Full wwPDB X-ray Structure Validation Report ⓘ

Dec 23, 2024 – 02:09 PM EST

PDB ID	:	8W30
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:

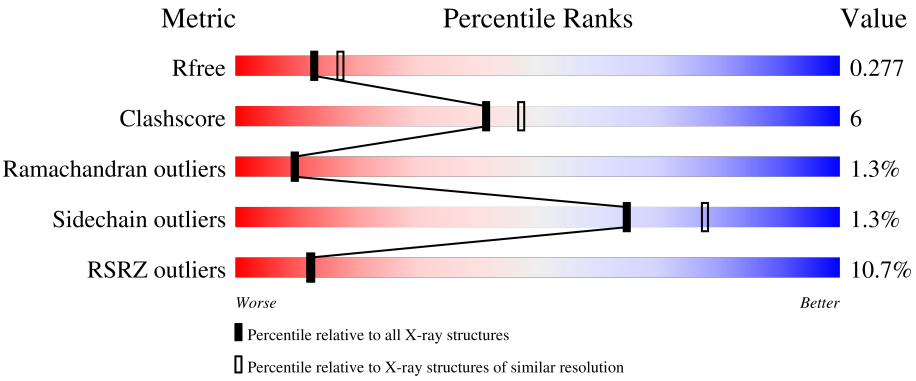
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance (i)

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}	164625	1096 (2.46-2.46)
Clashscore	180529	1178 (2.46-2.46)
Ramachandran outliers	177936	1170 (2.46-2.46)
Sidechain outliers	177891	1170 (2.46-2.46)
RSRZ outliers	164620	1096 (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 <=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	12% 79% 17%
2	B	456	6% 68% 13% 19%
3	C	3	67% 33%
4	D	6	83% 17%

2 Entry composition (i)

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
			Total	C	N	O	S			
1	A	584	4482	2847	745	869	21	0	0	0

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
			Total	C	N	O	S			
2	B	370	2836	1786	467	567	16	0	0	0

There are 11 discrepancies between the modelled and reference sequences:

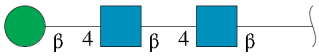
Chain	Residue	Modelled	Actual	Comment	Reference
B	446	ASP	-	expression tag	UNP P05556
B	447	THR	-	expression tag	UNP P05556
B	448	SER	-	expression tag	UNP P05556
B	449	GLY	-	expression tag	UNP P05556
B	450	LEU	-	expression tag	UNP P05556
B	451	GLU	-	expression tag	UNP P05556

Continued on next page...

Continued from previous page...

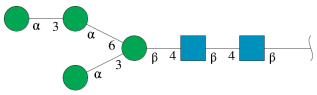
Chain	Residue	Modelled	Actual	Comment	Reference
B	452	ASN	-	expression tag	UNP P05556
B	453	LEU	-	expression tag	UNP P05556
B	454	TYR	-	expression tag	UNP P05556
B	455	PHE	-	expression tag	UNP P05556
B	456	GLN	-	expression tag	UNP P05556

- 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 39 22 2 15	0	0	0

- 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.

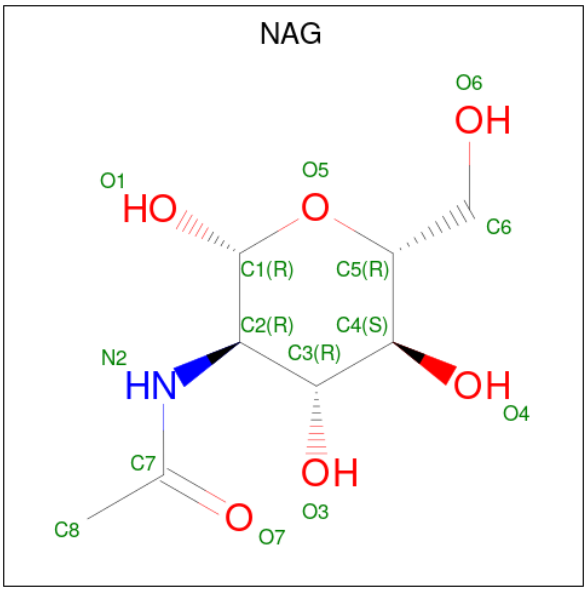


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
4	D	6	Total C N O 72 40 2 30	0	0	0

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

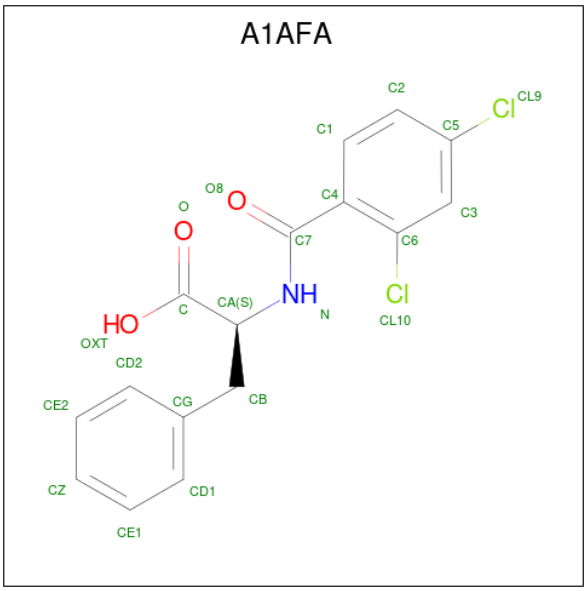
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	4	Total Ca 4 4	0	0
5	B	2	Total Ca 2 2	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 7 is N-(2,4-dichlorobenzoyl)-L-phenylalanine (three-letter code: 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.

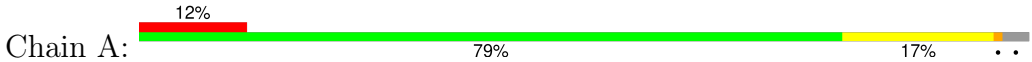
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	17	Total	O	0	0
			17	17		
8	B	7	Total	O	0	0
			7	7		

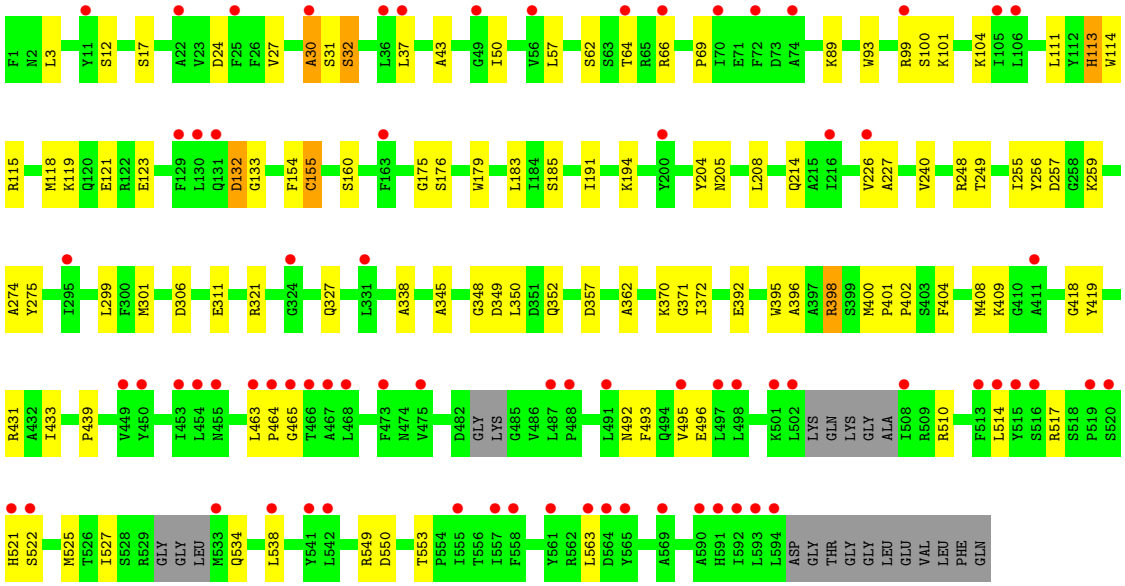
3 Residue-property plots (i)

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

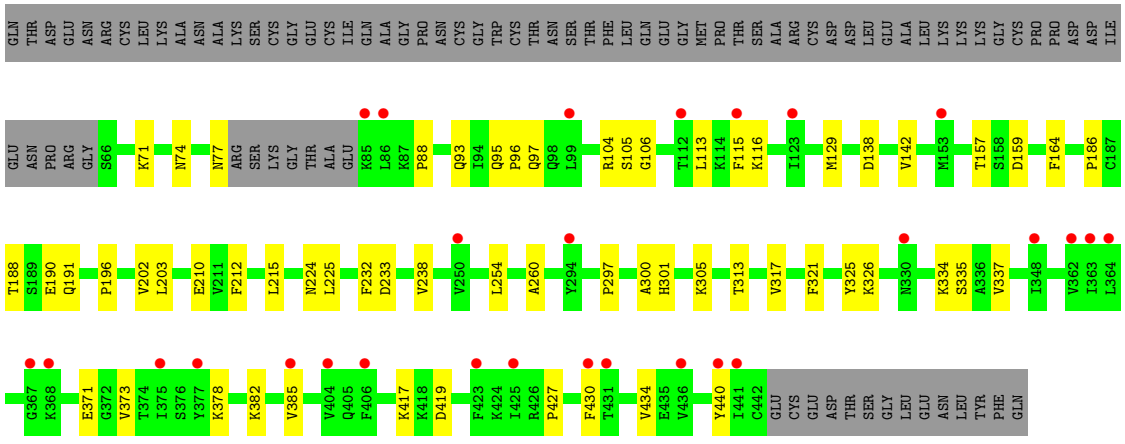
Chain A:





• Molecule 2: Integrin beta-1

Chain B:

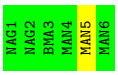


• Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:

• 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:



4 Data and refinement statistics (i)

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
$< I/\sigma(I) >$ [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	2796 reflections (5.08%)	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]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.026 for -h-2*l,-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.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: A1AFA, CA, NAG, MAN, BMA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.31	0/4583	0.53	0/6217
2	B	0.28	0/2885	0.47	0/3911
All	All	0.30	0/7468	0.51	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	39	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	93	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 6.

All (93) 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: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:301:MET:HE3	2:B:300: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: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
1:A:495:VAL:O	1:A:522:SER:HA	2.12	0.49
2:B:371:GLU:H	2:B:371:GLU:CD	2.16	0.49
1:A:463:LEU:HD23	1:A:464:PRO:HD2	1.94	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: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

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:248:ARG:O	1:A:249:THR:OG1	2.32	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
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
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
2:B:93:GLN:O	2:B:115:PHE:HA	2.17	0.45
2:B:417:LYS:C	2:B:419:ASP:H	2.20	0.45
2:B:210:GLU:H	2:B:210:GLU:CD	2.21	0.44
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
2:B:129:MET:HE3	2:B:164:PHE:CE1	2.54	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
2:B:427:PRO:HG2	2:B:430:PHE:HB2	2.02	0.42
2:B:77:ASN:HB3	2:B:116:LYS:HZ2	1.84	0.41
1:A:349:ASP:CG	1:A:352:GLN:HA	2.41	0.41
1:A:492:ASN:ND2	6:A:2007:NAG:H5	2.36	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:129:MET:HE3	2:B:164:PHE:HE1	1.85	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%)	25 32
All	All	942/1061 (89%)	878 (93%)	52 (6%)	12 (1%)	10 10

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	62	SER
2	B	105	SER
1	A	31	SER

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
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 (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	471/495 (95%)	463 (98%)	8 (2%)	56 70
2	B	319/405 (79%)	317 (99%)	2 (1%)	84 91
All	All	790/900 (88%)	780 (99%)	10 (1%)	65 78

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

Mol	Chain	Res	Type
1	A	27	VAL
1	A	99	ARG
1	A	113	HIS
1	A	114	TRP
1	A	155	CYS
1	A	275	TYR
1	A	400	MET
1	A	525	MET
2	B	224	ASN
2	B	301	HIS

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

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

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

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
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(^{o})	Ideal(^{o})
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:

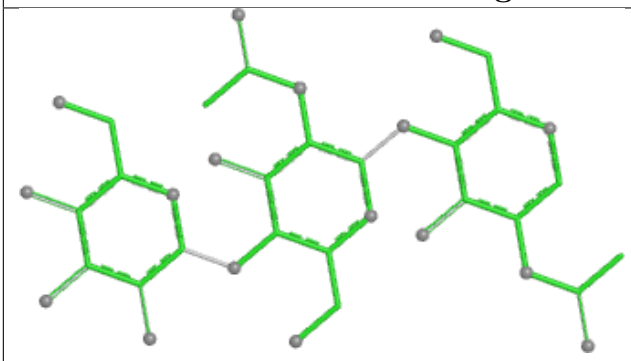
Mol	Chain	Res	Type	Atoms
4	D	5	MAN	O5-C5-C6-O6
4	D	6	MAN	O5-C5-C6-O6
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
4	D	5	MAN	C4-C5-C6-O6
3	C	1	NAG	O5-C5-C6-O6
4	D	6	MAN	C4-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
4	D	2	NAG	C4-C5-C6-O6
3	C	1	NAG	C4-C5-C6-O6

There are no ring outliers.

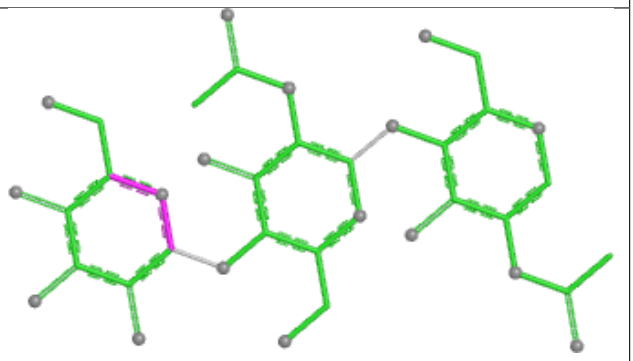
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

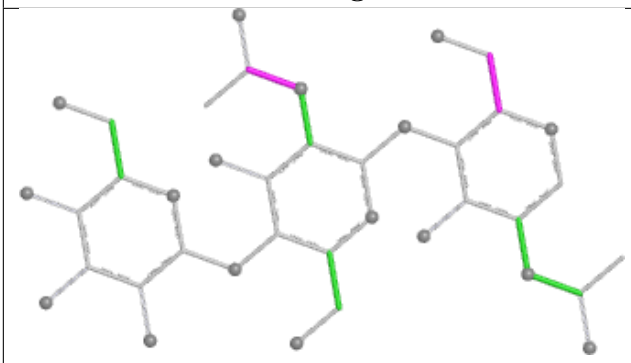
Oligosaccharide Chain C



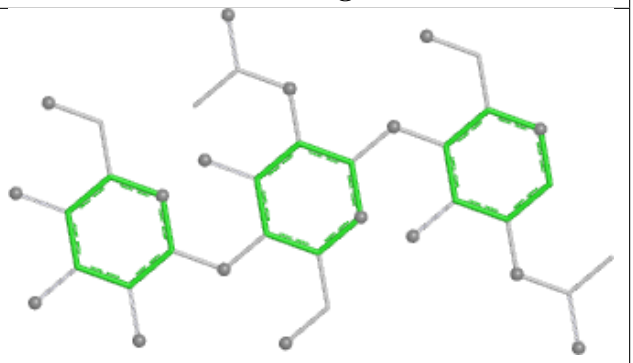
Bond lengths



Bond angles

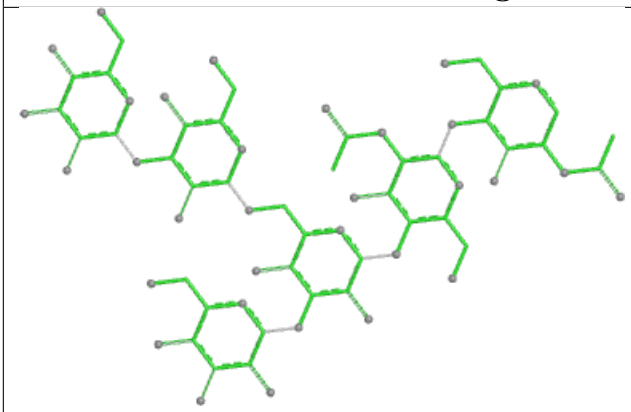


Torsions

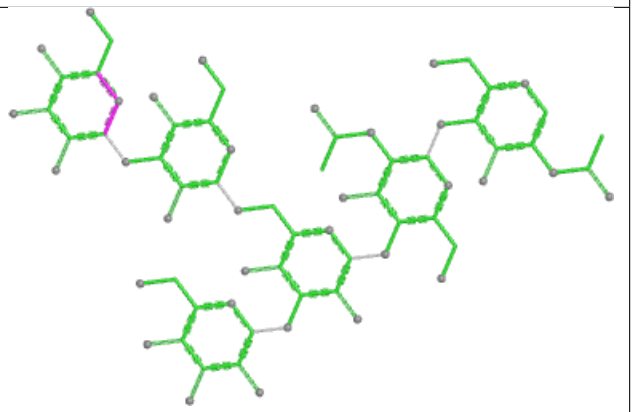


Rings

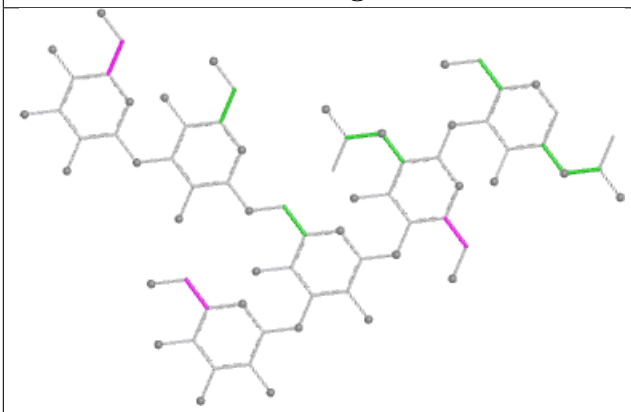
Oligosaccharide Chain D



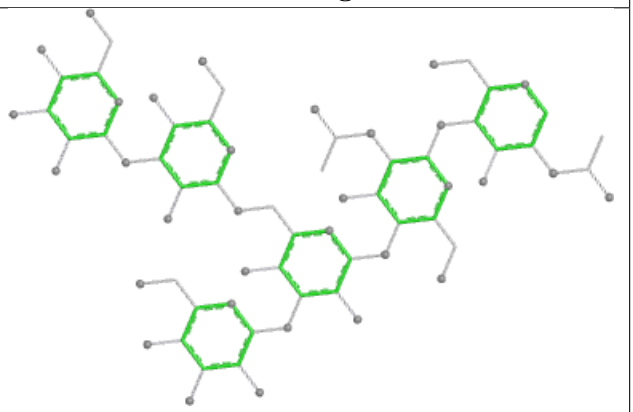
Bond lengths



Bond angles



Torsions



Rings

5.6 Ligand geometry (i)

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	2007	1	14,14,15	0.39	0	17,19,21	0.44	0
6	NAG	A	2005	1	14,14,15	0.64	0	17,19,21	0.70	1 (5%)
6	NAG	A	2006	1	14,14,15	0.56	0	17,19,21	0.63	0
6	NAG	B	504	2	14,14,15	0.48	0	17,19,21	0.49	0
7	A1AFA	B	505	5	23,23,23	0.80	0	31,31,31	1.31	6 (19%)
6	NAG	B	503	2	14,14,15	0.24	0	17,19,21	0.58	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
6	NAG	A	2007	1	-	2/6/23/26	0/1/1/1
6	NAG	A	2005	1	-	2/6/23/26	0/1/1/1
6	NAG	A	2006	1	-	4/6/23/26	0/1/1/1
6	NAG	B	504	2	-	2/6/23/26	0/1/1/1
7	A1AFA	B	505	5	-	4/16/16/16	0/2/2/2
6	NAG	B	503	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
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

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
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

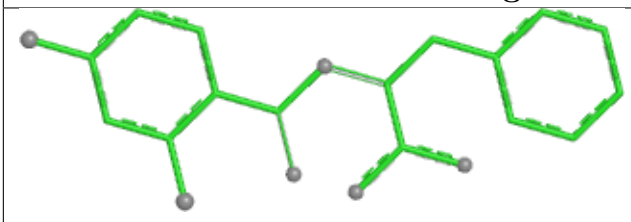
There are no ring outliers.

1 monomer is involved in 1 short contact:

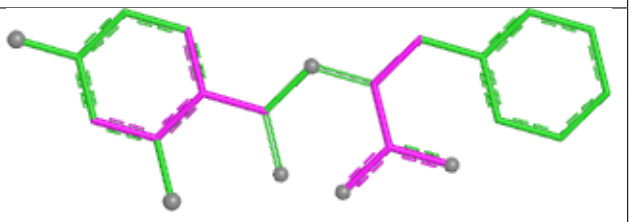
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	2007	NAG	1	0

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 then 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.

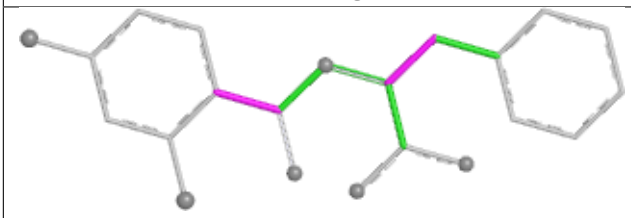
Ligand A1AFA B 505



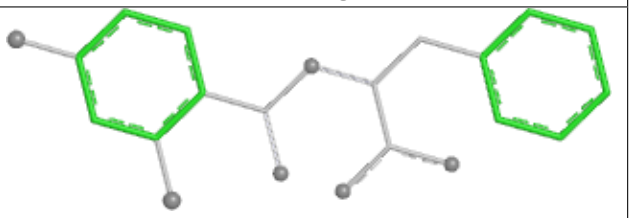
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95^{th} 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%)	0.93	74 (12%) 9 9	58, 86, 120, 148	0
2	B	370/456 (81%)	0.80	28 (7%) 21 21	62, 103, 142, 155	0
All	All	954/1061 (89%)	0.88	102 (10%) 12 12	58, 92, 133, 155	0

All (102) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	105	ILE	4.4
1	A	454	LEU	4.2
1	A	594	LEU	4.2
1	A	563	LEU	4.1
2	B	363	ILE	4.0
1	A	163	PHE	3.9
1	A	487	LEU	3.8
2	B	115	PHE	3.7
1	A	130	LEU	3.7
1	A	475	VAL	3.6
1	A	502	LEU	3.5
1	A	468	LEU	3.4
1	A	497	LEU	3.3
2	B	362	VAL	3.2
1	A	592	ILE	3.2
1	A	498	LEU	3.2
2	B	86	LEU	3.1
1	A	131	GLN	3.1
2	B	436	VAL	3.1
1	A	463	LEU	3.1
1	A	538	LEU	3.0
1	A	450	TYR	3.0
1	A	515	TYR	3.0
1	A	555	ILE	3.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	514	LEU	2.9
1	A	129	PHE	2.9
1	A	25	PHE	2.9
1	A	593	LEU	2.8
1	A	30	ALA	2.8
1	A	200	TYR	2.8
1	A	453	ILE	2.8
1	A	590	ALA	2.8
1	A	591	HIS	2.7
1	A	508	ILE	2.7
2	B	85	LYS	2.7
2	B	406	PHE	2.7
1	A	542	LEU	2.7
1	A	520	SER	2.7
1	A	465	GLY	2.6
2	B	430	PHE	2.6
2	B	294	TYR	2.6
1	A	466	THR	2.6
2	B	112	THR	2.6
1	A	473	PHE	2.6
1	A	467	ALA	2.5
1	A	72	PHE	2.5
2	B	385	VAL	2.5
2	B	368	LYS	2.5
1	A	501	LYS	2.5
2	B	330	ASN	2.5
2	B	404	VAL	2.4
1	A	464	PRO	2.4
1	A	70	ILE	2.4
1	A	295	ILE	2.4
1	A	99	ARG	2.4
1	A	495	VAL	2.4
1	A	22	ALA	2.4
1	A	522	SER	2.4
2	B	431	THR	2.4
1	A	561	TYR	2.4
1	A	541	TYR	2.3
1	A	56	VAL	2.3
1	A	557	ILE	2.3
1	A	513	PHE	2.3
1	A	66	ARG	2.3
2	B	250	VAL	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	491	LEU	2.2
1	A	521	HIS	2.2
1	A	533	MET	2.2
2	B	375	ILE	2.2
2	B	425	ILE	2.2
1	A	64	THR	2.2
2	B	153	MET	2.2
1	A	558	PHE	2.2
1	A	564	ASP	2.2
1	A	49	GLY	2.2
1	A	74	ALA	2.2
1	A	569	ALA	2.2
1	A	36	LEU	2.2
1	A	37	LEU	2.2
2	B	367	GLY	2.2
1	A	488	PRO	2.2
2	B	441	ILE	2.2
2	B	99	LEU	2.1
2	B	123	ILE	2.1
1	A	11	TYR	2.1
1	A	226	VAL	2.1
1	A	331	LEU	2.1
1	A	411	ALA	2.1
1	A	565	TYR	2.1
2	B	440	TYR	2.1
2	B	423	PHE	2.1
2	B	377	TYR	2.1
2	B	348	ILE	2.1
1	A	106	LEU	2.0
1	A	449	VAL	2.0
2	B	364	LEU	2.0
1	A	516	SER	2.0
1	A	455	ASN	2.0
1	A	324	GLY	2.0
1	A	519	PRO	2.0
1	A	216	ILE	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)

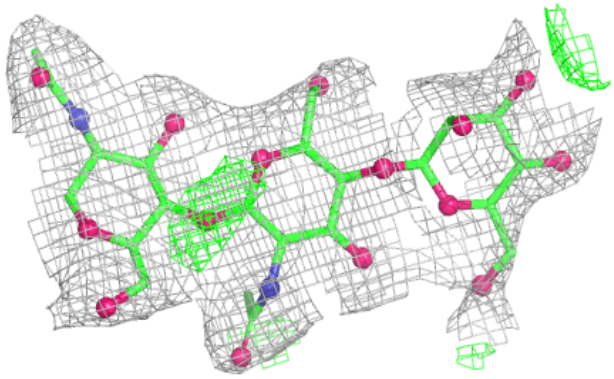
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

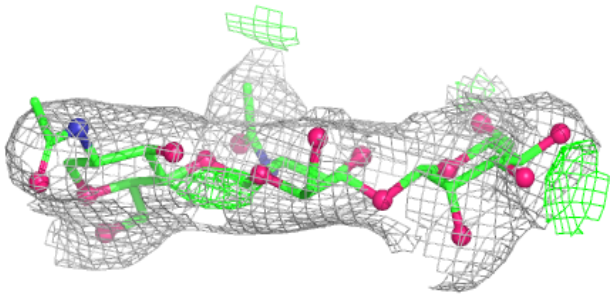
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	MAN	D	4	11/12	0.63	0.14	109,113,119,121	0
3	BMA	C	3	11/12	0.69	0.12	101,104,108,109	0
4	MAN	D	6	11/12	0.72	0.12	103,106,115,117	0
4	MAN	D	5	11/12	0.75	0.11	110,115,121,121	0
3	NAG	C	2	14/15	0.83	0.14	85,93,103,104	0
4	BMA	D	3	11/12	0.84	0.10	92,100,107,109	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

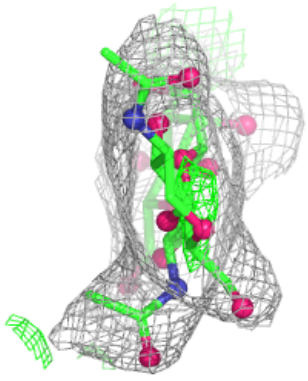
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

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)

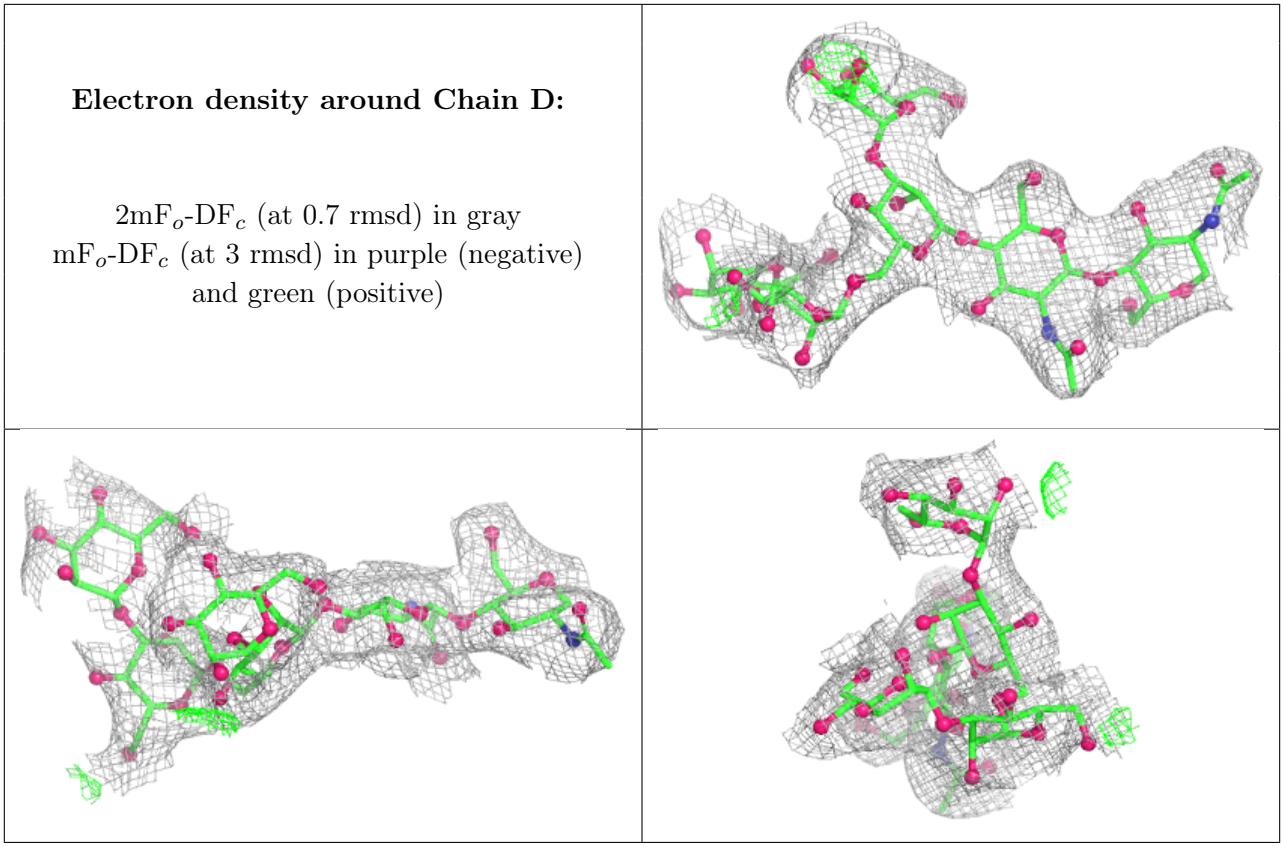






Electron density around Chain D:

$2mF_o$-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, 95^{th} 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.

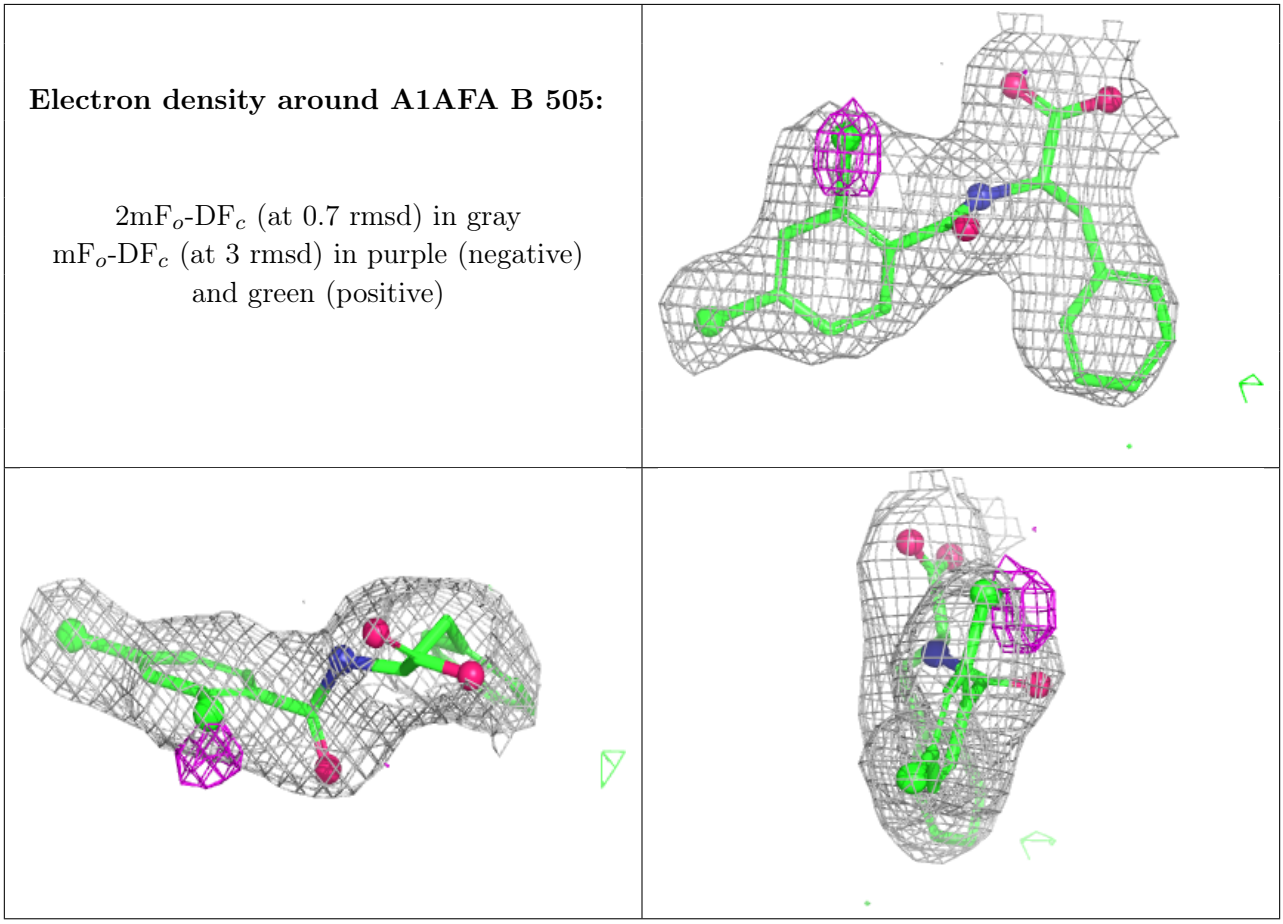
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	NAG	A	2007	14/15	0.58	0.18	129,139,143,146	0
6	NAG	A	2006	14/15	0.66	0.14	119,125,127,134	0
6	NAG	A	2005	14/15	0.66	0.17	114,121,125,128	0
6	NAG	B	503	14/15	0.67	0.12	132,134,139,140	0
6	NAG	B	504	14/15	0.76	0.14	115,120,125,135	0
7	A1AFA	B	505	22/22	0.85	0.12	87,94,102,113	0
5	CA	B	501	1/1	0.89	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	0.05	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.