A:404:PHE:HB3	1.85	0.57
1:A:194:LYS:NZ	1:A:205:ASN:OD1	2.38	0.57
1:A:311:GLU:HB2	2:B:300:ALA:CB	2.36	0.56
1:A:24:ASP:HA	1:A:409:LYS:HG2	1.88	0.55
2:B:96:PRO:HD2	2:B:113:LEU:HD12	1.89	0.55
1:A:155:CYS:HB2	1:A:176:SER:OG	2.08	0.54
1:A:510:ARG:HH12	1:A:553:THR:HB	1.73	0.54
1:A:465:GLY:HA3	1:A:517:ARG:HH21	1.71	0.54
2:B:371:GLU:H	2:B:371:GLU:CD	2.16	0.54
2:B:382:LYS:O	2:B:385:VAL:HG12	2.09	0.53
2:B:77:ASN:HB3	2:B:116:LYS:NZ	2.24	0.53
2:B:326:LYS:HA	2:B:337:VAL:HG21	1.91	0.53
2:B:238:VAL:HG11	2:B:254:LEU:HD13	1.92	0.51
2:B:188:THR:O	2:B:190:GLU:N	2.35	0.51
1:A:121:GLU:HB3	1:A:123:GLU:HG3	1.93	0.50
2:B:417:LYS:O	2:B:419:ASP:N	2.43	0.50
2:B:77:ASN:HB3	2:B:116:LYS:HZ3	1.76	0.49
1:A:495:VAL:O	1:A:522:SER:HA	2.12	0.49
2:B:417:LYS:C	2:B:419:ASP:H	2.20	0.49
1:A:463:LEU:HD23	1:A:464:PRO:HD2	1.94	0.49
2:B:210:GLU:H	2:B:210:GLU:CD	2.21	0.49
1:A:12:SER:HB3	1:A:431:ARG:HD3	1.95	0.48
1:A:257:ASP:OD2	1:A:259:LYS:HB2	2.13	0.48
1:A:464:PRO:HD3	1:A:514:LEU:HG	1.96	0.48
2:B:67:LYS:NZ	2:B:110:THR:O	2.37	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:164:PHE:HD2	2:B:202:VAL:HB	1.79	0.48
1:A:154:PHE:O	1:A:175:GLY:HA3	2.14	0.47
1:A:132:ASP:OD1	1:A:133:GLY:N	2.48	0.47
1:A:419:TYR:CZ	1:A:439:PRO:HA	2.50	0.47
1:A:398:ARG:NE	1:A:398:ARG:HA	2.30	0.46
1:A:57:LEU:HA	1:A:69:PRO:HA	1.97	0.46
1:A:349:ASP:CG	1:A:352:GLN:HA	2.41	0.46
1:A:37:LEU:HD12	1:A:100:SER:HB2	1.98	0.46
1:A:50:ILE:HD12	1:A:89:LYS:HB2	1.98	0.45
2:B:127:TYR:HE1	2:B:129:MET:HE2	1.80	0.45
1:A:3:LEU:HG	1:A:350:LEU:HD21	1.98	0.45
1:A:306:ASP:OD1	1:A:306:ASP:N	2.43	0.45
2:B:129:MET:HE3	2:B:164:PHE:CE1	2.51	0.45
1:A:348:GLY:O	1:A:357:ASP:N	2.43	0.45
2:B:164:PHE:HB2	2:B:212:PHE:CE2	2.51	0.45
1:A:495:VAL:HG21	1:A:525:MET:HE3	1.98	0.45
2:B:93:GLN:O	2:B:115:PHE:HA	2.17	0.45
1:A:175:GLY:HA2	1:A:179:TRP:CD1	2.53	0.44
1:A:191:ILE:HA	1:A:204:TYR:CE1	2.52	0.44
2:B:317:VAL:HG11	2:B:325:TYR:CG	2.52	0.44
1:A:160:SER:HB2	1:A:226:VAL:HG22	1.99	0.44
1:A:401:PRO:HA	1:A:402:PRO:HD3	1.91	0.44
2:B:373:VAL:HG11	2:B:440:TYR:HE1	1.83	0.44
2:B:313:THR:O	2:B:335:SER:HA	2.18	0.44
1:A:93:TRP:CD1	1:A:111:LEU:HD12	2.53	0.43
2:B:203:LEU:HD22	2:B:212:PHE:HA	2.00	0.43
2:B:104:ARG:O	2:B:106:GLY:N	2.51	0.43
2:B:260:ALA:HA	2:B:321:PHE:CE2	2.52	0.43
1:A:17:SER:HB2	1:A:43:ALA:HB2	1.99	0.43
1:A:183:LEU:HD12	1:A:256:TYR:CD2	2.53	0.43
1:A:214:GLN:OE1	1:A:214:GLN:N	2.41	0.43
1:A:496:GLU:HG3	1:A:522:SER:OG	2.19	0.43
2:B:138:ASP:O	2:B:142:VAL:HG23	2.18	0.43
2:B:203:LEU:HD13	2:B:215:LEU:HD12	2.01	0.43
1:A:274:ALA:HA	1:A:299:LEU:HB2	2.01	0.43
1:A:493:PHE:CD2	1:A:527:ILE:HD13	2.54	0.43
1:A:185:SER:HB3	1:A:208:LEU:HB2	2.01	0.42
1:A:113:HIS:ND1	1:A:113:HIS:N	2.68	0.42
2:B:378:LYS:HB3	2:B:378:LYS:HE2	1.83	0.42
1:A:101:LYS:O	1:A:104:LYS:HE2	2.19	0.42
1:A:338:ALA:HB1	1:A:362:ALA:HB1	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:149:LEU:HD11	2:B:153:MET:HE2	2.02	0.42
2:B:427:PRO:HG2	2:B:430:PHE:HB2	2.02	0.42
2:B:138:ASP:OD2	2:B:344:SER:OG	2.28	0.41
1:A:492:ASN:ND2	6:A:2007:NAG:H5	2.36	0.41
1:A:115:ARG:HA	1:A:121:GLU:O	2.20	0.41
1:A:372:ILE:HD13	1:A:392:GLU:HA	2.02	0.41
2:B:186:PRO:HG3	2:B:196:PRO:HD3	2.02	0.41
2:B:191:GLN:OE1	2:B:191:GLN:N	2.52	0.41
1:A:227:ALA:O	1:A:240:VAL:HG12	2.20	0.41
2:B:74:ASN:HA	2:B:95:GLN:OE1	2.21	0.40
2:B:225:LEU:HD23	2:B:225:LEU:HA	1.79	0.40
2:B:232:PHE:HB3	2:B:297:PRO:HD2	2.03	0.40
2:B:305:LYS:HD3	2:B:305:LYS:HA	1.89	0.40
2:B:233:ASP:OD1	2:B:297:PRO:HD3	2.21	0.40
2:B:334:LYS:HD3	2:B:334:LYS:HA	1.91	0.40
1:A:118:MET:SD	1:A:119:LYS:HG2	2.61	0.40
1:A:240:VAL:HG23	1:A:255:ILE:HG12	2.03	0.40
1:A:521:HIS:CE1	1:A:538:LEU:HD11	2.57	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	576/605 (95%)	536 (93%)	30 (5%)	10 (2%)	7	6
2	B	366/456 (80%)	342 (93%)	22 (6%)	2 (0%)	24	32
All	All	942/1061 (89%)	878 (93%)	52 (6%)	12 (1%)	9	9

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	62	SER
2	B	105	SER
1	A	31	SER
1	A	132	ASP
1	A	398	ARG
1	A	550	ASP
2	B	88	PRO
1	A	563	LEU
1	A	32	SER
1	A	534	GLN
1	A	549	ARG
1	A	30	ALA

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	471/495 (95%)	463 (98%)	8 (2%)	53	67
2	B	319/405 (79%)	317 (99%)	2 (1%)	78	86
All	All	790/900 (88%)	780 (99%)	10 (1%)	61	73

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	VAL
1	A	27	VAL
1	A	113	HIS
1	A	155	CYS
1	A	275	TYR
1	A	400	MET
1	A	525	MET
1	A	592	ILE
2	B	113	LEU
2	B	224	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	310	GLN
2	B	301	HIS
2	B	309	ASN
2	B	383	ASN

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](#)

9 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	C	1	3,1	14,14,15	0.50	0	17,19,21	0.54	0
3	NAG	C	2	3	14,14,15	0.25	0	17,19,21	0.42	0
3	BMA	C	3	3	11,11,12	0.80	0	15,15,17	0.93	1 (6%)
4	NAG	D	1	4,1	14,14,15	0.42	0	17,19,21	0.63	0
4	NAG	D	2	4	14,14,15	0.58	0	17,19,21	0.64	0
4	BMA	D	3	4	11,11,12	0.59	0	15,15,17	0.80	0
4	MAN	D	4	4	11,11,12	0.80	0	15,15,17	1.02	0
4	MAN	D	5	4	11,11,12	0.60	0	15,15,17	1.13	1 (6%)
4	MAN	D	6	4	11,11,12	0.71	0	15,15,17	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. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	C	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
3	BMA	C	3	3	-	0/2/19/22	0/1/1/1
4	NAG	D	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	2/6/23/26	0/1/1/1
4	BMA	D	3	4	-	0/2/19/22	0/1/1/1
4	MAN	D	4	4	-	0/2/19/22	0/1/1/1
4	MAN	D	5	4	-	2/2/19/22	0/1/1/1
4	MAN	D	6	4	-	2/2/19/22	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	5	MAN	C1-O5-C5	3.45	116.81	112.19
3	C	3	BMA	C1-O5-C5	2.48	115.51	112.19

There are no chirality outliers.

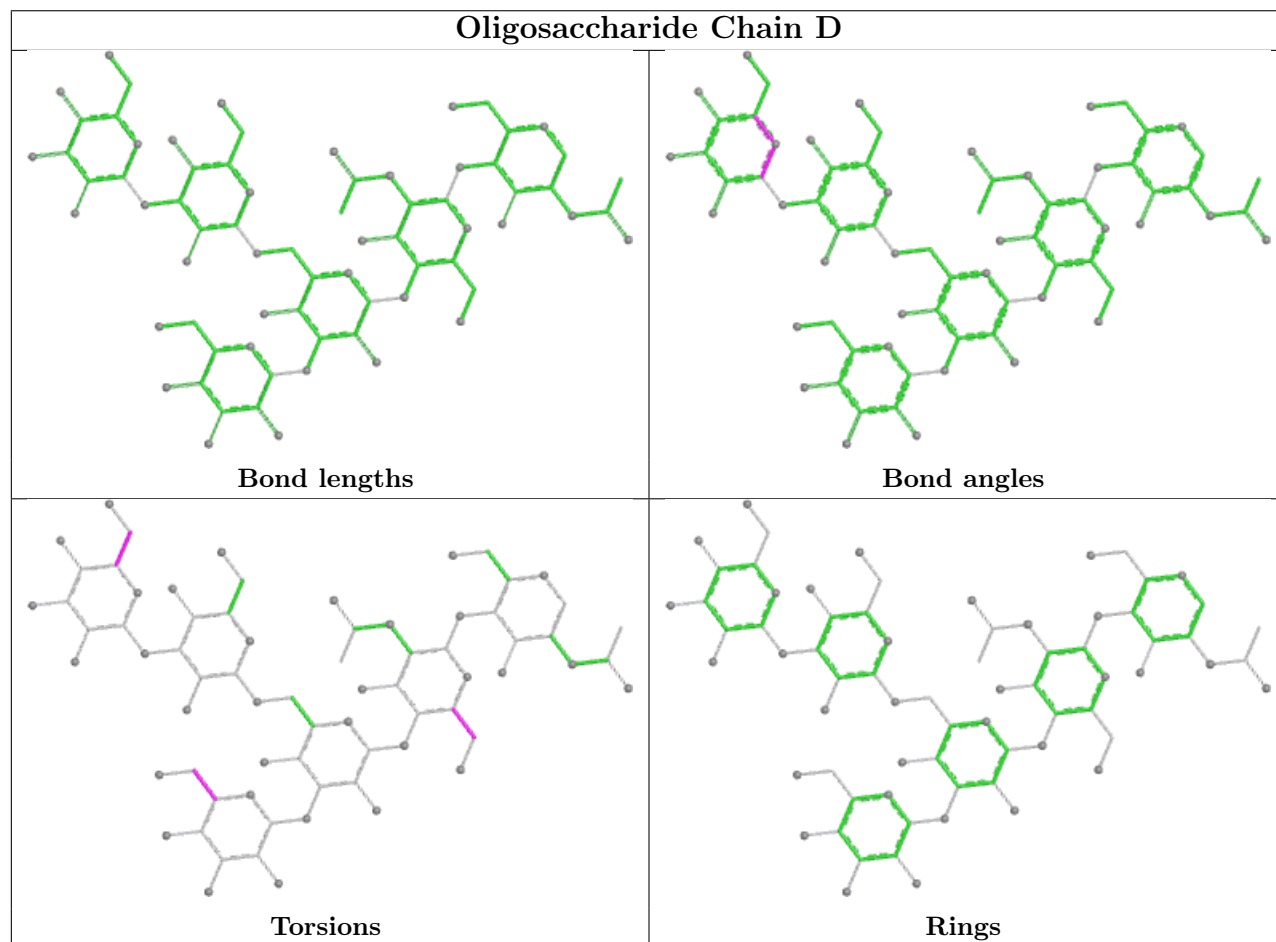
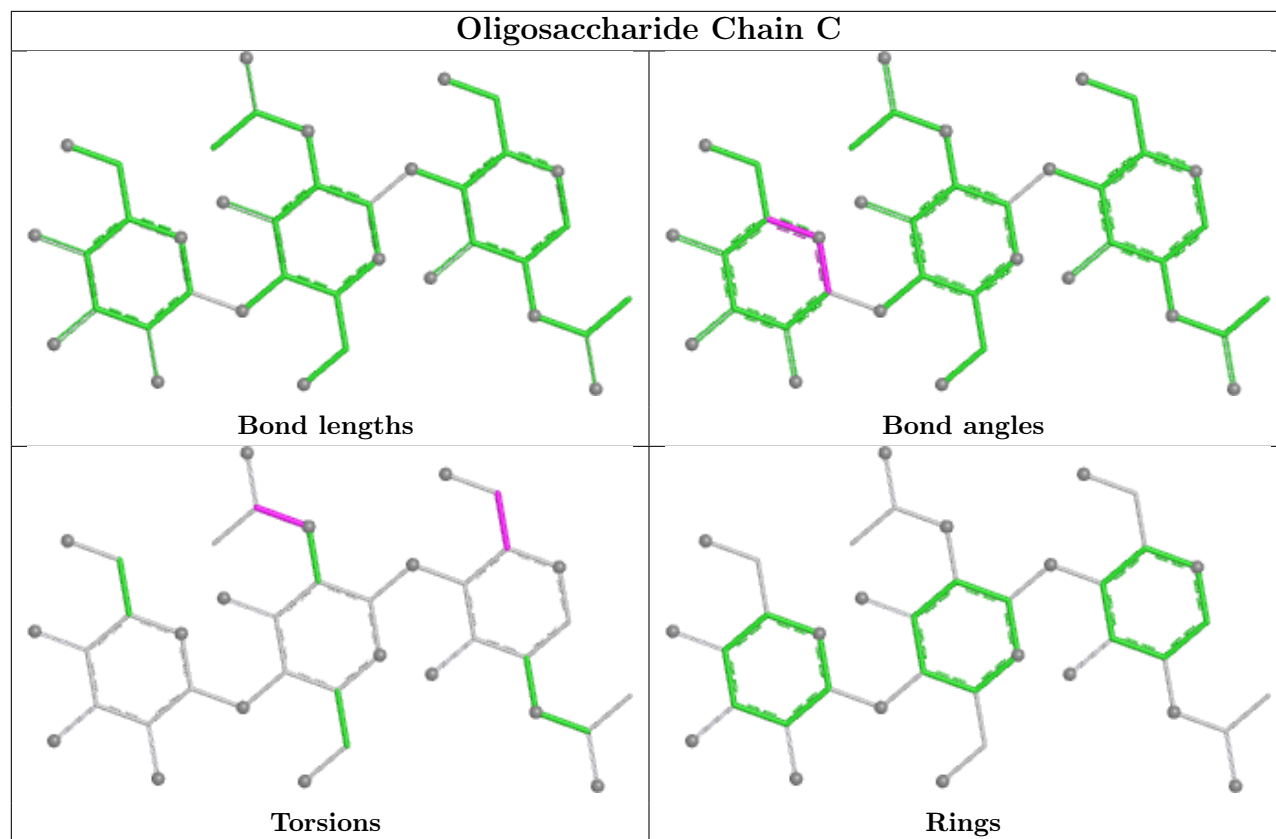
All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	D	5	MAN	O5-C5-C6-O6
4	D	6	MAN	O5-C5-C6-O6
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
4	D	5	MAN	C4-C5-C6-O6
3	C	1	NAG	O5-C5-C6-O6
4	D	6	MAN	C4-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
4	D	2	NAG	C4-C5-C6-O6
3	C	1	NAG	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

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
6	NAG	A	2006	1	14,14,15	0.56	0	17,19,21	0.63	0
6	NAG	A	2007	1	14,14,15	0.39	0	17,19,21	0.44	0
6	NAG	B	504	2	14,14,15	0.48	0	17,19,21	0.49	0
6	NAG	B	503	2	14,14,15	0.24	0	17,19,21	0.58	0
6	NAG	A	2005	1	14,14,15	0.64	0	17,19,21	0.70	1 (5%)
7	A1AFA	B	505	5	23,23,23	0.80	0	31,31,31	1.31	6 (19%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	NAG	A	2006	1	-	4/6/23/26	0/1/1/1
6	NAG	A	2007	1	-	2/6/23/26	0/1/1/1
6	NAG	B	504	2	-	2/6/23/26	0/1/1/1
6	NAG	B	503	2	-	2/6/23/26	0/1/1/1
6	NAG	A	2005	1	-	2/6/23/26	0/1/1/1
7	A1AFA	B	505	5	-	4/16/16/16	0/2/2/2

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	505	A1AFA	C1-C4-C6	2.88	121.16	117.79
7	B	505	A1AFA	OXT-C-O	2.73	130.28	124.08
7	B	505	A1AFA	CB-CA-C	-2.64	104.17	110.45
6	A	2005	NAG	C1-O5-C5	2.44	115.45	112.19
7	B	505	A1AFA	C3-C6-C4	-2.27	119.73	121.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	505	A1AFA	O-C-CA	-2.22	115.11	122.26
7	B	505	A1AFA	C6-C4-C7	-2.17	119.06	122.56

There are no chirality outliers.

All (16) torsion outliers are listed below:

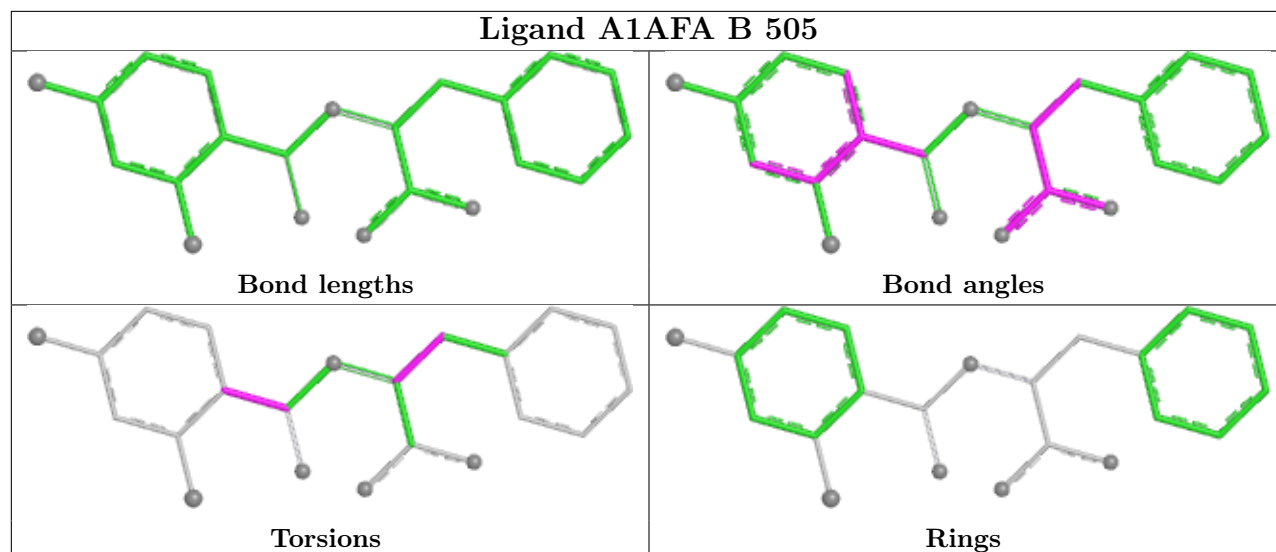
Mol	Chain	Res	Type	Atoms
6	A	2005	NAG	C4-C5-C6-O6
6	A	2007	NAG	O5-C5-C6-O6
6	A	2006	NAG	O5-C5-C6-O6
6	B	504	NAG	O5-C5-C6-O6
6	A	2006	NAG	C4-C5-C6-O6
6	B	504	NAG	C4-C5-C6-O6
6	A	2007	NAG	C4-C5-C6-O6
6	A	2005	NAG	O5-C5-C6-O6
6	A	2006	NAG	C8-C7-N2-C2
6	A	2006	NAG	O7-C7-N2-C2
6	B	503	NAG	C4-C5-C6-O6
6	B	503	NAG	O5-C5-C6-O6
7	B	505	A1AFA	C1-C4-C7-O8
7	B	505	A1AFA	C1-C4-C7-N
7	B	505	A1AFA	N-CA-CB-CG
7	B	505	A1AFA	C-CA-CB-CG

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	2007	NAG	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	584/605 (96%)	1.02	85 (14%) 6 4	58, 86, 120, 148	0
2	B	370/456 (81%)	0.89	31 (8%) 17 15	62, 103, 142, 155	0
All	All	954/1061 (89%)	0.97	116 (12%) 8 7	58, 92, 133, 155	0

All (116) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	105	ILE	4.5
1	A	454	LEU	4.3
1	A	594	LEU	4.3
1	A	563	LEU	4.2
2	B	363	ILE	4.1
1	A	163	PHE	4.0
1	A	487	LEU	3.9
2	B	115	PHE	3.8
1	A	130	LEU	3.8
1	A	475	VAL	3.7
1	A	502	LEU	3.6
1	A	468	LEU	3.5
1	A	497	LEU	3.4
1	A	498	LEU	3.3
2	B	362	VAL	3.3
1	A	592	ILE	3.3
2	B	86	LEU	3.2
1	A	463	LEU	3.2
2	B	436	VAL	3.2
1	A	131	GLN	3.2
1	A	538	LEU	3.1
1	A	450	TYR	3.1
1	A	515	TYR	3.1
1	A	555	ILE	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	129	PHE	3.0
1	A	514	LEU	3.0
1	A	25	PHE	3.0
1	A	593	LEU	2.9
1	A	30	ALA	2.9
1	A	200	TYR	2.9
1	A	453	ILE	2.8
1	A	590	ALA	2.8
2	B	406	PHE	2.8
1	A	591	HIS	2.8
1	A	542	LEU	2.8
1	A	508	ILE	2.8
2	B	430	PHE	2.7
1	A	465	GLY	2.7
1	A	520	SER	2.7
2	B	294	TYR	2.7
1	A	473	PHE	2.7
2	B	85	LYS	2.7
1	A	466	THR	2.7
2	B	112	THR	2.6
1	A	72	PHE	2.6
1	A	467	ALA	2.6
2	B	385	VAL	2.6
1	A	70	ILE	2.5
1	A	295	ILE	2.5
2	B	330	ASN	2.5
2	B	404	VAL	2.5
1	A	464	PRO	2.5
2	B	368	LYS	2.5
1	A	495	VAL	2.5
1	A	22	ALA	2.5
1	A	522	SER	2.5
2	B	431	THR	2.5
1	A	561	TYR	2.5
1	A	501	LYS	2.4
1	A	99	ARG	2.4
1	A	541	TYR	2.4
1	A	513	PHE	2.4
1	A	557	ILE	2.4
1	A	56	VAL	2.4
2	B	250	VAL	2.4
1	A	491	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	558	PHE	2.3
1	A	521	HIS	2.3
2	B	375	ILE	2.3
2	B	425	ILE	2.3
1	A	533	MET	2.3
1	A	64	THR	2.3
1	A	49	GLY	2.3
2	B	153	MET	2.3
1	A	66	ARG	2.3
1	A	36	LEU	2.3
1	A	37	LEU	2.3
1	A	74	ALA	2.2
1	A	569	ALA	2.2
2	B	367	GLY	2.2
2	B	99	LEU	2.2
2	B	441	ILE	2.2
1	A	564	ASP	2.2
1	A	488	PRO	2.2
1	A	11	TYR	2.2
2	B	123	ILE	2.2
2	B	423	PHE	2.2
1	A	565	TYR	2.2
2	B	440	TYR	2.2
1	A	331	LEU	2.2
1	A	226	VAL	2.2
1	A	411	ALA	2.2
2	B	377	TYR	2.2
2	B	348	ILE	2.2
1	A	106	LEU	2.1
2	B	364	LEU	2.1
1	A	449	VAL	2.1
1	A	516	SER	2.1
1	A	395	TRP	2.1
1	A	324	GLY	2.1
2	B	369	LEU	2.1
1	A	216	ILE	2.1
1	A	519	PRO	2.1
1	A	35	PHE	2.1
1	A	240	VAL	2.1
2	B	111	PHE	2.1
1	A	9	ALA	2.1
1	A	455	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	98	VAL	2.0
1	A	486	VAL	2.0
1	A	568	ALA	2.0
1	A	578	LEU	2.0
1	A	433	ILE	2.0
1	A	26	PHE	2.0
1	A	512	LEU	2.0
2	B	398	ILE	2.0

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 ⓘ

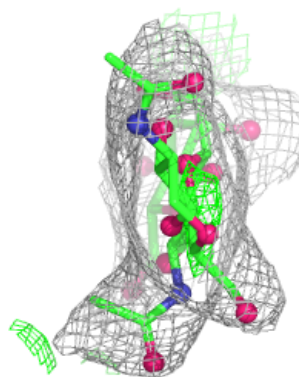
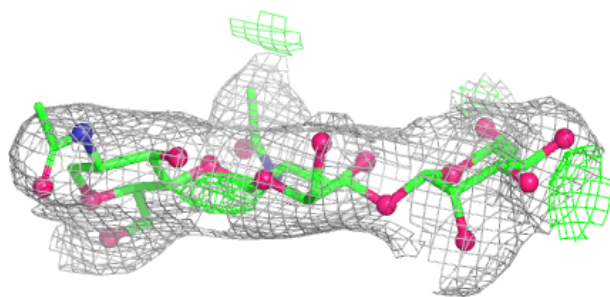
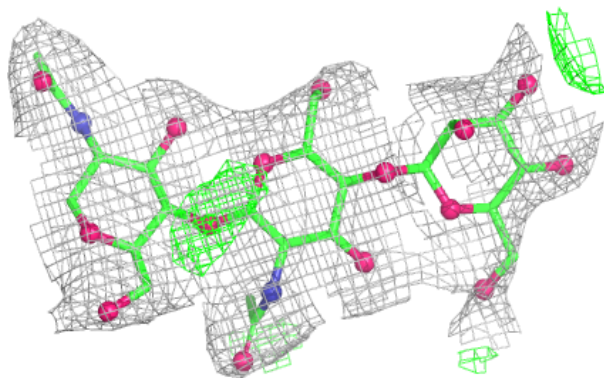
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	MAN	D	4	11/12	0.63	0.14	109,113,119,121	0
3	BMA	C	3	11/12	0.69	0.12	101,104,108,109	0
4	MAN	D	6	11/12	0.72	0.12	103,106,115,117	0
4	MAN	D	5	11/12	0.75	0.11	110,115,121,121	0
3	NAG	C	2	14/15	0.83	0.14	85,93,103,104	0
4	BMA	D	3	11/12	0.84	0.10	92,100,107,109	0
4	NAG	D	2	14/15	0.89	0.10	62,81,90,94	0
4	NAG	D	1	14/15	0.90	0.11	75,79,83,83	0
3	NAG	C	1	14/15	0.93	0.12	73,81,87,87	0

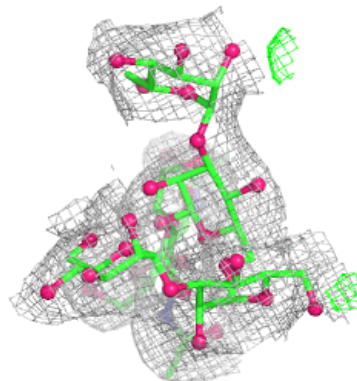
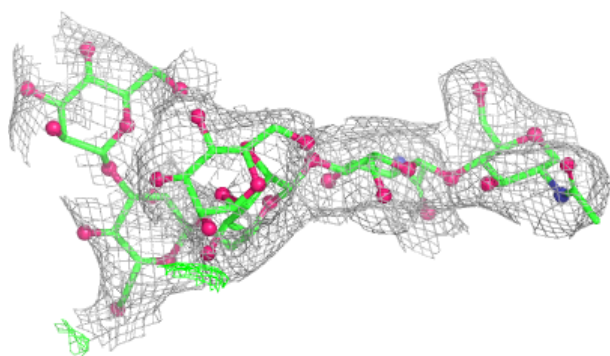
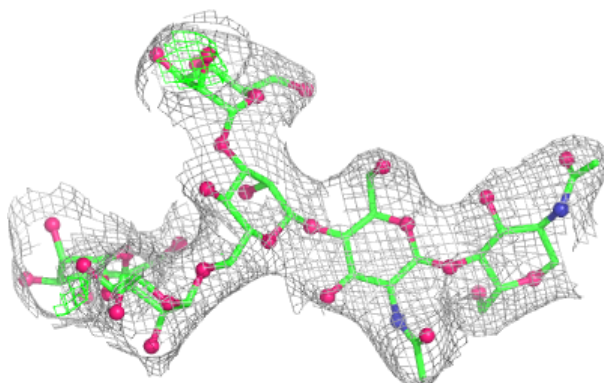
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

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

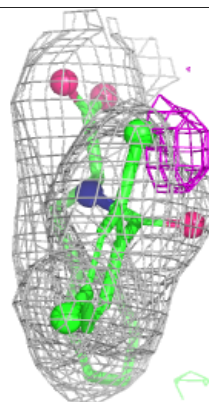
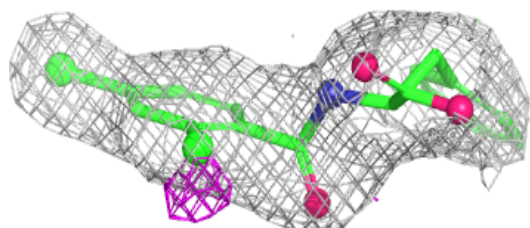
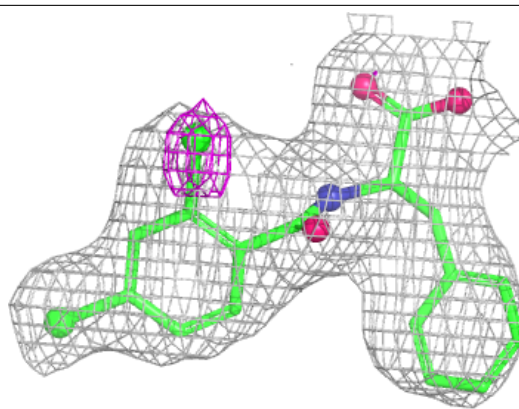
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
6	NAG	A	2007	14/15	0.58	0.18	129,139,143,146	0
6	NAG	A	2006	14/15	0.66	0.14	119,125,127,134	0
6	NAG	A	2005	14/15	0.66	0.17	114,121,125,128	0
6	NAG	B	503	14/15	0.67	0.12	132,134,139,140	0
6	NAG	B	504	14/15	0.76	0.14	115,120,125,135	0
7	A1AFA	B	505	22/22	0.85	0.12	87,94,102,113	0
5	CA	B	501	1/1	0.90	0.10	98,98,98,98	0
5	CA	A	2003	1/1	0.97	0.04	85,85,85,85	0
5	CA	A	2002	1/1	0.98	0.04	90,90,90,90	0
5	CA	B	502	1/1	0.98	0.04	74,74,74,74	0
5	CA	A	2001	1/1	0.98	0.05	88,88,88,88	0
5	CA	A	2004	1/1	0.98	0.04	90,90,90,90	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 A1AFA B 505:

$2mF_o-DF_c$ (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.