



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2026 – 06:19 AM UTC

PDB ID : 8PXT / pdb_00008pxt
Title : Targeting extended blood antigens by Akkermansia muciniphila enzymes unveils a missing link for generating universal donor blood
Authors : Jensen, M.; Abou Hachem, M.; Morth, J.P.
Deposited on : 2023-07-24
Resolution : 2.25 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 Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

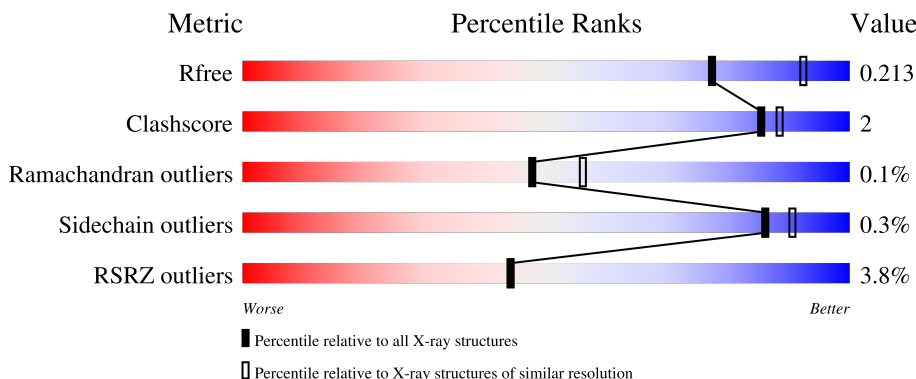
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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}	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	A	655	3% 92% 5%
1	B	655	5% 90% 7%
1	C	655	2% 93% .

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 30647 atoms, of which 14980 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 Beta-N-acetylhexosaminidase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	636	Total	C	H	N	O	S	0	0	0
			9980	3194	4962	879	928	17			
1	B	635	Total	C	H	N	O	S	0	0	0
			9974	3192	4960	878	927	17			
1	C	634	Total	C	H	N	O	S	0	0	0
			9957	3186	4953	875	926	17			

There are 30 discrepancies between the modelled and reference sequences:

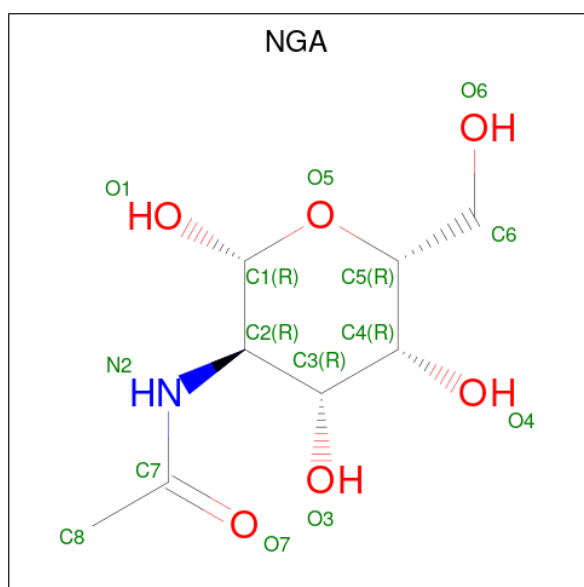
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP B2UN02
A	321	ALA	GLU	conflict	UNP B2UN02
A	648	LEU	-	expression tag	UNP B2UN02
A	649	GLU	-	expression tag	UNP B2UN02
A	650	HIS	-	expression tag	UNP B2UN02
A	651	HIS	-	expression tag	UNP B2UN02
A	652	HIS	-	expression tag	UNP B2UN02
A	653	HIS	-	expression tag	UNP B2UN02
A	654	HIS	-	expression tag	UNP B2UN02
A	655	HIS	-	expression tag	UNP B2UN02
B	1	MET	-	initiating methionine	UNP B2UN02
B	321	ALA	GLU	conflict	UNP B2UN02
B	648	LEU	-	expression tag	UNP B2UN02
B	649	GLU	-	expression tag	UNP B2UN02
B	650	HIS	-	expression tag	UNP B2UN02
B	651	HIS	-	expression tag	UNP B2UN02
B	652	HIS	-	expression tag	UNP B2UN02
B	653	HIS	-	expression tag	UNP B2UN02
B	654	HIS	-	expression tag	UNP B2UN02
B	655	HIS	-	expression tag	UNP B2UN02
C	1	MET	-	initiating methionine	UNP B2UN02
C	321	ALA	GLU	conflict	UNP B2UN02
C	648	LEU	-	expression tag	UNP B2UN02

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Chain	Residue	Modelled	Actual	Comment	Reference
C	649	GLU	-	expression tag	UNP B2UN02
C	650	HIS	-	expression tag	UNP B2UN02
C	651	HIS	-	expression tag	UNP B2UN02
C	652	HIS	-	expression tag	UNP B2UN02
C	653	HIS	-	expression tag	UNP B2UN02
C	654	HIS	-	expression tag	UNP B2UN02
C	655	HIS	-	expression tag	UNP B2UN02

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



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	A	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	A	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	B	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	B	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	C	1	Total 30	C 8	H 15	N 1	O 6	0	0
2	C	1	Total 30	C 8	H 15	N 1	O 6	0	0

- Molecule 3 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total 2	Na 2	0	0
3	C	2	Total 2	Na 2	0	0

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	1	Total 1	Cl 1	0	0

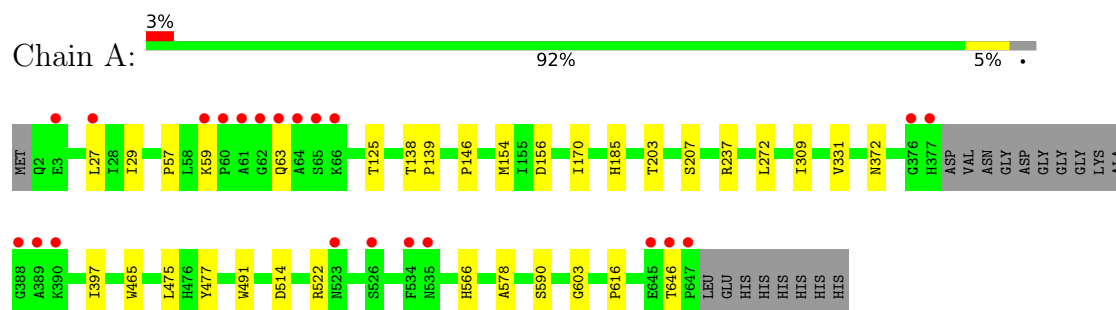
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	162	Total 162	O 162	0	0
5	B	167	Total 167	O 167	0	0
5	C	192	Total 192	O 192	0	0

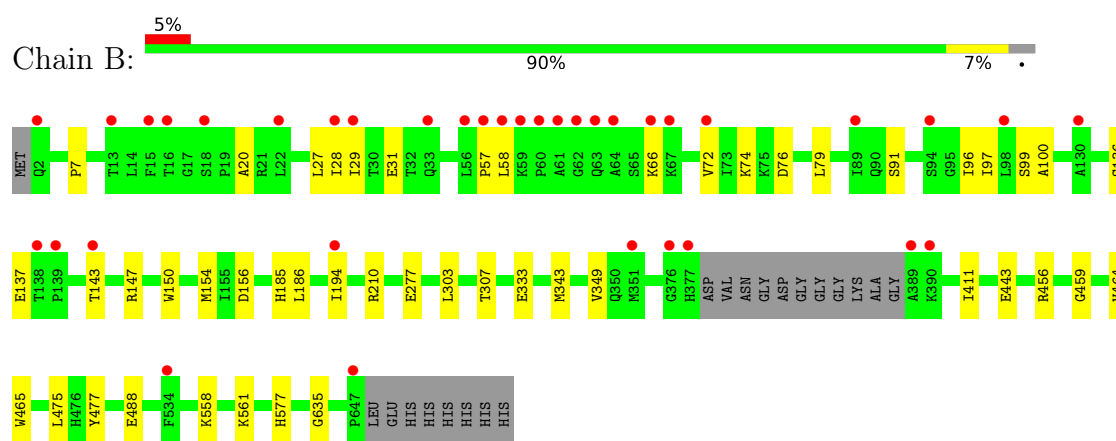
3 Residue-property plots [i](#)

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.

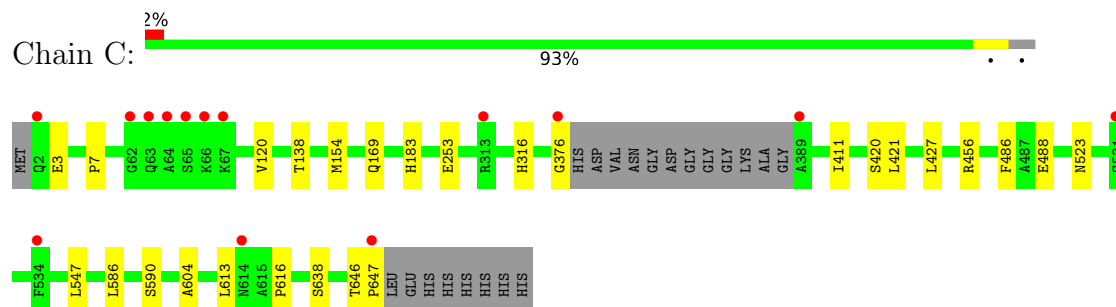
• Molecule 1: Beta-N-acetylhexosaminidase



• Molecule 1: Beta-N-acetylhexosaminidase



• Molecule 1: Beta-N-acetylhexosaminidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.23Å 169.06Å 171.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	62.32 – 2.25 62.32 – 2.25	Depositor EDS
% Data completeness (in resolution range)	100.0 (62.32-2.25) 100.0 (62.32-2.25)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.61 (at 2.25Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158, PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.180 , 0.210 0.182 , 0.213	Depositor DCC
R_{free} test set	6408 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	47.0	Xtriage
Anisotropy	0.352	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.43 , 42.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	30647	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.55% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NGA, CL, NA

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	0.14	0/5145	0.34	0/6965
1	B	0.13	0/5141	0.33	0/6960
1	C	0.14	0/5130	0.35	0/6945
All	All	0.14	0/15416	0.34	0/20870

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	A	5018	4962	4961	21	0
1	B	5014	4960	4959	31	1
1	C	5004	4953	4951	16	1
2	A	45	45	43	0	0
2	B	30	30	28	0	0
2	C	30	30	28	2	0
3	A	2	0	0	0	0
3	C	2	0	0	0	0
4	C	1	0	0	0	0
5	A	162	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	167	0	0	0	0
5	C	192	0	0	3	0
All	All	15667	14980	14970	66	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 2.

All (66) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186:LEU:CD1	1:B:194:ILE:HD11	2.20	0.70
1:B:186:LEU:HD13	1:B:194:ILE:HD11	1.75	0.69
1:C:120:VAL:HG23	5:C:975:HOH:O	1.93	0.67
1:B:29:ILE:HD11	1:B:72:VAL:HG22	1.77	0.65
1:A:566:HIS:ND1	1:A:646:THR:HG22	2.13	0.63
1:B:20:ALA:HB3	1:B:96:ILE:HD11	1.80	0.63
1:B:303:LEU:O	1:B:307:THR:HG23	1.98	0.63
1:B:343:MET:CE	1:B:349:VAL:HG22	2.32	0.59
1:C:411:ILE:HG23	1:C:456:ARG:HG3	1.87	0.56
1:A:170:ILE:HD11	1:A:475:LEU:CD2	2.37	0.55
1:B:154:MET:HE1	1:B:465:TRP:CE3	2.45	0.52
1:A:514:ASP:OD1	1:A:522:ARG:NH2	2.43	0.52
1:B:31:GLU:OE1	1:B:74:LYS:NZ	2.39	0.52
1:C:376:GLY:O	5:C:801:HOH:O	2.19	0.51
1:B:91:SER:HA	1:B:96:ILE:HD13	1.93	0.51
1:B:343:MET:HE3	1:B:349:VAL:HG22	1.93	0.50
1:C:547:LEU:HD11	1:C:638:SER:HB3	1.94	0.49
1:A:170:ILE:HD11	1:A:475:LEU:HD21	1.94	0.49
1:A:203:THR:O	1:A:207:SER:OG	2.19	0.49
1:B:411:ILE:HG23	1:B:456:ARG:HG3	1.95	0.48
1:B:343:MET:HE1	1:B:349:VAL:HG22	1.95	0.48
1:A:27:LEU:CD2	1:A:57:PRO:HG2	2.43	0.47
1:B:156:ASP:HA	1:B:185:HIS:HB3	1.97	0.47
1:C:7:PRO:HB3	1:C:488:GLU:HA	1.97	0.47
1:B:7:PRO:HB3	1:B:488:GLU:HA	1.97	0.47
1:A:63:GLN:OE1	1:A:63:GLN:N	2.49	0.46
1:B:154:MET:HE1	1:B:465:TRP:CD2	2.52	0.45
1:B:79:LEU:HD13	1:B:100:ALA:HA	1.99	0.44
1:A:138:THR:HB	1:A:139:PRO:HD2	1.99	0.43
1:A:154:MET:HE1	1:A:465:TRP:CD2	2.53	0.43
1:B:186:LEU:HD12	1:B:194:ILE:HD11	1.96	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:464:VAL:HG11	1:B:475:LEU:HD12	1.99	0.43
1:C:253:GLU:HA	1:C:316:HIS:O	2.18	0.43
1:C:586:LEU:HB2	1:C:613:LEU:HD13	2.00	0.43
1:A:154:MET:HE1	1:A:465:TRP:CE3	2.53	0.43
1:B:76:ASP:HB3	1:B:79:LEU:HD12	2.00	0.43
1:B:27:LEU:HD23	1:B:57:PRO:HD2	2.01	0.42
1:A:29:ILE:HA	1:A:59:LYS:O	2.19	0.42
2:C:702:NGA:O7	2:C:702:NGA:H1	2.19	0.42
1:A:237:ARG:NH1	1:A:309:ILE:HG22	2.34	0.42
1:A:578:ALA:HB2	1:A:603:GLY:HA3	2.01	0.42
1:C:523:ASN:OD1	5:C:802:HOH:O	2.22	0.42
1:B:66:LYS:N	1:B:66:LYS:HD3	2.35	0.42
1:C:154:MET:HA	1:C:183:HIS:O	2.20	0.42
1:A:170:ILE:HD11	1:A:475:LEU:HD23	2.02	0.42
1:A:616:PRO:HB3	1:B:477:TYR:CE1	2.55	0.42
1:A:156:ASP:HA	1:A:185:HIS:HB3	2.01	0.41
1:A:272:LEU:HD13	1:A:331:VAL:HG11	2.01	0.41
1:B:464:VAL:HG11	1:B:475:LEU:CD1	2.50	0.41
1:C:427:LEU:HD21	1:C:486:PHE:HE2	1.85	0.41
1:C:154:MET:HG3	1:C:183:HIS:CG	2.55	0.41
1:A:372:ASN:HA	1:A:397:ILE:HG23	2.02	0.41
1:A:146:PRO:HB3	1:A:491:TRP:CE3	2.56	0.41
1:B:154:MET:HE1	1:B:465:TRP:CZ3	2.56	0.41
1:C:420:SER:O	1:C:421:LEU:C	2.63	0.41
1:A:477:TYR:CE1	1:C:616:PRO:HB3	2.55	0.41
1:B:210:ARG:NH1	1:B:277:GLU:OE2	2.53	0.41
1:B:558:LYS:O	1:B:561:LYS:HE3	2.21	0.41
1:B:577:HIS:CE1	1:B:635:GLY:HA3	2.56	0.41
1:C:604:ALA:H	2:C:701:NGA:H81	1.86	0.41
1:A:125:THR:HB	1:C:138:THR:HG22	2.03	0.40
1:B:147:ARG:NH2	1:B:443:GLU:OE2	2.52	0.40
1:B:150:TRP:O	1:B:459:GLY:HA3	2.22	0.40
1:C:646:THR:HB	1:C:647:PRO:CD	2.52	0.40
1:B:136:SER:OG	1:B:137:GLU:N	2.43	0.40
1:B:28:ILE:O	1:B:58:LEU:HA	2.21	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)
1:B:333:GLU:OE2	1:C:590:SER:OG[3_645]	2.18	0.02

5.3 Torsion angles

5.3.1 Protein backbone

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	632/655 (96%)	613 (97%)	19 (3%)	0	100	100
1	B	631/655 (96%)	613 (97%)	18 (3%)	0	100	100
1	C	630/655 (96%)	614 (98%)	15 (2%)	1 (0%)	43	50
All	All	1893/1965 (96%)	1840 (97%)	52 (3%)	1 (0%)	48	56

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	3	GLU

5.3.2 Protein sidechains

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	527/541 (97%)	526 (100%)	1 (0%)	87	92
1	B	527/541 (97%)	524 (99%)	3 (1%)	78	84
1	C	526/541 (97%)	525 (100%)	1 (0%)	87	92
All	All	1580/1623 (97%)	1575 (100%)	5 (0%)	86	90

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	590	SER
1	B	97	ILE

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Mol	Chain	Res	Type
1	B	99	SER
1	B	143	THR
1	C	169	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	169	GLN
1	A	377	HIS
1	A	478	GLN
1	A	610	GLN
1	B	341	ASN
1	B	527	GLN
1	B	620	GLN
1	C	341	ASN
1	C	610	GLN
1	C	639	HIS

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](#)

Of 12 ligands modelled in this entry, 5 are monoatomic - leaving 7 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	$\# Z > 2$
2	NGA	A	702	-	15,15,15	1.88	4 (26%)	21,21,21	1.60	4 (19%)
2	NGA	A	703	-	15,15,15	1.95	4 (26%)	21,21,21	1.40	3 (14%)
2	NGA	C	702	-	15,15,15	1.89	4 (26%)	21,21,21	1.25	4 (19%)
2	NGA	C	701	-	15,15,15	1.87	4 (26%)	21,21,21	1.25	3 (14%)
2	NGA	B	701	-	15,15,15	1.83	4 (26%)	21,21,21	0.98	1 (4%)
2	NGA	B	702	-	15,15,15	1.78	4 (26%)	21,21,21	1.16	3 (14%)
2	NGA	A	701	-	15,15,15	1.81	4 (26%)	21,21,21	1.26	2 (9%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NGA	A	702	-	-	2/6/26/26	0/1/1/1
2	NGA	A	703	-	-	1/6/26/26	0/1/1/1
2	NGA	C	702	-	-	2/6/26/26	0/1/1/1
2	NGA	C	701	-	-	1/6/26/26	0/1/1/1
2	NGA	B	701	-	-	2/6/26/26	0/1/1/1
2	NGA	B	702	-	-	2/6/26/26	0/1/1/1
2	NGA	A	701	-	-	2/6/26/26	0/1/1/1

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	701	NGA	C7-N2	4.02	1.47	1.34
2	C	702	NGA	C7-N2	4.02	1.47	1.34
2	B	701	NGA	C7-N2	3.94	1.47	1.34
2	A	703	NGA	C7-N2	3.94	1.47	1.34
2	A	702	NGA	C7-N2	3.89	1.46	1.34
2	A	701	NGA	C7-N2	3.84	1.46	1.34
2	B	702	NGA	C7-N2	3.78	1.46	1.34
2	C	702	NGA	C2-N2	3.74	1.51	1.45
2	A	703	NGA	O5-C1	3.50	1.51	1.42
2	A	703	NGA	C2-N2	3.35	1.51	1.45
2	C	701	NGA	O5-C1	3.33	1.51	1.42
2	B	701	NGA	O5-C1	3.33	1.51	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	702	NGA	C2-N2	3.27	1.50	1.45
2	A	702	NGA	O5-C1	3.22	1.50	1.42
2	A	701	NGA	O5-C1	3.15	1.50	1.42
2	B	702	NGA	C2-N2	3.11	1.50	1.45
2	A	701	NGA	C2-N2	3.05	1.50	1.45
2	C	702	NGA	O5-C1	3.02	1.50	1.42
2	B	702	NGA	O5-C1	2.90	1.50	1.42
2	B	701	NGA	C2-N2	2.80	1.50	1.45
2	C	701	NGA	C2-N2	2.75	1.50	1.45
2	C	701	NGA	C3-C2	-2.46	1.48	1.53
2	A	703	NGA	C3-C2	-2.43	1.48	1.53
2	A	702	NGA	C3-C2	-2.30	1.48	1.53
2	B	701	NGA	C3-C2	-2.13	1.49	1.53
2	A	701	NGA	C3-C2	-2.13	1.49	1.53
2	B	702	NGA	C3-C2	-2.10	1.49	1.53
2	C	702	NGA	O7-C7	-2.04	1.18	1.23

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	702	NGA	C3-C4-C5	4.47	118.33	110.23
2	A	703	NGA	O5-C1-C2	4.07	113.61	109.52
2	A	701	NGA	O5-C1-C2	3.81	113.34	109.52
2	A	702	NGA	C4-C3-C2	3.24	115.11	110.40
2	A	702	NGA	O5-C5-C4	2.74	114.63	109.70
2	C	702	NGA	C8-C7-N2	2.64	120.49	116.12
2	C	701	NGA	O5-C5-C4	2.56	114.31	109.70
2	A	703	NGA	O5-C5-C4	2.52	114.25	109.70
2	C	702	NGA	O5-C1-C2	2.44	111.97	109.52
2	B	702	NGA	C1-O5-C5	-2.38	109.05	113.65
2	C	702	NGA	O7-C7-C8	-2.37	117.84	122.05
2	C	701	NGA	C8-C7-N2	2.22	119.80	116.12
2	C	702	NGA	C1-O5-C5	-2.15	109.48	113.65
2	B	701	NGA	C8-C7-N2	2.13	119.64	116.12
2	C	701	NGA	C1-C2-C3	-2.12	107.65	110.54
2	A	703	NGA	C3-C4-C5	2.12	114.07	110.23
2	A	701	NGA	C1-C2-C3	2.09	113.39	110.54
2	B	702	NGA	C1-C2-N2	-2.08	108.32	110.73
2	B	702	NGA	C1-C2-C3	2.03	113.31	110.54
2	A	702	NGA	O4-C4-C3	-2.01	105.65	110.38

There are no chirality outliers.

All (12) torsion outliers are listed below:

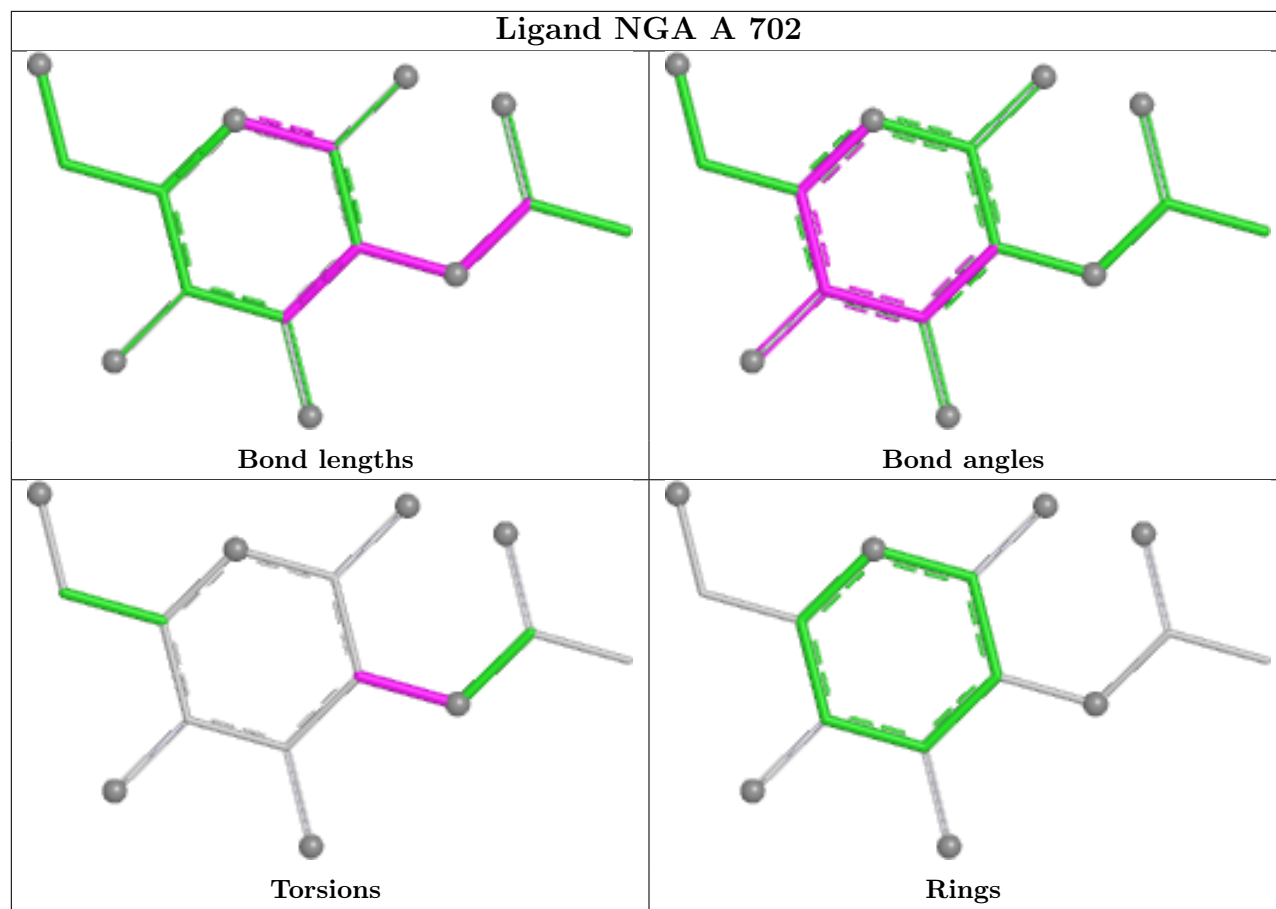
Mol	Chain	Res	Type	Atoms
2	A	703	NGA	C3-C2-N2-C7
2	C	702	NGA	C1-C2-N2-C7
2	B	701	NGA	C4-C5-C6-O6
2	B	701	NGA	O5-C5-C6-O6
2	C	701	NGA	O5-C5-C6-O6
2	A	702	NGA	C3-C2-N2-C7
2	B	702	NGA	C3-C2-N2-C7
2	A	701	NGA	C1-C2-N2-C7
2	B	702	NGA	C1-C2-N2-C7
2	A	701	NGA	C3-C2-N2-C7
2	C	702	NGA	C3-C2-N2-C7
2	A	702	NGA	C1-C2-N2-C7

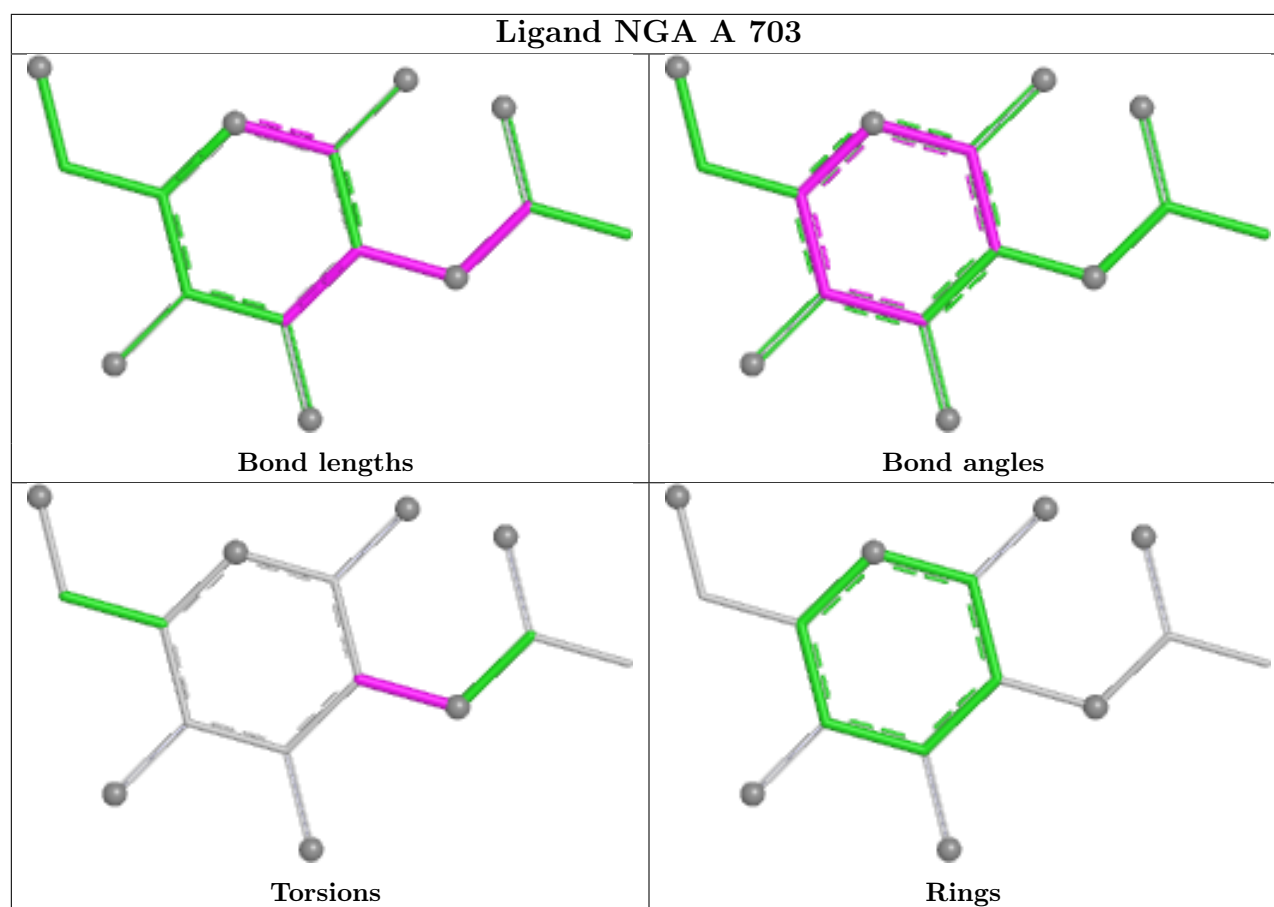
There are no ring outliers.

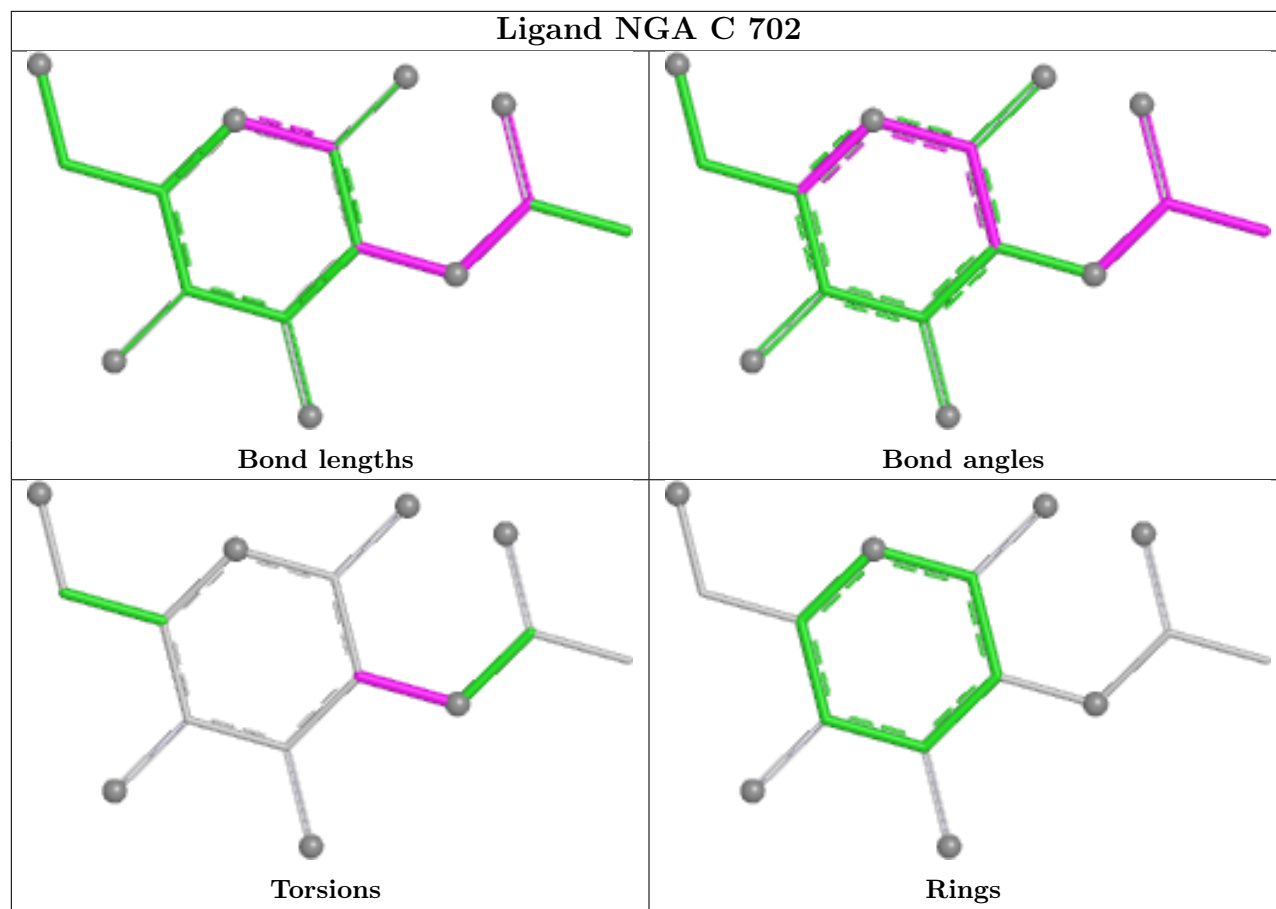
2 monomers are involved in 2 short contacts:

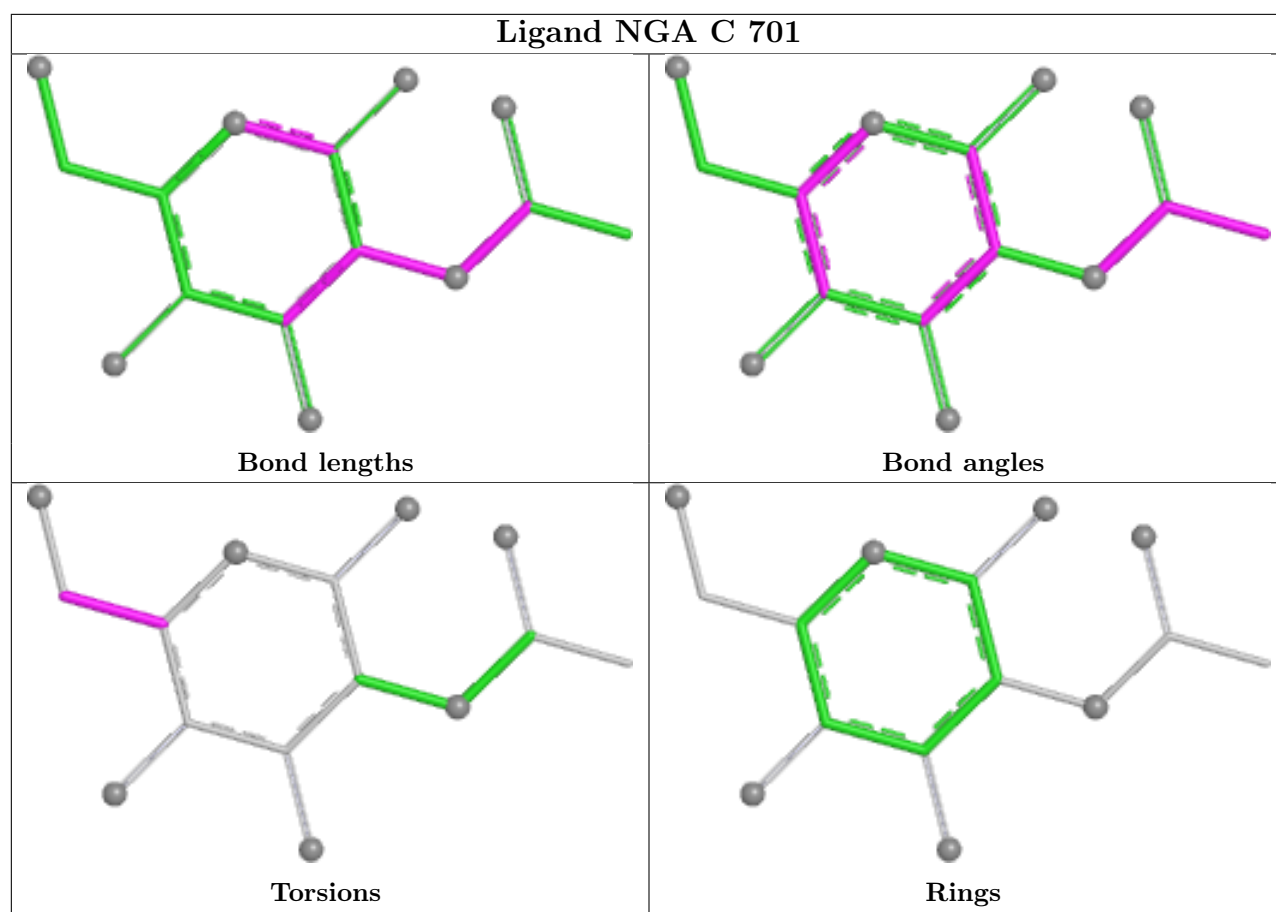
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	702	NGA	1	0
2	C	701	NGA	1	0

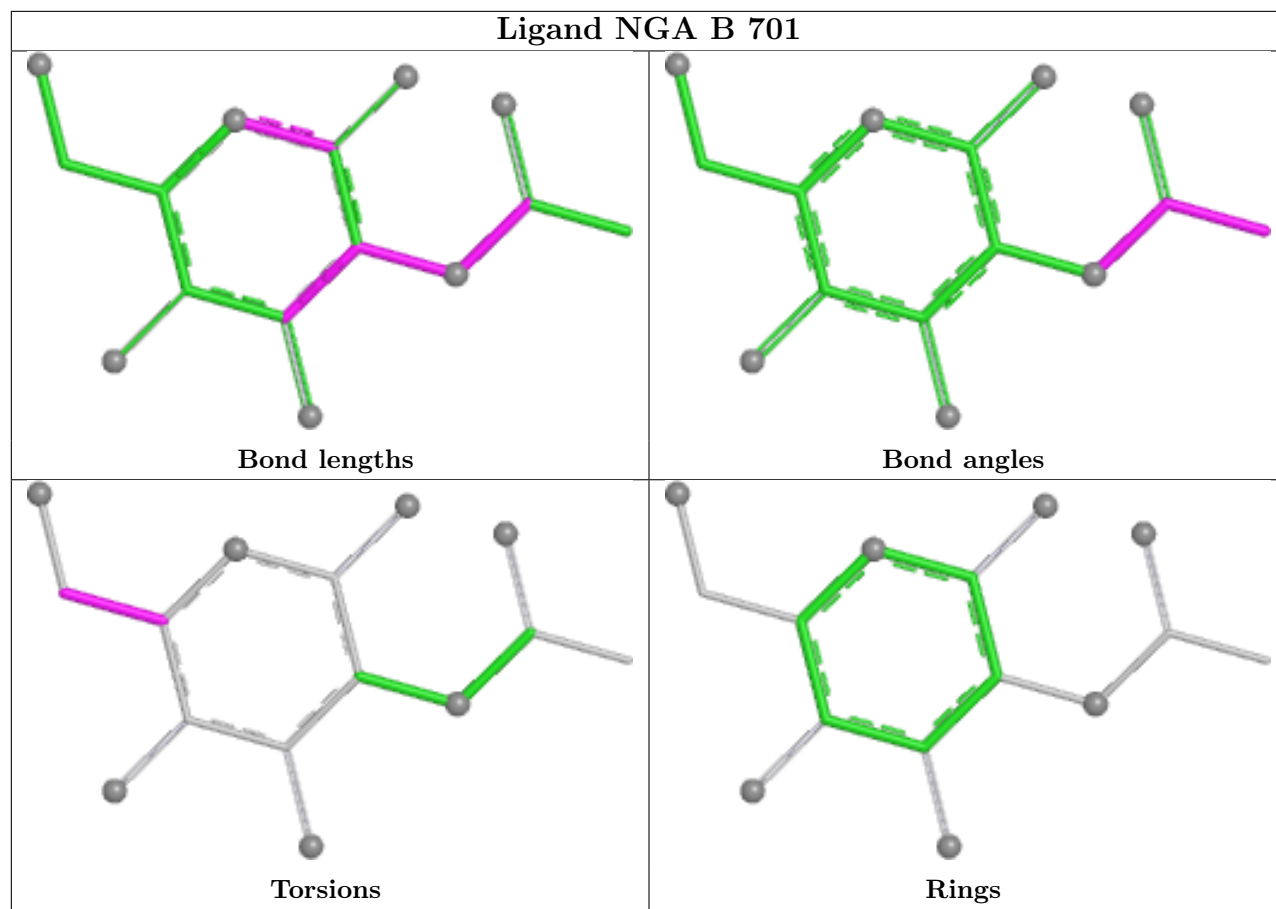
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

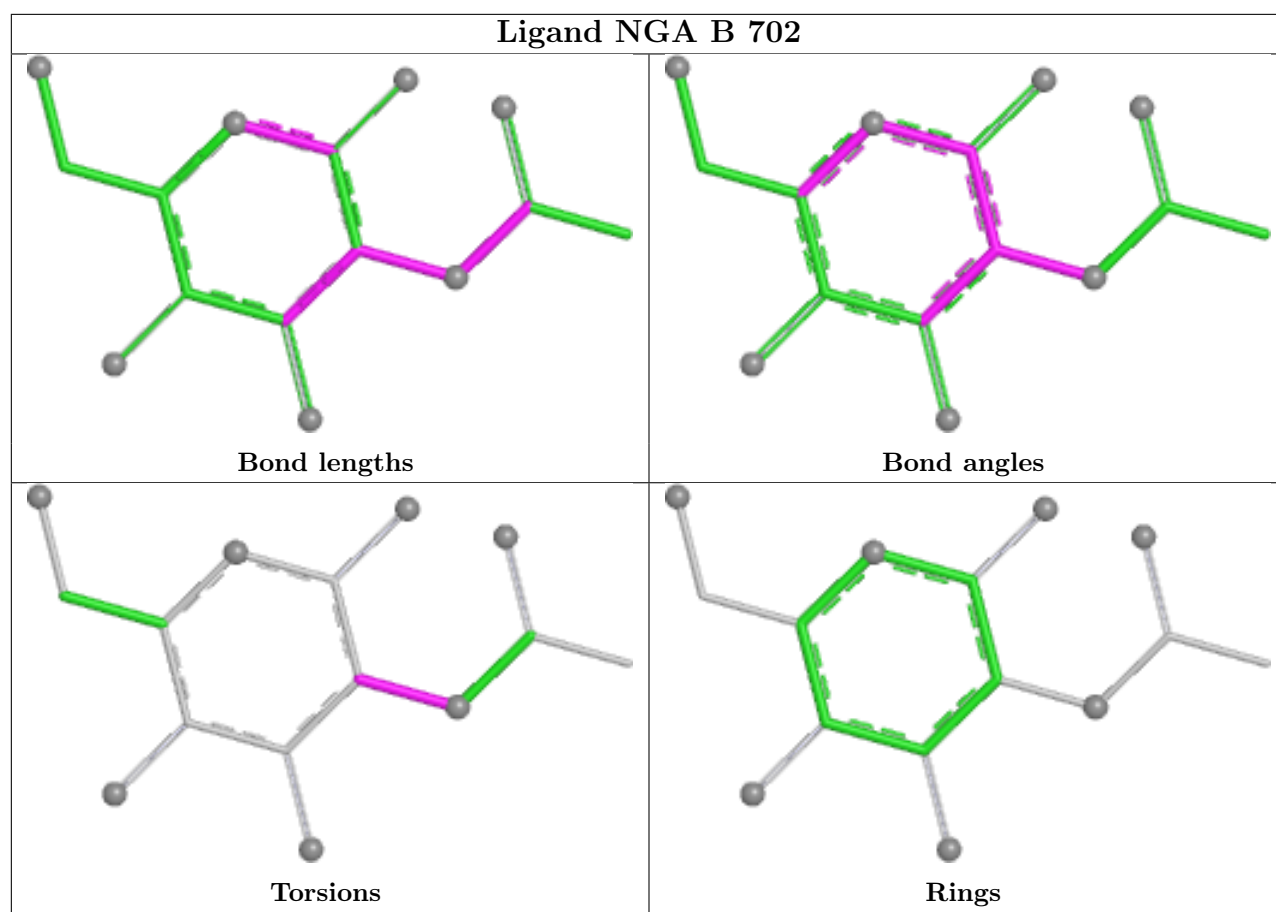


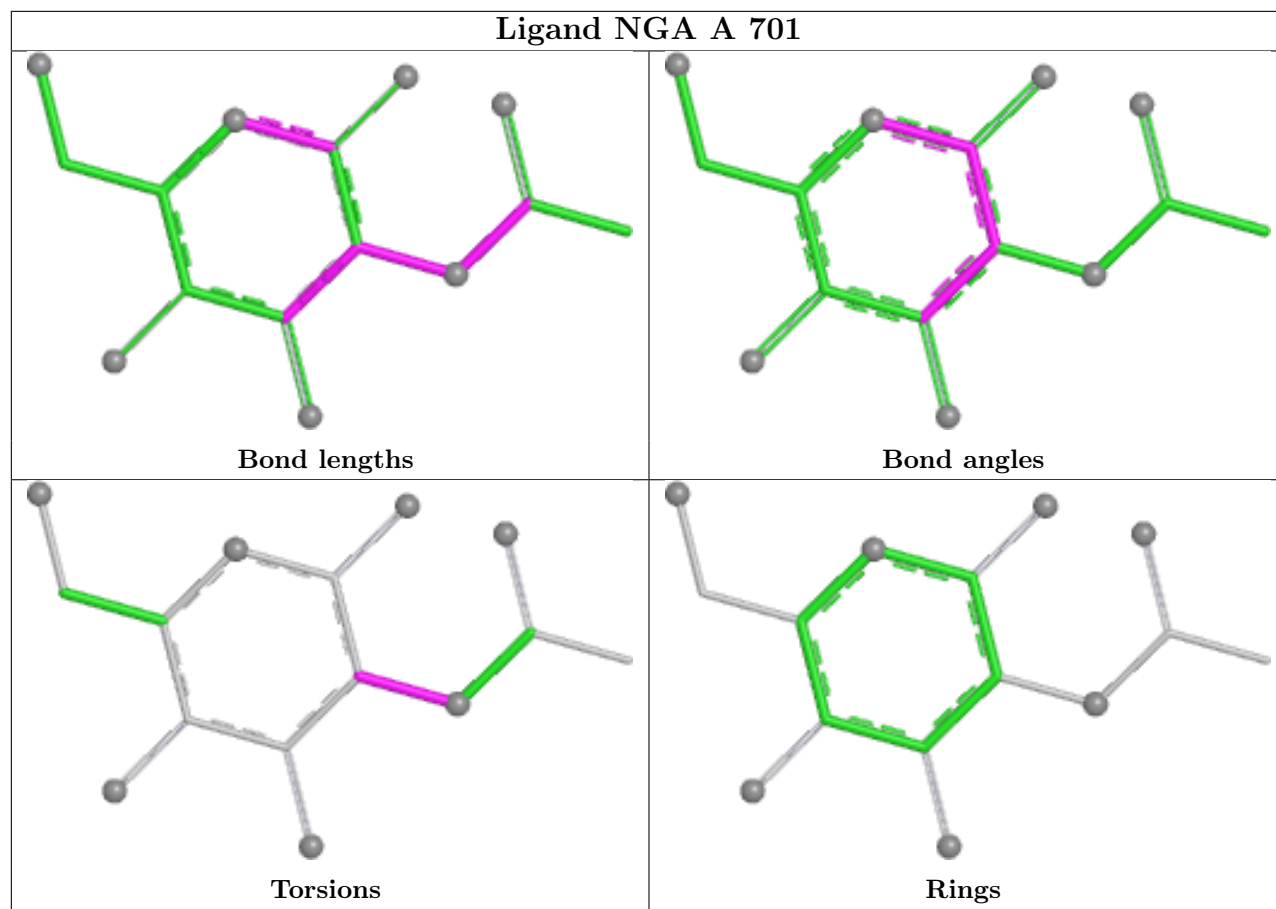












5.7 Other polymers [i](#)

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	A	636/655 (97%)	0.04	22 (3%) 47 47	39, 59, 101, 172	0
1	B	635/655 (96%)	0.12	36 (5%) 29 27	40, 63, 115, 171	0
1	C	634/655 (96%)	-0.13	14 (2%) 62 63	38, 53, 86, 143	0
All	All	1905/1965 (96%)	0.01	72 (3%) 44 44	38, 58, 105, 172	0

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	647	PRO	6.4
1	C	534	PHE	6.3
1	A	64	ALA	6.1
1	A	389	ALA	5.9
1	A	377	HIS	5.9
1	B	377	HIS	5.5
1	A	60	PRO	5.5
1	A	62	GLY	5.2
1	A	61	ALA	5.1
1	B	64	ALA	5.1
1	B	389	ALA	4.9
1	C	389	ALA	4.8
1	B	60	PRO	4.6
1	A	534	PHE	4.5
1	A	65	SER	4.0
1	B	2	GLN	4.0
1	C	376	GLY	3.8
1	B	61	ALA	3.7
1	B	62	GLY	3.6
1	A	390	LYS	3.5
1	A	646	THR	3.5
1	A	388	GLY	3.4
1	A	66	LYS	3.3

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Mol	Chain	Res	Type	RSRZ
1	C	67	LYS	3.3
1	C	66	LYS	3.1
1	C	64	ALA	3.1
1	B	15	PHE	3.0
1	C	647	PRO	3.0
1	B	22	LEU	3.0
1	A	523	ASN	2.9
1	B	376	GLY	2.9
1	B	534	PHE	2.9
1	C	313	ARG	2.8
1	C	62	GLY	2.8
1	A	645	GLU	2.8
1	B	647	PRO	2.8
1	B	94	SER	2.8
1	A	27	LEU	2.8
1	A	63	GLN	2.7
1	A	376	GLY	2.7
1	C	63	GLN	2.7
1	B	98	LEU	2.6
1	B	143	THR	2.6
1	B	351	MET	2.6
1	C	2	GLN	2.5
1	A	3	GLU	2.5
1	B	56	LEU	2.5
1	A	535	ASN	2.5
1	B	59	LYS	2.5
1	B	194	ILE	2.4
1	B	29	ILE	2.3
1	B	66	LYS	2.3
1	C	65	SER	2.3
1	B	33	GLN	2.3
1	B	138	THR	2.2
1	B	63	GLN	2.2
1	B	28	ILE	2.2
1	B	72	VAL	2.2
1	B	139	PRO	2.2
1	B	16	THR	2.2
1	B	18	SER	2.2
1	B	58	LEU	2.2
1	B	67	LYS	2.2
1	B	13	THR	2.2
1	B	130	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	531	SER	2.1
1	B	57	PRO	2.1
1	A	526	SER	2.1
1	C	614	ASN	2.1
1	B	390	LYS	2.0
1	B	89	ILE	2.0
1	A	59	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

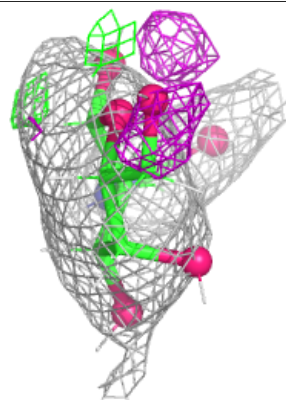
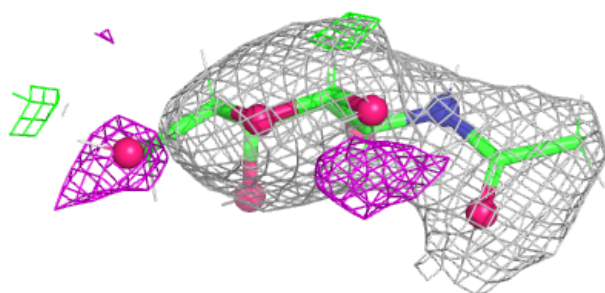
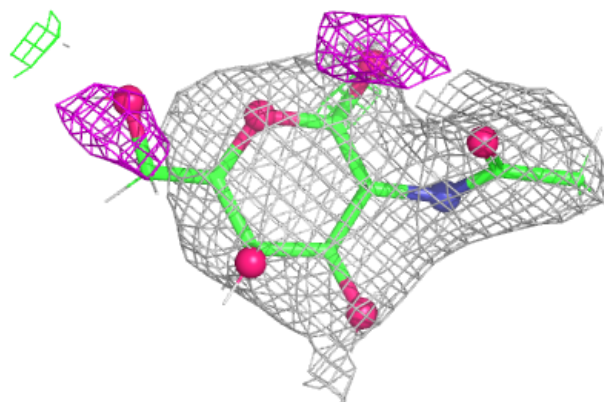
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NGA	C	701	15/15	0.83	0.16	70,85,104,106	0
2	NGA	B	701	15/15	0.84	0.14	61,76,96,99	0
2	NGA	A	703	15/15	0.84	0.13	55,78,100,111	0
3	NA	A	704	1/1	0.84	0.13	54,54,54,54	0
3	NA	A	705	1/1	0.84	0.20	72,72,72,72	0
4	CL	C	705	1/1	0.86	0.29	85,85,85,85	0
2	NGA	C	702	15/15	0.88	0.12	46,57,69,80	0
3	NA	C	703	1/1	0.89	0.20	59,59,59,59	0
2	NGA	A	702	15/15	0.92	0.09	54,67,86,96	0
3	NA	C	704	1/1	0.95	0.06	55,55,55,55	0
2	NGA	B	702	15/15	0.96	0.07	39,46,54,56	0
2	NGA	A	701	15/15	0.96	0.07	38,47,55,56	0

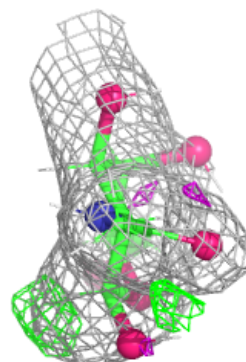
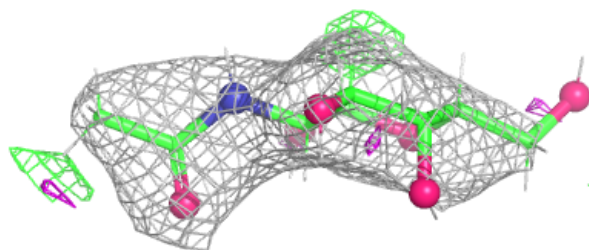
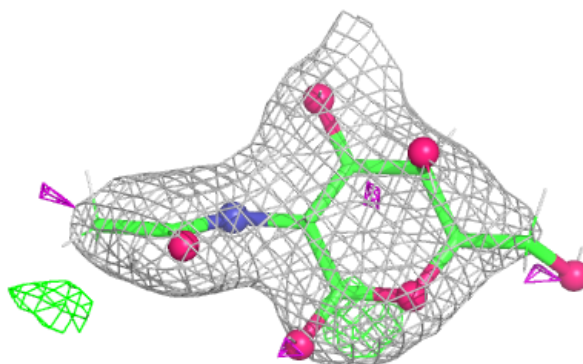
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NGA C 701:

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

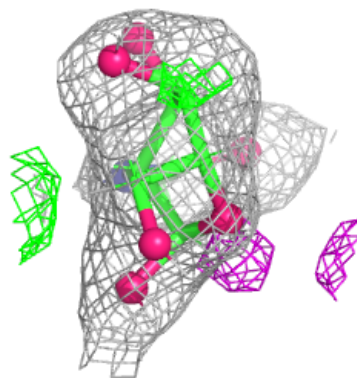
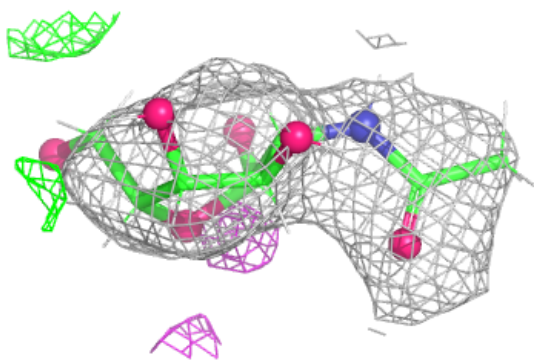
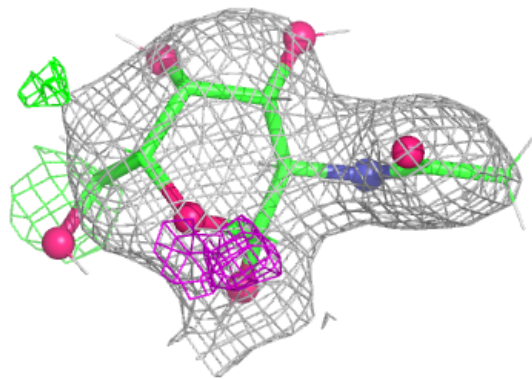
**Electron density around NGA B 701:**

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



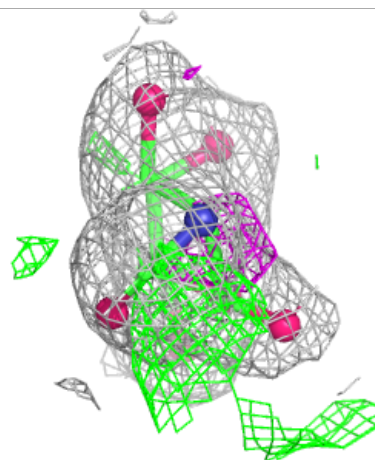
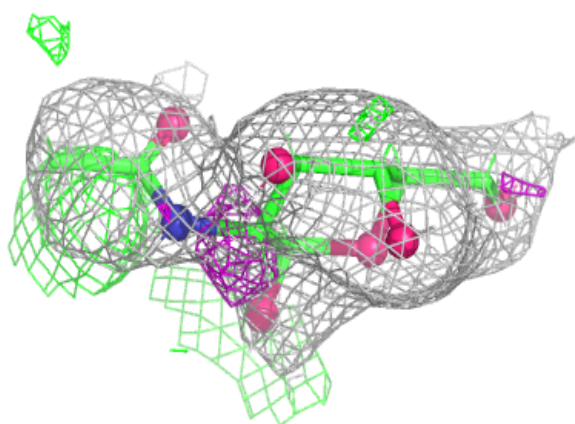
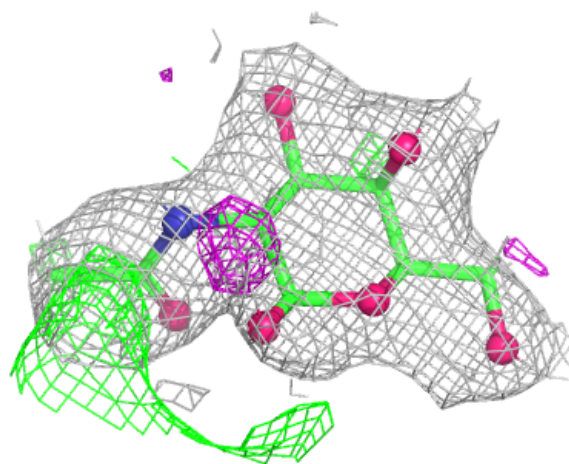
Electron density around NGA A 703:

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



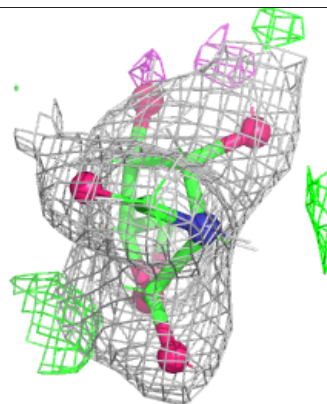
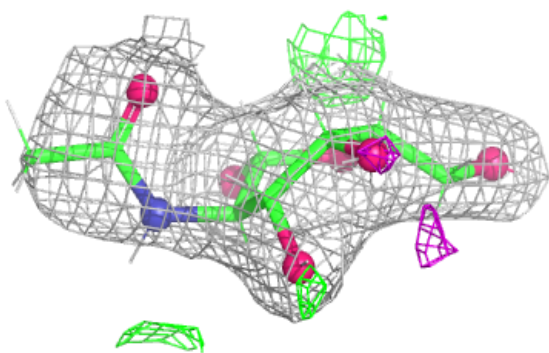
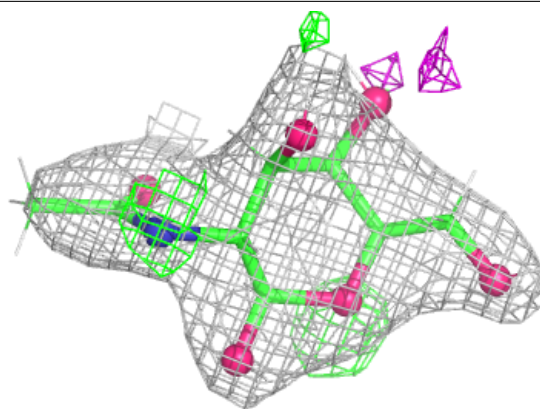
Electron density around NGA C 702:

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



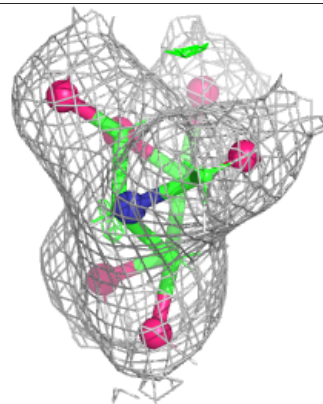
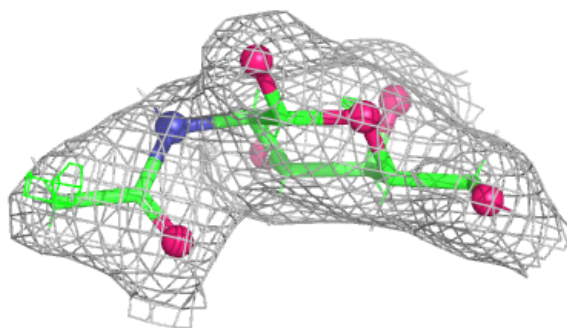
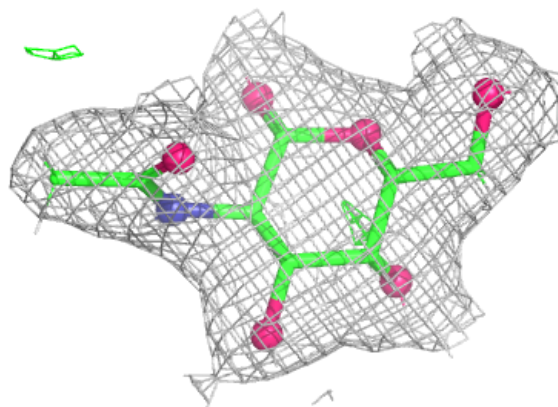
Electron density around NGA A 702:

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

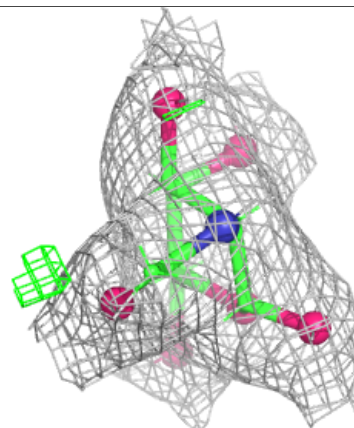
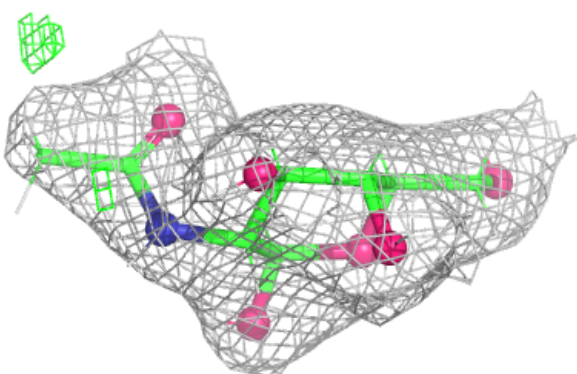
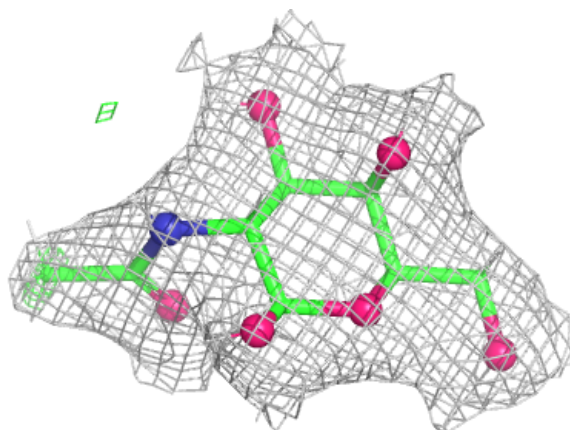


Electron density around NGA B 702:

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

**Electron density around NGA A 701:**

$2mF_o-DF_c$ (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.