Full wwPDB X-ray Structure Validation Report ⓘ

Sep 8, 2025 – 11:47 PM JST

PDB ID	:	7COE / pdb_00007coe
Title	:	Crystal structure of Receptor binding domain of MERS-CoV and KNIH90-F1 Fab complex
Authors	:	Lee, J.Y.; Song, J.Y.; Lee, H.S.; Hong, E.; Jang, T.H.
Deposited on	:	2020-08-04
Resolution	:	2.05 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:

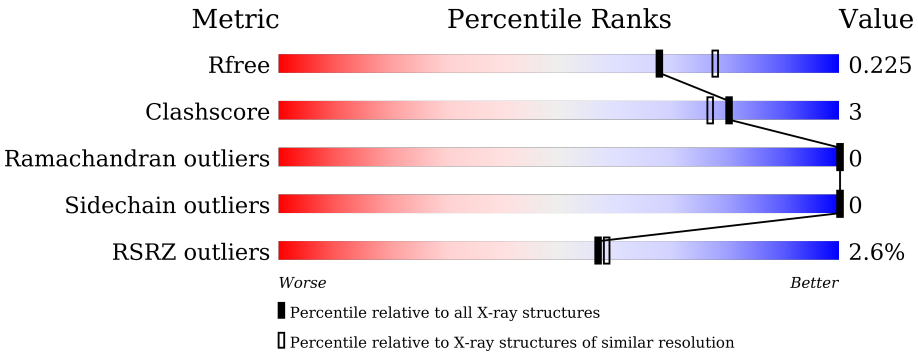
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

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 2.05 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	2096 (2.04-2.04)
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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	B	237	6% 90% 5% 5%
1	H	237	3% 88% 6% 6%
2	C	215	93% 6% .
2	L	215	96% .
3	A	223	2% 87% 5% 8%
3	D	223	3% 87% 5% 8%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 10840 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 Heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	H	223	Total	C	N	O	S	0	2	0
			1667	1057	279	323	8			
1	B	225	Total	C	N	O	S	0	0	0
			1650	1042	278	323	7			

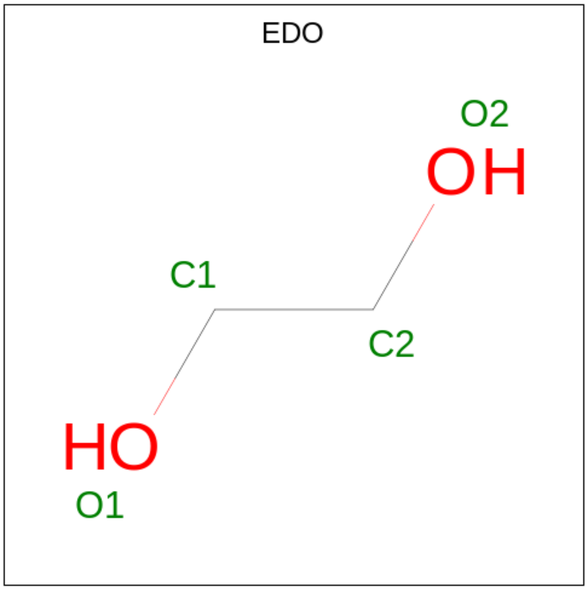
- Molecule 2 is a protein called Light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	214	Total	C	N	O	S	0	1	0
			1636	1024	276	332	4			
2	C	213	Total	C	N	O	S	0	1	0
			1603	1005	266	328	4			

- Molecule 3 is a protein called Spike glycoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	A	205	Total	C	N	O	S	0	0	0
			1575	1003	252	309	11			
3	D	206	Total	C	N	O	S	0	0	0
			1567	1000	249	307	11			

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	H	1	Total C O 4 2 2	0	0
4	L	1	Total C O 4 2 2	0	0
4	L	1	Total C O 4 2 2	0	0
4	L	1	Total C O 4 2 2	0	0

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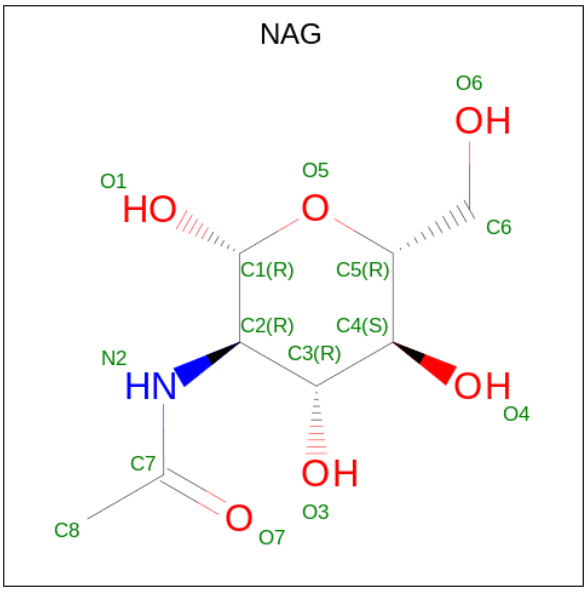
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 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
5	A	1	Total C N O 14 8 1 5	0	0
5	A	1	Total C N O 14 8 1 5	0	0
5	D	1	Total C N O 14 8 1 5	0	0
5	D	1	Total C N O 14 8 1 5	0	0

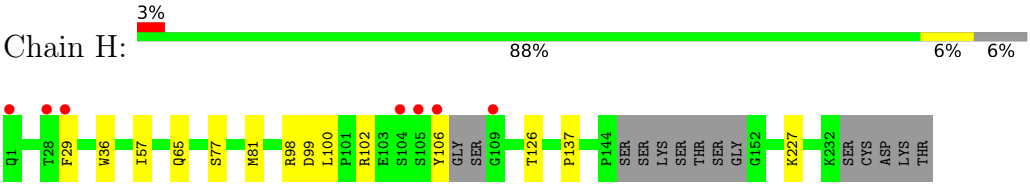
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	H	215	Total O 215 215	0	0
6	L	212	Total O 212 212	0	0
6	A	152	Total O 152 152	0	0
6	B	168	Total O 168 168	0	0
6	C	145	Total O 145 145	0	0
6	D	78	Total O 78 78	0	0

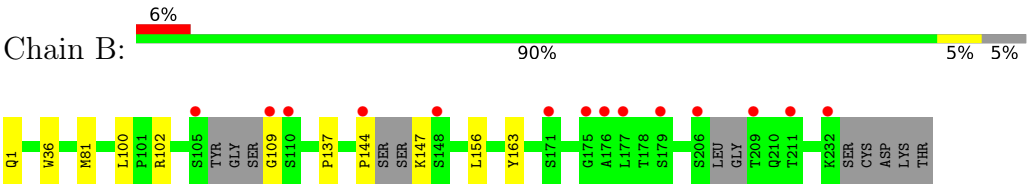
3 Residue-property plots (i)

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.

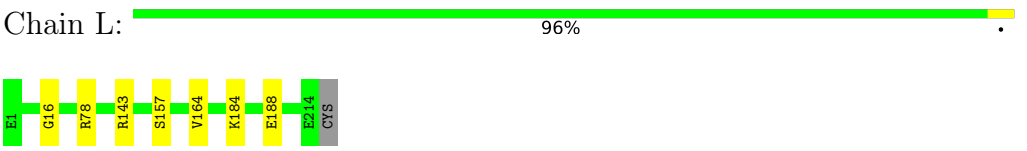
• Molecule 1: Heavy chain



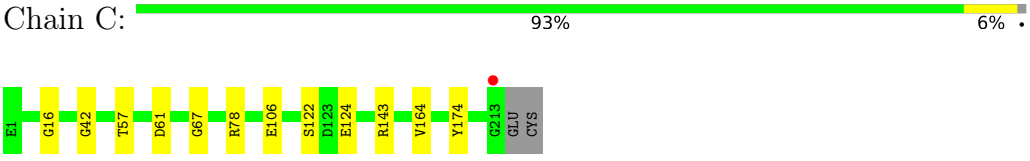
• Molecule 1: Heavy chain



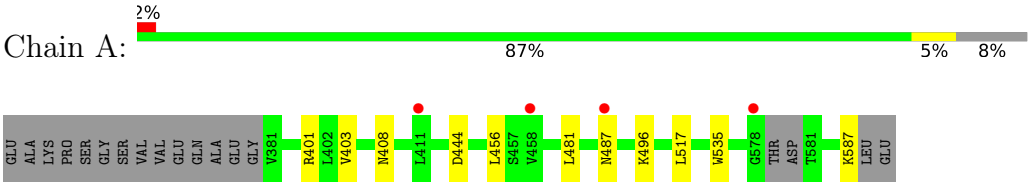
• Molecule 2: Light chain



• Molecule 2: Light chain

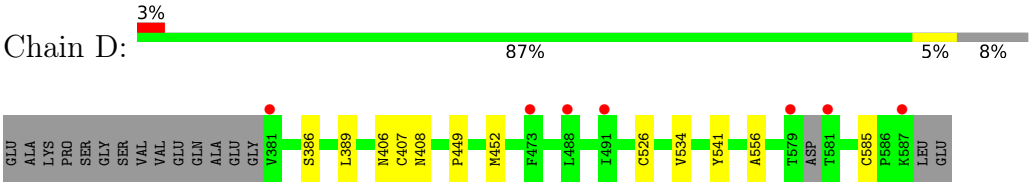


• Molecule 3: Spike glycoprotein



• Molecule 3: Spike glycoprotein

Chain D:


3%
87%
5%
8%
GLU
ALA
LYS
PRO
SER
GLY
SER
VAL
VAL
GLU
GLN
ALA
GLU
GLY
V381
S386
L389
N406
C407
N408
P449
M452
F473
L488
I491
C526
V534
Y541
A556
T579
ASP
T581
C585
P586
K587
LEU
GLU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	71.59Å 146.82Å 81.62Å 90.00° 96.73° 90.00°	Depositor
Resolution (Å)	44.95 – 2.05 44.95 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.0 (44.95-2.05) 98.9 (44.95-2.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.28 (at 2.05Å)	Xtriage
Refinement program	PHENIX 1.18.2-3874	Depositor
R, R_{free}	0.176 , 0.223 0.177 , 0.225	Depositor DCC
R_{free} test set	2000 reflections (1.91%)	wwPDB-VP
Wilson B-factor (Å^2)	29.0	Xtriage
Anisotropy	0.335	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 47.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	10840	wwPDB-VP
Average B, all atoms (Å^2)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.72% 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, EDO

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	B	0.30	0/1688	0.51	0/2304
1	H	0.36	0/1707	0.56	0/2327
2	C	0.28	0/1638	0.50	0/2232
2	L	0.33	0/1671	0.55	0/2270
3	A	0.31	0/1612	0.52	0/2201
3	D	0.25	0/1605	0.46	0/2194
All	All	0.31	0/9921	0.52	0/13528

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	B	1650	0	1567	9	0
1	H	1667	0	1603	11	0
2	C	1603	0	1532	12	0
2	L	1636	0	1592	5	0
3	A	1575	0	1531	7	0
3	D	1567	0	1500	7	0
4	A	12	0	18	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	16	0	24	0	0
4	C	20	0	30	6	0
4	D	12	0	18	0	0
4	H	44	0	64	3	0
4	L	12	0	18	2	0
5	A	28	0	26	1	0
5	D	28	0	26	0	0
6	A	152	0	0	0	0
6	B	168	0	0	2	0
6	C	145	0	0	1	0
6	D	78	0	0	2	1
6	H	215	0	0	1	0
6	L	212	0	0	0	1
All	All	10840	0	9549	49	1

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 3.

All (49) 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:L:157:SER:H	4:L:402:EDO:H22	1.43	0.82
1:B:1:GLN:N	1:B:1:GLN:OE1	2.14	0.79
1:H:106:TYR:HB2	3:A:517:LEU:HD21	1.64	0.79
1:B:144:PRO:HG3	1:B:156:LEU:HB3	1.67	0.76
3:A:487:ASN:HD21	5:A:604:NAG:H83	1.53	0.72
2:C:124:GLU:H	4:C:302:EDO:H11	1.54	0.72
3:A:401:ARG:HD2	3:A:444:ASP:OD1	1.92	0.69
2:C:122:SER:HB2	4:C:302:EDO:H12	1.74	0.68
3:D:449:PRO:HG2	3:D:452:MET:HG3	1.75	0.67
2:C:67:GLY:H	4:C:305:EDO:H12	1.62	0.64
3:A:496:LYS:NZ	3:A:535:TRP:O	2.31	0.60
1:H:100:LEU:O	1:H:102:ARG:NH1	2.35	0.59
1:H:126:THR:HG23	4:H:308:EDO:H21	1.84	0.59
3:D:407:CYS:SG	6:D:702:HOH:O	2.57	0.58
3:A:403:VAL:H	4:A:605:EDO:H12	1.70	0.57
1:B:109:GLY:N	6:B:405:HOH:O	2.39	0.56
3:D:406:ASN:N	6:D:702:HOH:O	2.28	0.56
1:H:29:PHE:CZ	1:H:77:SER:HA	2.42	0.55
1:H:102:ARG:HH11	1:H:102:ARG:HG3	1.73	0.54
1:H:36:TRP:CE2	1:H:81:MET:HB2	2.43	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:16:GLY:HA2	2:L:78:ARG:HG3	1.90	0.53
1:B:1:GLN:H1	1:B:1:GLN:CD	2.16	0.52
2:C:42:GLY:H	4:C:303:EDO:H11	1.76	0.51
2:C:143:ARG:NH1	2:C:164:VAL:HG21	2.26	0.50
2:L:157:SER:H	4:L:402:EDO:C2	2.18	0.50
1:H:98:ARG:HG2	1:H:99:ASP:O	2.13	0.49
1:B:36:TRP:CE2	1:B:81:MET:HB2	2.48	0.48
4:H:301:EDO:H21	6:C:447:HOH:O	2.14	0.47
2:C:67:GLY:N	4:C:305:EDO:H12	2.26	0.47
3:D:408:ASN:HA	3:D:585:CYS:O	2.14	0.47
2:C:16:GLY:HA2	2:C:78:ARG:HG3	1.97	0.46
2:L:143[A]:ARG:NH2	2:L:164:VAL:HG21	2.30	0.46
1:H:57:ILE:HG23	4:H:305:EDO:H12	1.97	0.45
2:C:67:GLY:H	4:C:305:EDO:C1	2.29	0.45
1:H:137:PRO:O	2:C:57[B]:THR:HG23	2.17	0.45
3:D:526:CYS:SG	3:D:556:ALA:HB2	2.57	0.44
2:C:106:GLU:OE1	2:C:174:TYR:OH	2.28	0.43
2:L:184:LYS:O	2:L:188:GLU:HG3	2.19	0.43
1:B:36:TRP:CD2	1:B:81:MET:HB2	2.54	0.43
1:H:227:LYS:HE2	2:C:61:ASP:OD2	2.19	0.43
3:D:386:SER:HA	3:D:389:LEU:HD12	2.01	0.43
3:A:408:ASN:HB3	3:A:587:LYS:HG2	2.01	0.42
1:H:65:GLN:HG3	6:H:470:HOH:O	2.19	0.42
1:B:147:LYS:HB3	6:B:430:HOH:O	2.18	0.42
2:C:143:ARG:HH12	2:C:164:VAL:HG21	1.85	0.42
1:B:100:LEU:O	1:B:102:ARG:HD3	2.21	0.41
3:D:534:VAL:HG13	3:D:541:TYR:OH	2.20	0.41
3:A:456:LEU:HD23	3:A:481:LEU:HD21	2.02	0.41
1:B:137:PRO:HB3	1:B:163:TYR:HB3	2.03	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:L:643:HOH:O	6:D:768:HOH:O[1_455]	2.05	0.15

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	B	217/237 (92%)	209 (96%)	8 (4%)	0	100	100
1	H	219/237 (92%)	212 (97%)	7 (3%)	0	100	100
2	C	212/215 (99%)	208 (98%)	4 (2%)	0	100	100
2	L	213/215 (99%)	209 (98%)	4 (2%)	0	100	100
3	A	201/223 (90%)	197 (98%)	4 (2%)	0	100	100
3	D	202/223 (91%)	194 (96%)	8 (4%)	0	100	100
All	All	1264/1350 (94%)	1229 (97%)	35 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	B	176/199 (88%)	176 (100%)	0	100	100
1	H	180/199 (90%)	180 (100%)	0	100	100
2	C	177/185 (96%)	177 (100%)	0	100	100
2	L	184/185 (100%)	184 (100%)	0	100	100
3	A	185/201 (92%)	185 (100%)	0	100	100
3	D	181/201 (90%)	181 (100%)	0	100	100
All	All	1083/1170 (93%)	1083 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	H	39	GLN
1	H	43	GLN
1	H	222	ASN
2	L	39	GLN
2	L	153	ASN
2	L	200	GLN
1	B	65	GLN
1	B	217	ASN
2	C	161	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)

33 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	$\#\|Z\| > 2$
5	NAG	D	603	3	14,14,15	0.27	0	17,19,21	0.38	0
4	EDO	B	304	-	3,3,3	0.43	0	2,2,2	0.54	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
4	EDO	H	310	-	3,3,3	0.56	0	2,2,2	0.14	0
4	EDO	A	605	-	3,3,3	0.49	0	2,2,2	0.29	0
5	NAG	A	603	3	14,14,15	0.24	0	17,19,21	0.38	0
4	EDO	H	307	-	3,3,3	0.48	0	2,2,2	0.35	0
4	EDO	A	602	-	3,3,3	0.46	0	2,2,2	0.31	0
4	EDO	C	303	-	3,3,3	0.52	0	2,2,2	0.42	0
4	EDO	H	302	-	3,3,3	0.41	0	2,2,2	0.44	0
4	EDO	L	401	-	3,3,3	0.51	0	2,2,2	0.55	0
4	EDO	A	601	-	3,3,3	0.59	0	2,2,2	0.01	0
4	EDO	B	301	-	3,3,3	0.51	0	2,2,2	0.41	0
4	EDO	C	302	-	3,3,3	0.50	0	2,2,2	0.24	0
5	NAG	A	604	3	14,14,15	0.59	0	17,19,21	0.47	0
4	EDO	D	601	-	3,3,3	0.49	0	2,2,2	0.25	0
4	EDO	H	311	-	3,3,3	0.51	0	2,2,2	0.35	0
4	EDO	L	403	-	3,3,3	0.48	0	2,2,2	0.39	0
4	EDO	C	301	-	3,3,3	0.61	0	2,2,2	0.15	0
4	EDO	C	304	-	3,3,3	0.49	0	2,2,2	0.48	0
4	EDO	L	402	-	3,3,3	0.44	0	2,2,2	0.45	0
4	EDO	D	605	-	3,3,3	0.47	0	2,2,2	0.29	0
4	EDO	B	302	-	3,3,3	0.54	0	2,2,2	0.29	0
4	EDO	D	602	-	3,3,3	0.50	0	2,2,2	0.26	0
4	EDO	H	301	-	3,3,3	0.69	0	2,2,2	0.09	0
4	EDO	H	305	-	3,3,3	0.56	0	2,2,2	1.28	0
4	EDO	H	303	-	3,3,3	0.49	0	2,2,2	0.33	0
4	EDO	H	306	-	3,3,3	0.52	0	2,2,2	0.47	0
4	EDO	C	305	-	3,3,3	0.48	0	2,2,2	0.23	0
5	NAG	D	604	3	14,14,15	0.52	0	17,19,21	0.71	1 (5%)
4	EDO	H	304	-	3,3,3	0.52	0	2,2,2	0.21	0
4	EDO	B	303	-	3,3,3	0.47	0	2,2,2	0.62	0
4	EDO	H	309	-	3,3,3	0.73	0	2,2,2	0.23	0
4	EDO	H	308	-	3,3,3	0.59	0	2,2,2	0.08	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
5	NAG	D	603	3	-	2/6/23/26	0/1/1/1
4	EDO	B	304	-	-	0/1/1/1	-
4	EDO	H	310	-	-	0/1/1/1	-
4	EDO	A	605	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	603	3	-	2/6/23/26	0/1/1/1
4	EDO	H	307	-	-	0/1/1/1	-
4	EDO	A	602	-	-	0/1/1/1	-
4	EDO	C	303	-	-	0/1/1/1	-
4	EDO	H	302	-	-	0/1/1/1	-
4	EDO	L	401	-	-	0/1/1/1	-
4	EDO	A	601	-	-	0/1/1/1	-
4	EDO	B	301	-	-	1/1/1/1	-
4	EDO	C	302	-	-	0/1/1/1	-
5	NAG	A	604	3	-	4/6/23/26	0/1/1/1
4	EDO	D	601	-	-	0/1/1/1	-
4	EDO	H	311	-	-	0/1/1/1	-
4	EDO	L	403	-	-	0/1/1/1	-
4	EDO	C	301	-	-	0/1/1/1	-
4	EDO	C	304	-	-	0/1/1/1	-
4	EDO	L	402	-	-	0/1/1/1	-
4	EDO	D	605	-	-	0/1/1/1	-
4	EDO	B	302	-	-	0/1/1/1	-
4	EDO	D	602	-	-	1/1/1/1	-
4	EDO	H	301	-	-	0/1/1/1	-
4	EDO	H	305	-	-	0/1/1/1	-
4	EDO	H	303	-	-	0/1/1/1	-
4	EDO	H	306	-	-	0/1/1/1	-
4	EDO	C	305	-	-	0/1/1/1	-
5	NAG	D	604	3	-	1/6/23/26	0/1/1/1
4	EDO	H	304	-	-	0/1/1/1	-
4	EDO	B	303	-	-	1/1/1/1	-
4	EDO	H	309	-	-	0/1/1/1	-
4	EDO	H	308	-	-	0/1/1/1	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	D	604	NAG	C1-O5-C5	2.43	115.48	112.19

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	604	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	A	603	NAG	C4-C5-C6-O6
5	D	603	NAG	O5-C5-C6-O6
5	D	603	NAG	C4-C5-C6-O6
5	A	604	NAG	C8-C7-N2-C2
5	A	604	NAG	O7-C7-N2-C2
5	A	604	NAG	C4-C5-C6-O6
5	A	603	NAG	O5-C5-C6-O6
4	D	602	EDO	O1-C1-C2-O2
5	D	604	NAG	O5-C5-C6-O6
4	B	303	EDO	O1-C1-C2-O2
4	B	301	EDO	O1-C1-C2-O2

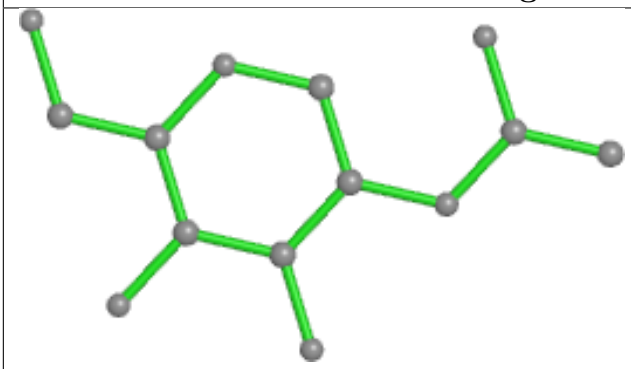
There are no ring outliers.

9 monomers are involved in 13 short contacts:

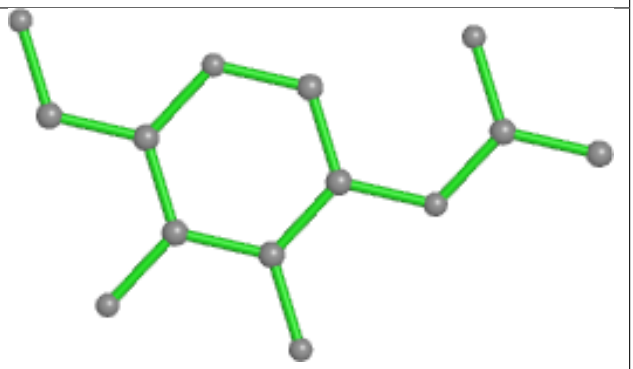
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	605	EDO	1	0
4	C	303	EDO	1	0
4	C	302	EDO	2	0
5	A	604	NAG	1	0
4	L	402	EDO	2	0
4	H	301	EDO	1	0
4	H	305	EDO	1	0
4	C	305	EDO	3	0
4	H	308	EDO	1	0

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.

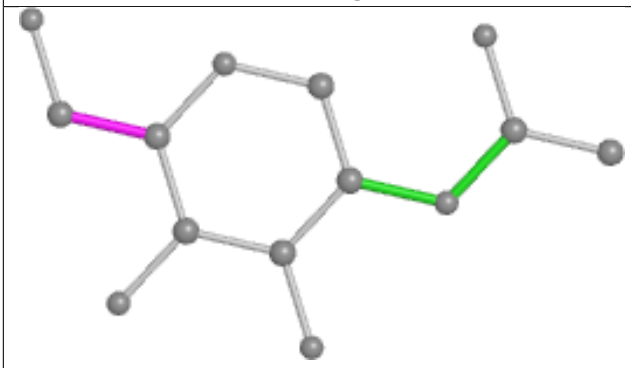
Ligand NAG D 603



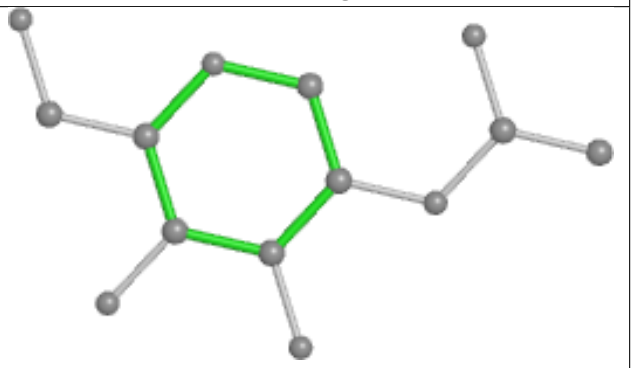
Bond lengths



Bond angles

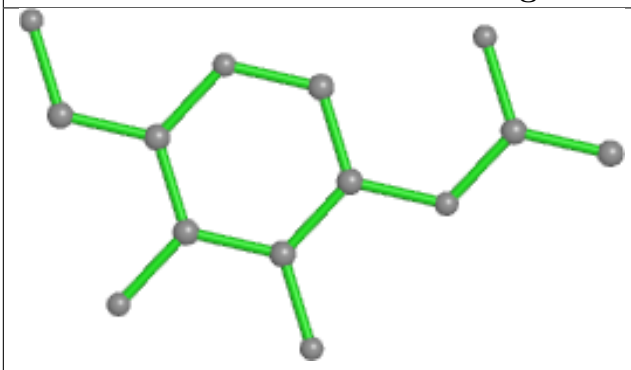


Torsions

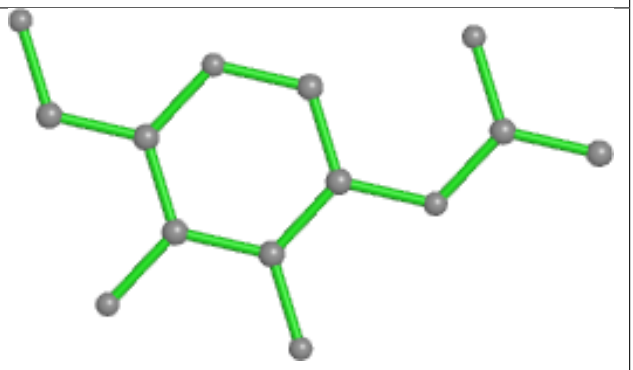


Rings

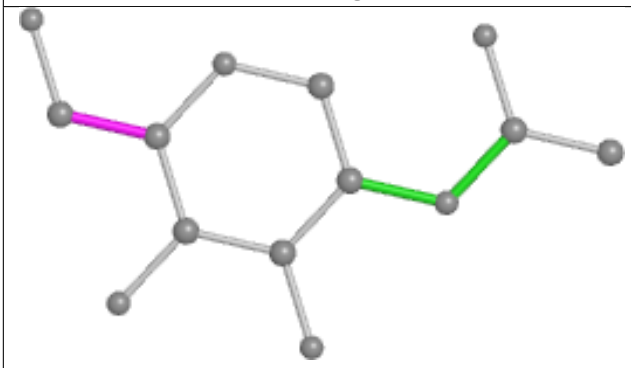
Ligand NAG A 603



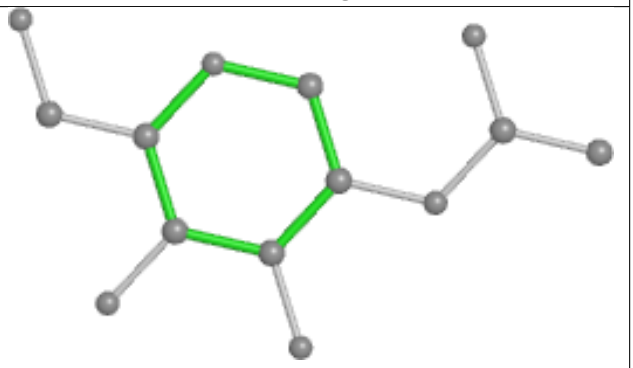
Bond lengths



Bond angles

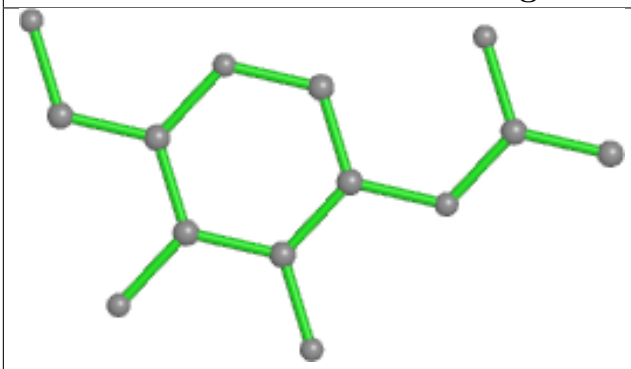


Torsions

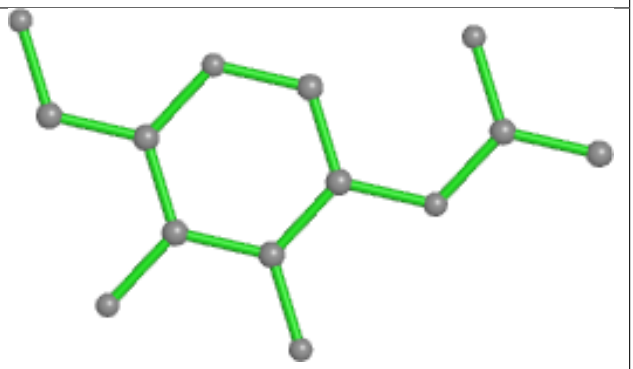


Rings

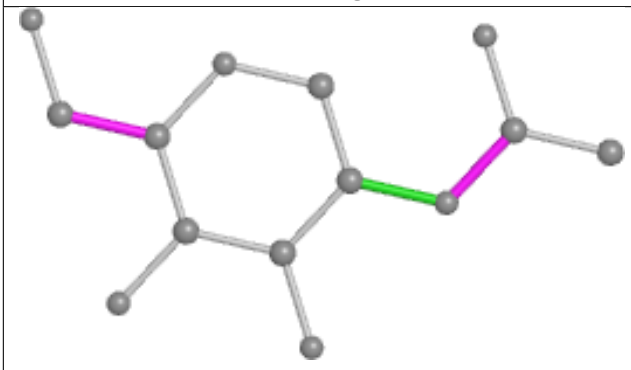
Ligand NAG A 604



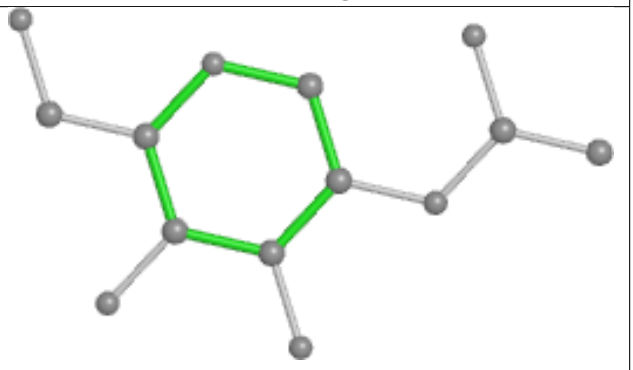
Bond lengths



Bond angles

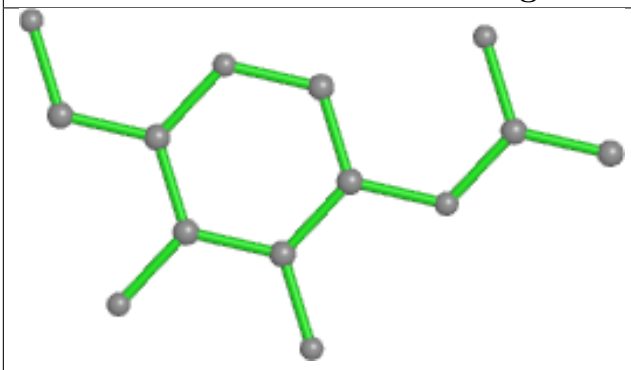


Torsions

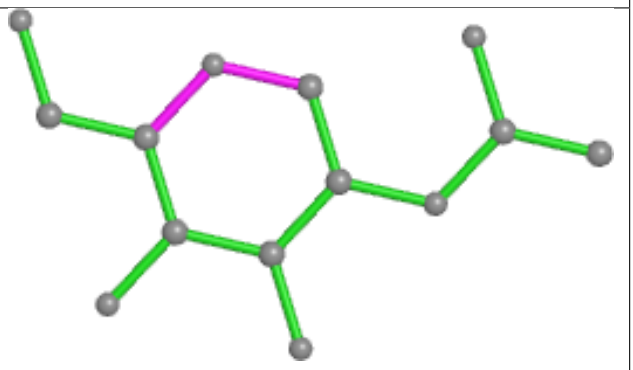


Rings

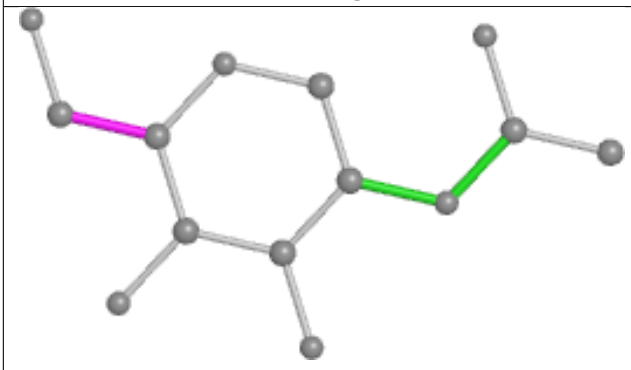
Ligand NAG D 604



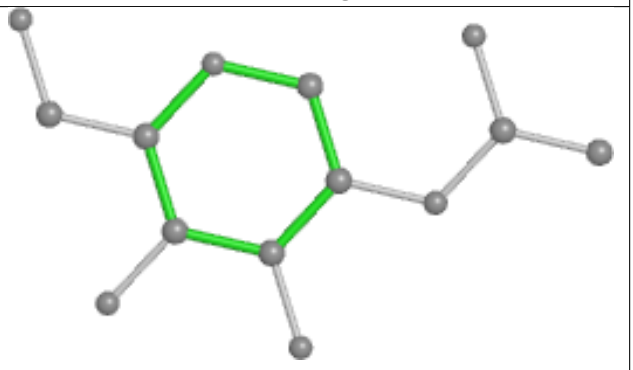
Bond lengths



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.

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	B	225/237 (94%)	0.08	14 (6%) 28 29	19, 39, 73, 84	0
1	H	223/237 (94%)	-0.49	7 (3%) 51 53	12, 25, 51, 72	2 (0%)
2	C	213/215 (99%)	-0.13	1 (0%) 87 89	14, 40, 60, 72	1 (0%)
2	L	214/215 (99%)	-0.48	0 100 100	14, 31, 47, 58	1 (0%)
3	A	205/223 (91%)	-0.20	4 (1%) 64 68	21, 36, 56, 71	0
3	D	206/223 (92%)	0.44	7 (3%) 48 50	28, 48, 70, 93	0
All	All	1286/1350 (95%)	-0.13	33 (2%) 57 58	12, 36, 64, 93	4 (0%)

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	106	TYR	5.7
1	B	209	THR	4.6
3	D	581	THR	4.6
1	H	105	SER	4.6
3	D	579	THR	4.0
1	H	28	THR	3.9
1	B	109	GLY	3.9
1	H	29	PHE	3.8
1	B	148	SER	3.4
1	B	175	GLY	3.3
1	B	105	SER	2.9
1	H	109	GLY	2.9
2	C	213	GLY	2.9
3	D	473	PHE	2.8
1	B	176	ALA	2.7
3	D	491	ILE	2.6
1	B	110	SER	2.6
1	B	144	PRO	2.4
1	B	171	SER	2.4

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Mol	Chain	Res	Type	RSRZ
3	A	458	VAL	2.4
3	A	487	ASN	2.4
3	D	381	VAL	2.4
1	H	1	GLN	2.4
1	B	211	THR	2.3
3	A	578	GLY	2.3
3	D	587	LYS	2.2
3	D	488	LEU	2.2
1	B	232	LYS	2.1
1	B	206	SER	2.1
1	B	177	LEU	2.1
1	B	179	SER	2.1
1	H	104	SER	2.0
3	A	411	LEU	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)

There are no oligosaccharides in this entry.

6.4 Ligands (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
5	NAG	D	604	14/15	0.35	0.15	122,129,133,134	0
4	EDO	C	303	4/4	0.72	0.20	43,44,47,52	0
5	NAG	A	604	14/15	0.74	0.16	62,69,79,79	0
5	NAG	D	603	14/15	0.77	0.12	73,77,81,84	0
4	EDO	L	403	4/4	0.78	0.17	41,49,56,62	0
4	EDO	B	301	4/4	0.80	0.16	44,47,48,48	0
4	EDO	C	302	4/4	0.80	0.15	63,63,63,64	0
4	EDO	C	305	4/4	0.83	0.27	48,51,53,53	0
4	EDO	H	305	4/4	0.83	0.23	42,44,46,48	0

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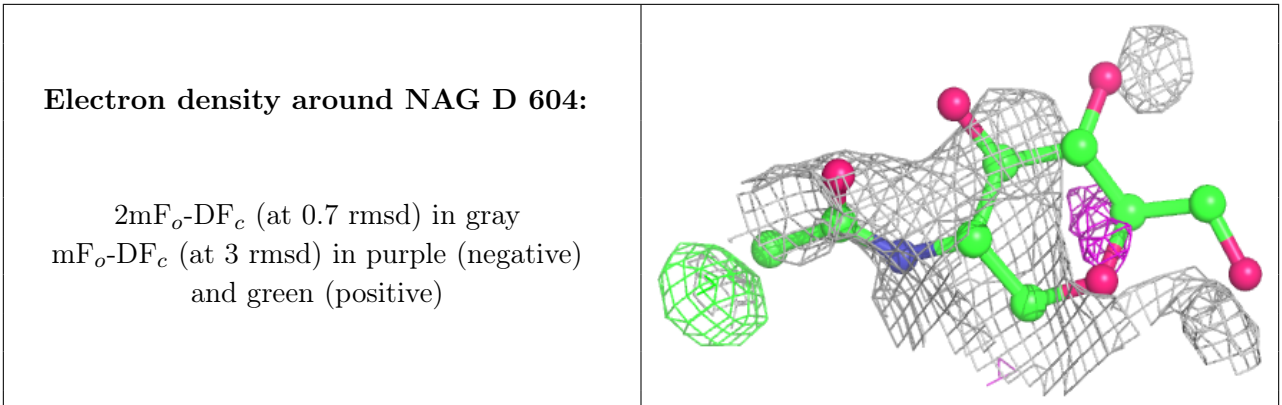
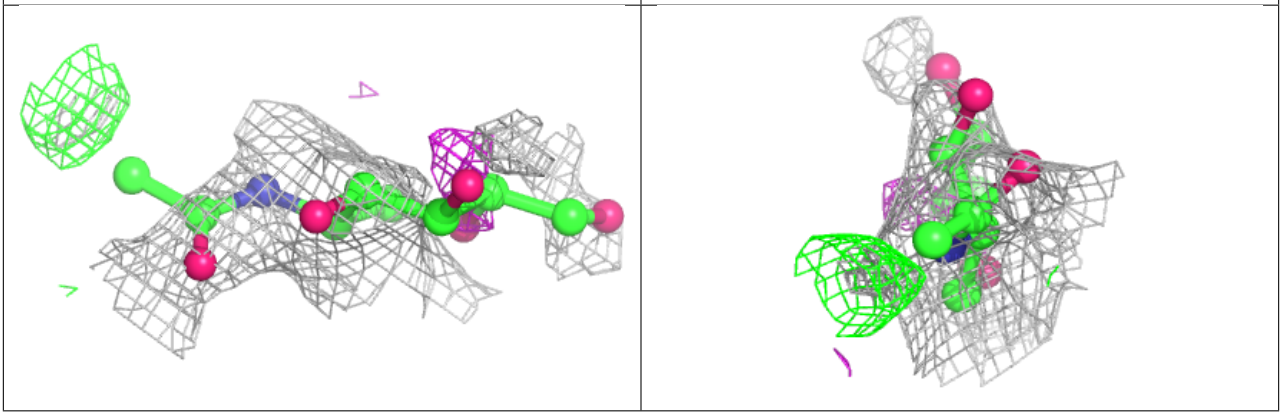
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	EDO	H	304	4/4	0.85	0.14	54,54,55,57	0
4	EDO	D	602	4/4	0.85	0.15	57,59,63,69	0
5	NAG	A	603	14/15	0.85	0.10	64,69,76,79	0
4	EDO	H	301	4/4	0.85	0.14	26,33,34,42	0
4	EDO	H	308	4/4	0.85	0.16	41,41,42,49	0
4	EDO	H	311	4/4	0.85	0.15	48,50,51,56	0
4	EDO	D	601	4/4	0.87	0.12	67,72,76,79	0
4	EDO	B	302	4/4	0.87	0.16	50,50,53,57	0
4	EDO	D	605	4/4	0.87	0.15	55,56,56,58	0
4	EDO	B	304	4/4	0.87	0.17	41,48,52,54	0
4	EDO	H	307	4/4	0.87	0.13	62,62,64,66	0
4	EDO	A	605	4/4	0.87	0.10	54,55,56,57	0
4	EDO	L	402	4/4	0.87	0.12	38,43,43,50	0
4	EDO	L	401	4/4	0.88	0.13	37,39,43,47	0
4	EDO	B	303	4/4	0.89	0.15	42,46,51,55	0
4	EDO	A	601	4/4	0.89	0.14	38,44,45,46	0
4	EDO	H	306	4/4	0.90	0.12	40,43,43,44	0
4	EDO	H	310	4/4	0.91	0.13	31,36,46,49	0
4	EDO	C	304	4/4	0.92	0.12	40,43,45,51	0
4	EDO	A	602	4/4	0.92	0.13	42,44,48,55	0
4	EDO	H	302	4/4	0.92	0.11	46,47,49,52	0
4	EDO	C	301	4/4	0.94	0.10	29,30,40,41	0
4	EDO	H	303	4/4	0.95	0.07	38,39,40,41	0
4	EDO	H	309	4/4	0.96	0.07	22,23,23,29	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 D 604:

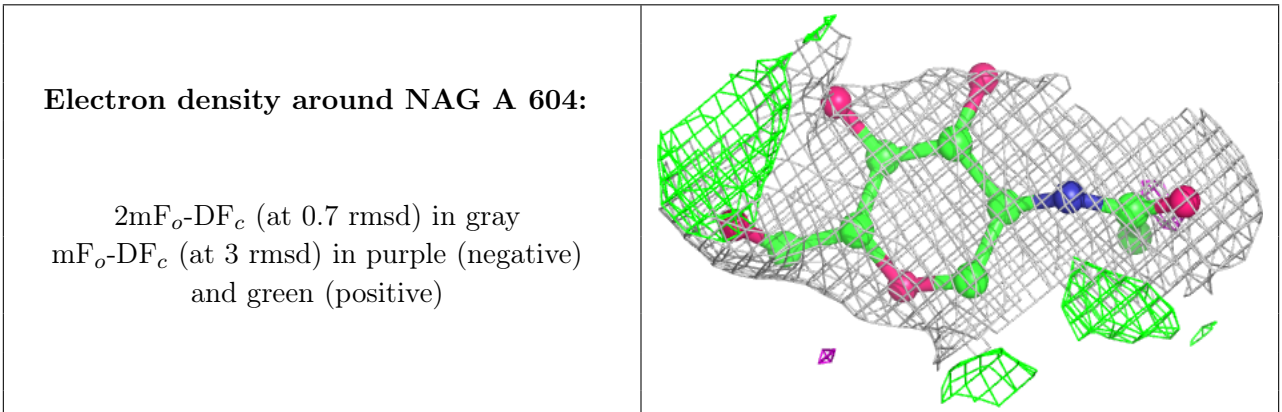
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

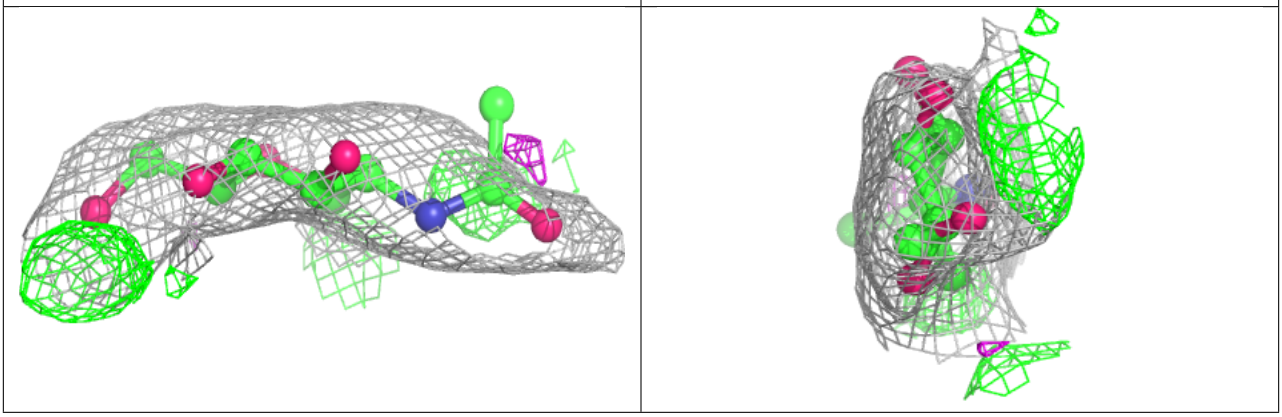




Electron density around NAG A 604:

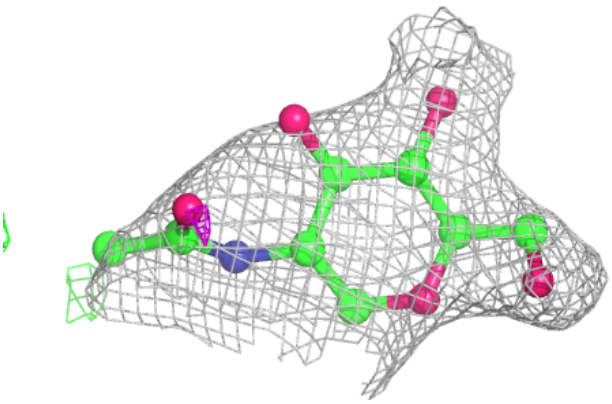
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

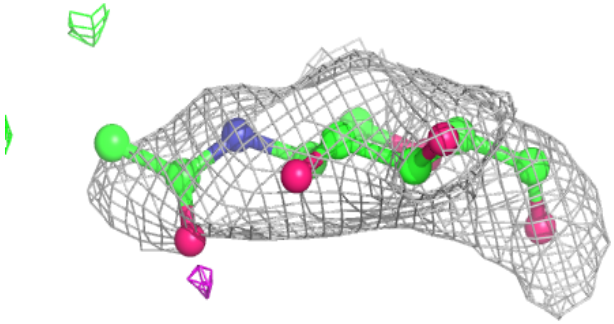


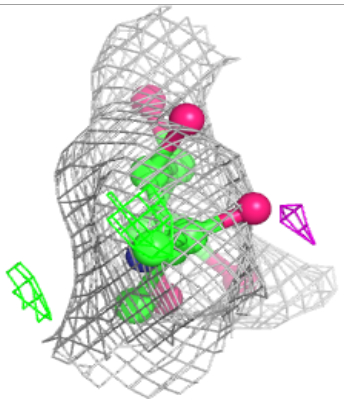


Electron density around NAG D 603:

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

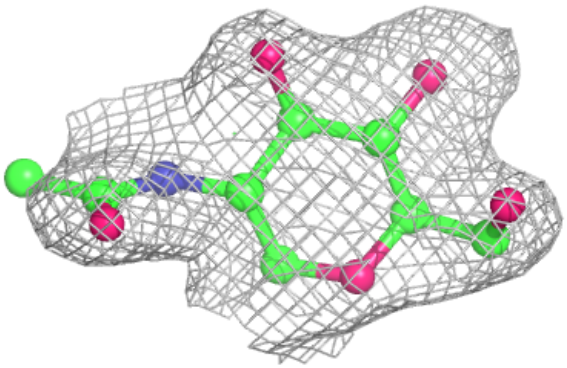


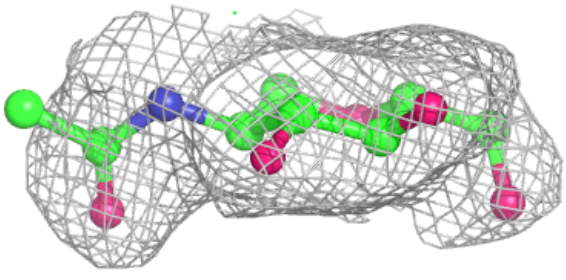


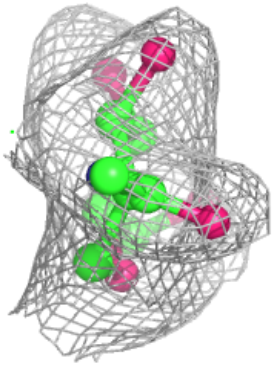


Electron density around NAG A 603:

$2mF_o$-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.