



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2023 – 02:01 PM JST

PDB ID : 7COE
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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

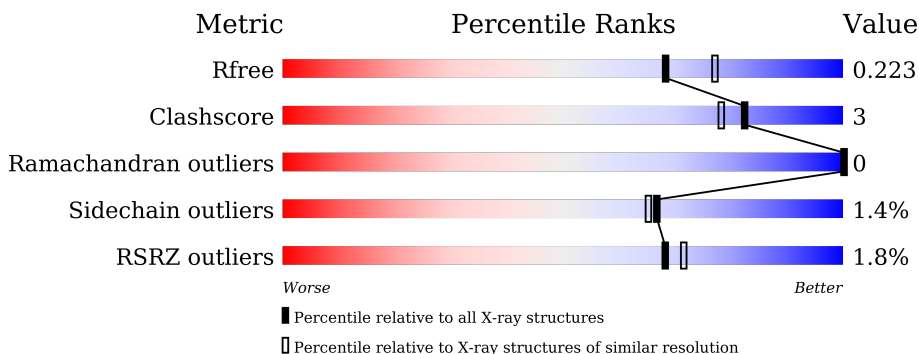
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.05 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}	130704	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	B	237	90% (green), 5% (grey), 0% (yellow), 0% (orange), 0% (red)
1	H	237	87% (green), 7% (yellow), 6% (grey), 0% (orange), 2% (red)
2	C	215	93% (green), 6% (grey), 0% (yellow), 0% (orange), 0% (red)
2	L	215	94% (green), 5% (yellow), 0% (grey), 0% (orange), 0% (red)
3	A	223	87% (green), 5% (yellow), 8% (grey), 0% (orange), 0% (red)
3	D	223	86% (green), 7% (yellow), 8% (grey), 0% (orange), 7% (red)

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	NAG	D	604	-	-	-	X

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
			Total	C	N	O	S			
1	H	223	Total 1667	C 1057	N 279	O 323	S 8	0	2	0
1	B	225	Total 1650	C 1042	N 278	O 323	S 7	0	0	0

- Molecule 2 is a protein called Light chain.

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

- Molecule 3 is a protein called Spike glycoprotein.

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

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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-glucofuranose (three-letter code: 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	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		

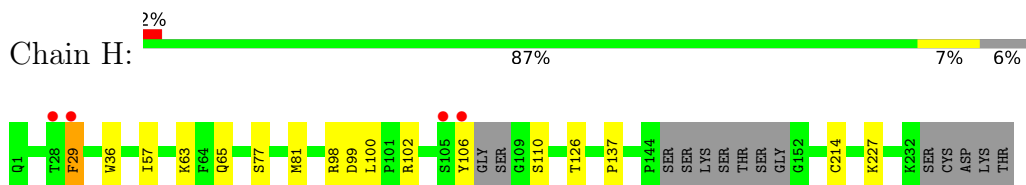
- Molecule 6 is water.

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

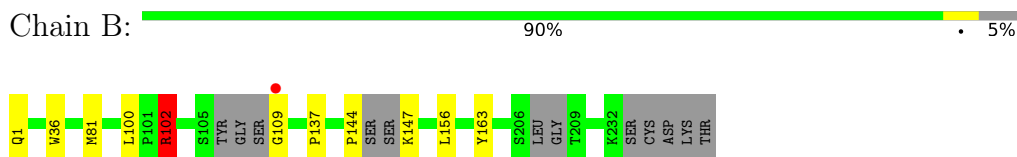
3 Residue-property plots [i](#)

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.

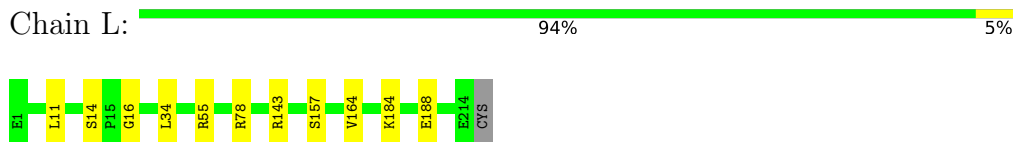
- Molecule 1: Heavy chain



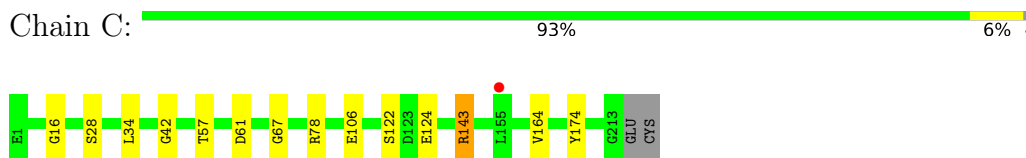
- Molecule 1: Heavy chain



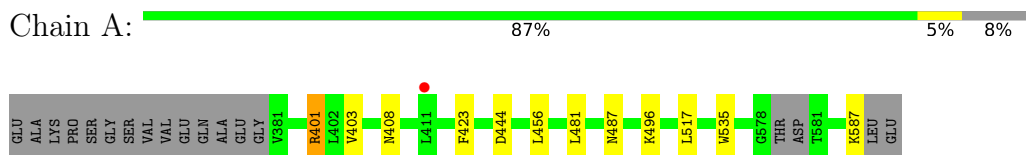
- Molecule 2: Light chain




- Molecule 2: Light chain

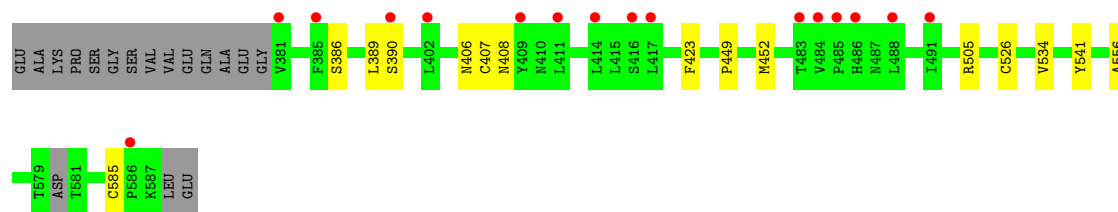


- Molecule 3: Spike glycoprotein



- Molecule 3: Spike glycoprotein

Chain D: 



4 Data and refinement statistics

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
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 2.05Å)	Xtrriage
Refinement program	PHENIX 1.18.2-3874	Depositor
R, R_{free}	0.176 , 0.223 0.176 , 0.223	Depositor DCC
R_{free} test set	1999 reflections (1.93%)	wwPDB-VP
Wilson B-factor (Å ²)	29.0	Xtrriage
Anisotropy	0.335	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 48.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
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

Xtrriage'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.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.39	0/1688	0.61	2/2304 (0.1%)
1	H	0.45	1/1707 (0.1%)	0.59	0/2327
2	C	0.37	0/1638	0.56	0/2232
2	L	0.42	0/1671	0.60	1/2270 (0.0%)
3	A	0.37	0/1612	0.58	0/2201
3	D	0.32	0/1605	0.53	0/2194
All	All	0.39	1/9921 (0.0%)	0.58	3/13528 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	214	CYS	CB-SG	-5.25	1.73	1.81

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	102	ARG	NE-CZ-NH2	-8.93	115.84	120.30
1	B	102	ARG	NE-CZ-NH1	8.28	124.44	120.30
2	L	11	LEU	CA-CB-CG	5.13	127.10	115.30

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	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
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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
2:L:16:GLY:HA2	2:L:78:ARG:HG3	1.90	0.53
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:1:GLN:H3	1:B:1:GLN:CD	2.21	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%)	175 (99%)	1 (1%)	86	87
1	H	180/199 (90%)	177 (98%)	3 (2%)	60	57
2	C	177/185 (96%)	174 (98%)	3 (2%)	60	57
2	L	184/185 (100%)	181 (98%)	3 (2%)	62	59
3	A	185/201 (92%)	183 (99%)	2 (1%)	73	73
3	D	181/201 (90%)	178 (98%)	3 (2%)	60	57
All	All	1083/1170 (93%)	1068 (99%)	15 (1%)	67	65

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	29	PHE
1	H	63	LYS
1	H	110	SER
2	L	14	SER
2	L	34	LEU
2	L	55	ARG
3	A	401	ARG
3	A	423	PHE
1	B	102	ARG
2	C	28	SER
2	C	34	LEU
2	C	143	ARG
3	D	390	SER
3	D	423	PHE
3	D	505	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	H	222	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides 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
4	EDO	H	303	-	3,3,3	0.49	0	2,2,2	0.33	0
4	EDO	H	310	-	3,3,3	0.56	0	2,2,2	0.14	0
4	EDO	A	602	-	3,3,3	0.46	0	2,2,2	0.31	0
4	EDO	H	302	-	3,3,3	0.41	0	2,2,2	0.44	0
5	NAG	D	604	3	14,14,15	0.52	0	17,19,21	0.71	1 (5%)
5	NAG	D	603	3	14,14,15	0.27	0	17,19,21	0.38	0
4	EDO	A	601	-	3,3,3	0.59	0	2,2,2	0.01	0
4	EDO	L	402	-	3,3,3	0.44	0	2,2,2	0.45	0
4	EDO	H	301	-	3,3,3	0.69	0	2,2,2	0.09	0
4	EDO	D	605	-	3,3,3	0.47	0	2,2,2	0.29	0
4	EDO	H	311	-	3,3,3	0.51	0	2,2,2	0.35	0
4	EDO	L	401	-	3,3,3	0.51	0	2,2,2	0.55	0
4	EDO	D	601	-	3,3,3	0.49	0	2,2,2	0.25	0
4	EDO	H	306	-	3,3,3	0.52	0	2,2,2	0.47	0
4	EDO	H	308	-	3,3,3	0.59	0	2,2,2	0.08	0
5	NAG	A	603	3	14,14,15	0.24	0	17,19,21	0.38	0
4	EDO	C	305	-	3,3,3	0.48	0	2,2,2	0.23	0
4	EDO	H	309	-	3,3,3	0.73	0	2,2,2	0.23	0
4	EDO	C	302	-	3,3,3	0.50	0	2,2,2	0.24	0
4	EDO	C	303	-	3,3,3	0.52	0	2,2,2	0.42	0
4	EDO	C	304	-	3,3,3	0.49	0	2,2,2	0.48	0
4	EDO	B	304	-	3,3,3	0.43	0	2,2,2	0.54	0
4	EDO	C	301	-	3,3,3	0.61	0	2,2,2	0.15	0
4	EDO	H	305	1	3,3,3	0.56	0	2,2,2	1.28	0
4	EDO	A	605	-	3,3,3	0.49	0	2,2,2	0.29	0
5	NAG	A	604	3	14,14,15	0.59	0	17,19,21	0.47	0
4	EDO	D	602	-	3,3,3	0.50	0	2,2,2	0.26	0
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	L	403	-	3,3,3	0.48	0	2,2,2	0.39	0
4	EDO	H	307	-	3,3,3	0.48	0	2,2,2	0.35	0
4	EDO	B	302	-	3,3,3	0.54	0	2,2,2	0.29	0
4	EDO	B	301	-	3,3,3	0.51	0	2,2,2	0.41	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
4	EDO	H	303	-	-	0/1/1/1	-
4	EDO	H	310	-	-	0/1/1/1	-
4	EDO	A	602	-	-	0/1/1/1	-
4	EDO	H	302	-	-	0/1/1/1	-
5	NAG	D	604	3	-	1/6/23/26	0/1/1/1
5	NAG	D	603	3	-	2/6/23/26	0/1/1/1
4	EDO	A	601	-	-	0/1/1/1	-
4	EDO	L	402	-	-	0/1/1/1	-
4	EDO	H	301	-	-	0/1/1/1	-
4	EDO	D	605	-	-	0/1/1/1	-
4	EDO	H	311	-	-	0/1/1/1	-
4	EDO	L	401	-	-	0/1/1/1	-
4	EDO	D	601	-	-	0/1/1/1	-
4	EDO	H	306	-	-	0/1/1/1	-
4	EDO	H	308	-	-	0/1/1/1	-
5	NAG	A	603	3	-	2/6/23/26	0/1/1/1
4	EDO	C	305	-	-	0/1/1/1	-
4	EDO	H	309	-	-	0/1/1/1	-
4	EDO	C	302	-	-	0/1/1/1	-
4	EDO	C	303	-	-	0/1/1/1	-
4	EDO	C	304	-	-	0/1/1/1	-
4	EDO	B	304	-	-	0/1/1/1	-
4	EDO	C	301	-	-	0/1/1/1	-
4	EDO	H	305	1	-	0/1/1/1	-
4	EDO	A	605	-	-	0/1/1/1	-
5	NAG	A	604	3	-	4/6/23/26	0/1/1/1
4	EDO	D	602	-	-	1/1/1/1	-
4	EDO	H	304	-	-	0/1/1/1	-
4	EDO	B	303	-	-	1/1/1/1	-
4	EDO	L	403	-	-	0/1/1/1	-
4	EDO	H	307	-	-	0/1/1/1	-
4	EDO	B	302	-	-	0/1/1/1	-
4	EDO	B	301	-	-	1/1/1/1	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
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:

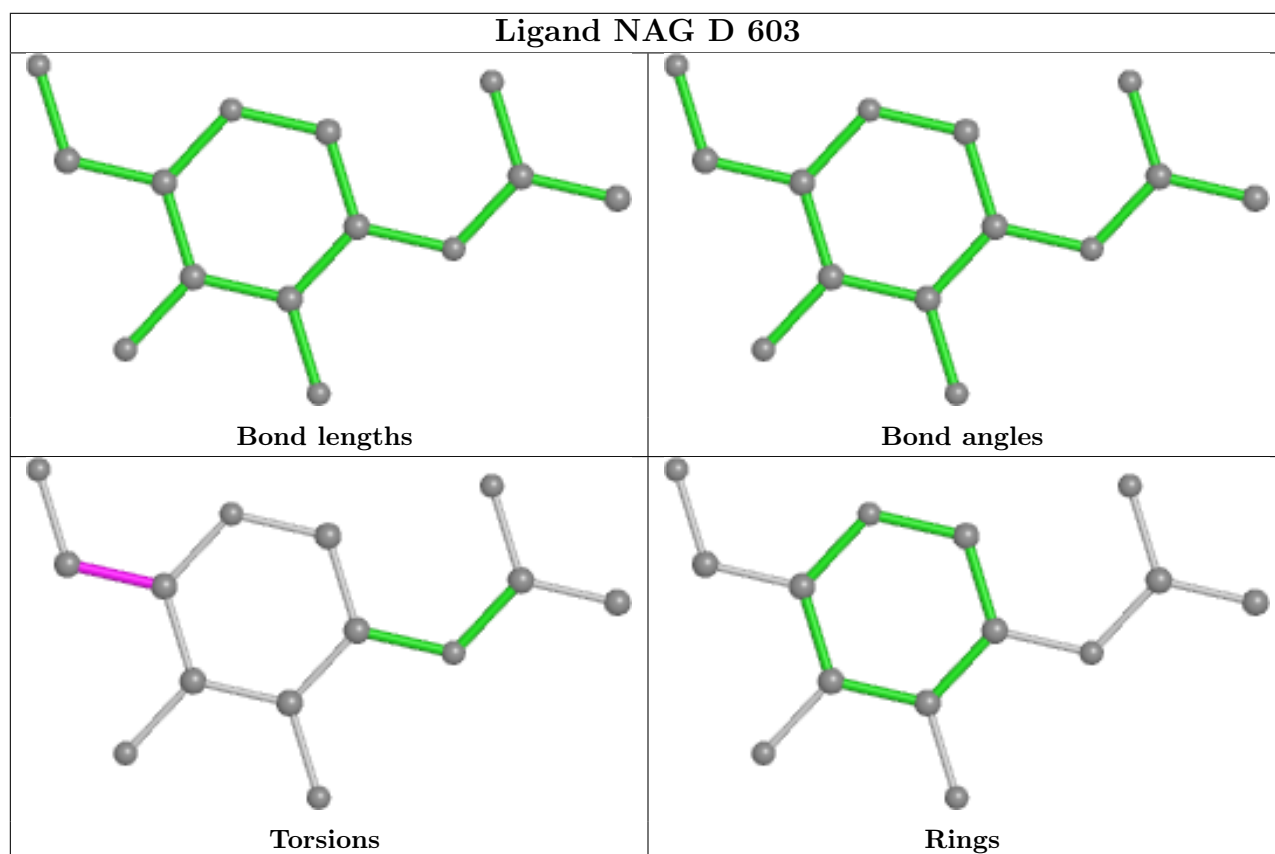
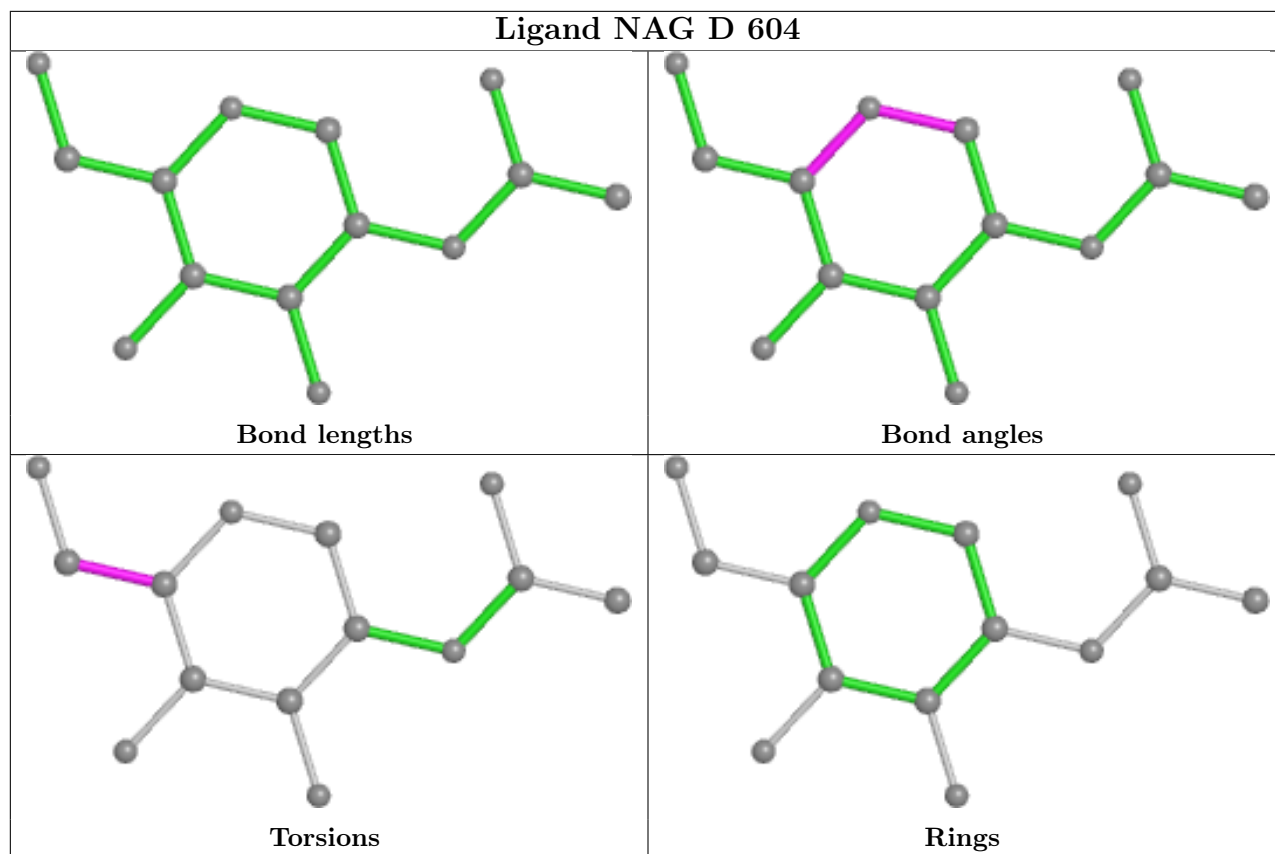
Mol	Chain	Res	Type	Atoms
5	A	604	NAG	O5-C5-C6-O6
5	A	603	NAG	C4-C5-C6-O6
5	D	603	NAG	O5-C5-C6-O6
5	D	603	NAG	C4-C5-C6-O6
5	A	604	NAG	C8-C7-N2-C2
5	A	604	NAG	O7-C7-N2-C2
5	A	604	NAG	C4-C5-C6-O6
5	A	603	NAG	O5-C5-C6-O6
4	D	602	EDO	O1-C1-C2-O2
5	D	604	NAG	O5-C5-C6-O6
4	B	303	EDO	O1-C1-C2-O2
4	B	301	EDO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

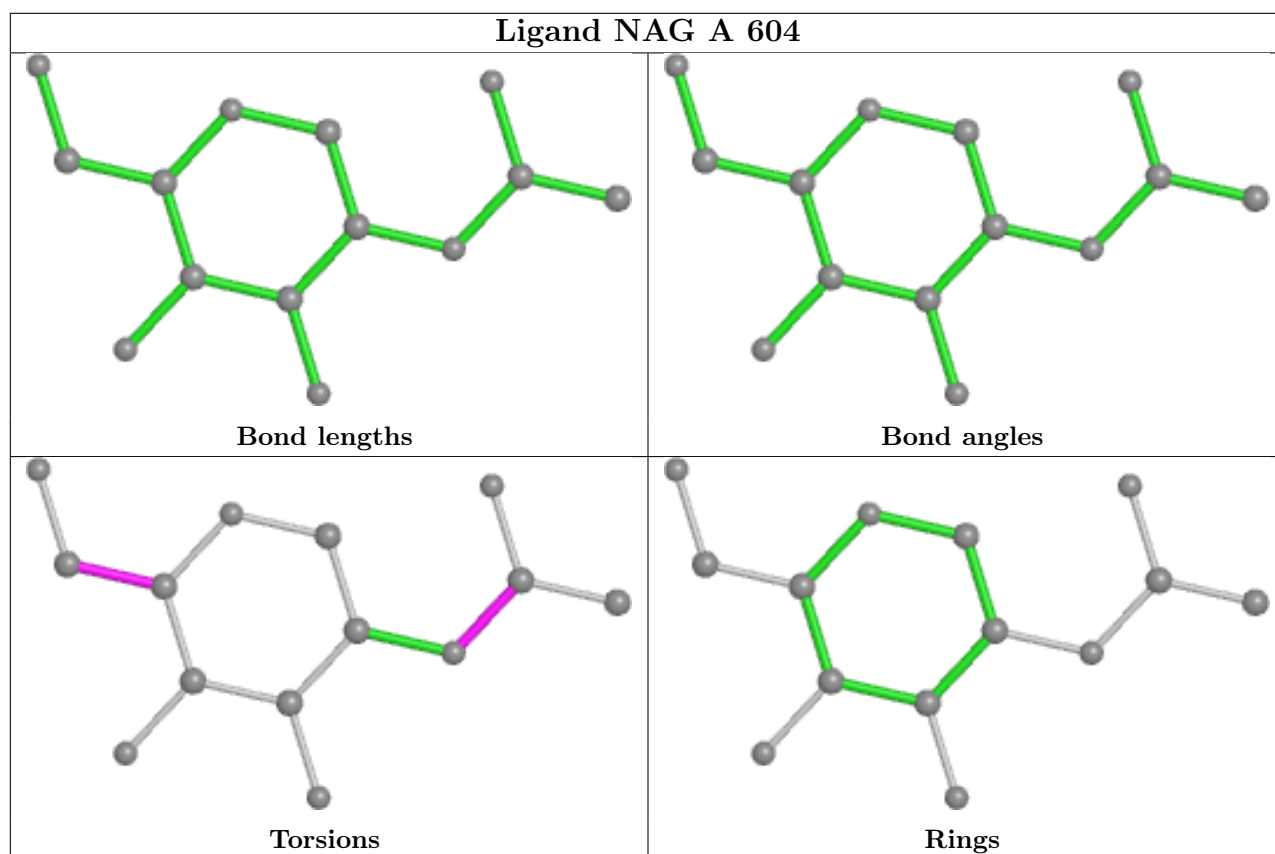
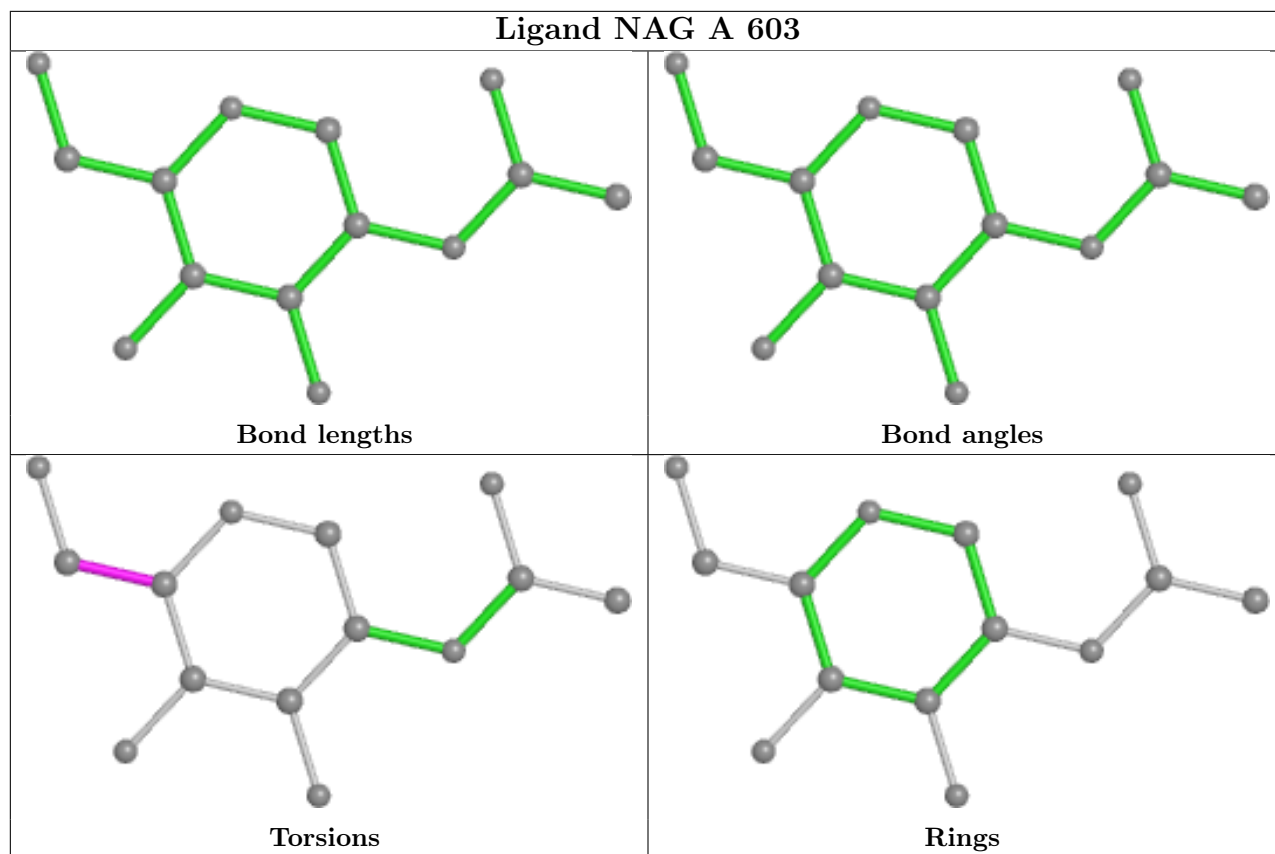
There are no ring outliers.

9 monomers are involved in 13 short contacts:

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

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	B	225/237 (94%)	-0.17	1 (0%) 92 93	19, 39, 73, 84	0
1	H	223/237 (94%)	-0.16	4 (1%) 68 71	18, 25, 51, 72	0
2	C	213/215 (99%)	-0.17	1 (0%) 91 92	20, 40, 60, 72	0
2	L	214/215 (99%)	-0.30	0 100 100	18, 31, 47, 58	0
3	A	205/223 (91%)	-0.24	1 (0%) 91 92	21, 36, 56, 71	0
3	D	206/223 (92%)	0.28	16 (7%) 13 14	28, 48, 70, 93	0
All	All	1286/1350 (95%)	-0.13	23 (1%) 68 71	18, 36, 64, 93	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	109	GLY	7.1
1	H	106	TYR	4.7
1	H	28	THR	3.8
3	D	488	LEU	3.8
1	H	105	SER	3.6
3	D	483	THR	3.3
2	C	155	LEU	3.0
3	D	491	ILE	2.9
3	D	390	SER	2.9
3	D	484	VAL	2.7
3	D	381	VAL	2.7
3	D	586	PRO	2.6
3	A	411	LEU	2.5
1	H	29	PHE	2.5
3	D	414	LEU	2.4
3	D	417	LEU	2.4
3	D	485	PRO	2.3
3	D	385	PHE	2.1
3	D	416	SER	2.1

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Mol	Chain	Res	Type	RSRZ
3	D	486	HIS	2.1
3	D	411	LEU	2.1
3	D	409	TYR	2.0
3	D	402	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 monosaccharides 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

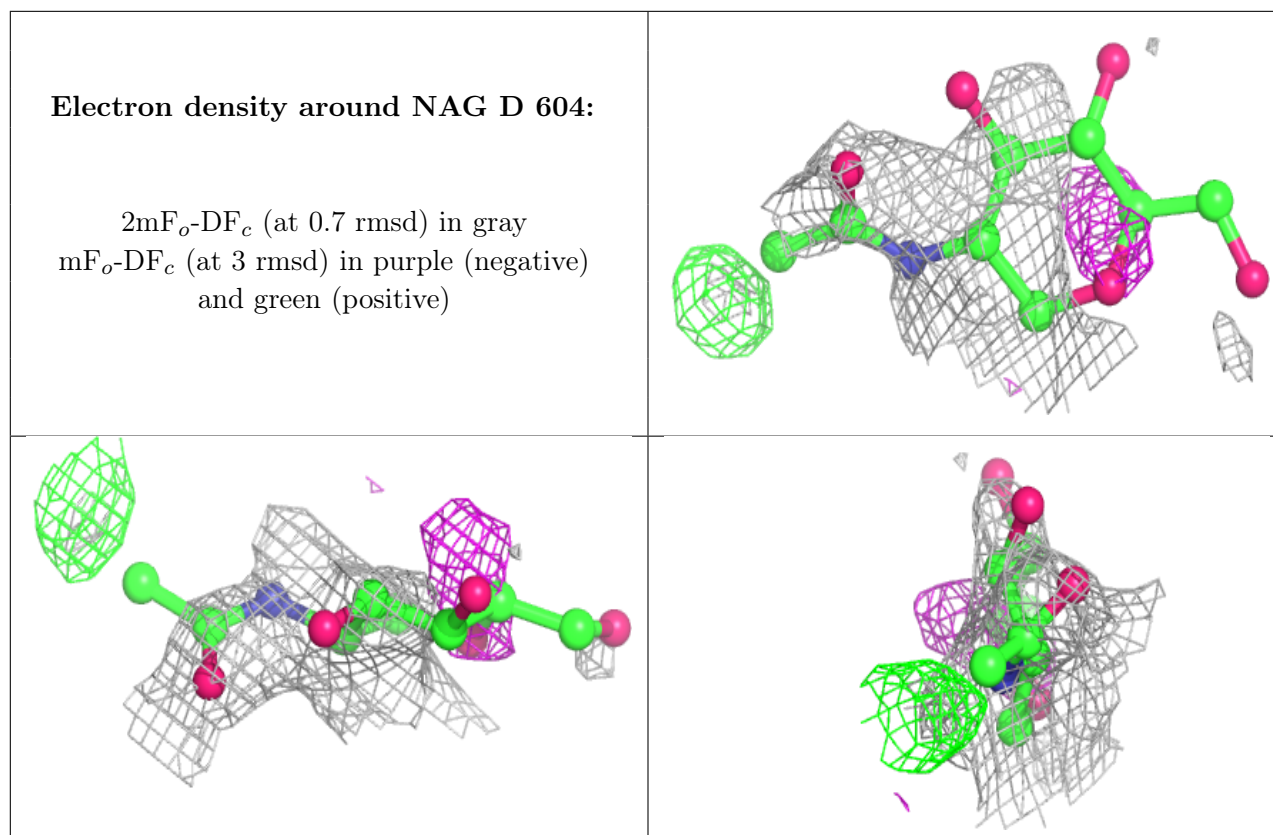
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	NAG	D	604	14/15	0.58	0.52	122,129,133,134	0
4	EDO	H	305	4/4	0.68	0.36	42,44,46,48	0
4	EDO	C	303	4/4	0.69	0.20	43,44,47,52	0
4	EDO	C	302	4/4	0.73	0.29	63,63,63,64	0
5	NAG	A	604	14/15	0.77	0.21	62,69,79,79	0
4	EDO	H	304	4/4	0.80	0.18	54,54,55,57	0
4	EDO	D	601	4/4	0.80	0.44	67,72,76,79	0
5	NAG	A	603	14/15	0.81	0.21	64,69,76,79	0
4	EDO	H	311	4/4	0.83	0.16	48,50,51,56	0
4	EDO	H	308	4/4	0.85	0.20	41,41,42,49	0
4	EDO	H	301	4/4	0.85	0.14	26,33,34,42	0
4	EDO	B	301	4/4	0.86	0.16	44,47,48,48	0
4	EDO	D	602	4/4	0.86	0.28	57,59,63,69	0
4	EDO	H	306	4/4	0.86	0.17	40,43,43,44	0
4	EDO	L	403	4/4	0.86	0.16	41,49,56,62	0
4	EDO	C	305	4/4	0.86	0.53	48,51,53,53	0
4	EDO	B	304	4/4	0.87	0.22	41,48,52,54	0
5	NAG	D	603	14/15	0.88	0.24	73,77,81,84	0
4	EDO	A	601	4/4	0.89	0.20	38,44,45,46	0

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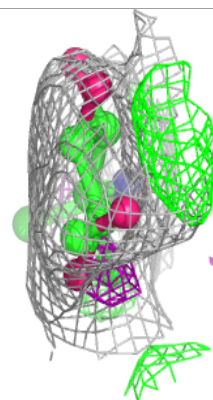
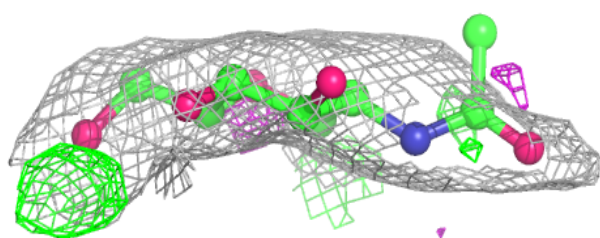
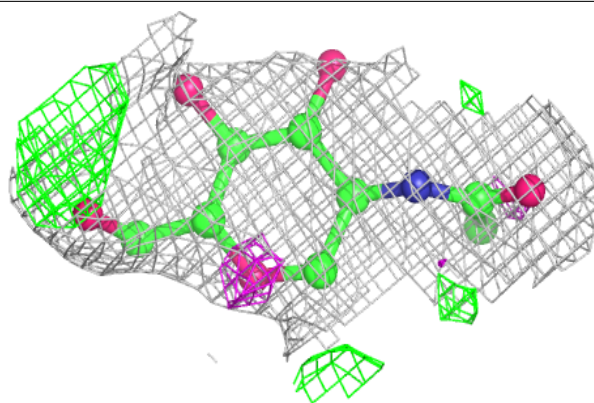
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9																																				
4	EDO	B	302	4/4	0.89	0.16	50,50,53,57	0																																				
4	EDO	A	605	4/4	0.89	0.19	54,55,56,57	0																																				
4	EDO	B	303	4/4	0.90	0.25	42,46,51,55	0																																				
4	EDO	D	605	4/4	0.90	0.27	55,56,56,58	0																																				
4	EDO	H	302	4/4	0.91	0.15	46,47,49,52	0																																				
4	EDO	H	310	4/4	0.91	0.11	31,36,46,49	0																																				
4	EDO	H	307	4/4	0.92	0.15	62,62,64,66	0																																				
4	EDO	L	402	4/4	0.94	0.11	38,43,43,50	0																																				
4	EDO	A	602	4/4	0.94	0.17	42,44,48,55	0																																				
4	EDO	L	401	4/4	0.94	0.12	37,39,43,47	0 </tr <tr> <td>4</td> <td>EDO</td> <td>C</td> <td>304</td> <td>4/4</td> <td>0.94</td> <td>0.11</td> <td>40,43,45,51</td> <td>0</td> </tr> <tr> <td>4</td> <td>EDO</td> <td>C</td> <td>301</td> <td>4/4</td> <td>0.95</td> <td>0.10</td> <td>29,30,40,41</td> <td>0</td> </tr> <tr> <td>4</td> <td>EDO</td> <td>H</td> <td>309</td> <td>4/4</td> <td>0.96</td> <td>0.11</td> <td>22,23,23,29</td> <td>0</td> </tr> <tr> <td>4</td> <td>EDO</td> <td>H</td> <td>303</td> <td>4/4</td> <td>0.97</td> <td>0.11</td> <td>38,39,40,41</td> <td>0</td> </tr>	4	EDO	C	304	4/4	0.94	0.11	40,43,45,51	0	4	EDO	C	301	4/4	0.95	0.10	29,30,40,41	0	4	EDO	H	309	4/4	0.96	0.11	22,23,23,29	0	4	EDO	H	303	4/4	0.97	0.11	38,39,40,41	0
4	EDO	C	304	4/4	0.94	0.11	40,43,45,51	0																																				
4	EDO	C	301	4/4	0.95	0.10	29,30,40,41	0																																				
4	EDO	H	309	4/4	0.96	0.11	22,23,23,29	0																																				
4	EDO	H	303	4/4	0.97	0.11	38,39,40,41	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.

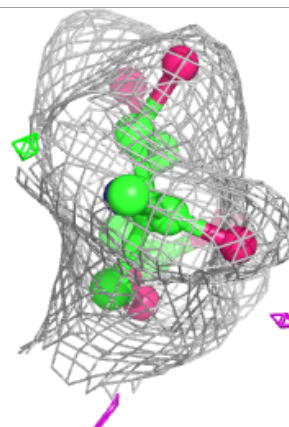
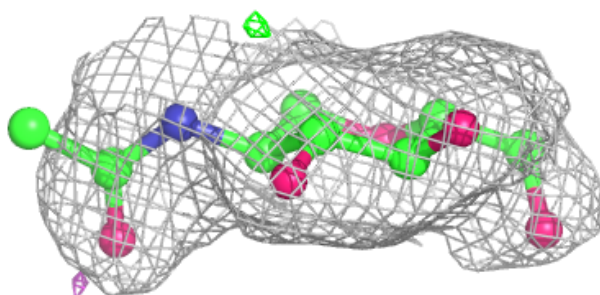
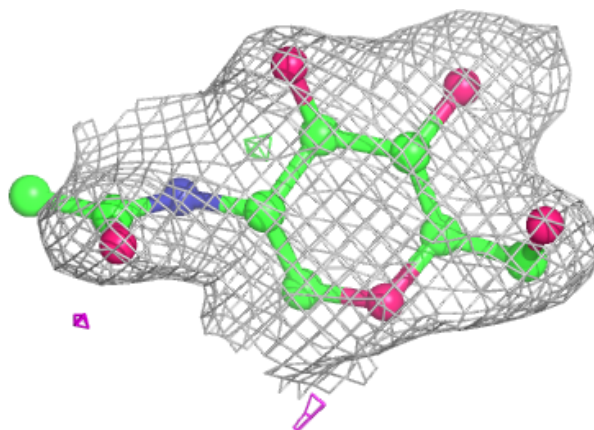


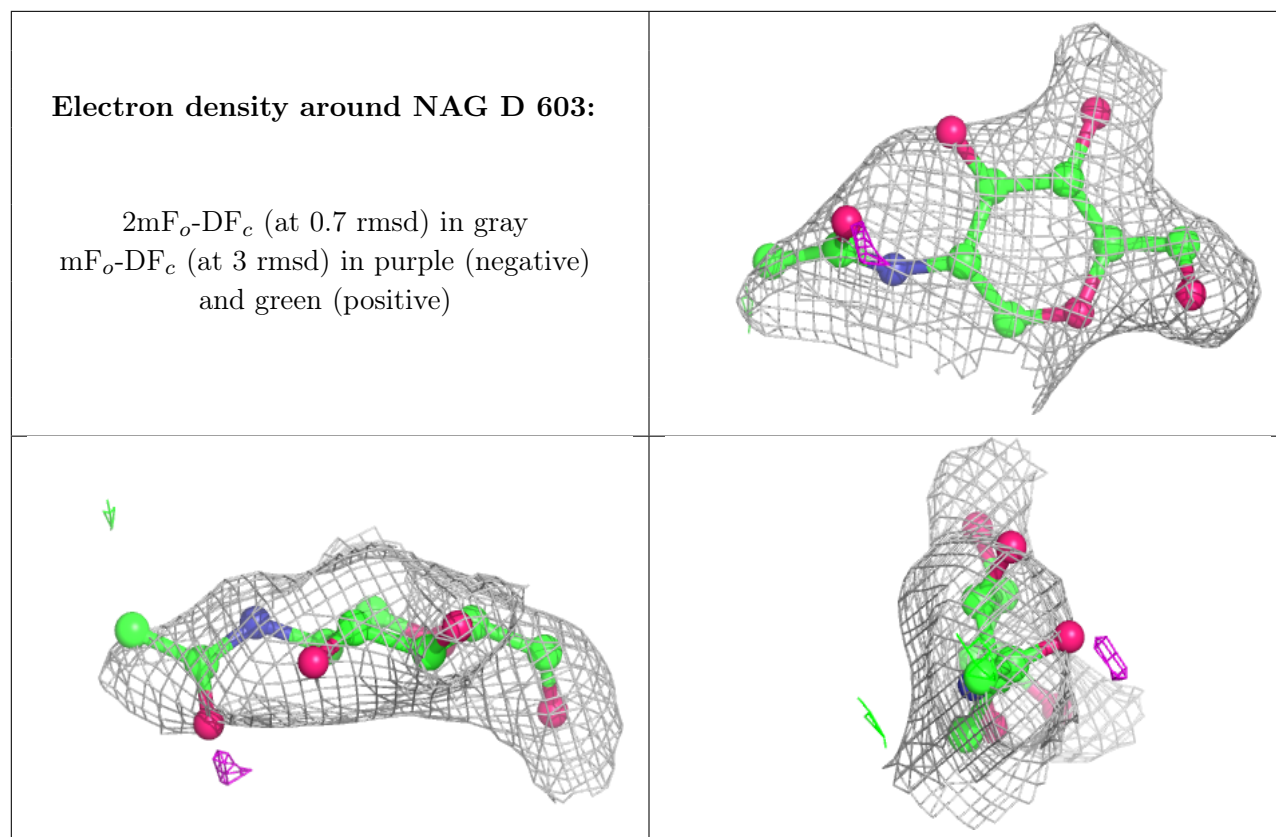
Electron density around NAG A 604:

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

**Electron density around NAG 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.