Full wwPDB X-ray Structure Validation Report ⓘ

Jun 16, 2025 – 10:12 AM EDT

PDB ID	:	9OAR / pdb_00009oar
Title	:	Crystal structure of antibody Fab G001-179 from IAVI G001 human trial in complex with a germline-targeting gp120 engineered outer domain eOD-GT8-mingly
Authors	:	Lin, X.; Wilson, I.A.
Deposited on	:	2025-04-21
Resolution	:	1.94 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:

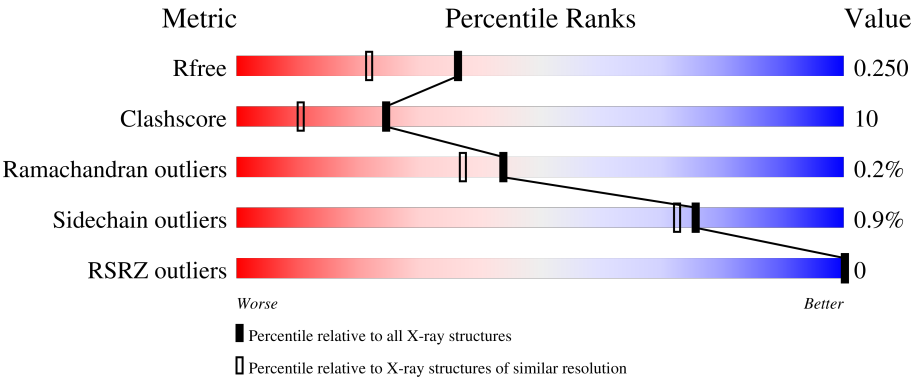
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 1.94 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	1306 (1.94-1.94)
Clashscore	180529	1400 (1.94-1.94)
Ramachandran outliers	177936	1387 (1.94-1.94)
Sidechain outliers	177891	1387 (1.94-1.94)
RSRZ outliers	164620	1306 (1.94-1.94)

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	183	75% 17% 8%
1	C	183	72% 20% • 8%
2	B	227	77% 19% •
2	H	227	81% 15% •

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Mol	Chain	Length	Quality of chain
3	D	210	
3	L	210	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 10722 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 Germline-targeting HIV-1 gp120 engineered outer domain eOD-GT8-mingly.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	169	Total	C	N	O	S	0	0	0
			1288	809	227	244	8			
1	A	169	Total	C	N	O	S	0	0	0
			1288	809	227	244	8			

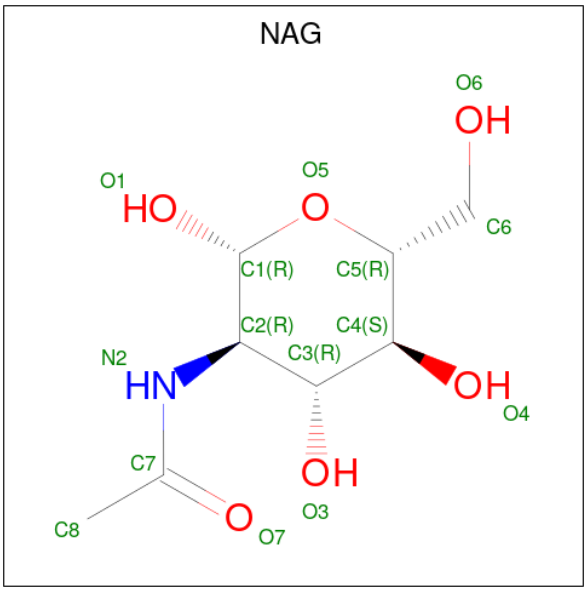
- Molecule 2 is a protein called G001-179 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	218	Total	C	N	O	S	0	0	0
			1639	1034	277	318	10			
2	B	218	Total	C	N	O	S	0	0	0
			1639	1034	277	318	10			

- Molecule 3 is a protein called G001-179 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	206	Total	C	N	O	S	0	0	0
			1585	993	262	325	5			
3	D	206	Total	C	N	O	S	0	0	0
			1585	993	262	325	5			

- Molecule 4 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	ZeroOcc	AltConf
4	C	1	Total C N O 14 8 1 5	0	0
4	C	1	Total C N O 14 8 1 5	0	0
4	A	1	Total C N O 14 8 1 5	0	0
4	A	1	Total C N O 14 8 1 5	0	0

- Molecule 5 is water.

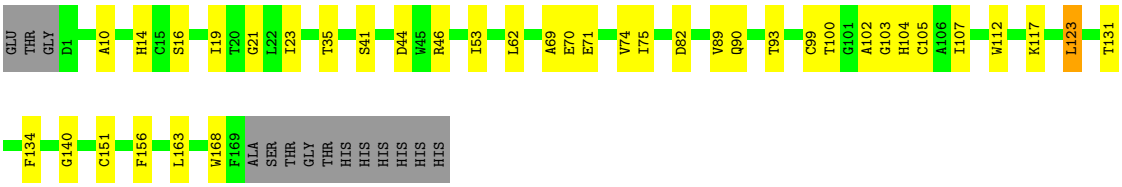
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	227	Total O 227 227	0	0
5	H	291	Total O 291 291	0	0
5	L	288	Total O 288 288	0	0
5	A	216	Total O 216 216	0	0
5	B	324	Total O 324 324	0	0
5	D	296	Total O 296 296	0	0

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 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: Germline-targeting HIV-1 gp120 engineered outer domain eOD-GT8-mingly

Chain C:

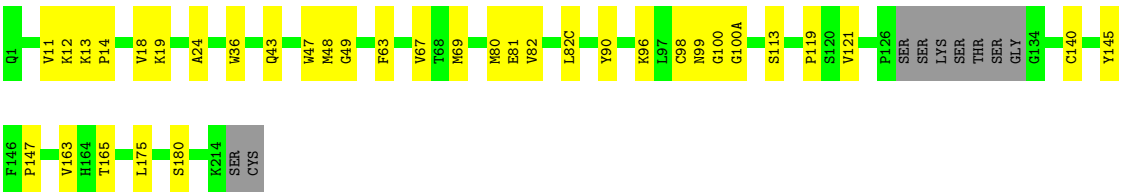


• Molecule 1: Germline-targeting HIV-1 gp120 engineered outer domain eOD-GT8-mingly

Chain A:

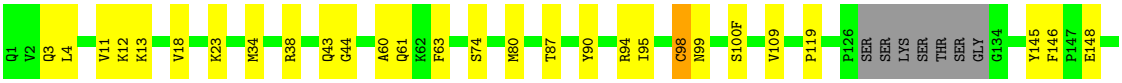
• Molecule 2: G001-179 Fab heavy chain

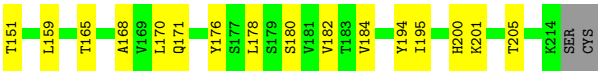
Chain H:



• Molecule 2: G001-179 Fab heavy chain

Chain B:



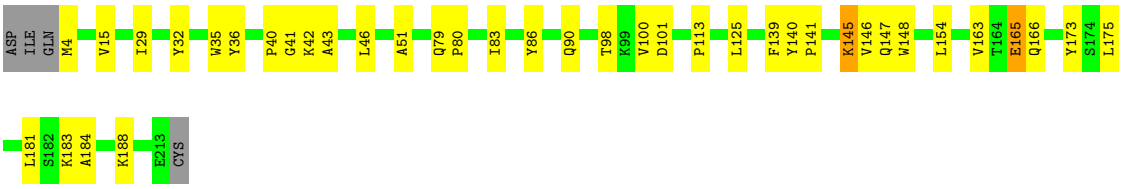


• Molecule 3: G001-179 Fab light chain

Chain L:

• Molecule 3: G001-179 Fab light chain

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	49.22Å 65.93Å 122.10Å 89.90° 96.93° 90.03°	Depositor
Resolution (Å)	26.28 – 1.94 26.28 – 1.94	Depositor EDS
% Data completeness (in resolution range)	86.2 (26.28-1.94) 86.2 (26.28-1.94)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.70 (at 1.95Å)	Xtriage
Refinement program	PHENIX 1.21.2_5419	Depositor
R, R_{free}	0.213 , 0.248 0.214 , 0.250	Depositor DCC
R_{free} test set	4590 reflections (4.75%)	wwPDB-VP
Wilson B-factor (Å^2)	17.8	Xtriage
Anisotropy	0.844	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 61.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.44$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	0.438 for -h,k,-l	Xtriage
Reported twinning fraction	0.480 for -h,k,-l	Depositor
Outliers	0 of 96730 reflections	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	10722	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.04% 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: 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	0.31	0/1318	0.50	0/1791
1	C	0.33	0/1318	0.54	0/1791
2	B	0.30	0/1680	0.54	0/2289
2	H	0.30	0/1680	0.50	0/2289
3	D	0.29	0/1620	0.55	2/2200 (0.1%)
3	L	0.28	0/1620	0.48	0/2200
All	All	0.30	0/9236	0.52	2/12560 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	41	GLY	N-CA-C	6.24	123.66	115.36
3	D	43	ALA	N-CA-C	5.49	116.61	109.64

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	1288	0	1246	24	0
1	C	1288	0	1246	30	0
2	B	1639	0	1596	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	H	1639	0	1596	30	0
3	D	1585	0	1525	35	0
3	L	1585	0	1525	25	0
4	A	28	0	26	0	0
4	C	28	0	26	1	0
5	A	216	0	0	8	0
5	B	324	0	0	18	0
5	C	227	0	0	12	0
5	D	296	0	0	17	0
5	H	291	0	0	11	0
5	L	288	0	0	8	0
All	All	10722	0	8786	173	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 10.

All (173) 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:C:70:GLU:HA	5:B:301:HOH:O	1.82	0.80
2:B:34:MET:HA	5:B:304:HOH:O	1.82	0.79
1:A:146:ASN:HB2	5:A:302:HOH:O	1.83	0.78
3:L:83:ILE:HD12	3:L:166:GLN:HE21	1.47	0.77
1:C:134:PHE:HB2	5:C:306:HOH:O	1.89	0.71
3:D:83:ILE:HD13	3:D:166:GLN:HB3	1.74	0.69
2:H:48:MET:HE1	2:H:90:TYR:HE2	1.56	0.69
2:B:159:LEU:HD21	2:B:182:VAL:HG21	1.75	0.68
3:D:46:LEU:HD21	5:D:314:HOH:O	1.95	0.66
1:C:100:THR:HG23	1:C:102:ALA:H	1.61	0.66
1:A:162:GLN:HA	5:A:336:HOH:O	1.98	0.64
3:D:86:TYR:HB2	5:D:302:HOH:O	1.98	0.63
2:H:98:CYS:HB3	2:H:100(A):GLY:H	1.63	0.63
2:B:119:PRO:HD2	2:B:205:THR:HG21	1.80	0.62
1:C:117:LYS:HE3	1:A:46:ARG:HH22	1.65	0.62
3:L:113:PRO:HA	5:L:301:HOH:O	1.99	0.62
3:L:83:ILE:CD1	3:L:166:GLN:HE21	2.12	0.61
3:D:146:VAL:HG23	5:D:457:HOH:O	2.00	0.61
1:C:53:ILE:HD12	5:C:321:HOH:O	2.01	0.61
3:D:40:PRO:HB3	3:D:165:GLU:OE2	2.00	0.61
2:B:12:LYS:HB3	5:B:309:HOH:O	1.99	0.60
3:D:98:THR:HB	5:D:302:HOH:O	2.02	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:42:GLY:HA3	5:B:302:HOH:O	2.01	0.59
1:A:31:SER:HA	2:B:61:GLN:OE1	2.03	0.59
3:D:165:GLU:HG2	5:D:456:HOH:O	2.02	0.59
2:B:100(F):SER:HB2	5:B:313:HOH:O	2.03	0.59
3:L:102:ILE:H	3:L:166:GLN:HE22	1.50	0.59
1:C:75:ILE:HD13	1:C:123:LEU:HD12	1.84	0.59
2:H:11:VAL:HG22	5:H:331:HOH:O	2.02	0.59
3:D:15:VAL:HG13	5:D:307:HOH:O	2.04	0.58
2:H:36:TRP:CG	2:H:80:MET:HG3	2.40	0.57
2:H:82(C):LEU:HD12	5:H:301:HOH:O	2.05	0.57
2:B:11:VAL:HG21	2:B:146:PHE:HE1	1.70	0.57
3:D:80:PRO:HD3	5:D:307:HOH:O	2.05	0.57
3:D:184:ALA:O	3:D:188:LYS:HD3	2.04	0.57
1:C:35:THR:HG22	1:C:131:THR:HB	1.86	0.57
2:H:13:LYS:N	2:H:13:LYS:HD2	2.20	0.56
3:L:39:LYS:HG3	3:L:40:PRO:HD2	1.86	0.56
1:A:35:THR:HG22	1:A:131:THR:HB	1.87	0.56
1:A:100:THR:HG23	1:A:102:ALA:H	1.71	0.56
3:D:145:LYS:HD2	3:D:147:GLN:OE1	2.05	0.56
3:D:29:ILE:HG22	3:D:32:TYR:HB2	1.88	0.56
3:L:80:PRO:HA	3:L:102:ILE:CD1	2.37	0.55
3:D:101:ASP:HB3	5:D:464:HOH:O	2.05	0.55
3:L:33:LEU:HD11	5:L:467:HOH:O	2.05	0.55
2:B:201:LYS:HG2	5:B:315:HOH:O	2.06	0.55
1:A:10:ALA:HA	5:A:319:HOH:O	2.06	0.54
3:L:139:PHE:HB3	5:L:301:HOH:O	2.06	0.54
3:D:51:ALA:HA	5:D:355:HOH:O	2.07	0.54
2:B:165:THR:HG23	5:B:306:HOH:O	2.08	0.54
3:D:113:PRO:HB3	3:D:139:PHE:HB3	1.90	0.54
2:B:95:ILE:HB	5:B:313:HOH:O	2.08	0.53
3:D:147:GLN:HB3	3:D:154:LEU:HD11	1.89	0.53
2:H:47:TRP:CZ2	2:H:49:GLY:HA2	2.43	0.53
1:A:23:ILE:HG12	1:A:41:SER:HB2	1.89	0.53
2:B:119:PRO:HB3	2:B:145:TYR:HB3	1.90	0.52
2:H:98:CYS:O	2:H:99:ASN:HB2	2.10	0.52
3:L:4:MET:HE2	3:L:25:ALA:HA	1.92	0.52
1:C:117:LYS:HD3	1:C:168:TRP:CE3	2.44	0.52
2:B:94:ARG:HB3	5:B:304:HOH:O	2.09	0.52
1:C:10:ALA:HA	5:C:307:HOH:O	2.08	0.52
1:C:71:GLU:HG2	5:B:381:HOH:O	2.10	0.52
3:L:104:ARG:NH2	3:L:111:ALA:HB2	2.26	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:163:VAL:HG22	3:D:175:LEU:HD12	1.92	0.51
2:B:95:ILE:HG13	5:B:394:HOH:O	2.10	0.51
2:H:67:VAL:HG22	2:H:82:VAL:HG22	1.92	0.51
2:B:38:ARG:HD3	2:B:90:TYR:CE2	2.45	0.51
1:C:23:ILE:HG12	1:C:41:SER:HB2	1.93	0.50
1:C:21:GLY:HA3	5:C:321:HOH:O	2.10	0.50
1:A:109:ARG:HB3	5:A:455:HOH:O	2.12	0.50
3:L:21:ILE:HG23	5:L:338:HOH:O	2.11	0.50
1:C:44:ASP:HB2	5:C:397:HOH:O	2.11	0.50
3:D:79:GLN:HA	5:D:307:HOH:O	2.12	0.49
3:D:83:ILE:HG22	5:D:301:HOH:O	2.11	0.49
3:L:123:GLU:HA	3:L:126:LYS:HE2	1.94	0.49
2:H:175:LEU:HB2	5:H:318:HOH:O	2.12	0.49
2:B:170:LEU:HB2	2:B:176:TYR:HE1	1.78	0.49
2:H:48:MET:HG2	2:H:63:PHE:CE2	2.47	0.49
3:L:133:VAL:HG13	5:L:312:HOH:O	2.13	0.49
2:H:19:LYS:HG3	2:H:81:GLU:HB2	1.94	0.48
3:L:80:PRO:HA	3:L:102:ILE:HD13	1.95	0.48
2:B:200:HIS:HB3	2:B:205:THR:CG2	2.44	0.48
3:D:175:LEU:HD23	5:D:311:HOH:O	2.13	0.48
1:A:28:GLY:O	2:B:61:GLN:HG3	2.13	0.48
2:B:178:LEU:HD13	5:B:306:HOH:O	2.13	0.48
3:L:63:SER:HB2	5:L:477:HOH:O	2.14	0.48
2:B:168:ALA:HA	2:B:178:LEU:HB3	1.96	0.47
2:H:119:PRO:HB3	2:H:145:TYR:HB3	1.95	0.47
3:L:42:LYS:HG3	5:L:308:HOH:O	2.15	0.47
1:A:27:GLN:HG2	2:B:61:GLN:HG2	1.96	0.47
2:B:171:GLN:HB2	5:B:307:HOH:O	2.14	0.47
1:A:70:GLU:HG2	5:A:356:HOH:O	2.13	0.47
3:L:38:GLN:HA	5:L:308:HOH:O	2.15	0.47
2:H:96:LYS:HE2	3:L:55:GLU:OE2	2.15	0.46
3:L:190:LYS:HD2	3:L:190:LYS:HA	1.70	0.46
3:L:188:LYS:HB2	3:L:188:LYS:HE3	1.74	0.46
1:A:111:LYS:O	1:A:115:THR:HG23	2.15	0.46
2:H:69:MET:HG2	2:H:80:MET:HG2	1.98	0.46
1:C:46:ARG:HB3	5:C:319:HOH:O	2.15	0.46
2:H:14:PRO:HG2	5:H:489:HOH:O	2.16	0.46
3:L:83:ILE:HD12	3:L:166:GLN:NE2	2.25	0.45
2:B:43:GLN:CD	2:B:44:GLY:H	2.24	0.45
2:B:23:LYS:HE2	2:B:23:LYS:HB3	1.71	0.45
1:C:74:VAL:CG2	1:C:90:GLN:HB3	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:181:LEU:HD13	5:D:331:HOH:O	2.16	0.45
2:H:165:THR:HG22	2:H:180:SER:OG	2.17	0.45
2:H:12:LYS:HG3	2:H:18:VAL:HB	1.97	0.45
1:C:19:ILE:HD13	1:C:62:LEU:HD13	1.97	0.45
2:B:151:THR:HG23	5:B:511:HOH:O	2.16	0.45
3:L:39:LYS:NZ	3:L:40:PRO:HD2	2.32	0.45
1:C:151:CYS:HB3	1:C:156:PHE:HE2	1.82	0.45
2:B:18:VAL:HG22	5:B:314:HOH:O	2.16	0.45
1:C:75:ILE:HG22	1:C:89:VAL:HG22	1.98	0.44
2:H:121:VAL:HG13	5:H:317:HOH:O	2.16	0.44
2:B:195:ILE:HG22	5:B:324:HOH:O	2.17	0.44
1:A:40:PRO:HG2	1:A:137:SER:HB2	1.99	0.44
1:C:117:LYS:CE	1:A:46:ARG:HH22	2.30	0.44
2:H:13:LYS:HE3	2:H:113:SER:HA	2.00	0.44
2:H:24:ALA:HB2	5:H:400:HOH:O	2.17	0.44
1:C:82:ASP:HA	5:H:323:HOH:O	2.17	0.43
2:H:163:VAL:HG13	5:H:303:HOH:O	2.17	0.43
2:B:95:ILE:HA	2:B:100(F):SER:O	2.18	0.43
3:D:166:GLN:HB2	3:D:173:TYR:CE1	2.54	0.43
2:H:36:TRP:CD2	2:H:80:MET:HG3	2.52	0.43
2:B:60:ALA:HB3	2:B:63:PHE:HD2	1.83	0.43
5:C:355:HOH:O	2:B:74:SER:HA	2.18	0.43
2:H:82(C):LEU:HB2	5:H:301:HOH:O	2.17	0.43
1:C:90:GLN:HA	5:C:321:HOH:O	2.18	0.43
2:H:98:CYS:C	2:H:100:GLY:H	2.27	0.42
2:H:48:MET:HE1	2:H:90:TYR:CE2	2.45	0.42
2:H:180:SER:HB3	5:H:302:HOH:O	2.19	0.42
1:A:92:ALA:HB1	5:A:303:HOH:O	2.18	0.42
2:B:87:THR:HA	2:B:109:VAL:O	2.19	0.42
3:D:42:LYS:HB2	5:D:310:HOH:O	2.18	0.42
3:D:125:LEU:O	3:D:183:LYS:HD2	2.19	0.42
1:C:140:GLY:HA3	5:C:373:HOH:O	2.20	0.42
1:A:12:PRO:HB2	1:A:14:HIS:CE1	2.55	0.42
2:B:148:GLU:HG2	2:B:176:TYR:HD2	1.84	0.42
3:D:183:LYS:HG3	5:D:339:HOH:O	2.18	0.42
3:D:140:TYR:CG	3:D:141:PRO:HA	2.55	0.42
3:L:149:LYS:HB3	3:L:149:LYS:HE2	1.94	0.42
1:A:151:CYS:HB3	1:A:156:PHE:HE2	1.84	0.42
1:A:157:TYR:HD2	5:A:302:HOH:O	2.02	0.42
3:D:140:TYR:HB3	5:D:312:HOH:O	2.19	0.42
3:D:83:ILE:HG13	3:D:100:VAL:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:93:THR:HG22	5:B:386:HOH:O	2.20	0.42
1:C:107:ILE:HD12	1:C:163:LEU:HD21	2.01	0.41
3:D:4:MET:HE3	3:D:90:GLN:HG3	2.00	0.41
3:D:148:TRP:O	3:D:154:LEU:HD12	2.21	0.41
1:A:95:VAL:HG21	1:A:115:THR:HG21	2.02	0.41
1:C:16:SER:O	4:C:201:NAG:H81	2.20	0.41
1:C:99:CYS:HA	1:C:105:CYS:HA	2.02	0.41
2:B:80:MET:HB3	2:B:80:MET:HE3	1.86	0.41
2:B:3:GLN:O	2:B:4:LEU:HD13	2.20	0.41
3:D:147:GLN:HB3	3:D:154:LEU:CD1	2.51	0.41
1:C:112:TRP:CE2	1:C:163:LEU:HD22	2.55	0.41
3:L:46:LEU:O	3:L:55:GLU:HG3	2.21	0.41
1:C:69:ALA:HB1	5:C:386:HOH:O	2.21	0.41
3:L:166:GLN:HB2	3:L:173:TYR:CE1	2.56	0.41
2:B:180:SER:HB2	5:B:306:HOH:O	2.21	0.41
3:D:83:ILE:CD1	3:D:166:GLN:HB3	2.46	0.41
2:H:140:CYS:HB2	5:H:302:HOH:O	2.20	0.40
2:B:184:VAL:HG11	2:B:194:TYR:CE1	2.55	0.40
3:D:113:PRO:HB3	3:D:139:PHE:CD1	2.57	0.40
2:H:36:TRP:CE2	2:H:80:MET:HB2	2.56	0.40
1:A:115:THR:HG22	5:A:323:HOH:O	2.21	0.40
3:D:35:TRP:CD1	5:D:355:HOH:O	2.75	0.40
3:D:36:TYR:O	3:D:86:TYR:HA	2.21	0.40
1:C:103:GLY:HA2	5:C:307:HOH:O	2.21	0.40
1:C:104:HIS:HD2	5:C:371:HOH:O	2.04	0.40
2:H:11:VAL:HB	2:H:147:PRO:HG3	2.03	0.40
1:A:11:PRO:HA	1:A:12:PRO:HD3	1.89	0.40
1:A:13:PRO:HA	1:A:99:CYS:O	2.21	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	167/183 (91%)	160 (96%)	7 (4%)	0	100 100
1	C	167/183 (91%)	159 (95%)	8 (5%)	0	100 100
2	B	214/227 (94%)	208 (97%)	4 (2%)	2 (1%)	14 6
2	H	214/227 (94%)	209 (98%)	5 (2%)	0	100 100
3	D	204/210 (97%)	197 (97%)	7 (3%)	0	100 100
3	L	204/210 (97%)	197 (97%)	7 (3%)	0	100 100
All	All	1170/1240 (94%)	1130 (97%)	38 (3%)	2 (0%)	44 37

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	99	ASN
2	B	98	CYS

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	139/150 (93%)	138 (99%)	1 (1%)	81 79
1	C	139/150 (93%)	137 (99%)	2 (1%)	62 55
2	B	183/191 (96%)	181 (99%)	2 (1%)	70 64
2	H	183/191 (96%)	182 (100%)	1 (0%)	86 86
3	D	181/185 (98%)	179 (99%)	2 (1%)	70 64
3	L	181/185 (98%)	180 (99%)	1 (1%)	84 83
All	All	1006/1052 (96%)	997 (99%)	9 (1%)	75 72

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	14	HIS
1	C	123	LEU
2	H	43	GLN

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Mol	Chain	Res	Type
3	L	169	LYS
1	A	22	LEU
2	B	13	LYS
2	B	98	CYS
3	D	145	LYS
3	D	165	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	104	HIS
2	H	3	GLN
2	H	39	GLN
2	H	100(D)	ASN
3	L	24	GLN
3	L	31	ASN
3	L	37	GLN
3	L	38	GLN
3	L	147	GLN
3	L	166	GLN
2	B	99	ASN
3	D	160	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)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

4 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	$\#\|Z\| > 2$
4	NAG	A	202	1	14,14,15	0.68	0	17,19,21	1.16	1 (5%)
4	NAG	A	201	1	14,14,15	0.72	0	17,19,21	0.83	0
4	NAG	C	202	1	14,14,15	0.68	0	17,19,21	1.06	1 (5%)
4	NAG	C	201	1	14,14,15	0.82	0	17,19,21	0.96	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
4	NAG	A	202	1	-	2/6/23/26	0/1/1/1
4	NAG	A	201	1	-	0/6/23/26	0/1/1/1
4	NAG	C	202	1	-	2/6/23/26	0/1/1/1
4	NAG	C	201	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	202	NAG	C1-O5-C5	3.79	117.26	112.19
4	C	202	NAG	C1-O5-C5	3.42	116.77	112.19
4	C	201	NAG	C1-O5-C5	2.16	115.08	112.19

There are no chirality outliers.

All (4) torsion outliers are listed below:

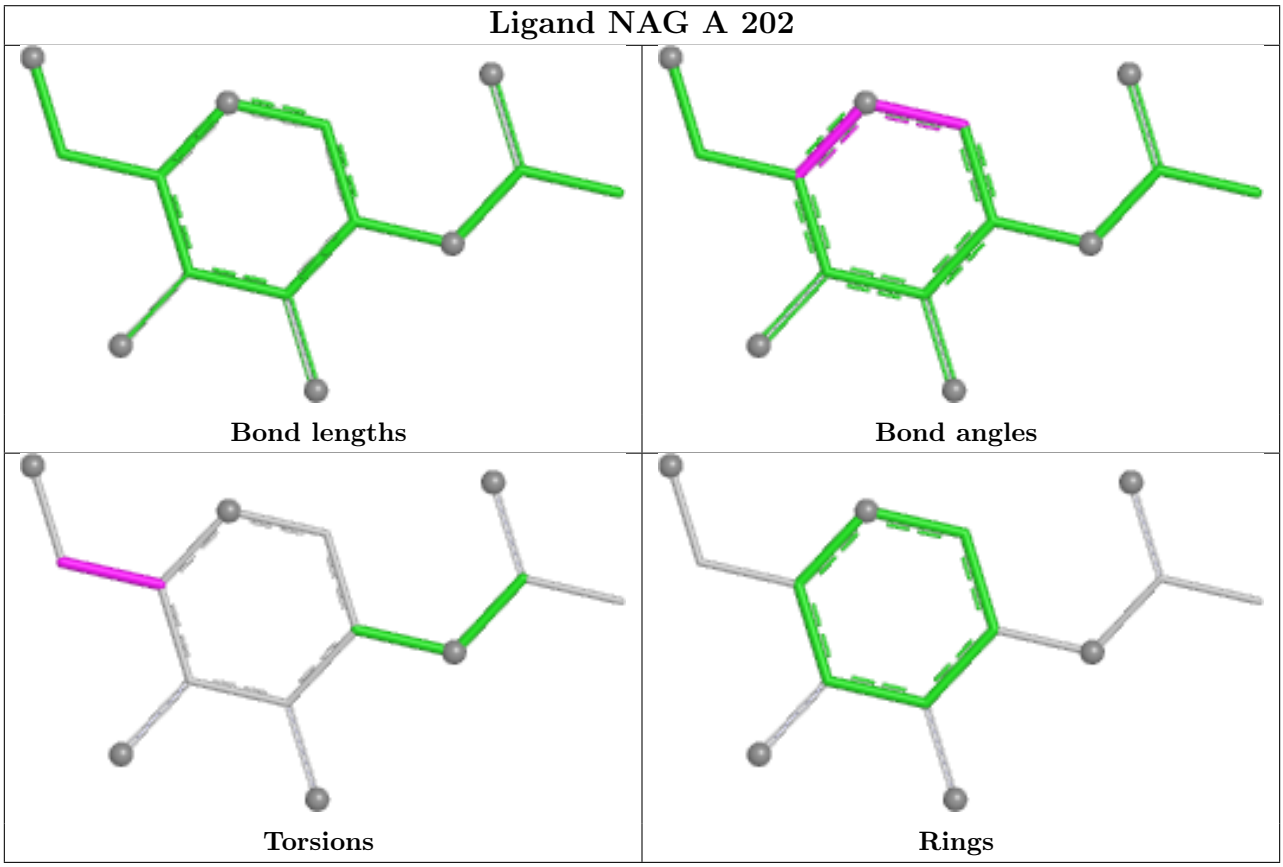
Mol	Chain	Res	Type	Atoms
4	A	202	NAG	O5-C5-C6-O6
4	C	202	NAG	C4-C5-C6-O6
4	C	202	NAG	O5-C5-C6-O6
4	A	202	NAG	C4-C5-C6-O6

There are no ring outliers.

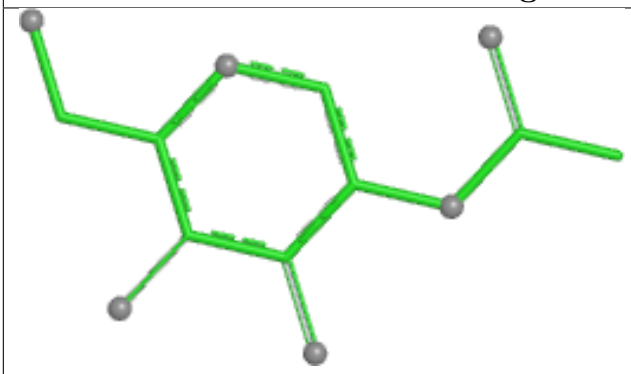
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	201	NAG	1	0

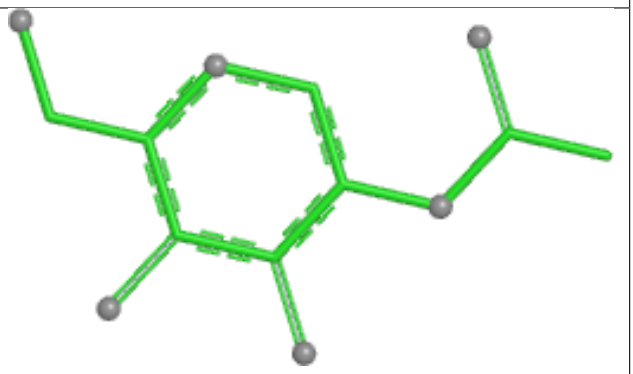
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



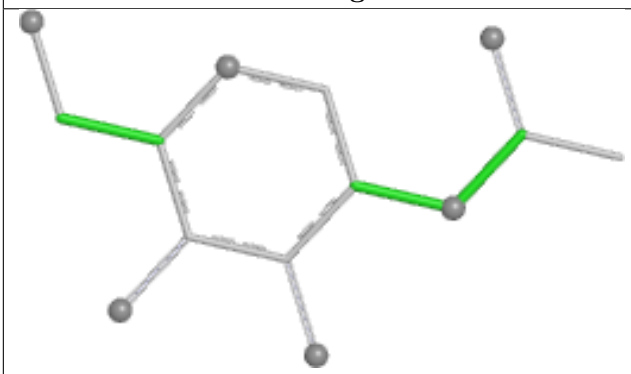
Ligand NAG A 201



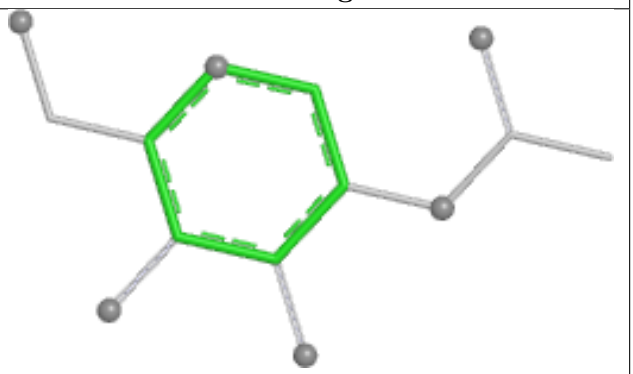
Bond lengths



Bond angles

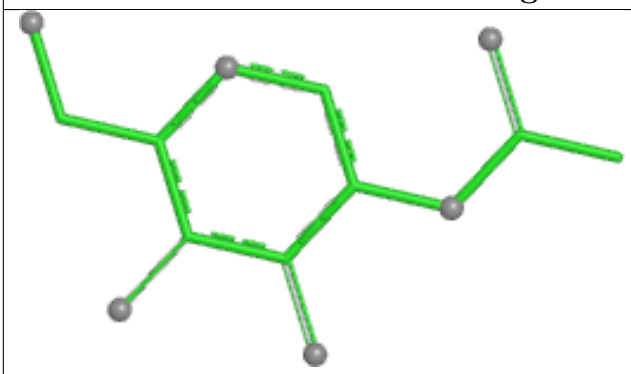


Torsions

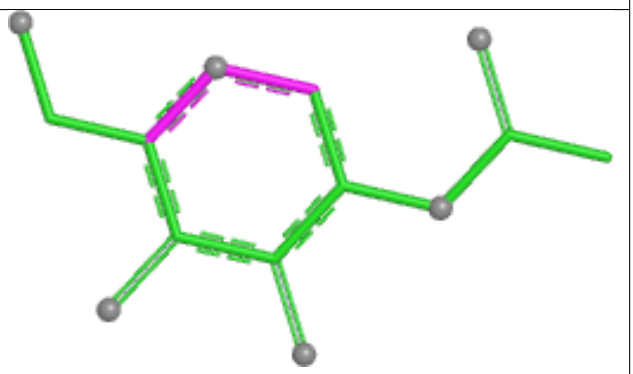


Rings

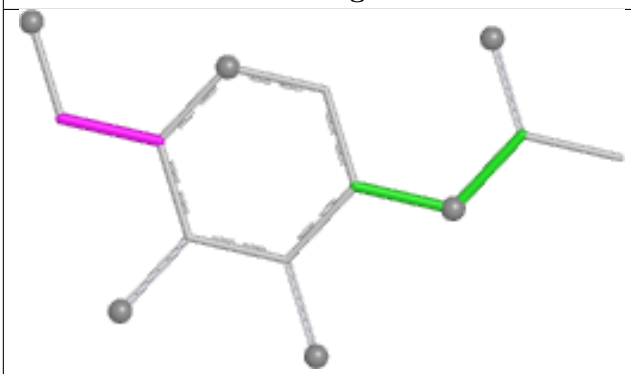
Ligand NAG C 202



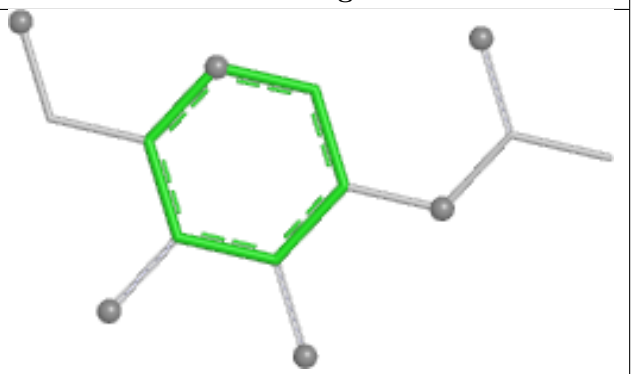
Bond lengths



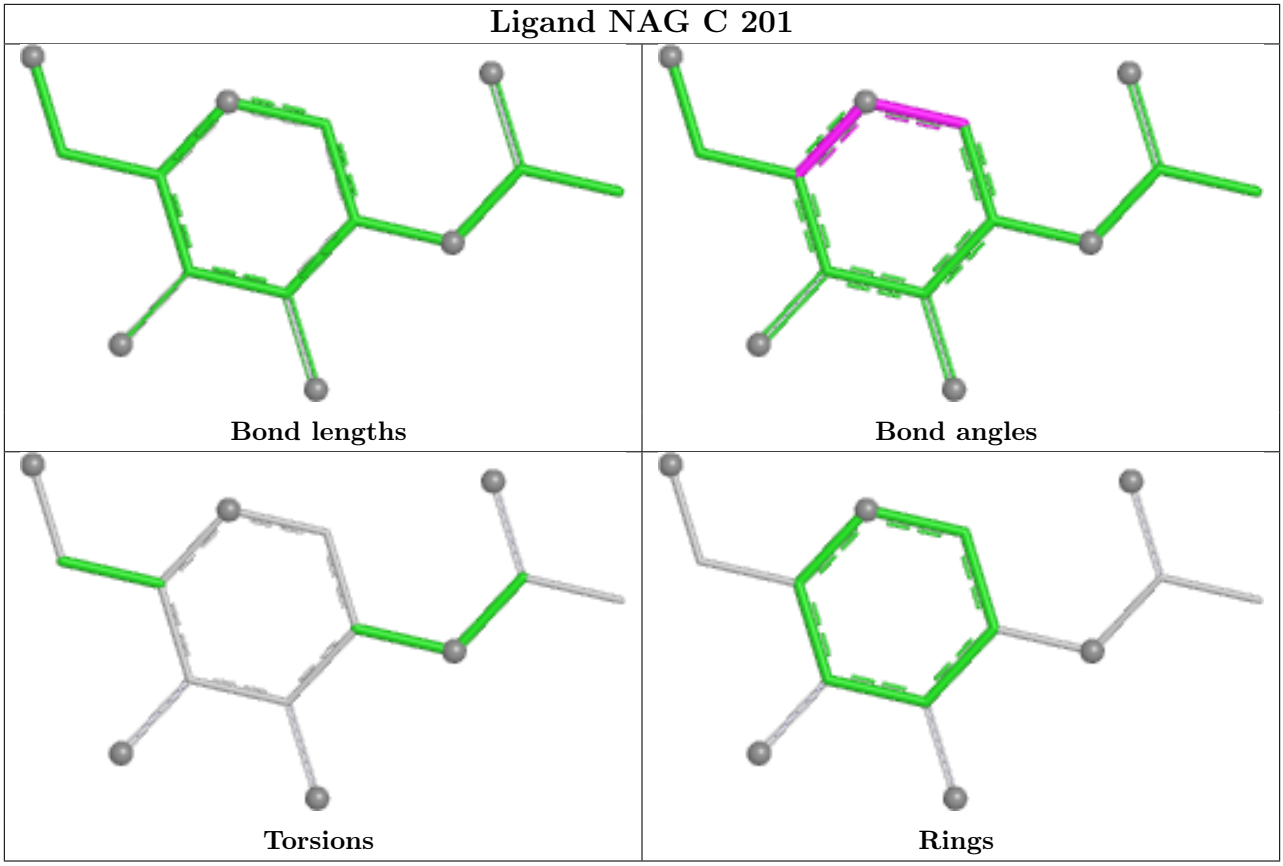
Bond angles



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	169/183 (92%)	-1.57	0	100	100	13, 21, 40, 45	0
1	C	169/183 (92%)	-1.59	0	100	100	15, 20, 32, 43	0
2	B	218/227 (96%)	-1.57	0	100	100	12, 22, 33, 42	0
2	H	218/227 (96%)	-1.57	0	100	100	12, 22, 32, 54	0
3	D	206/210 (98%)	-1.58	0	100	100	14, 24, 33, 42	0
3	L	206/210 (98%)	-1.59	0	100	100	14, 23, 33, 38	0
All	All	1186/1240 (95%)	-1.58	0	100	100	12, 22, 34, 54	0

There are no RSRZ outliers to report.

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

There are no oligosaccharides in this entry.

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
4	NAG	C	201	14/15	0.99	0.03	27,33,39,49	0

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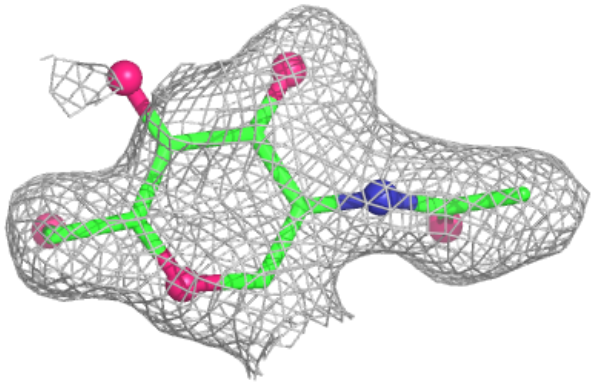
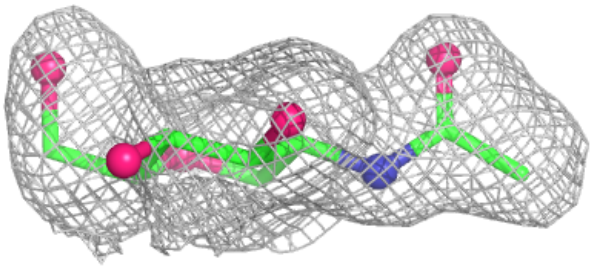
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	NAG	C	202	14/15	0.99	0.02	21,23,26,27	0
4	NAG	A	201	14/15	0.99	0.04	32,35,40,42	0
4	NAG	A	202	14/15	0.99	0.03	24,28,30,31	0

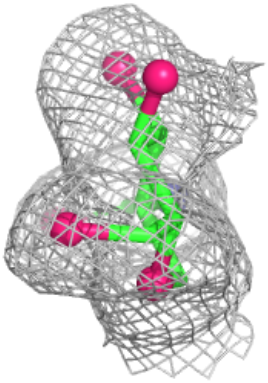
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around NAG C 201:

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

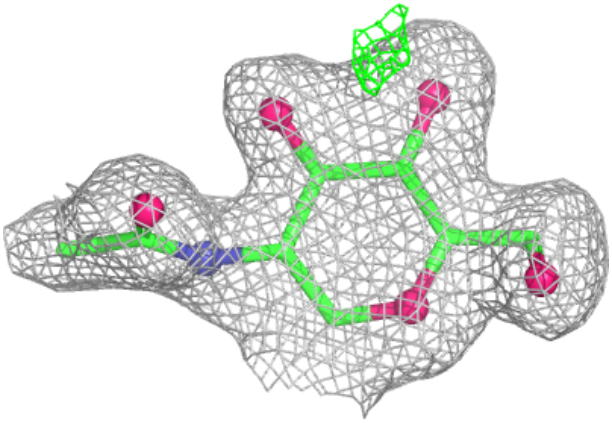


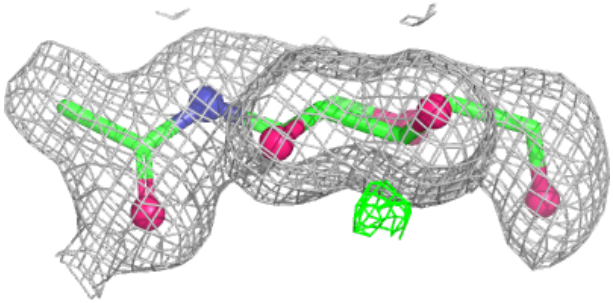


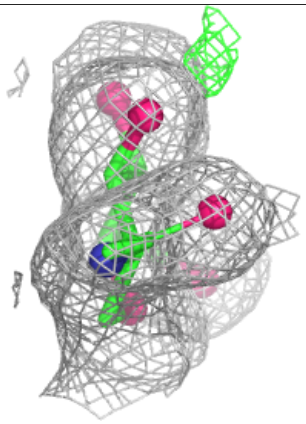


Electron density around NAG C 202:

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

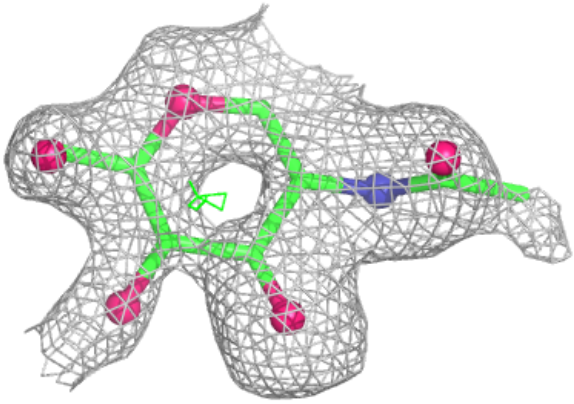


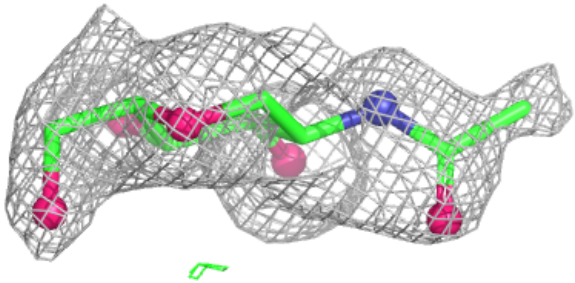


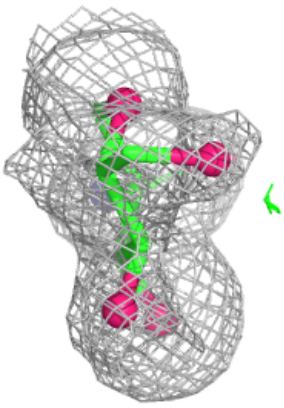


Electron density around NAG A 201:

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

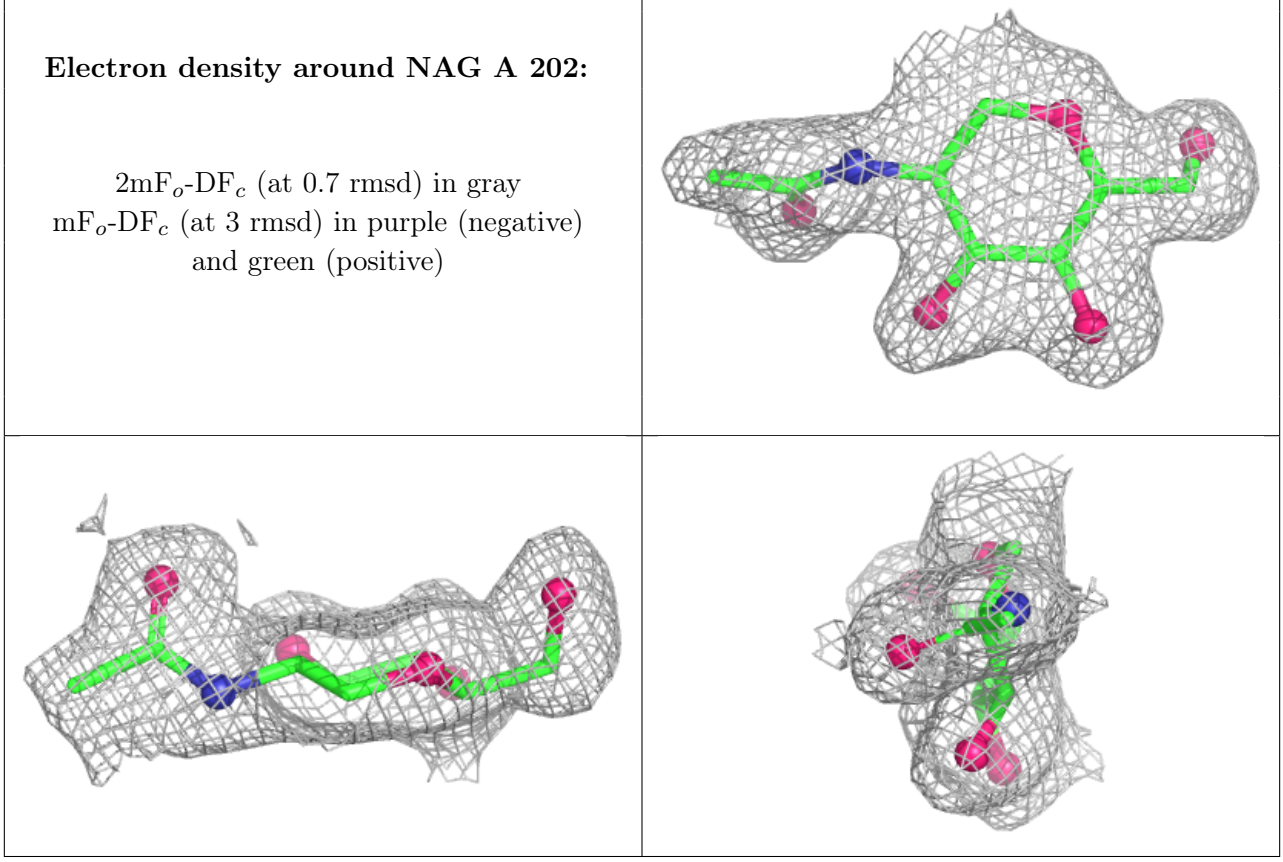






Electron density around NAG A 202:

$2mF_o$-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

There are no such residues in this entry.