



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 16, 2024 – 06:16 PM JST

PDB ID : 8HJ6
Title : Crystal structure of barley exohydrolase isoform ExoI E220A mutant
Authors : Luang, S.; Streltsov, V.A.; Hrmova, M.
Deposited on : 2022-11-22
Resolution : 1.79 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) : 1.21
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

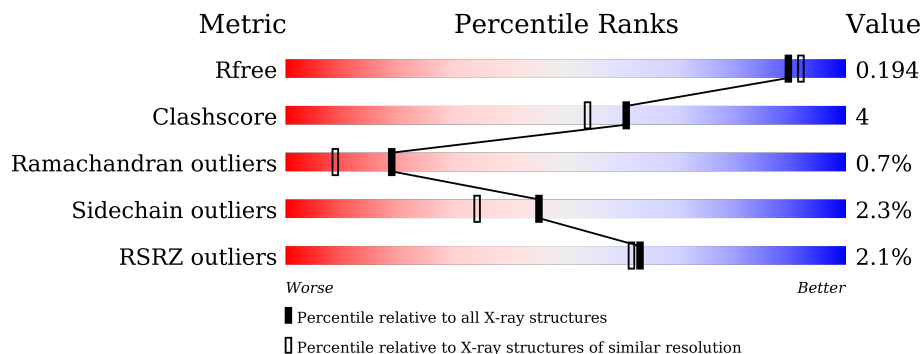
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.79 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

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	609	 2% 85% 12%

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 5471 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.

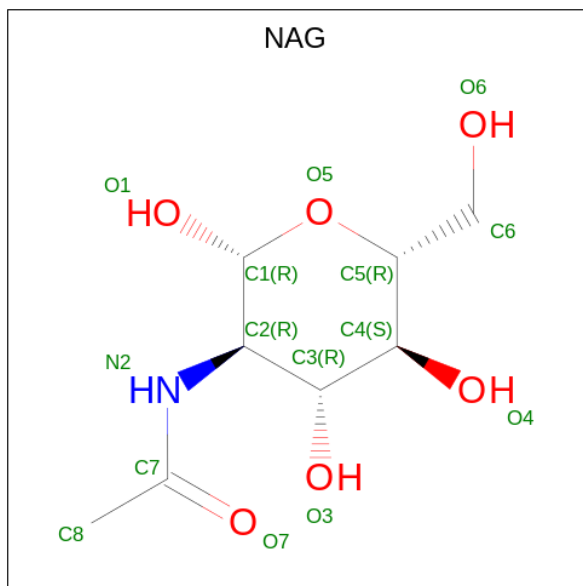
- Molecule 1 is a protein called Glyco_hydro_3 domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	606	4617	2918	802	868	29	0	14	0

There are 5 discrepancies between the modelled and reference sequences:

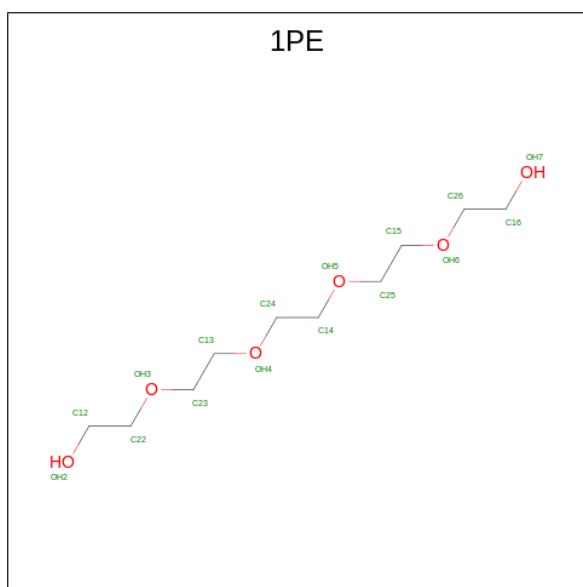
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	HIS	-	expression tag	UNP A0A8I6XKI1
A	-2	HIS	-	expression tag	UNP A0A8I6XKI1
A	-1	ALA	-	expression tag	UNP A0A8I6XKI1
A	220	ALA	GLU	engineered mutation	UNP A0A8I6XKI1
A	320	LYS	ASN	conflict	UNP A0A8I6XKI1

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 3 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: C₁₀H₂₂O₆) (labeled as "Ligand of Interest" by depositor).



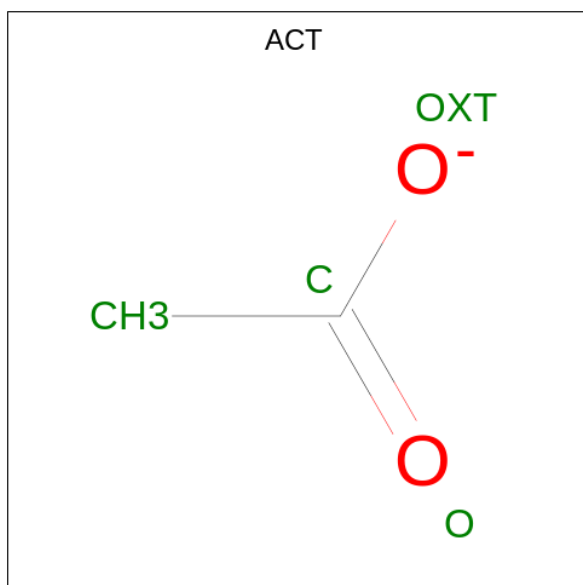
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	7	4		
3	A	1	Total	C	O	0	0
			9	6	3		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



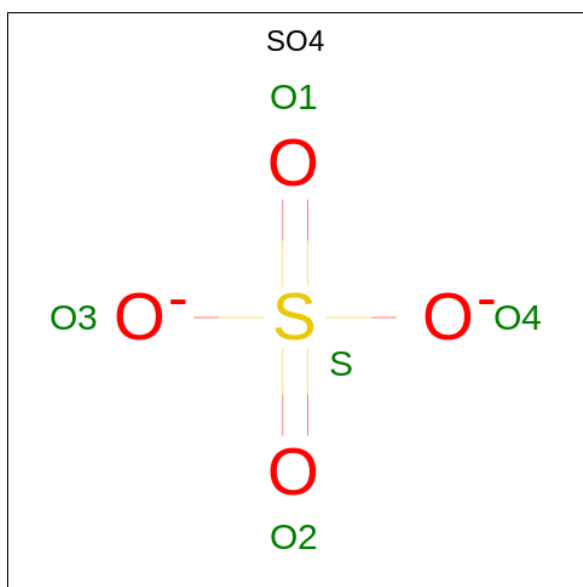
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	O	S	0	0
			5	4	1		

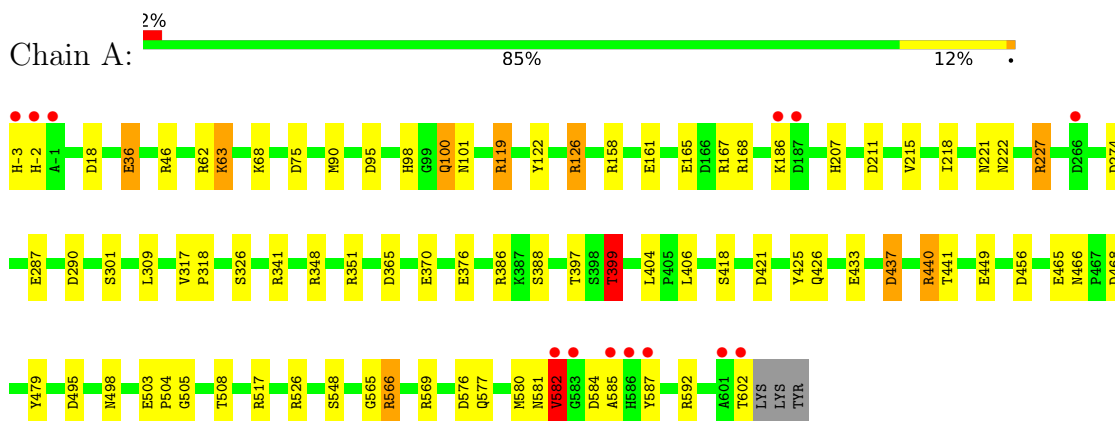
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	695	Total	O	0	0
			695	695		

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: Glyco_hydro_3 domain-containing protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	100.23Å 100.23Å 183.17Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	87.93 – 1.79 87.93 – 1.79	Depositor EDS
% Data completeness (in resolution range)	95.3 (87.93-1.79) 95.0 (87.93-1.79)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.46 (at 1.79Å)	Xtrriage
Refinement program	REFMAC 7.0.005	Depositor
R, R_{free}	0.142 , 0.180 0.156 , 0.194	Depositor DCC
R_{free} test set	4402 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	29.2	Xtrriage
Anisotropy	0.129	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 53.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5471	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.32% 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, ACT, 1PE, SO4, 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	1.42	28/4769 (0.6%)	1.35	50/6474 (0.8%)

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	4

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	503	GLU	CD-OE2	14.13	1.41	1.25
1	A	440[A]	ARG	CZ-NH1	7.99	1.43	1.33
1	A	399	THR	CB-CG2	-7.82	1.26	1.52
1	A	301	SER	CA-CB	7.76	1.64	1.52
1	A	440[A]	ARG	CZ-NH2	7.34	1.42	1.33
1	A	287	GLU	CD-OE1	-7.02	1.18	1.25
1	A	126	ARG	CD-NE	-6.97	1.34	1.46
1	A	479	TYR	CG-CD2	6.74	1.48	1.39
1	A	517[B]	ARG	CG-CD	6.60	1.68	1.51
1	A	602	THR	CB-CG2	6.31	1.73	1.52
1	A	287	GLU	CD-OE2	-6.21	1.18	1.25
1	A	517[B]	ARG	CZ-NH1	6.16	1.41	1.33
1	A	587	TYR	CB-CG	6.11	1.60	1.51
1	A	548	SER	CB-OG	6.08	1.50	1.42
1	A	388	SER	CB-OG	5.57	1.49	1.42
1	A	569	ARG	CB-CG	-5.56	1.37	1.52
1	A	167	ARG	CZ-NH1	5.41	1.40	1.33
1	A	418	SER	CA-CB	5.38	1.61	1.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	576	ASP	CB-CG	-5.37	1.40	1.51
1	A	370	GLU	CD-OE2	5.24	1.31	1.25
1	A	119	ARG	CZ-NH1	5.18	1.39	1.33
1	A	433	GLU	CD-OE2	-5.18	1.20	1.25
1	A	592	ARG	CZ-NH2	5.18	1.39	1.33
1	A	517[B]	ARG	NE-CZ	5.09	1.39	1.33
1	A	565	GLY	N-CA	5.09	1.53	1.46
1	A	326	SER	CB-OG	5.09	1.48	1.42
1	A	36	GLU	CD-OE1	-5.08	1.20	1.25
1	A	426	GLN	CB-CG	-5.04	1.39	1.52

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	126	ARG	NE-CZ-NH1	25.31	132.96	120.30
1	A	126	ARG	NE-CZ-NH2	-20.36	110.12	120.30
1	A	440[A]	ARG	NE-CZ-NH2	-12.93	113.83	120.30
1	A	62	ARG	NE-CZ-NH2	-10.32	115.14	120.30
1	A	566[A]	ARG	NE-CZ-NH1	10.11	125.36	120.30
1	A	566[B]	ARG	NE-CZ-NH1	10.11	125.36	120.30
1	A	517[B]	ARG	NE-CZ-NH1	9.76	125.18	120.30
1	A	440[A]	ARG	CG-CD-NE	-9.32	92.23	111.80
1	A	566[A]	ARG	NE-CZ-NH2	-8.92	115.84	120.30
1	A	566[B]	ARG	NE-CZ-NH2	-8.92	115.84	120.30
1	A	211	ASP	CB-CG-OD1	8.64	126.07	118.30
1	A	592	ARG	NE-CZ-NH2	8.33	124.47	120.30
1	A	351	ARG	NE-CZ-NH1	8.20	124.40	120.30
1	A	68	LYS	CD-CE-NZ	8.19	130.55	111.70
1	A	126	ARG	CD-NE-CZ	8.18	135.05	123.60
1	A	119	ARG	NE-CZ-NH2	-7.15	116.73	120.30
1	A	75	ASP	CB-CG-OD1	7.06	124.66	118.30
1	A	495	ASP	CB-CG-OD1	6.90	124.51	118.30
1	A	440[A]	ARG	NE-CZ-NH1	6.54	123.57	120.30
1	A	18	ASP	CB-CG-OD2	6.53	124.18	118.30
1	A	274	ASP	CB-CG-OD1	6.48	124.14	118.30
1	A	211	ASP	CB-CG-OD2	-6.48	112.47	118.30
1	A	75	ASP	CB-CG-OD2	-6.44	112.50	118.30
1	A	348	ARG	NE-CZ-NH1	6.37	123.48	120.30
1	A	46	ARG	NE-CZ-NH2	6.35	123.48	120.30
1	A	376[A]	GLU	CG-CD-OE1	6.28	130.87	118.30
1	A	376[B]	GLU	CG-CD-OE1	6.28	130.87	118.30
1	A	341	ARG	NE-CZ-NH2	-6.22	117.19	120.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	376[A]	GLU	OE1-CD-OE2	-5.85	116.28	123.30
1	A	376[B]	GLU	OE1-CD-OE2	-5.85	116.28	123.30
1	A	161	GLU	OE1-CD-OE2	5.78	130.23	123.30
1	A	449	GLU	OE1-CD-OE2	-5.77	116.37	123.30
1	A	456	ASP	CB-CG-OD2	-5.73	113.14	118.30
1	A	456	ASP	CB-CG-OD1	5.63	123.37	118.30
1	A	440[A]	ARG	CD-NE-CZ	5.63	131.48	123.60
1	A	437	ASP	CB-CG-OD2	-5.62	113.24	118.30
1	A	341	ARG	NE-CZ-NH1	5.62	123.11	120.30
1	A	63	LYS	CD-CE-NZ	5.51	124.38	111.70
1	A	465	GLU	OE1-CD-OE2	5.49	129.88	123.30
1	A	592	ARG	NE-CZ-NH1	-5.48	117.56	120.30
1	A	227[A]	ARG	CG-CD-NE	5.47	123.30	111.80
1	A	227[B]	ARG	CG-CD-NE	5.47	123.30	111.80
1	A	365	ASP	CB-CG-OD2	-5.37	113.47	118.30
1	A	526	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	468	ASP	CB-CG-OD1	5.25	123.03	118.30
1	A	569	ARG	CB-CA-C	-5.23	99.94	110.40
1	A	46	ARG	CD-NE-CZ	5.22	130.91	123.60
1	A	425	TYR	CB-CG-CD1	5.19	124.11	121.00
1	A	421	ASP	CB-CG-OD2	-5.04	113.77	118.30
1	A	18	ASP	CB-CG-OD1	-5.03	113.77	118.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	-3	HIS	Peptide
1	A	581	ASN	Peptide,Mainchain
1	A	582	VAL	Peptide

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	4617	0	4572	35	0
2	A	42	0	39	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	20	0	23	5	0
4	A	24	0	32	3	0
5	A	68	0	51	6	0
6	A	5	0	0	0	0
7	A	695	0	0	10	0
All	All	5471	0	4717	38	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 4.

All (38) 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:466[A]:ASN:ND2	1:A:508:THR:OG1	2.10	0.85
1:A:566[B]:ARG:NE	7:A:806:HOH:O	2.15	0.79
1:A:227[A]:ARG:NH1	5:A:724:ACT:OXT	2.14	0.77
5:A:711:ACT:H3	7:A:1123:HOH:O	1.84	0.77
1:A:122:TYR:CE2	1:A:126:ARG:HD2	2.22	0.74
1:A:504:PRO:O	7:A:804:HOH:O	2.07	0.73
1:A:119:ARG:HH21	5:A:718:ACT:H2	1.54	0.72
1:A:566[A]:ARG:NE	7:A:806:HOH:O	2.24	0.70
1:A:566[B]:ARG:CZ	7:A:806:HOH:O	2.43	0.65
1:A:582:VAL:HG13	7:A:1059:HOH:O	1.95	0.65
1:A:158:ARG:HH22	3:A:704:1PE:C26	2.11	0.64
4:A:709:GOL:O2	7:A:805:HOH:O	2.13	0.62
1:A:95:ASP:OD2	3:A:704:1PE:H141	1.99	0.62
1:A:165:GLU:OE2	1:A:582:VAL:HG11	1.99	0.61
1:A:577:GLN:HB3	1:A:580[B]:MET:SD	2.41	0.60
1:A:95:ASP:OD1	3:A:704:1PE:H152	2.04	0.57
5:A:710:ACT:H3	7:A:1380:HOH:O	2.07	0.54
1:A:386:ARG:HH12	5:A:715:ACT:H3	1.74	0.52
1:A:399:THR:HG23	7:A:869:HOH:O	2.10	0.52
1:A:95:ASP:OD2	3:A:704:1PE:C14	2.59	0.51
1:A:158:ARG:NH1	4:A:709:GOL:H2	2.28	0.48
1:A:158:ARG:HH11	4:A:709:GOL:H2	1.81	0.46
1:A:582:VAL:HG22	1:A:582:VAL:O	2.16	0.46
1:A:168:ARG:HH22	5:A:722:ACT:H3	1.80	0.45
1:A:207:HIS:NE2	3:A:704:1PE:C26	2.79	0.45
1:A:227[B]:ARG:NH2	7:A:808:HOH:O	2.37	0.45
1:A:100:GLN:HA	1:A:100:GLN:OE1	2.18	0.44
1:A:397:THR:OG1	1:A:399:THR:HG22	2.18	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:404:LEU:HD23	1:A:406:LEU:HG	1.99	0.43
1:A:122:TYR:O	1:A:126:ARG:HD3	2.19	0.43
1:A:218:ILE:HG22	1:A:221:ASN:HB2	2.01	0.43
1:A:437:ASP:HB3	1:A:441:THR:HG21	2.01	0.42
1:A:215:VAL:HG23	1:A:222:ASN:O	2.20	0.41
1:A:222:ASN:HB2	2:A:701:NAG:H82	2.02	0.40
1:A:122:TYR:CD2	1:A:126:ARG:HD2	2.57	0.40
1:A:309:LEU:HA	1:A:309:LEU:HD23	1.89	0.40
1:A:317:VAL:N	1:A:318:PRO:HA	2.37	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	613/609 (101%)	592 (97%)	17 (3%)	4 (1%)	19 9

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	-2	HIS
1	A	585	ALA
1	A	584	ASP
1	A	505	GLY

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	495/489 (101%)	484 (98%)	11 (2%)	47 36

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	GLU
1	A	63	LYS
1	A	90	MET
1	A	98	HIS
1	A	100	GLN
1	A	101	ASN
1	A	186[A]	LYS
1	A	290	ASP
1	A	399	THR
1	A	440[A]	ARG
1	A	582	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

27 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The

Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	ACT	A	710	-	3,3,3	0.94	0	3,3,3	0.57	0
6	SO4	A	727	-	4,4,4	0.74	0	6,6,6	0.83	0
4	GOL	A	708	-	5,5,5	0.42	0	5,5,5	0.70	0
5	ACT	A	720	-	3,3,3	0.82	0	3,3,3	0.71	0
5	ACT	A	723	-	3,3,3	0.71	0	3,3,3	1.62	1 (33%)
4	GOL	A	709	-	5,5,5	0.76	0	5,5,5	1.06	0
5	ACT	A	716	-	3,3,3	0.75	0	3,3,3	0.67	0
5	ACT	A	717	-	3,3,3	0.89	0	3,3,3	1.16	0
2	NAG	A	701	1	14,14,15	0.90	1 (7%)	17,19,21	1.94	5 (29%)
5	ACT	A	715	-	3,3,3	0.55	0	3,3,3	0.94	0
3	1PE	A	704	-	10,10,15	1.20	0	9,9,14	1.75	3 (33%)
5	ACT	A	718	-	3,3,3	1.02	0	3,3,3	0.73	0
5	ACT	A	711	-	3,3,3	0.84	0	3,3,3	0.80	0
5	ACT	A	722	-	3,3,3	0.87	0	3,3,3	0.58	0
5	ACT	A	714	-	3,3,3	0.63	0	3,3,3	1.39	0
5	ACT	A	726	-	3,3,3	1.02	0	3,3,3	0.66	0
5	ACT	A	721	-	3,3,3	0.91	0	3,3,3	1.32	0
5	ACT	A	725	-	3,3,3	0.45	0	3,3,3	2.20	1 (33%)
4	GOL	A	707	-	5,5,5	0.46	0	5,5,5	1.17	0
2	NAG	A	702	-	14,14,15	1.00	1 (7%)	17,19,21	1.68	6 (35%)
5	ACT	A	719	-	3,3,3	1.08	0	3,3,3	0.86	0
5	ACT	A	712	-	3,3,3	0.71	0	3,3,3	0.84	0
3	1PE	A	705	-	8,8,15	0.71	0	7,7,14	0.78	0
2	NAG	A	703	-	14,14,15	1.05	1 (7%)	17,19,21	2.23	5 (29%)
4	GOL	A	706	-	5,5,5	0.28	0	5,5,5	0.23	0
5	ACT	A	724	-	3,3,3	0.87	0	3,3,3	0.83	0
5	ACT	A	713	-	3,3,3	0.80	0	3,3,3	0.88	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
2	NAG	A	702	-	-	0/6/23/26	0/1/1/1
4	GOL	A	708	-	-	4/4/4/4	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	1PE	A	704	-	-	5/8/8/13	-
3	1PE	A	705	-	-	6/6/6/13	-
4	GOL	A	709	-	-	0/4/4/4	-
2	NAG	A	703	-	-	2/6/23/26	0/1/1/1
2	NAG	A	701	1	-	0/6/23/26	0/1/1/1
4	GOL	A	706	-	-	4/4/4/4	-
4	GOL	A	707	-	-	3/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	702	NAG	C1-C2	3.03	1.56	1.52
2	A	701	NAG	C1-C2	2.29	1.55	1.52
2	A	703	NAG	C1-C2	2.04	1.55	1.52

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	701	NAG	O5-C1-C2	-5.52	102.58	111.29
2	A	703	NAG	C2-N2-C7	4.78	129.70	122.90
2	A	703	NAG	O5-C5-C6	4.54	114.31	107.20
2	A	703	NAG	C4-C3-C2	3.78	116.56	111.02
2	A	703	NAG	C1-C2-N2	3.44	116.36	110.49
5	A	725	ACT	O-C-CH3	-3.07	110.39	122.33
3	A	704	1PE	C25-OH5-C14	2.88	125.75	113.29
2	A	702	NAG	C3-C4-C5	-2.67	105.48	110.24
2	A	701	NAG	C4-C3-C2	2.66	114.91	111.02
2	A	702	NAG	O6-C6-C5	-2.62	102.31	111.29
2	A	702	NAG	C2-N2-C7	2.59	126.59	122.90
2	A	701	NAG	C2-N2-C7	2.46	126.41	122.90
2	A	702	NAG	O5-C5-C4	-2.39	105.00	110.83
2	A	701	NAG	O3-C3-C2	-2.31	104.69	109.47
5	A	723	ACT	OXT-C-CH3	2.22	124.35	115.18
2	A	702	NAG	O5-C1-C2	-2.21	107.79	111.29
3	A	704	1PE	OH4-C24-C14	2.20	120.31	110.39
3	A	704	1PE	OH5-C25-C15	2.16	120.12	110.39
2	A	701	NAG	C1-O5-C5	-2.15	109.28	112.19
2	A	702	NAG	C1-C2-N2	2.07	114.02	110.49
2	A	703	NAG	O5-C5-C4	-2.05	105.84	110.83

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	706	GOL	O1-C1-C2-C3
4	A	706	GOL	C1-C2-C3-O3
4	A	707	GOL	C1-C2-C3-O3
4	A	708	GOL	O1-C1-C2-O2
4	A	708	GOL	O1-C1-C2-C3
3	A	705	1PE	OH4-C13-C23-OH3
2	A	703	NAG	C1-C2-N2-C7
3	A	704	1PE	OH6-C15-C25-OH5
3	A	704	1PE	OH5-C14-C24-OH4
4	A	708	GOL	C1-C2-C3-O3
3	A	704	1PE	C15-C25-OH5-C14
4	A	706	GOL	O2-C2-C3-O3
3	A	705	1PE	OH2-C12-C22-OH3
4	A	706	GOL	O1-C1-C2-O2
4	A	707	GOL	O2-C2-C3-O3
4	A	708	GOL	O2-C2-C3-O3
3	A	704	1PE	C24-C14-OH5-C25
3	A	704	1PE	C14-C24-OH4-C13
3	A	705	1PE	C23-C13-OH4-C24
3	A	705	1PE	C12-C22-OH3-C23
3	A	705	1PE	C14-C24-OH4-C13
3	A	705	1PE	C13-C23-OH3-C22
4	A	707	GOL	O1-C1-C2-C3
2	A	703	NAG	C4-C5-C6-O6

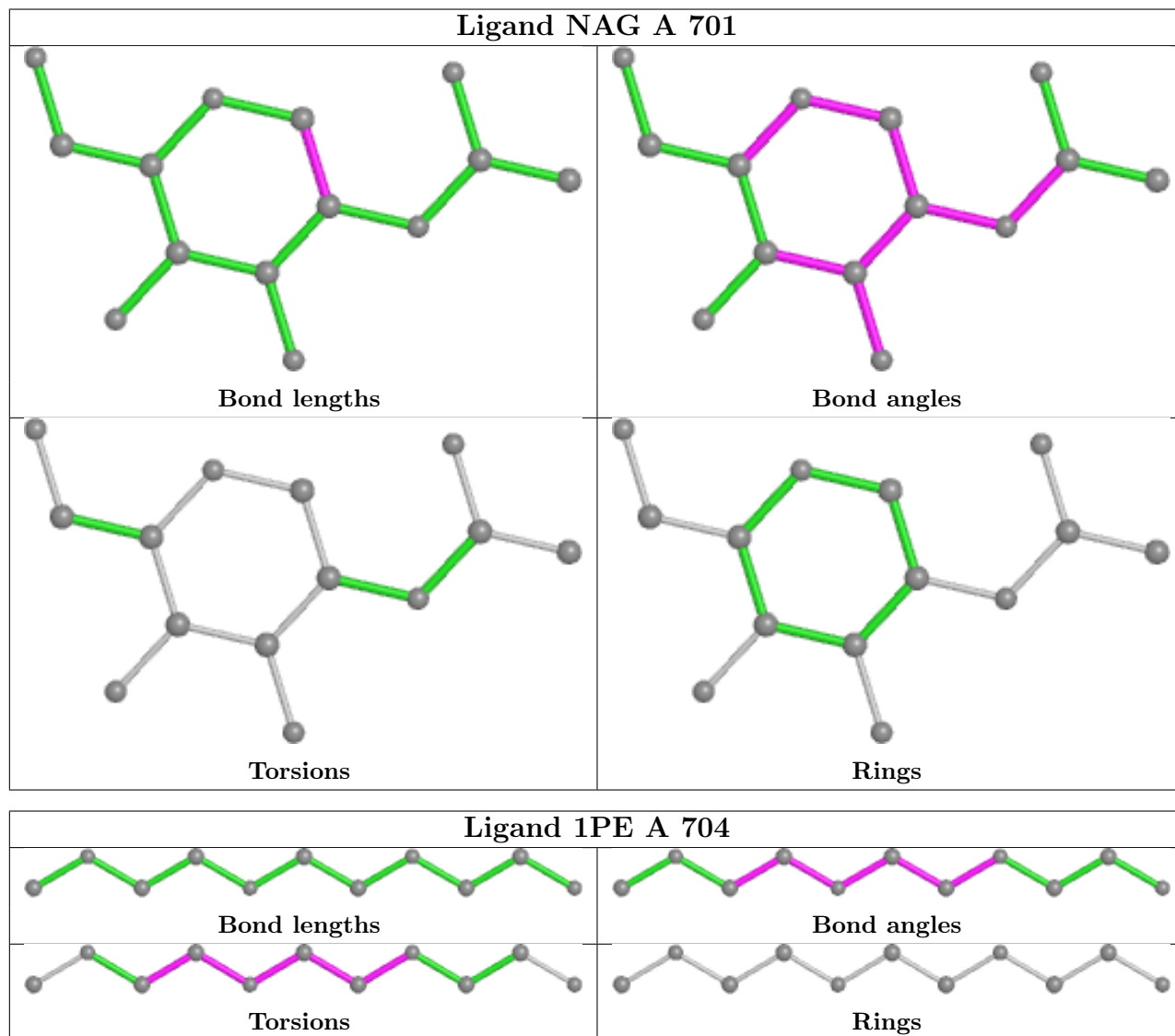
There are no ring outliers.

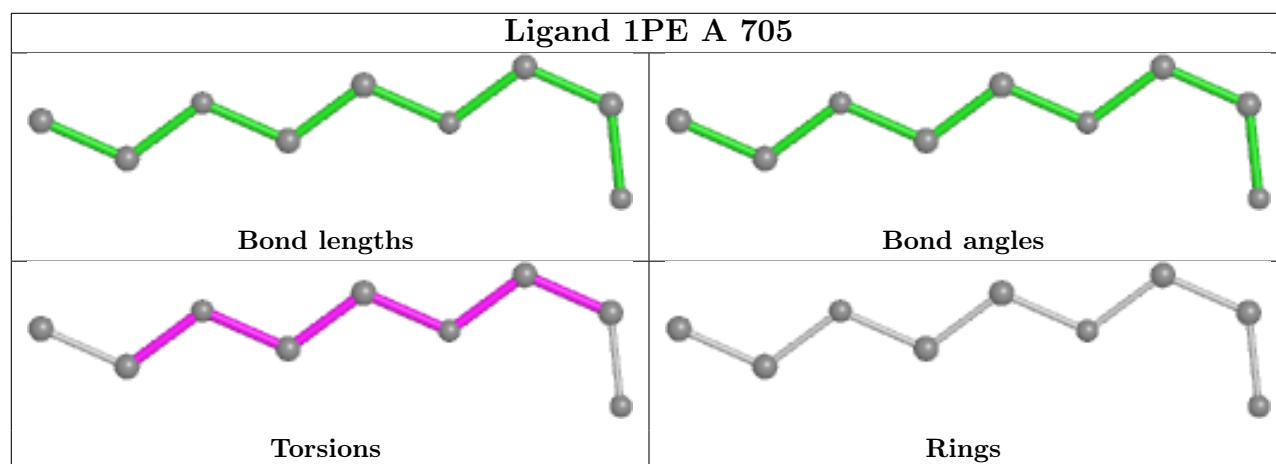
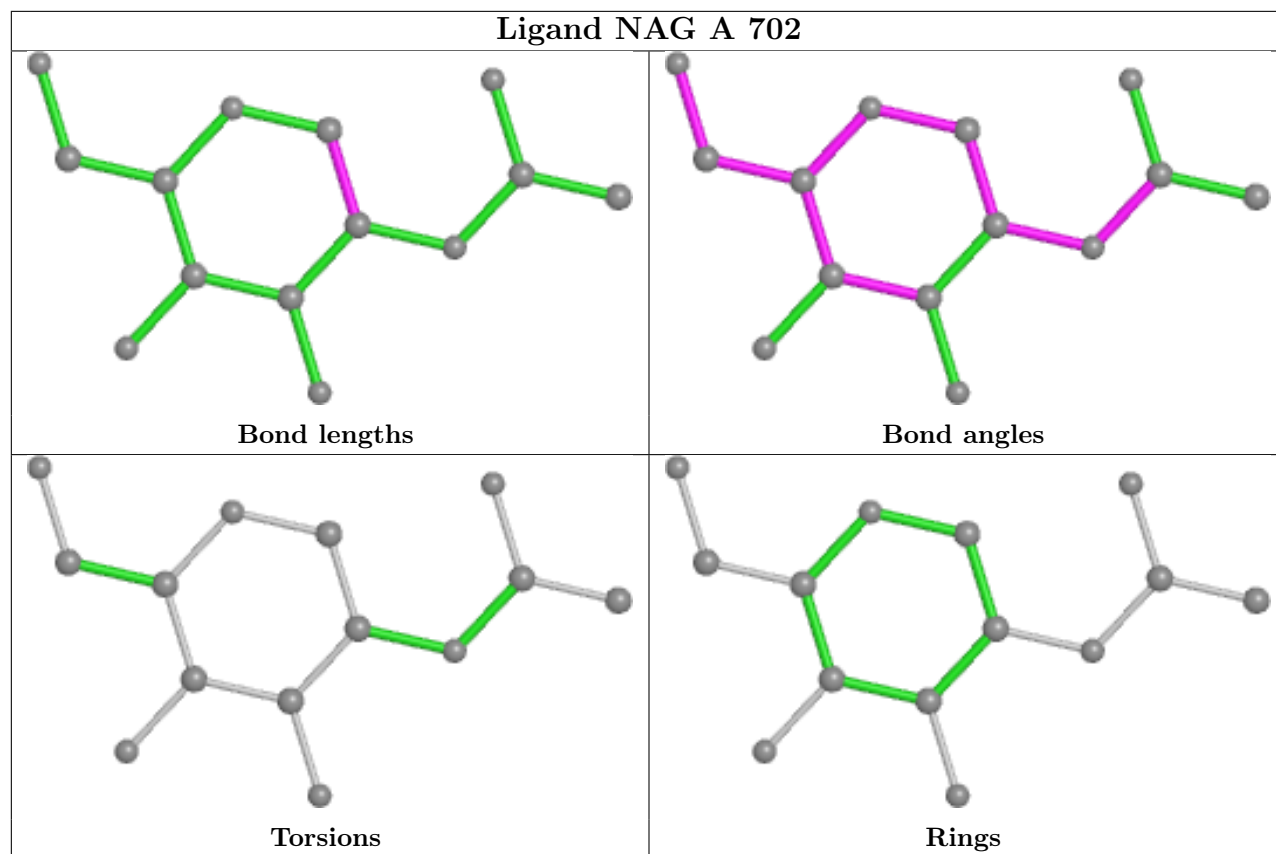
9 monomers are involved in 15 short contacts:

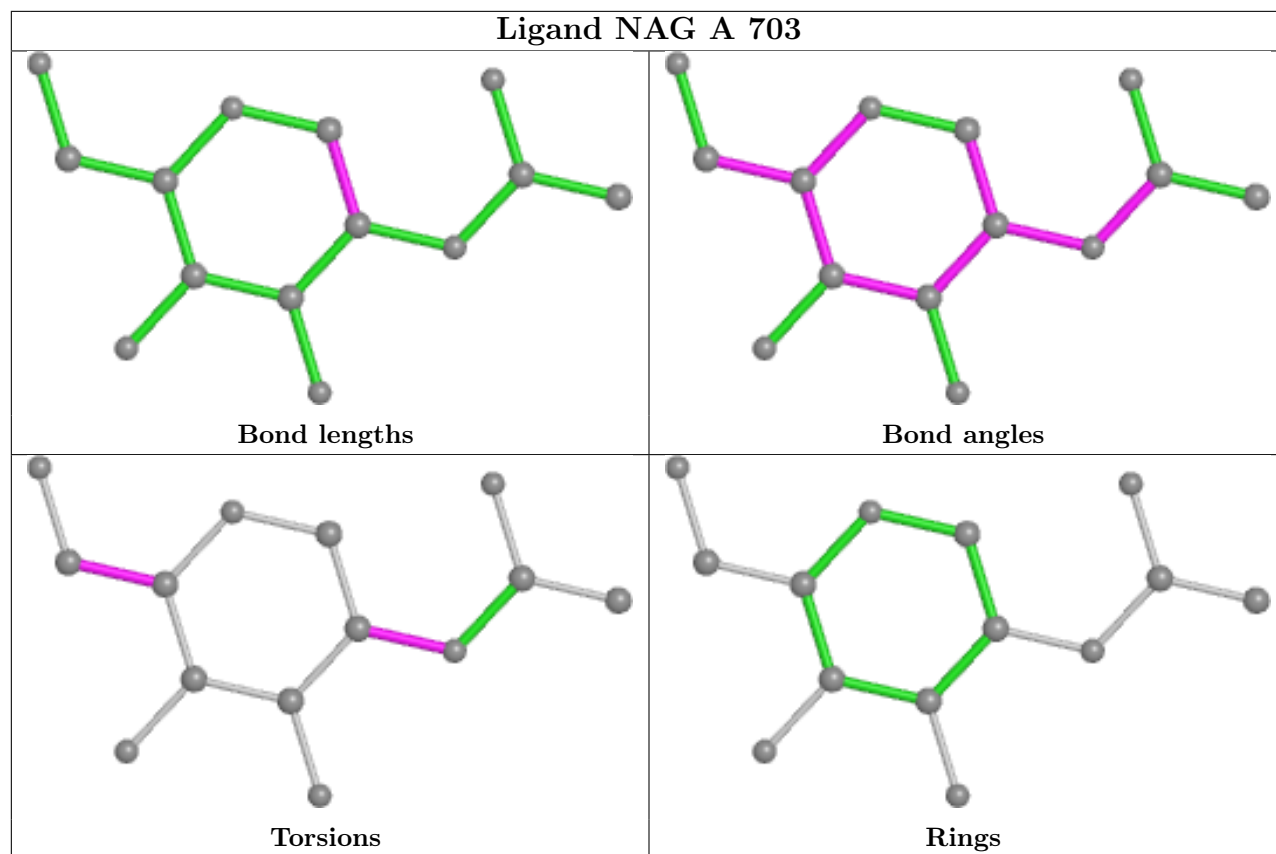
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	710	ACT	1	0
4	A	709	GOL	3	0
2	A	701	NAG	1	0
5	A	715	ACT	1	0
3	A	704	1PE	5	0
5	A	718	ACT	1	0
5	A	711	ACT	1	0
5	A	722	ACT	1	0
5	A	724	ACT	1	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	606/609 (99%)	-0.05	13 (2%) 63 62	24, 36, 52, 106	8 (1%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	-1	ALA	4.5
1	A	582	VAL	4.5
1	A	602	THR	4.2
1	A	-3	HIS	3.8
1	A	-2	HIS	3.5
1	A	585	ALA	3.1
1	A	586	HIS	2.8
1	A	186[A]	LYS	2.7
1	A	583	GLY	2.7
1	A	266	ASP	2.3
1	A	601	ALA	2.2
1	A	187	ASP	2.2
1	A	587	TYR	2.2

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

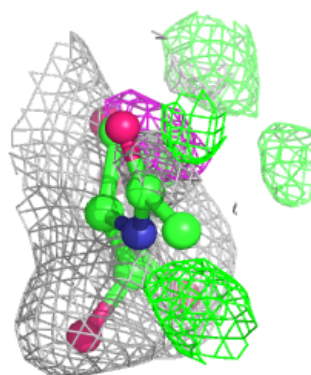
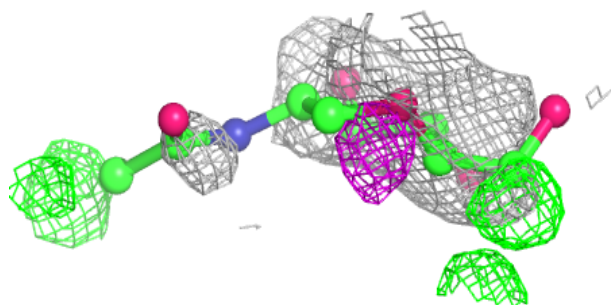
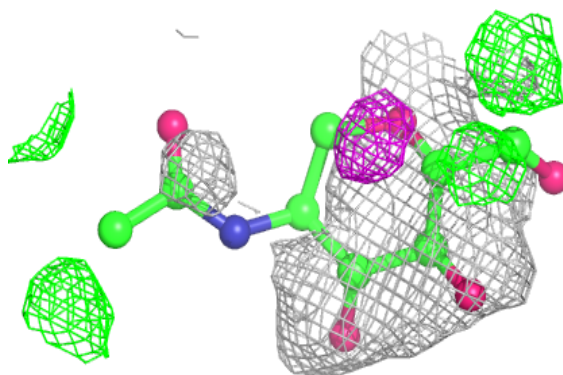
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	ACT	A	721	4/4	0.48	0.24	81,81,82,84	0
2	NAG	A	703	14/15	0.56	0.20	87,106,123,124	0
5	ACT	A	723	4/4	0.64	0.23	70,78,82,89	0
5	ACT	A	724	4/4	0.72	0.20	71,80,87,87	0
2	NAG	A	702	14/15	0.73	0.14	82,89,102,103	0
5	ACT	A	726	4/4	0.73	0.26	73,76,79,87	0
5	ACT	A	718	4/4	0.74	0.18	61,70,73,82	0
5	ACT	A	720	4/4	0.75	0.17	77,81,84,89	0
5	ACT	A	722	4/4	0.76	0.17	73,88,90,91	0
5	ACT	A	710	4/4	0.79	0.20	59,81,83,87	0
5	ACT	A	711	4/4	0.80	0.20	61,79,81,89	0
5	ACT	A	717	4/4	0.81	0.16	52,74,79,82	0
5	ACT	A	713	4/4	0.81	0.20	78,84,84,87	0
3	1PE	A	704	11/16	0.82	0.19	28,52,70,85	0
5	ACT	A	725	4/4	0.83	0.18	56,73,75,75	0
3	1PE	A	705	9/16	0.83	0.24	61,77,88,93	0
5	ACT	A	719	4/4	0.84	0.19	63,69,72,74	0
5	ACT	A	712	4/4	0.84	0.17	49,61,63,68	0
5	ACT	A	716	4/4	0.85	0.16	62,68,75,76	0
5	ACT	A	715	4/4	0.86	0.16	62,66,66,73	0
2	NAG	A	701	14/15	0.87	0.13	49,56,82,88	0
4	GOL	A	708	6/6	0.88	0.16	44,61,73,87	0
5	ACT	A	714	4/4	0.89	0.15	60,66,67,68	0
4	GOL	A	706	6/6	0.90	0.16	78,80,85,88	0
4	GOL	A	707	6/6	0.90	0.15	46,74,75,78	0
6	SO4	A	727	5/5	0.91	0.10	40,43,55,56	5
4	GOL	A	709	6/6	0.97	0.10	40,42,44,49	6

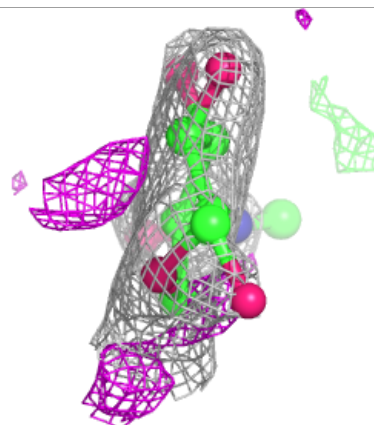
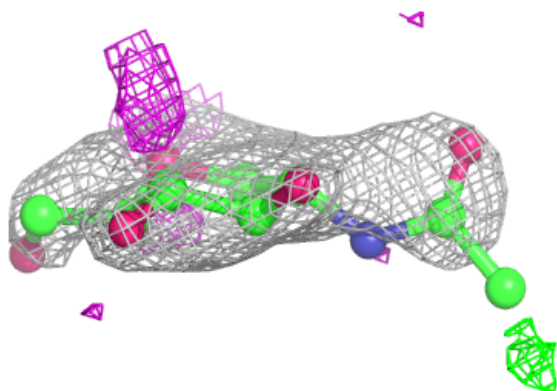
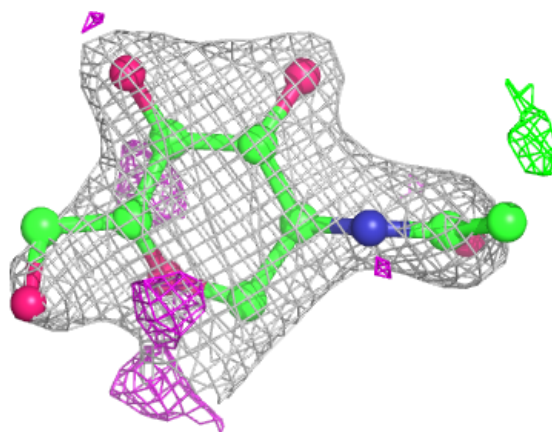
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NAG A 703:

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

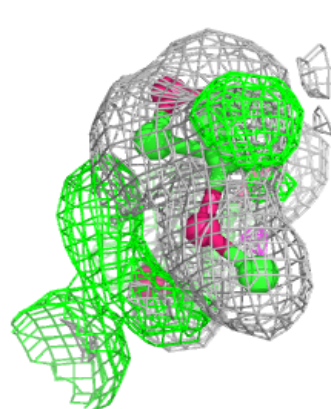
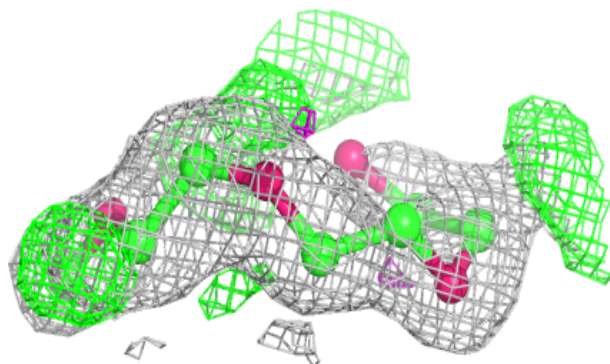
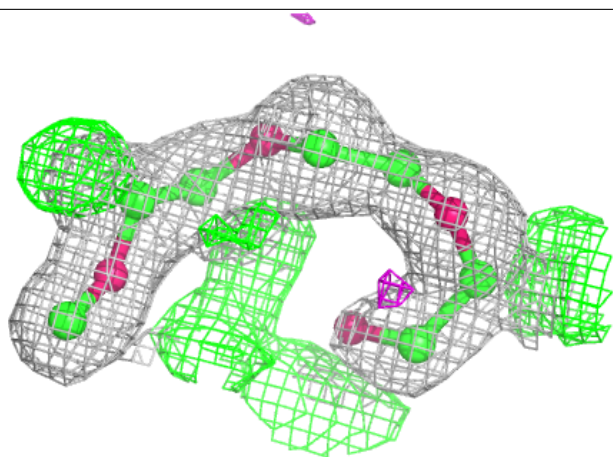
**Electron density around NAG A 702:**

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

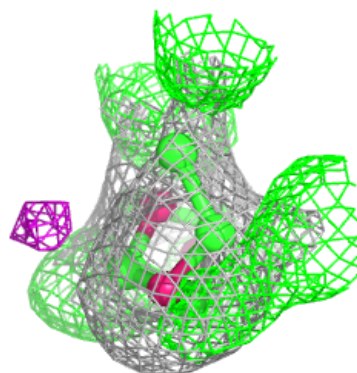
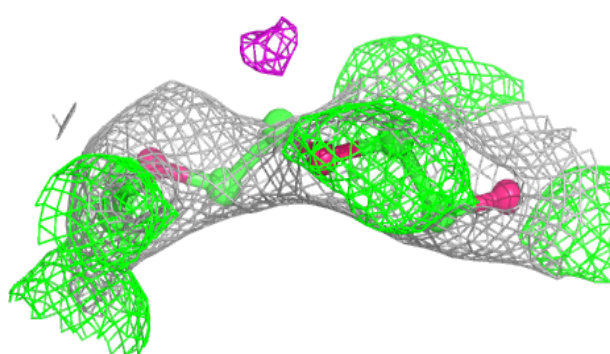
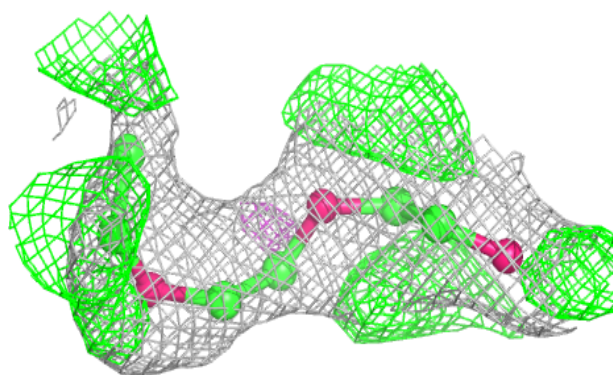


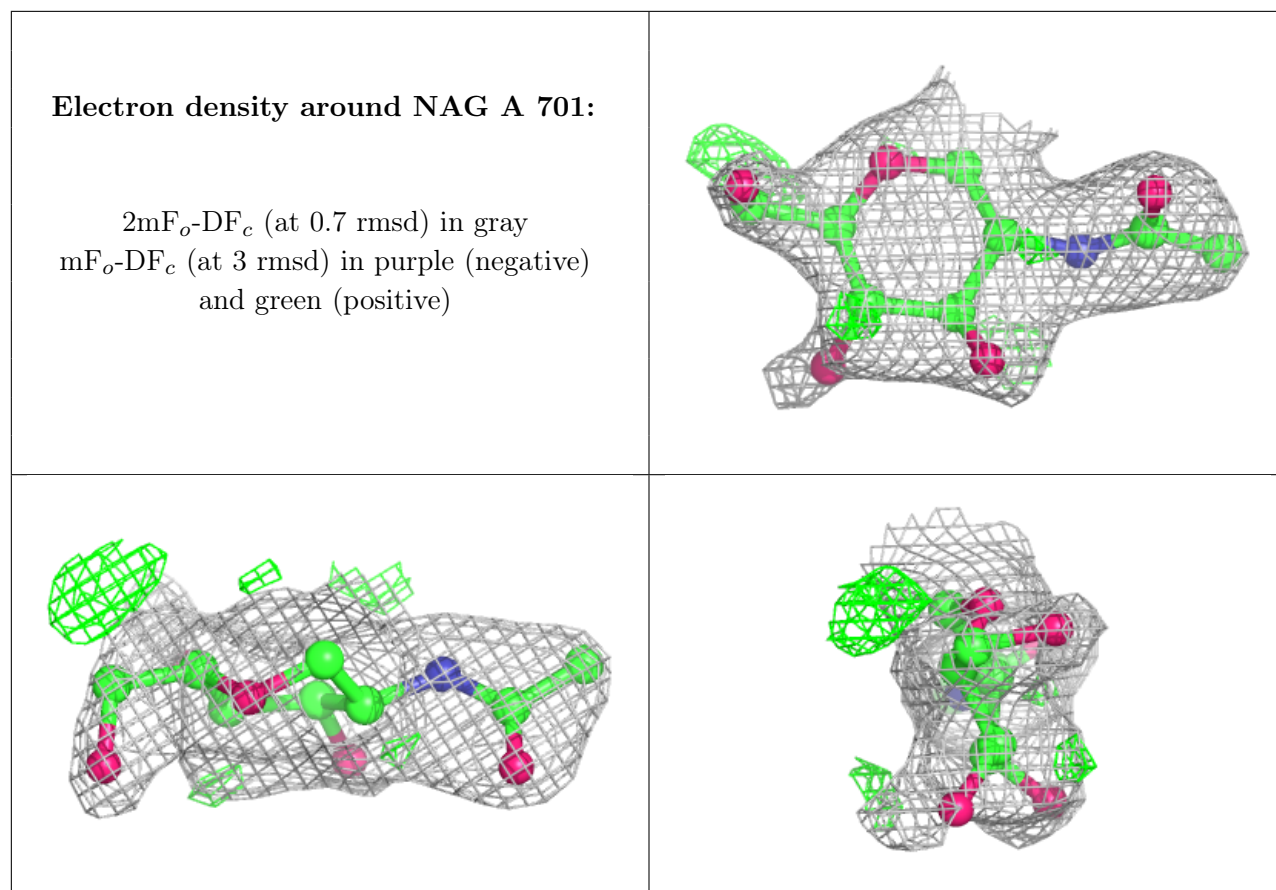
Electron density around 1PE A 704:

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

**Electron density around 1PE A 705:**

$2mF_o-DF_c$ (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.