



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 08:44 AM UTC

PDB ID : 8RZG / pdb_00008rzg
Title : ZgGH129 from *Zobellia galactanivorans* soaked with the product of the reaction ADG (3,6-anhydro-D-galactose).
Authors : Roret, T.; Czjzek, M.; Ficko-Blean, E.
Deposited on : 2024-02-12
Resolution : 1.81 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

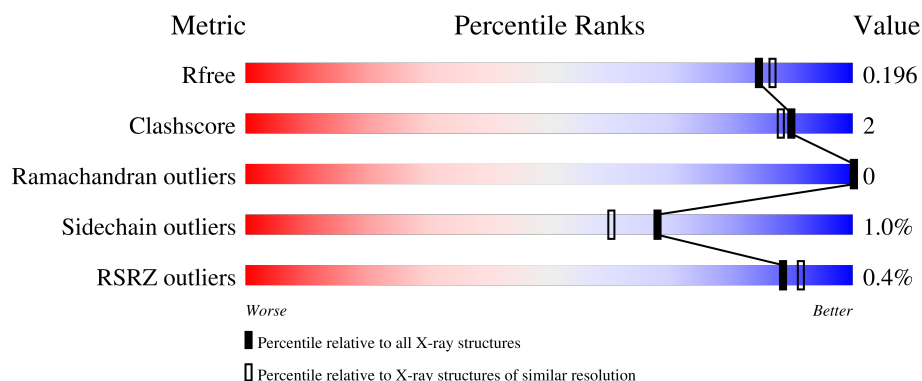
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.81 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	1112 (1.82-1.82)
Clashscore	190562	1148 (1.82-1.82)
Ramachandran outliers	187476	1140 (1.82-1.82)
Sidechain outliers	187428	1140 (1.82-1.82)
RSRZ outliers	180081	1112 (1.82-1.82)

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	676	91% 7% .
1	B	676	93% . .
1	C	676	93% 5% .
1	D	676	92% 5% .

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 23263 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 Conserved hypothetical periplasmic protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	659	Total	C	N	O	S	0	4	0
			5219	3335	882	978	24			
1	B	659	Total	C	N	O	S	0	4	0
			5240	3348	885	984	23			
1	C	659	Total	C	N	O	S	0	4	0
			5225	3336	880	985	24			
1	D	659	Total	C	N	O	S	0	2	0
			5214	3330	880	981	23			

There are 56 discrepancies between the modelled and reference sequences:

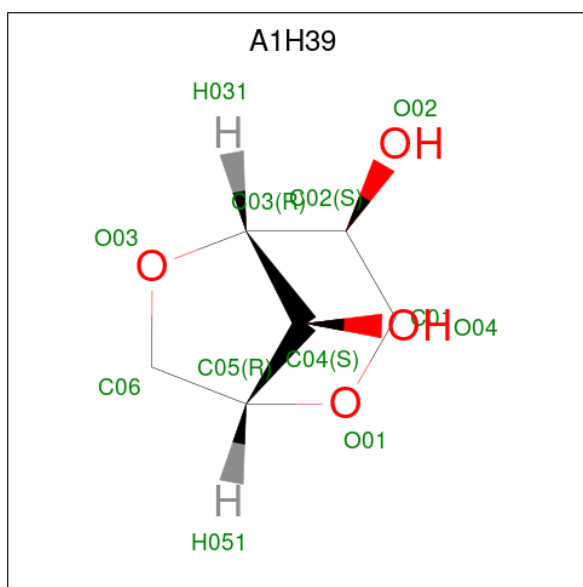
Chain	Residue	Modelled	Actual	Comment	Reference
A	18	MET	-	initiating methionine	UNP G0L004
A	19	GLY	-	expression tag	UNP G0L004
A	20	SER	-	expression tag	UNP G0L004
A	21	SER	-	expression tag	UNP G0L004
A	22	HIS	-	expression tag	UNP G0L004
A	23	HIS	-	expression tag	UNP G0L004
A	24	HIS	-	expression tag	UNP G0L004
A	25	HIS	-	expression tag	UNP G0L004
A	26	HIS	-	expression tag	UNP G0L004
A	27	HIS	-	expression tag	UNP G0L004
A	28	GLY	-	expression tag	UNP G0L004
A	29	SER	-	expression tag	UNP G0L004
A	30	LEU	-	expression tag	UNP G0L004
A	31	ASP	-	expression tag	UNP G0L004
B	18	MET	-	initiating methionine	UNP G0L004
B	19	GLY	-	expression tag	UNP G0L004
B	20	SER	-	expression tag	UNP G0L004
B	21	SER	-	expression tag	UNP G0L004
B	22	HIS	-	expression tag	UNP G0L004
B	23	HIS	-	expression tag	UNP G0L004
B	24	HIS	-	expression tag	UNP G0L004

Continued on next page...

Continued from previous page...

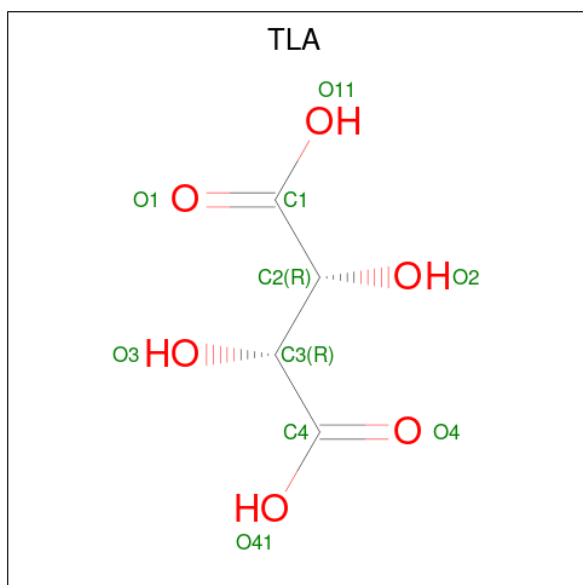
Chain	Residue	Modelled	Actual	Comment	Reference
B	25	HIS	-	expression tag	UNP G0L004
B	26	HIS	-	expression tag	UNP G0L004
B	27	HIS	-	expression tag	UNP G0L004
B	28	GLY	-	expression tag	UNP G0L004
B	29	SER	-	expression tag	UNP G0L004
B	30	LEU	-	expression tag	UNP G0L004
B	31	ASP	-	expression tag	UNP G0L004
C	18	MET	-	initiating methionine	UNP G0L004
C	19	GLY	-	expression tag	UNP G0L004
C	20	SER	-	expression tag	UNP G0L004
C	21	SER	-	expression tag	UNP G0L004
C	22	HIS	-	expression tag	UNP G0L004
C	23	HIS	-	expression tag	UNP G0L004
C	24	HIS	-	expression tag	UNP G0L004
C	25	HIS	-	expression tag	UNP G0L004
C	26	HIS	-	expression tag	UNP G0L004
C	27	HIS	-	expression tag	UNP G0L004
C	28	GLY	-	expression tag	UNP G0L004
C	29	SER	-	expression tag	UNP G0L004
C	30	LEU	-	expression tag	UNP G0L004
C	31	ASP	-	expression tag	UNP G0L004
D	18	MET	-	initiating methionine	UNP G0L004
D	19	GLY	-	expression tag	UNP G0L004
D	20	SER	-	expression tag	UNP G0L004
D	21	SER	-	expression tag	UNP G0L004
D	22	HIS	-	expression tag	UNP G0L004
D	23	HIS	-	expression tag	UNP G0L004
D	24	HIS	-	expression tag	UNP G0L004
D	25	HIS	-	expression tag	UNP G0L004
D	26	HIS	-	expression tag	UNP G0L004
D	27	HIS	-	expression tag	UNP G0L004
D	28	GLY	-	expression tag	UNP G0L004
D	29	SER	-	expression tag	UNP G0L004
D	30	LEU	-	expression tag	UNP G0L004
D	31	ASP	-	expression tag	UNP G0L004

- Molecule 2 is (1 {R},4 {S},5 {R},8 {S})-2,6-dioxabicyclo[3.2.1]octane-4,8-diol (CCD ID: A1H39) (formula: C₆H₁₀O₄) (labeled as "Ligand of Interest" by depositor).



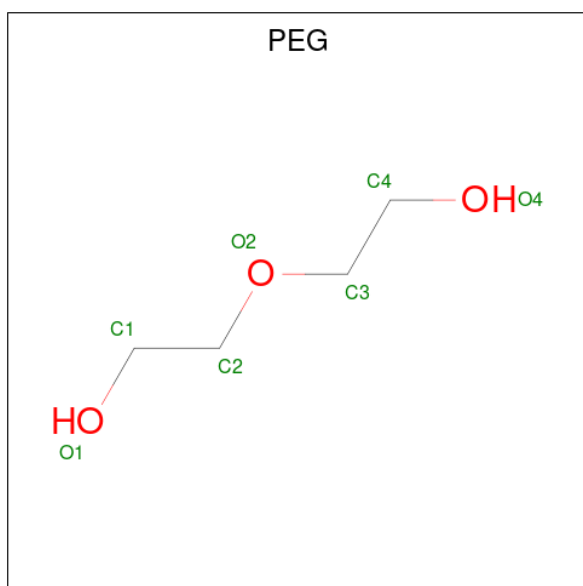
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			10	6	4		
2	B	1	Total	C	O	0	0
			10	6	4		
2	C	1	Total	C	O	0	0
			10	6	4		
2	D	1	Total	C	O	0	0
			10	6	4		

- Molecule 3 is L(+)-TARTARIC ACID (CCD ID: TLA) (formula: $C_4H_6O_6$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 10 4 6	0	0
3	A	1	Total C O 10 4 6	0	0
3	B	1	Total C O 10 4 6	0	0
3	C	1	Total C O 10 4 6	0	0
3	D	1	Total C O 10 4 6	0	0

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C₄H₁₀O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 4 3	0	0
4	D	1	Total C O 7 4 3	0	0

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

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

Continued on next page...

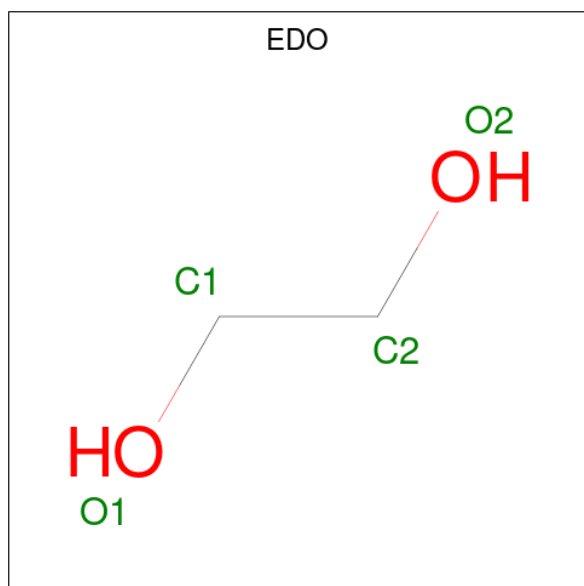
Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	2	Total	Na	0	0
			2	2		

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	2	Total	Cl	0	0
			2	2		
6	B	2	Total	Cl	0	0
			2	2		
6	C	2	Total	Cl	0	0
			2	2		
6	D	2	Total	Cl	0	0
			2	2		

- Molecule 7 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



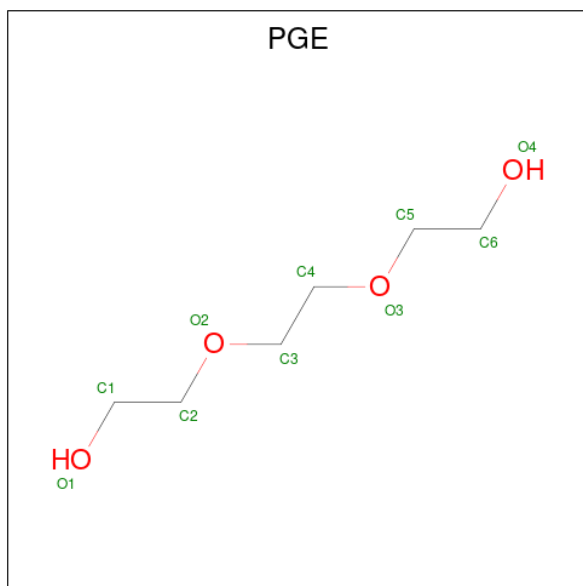
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		

Continued on next page...

Continued from previous page...

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

- Molecule 8 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	C	O	0	0
			10	6	4		
8	C	1	Total	C	O	0	0
			10	6	4		

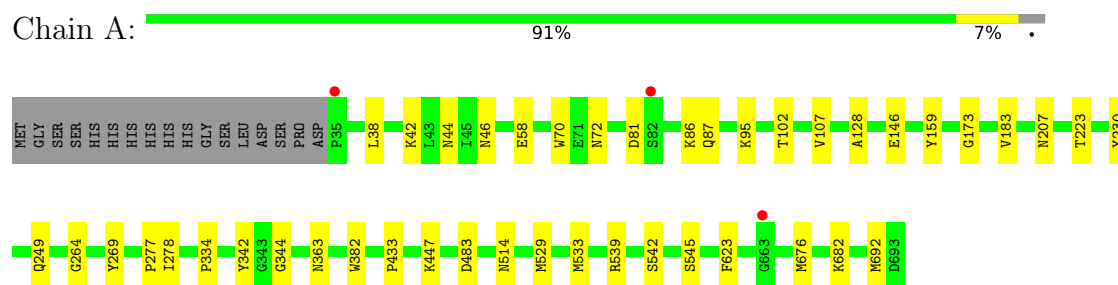
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	570	Total 571	O 571	0	1
9	B	553	Total 554	O 554	0	1
9	C	535	Total 537	O 537	0	2
9	D	509	Total 511	O 511	0	2

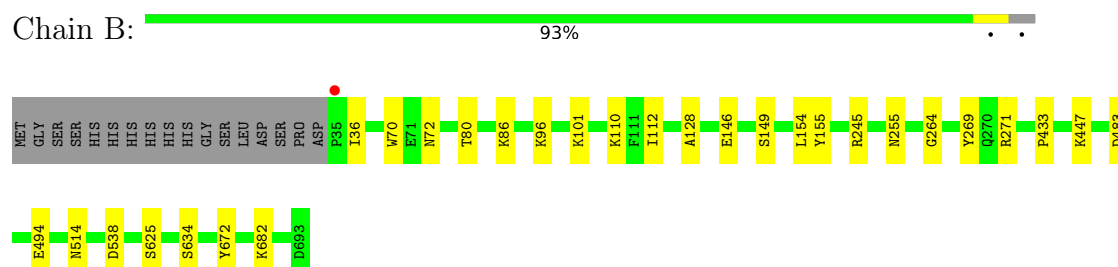
3 Residue-property plots

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.

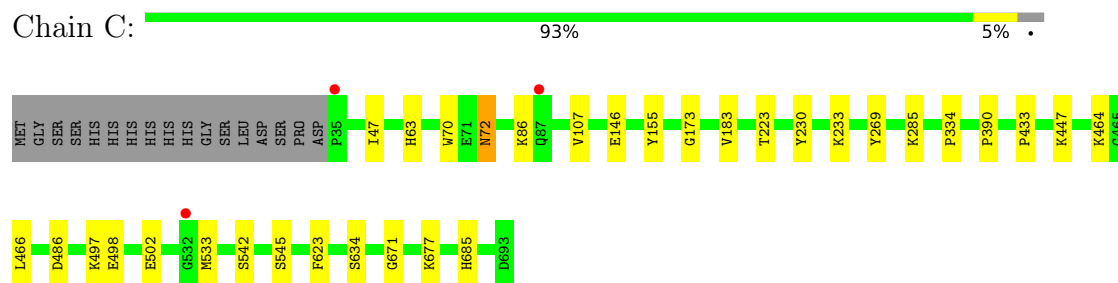
- Molecule 1: Conserved hypothetical periplasmic protein



- Molecule 1: Conserved hypothetical periplasmic protein

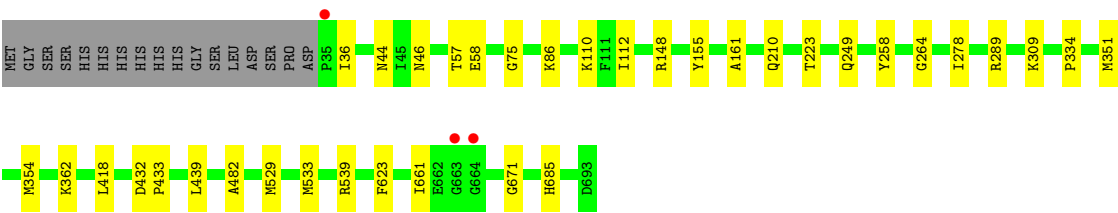


- Molecule 1: Conserved hypothetical periplasmic protein



- Molecule 1: Conserved hypothetical periplasmic protein





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	219.95Å 106.83Å 165.53Å 90.00° 113.93° 90.00°	Depositor
Resolution (Å)	48.00 – 1.81 48.00 – 1.81	Depositor EDS
% Data completeness (in resolution range)	86.3 (48.00-1.81) 86.3 (48.00-1.81)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.14 (at 1.82Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.166 , 0.194 0.168 , 0.196	Depositor DCC
R_{free} test set	13596 reflections (4.30%)	wwPDB-VP
Wilson B-factor (Å ²)	33.7	Xtriage
Anisotropy	0.286	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 45.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	23263	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.41% 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: NA, EDO, A1H39, PGE, PEG, TLA, CL

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	0.25	0/5357	0.47	0/7253
1	B	0.24	0/5377	0.47	0/7274
1	C	0.23	0/5362	0.46	0/7260
1	D	0.23	0/5351	0.46	0/7244
All	All	0.24	0/21447	0.47	0/29031

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 [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	5219	0	5046	23	0
1	B	5240	0	5095	17	0
1	C	5225	0	5052	18	0
1	D	5214	0	5047	19	0
2	A	10	0	0	0	0
2	B	10	0	0	0	0
2	C	10	0	0	0	0
2	D	10	0	0	0	0
3	A	20	0	8	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	4	0	0
3	C	10	0	4	0	0
3	D	10	0	4	0	0
4	A	7	0	10	0	0
4	D	7	0	10	2	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
5	C	2	0	0	0	0
5	D	2	0	0	0	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
6	C	2	0	0	0	0
6	D	2	0	0	0	0
7	A	16	0	24	2	0
7	B	12	0	18	1	0
7	C	12	0	18	1	0
7	D	12	0	18	1	0
8	B	10	0	14	1	0
8	C	10	0	14	1	0
9	A	571	0	0	1	0
9	B	554	0	0	2	0
9	C	537	0	0	3	0
9	D	511	0	0	5	0
All	All	23263	0	20386	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 2.

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:C:72:ASN:ND2	9:C:804:HOH:O	2.35	0.60
1:C:498:GLU:H	1:C:498:GLU:CD	2.11	0.57
1:B:96:LYS:HB3	1:B:112:ILE:HB	1.89	0.55
1:B:149:SER:HB3	1:B:154:LEU:HG	1.88	0.55
1:B:128:ALA:HB3	1:B:146:GLU:HB3	1.88	0.55
1:A:38:LEU:HD21	1:A:107:VAL:HG23	1.90	0.54
1:C:464:LYS:HD2	1:C:502:GLU:HG2	1.90	0.53
7:D:706:EDO:H12	9:D:1126:HOH:O	2.09	0.53
1:B:433:PRO:HA	7:B:708:EDO:H21	1.89	0.52
1:B:245:ARG:NE	1:B:494:GLU:HG2	2.27	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:44:ASN:OD1	1:A:46:ASN:ND2	2.43	0.50
1:B:682:LYS:NZ	9:B:812:HOH:O	2.43	0.50
1:B:538[A]:ASP:OD1	9:B:801:HOH:O	2.20	0.50
1:C:70:TRP:CD1	1:C:269:TYR:HB3	2.47	0.49
1:A:433:PRO:HA	7:A:708:EDO:H22	1.93	0.49
1:D:433:PRO:HA	4:D:709:PEG:H32	1.94	0.49
1:A:264:GLY:HA3	1:B:447:LYS:HB3	1.95	0.49
1:A:249:GLN:HB2	1:A:278:ILE:HD11	1.95	0.48
1:C:47:ILE:HD13	1:C:107:VAL:HG21	1.95	0.48
1:B:70:TRP:CD1	1:B:269:TYR:HB3	2.50	0.47
1:D:223:THR:HG21	1:D:533:MET:SD	2.55	0.47
1:A:207:ASN:H	7:A:710:EDO:H22	1.81	0.46
1:D:46:ASN:ND2	9:D:813:HOH:O	2.45	0.46
1:D:539:ARG:NH1	9:D:817:HOH:O	2.48	0.46
1:D:351:MET:HG2	1:D:354:MET:HB2	1.96	0.46
1:D:44:ASN:HB3	1:D:57:THR:HB	1.97	0.46
1:A:483:ASP:O	1:A:514:ASN:HA	2.15	0.46
1:A:81:ASP:OD2	1:A:87:GLN:NE2	2.48	0.46
1:C:334:PRO:HG3	1:C:623:PHE:CD2	2.51	0.45
1:A:676:MET:HG3	1:A:682:LYS:HE2	1.97	0.45
1:A:223:THR:HG21	1:A:533:MET:SD	2.57	0.45
1:C:390:PRO:HB2	1:C:466:LEU:HD13	1.99	0.44
1:D:418:LEU:HD22	1:D:482:ALA:HB2	1.99	0.44
1:A:70:TRP:CD1	1:A:269:TYR:HB3	2.52	0.44
1:D:148:ARG:HD3	1:D:148:ARG:HA	1.66	0.44
1:A:159:TYR:O	1:A:277:PRO:HG2	2.17	0.44
1:C:183:VAL:HB	1:C:545:SER:HB2	2.00	0.44
1:B:634:SER:O	8:B:702:PGE:H42	2.17	0.44
1:D:334:PRO:HG3	1:D:623:PHE:CD2	2.53	0.44
1:C:223:THR:HG21	1:C:533:MET:SD	2.58	0.44
1:D:249:GLN:HB2	1:D:278:ILE:HD11	2.00	0.44
1:B:255:ASN:HB3	1:B:271:ARG:HG3	1.99	0.44
1:D:289:ARG:NH2	9:D:804:HOH:O	2.30	0.44
1:A:86:LYS:NZ	9:A:827:HOH:O	2.50	0.43
1:B:86:LYS:HE2	1:B:155:TYR:CE2	2.54	0.43
1:C:63:HIS:HD2	9:C:827:HOH:O	2.01	0.43
1:C:233:LYS:NZ	9:C:827:HOH:O	2.52	0.43
1:A:173:GLY:HA3	1:A:230:TYR:O	2.19	0.43
1:B:80:THR:HG23	1:B:155:TYR:HE2	1.84	0.42
1:D:86:LYS:HE2	1:D:155:TYR:CE2	2.54	0.42
1:C:634:SER:O	8:C:702:PGE:H32	2.18	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:245:ARG:HE	1:B:494:GLU:HG2	1.84	0.42
1:A:128:ALA:HB3	1:A:146:GLU:HB3	2.02	0.42
1:B:483:ASP:O	1:B:514:ASN:HA	2.20	0.42
1:C:86:LYS:HE2	1:C:155:TYR:CE2	2.54	0.42
1:A:334:PRO:HG3	1:A:623:PHE:CD2	2.55	0.42
1:A:692:MET:HG2	1:B:672:TYR:OH	2.20	0.42
1:A:342:TYR:CE2	1:A:344:GLY:HA2	2.55	0.41
1:C:173:GLY:HA3	1:C:230:TYR:O	2.21	0.41
1:C:497:LYS:HE2	1:C:497:LYS:HB3	1.89	0.41
1:D:75:GLY:HA2	1:D:161:ALA:HB2	2.03	0.41
1:A:342:TYR:HA	1:A:382:TRP:HB2	2.03	0.41
1:D:309:LYS:NZ	9:D:830:HOH:O	2.53	0.41
1:A:183:VAL:HB	1:A:545:SER:HB2	2.02	0.41
1:C:433:PRO:HA	7:C:707:EDO:H11	2.03	0.41
1:D:432:ASP:O	4:D:709:PEG:H31	2.20	0.41
1:C:447:LYS:HB3	1:D:264:GLY:HA3	2.03	0.40
1:D:110:LYS:HZ2	1:D:112:ILE:HD11	1.86	0.40
1:A:539:ARG:HG3	1:A:542:SER:HB3	2.02	0.40
1:C:671:GLY:HA2	1:C:685:HIS:HA	2.03	0.40
1:D:210:GLN:HG2	1:D:258:TYR:CD1	2.57	0.40
1:D:671:GLY:HA2	1:D:685:HIS:HA	2.03	0.40
1:A:95:LYS:HA	1:A:95:LYS:HD3	1.89	0.40
1:A:447:LYS:HB3	1:B:264:GLY:HA3	2.04	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	661/676 (98%)	633 (96%)	28 (4%)	0	100	100
1	B	661/676 (98%)	634 (96%)	27 (4%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	661/676 (98%)	633 (96%)	28 (4%)	0	100	100
1	D	659/676 (98%)	633 (96%)	26 (4%)	0	100	100
All	All	2642/2704 (98%)	2533 (96%)	109 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	552/577 (96%)	546 (99%)	6 (1%)	65	56
1	B	558/577 (97%)	552 (99%)	6 (1%)	65	56
1	C	555/577 (96%)	548 (99%)	7 (1%)	61	50
1	D	553/577 (96%)	547 (99%)	6 (1%)	65	56
All	All	2218/2308 (96%)	2193 (99%)	25 (1%)	68	56

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	LYS
1	A	58	GLU
1	A	72	ASN
1	A	102	THR
1	A	363	ASN
1	A	529	MET
1	B	36	ILE
1	B	72	ASN
1	B	101	LYS
1	B	110	LYS
1	B	625[A]	SER
1	B	625[B]	SER
1	C	72	ASN
1	C	146	GLU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	285	LYS
1	C	486[A]	ASP
1	C	486[B]	ASP
1	C	542	SER
1	C	677	LYS
1	D	36	ILE
1	D	58	GLU
1	D	362	LYS
1	D	439	LEU
1	D	529	MET
1	D	661	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	434	ASN
1	A	687	GLN
1	B	434	ASN
1	C	87	GLN
1	C	308	GLN
1	C	691	HIS
1	D	63	HIS
1	D	87	GLN
1	D	247	HIS
1	D	308	GLN
1	D	691	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

Of 42 ligands modelled in this entry, 16 are monoatomic - leaving 26 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
8	PGE	B	702	-	9,9,9	0.33	0	8,8,8	0.25	0
4	PEG	D	709	-	6,6,6	0.49	0	5,5,5	0.31	0
7	EDO	C	709	-	3,3,3	0.41	0	2,2,2	0.53	0
7	EDO	C	708	-	3,3,3	0.47	0	2,2,2	0.28	0
7	EDO	D	707	-	3,3,3	0.41	0	2,2,2	0.42	0
7	EDO	B	708	-	3,3,3	0.39	0	2,2,2	0.44	0
7	EDO	C	707	-	3,3,3	0.42	0	2,2,2	0.33	0
8	PGE	C	702	-	9,9,9	0.33	0	8,8,8	0.35	0
7	EDO	B	709	-	3,3,3	0.41	0	2,2,2	0.40	0
7	EDO	A	710	-	3,3,3	0.45	0	2,2,2	0.33	0
3	TLA	A	701	-	9,9,9	1.01	0	12,12,12	1.16	2 (16%)
2	A1H39	A	700	1	11,11,11	5.70	7 (63%)	13,16,16	2.26	6 (46%)
3	TLA	A	703	-	9,9,9	1.05	0	12,12,12	1.26	2 (16%)
7	EDO	A	709	-	3,3,3	0.52	0	2,2,2	0.28	0
4	PEG	A	702	-	6,6,6	0.48	0	5,5,5	0.39	0
7	EDO	D	708	-	3,3,3	0.43	0	2,2,2	0.27	0
7	EDO	D	706	-	3,3,3	0.44	0	2,2,2	0.28	0
7	EDO	A	708	-	3,3,3	0.42	0	2,2,2	0.28	0
2	A1H39	D	700	1	11,11,11	5.72	7 (63%)	13,16,16	2.17	6 (46%)
3	TLA	D	701	-	9,9,9	1.03	0	12,12,12	1.23	2 (16%)
2	A1H39	C	700	1	11,11,11	5.70	7 (63%)	13,16,16	2.14	6 (46%)
7	EDO	A	711	-	3,3,3	0.45	0	2,2,2	0.32	0
3	TLA	C	701	-	9,9,9	1.06	0	12,12,12	1.19	0
7	EDO	B	707	-	3,3,3	0.47	0	2,2,2	0.31	0
2	A1H39	B	700	1	11,11,11	5.71	7 (63%)	13,16,16	2.25	6 (46%)
3	TLA	B	701	-	9,9,9	0.98	0	12,12,12	1.22	2 (16%)

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
8	PGE	B	702	-	-	4/7/7/7	-
4	PEG	D	709	-	-	3/4/4/4	-
7	EDO	C	709	-	-	0/1/1/1	-
7	EDO	C	708	-	-	1/1/1/1	-
7	EDO	D	707	-	-	1/1/1/1	-
7	EDO	B	708	-	-	0/1/1/1	-
7	EDO	C	707	-	-	1/1/1/1	-
8	PGE	C	702	-	-	5/7/7/7	-
7	EDO	B	709	-	-	0/1/1/1	-
7	EDO	A	710	-	-	1/1/1/1	-
3	TLA	A	701	-	-	0/12/12/12	-
3	TLA	A	703	-	-	0/12/12/12	-
2	A1H39	A	700	1	-	-	0/3/2/2
7	EDO	A	709	-	-	1/1/1/1	-
4	PEG	A	702	-	-	2/4/4/4	-
7	EDO	D	708	-	-	1/1/1/1	-
7	EDO	D	706	-	-	1/1/1/1	-
7	EDO	A	708	-	-	1/1/1/1	-
2	A1H39	D	700	1	-	-	0/3/2/2
3	TLA	D	701	-	-	0/12/12/12	-
2	A1H39	C	700	1	-	-	0/3/2/2
7	EDO	A	711	-	-	1/1/1/1	-
3	TLA	C	701	-	-	0/12/12/12	-
7	EDO	B	707	-	-	0/1/1/1	-
2	A1H39	B	700	1	-	-	0/3/2/2
3	TLA	B	701	-	-	0/12/12/12	-

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	700	A1H39	O01-C01	11.34	1.62	1.43
2	B	700	A1H39	O01-C01	11.23	1.62	1.43
2	C	700	A1H39	O01-C01	11.20	1.62	1.43
2	D	700	A1H39	O01-C01	11.13	1.62	1.43
2	D	700	A1H39	C04-C03	-9.27	1.32	1.53
2	A	700	A1H39	C04-C03	-9.10	1.33	1.53
2	C	700	A1H39	C04-C03	-9.03	1.33	1.53
2	B	700	A1H39	C04-C03	-9.03	1.33	1.53
2	B	700	A1H39	C04-C05	-8.12	1.32	1.53
2	D	700	A1H39	C04-C05	-7.98	1.32	1.53
2	C	700	A1H39	C04-C05	-7.86	1.33	1.53

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	700	A1H39	C04-C05	-7.60	1.33	1.53
2	B	700	A1H39	C01-C02	6.19	1.67	1.52
2	A	700	A1H39	C01-C02	6.19	1.67	1.52
2	C	700	A1H39	C01-C02	6.00	1.66	1.52
2	D	700	A1H39	C01-C02	5.86	1.66	1.52
2	C	700	A1H39	O03-C06	5.77	1.56	1.43
2	A	700	A1H39	O03-C06	5.71	1.56	1.43
2	D	700	A1H39	O03-C06	5.68	1.56	1.43
2	B	700	A1H39	O03-C06	5.59	1.55	1.43
2	D	700	A1H39	C02-C03	-3.00	1.45	1.52
2	A	700	A1H39	C02-C03	-2.95	1.45	1.52
2	C	700	A1H39	C02-C03	-2.91	1.45	1.52
2	B	700	A1H39	C02-C03	-2.81	1.46	1.52
2	C	700	A1H39	O03-C03	2.54	1.49	1.43
2	D	700	A1H39	O03-C03	2.30	1.48	1.43
2	A	700	A1H39	O03-C03	2.24	1.48	1.43
2	B	700	A1H39	O03-C03	2.19	1.48	1.43

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	700	A1H39	C03-C04-C05	4.33	111.31	101.99
2	A	700	A1H39	O01-C01-C02	-4.21	100.75	110.79
2	C	700	A1H39	C03-C04-C05	4.12	110.86	101.99
2	B	700	A1H39	C03-C04-C05	4.10	110.80	101.99
2	A	700	A1H39	C03-C04-C05	4.08	110.75	101.99
2	B	700	A1H39	O01-C01-C02	-4.07	101.09	110.79
2	B	700	A1H39	C06-O03-C03	-3.09	101.68	107.84
2	D	700	A1H39	O01-C01-C02	-3.06	103.48	110.79
2	B	700	A1H39	C01-C02-C03	3.03	113.44	109.29
2	C	700	A1H39	C06-O03-C03	-2.99	101.87	107.84
2	A	700	A1H39	O01-C05-C06	-2.94	109.03	113.33
2	C	700	A1H39	O01-C01-C02	-2.83	104.04	110.79
2	C	700	A1H39	C01-C02-C03	2.81	113.14	109.29
2	A	700	A1H39	C06-O03-C03	-2.76	102.34	107.84
2	D	700	A1H39	C06-O03-C03	-2.74	102.38	107.84
2	A	700	A1H39	O02-C02-C03	-2.73	103.61	109.99
2	D	700	A1H39	O02-C02-C03	-2.62	103.86	109.99
2	C	700	A1H39	O01-C05-C06	-2.59	109.55	113.33
3	B	701	TLA	O41-C4-C3	2.53	120.35	113.31
2	D	700	A1H39	C01-C02-C03	2.50	112.72	109.29
3	A	703	TLA	O11-C1-C2	2.44	120.09	113.31

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	701	TLA	O11-C1-C2	2.38	119.92	113.31
2	B	700	A1H39	O01-C05-C06	-2.33	109.92	113.33
3	D	701	TLA	O11-C1-C2	2.32	119.75	113.31
2	A	700	A1H39	C01-C02-C03	2.25	112.37	109.29
3	A	703	TLA	O41-C4-C3	2.25	119.55	113.31
3	D	701	TLA	O41-C4-C3	2.24	119.52	113.31
2	D	700	A1H39	O01-C05-C06	-2.17	110.16	113.33
2	B	700	A1H39	O02-C02-C03	-2.16	104.94	109.99
2	C	700	A1H39	C01-O01-C05	2.13	115.05	112.19
3	B	701	TLA	O11-C1-C2	2.04	118.99	113.31
3	A	701	TLA	O41-C4-C3	2.03	118.95	113.31

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	702	PEG	O1-C1-C2-O2
8	C	702	PGE	O3-C5-C6-O4
7	D	706	EDO	O1-C1-C2-O2
4	D	709	PEG	O1-C1-C2-O2
8	B	702	PGE	O1-C1-C2-O2
8	C	702	PGE	C3-C4-O3-C5
7	A	709	EDO	O1-C1-C2-O2
7	C	707	EDO	O1-C1-C2-O2
7	D	707	EDO	O1-C1-C2-O2
8	B	702	PGE	C6-C5-O3-C4
8	C	702	PGE	O1-C1-C2-O2
4	D	709	PEG	C1-C2-O2-C3
8	C	702	PGE	C6-C5-O3-C4
7	A	708	EDO	O1-C1-C2-O2
8	C	702	PGE	C1-C2-O2-C3
7	A	710	EDO	O1-C1-C2-O2
7	C	708	EDO	O1-C1-C2-O2
4	D	709	PEG	O2-C3-C4-O4
7	D	708	EDO	O1-C1-C2-O2
8	B	702	PGE	C4-C3-O2-C2
7	A	711	EDO	O1-C1-C2-O2
8	B	702	PGE	C3-C4-O3-C5
4	A	702	PEG	C1-C2-O2-C3

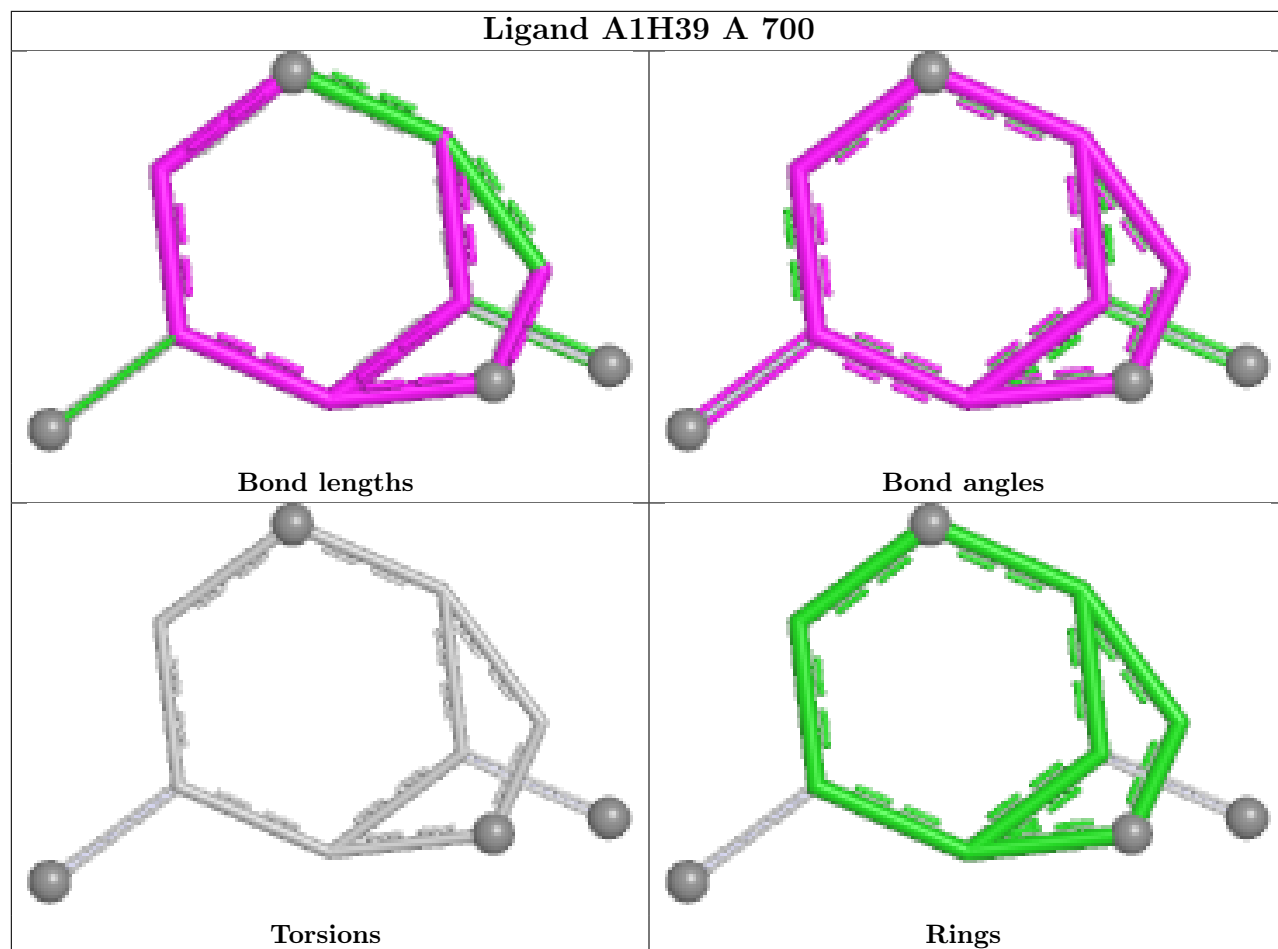
There are no ring outliers.

8 monomers are involved in 9 short contacts:

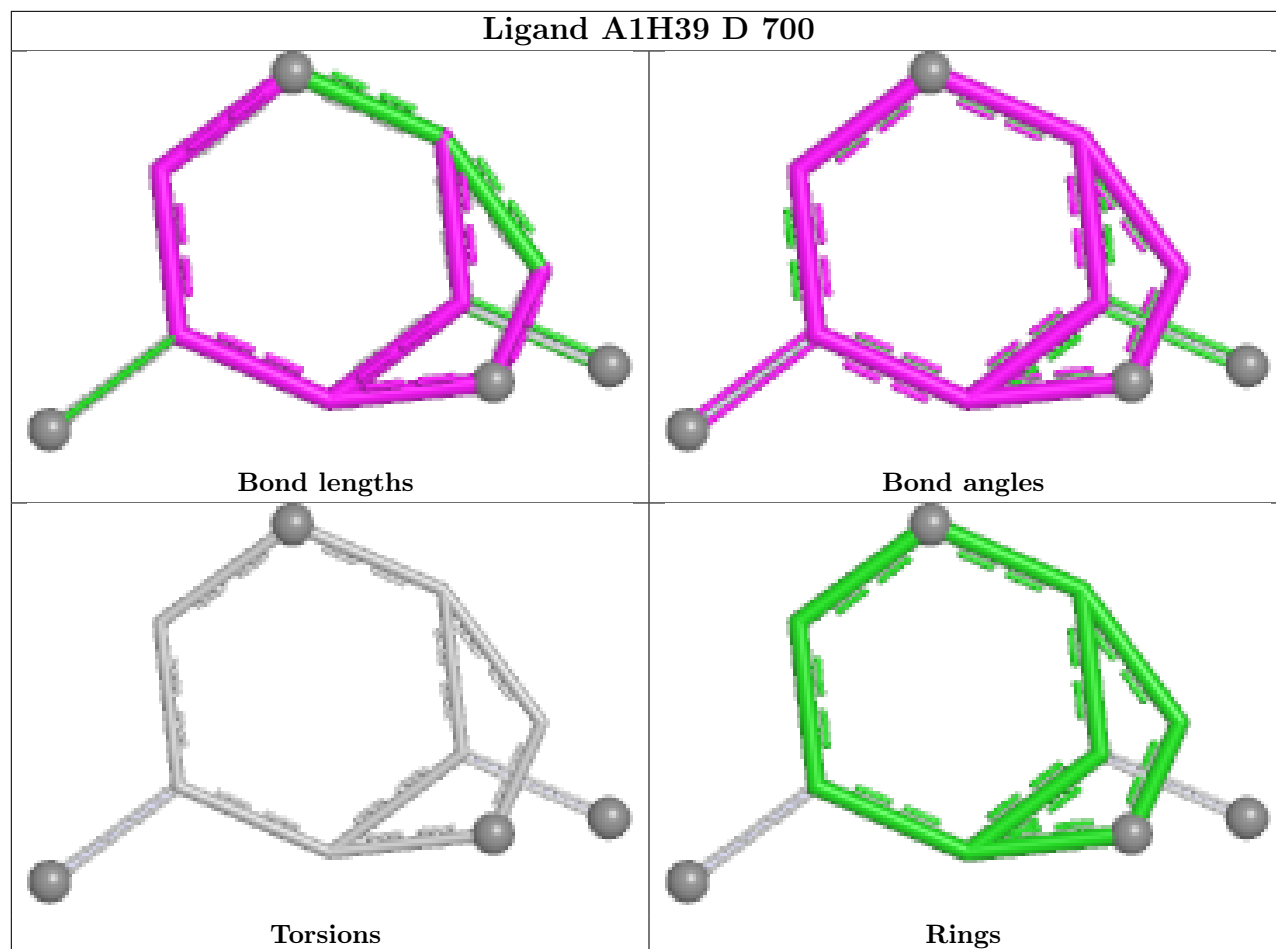
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	702	PGE	1	0
4	D	709	PEG	2	0
7	B	708	EDO	1	0
7	C	707	EDO	1	0
8	C	702	PGE	1	0
7	A	710	EDO	1	0
7	D	706	EDO	1	0
7	A	708	EDO	1	0

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

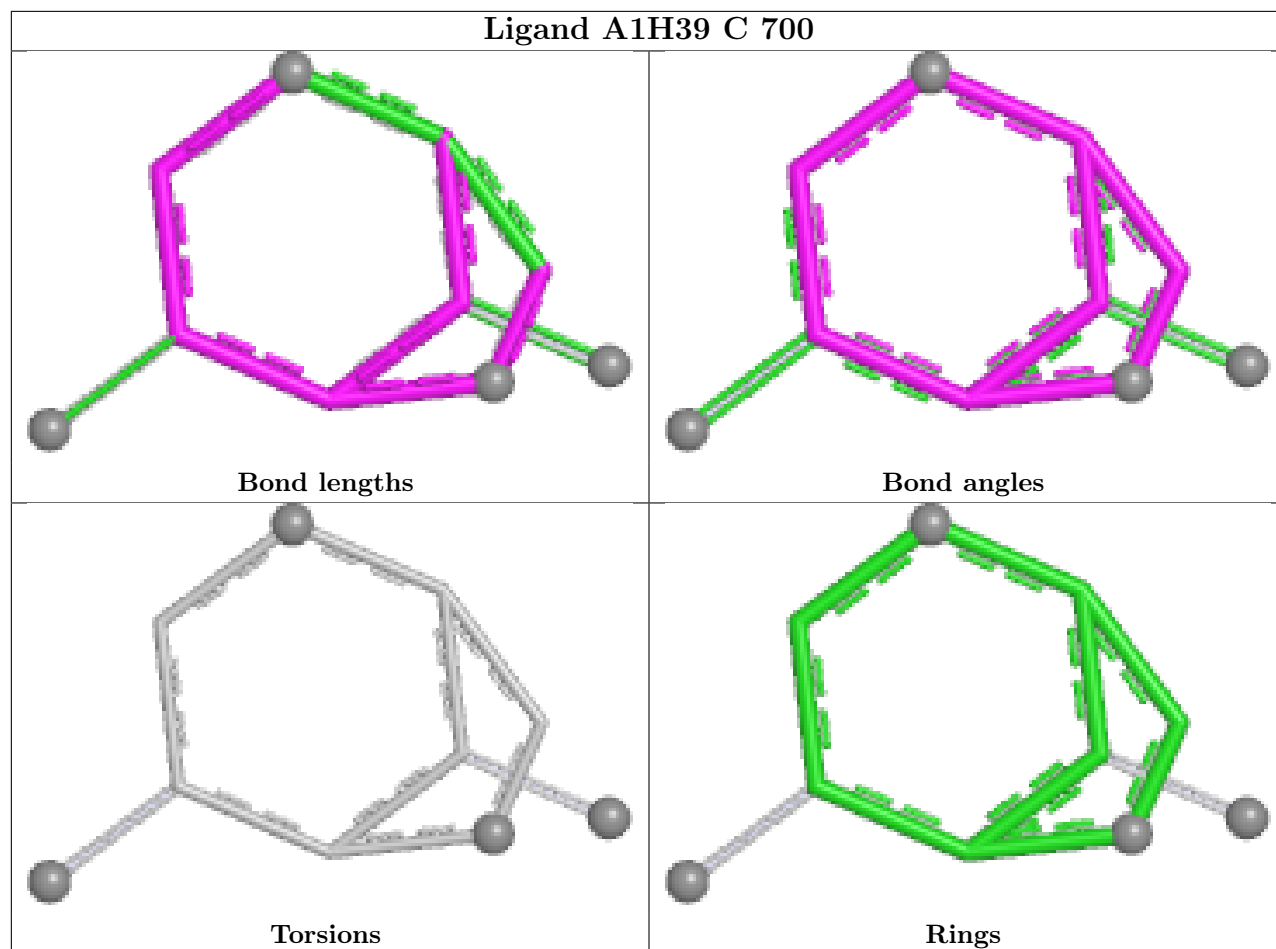
Ligand A1H39 A 700

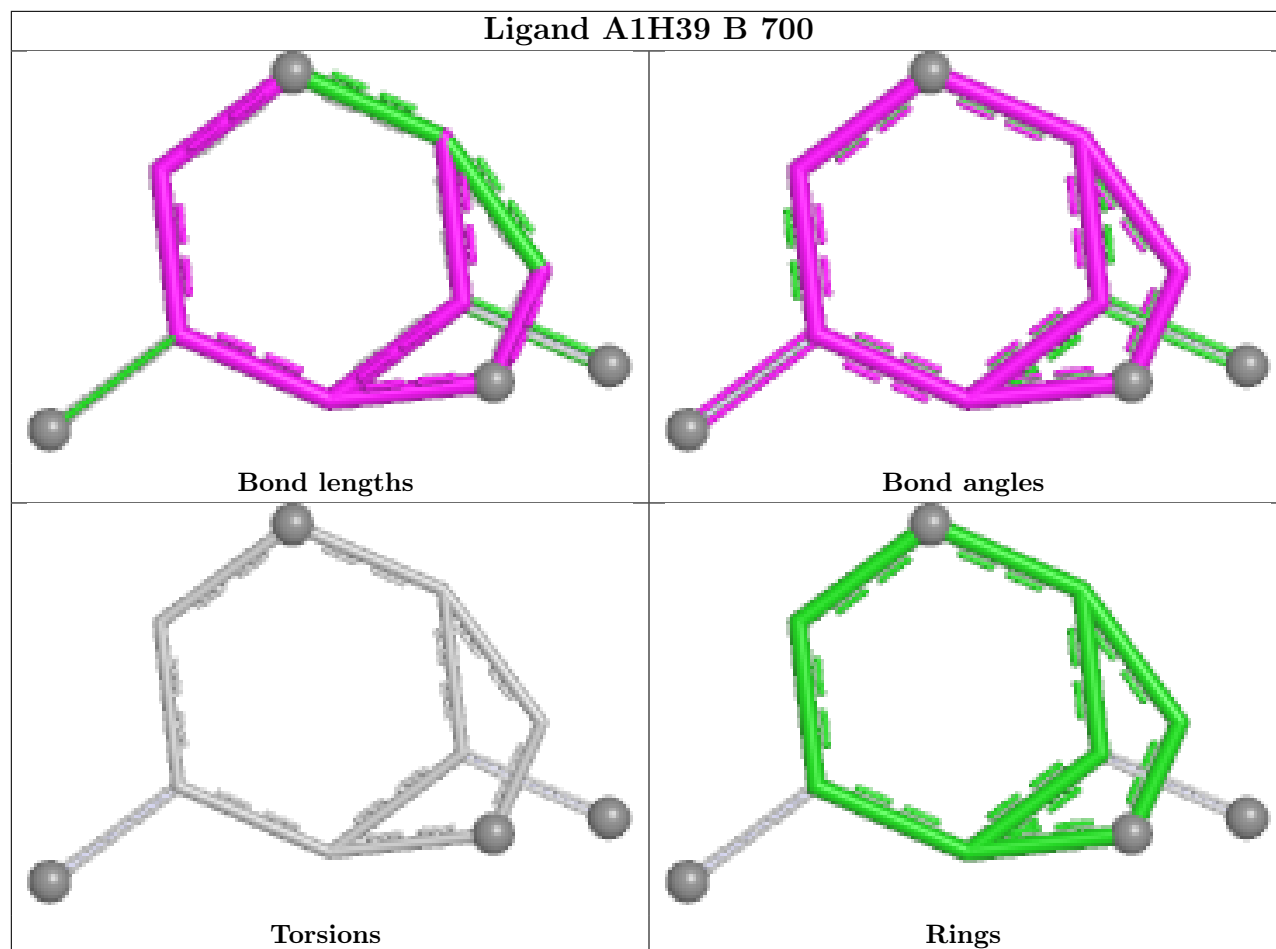


Ligand A1H39 D 700



Ligand A1H39 C 700





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	659/676 (97%)	-0.31	3 (0%) 87 90	13, 30, 53, 69	4 (0%)
1	B	659/676 (97%)	-0.24	1 (0%) 91 93	15, 32, 51, 66	4 (0%)
1	C	659/676 (97%)	-0.17	3 (0%) 87 90	14, 34, 49, 65	4 (0%)
1	D	659/676 (97%)	-0.17	3 (0%) 87 90	16, 34, 52, 70	2 (0%)
All	All	2636/2704 (97%)	-0.22	10 (0%) 88 91	13, 33, 51, 70	14 (0%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	663	GLY	5.2
1	D	35	PRO	3.7
1	A	35	PRO	2.7
1	A	663	GLY	2.6
1	B	35	PRO	2.3
1	C	532	GLY	2.3
1	D	664	GLY	2.3
1	A	82	SER	2.3
1	C	87	GLN	2.3
1	C	35	PRO	2.3

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 ⓘ

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
7	EDO	C	709	4/4	0.71	0.19	61,63,63,64	0
7	EDO	A	709	4/4	0.81	0.18	53,53,54,54	0
7	EDO	A	710	4/4	0.83	0.18	59,59,59,61	0
7	EDO	B	709	4/4	0.84	0.20	65,66,66,68	0
7	EDO	A	711	4/4	0.88	0.14	63,64,64,64	0
4	PEG	D	709	7/7	0.89	0.12	59,61,64,66	0
7	EDO	B	707	4/4	0.90	0.16	59,59,60,60	0
7	EDO	B	708	4/4	0.90	0.12	51,52,52,54	0
2	A1H39	A	700	10/10	0.90	0.10	26,29,32,33	0
2	A1H39	D	700	10/10	0.90	0.10	32,34,36,36	0
8	PGE	C	702	10/10	0.90	0.13	50,54,59,59	0
7	EDO	D	706	4/4	0.91	0.12	54,55,56,57	0
8	PGE	B	702	10/10	0.91	0.12	52,55,59,60	0
7	EDO	C	708	4/4	0.91	0.13	50,53,55,58	0
3	TLA	A	703	10/10	0.92	0.10	49,54,60,62	0
7	EDO	D	707	4/4	0.92	0.09	61,62,63,65	0
2	A1H39	C	700	10/10	0.93	0.09	29,32,34,34	0
3	TLA	C	701	10/10	0.93	0.10	34,46,54,55	0
3	TLA	A	701	10/10	0.93	0.08	33,46,49,50	0
7	EDO	A	708	4/4	0.93	0.11	49,51,52,56	0
4	PEG	A	702	7/7	0.94	0.10	46,47,54,58	0
7	EDO	D	708	4/4	0.94	0.12	51,51,52,53	0
3	TLA	B	701	10/10	0.94	0.08	35,45,47,49	0
3	TLA	D	701	10/10	0.94	0.08	38,51,55,55	0
7	EDO	C	707	4/4	0.95	0.12	54,55,55,59	0
5	NA	D	702	1/1	0.95	0.08	36,36,36,36	0
6	CL	B	705	1/1	0.95	0.10	44,44,44,44	0
2	A1H39	B	700	10/10	0.95	0.08	26,29,31,33	0
6	CL	A	706	1/1	0.96	0.09	44,44,44,44	0
6	CL	D	704	1/1	0.97	0.08	48,48,48,48	0
5	NA	C	704	1/1	0.97	0.05	35,35,35,35	0
5	NA	B	704	1/1	0.97	0.06	37,37,37,37	0
6	CL	C	705	1/1	0.97	0.07	51,51,51,51	0
5	NA	A	704	1/1	0.98	0.04	32,32,32,32	0
5	NA	D	703	1/1	0.98	0.05	38,38,38,38	0
5	NA	A	705	1/1	0.98	0.04	36,36,36,36	0
6	CL	C	706	1/1	0.99	0.07	33,33,33,33	0

Continued on next page...

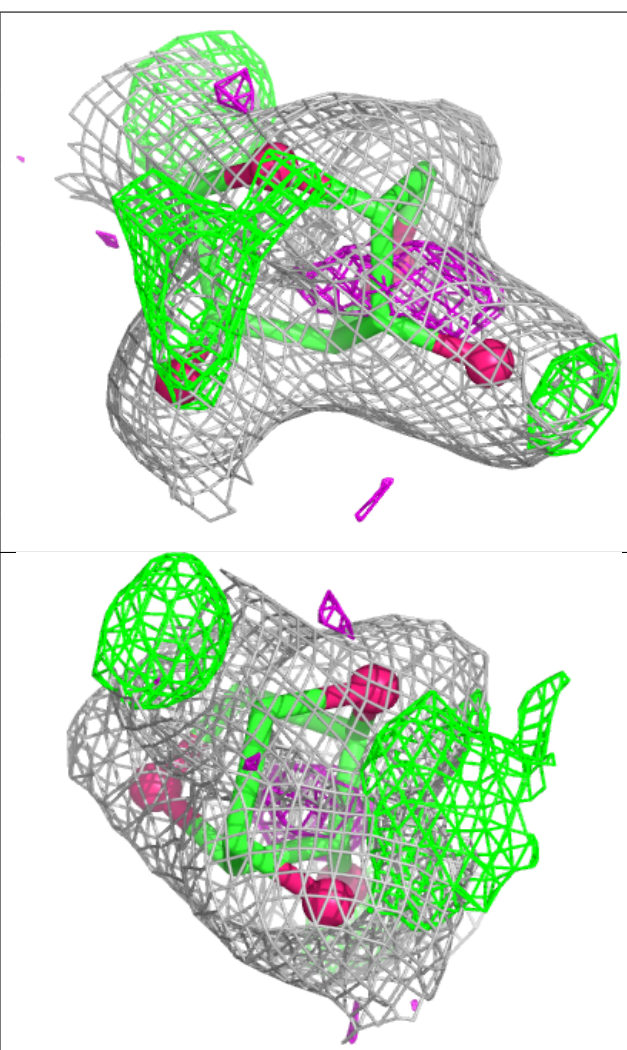
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	CL	A	707	1/1	0.99	0.05	31,31,31,31	0
6	CL	D	705	1/1	0.99	0.06	37,37,37,37	0
5	NA	B	703	1/1	0.99	0.04	34,34,34,34	0
6	CL	B	706	1/1	0.99	0.12	36,36,36,36	0
5	NA	C	703	1/1	0.99	0.03	34,34,34,34	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.

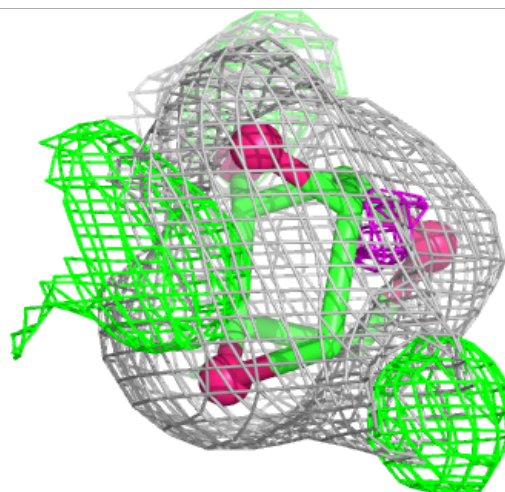
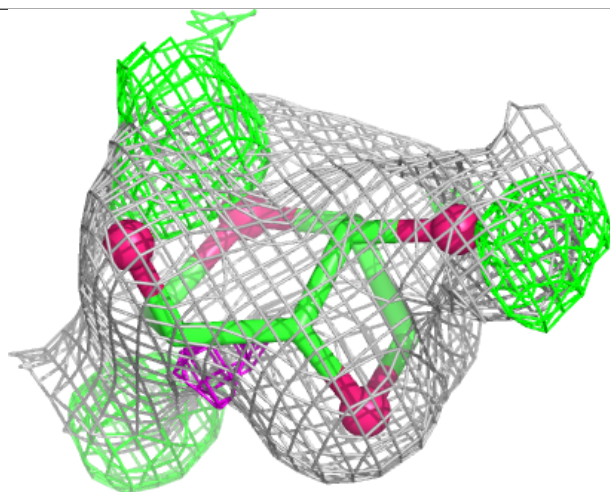
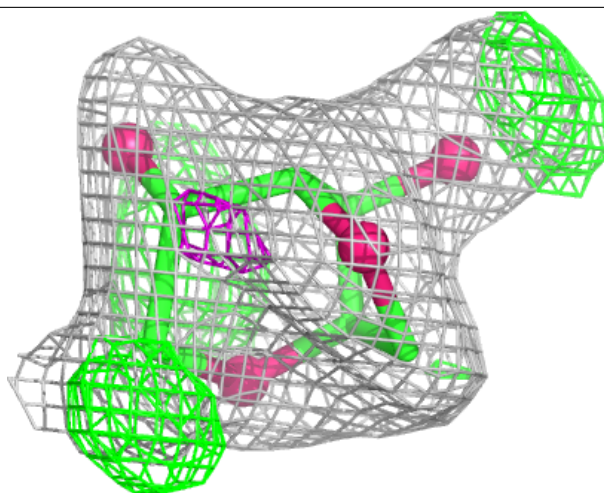
Electron density around A1H39 A 700:

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



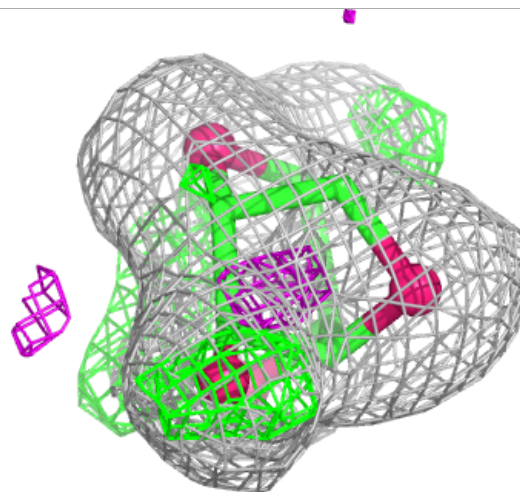
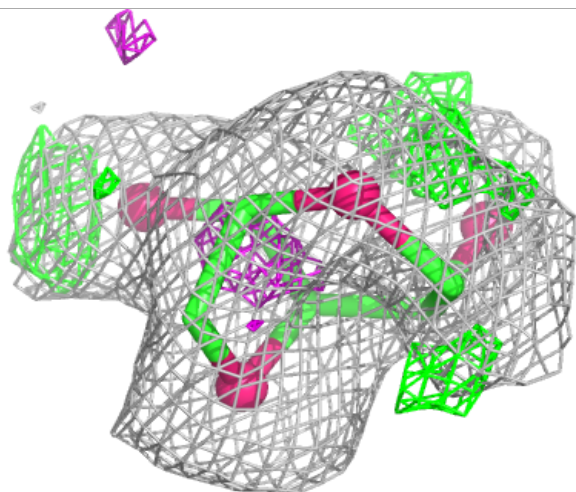
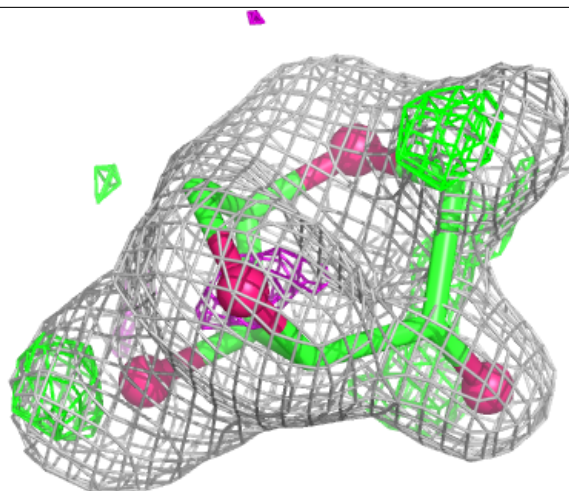
Electron density around A1H39 D 700:

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



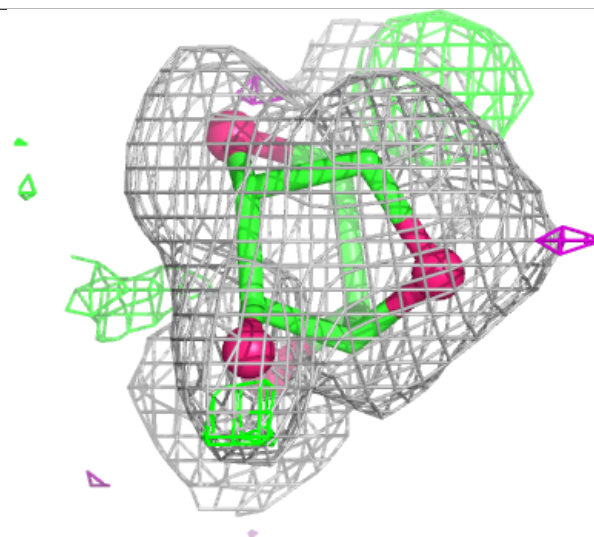
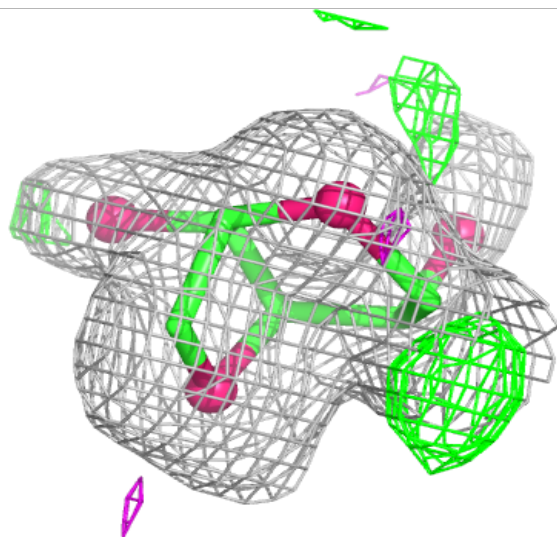
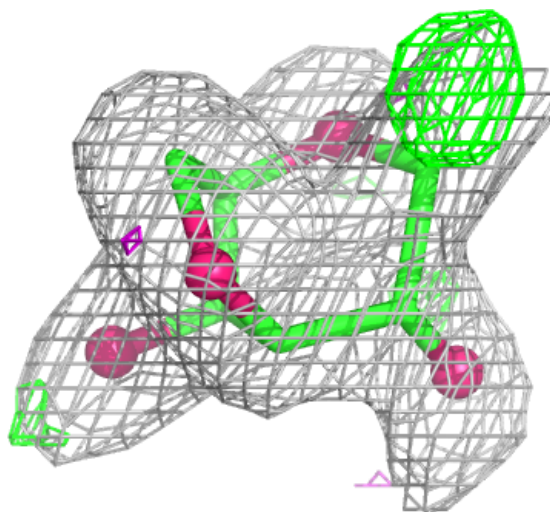
Electron density around A1H39 C 700:

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



Electron density around A1H39 B 700:

$2mF_o-DF_c$ (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.