Full wwPDB EM Validation Report (i)

Jul 8, 2025 – 03:17 PM JST

PDB ID	:	8ZY5 / pdb_00008zy5
EMDB ID	:	EMD-60556
Title	:	Sarbecovirus RmYN02 Spike Trimer in a Locked Conformation
Authors	:	Wang, J.; Xiong, X.
Deposited on	:	2024-06-16
Resolution	:	3.80 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.80 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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%

Mol	Chain	Length	Quality of chain
1	A	1241	71% 11% 19%
1	B	1241	69% 12% 19%
1	C	1241	70% 11% 19%
2	D	2	100%
2	E	2	50% 50%
2	F	2	50% 50%
2	G	2	100%
2	H	2	50% 50%
2	I	2	50% 50%

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Mol	Chain	Length	Quality of chain
2	J	2	50% 50%
2	K	2	50% 50%
2	L	2	50% 50%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 24450 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1010	7856	5018	1306	1497	35	0	0
1	B	1010	7856	5018	1306	1497	35	0	0
1	C	1010	7856	5018	1306	1497	35	0	0

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	D	2	28	16	2	10	0	0
2	E	2	28	16	2	10	0	0
2	F	2	28	16	2	10	0	0
2	G	2	28	16	2	10	0	0
2	H	2	28	16	2	10	0	0
2	I	2	28	16	2	10	0	0
2	J	2	28	16	2	10	0	0
2	K	2	28	16	2	10	0	0
2	L	2	28	16	2	10	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$) (labeled as "Ligand of Interest" by depositor).

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

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

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

3 Residue-property plots (i)

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

Chain A: 71% 11% 19%

- Molecule 1: Spike glycoprotein

Chain B: 69% 12% 19%

- Molecule 1: Spike glycoprotein

Chain C: 70% 11% 19%

SER GLY GLY GLY GLY SER GLY GLY SER ALA TRP SER HIS PRO GLN PHE GLU LYS SER ALA

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

Chain D: 100%

NAG1 NAG2

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

Chain E: 50% 50%

NAG1 NAG2

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

Chain F: 50% 50%

NAG1 NAG2

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

Chain G: 100%

NAG1 NAG2

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

Chain H: 50% 50%

NAG1 NAG2

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

Chain I: 50% 50%

NAG1 NAG2

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

Chain J:

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

Chain K:

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

Chain L:

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	27757	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	60	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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: NAG

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	0/8027	0.51	4/10926 (0.0%)
1	B	0.22	0/8027	0.52	6/10926 (0.1%)
1	C	0.23	0/8027	0.54	6/10926 (0.1%)
All	All	0.22	0/24081	0.52	16/32778 (0.0%)

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	86	VAL	N-CA-C	-12.21	101.56	113.53
1	A	396	VAL	N-CA-C	-8.43	103.66	111.67
1	B	86	VAL	N-CA-C	-8.02	104.04	113.42
1	A	808	LYS	N-CA-C	-7.75	104.31	114.31
1	A	86	VAL	N-CA-C	-6.84	103.33	113.39
1	C	810	ASN	N-CA-C	-6.83	103.50	114.09
1	B	707	LEU	N-CA-C	-6.09	105.81	113.18
1	B	814	VAL	N-CA-CB	-6.05	105.60	111.89
1	C	396	VAL	N-CA-CB	6.04	121.19	111.23
1	C	809	PHE	N-CA-C	-5.93	100.86	113.20
1	C	808	LYS	CA-C-O	-5.81	115.23	121.56
1	B	810	ASN	N-CA-C	-5.78	106.27	113.38
1	A	396	VAL	N-CA-CB	5.69	118.70	110.68
1	B	709	GLN	N-CA-C	-5.59	105.81	113.30
1	C	808	LYS	N-CA-C	-5.49	102.77	110.50
1	B	708	LEU	N-CA-C	-5.46	106.65	113.15

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	7856	0	7702	83	0
1	B	7856	0	7702	96	0
1	C	7856	0	7702	86	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
2	I	28	0	25	0	0
2	J	28	0	25	2	0
2	K	28	0	25	0	0
2	L	28	0	25	0	0
3	A	210	0	195	1	0
3	B	210	0	195	1	0
3	C	210	0	195	1	0
All	All	24450	0	23916	252	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 5.

All (252) 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:572:TYR:O	1:B:608:GLY:HA3	1.77	0.84
1:C:572:TYR:O	1:C:608:GLY:HA3	1.77	0.84
1:A:572:TYR:O	1:A:608:GLY:HA3	1.80	0.82
1:B:1047:GLY:HA3	1:B:1059:THR:O	1.86	0.76
1:A:1047:GLY:HA3	1:A:1059:THR:O	1.86	0.74
1:B:707:LEU:HD13	1:B:951:ILE:HD11	1.76	0.68
1:C:125:GLN:HG3	3:C:1312:NAG:HN2	1.60	0.67
1:A:125:GLN:HG3	3:A:1312:NAG:HN2	1.61	0.66
1:B:707:LEU:HD12	1:B:710:TYR:HB2	1.78	0.65
1:C:1047:GLY:HA3	1:C:1059:THR:O	2.00	0.62
1:A:696:ILE:HG21	1:A:951:ILE:HG13	1.82	0.61
1:B:81:ILE:HD11	1:B:246:VAL:HG13	1.82	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:125:GLN:HG3	3:B:1312:NAG:HN2	1.66	0.61
1:B:696:ILE:HG21	1:B:951:ILE:HG13	1.83	0.60
1:C:696:ILE:HG21	1:C:951:ILE:HG13	1.84	0.60
1:A:422:ILE:HD12	1:A:459:PRO:HD3	1.83	0.60
1:A:807:GLN:HG3	1:A:812:LEU:O	2.02	0.60
1:B:815:LEU:HD12	1:B:816:PRO:HD2	1.82	0.59
1:C:389:ILE:HD13	1:C:470:VAL:HG11	1.86	0.58
1:B:485:CYS:SG	1:B:486:GLY:N	2.77	0.58
1:A:758:GLN:NE2	1:A:889:GLN:OE1	2.37	0.57
1:C:485:CYS:SG	1:C:486:GLY:N	2.77	0.57
1:C:397:ILE:O	1:C:398:ALA:HB3	2.05	0.57
1:A:769:ARG:NH1	1:A:774:ASP:OD1	2.38	0.57
1:A:485:CYS:SG	1:A:486:GLY:N	2.77	0.57
1:A:808:LYS:O	1:A:809:PHE:HB2	2.05	0.57
1:A:278:LEU:HD21	1:A:287:VAL:HG11	1.88	0.56
1:B:1000:GLY:HA3	1:B:1020:THR:HB	1.87	0.56
1:C:84:SER:HB3	1:C:245:ALA:HB3	1.88	0.56
1:C:769:ARG:NH1	1:C:774:ASP:OD1	2.39	0.56
1:C:278:LEU:HD21	1:C:287:VAL:HG11	1.87	0.55
1:A:748:ILE:HG22	1:A:750:ASP:H	1.71	0.55
1:C:172:LYS:HD3	1:C:197:ILE:HG13	1.89	0.55
1:B:204:SER:OG	1:B:205:LEU:N	2.40	0.55
1:C:38:ASP:OD2	1:C:42:ARG:NH1	2.40	0.55
1:C:1000:GLY:HA3	1:C:1020:THR:HB	1.88	0.55
1:B:374:VAL:HG22	1:B:475:PHE:HB3	1.89	0.55
1:A:389:ILE:HD13	1:A:470:VAL:HG11	1.89	0.55
1:C:779:LYS:NZ	1:C:895:THR:O	2.40	0.55
1:B:769:ARG:NH1	1:B:774:ASP:OD1	2.40	0.54
1:A:431:ARG:NH1	1:A:433:VAL:O	2.40	0.54
1:B:38:ASP:OD2	1:B:42:ARG:NH1	2.40	0.54
1:B:779:LYS:NZ	1:B:895:THR:O	2.39	0.54
1:B:748:ILE:HG22	1:B:750:ASP:H	1.73	0.54
1:A:1000:GLY:HA3	1:A:1020:THR:HB	1.89	0.54
1:B:389:ILE:HD13	1:B:470:VAL:HG11	1.89	0.54
1:B:431:ARG:NH1	1:B:433:VAL:O	2.41	0.54
1:C:748:ILE:HG22	1:C:750:ASP:H	1.72	0.54
1:A:38:ASP:OD2	1:A:42:ARG:NH1	2.40	0.54
1:C:939:ASP:OD1	1:C:939:ASP:N	2.41	0.54
1:C:60:LEU:HD23	1:C:245:ALA:HB1	1.90	0.53
1:C:125:GLN:HB3	1:C:147:SER:HB3	1.90	0.53
1:C:431:ARG:NH1	1:C:433:VAL:O	2.41	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:747:VAL:HG13	1:A:748:ILE:HG12	1.90	0.53
1:B:1045:ARG:NH1	1:B:1072:ASP:O	2.42	0.53
1:A:27:VAL:HG13	1:A:62:TRP:HE1	1.74	0.53
1:A:939:ASP:OD1	1:A:939:ASP:N	2.40	0.53
1:B:60:LEU:HD23	1:B:245:ALA:HB1	1.91	0.53
1:A:497:ARG:NH1	1:A:587:ASP:OD2	2.40	0.53
1:B:84:SER:HB3	1:B:245:ALA:HB3	1.89	0.53
1:B:537:ARG:HD3	1:B:542:LEU:HD23	1.91	0.53
1:A:707:LEU:HD13	1:A:951:ILE:HD11	1.90	0.53
1:A:837:THR:HG23	1:C:661:TYR:HB2	1.91	0.53
1:B:298:ARG:NH2	1:B:552:PHE:O	2.41	0.52
1:C:497:ARG:NH1	1:C:587:ASP:OD2	2.42	0.52
1:C:747:VAL:HG13	1:C:748:ILE:HG12	1.91	0.52
1:B:296:ASN:HD21	1:B:551:SER:HB3	1.73	0.52
1:A:374:VAL:HG22	1:A:475:PHE:HB3	1.90	0.52
1:B:747:VAL:HG13	1:B:748:ILE:HG12	1.91	0.52
1:A:851:PRO:HA	1:C:661:TYR:HE1	1.74	0.52
1:C:298:ARG:NH2	1:C:552:PHE:O	2.43	0.52
1:A:296:ASN:HD21	1:A:551:SER:HB3	1.74	0.52
1:A:537:ARG:HD3	1:A:542:LEU:HD23	1.92	0.52
1:B:687:LYS:HE2	1:B:815:LEU:HD23	1.92	0.51
1:C:49:PHE:O	1:C:253:THR:HA	2.10	0.51
1:C:537:ARG:HD3	1:C:542:LEU:HD23	1.91	0.51
1:B:369:LEU:HD11	1:C:937:ARG:HA	1.92	0.51
1:C:807:GLN:O	1:C:810:ASN:HB2	2.10	0.51
1:B:211:PRO:HB3	1:B:264:ILE:HB	1.93	0.51
1:B:497:ARG:NH1	1:B:587:ASP:OD2	2.43	0.51
1:B:661:TYR:HE1	1:C:851:PRO:HA	1.75	0.51
1:C:81:ILE:HD11	1:C:246:VAL:HG13	1.91	0.51
1:C:710:TYR:O	1:C:712:SER:N	2.44	0.51
1:B:661:TYR:HB2	1:C:837:THR:HG23	1.93	0.51
1:C:444:SER:HA	1:C:452:LEU:HD23	1.93	0.51
1:C:517:LYS:HB2	1:C:544:ILE:HG21	1.93	0.51
1:B:517:LYS:HB2	1:B:544:ILE:HG21	1.91	0.51
1:C:716:GLN:OE1	1:C:719:ARG:NH1	2.44	0.51
1:A:661:TYR:HB2	1:B:837:THR:HG23	1.93	0.51
1:C:1045:ARG:NH1	1:C:1072:ASP:O	2.43	0.51
1:A:517:LYS:HB2	1:A:544:ILE:HG21	1.93	0.51
1:B:27:VAL:HG13	1:B:62:TRP:HE1	1.76	0.51
1:A:298:ARG:NH2	1:A:552:PHE:O	2.43	0.51
1:A:586:LEU:O	1:A:594:ARG:NH1	2.44	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:516:ASP:OD1	1:B:516:ASP:N	2.43	0.51
1:C:551:SER:OG	1:C:552:PHE:N	2.44	0.50
1:C:211:PRO:HB3	1:C:264:ILE:HB	1.93	0.50
1:A:41:TYR:HB3	1:C:479:ASN:HD22	1.76	0.50
1:C:296:ASN:HD21	1:C:551:SER:HB3	1.75	0.50
1:A:130:PRO:HB2	1:A:230:VAL:HG13	1.93	0.50
1:A:937:ARG:HA	1:C:369:LEU:HD11	1.93	0.50
1:B:444:SER:HA	1:B:452:LEU:HD23	1.94	0.50
1:C:895:THR:HG22	1:C:897:SER:H	1.76	0.50
2:J:1:NAG:H61	2:J:2:NAG:H61	1.93	0.50
1:B:982:LYS:NZ	1:B:996:PHE:O	2.45	0.50
1:B:586:LEU:O	1:B:594:ARG:NH1	2.44	0.50
1:A:125:GLN:HB3	1:A:147:SER:HB3	1.94	0.50
1:B:549:PRO:HB2	1:C:694:MET:HE1	1.93	0.50
1:B:526:GLY:N	1:B:535:SER:O	2.45	0.50
1:A:982:LYS:NZ	1:A:996:PHE:O	2.45	0.49
1:B:278:LEU:HD21	1:B:287:VAL:HG11	1.94	0.49
1:A:49:PHE:O	1:A:253:THR:HA	2.12	0.49
1:A:1045:ARG:NH1	1:A:1072:ASP:O	2.45	0.49
1:B:680:VAL:HG22	1:B:1015:VAL:HG22	1.94	0.49
1:C:306:VAL:HG22	1:C:502:ASN:HB3	1.94	0.49
1:A:551:SER:OG	1:A:552:PHE:N	2.44	0.49
1:A:526:GLY:N	1:A:535:SER:O	2.44	0.49
1:A:60:LEU:HD23	1:A:245:ALA:HB1	1.95	0.49
1:A:444:SER:HA	1:A:452:LEU:HD23	1.94	0.49
1:B:125:GLN:HB3	1:B:147:SER:HB3	1.95	0.49
1:C:347:LEU:O	1:C:351:THR:OG1	2.31	0.49
1:A:211:PRO:HB3	1:A:264:ILE:HB	1.95	0.49
1:A:895:THR:HG22	1:A:897:SER:H	1.78	0.49
1:A:347:LEU:O	1:A:351:THR:OG1	2.31	0.48
1:C:815:LEU:HD12	1:C:816:PRO:HD2	1.95	0.48
1:C:130:PRO:HB2	1:C:230:VAL:HG13	1.95	0.48
1:A:680:VAL:HG22	1:A:1015:VAL:HG22	1.96	0.48
1:B:172:LYS:HD3	1:B:197:ILE:HG13	1.94	0.48
1:A:661:TYR:HE1	1:B:851:PRO:HA	1.78	0.48
1:B:895:THR:HG22	1:B:897:SER:H	1.77	0.48
1:A:708:LEU:HD11	1:C:50:THR:HG23	1.95	0.48
1:B:604:GLN:NE2	1:B:608:GLY:O	2.46	0.48
1:B:347:LEU:O	1:B:351:THR:OG1	2.31	0.47
1:C:526:GLY:N	1:C:535:SER:O	2.44	0.47
1:A:370:CYS:HB3	1:A:485:CYS:HB2	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:604:GLN:NE2	1:C:608:GLY:O	2.47	0.47
1:B:551:SER:OG	1:B:552:PHE:N	2.45	0.47
1:B:939:ASP:N	1:B:939:ASP:OD1	2.40	0.47
1:C:123:TYR:O	1:C:148:SER:HA	2.15	0.47
1:A:123:TYR:O	1:A:148:SER:HA	2.14	0.47
1:B:130:PRO:HB2	1:B:230:VAL:HG13	1.96	0.47
1:C:577:CYS:HB2	1:C:609:CYS:HB3	1.72	0.47
1:B:234:ARG:HA	1:B:234:ARG:HD3	1.77	0.47
1:B:254:ILE:HG22	1:B:269:ASP:HA	1.95	0.47
1:B:577:CYS:HB2	1:B:609:CYS:HB3	1.73	0.47
1:A:172:LYS:HD3	1:A:197:ILE:HG13	1.97	0.47
1:B:1036:CYS:HB3	1:B:1088:ASN:HB3	1.97	0.47
1:B:538:ASP:OD1	1:B:538:ASP:N	2.49	0.46
1:B:815:LEU:CD1	1:B:816:PRO:HD2	2.45	0.46
1:C:680:VAL:HG22	1:C:1015:VAL:HG22	1.96	0.46
1:A:604:GLN:NE2	1:A:608:GLY:O	2.47	0.46
1:B:38:ASP:OD1	1:B:38:ASP:N	2.45	0.46
1:B:422:ILE:HD12	1:B:459:PRO:HD3	1.96	0.46
1:C:370:CYS:HB3	1:C:485:CYS:HB2	1.79	0.46
1:C:982:LYS:NZ	1:C:996:PHE:O	2.49	0.46
1:A:538:ASP:OD1	1:A:538:ASP:N	2.47	0.46
1:C:422:ILE:HD12	1:C:459:PRO:HD3	1.97	0.46
1:A:352:SER:HG	1:C:384:SER:HG	1.57	0.46
1:A:866:THR:H	1:A:1060:GLN:HE22	1.64	0.46
1:C:586:LEU:O	1:C:594:ARG:NH1	2.49	0.46
1:B:123:TYR:O	1:B:148:SER:HA	2.16	0.45
1:A:369:LEU:HD11	1:B:937:ARG:HA	1.97	0.45
1:A:762:ASP:OD1	1:A:762:ASP:N	2.49	0.45
1:A:254:ILE:HG22	1:A:269:ASP:HA	1.97	0.45
1:A:781:THR:O	1:A:903:GLN:NE2	2.50	0.45
1:B:781:THR:O	1:B:903:GLN:NE2	2.49	0.45
1:C:234:ARG:HA	1:C:234:ARG:HD3	1.77	0.45
2:J:1:NAG:H4	2:J:2:NAG:H2	1.61	0.45
1:B:873:ASN:HB2	1:B:876:LEU:HB2	1.99	0.45
1:C:1036:CYS:HB3	1:C:1088:ASN:HB3	1.98	0.45
1:A:144:VAL:HG13	1:A:145:TYR:HD1	1.82	0.44
1:A:1036:CYS:HB3	1:A:1088:ASN:HB3	1.99	0.44
1:B:700:SER:O	1:B:704:ASN:ND2	2.50	0.44
1:B:866:THR:H	1:B:1060:GLN:HE22	1.65	0.44
1:C:254:ILE:HG22	1:C:269:ASP:HA	1.99	0.44
1:A:1047:GLY:CA	1:A:1059:THR:O	2.63	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:367:ILE:HG23	1:B:487:PRO:HD2	1.99	0.44
1:B:676:VAL:HA	1:B:1018:HIS:O	2.18	0.44
1:B:707:LEU:C	1:B:709:GLN:H	2.25	0.44
1:A:306:VAL:HG22	1:A:502:ASN:HB3	2.00	0.44
1:A:49:PHE:HB3	1:A:51:VAL:HG13	2.00	0.44
1:C:95:TRP:HB3	1:C:227:PHE:HE1	1.82	0.43
1:C:676:VAL:HA	1:C:1018:HIS:O	2.17	0.43
1:B:1081:ASP:OD1	1:B:1081:ASP:N	2.51	0.43
1:C:894:SER:OG	1:C:895:THR:N	2.52	0.43
1:B:373:SER:OG	1:B:476:GLU:OE2	2.37	0.43
1:A:348:TYR:HB3	1:C:396:VAL:HG13	2.00	0.43
1:C:55:ARG:O	1:C:58:SER:OG	2.29	0.43
1:A:427:TYR:HB3	1:A:455:TYR:HE1	1.84	0.43
1:B:1047:GLY:CA	1:B:1059:THR:O	2.63	0.43
1:C:49:PHE:HB3	1:C:51:VAL:HG13	2.00	0.43
1:A:717:LEU:HD22	1:A:962:VAL:HG21	2.00	0.43
1:B:306:VAL:HG22	1:B:502:ASN:HB3	2.00	0.43
1:B:894:SER:OG	1:B:895:THR:N	2.51	0.43
1:A:765:LYS:HD2	1:A:765:LYS:HA	1.85	0.43
1:B:510:GLY:HA2	1:B:550:CYS:HB3	2.01	0.43
1:B:717:LEU:HD22	1:B:962:VAL:HG21	2.01	0.42
1:C:579:ASP:OD1	1:C:579:ASP:N	2.49	0.42
1:B:463:LEU:HD23	1:B:463:LEU:HA	1.86	0.42
1:C:370:CYS:HA	1:C:485:CYS:HA	2.00	0.42
1:A:873:ASN:HB2	1:A:876:LEU:HB2	2.01	0.42
1:B:24:LYS:HG2	1:B:63:TYR:HD1	1.85	0.42
1:C:866:THR:H	1:C:1060:GLN:HE22	1.67	0.42
1:A:894:SER:OG	1:A:895:THR:N	2.52	0.42
1:B:370:CYS:HB3	1:B:485:CYS:HB2	1.80	0.42
1:B:427:TYR:HB3	1:B:455:TYR:HE1	1.84	0.42
1:B:707:LEU:HB2	1:B:951:ILE:HD11	2.01	0.42
1:A:80:GLY:HA2	1:A:179:PHE:O	2.20	0.42
1:B:29:SER:HB2	1:B:58:SER:H	1.85	0.42
1:B:707:LEU:CD1	1:B:951:ILE:HD11	2.48	0.42
1:C:396:VAL:HG11	1:C:427:TYR:HE2	1.85	0.42
1:C:692:CYS:SG	1:C:718:ASN:ND2	2.92	0.42
1:A:38:ASP:OD1	1:A:38:ASP:N	2.45	0.42
1:A:173:ARG:HH21	1:A:192:TYR:HB3	1.84	0.42
1:A:1081:ASP:OD1	1:A:1081:ASP:N	2.51	0.42
1:B:49:PHE:O	1:B:253:THR:HA	2.20	0.42
1:A:577:CYS:HB2	1:A:609:CYS:HB3	1.88	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:174:LEU:HB2	1:B:195:HIS:HB2	2.01	0.42
1:B:690:VAL:HA	1:B:811:GLY:O	2.19	0.42
1:C:738:GLN:NE2	1:C:984:SER:OG	2.44	0.42
1:A:937:ARG:HB3	1:C:361:VAL:HG12	2.00	0.42
1:C:396:VAL:C	1:C:397:ILE:O	2.61	0.42
1:B:66:TRP:H	1:B:69:ALA:HB2	1.85	0.41
1:B:370:CYS:HA	1:B:485:CYS:HA	2.02	0.41
1:B:538:ASP:HA	1:B:539:PRO:HD3	1.95	0.41
1:B:49:PHE:HB3	1:B:51:VAL:HG13	2.01	0.41
1:C:427:TYR:HB3	1:C:455:TYR:HE1	1.85	0.41
1:C:700:SER:O	1:C:704:ASN:ND2	2.49	0.41
1:A:688:THR:HG21	1:A:913:LEU:HD21	2.01	0.41
1:C:66:TRP:H	1:C:69:ALA:HB2	1.86	0.41
1:C:321:PHE:HE1	1:C:471:VAL:HG11	1.85	0.41
1:A:29:SER:HB2	1:A:58:SER:H	1.86	0.41
1:A:373:SER:OG	1:A:476:GLU:OE2	2.39	0.41
1:A:676:VAL:HA	1:A:1018:HIS:O	2.21	0.41
1:B:372:THR:OG1	1:B:476:GLU:O	2.36	0.41
1:B:694:MET:HG2	1:B:809:PHE:O	2.20	0.41
1:C:781:THR:O	1:C:903:GLN:NE2	2.52	0.41
1:A:370:CYS:HA	1:A:485:CYS:HA	2.03	0.41
1:A:174:LEU:HB2	1:A:195:HIS:HB2	2.02	0.41
1:B:97:PHE:HB3	1:B:224:ILE:HD12	2.03	0.41
1:C:669:PRO:HA	1:C:1025:GLN:O	2.21	0.41
1:C:873:ASN:HB2	1:C:876:LEU:HB2	2.02	0.41
1:A:498:CYS:HB2	1:A:550:CYS:HB2	1.94	0.41
1:C:398:ALA:HA	1:C:402:TYR:O	2.21	0.41
1:C:538:ASP:OD1	1:C:538:ASP:N	2.48	0.40
1:B:589:ILE:HD12	1:B:593:TRP:HB3	2.03	0.40
1:B:765:LYS:HA	1:B:765:LYS:HD2	1.86	0.40
1:B:918:LYS:O	1:B:921:SER:OG	2.36	0.40
1:A:566:SER:O	1:A:566:SER:OG	2.32	0.40
1:B:70:TYR:HE1	1:B:231:LEU:HG	1.86	0.40
1:C:707:LEU:HD13	1:C:951:ILE:HD11	2.03	0.40
1:C:831:LEU:HD23	1:C:842:PHE:HE2	1.87	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 PDB entries followed by that with respect to all EM entries.

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	996/1241 (80%)	929 (93%)	64 (6%)	3 (0%)	37	69
1	B	996/1241 (80%)	928 (93%)	68 (7%)	0	100	100
1	C	996/1241 (80%)	927 (93%)	67 (7%)	2 (0%)	44	74
All	All	2988/3723 (80%)	2784 (93%)	199 (7%)	5 (0%)	45	74

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	810	ASN
1	C	711	GLY
1	A	809	PHE
1	C	396	VAL
1	A	811	GLY

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 PDB entries followed by that with respect to all EM entries.

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	881/1066 (83%)	879 (100%)	2 (0%)	92	94
1	B	881/1066 (83%)	879 (100%)	2 (0%)	92	94
1	C	881/1066 (83%)	879 (100%)	2 (0%)	92	94
All	All	2643/3198 (83%)	2637 (100%)	6 (0%)	91	94

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	807	GLN
1	A	809	PHE
1	B	807	GLN
1	B	809	PHE
1	C	396	VAL
1	C	397	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	187	HIS
1	A	333	GLN
1	A	524	GLN
1	A	540	GLN
1	A	606	GLN
1	A	716	GLN
1	A	959	GLN
1	A	1012	HIS
1	B	46	ASN
1	B	333	GLN
1	B	540	GLN
1	B	606	GLN
1	B	738	GLN
1	B	849	GLN
1	B	959	GLN
1	B	1012	HIS
1	B	1060	GLN
1	C	149	HIS
1	C	333	GLN
1	C	416	ASN
1	C	479	ASN
1	C	496	ASN
1	C	606	GLN
1	C	959	GLN
1	C	1060	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

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

5.5 Carbohydrates (i)

18 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	NAG	D	1	2,1	14,14,15	0.35	0	17,19,21	0.86	1 (5%)
2	NAG	D	2	2	14,14,15	0.81	1 (7%)	17,19,21	0.68	1 (5%)
2	NAG	E	1	2,1	14,14,15	0.25	0	17,19,21	0.49	0
2	NAG	E	2	2	14,14,15	0.50	0	17,19,21	0.99	1 (5%)
2	NAG	F	1	2,1	14,14,15	0.22	0	17,19,21	0.58	0
2	NAG	F	2	2	14,14,15	0.28	0	17,19,21	0.71	1 (5%)
2	NAG	G	1	2,1	14,14,15	0.38	0	17,19,21	0.88	1 (5%)
2	NAG	G	2	2	14,14,15	0.81	1 (7%)	17,19,21	0.70	1 (5%)
2	NAG	H	1	2,1	14,14,15	0.26	0	17,19,21	0.49	0
2	NAG	H	2	2	14,14,15	0.49	0	17,19,21	0.99	1 (5%)
2	NAG	I	1	2,1	14,14,15	0.22	0	17,19,21	0.64	0
2	NAG	I	2	2	14,14,15	0.27	0	17,19,21	0.71	1 (5%)
2	NAG	J	1	2,1	14,14,15	0.28	0	17,19,21	0.66	0
2	NAG	J	2	2	14,14,15	1.60	2 (14%)	17,19,21	1.41	1 (5%)
2	NAG	K	1	2,1	14,14,15	0.26	0	17,19,21	0.51	0
2	NAG	K	2	2	14,14,15	0.51	0	17,19,21	1.00	1 (5%)
2	NAG	L	1	2,1	14,14,15	0.26	0	17,19,21	0.65	0
2	NAG	L	2	2	14,14,15	0.27	0	17,19,21	0.71	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	D	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	1/6/23/26	0/1/1/1
2	NAG	F	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	4/6/23/26	0/1/1/1
2	NAG	G	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	H	2	2	-	1/6/23/26	0/1/1/1
2	NAG	I	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	-	4/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	J	2	2	-	2/6/23/26	0/1/1/1
2	NAG	K	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	K	2	2	-	1/6/23/26	0/1/1/1
2	NAG	L	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	L	2	2	-	4/6/23/26	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	J	2	NAG	O5-C1	5.37	1.52	1.43
2	J	2	NAG	C1-C2	2.56	1.56	1.52
2	G	2	NAG	C1-C2	2.44	1.56	1.52
2	D	2	NAG	C1-C2	2.40	1.55	1.52

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	J	2	NAG	C1-O5-C5	5.59	119.77	112.19
2	K	2	NAG	C2-N2-C7	3.09	127.30	122.90
2	E	2	NAG	C2-N2-C7	3.06	127.26	122.90
2	H	2	NAG	C2-N2-C7	3.05	127.24	122.90
2	G	1	NAG	C1-O5-C5	2.76	115.93	112.19
2	D	1	NAG	C1-O5-C5	2.74	115.91	112.19
2	L	2	NAG	C1-O5-C5	2.39	115.43	112.19
2	F	2	NAG	C1-O5-C5	2.37	115.40	112.19
2	G	2	NAG	C1-O5-C5	2.36	115.40	112.19
2	I	2	NAG	C1-O5-C5	2.36	115.39	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	2	NAG	C1-O5-C5	2.27	115.26	112.19

There are no chirality outliers.

All (35) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	2	NAG	O5-C5-C6-O6
2	G	2	NAG	O5-C5-C6-O6
2	I	1	NAG	O5-C5-C6-O6
2	L	2	NAG	O5-C5-C6-O6
2	K	1	NAG	O5-C5-C6-O6
2	G	2	NAG	C4-C5-C6-O6
2	E	1	NAG	O5-C5-C6-O6
2	I	2	NAG	O5-C5-C6-O6
2	I	1	NAG	C4-C5-C6-O6
2	H	1	NAG	O5-C5-C6-O6
2	J	2	NAG	O5-C5-C6-O6
2	F	2	NAG	C4-C5-C6-O6
2	L	2	NAG	C4-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	L	1	NAG	O5-C5-C6-O6
2	K	1	NAG	C4-C5-C6-O6
2	L	1	NAG	C4-C5-C6-O6
2	F	2	NAG	C8-C7-N2-C2
2	F	2	NAG	O7-C7-N2-C2
2	I	2	NAG	C8-C7-N2-C2
2	I	2	NAG	O7-C7-N2-C2
2	L	2	NAG	C8-C7-N2-C2
2	L	2	NAG	O7-C7-N2-C2
2	F	1	NAG	O5-C5-C6-O6
2	F	1	NAG	C4-C5-C6-O6
2	H	1	NAG	C4-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	I	2	NAG	C4-C5-C6-O6
2	J	2	NAG	C4-C5-C6-O6
2	D	1	NAG	C4-C5-C6-O6
2	G	1	NAG	C4-C5-C6-O6
2	E	2	NAG	C3-C2-N2-C7
2	H	2	NAG	C3-C2-N2-C7
2	K	2	NAG	C3-C2-N2-C7

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	2	NAG	2	0
2	J	1	NAG	2	0

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

Oligosaccharide Chain D

Oligosaccharide Chain E

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain F

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain G

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain H

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain I

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain J

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain K

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain L

5.6 Ligand geometry (i)

45 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	NAG	A	1308	1	14,14,15	0.32	0	17,19,21	0.40	0
3	NAG	B	1313	1	14,14,15	0.29	0	17,19,21	0.46	0
3	NAG	A	1311	1	14,14,15	0.47	0	17,19,21	1.00	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
3	NAG	B	1306	1	14,14,15	0.46	0	17,19,21	0.57	0
3	NAG	C	1305	1	14,14,15	0.37	0	17,19,21	0.51	0
3	NAG	A	1315	1	14,14,15	0.33	0	17,19,21	0.56	0
3	NAG	B	1305	1	14,14,15	0.38	0	17,19,21	0.53	0
3	NAG	B	1307	1	14,14,15	0.34	0	17,19,21	0.49	0
3	NAG	C	1307	1	14,14,15	0.34	0	17,19,21	0.50	0
3	NAG	A	1301	1	14,14,15	0.32	0	17,19,21	0.48	0
3	NAG	C	1311	1	14,14,15	0.78	1 (7%)	17,19,21	1.15	2 (11%)
3	NAG	B	1309	1	14,14,15	0.38	0	17,19,21	0.97	1 (5%)
3	NAG	A	1306	1	14,14,15	0.46	0	17,19,21	0.57	0
3	NAG	B	1310	1	14,14,15	0.49	0	17,19,21	0.58	0
3	NAG	B	1312	1	14,14,15	0.52	0	17,19,21	0.57	0
3	NAG	C	1302	1	14,14,15	0.86	1 (7%)	17,19,21	0.65	1 (5%)
3	NAG	B	1302	1	14,14,15	0.86	1 (7%)	17,19,21	0.65	1 (5%)
3	NAG	C	1315	1	14,14,15	0.33	0	17,19,21	0.55	0
3	NAG	B	1308	1	14,14,15	0.31	0	17,19,21	0.41	0
3	NAG	A	1303	-	14,14,15	0.33	0	17,19,21	0.47	0
3	NAG	A	1309	1	14,14,15	0.38	0	17,19,21	0.97	1 (5%)
3	NAG	B	1311	1	14,14,15	0.51	0	17,19,21	1.01	1 (5%)
3	NAG	C	1312	1	14,14,15	0.44	0	17,19,21	0.55	0
3	NAG	C	1314	1	14,14,15	0.46	0	17,19,21	0.51	0
3	NAG	B	1315	1	14,14,15	0.31	0	17,19,21	0.55	0
3	NAG	A	1313	1	14,14,15	0.27	0	17,19,21	0.50	0
3	NAG	C	1310	1	14,14,15	0.53	0	17,19,21	0.41	0
3	NAG	A	1307	1	14,14,15	0.33	0	17,19,21	0.48	0
3	NAG	B	1301	1	14,14,15	0.32	0	17,19,21	0.47	0
3	NAG	B	1303	-	14,14,15	0.32	0	17,19,21	0.48	0
3	NAG	C	1306	1	14,14,15	0.48	0	17,19,21	0.57	0
3	NAG	A	1304	1	14,14,15	0.42	0	17,19,21	0.54	0
3	NAG	C	1301	1	14,14,15	0.33	0	17,19,21	0.48	0
3	NAG	C	1303	-	14,14,15	0.32	0	17,19,21	0.48	0
3	NAG	C	1309	1	14,14,15	0.38	0	17,19,21	0.97	1 (5%)
3	NAG	A	1312	1	14,14,15	0.44	0	17,19,21	0.55	0
3	NAG	B	1314	1	14,14,15	0.46	0	17,19,21	0.52	0
3	NAG	C	1304	1	14,14,15	0.40	0	17,19,21	0.52	0
3	NAG	C	1308	1	14,14,15	0.34	0	17,19,21	0.43	0
3	NAG	C	1313	1	14,14,15	0.31	0	17,19,21	0.50	0
3	NAG	A	1305	1	14,14,15	0.37	0	17,19,21	0.52	0
3	NAG	A	1310	1	14,14,15	0.47	0	17,19,21	0.58	0
3	NAG	A	1314	1	14,14,15	0.46	0	17,19,21	0.48	0
3	NAG	B	1304	1	14,14,15	0.44	0	17,19,21	0.54	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	NAG	A	1302	1	14,14,15	0.86	1 (7%)	17,19,21	0.66	1 (5%)

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	A	1308	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1313	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1311	1	-	3/6/23/26	0/1/1/1
3	NAG	B	1306	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1305	1	-	1/6/23/26	0/1/1/1
3	NAG	A	1315	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1305	1	-	1/6/23/26	0/1/1/1
3	NAG	B	1307	1	-	1/6/23/26	0/1/1/1
3	NAG	C	1307	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1311	1	-	1/6/23/26	0/1/1/1
3	NAG	B	1309	1	-	3/6/23/26	0/1/1/1
3	NAG	A	1306	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1310	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1312	1	-	3/6/23/26	0/1/1/1
3	NAG	C	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1315	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1308	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1303	-	-	0/6/23/26	0/1/1/1
3	NAG	A	1309	1	-	3/6/23/26	0/1/1/1
3	NAG	B	1311	1	-	3/6/23/26	0/1/1/1
3	NAG	C	1312	1	-	4/6/23/26	0/1/1/1
3	NAG	C	1314	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1315	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1313	1	-	4/6/23/26	0/1/1/1
3	NAG	C	1310	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1307	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1301	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	B	1303	-	-	0/6/23/26	0/1/1/1
3	NAG	C	1306	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1304	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1303	-	-	0/6/23/26	0/1/1/1
3	NAG	C	1309	1	-	3/6/23/26	0/1/1/1
3	NAG	A	1312	1	-	4/6/23/26	0/1/1/1
3	NAG	B	1314	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1304	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1308	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1313	1	-	4/6/23/26	0/1/1/1
3	NAG	A	1305	1	-	1/6/23/26	0/1/1/1
3	NAG	A	1310	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1314	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1304	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1302	1	-	2/6/23/26	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1302	NAG	O5-C1	2.85	1.48	1.43
3	B	1302	NAG	O5-C1	2.83	1.48	1.43
3	A	1302	NAG	O5-C1	2.82	1.48	1.43
3	C	1311	NAG	C1-C2	2.41	1.55	1.52

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	1309	NAG	C2-N2-C7	3.16	127.41	122.90
3	A	1309	NAG	C2-N2-C7	3.15	127.39	122.90
3	C	1309	NAG	C2-N2-C7	3.13	127.35	122.90
3	B	1311	NAG	C2-N2-C7	3.05	127.25	122.90
3	A	1311	NAG	C2-N2-C7	3.05	127.24	122.90
3	C	1311	NAG	C2-N2-C7	3.03	127.21	122.90
3	C	1311	NAG	C1-O5-C5	2.94	116.17	112.19
3	A	1302	NAG	C1-O5-C5	2.42	115.47	112.19
3	B	1302	NAG	C1-O5-C5	2.41	115.46	112.19
3	C	1302	NAG	C1-O5-C5	2.38	115.42	112.19

There are no chirality outliers.

All (85) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1315	NAG	O5-C5-C6-O6
3	B	1310	NAG	O5-C5-C6-O6
3	C	1309	NAG	O5-C5-C6-O6
3	A	1311	NAG	O5-C5-C6-O6
3	B	1311	NAG	O5-C5-C6-O6
3	A	1309	NAG	O5-C5-C6-O6
3	A	1310	NAG	O5-C5-C6-O6
3	B	1309	NAG	O5-C5-C6-O6
3	B	1315	NAG	O5-C5-C6-O6
3	C	1315	NAG	O5-C5-C6-O6
3	A	1311	NAG	C4-C5-C6-O6
3	C	1309	NAG	C4-C5-C6-O6
3	C	1312	NAG	O5-C5-C6-O6
3	A	1315	NAG	C4-C5-C6-O6
3	B	1310	NAG	C4-C5-C6-O6
3	A	1312	NAG	O5-C5-C6-O6
3	A	1309	NAG	C4-C5-C6-O6
3	C	1302	NAG	C4-C5-C6-O6
3	B	1309	NAG	C4-C5-C6-O6
3	A	1302	NAG	C4-C5-C6-O6
3	B	1301	NAG	C4-C5-C6-O6
3	A	1310	NAG	C4-C5-C6-O6
3	A	1307	NAG	C4-C5-C6-O6
3	B	1311	NAG	C4-C5-C6-O6
3	C	1315	NAG	C4-C5-C6-O6
3	A	1312	NAG	C8-C7-N2-C2
3	A	1312	NAG	O7-C7-N2-C2
3	A	1313	NAG	C8-C7-N2-C2
3	A	1313	NAG	O7-C7-N2-C2
3	B	1312	NAG	C8-C7-N2-C2
3	B	1312	NAG	O7-C7-N2-C2
3	B	1313	NAG	C8-C7-N2-C2
3	B	1313	NAG	O7-C7-N2-C2
3	C	1312	NAG	C8-C7-N2-C2
3	C	1312	NAG	O7-C7-N2-C2
3	C	1313	NAG	C8-C7-N2-C2
3	C	1313	NAG	O7-C7-N2-C2
3	A	1301	NAG	C4-C5-C6-O6
3	B	1302	NAG	C4-C5-C6-O6
3	B	1315	NAG	C4-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
3	C	1301	NAG	C4-C5-C6-O6
3	A	1304	NAG	C4-C5-C6-O6
3	B	1304	NAG	C4-C5-C6-O6
3	A	1307	NAG	O5-C5-C6-O6
3	C	1302	NAG	O5-C5-C6-O6
3	A	1312	NAG	C4-C5-C6-O6
3	C	1306	NAG	C4-C5-C6-O6
3	C	1313	NAG	O5-C5-C6-O6
3	A	1302	NAG	O5-C5-C6-O6
3	B	1301	NAG	O5-C5-C6-O6
3	C	1313	NAG	C4-C5-C6-O6
3	A	1301	NAG	O5-C5-C6-O6
3	C	1301	NAG	O5-C5-C6-O6
3	A	1306	NAG	C4-C5-C6-O6
3	C	1312	NAG	C4-C5-C6-O6
3	B	1302	NAG	O5-C5-C6-O6
3	A	1314	NAG	C4-C5-C6-O6
3	A	1304	NAG	O5-C5-C6-O6
3	B	1304	NAG	O5-C5-C6-O6
3	C	1305	NAG	O5-C5-C6-O6
3	B	1306	NAG	C4-C5-C6-O6
3	C	1304	NAG	C4-C5-C6-O6
3	B	1312	NAG	O5-C5-C6-O6
3	A	1305	NAG	O5-C5-C6-O6
3	B	1305	NAG	O5-C5-C6-O6
3	B	1314	NAG	C4-C5-C6-O6
3	C	1306	NAG	O5-C5-C6-O6
3	A	1308	NAG	C4-C5-C6-O6
3	A	1306	NAG	O5-C5-C6-O6
3	A	1314	NAG	O5-C5-C6-O6
3	B	1306	NAG	O5-C5-C6-O6
3	C	1304	NAG	O5-C5-C6-O6
3	A	1308	NAG	O5-C5-C6-O6
3	B	1314	NAG	O5-C5-C6-O6
3	C	1311	NAG	C3-C2-N2-C7
3	A	1313	NAG	C4-C5-C6-O6
3	B	1308	NAG	C4-C5-C6-O6
3	B	1307	NAG	C4-C5-C6-O6
3	A	1313	NAG	O5-C5-C6-O6
3	A	1309	NAG	C3-C2-N2-C7
3	A	1311	NAG	C3-C2-N2-C7
3	B	1309	NAG	C3-C2-N2-C7

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Mol	Chain	Res	Type	Atoms
3	B	1311	NAG	C3-C2-N2-C7
3	C	1309	NAG	C3-C2-N2-C7
3	B	1308	NAG	O5-C5-C6-O6

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1312	NAG	1	0
3	C	1312	NAG	1	0
3	A	1312	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 NAG A 1308

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1313

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG A 1311	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1306	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG C 1305	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1315	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1305	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1307	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG C 1307	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1301	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG C 1311

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1309

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG A 1306	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1310	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1312

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1302

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1302

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1315

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1308	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1303	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1309

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1311

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1312

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1314

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1315	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1313	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG C 1310	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1307	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1303

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1306

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG A 1304

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1303

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1309

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG A 1312

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG B 1314

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1304

Bond lengths

Bond angles

Torsions

Rings

Ligand NAG C 1308

Ligand NAG C 1313

Ligand NAG A 1305	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1310	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1314	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG B 1304	
Bond lengths	Bond angles
Torsions	Rings

Ligand NAG A 1302	
Bond lengths	Bond angles
Torsions	Rings

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.