



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2024 – 12:18 pm GMT

PDB ID : 8PN3  
Title : Crystal structure of the HC7-Glu200Ala mutant complexed to a tetraglycopeptide.  
Authors : Taleb, V.; Hurtado-Guerrero, R.  
Deposited on : 2023-06-29  
Resolution : 1.44 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, 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

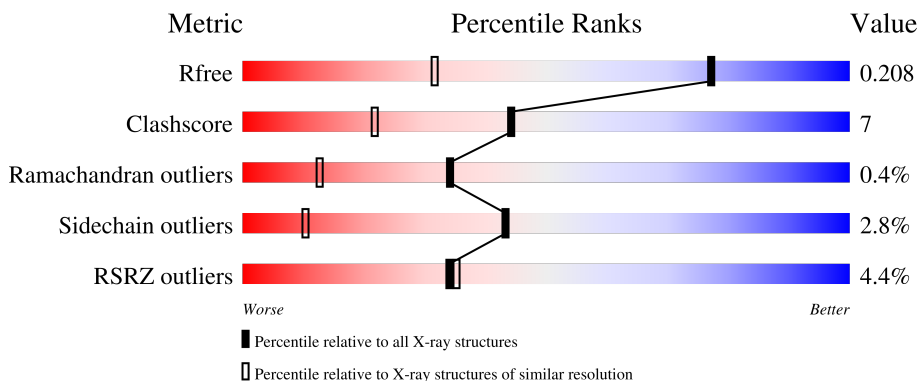
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.44 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	2021 (1.46-1.42)
Clashscore	141614	2086 (1.46-1.42)
Ramachandran outliers	138981	2047 (1.46-1.42)
Sidechain outliers	138945	2047 (1.46-1.42)
RSRZ outliers	127900	1993 (1.46-1.42)

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  $\geq 3$ , 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	A	659	
1	B	659	
2	C	15	
2	D	15	

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6600 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.

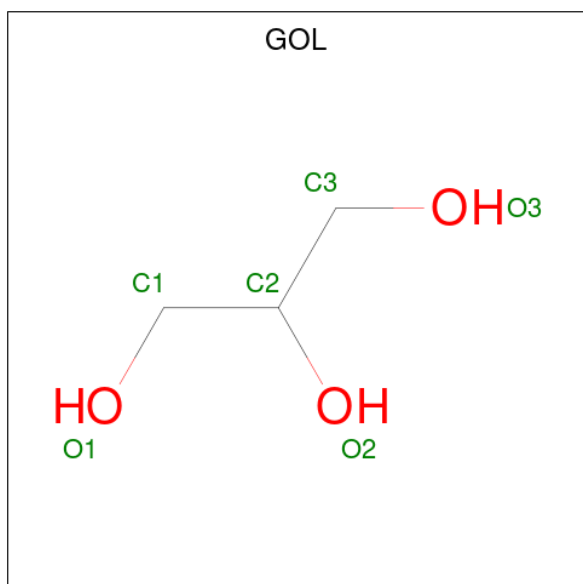
- Molecule 1 is a protein called DUF3472 domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	343	Total 2762	C 1751	N 465	O 542	S 4	0	4	0
1	B	342	Total 2753	C 1748	N 463	O 538	S 4	0	4	0

- Molecule 2 is a protein called Tetraglycopeptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	10	Total 58	C 35	N 10	O 13	0	0	1
2	D	11	Total 60	C 36	N 10	O 14	0	0	2

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).

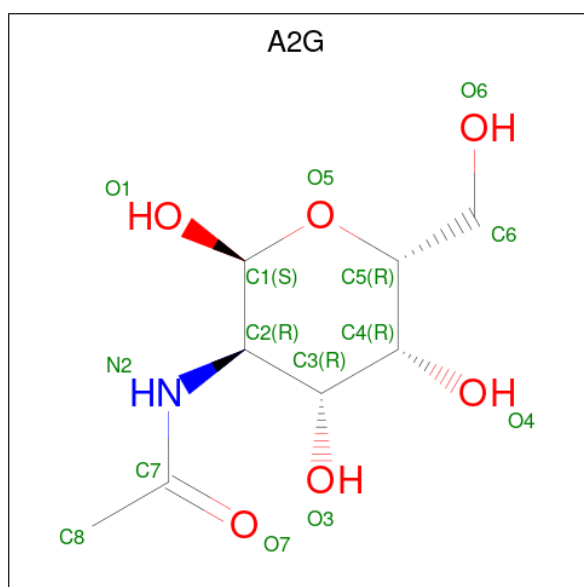


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	3	Total	Zn	0	0
			3	3		

- Molecule 5 is 2-acetamido-2-deoxy-alpha-D-galactopyranose (three-letter code: A2G) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>) (labeled as "Ligand of Interest" by depositor).



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

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
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	A	361	Total	O	0	0
			361	361		
6	B	426	Total	O	0	0
			426	426		
6	C	21	Total	O	0	0
			21	21		
6	D	32	Total	O	0	0
			32	32		





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	84.70Å 91.94Å 99.74Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.90 – 1.44 19.89 – 1.44	Depositor EDS
% Data completeness (in resolution range)	99.9 (19.90-1.44) 100.0 (19.89-1.44)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.69 (at 1.44Å)	Xtrriage
Refinement program	REFMAC 5.8.0352	Depositor
R, $R_{free}$	0.170 , 0.201 0.179 , 0.208	Depositor DCC
$R_{free}$ test set	5577 reflections (3.96%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	15.8	Xtrriage
Anisotropy	0.379	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 42.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	6600	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	19.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.14% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: ZN, A2G, GOL

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	0.52	0/2850	0.88	6/3875 (0.2%)
1	B	0.57	0/2840	0.87	5/3859 (0.1%)
2	C	1.55	0/59	1.46	0/84
2	D	1.43	0/61	1.31	0/86
All	All	0.58	0/5810	0.89	11/7904 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	360	THR	CA-CB-OG1	6.81	123.31	109.00
1	B	98	ARG	NE-CZ-NH2	-6.71	116.94	120.30
1	A	83	TYR	CB-CG-CD1	6.53	124.92	121.00
1	B	83	TYR	CB-CG-CD1	6.36	124.81	121.00
1	B	83	TYR	CB-CG-CD2	-6.32	117.21	121.00
1	A	150	ARG	NE-CZ-NH2	-6.09	117.26	120.30
1	A	154	ARG	NE-CZ-NH2	-5.88	117.36	120.30
1	A	150	ARG	NE-CZ-NH1	5.71	123.16	120.30
1	A	98	ARG	NE-CZ-NH2	-5.33	117.63	120.30
1	B	354	TYR	CB-CG-CD1	-5.16	117.90	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	68	TYR	CB-CG-CD2	-5.15	117.91	121.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	131	GLU	Peptide
1	B	263	ARG	Sidechain

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2762	0	2633	53	0
1	B	2753	0	2634	21	0
2	C	58	0	52	0	0
2	D	60	0	53	0	0
3	A	6	0	8	0	0
3	B	6	0	8	0	0
4	A	3	0	0	0	0
5	C	56	0	48	0	0
5	D	56	0	48	0	0
6	A	361	0	0	3	0
6	B	426	0	0	2	0
6	C	21	0	0	0	0
6	D	32	0	0	0	0
All	All	6600	0	5484	74	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 7.

All (74) 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:A:37:SER:HB2	1:A:204:GLY:HA2	1.63	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:207:GLN:H	1:B:207:GLN:HE21	1.33	0.76
1:A:141:TYR:CZ	1:A:168:LEU:HD23	2.25	0.71
1:A:98:ARG:HH22	1:A:145:ASN:HD21	1.37	0.70
1:A:293:TYR:HB2	1:A:377:SER:CB	2.21	0.70
1:B:157:GLN:HE22	1:B:188:ASN:H	1.37	0.70
1:B:141:TYR:CZ	1:B:168:LEU:HD23	2.26	0.70
1:A:295:GLU:OE1	1:A:378:PRO:CD	2.40	0.69
1:A:37:SER:CB	1:A:204:GLY:HA2	2.23	0.69
1:A:295:GLU:OE1	1:A:378:PRO:HD2	1.92	0.69
1:A:295:GLU:OE1	1:A:378:PRO:N	2.25	0.69
1:A:351:THR:O	1:A:375:ASN:OD1	2.11	0.68
1:A:157:GLN:HE22	1:A:188:ASN:H	1.41	0.67
1:A:376:GLU:N	1:A:376:GLU:OE2	2.27	0.67
1:A:378:PRO:O	1:A:379:ASN:ND2	2.28	0.67
1:B:325:MET:CE	1:B:370:LYS:HG3	2.25	0.67
1:A:293:TYR:HB2	1:A:377:SER:HB3	1.77	0.66
1:A:293:TYR:CB	1:A:377:SER:HB3	2.25	0.65
1:A:325:MET:CE	1:A:370:LYS:HG3	2.27	0.65
1:B:157:GLN:NE2	1:B:188:ASN:H	1.95	0.65
1:A:293:TYR:CG	1:A:377:SER:HB3	2.33	0.64
1:A:292:THR:HG21	1:A:371:VAL:HG23	1.81	0.63
1:A:157:GLN:NE2	1:A:188:ASN:H	1.98	0.61
1:A:62:GLN:OE1	1:A:209:VAL:HG11	1.99	0.61
1:B:192:ASN:HB2	6:B:1032:HOH:O	1.99	0.61
1:B:325:MET:HE1	1:B:370:LYS:HG3	1.83	0.61
1:A:293:TYR:CB	1:A:377:SER:CB	2.78	0.60
1:B:207:GLN:H	1:B:207:GLN:NE2	1.97	0.60
1:A:141:TYR:CE2	1:A:168:LEU:HD23	2.38	0.58
1:A:325:MET:HE1	1:A:370:LYS:HG3	1.86	0.58
1:A:209:VAL:HG12	6:A:1047:HOH:O	2.06	0.56
1:B:98:ARG:HH22	1:B:145:ASN:HD21	1.52	0.56
1:A:293:TYR:HB2	1:A:377:SER:HB2	1.88	0.56
1:A:379:ASN:C	1:A:379:ASN:HD22	2.11	0.55
1:A:98:ARG:NH2	1:A:145:ASN:HD21	2.04	0.54
1:A:205:ASN:HA	1:A:207:GLN:HE22	1.71	0.54
1:A:360:THR:HG23	6:A:956:HOH:O	2.07	0.54
1:A:62:GLN:OE1	1:A:209:VAL:CG1	2.57	0.53
1:B:141:TYR:CE2	1:B:168:LEU:HD23	2.43	0.53
1:B:292:THR:HG21	1:B:371[A]:VAL:HG23	1.90	0.53
1:B:98:ARG:NH2	1:B:145:ASN:HD21	2.08	0.52
1:B:325:MET:HE3	1:B:370:LYS:HG3	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:190[B]:THR:H	1:A:192[B]:ASN:ND2	2.09	0.51
1:A:100:LEU:HD11	1:A:168:LEU:HD22	1.93	0.51
1:A:325:MET:HE3	1:A:370:LYS:HG3	1.92	0.50
1:B:330:ILE:HG13	1:B:331:ASN:HD22	1.76	0.50
1:A:293:TYR:CE1	1:A:378:PRO:CD	2.95	0.49
1:A:333:ILE:HG21	1:A:343:ILE:HG21	1.94	0.49
1:A:207:GLN:NE2	1:A:207:GLN:H	2.10	0.49
1:A:145:ASN:N	1:A:145:ASN:HD22	2.11	0.48
1:A:46:LYS:HD3	1:A:46:LYS:O	2.13	0.48
1:A:252:GLU:CG	1:A:253:TYR:CD2	2.98	0.47
1:A:299:LEU:CD2	1:A:319:ILE:HD11	2.44	0.47
1:B:100:LEU:HD11	1:B:168:LEU:HD22	1.97	0.47
1:B:145:ASN:HD22	1:B:145:ASN:N	2.14	0.46
1:A:98:ARG:HH22	1:A:145:ASN:ND2	2.10	0.46
1:A:293:TYR:CE1	1:A:378:PRO:HD3	2.50	0.46
1:B:98:ARG:HH22	1:B:145:ASN:ND2	2.12	0.46
1:A:293:TYR:CD1	1:A:378:PRO:HD3	2.50	0.45
1:A:330:ILE:HG13	1:A:331:ASN:HD22	1.80	0.45
1:B:197:LEU:CD1	1:B:214:VAL:HG11	2.46	0.45
1:A:252:GLU:HG3	1:A:253:TYR:CD2	2.52	0.45
1:A:239:GLU:HB2	1:A:242:ASN:HB3	2.00	0.44
1:A:292:THR:HG21	1:A:371:VAL:CG2	2.47	0.44
1:B:298:LYS:HE3	6:B:969:HOH:O	2.18	0.44
1:A:150:ARG:HB3	1:A:169:LYS:HB3	2.00	0.44
1:A:252:GLU:HG2	1:A:253:TYR:CD2	2.54	0.43
1:A:295:GLU:OE2	1:A:379:ASN:N	2.40	0.42
1:B:150:ARG:HB3	1:B:169:LYS:HB3	2.01	0.42
1:A:197:LEU:CD1	1:A:214:VAL:HG11	2.50	0.41
1:A:299:LEU:HD21	1:A:319:ILE:HD11	2.02	0.41
1:A:295:GLU:CD	1:A:379:ASN:H	2.23	0.41
1:A:375:ASN:ND2	6:A:805:HOH:O	2.47	0.41
1:B:375:ASN:C	1:B:375:ASN:HD22	2.24	0.41

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	345/659 (52%)	331 (96%)	11 (3%)	3 (1%)	17	3
1	B	344/659 (52%)	337 (98%)	7 (2%)	0	100	100
2	C	8/15 (53%)	8 (100%)	0	0	100	100
2	D	9/15 (60%)	9 (100%)	0	0	100	100
All	All	706/1348 (52%)	685 (97%)	18 (2%)	3 (0%)	34	13

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	376	GLU
1	A	377	SER
1	A	378	PRO

### 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	302/574 (53%)	293 (97%)	9 (3%)	41	9
1	B	300/574 (52%)	294 (98%)	6 (2%)	55	21
2	C	6/8 (75%)	5 (83%)	1 (17%)	2	0
2	D	6/8 (75%)	5 (83%)	1 (17%)	2	0
All	All	614/1164 (53%)	597 (97%)	17 (3%)	43	10

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	LYS
1	A	83	TYR
1	A	145	ASN

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Mol	Chain	Res	Type
1	A	203	LEU
1	A	207	GLN
1	A	210	ARG
1	A	252	GLU
1	A	360	THR
1	A	379	ASN
1	B	83	TYR
1	B	145	ASN
1	B	203	LEU
1	B	207	GLN
1	B	210	ARG
1	B	375	ASN
2	C	6	THR
2	D	6	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	145	ASN
1	A	157	GLN
1	A	207	GLN
1	A	221	ASN
1	A	244	ASN
1	A	304	GLN
1	A	331	ASN
1	A	365	GLN
1	A	379	ASN
1	B	145	ASN
1	B	157	GLN
1	B	207	GLN
1	B	221	ASN
1	B	244	ASN
1	B	279	GLN
1	B	304	GLN
1	B	331	ASN
1	B	365	GLN
1	B	375	ASN

### 5.3.3 RNA

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](#)

Of 13 ligands modelled in this entry, 3 are monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	A2G	C	104	2	14,14,15	1.45	2 (14%)	17,19,21	1.86	5 (29%)
5	A2G	C	102	2	14,14,15	1.69	5 (35%)	17,19,21	1.62	3 (17%)
3	GOL	B	701	-	5,5,5	0.53	0	5,5,5	1.21	0
5	A2G	D	101	2	14,14,15	1.47	3 (21%)	17,19,21	0.92	0
5	A2G	C	101	2	14,14,15	1.60	3 (21%)	17,19,21	0.78	0
3	GOL	A	701	-	5,5,5	0.21	0	5,5,5	0.26	0
5	A2G	D	103	2	14,14,15	1.28	2 (14%)	17,19,21	1.54	3 (17%)
5	A2G	D	104	2	14,14,15	1.31	2 (14%)	17,19,21	1.18	1 (5%)
5	A2G	D	102	2	14,14,15	1.09	1 (7%)	17,19,21	0.95	0
5	A2G	C	103	2	14,14,15	1.19	1 (7%)	17,19,21	1.27	2 (11%)

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	A2G	C	104	2	-	0/6/23/26	0/1/1/1
5	A2G	C	102	2	-	0/6/23/26	0/1/1/1
3	GOL	B	701	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	A2G	D	101	2	-	0/6/23/26	0/1/1/1
5	A2G	C	101	2	-	0/6/23/26	0/1/1/1
3	GOL	A	701	-	-	0/4/4/4	-
5	A2G	D	103	2	-	0/6/23/26	0/1/1/1
5	A2G	D	104	2	-	0/6/23/26	0/1/1/1
5	A2G	D	102	2	-	0/6/23/26	0/1/1/1
5	A2G	C	103	2	-	0/6/23/26	0/1/1/1

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	102	A2G	O5-C1	3.43	1.49	1.43
5	C	101	A2G	C1-C2	3.43	1.57	1.52
5	C	103	A2G	O4-C4	3.08	1.50	1.43
5	D	103	A2G	C8-C7	2.98	1.56	1.50
5	C	101	A2G	O5-C5	2.85	1.49	1.43
5	D	103	A2G	C2-N2	2.80	1.51	1.46
5	D	104	A2G	C8-C7	2.50	1.55	1.50
5	C	104	A2G	C8-C7	2.49	1.55	1.50
5	D	101	A2G	O4-C4	2.47	1.48	1.43
5	C	102	A2G	O3-C3	2.44	1.48	1.43
5	D	101	A2G	C3-C2	2.44	1.57	1.52
5	C	102	A2G	C6-C5	2.31	1.59	1.51
5	C	101	A2G	O3-C3	2.31	1.48	1.43
5	D	102	A2G	C8-C7	2.28	1.55	1.50
5	C	104	A2G	O5-C5	-2.26	1.38	1.43
5	D	104	A2G	C3-C2	2.16	1.57	1.52
5	C	102	A2G	O4-C4	2.03	1.47	1.43
5	D	101	A2G	C1-C2	-2.02	1.49	1.52
5	C	102	A2G	C8-C7	2.02	1.54	1.50

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	102	A2G	O5-C1-C2	-4.41	104.33	111.29
5	C	104	A2G	C1-O5-C5	-3.38	107.61	112.19
5	D	103	A2G	C2-N2-C7	-3.32	118.18	122.90
5	C	104	A2G	C4-C3-C2	-3.00	106.61	111.02
5	C	104	A2G	C3-C4-C5	-2.86	105.14	110.24
5	C	102	A2G	C8-C7-N2	-2.74	111.47	116.10
5	D	104	A2G	O5-C1-C2	2.66	115.50	111.29
5	D	103	A2G	C4-C3-C2	-2.52	107.33	111.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	103	A2G	C1-C2-N2	-2.40	106.38	110.49
5	C	104	A2G	C2-N2-C7	-2.33	119.58	122.90
5	C	102	A2G	O7-C7-N2	2.24	126.06	121.95
5	C	103	A2G	O7-C7-C8	-2.18	118.00	122.06
5	C	104	A2G	C6-C5-C4	-2.11	108.06	113.00
5	C	103	A2G	O7-C7-N2	2.02	125.67	121.95

There are no chirality outliers.

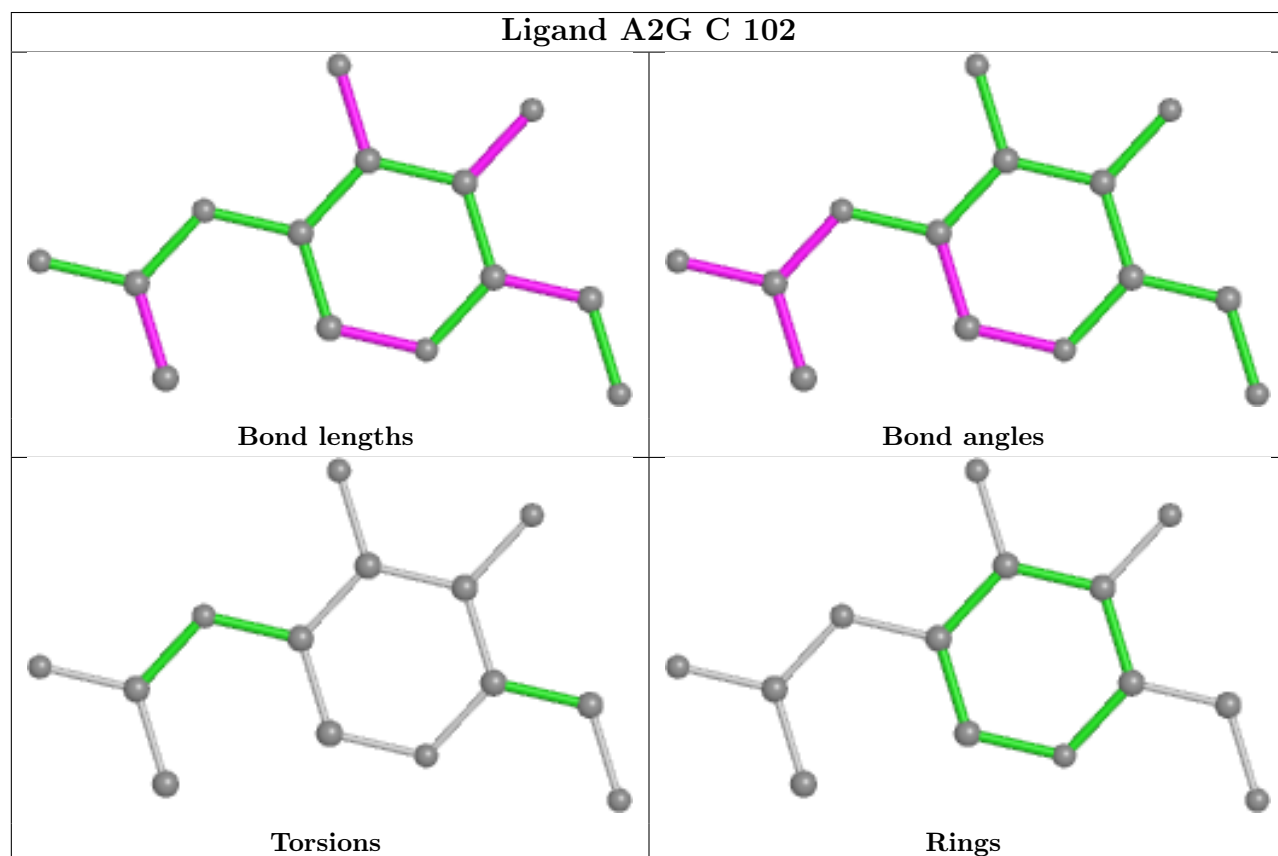
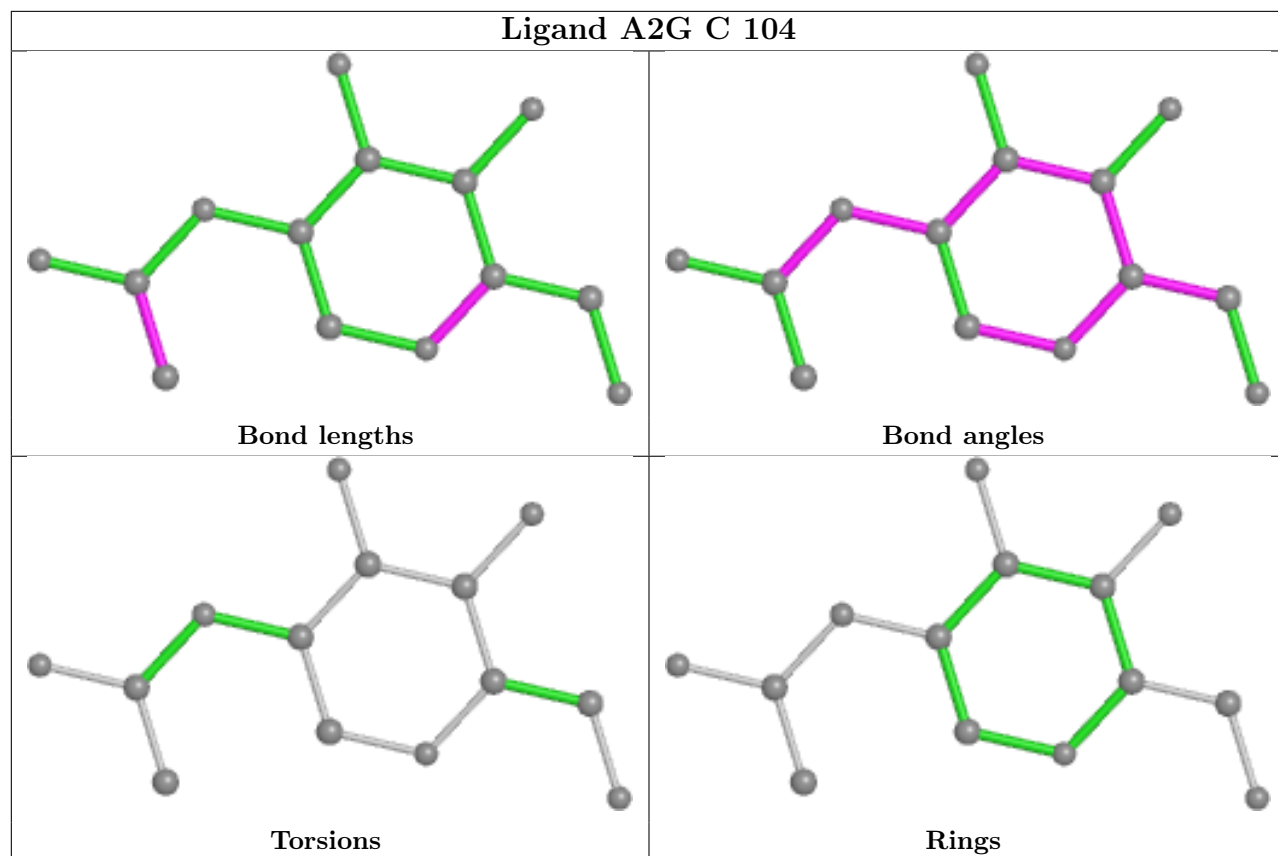
All (4) torsion outliers are listed below:

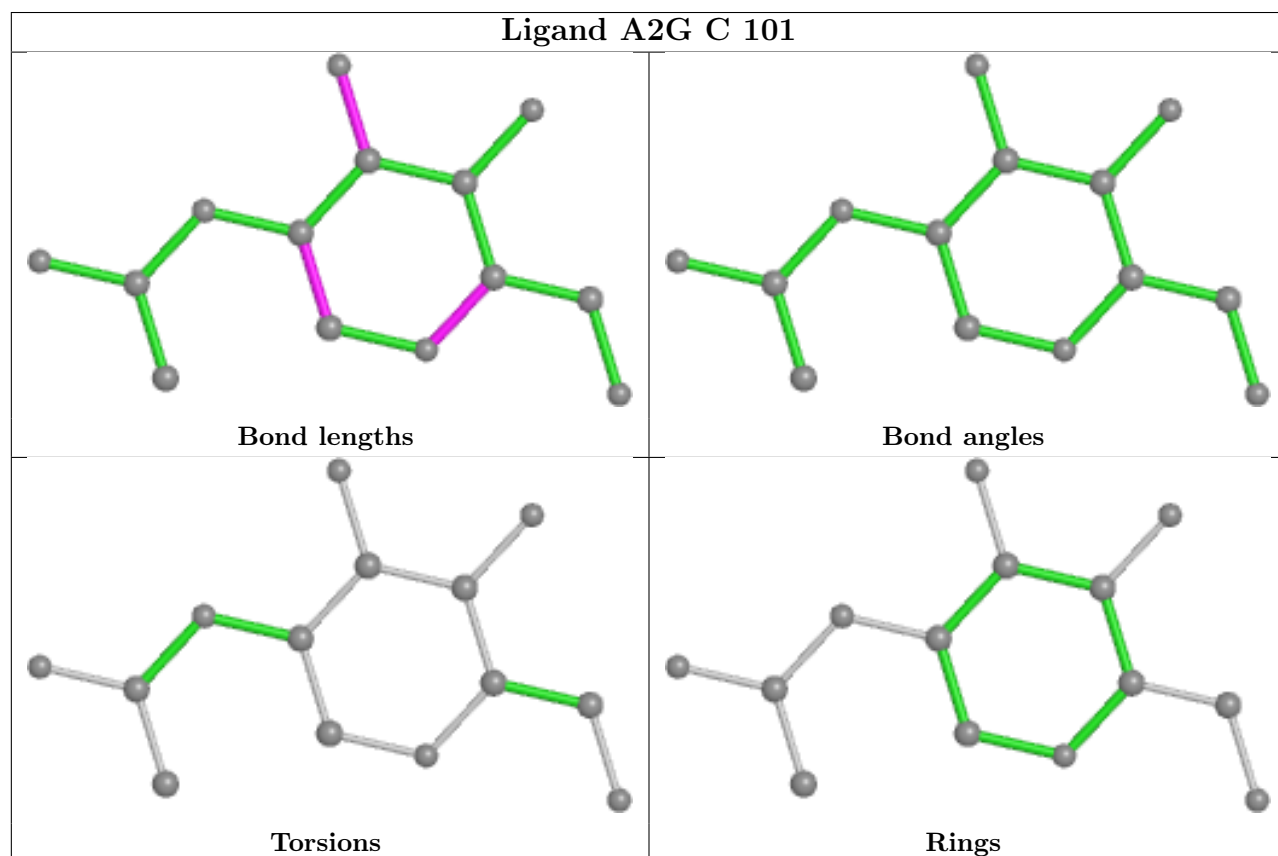
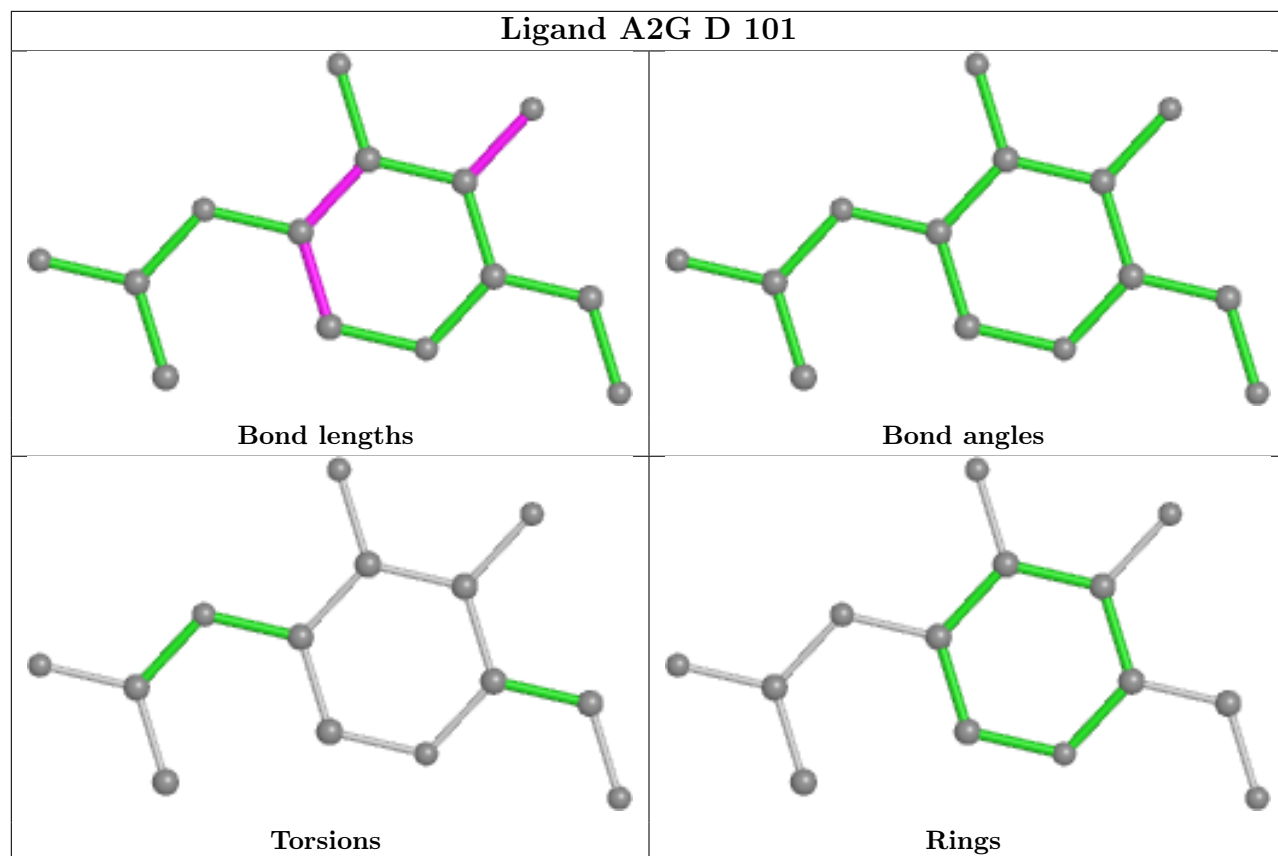
Mol	Chain	Res	Type	Atoms
3	B	701	GOL	O1-C1-C2-C3
3	B	701	GOL	C1-C2-C3-O3
3	B	701	GOL	O2-C2-C3-O3
3	B	701	GOL	O1-C1-C2-O2

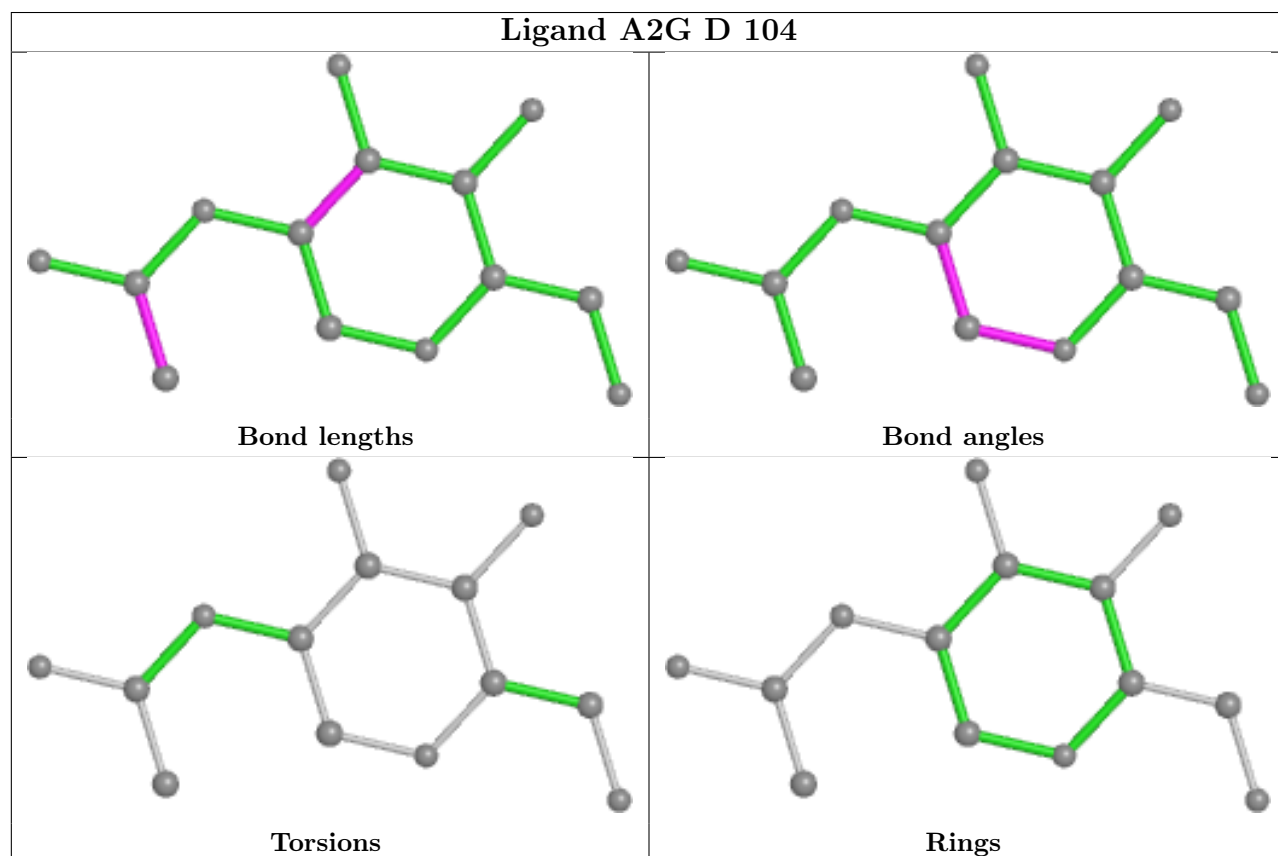
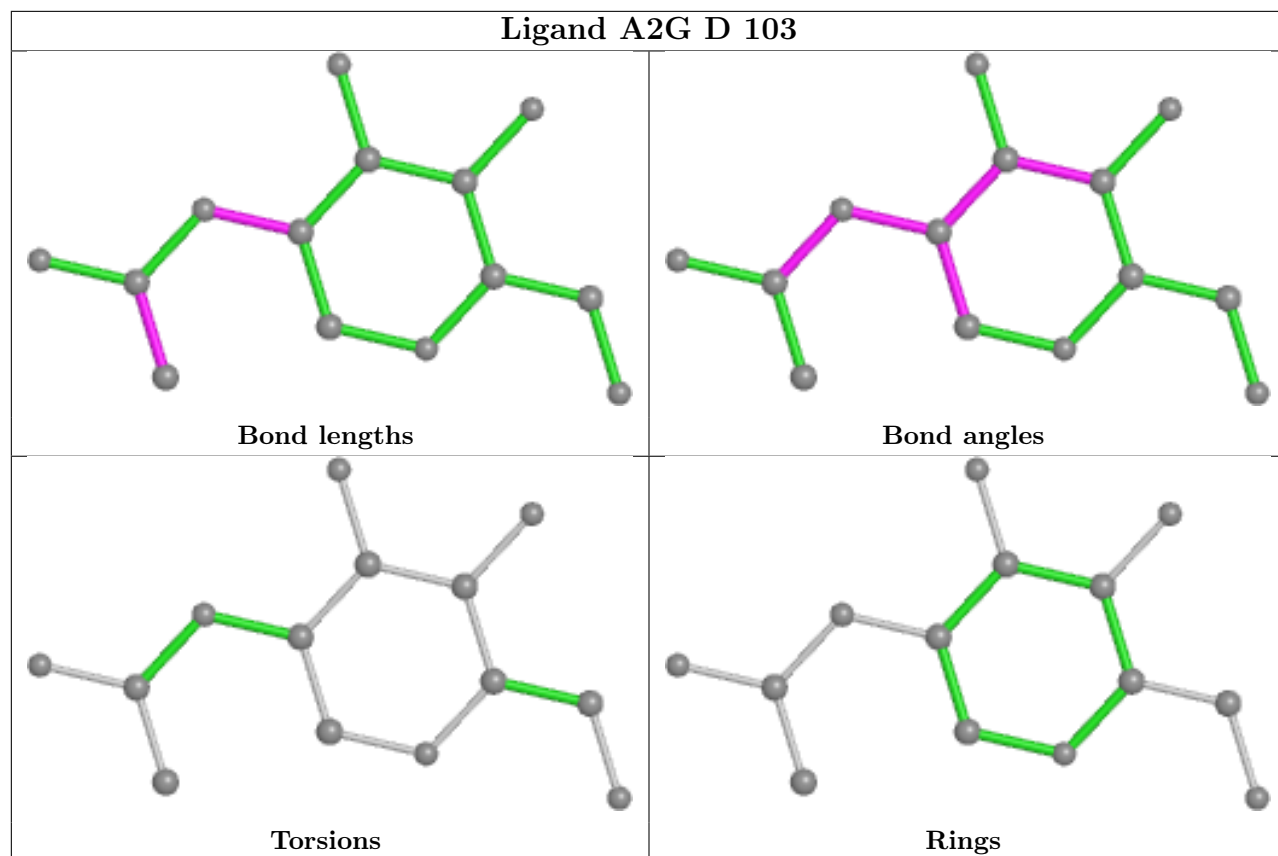
There are no ring outliers.

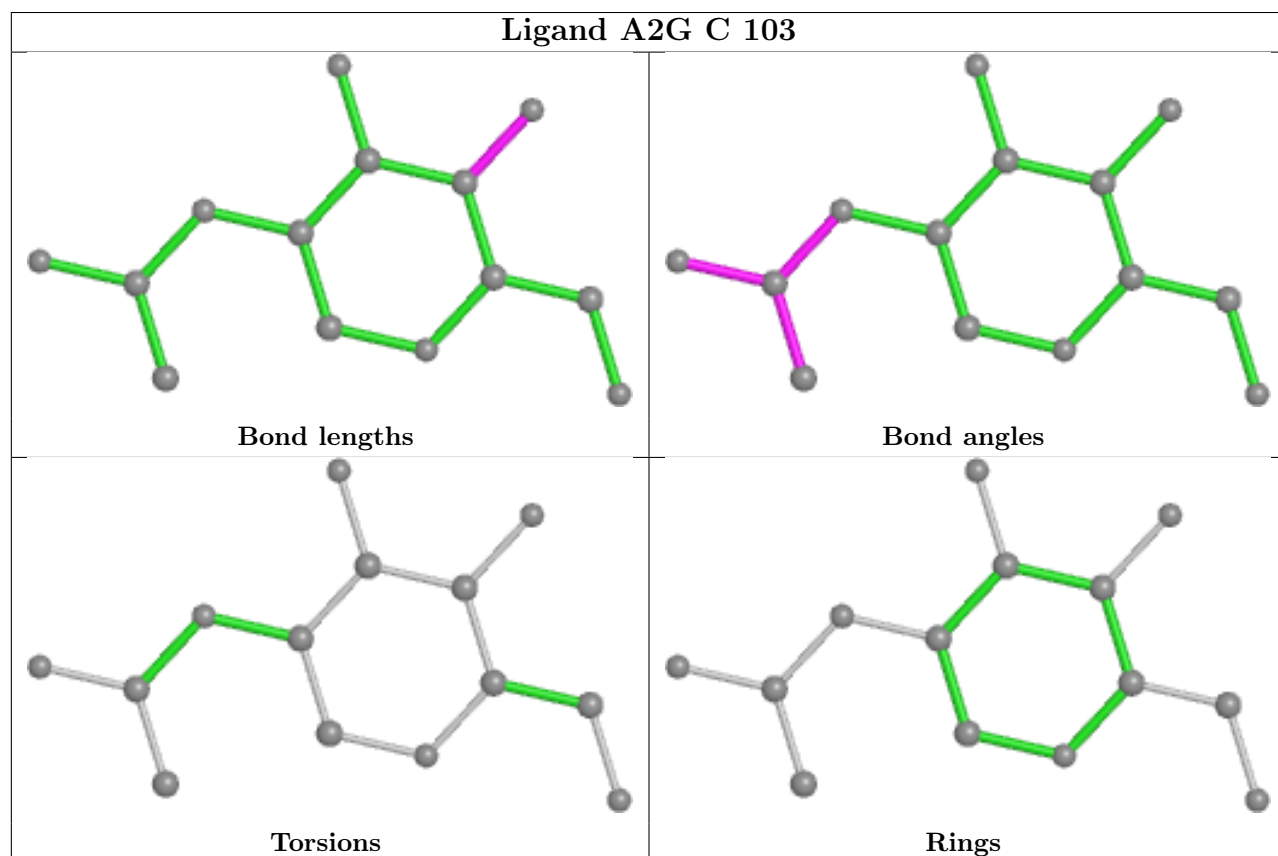
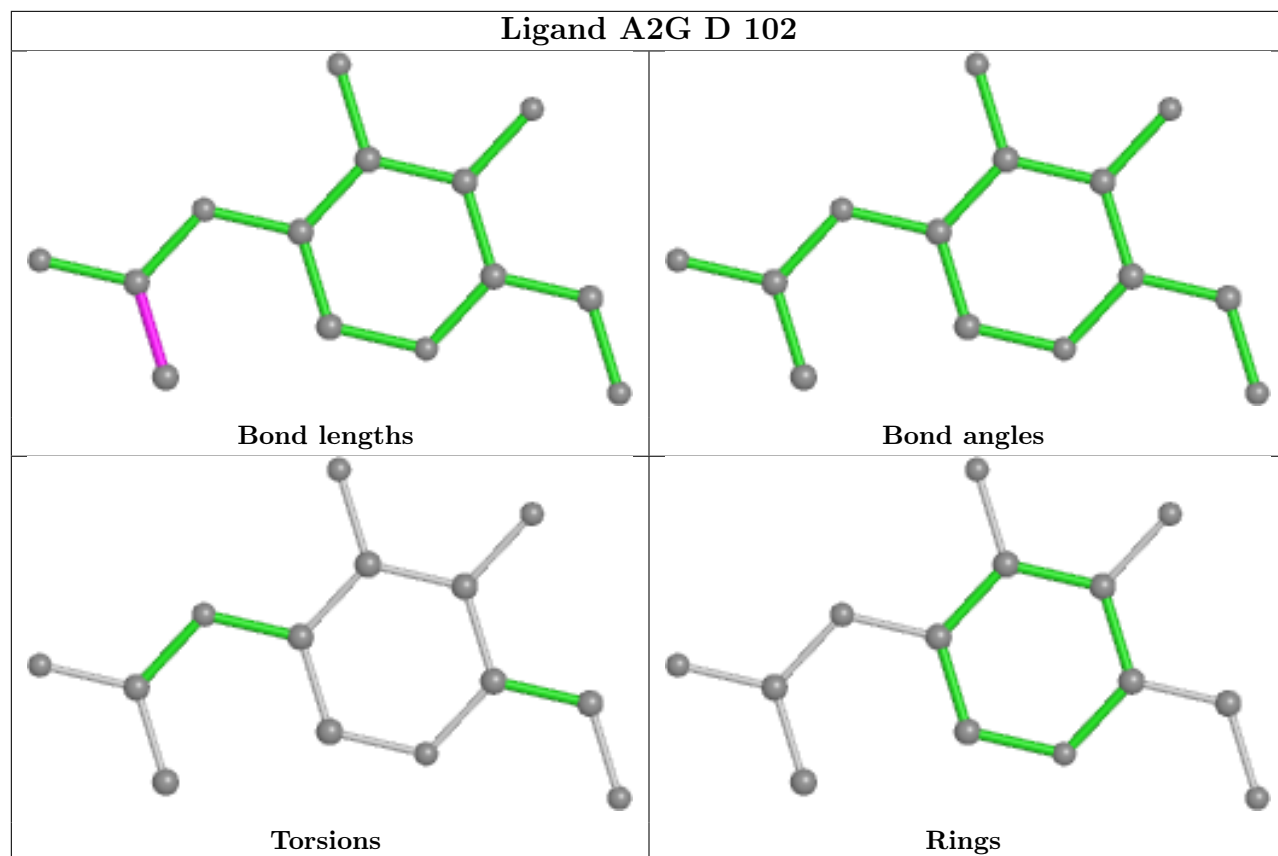
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	343/659 (52%)	0.18	17 (4%) 28 29	11, 18, 32, 56	0
1	B	342/659 (51%)	-0.01	7 (2%) 65 65	10, 15, 27, 40	0
2	C	10/15 (66%)	1.90	4 (40%) 0 0	17, 24, 32, 36	0
2	D	11/15 (73%)	1.27	3 (27%) 0 0	14, 19, 39, 39	0
All	All	706/1348 (52%)	0.13	31 (4%) 34 35	10, 16, 31, 56	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	377	SER	8.9
1	A	379	ASN	6.9
1	A	378	PRO	6.0
2	C	12	PRO	5.9
2	D	12	PRO	5.0
1	A	275	ASN	4.4
1	A	375	ASN	4.4
2	C	13	ALA	4.3
2	D	3	ALA	4.2
1	A	376	GLU	3.9
1	A	296	ASN	3.6
1	A	351	THR	3.6
1	A	130	GLY	3.5
2	C	10	PRO	3.0
1	A	203	LEU	3.0
1	A	352	ASN	2.9
2	C	11	ALA	2.9
1	A	282	ILE	2.7
1	B	377	SER	2.7
1	B	281	GLU	2.6
1	B	109	SER	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	281	GLU	2.4
1	A	298	LYS	2.4
2	D	4	ALA	2.2
1	B	263	ARG	2.1
1	A	348	SER	2.1
1	B	376	GLU	2.0
1	B	375	ASN	2.0
1	A	261	ASP	2.0
1	B	307	ASP	2.0
1	A	46	LYS	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.

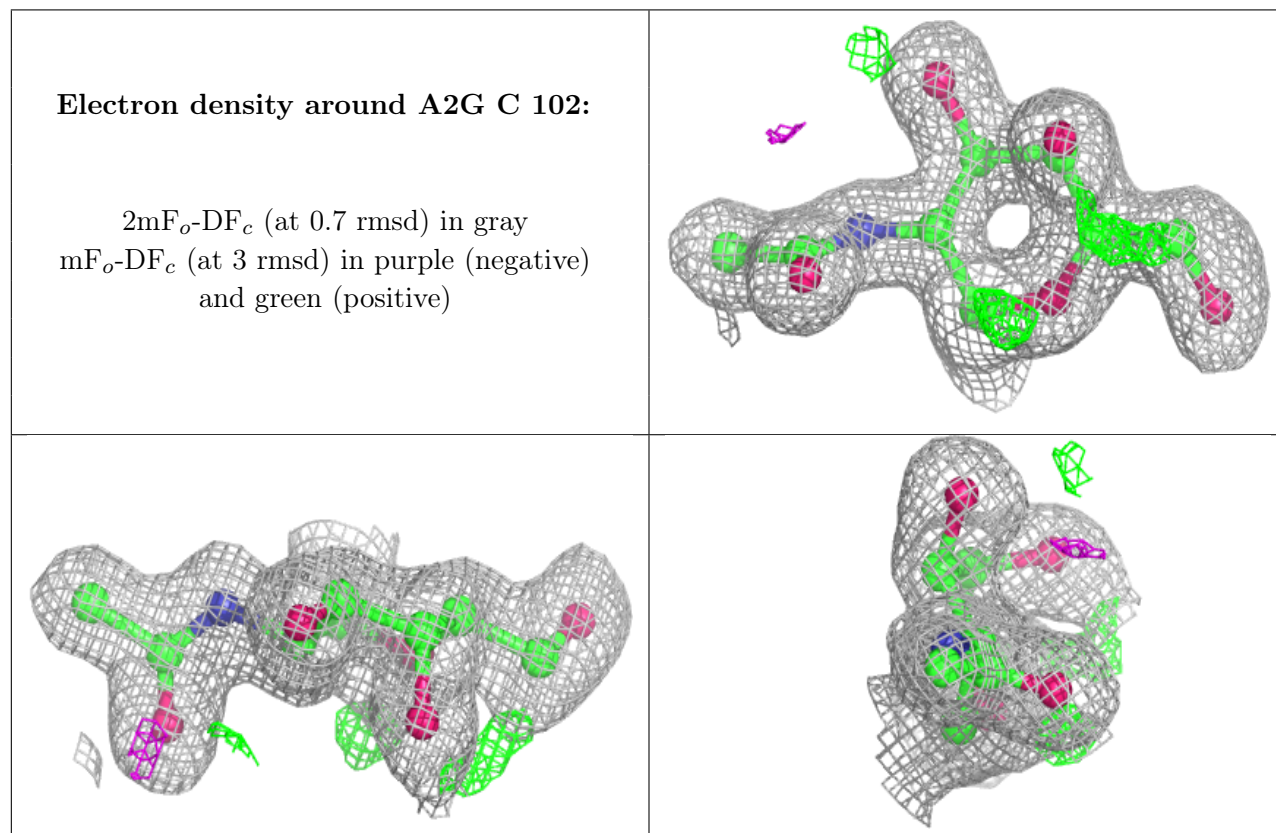
## 6.4 Ligands [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	GOL	B	701	6/6	0.62	0.23	28,34,35,41	0
3	GOL	A	701	6/6	0.85	0.12	19,23,27,28	0
5	A2G	C	102	14/15	0.90	0.11	16,20,27,29	0
5	A2G	C	103	14/15	0.91	0.14	20,24,27,31	0
5	A2G	D	102	14/15	0.92	0.10	14,16,20,21	0
5	A2G	D	103	14/15	0.93	0.09	12,14,18,19	0
5	A2G	C	104	14/15	0.94	0.08	16,17,24,25	0
5	A2G	C	101	14/15	0.96	0.07	14,16,17,17	0
5	A2G	D	104	14/15	0.96	0.09	15,16,18,18	0
5	A2G	D	101	14/15	0.97	0.06	13,13,15,15	0
4	ZN	A	702	1/1	0.99	0.04	13,13,13,13	0
4	ZN	A	703	1/1	0.99	0.04	15,15,15,15	0
4	ZN	A	704	1/1	1.00	0.06	17,17,17,17	0

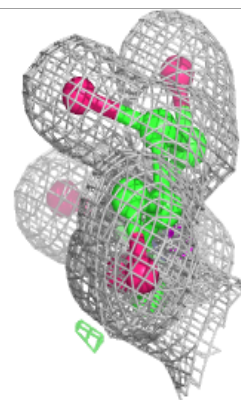
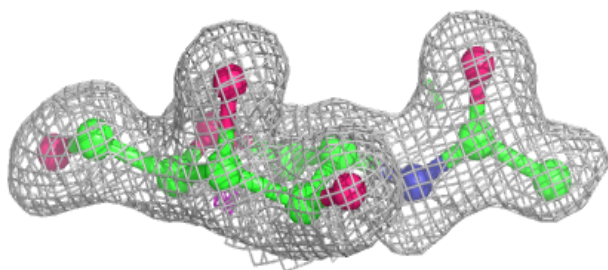
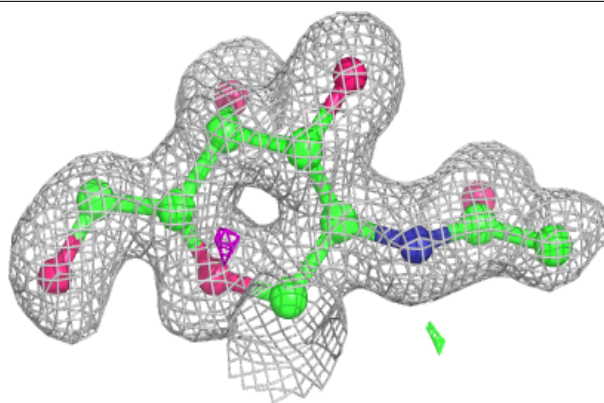


The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

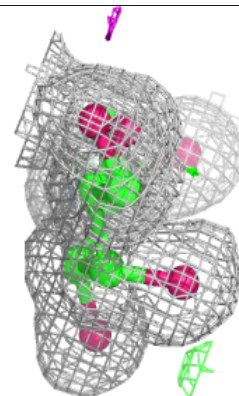
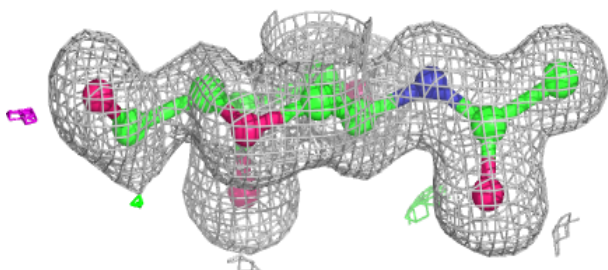
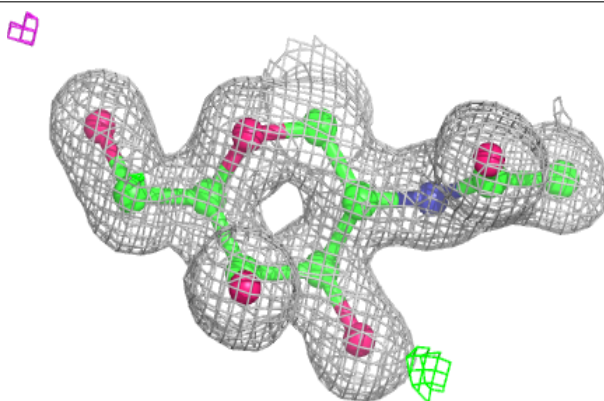


**Electron density around A2G C 103:**

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

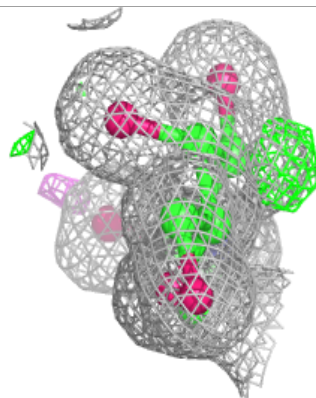
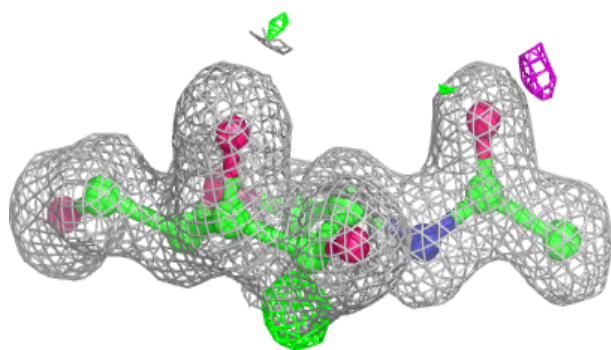
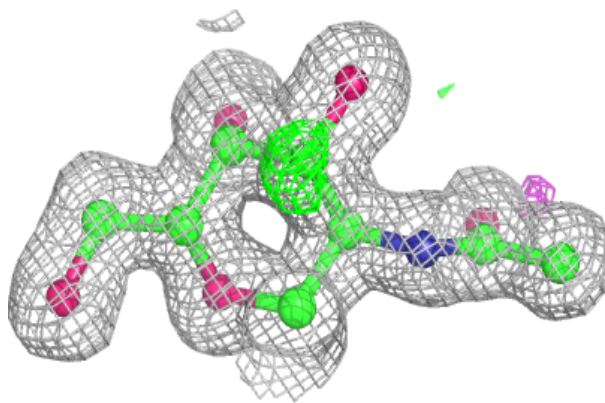
**Electron density around A2G D 102:**

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

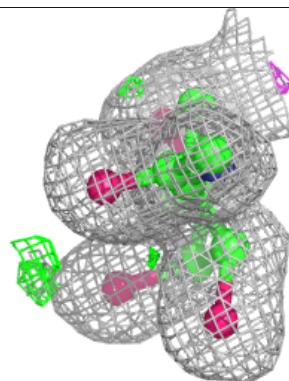
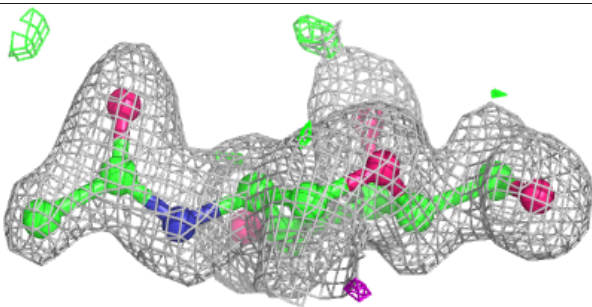
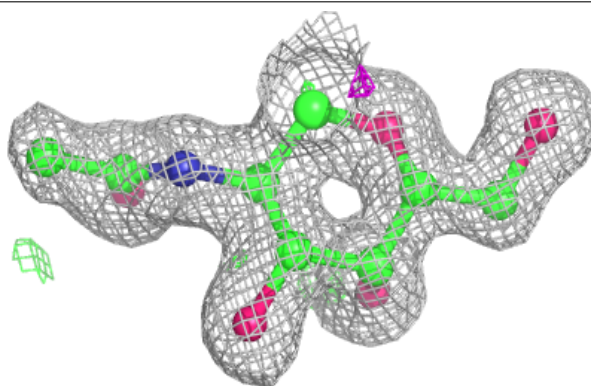


**Electron density around A2G D 103:**

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

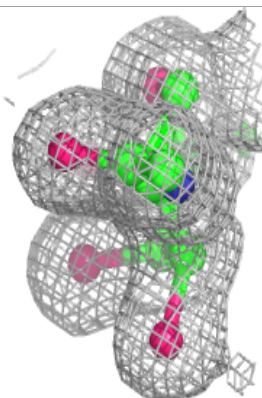
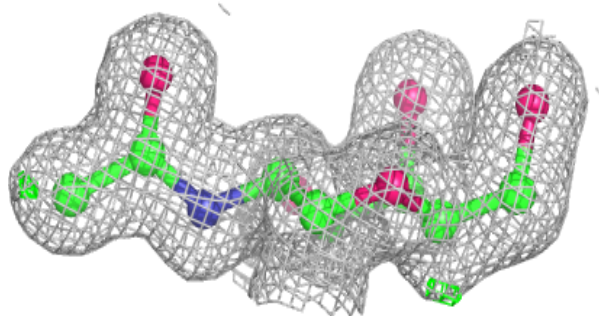
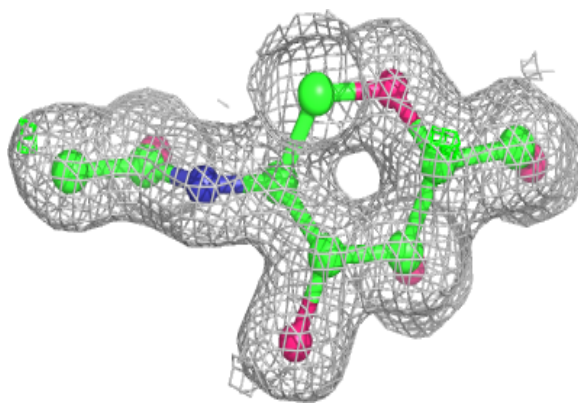
**Electron density around A2G C 104:**

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

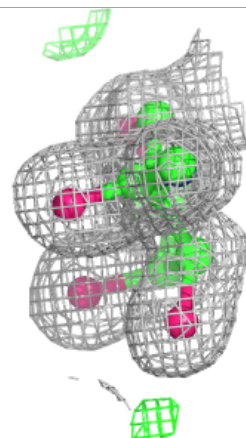
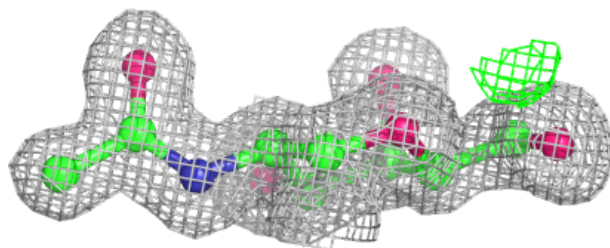
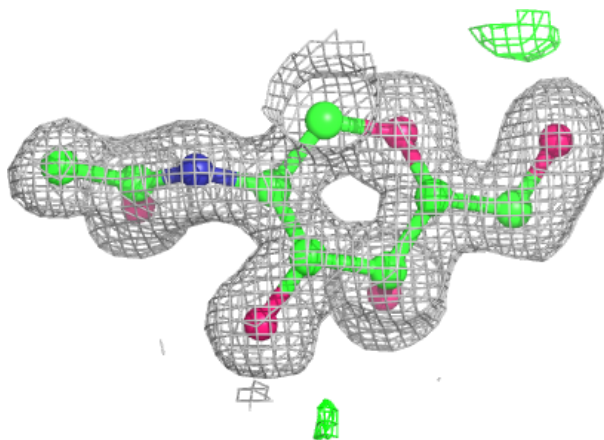


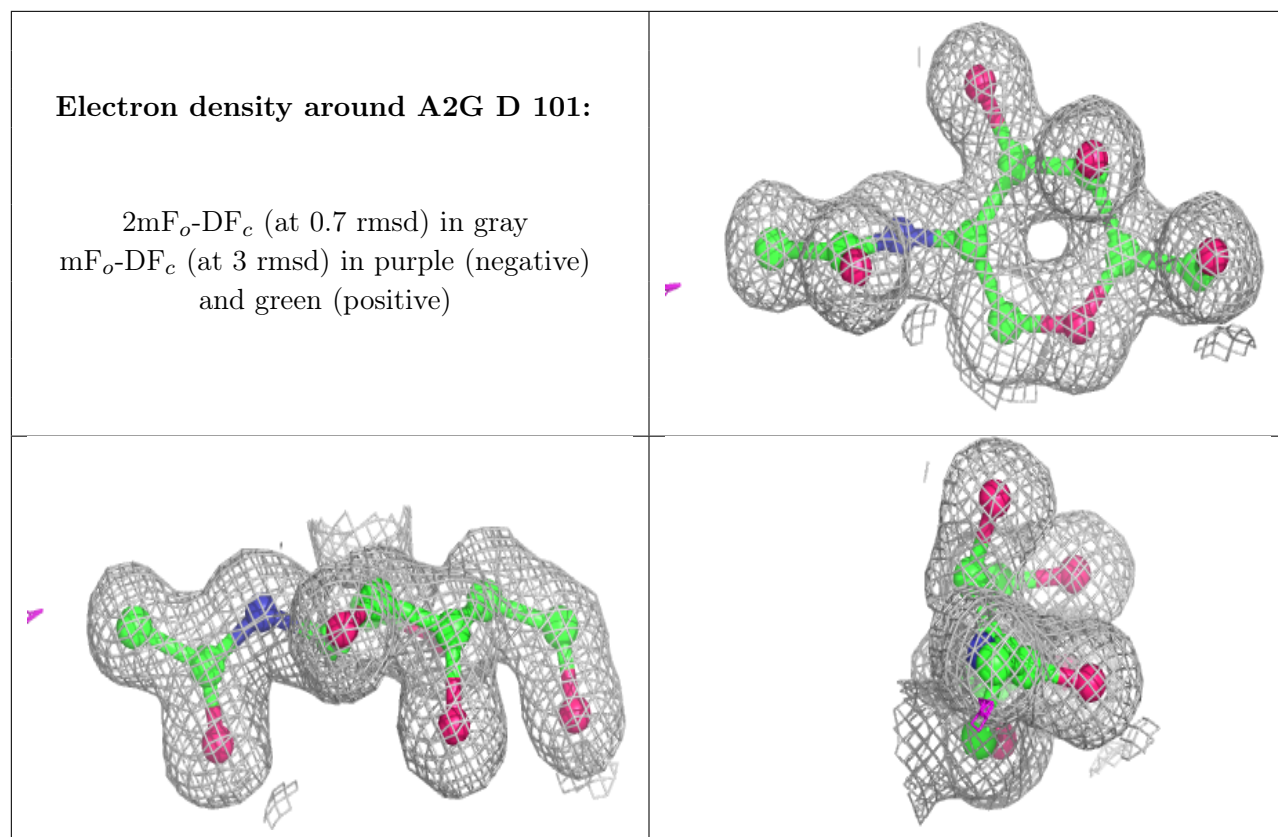
**Electron density around A2G C 101:**

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

**Electron density around A2G D 104:**

$2mF_o-DF_c$  (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.