



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 1, 2025 – 12:52 PM JST

PDB ID : 9KW8 / pdb_00009kw8
Title : Polyether epoxide hydrolase MonBI-MonBII complex with product analogue
Authors : Yao, M.; Dosen, T.; Minami, A.; Ozaki, T.; Maenaka, K.; Kumeta, H.; Oikawa, H.; Ose, T.
Deposited on : 2024-12-05
Resolution : 3.14 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.46

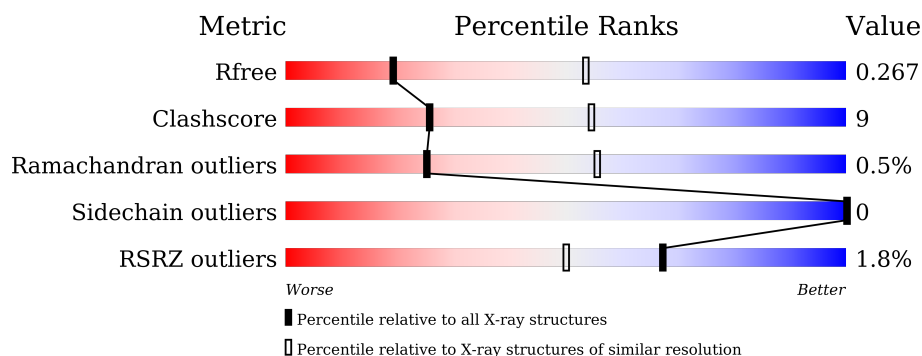
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.14 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	2149 (3.18-3.10)
Clashscore	180529	2290 (3.18-3.10)
Ramachandran outliers	177936	2178 (3.18-3.10)
Sidechain outliers	177891	2178 (3.18-3.10)
RSRZ outliers	164620	2149 (3.18-3.10)

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	302	70% 20% 11%
1	B	302	71% 20% 10%
1	C	302	65% 25% 10%
1	D	302	69% 21% 11%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 8452 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 MonBI,MonBII.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	269	Total	C	N	O	S	0	0	0
			2080	1303	374	392	11			
1	B	272	Total	C	N	O	S	0	1	0
			2102	1316	379	396	11			
1	C	272	Total	C	N	O	S	0	0	0
			2091	1310	375	395	11			
1	D	269	Total	C	N	O	S	0	0	0
			2075	1300	372	392	11			

There are 92 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	MET	-	initiating methionine	UNP Q846W7
A	-14	ASN	-	expression tag	UNP Q846W7
A	-13	HIS	-	expression tag	UNP Q846W7
A	-12	LYS	-	expression tag	UNP Q846W7
A	-11	VAL	-	expression tag	UNP Q846W7
A	-10	HIS	-	expression tag	UNP Q846W7
A	-9	HIS	-	expression tag	UNP Q846W7
A	-8	HIS	-	expression tag	UNP Q846W7
A	-7	HIS	-	expression tag	UNP Q846W7
A	-6	HIS	-	expression tag	UNP Q846W7
A	-5	HIS	-	expression tag	UNP Q846W7
A	-4	ILE	-	expression tag	UNP Q846W7
A	-3	GLU	-	expression tag	UNP Q846W7
A	-2	GLY	-	expression tag	UNP Q846W7
A	-1	ARG	-	expression tag	UNP Q846W7
A	0	HIS	-	expression tag	UNP Q846W7
A	141	SER	-	linker	UNP Q846W7
A	142	GLY	-	linker	UNP Q846W7
A	143	GLY	-	linker	UNP Q846W7
A	144	SER	-	linker	UNP Q846W7
A	145	GLY	-	linker	UNP Q846W7

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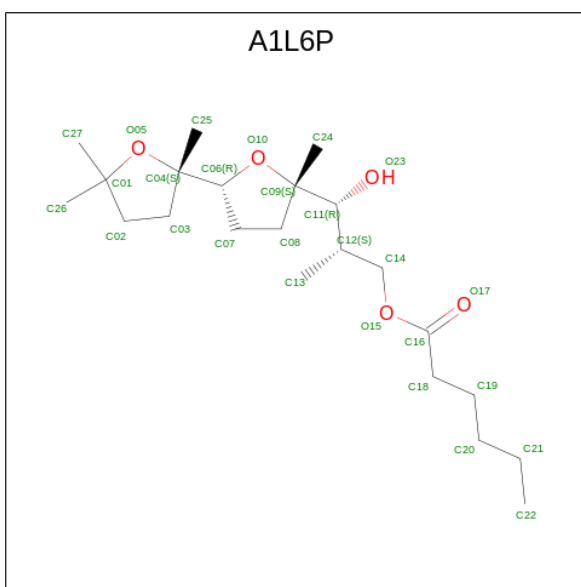
Chain	Residue	Modelled	Actual	Comment	Reference
A	146	PRO	-	linker	UNP Q846W7
A	147	ALA	-	linker	UNP Q846W7
B	-15	MET	-	initiating methionine	UNP Q846W7
B	-14	ASN	-	expression tag	UNP Q846W7
B	-13	HIS	-	expression tag	UNP Q846W7
B	-12	LYS	-	expression tag	UNP Q846W7
B	-11	VAL	-	expression tag	UNP Q846W7
B	-10	HIS	-	expression tag	UNP Q846W7
B	-9	HIS	-	expression tag	UNP Q846W7
B	-8	HIS	-	expression tag	UNP Q846W7
B	-7	HIS	-	expression tag	UNP Q846W7
B	-6	HIS	-	expression tag	UNP Q846W7
B	-5	HIS	-	expression tag	UNP Q846W7
B	-4	ILE	-	expression tag	UNP Q846W7
B	-3	GLU	-	expression tag	UNP Q846W7
B	-2	GLY	-	expression tag	UNP Q846W7
B	-1	ARG	-	expression tag	UNP Q846W7
B	0	HIS	-	expression tag	UNP Q846W7
B	141	SER	-	linker	UNP Q846W7
B	142	GLY	-	linker	UNP Q846W7
B	143	GLY	-	linker	UNP Q846W7
B	144	SER	-	linker	UNP Q846W7
B	145	GLY	-	linker	UNP Q846W7
B	146	PRO	-	linker	UNP Q846W7
B	147	ALA	-	linker	UNP Q846W7
C	-15	MET	-	initiating methionine	UNP Q846W7
C	-14	ASN	-	expression tag	UNP Q846W7
C	-13	HIS	-	expression tag	UNP Q846W7
C	-12	LYS	-	expression tag	UNP Q846W7
C	-11	VAL	-	expression tag	UNP Q846W7
C	-10	HIS	-	expression tag	UNP Q846W7
C	-9	HIS	-	expression tag	UNP Q846W7
C	-8	HIS	-	expression tag	UNP Q846W7
C	-7	HIS	-	expression tag	UNP Q846W7
C	-6	HIS	-	expression tag	UNP Q846W7
C	-5	HIS	-	expression tag	UNP Q846W7
C	-4	ILE	-	expression tag	UNP Q846W7
C	-3	GLU	-	expression tag	UNP Q846W7
C	-2	GLY	-	expression tag	UNP Q846W7
C	-1	ARG	-	expression tag	UNP Q846W7
C	0	HIS	-	expression tag	UNP Q846W7
C	141	SER	-	linker	UNP Q846W7

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Chain	Residue	Modelled	Actual	Comment	Reference
C	142	GLY	-	linker	UNP Q846W7
C	143	GLY	-	linker	UNP Q846W7
C	144	SER	-	linker	UNP Q846W7
C	145	GLY	-	linker	UNP Q846W7
C	146	PRO	-	linker	UNP Q846W7
C	147	ALA	-	linker	UNP Q846W7
D	-15	MET	-	initiating methionine	UNP Q846W7
D	-14	ASN	-	expression tag	UNP Q846W7
D	-13	HIS	-	expression tag	UNP Q846W7
D	-12	LYS	-	expression tag	UNP Q846W7
D	-11	VAL	-	expression tag	UNP Q846W7
D	-10	HIS	-	expression tag	UNP Q846W7
D	-9	HIS	-	expression tag	UNP Q846W7
D	-8	HIS	-	expression tag	UNP Q846W7
D	-7	HIS	-	expression tag	UNP Q846W7
D	-6	HIS	-	expression tag	UNP Q846W7
D	-5	HIS	-	expression tag	UNP Q846W7
D	-4	ILE	-	expression tag	UNP Q846W7
D	-3	GLU	-	expression tag	UNP Q846W7
D	-2	GLY	-	expression tag	UNP Q846W7
D	-1	ARG	-	expression tag	UNP Q846W7
D	0	HIS	-	expression tag	UNP Q846W7
D	141	SER	-	linker	UNP Q846W7
D	142	GLY	-	linker	UNP Q846W7
D	143	GLY	-	linker	UNP Q846W7
D	144	SER	-	linker	UNP Q846W7
D	145	GLY	-	linker	UNP Q846W7
D	146	PRO	-	linker	UNP Q846W7
D	147	ALA	-	linker	UNP Q846W7

- Molecule 2 is [(2 {S},3 {R})-2-methyl-3-[(2 {S},5 {R})-2-methyl-5-[(2 {S})-2,5,5-trimethyloxolan-2-yl]oxolan-2-yl]-3-oxidanyl-propyl] hexanoate (CCD ID: A1L6P) (formula: C₂₂H₄₀O₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			27	22	5		
2	B	1	Total	C	O	0	0
			27	22	5		
2	C	1	Total	C	O	0	0
			27	22	5		
2	D	1	Total	C	O	0	0
			19	15	4		

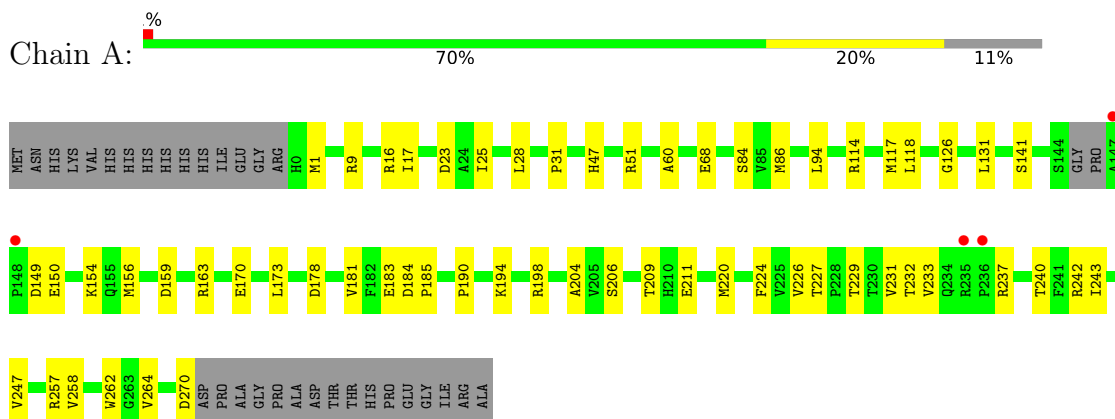
- Molecule 3 is SODIUM ION (CCD ID: NA) (formula: Na) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Na	0	0
			1	1		
3	B	1	Total	Na	0	0
			1	1		
3	C	1	Total	Na	0	0
			1	1		
3	D	1	Total	Na	0	0
			1	1		

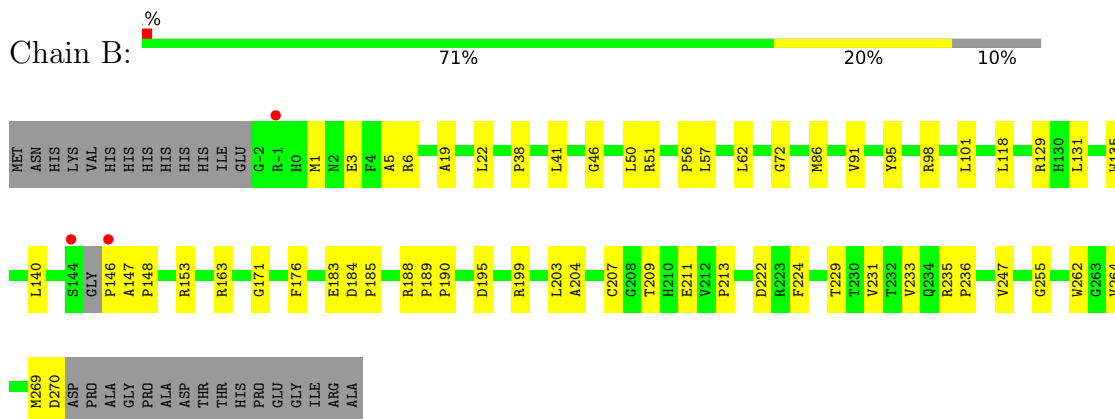
3 Residue-property plots [i](#)

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.

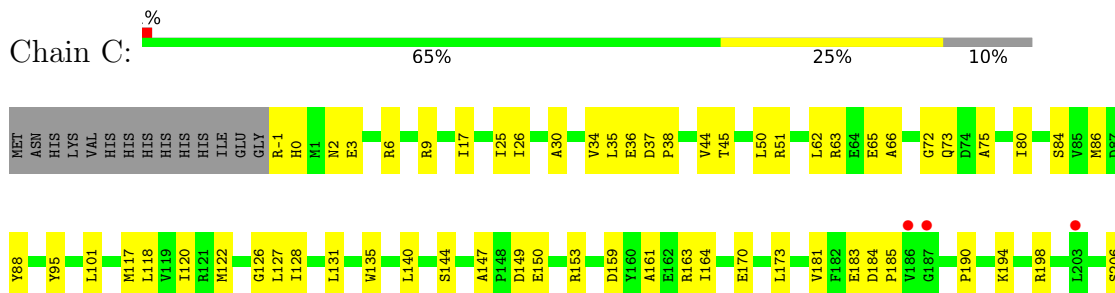
• Molecule 1: MonBI,MonBII



• Molecule 1: MonBI,MonBII

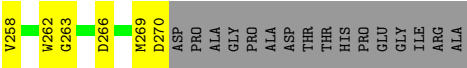


• Molecule 1: MonBI,MonBII





● Molecule 1: MonBI,MonBII



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	103.92Å 135.01Å 144.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.37 – 3.14 45.37 – 3.14	Depositor EDS
% Data completeness (in resolution range)	98.7 (45.37-3.14) 98.8 (45.37-3.14)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.43 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.216 , 0.266 0.216 , 0.267	Depositor DCC
R_{free} test set	1745 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å ²)	80.2	Xtriage
Anisotropy	0.111	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 52.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	8452	wwPDB-VP
Average B, all atoms (Å ²)	76.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.58% 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: NA, A1L6P

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	0.10	0/2127	0.31	0/2895
1	B	0.11	0/2149	0.37	2/2924 (0.1%)
1	C	0.10	0/2139	0.33	2/2914 (0.1%)
1	D	0.12	0/2121	0.32	0/2887
All	All	0.11	0/8536	0.33	4/11620 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	146	PRO	CA-C-N	6.00	132.50	121.70
1	B	146	PRO	C-N-CA	6.00	132.50	121.70
1	C	144	SER	CA-C-N	5.95	132.41	121.70
1	C	144	SER	C-N-CA	5.95	132.41	121.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	149	ASP	Peptide

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	2080	0	2046	35	0
1	B	2102	0	2067	40	0
1	C	2091	0	2055	46	0
1	D	2075	0	2042	40	0
2	A	27	0	0	1	0
2	B	27	0	0	1	0
2	C	27	0	0	1	0
2	D	19	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
All	All	8452	0	8210	156	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 9.

All (156) 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:183:GLU:HG2	1:B:190:PRO:HB3	1.63	0.81
1:A:211:GLU:HG2	1:A:231:VAL:HG22	1.62	0.80
1:D:66:ALA:HB1	1:D:80:ILE:HD11	1.71	0.72
1:D:183:GLU:HG2	1:D:190:PRO:HB3	1.73	0.71
1:C:62:LEU:HD13	1:C:86:MET:HE3	1.76	0.68
1:C:183:GLU:HG2	1:C:190:PRO:HB3	1.74	0.67
1:C:206:SER:O	1:C:235:ARG:NH1	2.28	0.67
1:D:209:THR:HG22	1:D:233:VAL:HG12	1.77	0.66
1:A:23:ASP:OD1	1:A:51:ARG:NH2	2.28	0.65
1:B:6:ARG:NH1	1:B:72:GLY:O	2.27	0.65
1:C:66:ALA:HB1	1:C:80:ILE:HD11	1.81	0.62
1:D:38:PRO:HD2	1:D:41:LEU:HD12	1.83	0.61
1:D:15:ARG:HH21	1:D:16:ARG:HG2	1.64	0.61
1:B:57:LEU:HD22	1:B:86:MET:HE1	1.81	0.61
1:A:68:GLU:O	1:A:242:ARG:NH2	2.29	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:264:VAL:HG13	1:D:237:ARG:HG3	1.83	0.60
1:B:1:MET:HG2	1:B:5:ALA:HB3	1.84	0.60
1:C:147:ALA:HB3	1:C:150:GLU:HB2	1.84	0.59
1:A:60:ALA:HB3	1:A:86:MET:HE2	1.84	0.59
1:A:247:VAL:HG22	1:A:258:VAL:HG22	1.84	0.59
1:C:181:VAL:HB	1:C:257:ARG:HG3	1.86	0.58
1:C:184:ASP:OD2	2:C:301:A1L6P:O23	2.22	0.58
1:B:270:ASP:OD1	1:B:270:ASP:N	2.34	0.57
1:B:184:ASP:OD2	2:B:301:A1L6P:O23	2.22	0.57
1:D:270:ASP:N	1:D:270:ASP:OD1	2.37	0.57
1:A:181:VAL:HB	1:A:257:ARG:HD3	1.85	0.56
1:D:26:ILE:HD13	1:D:51:ARG:HG2	1.86	0.56
1:A:183:GLU:HG2	1:A:190:PRO:HB3	1.86	0.56
1:C:173:LEU:HB3	1:C:194:LYS:HD3	1.88	0.55
1:D:60:ALA:HB3	1:D:86:MET:HE2	1.88	0.55
1:A:184:ASP:OD2	2:A:301:A1L6P:O23	2.25	0.55
1:C:63:ARG:NH2	1:C:65:GLU:OE1	2.39	0.55
1:C:62:LEU:HD11	1:C:84:SER:HB3	1.88	0.55
1:D:63:ARG:NH1	1:D:65:GLU:OE1	2.40	0.54
1:C:34:VAL:HG22	1:C:45:THR:HG23	1.89	0.54
1:A:31:PRO:HA	1:A:47:HIS:CD2	2.42	0.54
1:D:56:PRO:HB2	1:D:91:VAL:HG22	1.89	0.54
1:B:135:TRP:HZ3	1:B:140:LEU:HD22	1.73	0.53
1:A:220:MET:HE3	1:A:220:MET:O	2.09	0.53
1:B:118:LEU:HD22	1:B:131:LEU:HD21	1.90	0.53
1:B:62:LEU:HD13	1:B:86:MET:HE3	1.90	0.53
1:D:57:LEU:HD23	1:D:91:VAL:HG21	1.91	0.53
1:D:114:ARG:HD3	1:D:135:TRP:CD2	2.42	0.53
1:C:38:PRO:HB3	1:C:135:TRP:CE2	2.44	0.53
1:C:95:TYR:HB3	1:C:101:LEU:HD13	1.90	0.53
1:B:22:LEU:HD21	1:B:51[A]:ARG:HB3	1.91	0.52
1:C:9:ARG:NE	1:C:126:GLY:O	2.42	0.52
1:C:185:PRO:HB3	1:C:262:TRP:CE2	2.44	0.52
1:C:117:MET:HG2	1:C:226:VAL:HG11	1.91	0.52
1:C:218:THR:HG22	1:C:225:VAL:HG22	1.90	0.52
1:D:147:ALA:HB3	1:D:148:PRO:HD3	1.91	0.52
1:A:1:MET:HE1	1:A:126:GLY:HA2	1.92	0.52
1:C:2:ASN:OD1	1:C:3:GLU:N	2.42	0.52
1:B:269:MET:N	1:B:269:MET:HE2	2.25	0.52
1:D:182:PHE:HB3	1:D:191:MET:HE3	1.91	0.51
1:D:269:MET:HE2	1:D:269:MET:H	1.76	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:38:PRO:HB3	1:D:135:TRP:CE2	2.46	0.51
1:A:17:ILE:HD13	1:A:25:ILE:HD13	1.92	0.51
1:A:185:PRO:HB3	1:A:262:TRP:CE2	2.46	0.51
1:C:232:THR:HG22	1:C:240:THR:HG23	1.92	0.51
1:B:95:TYR:HB3	1:B:101:LEU:HD13	1.93	0.50
1:A:173:LEU:HD22	1:A:194:LYS:HB3	1.94	0.50
1:B:153:ARG:NH1	1:B:222:ASP:O	2.45	0.50
1:C:135:TRP:HZ3	1:C:140:LEU:HD22	1.76	0.50
1:D:68:GLU:O	1:D:242:ARG:NH2	2.31	0.50
1:B:269:MET:HE2	1:B:269:MET:H	1.76	0.50
1:A:270:ASP:N	1:A:270:ASP:OD1	2.43	0.50
1:B:185:PRO:HB3	1:B:262:TRP:CE2	2.47	0.50
1:C:35:LEU:HD11	1:C:37:ASP:HB2	1.94	0.50
1:B:176:PHE:CD1	1:B:255:GLY:HA3	2.47	0.50
1:A:117:MET:HG2	1:A:226:VAL:HG11	1.93	0.49
1:B:211:GLU:HG2	1:B:231:VAL:HG13	1.92	0.49
1:C:17:ILE:HD13	1:C:25:ILE:HD13	1.94	0.49
1:D:62:LEU:HD13	1:D:86:MET:HE3	1.93	0.49
1:B:46:GLY:O	1:B:50:LEU:HG	2.12	0.49
1:B:204:ALA:O	1:B:209:THR:HG23	2.13	0.49
1:A:243:ILE:HG23	1:A:262:TRP:HB3	1.94	0.49
1:D:4:PHE:O	1:D:8:LYS:HG2	2.13	0.49
1:D:73:GLN:HG3	1:D:263:GLY:HA2	1.94	0.48
1:C:149:ASP:O	1:C:153:ARG:HG3	2.12	0.48
1:A:206:SER:HB3	1:D:203:LEU:HD13	1.95	0.48
1:D:16:ARG:NH1	1:D:24:ALA:O	2.39	0.48
1:B:38:PRO:HD2	1:B:41:LEU:HD12	1.95	0.48
1:D:204:ALA:O	1:D:209:THR:HG23	2.12	0.48
1:D:185:PRO:HB3	1:D:262:TRP:CE2	2.49	0.47
1:B:3:GLU:OE2	1:B:264:VAL:N	2.47	0.47
1:A:9:ARG:NH1	1:A:126:GLY:O	2.48	0.47
1:C:250:ASP:HB3	1:C:256:ARG:HG3	1.97	0.47
1:B:188:ARG:HB3	1:B:189:PRO:HD2	1.97	0.47
1:B:235:ARG:HA	1:B:236:PRO:C	2.39	0.47
1:B:195:ASP:HB3	1:B:199:ARG:NH2	2.30	0.47
1:A:94:LEU:HD13	1:B:98:ARG:HG2	1.97	0.46
1:B:1:MET:HE2	1:B:5:ALA:HB1	1.97	0.46
1:D:227:THR:HG22	1:D:229:THR:HG23	1.97	0.46
1:A:204:ALA:O	1:A:209:THR:HG23	2.15	0.46
1:D:201:LEU:O	1:D:205:VAL:HG23	2.15	0.46
1:B:56:PRO:HB2	1:B:91:VAL:HG13	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:147:ALA:HB1	1:B:148:PRO:HD2	1.97	0.46
1:D:32:ASP:OD1	1:D:32:ASP:N	2.47	0.46
1:D:269:MET:SD	1:D:269:MET:N	2.89	0.46
1:D:120:ILE:HG12	1:D:131:LEU:HG	1.98	0.46
1:C:-1:ARG:HA	1:C:0:HIS:HA	1.75	0.46
1:C:118:LEU:HD22	1:C:131:LEU:HD21	1.98	0.46
1:B:57:LEU:HD23	1:B:91:VAL:HG11	1.98	0.46
1:C:170:GLU:CD	1:C:198:ARG:HH12	2.24	0.46
1:D:20:GLY:HA2	1:D:58:LEU:HD22	1.97	0.46
1:A:209:THR:HG22	1:A:233:VAL:HG12	1.97	0.45
1:B:38:PRO:HB3	1:B:135:TRP:CE2	2.51	0.45
1:C:30:ALA:HA	1:C:127:LEU:HD23	1.98	0.45
1:C:239:MET:HG2	1:C:269:MET:SD	2.57	0.45
1:D:173:LEU:HD23	1:D:197:LEU:HD23	1.99	0.45
1:A:170:GLU:OE1	1:A:198:ARG:NH1	2.43	0.45
1:D:1:MET:HG3	1:D:4:PHE:HB2	1.99	0.45
1:A:156:MET:HE1	1:A:247:VAL:HG21	1.99	0.45
1:B:176:PHE:HD1	1:B:255:GLY:HA3	1.81	0.45
1:C:150:GLU:HG3	1:C:222:ASP:OD2	2.17	0.45
1:D:7:LYS:NZ	1:D:266:ASP:OD1	2.50	0.45
1:B:207:CYS:HB2	1:B:235:ARG:O	2.18	0.44
1:C:17:ILE:HA	1:C:25:ILE:HD11	1.98	0.44
1:C:88:TYR:HE1	1:C:101:LEU:HD23	1.83	0.44
1:D:26:ILE:CD1	1:D:51:ARG:HG2	2.48	0.44
1:A:9:ARG:HD3	1:A:9:ARG:HA	1.86	0.44
1:A:150:GLU:O	1:A:154:LYS:N	2.45	0.43
1:C:26:ILE:HG13	1:C:51:ARG:HG2	2.00	0.43
1:A:232:THR:HG22	1:A:240:THR:HG23	2.01	0.43
1:C:120:ILE:HG23	1:C:128:ILE:HG23	2.01	0.43
1:C:159:ASP:O	1:C:163:ARG:HG3	2.19	0.43
1:A:118:LEU:HG	1:A:131:LEU:HD21	2.00	0.43
1:A:224:PHE:HA	1:A:247:VAL:O	2.18	0.43
1:C:6:ARG:NH2	1:C:72:GLY:O	2.52	0.43
1:C:224:PHE:HA	1:C:247:VAL:O	2.19	0.43
1:D:15:ARG:NH2	1:D:16:ARG:HG2	2.31	0.43
1:D:224:PHE:HA	1:D:247:VAL:O	2.18	0.43
1:A:16:ARG:HD2	1:A:28:LEU:HD11	2.01	0.43
1:C:44:VAL:HG12	1:C:50:LEU:HD23	2.01	0.43
1:A:178:ASP:HA	1:A:194:LYS:HE3	2.01	0.42
1:A:227:THR:HG22	1:A:229:THR:HG23	2.01	0.42
1:B:51[A]:ARG:H	1:B:51[A]:ARG:HG2	1.66	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:47:HIS:O	1:D:51:ARG:HG3	2.19	0.42
1:A:84:SER:HB2	1:A:114:ARG:HB3	2.01	0.42
1:B:224:PHE:HA	1:B:247:VAL:O	2.19	0.41
1:B:129:ARG:HE	1:B:129:ARG:HB3	1.67	0.41
1:C:120:ILE:HG22	1:C:122:MET:HG3	2.02	0.41
1:B:209:THR:HG22	1:B:233:VAL:HG12	2.02	0.41
1:B:236:PRO:HB2	1:C:239:MET:HE1	2.01	0.41
1:C:6:ARG:NH1	1:C:75:ALA:HA	2.36	0.41
1:A:159:ASP:CG	1:A:163:ARG:HH21	2.29	0.41
1:C:6:ARG:HB3	1:C:122:MET:HE1	2.01	0.41
1:D:247:VAL:HG13	1:D:258:VAL:HG22	2.02	0.41
1:D:6:ARG:HB3	1:D:78:ALA:HB2	2.03	0.41
1:C:35:LEU:HD12	1:C:36:GLU:N	2.36	0.40
1:B:163:ARG:HD2	1:B:171:GLY:HA3	2.03	0.40
1:B:213:PRO:HB3	1:B:229:THR:HG22	2.04	0.40
1:B:203:LEU:HD13	1:C:206:SER:HB2	2.02	0.40
1:C:161:ALA:HA	1:C:164:ILE:HG22	2.04	0.40
1:C:73:GLN:HG3	1:C:263:GLY:HA2	2.02	0.40

There are no symmetry-related clashes.

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	265/302 (88%)	250 (94%)	13 (5%)	2 (1%)	16	45
1	B	269/302 (89%)	251 (93%)	17 (6%)	1 (0%)	30	60
1	C	270/302 (89%)	259 (96%)	11 (4%)	0	100	100
1	D	265/302 (88%)	248 (94%)	15 (6%)	2 (1%)	16	45
All	All	1069/1208 (88%)	1008 (94%)	56 (5%)	5 (0%)	25	55

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	141	SER
1	A	141	SER
1	B	19	ALA
1	A	237	ARG
1	D	143	GLY

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	220/246 (89%)	220 (100%)	0	100	100
1	B	221/246 (90%)	221 (100%)	0	100	100
1	C	220/246 (89%)	220 (100%)	0	100	100
1	D	219/246 (89%)	219 (100%)	0	100	100
All	All	880/984 (89%)	880 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	GLN
1	A	210	HIS
1	B	73	GLN
1	C	53	HIS
1	C	81	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	A1L6P	A	301	-	27,28,28	1.19	3 (11%)	37,42,42	1.40	8 (21%)
2	A1L6P	B	301	-	27,28,28	1.24	4 (14%)	37,42,42	1.40	9 (24%)
2	A1L6P	C	301	-	27,28,28	1.23	3 (11%)	37,42,42	1.41	5 (13%)
2	A1L6P	D	301	-	18,19,28	0.83	0	23,25,42	1.88	7 (30%)

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	A1L6P	A	301	-	-	18/26/50/50	0/2/2/2
2	A1L6P	B	301	-	-	17/26/50/50	0/2/2/2
2	A1L6P	C	301	-	-	17/26/50/50	0/2/2/2
2	A1L6P	D	301	-	-	10/20/29/50	0/1/1/2

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	A1L6P	O05-C01	-3.53	1.41	1.47
2	B	301	A1L6P	O05-C01	-3.13	1.42	1.47
2	A	301	A1L6P	O05-C01	-2.99	1.42	1.47
2	C	301	A1L6P	O10-C09	-2.51	1.42	1.46
2	A	301	A1L6P	O10-C09	-2.49	1.42	1.46
2	B	301	A1L6P	O10-C09	-2.49	1.42	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	A1L6P	C12-C11	2.21	1.57	1.53
2	B	301	A1L6P	O05-C04	-2.18	1.42	1.45
2	C	301	A1L6P	O05-C04	-2.16	1.42	1.45
2	A	301	A1L6P	O05-C04	-2.10	1.42	1.45

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	A1L6P	C24-C09-C11	4.30	117.11	112.15
2	C	301	A1L6P	C07-C06-C04	-4.25	111.16	116.85
2	D	301	A1L6P	O23-C11-C12	-3.73	101.92	109.80
2	A	301	A1L6P	C07-C06-C04	-3.48	112.20	116.85
2	B	301	A1L6P	C07-C06-C04	-3.29	112.45	116.85
2	D	301	A1L6P	C13-C12-C11	-3.19	106.12	112.66
2	A	301	A1L6P	O05-C01-C26	2.54	110.15	107.20
2	A	301	A1L6P	C03-C04-C06	-2.44	108.93	113.60
2	D	301	A1L6P	O10-C09-C24	-2.44	102.62	107.42
2	D	301	A1L6P	O15-C16-O17	-2.43	117.47	123.59
2	A	301	A1L6P	O10-C06-C04	2.38	112.64	109.38
2	B	301	A1L6P	C03-C04-C06	-2.38	109.04	113.60
2	B	301	A1L6P	O05-C04-C06	2.33	109.47	106.29
2	D	301	A1L6P	O10-C09-C08	2.31	107.21	103.68
2	C	301	A1L6P	O10-C09-C24	-2.29	103.78	108.00
2	A	301	A1L6P	C13-C12-C11	-2.26	108.03	112.66
2	B	301	A1L6P	O10-C09-C24	-2.25	103.85	108.00
2	B	301	A1L6P	O10-C06-C04	2.21	112.39	109.38
2	B	301	A1L6P	C13-C12-C11	-2.19	108.18	112.66
2	C	301	A1L6P	C13-C12-C11	-2.16	108.23	112.66
2	B	301	A1L6P	O15-C14-C12	2.15	111.98	108.38
2	A	301	A1L6P	O10-C09-C24	-2.14	104.05	108.00
2	A	301	A1L6P	O05-C04-C06	2.13	109.19	106.29
2	D	301	A1L6P	O15-C16-C18	2.07	118.39	111.91
2	B	301	A1L6P	O05-C01-C26	2.06	109.58	107.20
2	B	301	A1L6P	O10-C09-C11	2.05	108.17	106.33
2	C	301	A1L6P	O05-C01-C26	2.05	109.58	107.20
2	C	301	A1L6P	O10-C09-C08	2.04	106.79	103.67
2	A	301	A1L6P	O10-C09-C11	2.01	108.13	106.33

There are no chirality outliers.

All (62) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	A1L6P	C03-C04-C06-C07
2	A	301	A1L6P	C03-C04-C06-O10
2	A	301	A1L6P	C25-C04-C06-C07
2	A	301	A1L6P	C25-C04-C06-O10
2	A	301	A1L6P	O05-C04-C06-C07
2	A	301	A1L6P	O05-C04-C06-O10
2	A	301	A1L6P	C24-C09-C11-C12
2	A	301	A1L6P	C08-C09-C11-C12
2	A	301	A1L6P	C08-C09-C11-O23
2	A	301	A1L6P	O10-C09-C11-C12
2	A	301	A1L6P	O10-C09-C11-O23
2	B	301	A1L6P	C03-C04-C06-C07
2	B	301	A1L6P	C03-C04-C06-O10
2	B	301	A1L6P	C25-C04-C06-C07
2	B	301	A1L6P	C25-C04-C06-O10
2	B	301	A1L6P	O05-C04-C06-C07
2	B	301	A1L6P	O05-C04-C06-O10
2	B	301	A1L6P	C24-C09-C11-C12
2	B	301	A1L6P	C08-C09-C11-C12
2	B	301	A1L6P	C08-C09-C11-O23
2	B	301	A1L6P	O10-C09-C11-C12
2	B	301	A1L6P	O10-C09-C11-O23
2	C	301	A1L6P	C03-C04-C06-C07
2	C	301	A1L6P	C03-C04-C06-O10
2	C	301	A1L6P	C25-C04-C06-C07
2	C	301	A1L6P	C25-C04-C06-O10
2	C	301	A1L6P	O05-C04-C06-C07
2	C	301	A1L6P	O05-C04-C06-O10
2	C	301	A1L6P	C24-C09-C11-C12
2	C	301	A1L6P	O10-C09-C11-C12
2	D	301	A1L6P	C24-C09-C11-C12
2	D	301	A1L6P	C24-C09-C11-O23
2	D	301	A1L6P	C08-C09-C11-O23
2	D	301	A1L6P	O10-C09-C11-C12
2	C	301	A1L6P	C16-C18-C19-C20
2	B	301	A1L6P	C16-C18-C19-C20
2	D	301	A1L6P	C16-C18-C19-C20
2	A	301	A1L6P	C16-C18-C19-C20
2	A	301	A1L6P	C18-C16-O15-C14
2	A	301	A1L6P	O17-C16-O15-C14
2	B	301	A1L6P	C18-C16-O15-C14
2	D	301	A1L6P	C18-C16-O15-C14
2	B	301	A1L6P	O17-C16-O15-C14

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Mol	Chain	Res	Type	Atoms
2	B	301	A1L6P	C18-C19-C20-C21
2	A	301	A1L6P	C18-C19-C20-C21
2	D	301	A1L6P	O17-C16-O15-C14
2	D	301	A1L6P	C18-C19-C20-C21
2	B	301	A1L6P	C19-C20-C21-C22
2	C	301	A1L6P	C18-C16-O15-C14
2	A	301	A1L6P	C19-C20-C21-C22
2	C	301	A1L6P	O17-C16-O15-C14
2	A	301	A1L6P	C24-C09-C11-O23
2	A	301	A1L6P	O23-C11-C12-C13
2	B	301	A1L6P	C24-C09-C11-O23
2	C	301	A1L6P	C24-C09-C11-O23
2	C	301	A1L6P	C08-C09-C11-O23
2	C	301	A1L6P	C08-C09-C11-C12
2	C	301	A1L6P	O10-C09-C11-O23
2	D	301	A1L6P	O10-C09-C11-O23
2	D	301	A1L6P	C19-C20-C21-C22
2	C	301	A1L6P	C18-C19-C20-C21
2	C	301	A1L6P	O23-C11-C12-C13

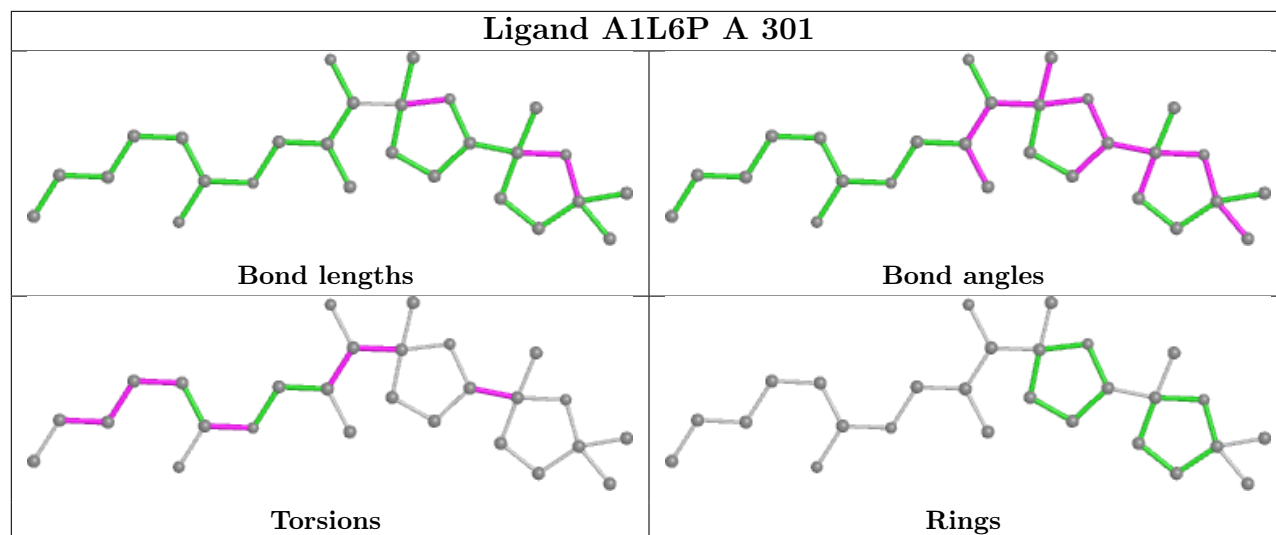
There are no ring outliers.

3 monomers are involved in 3 short contacts:

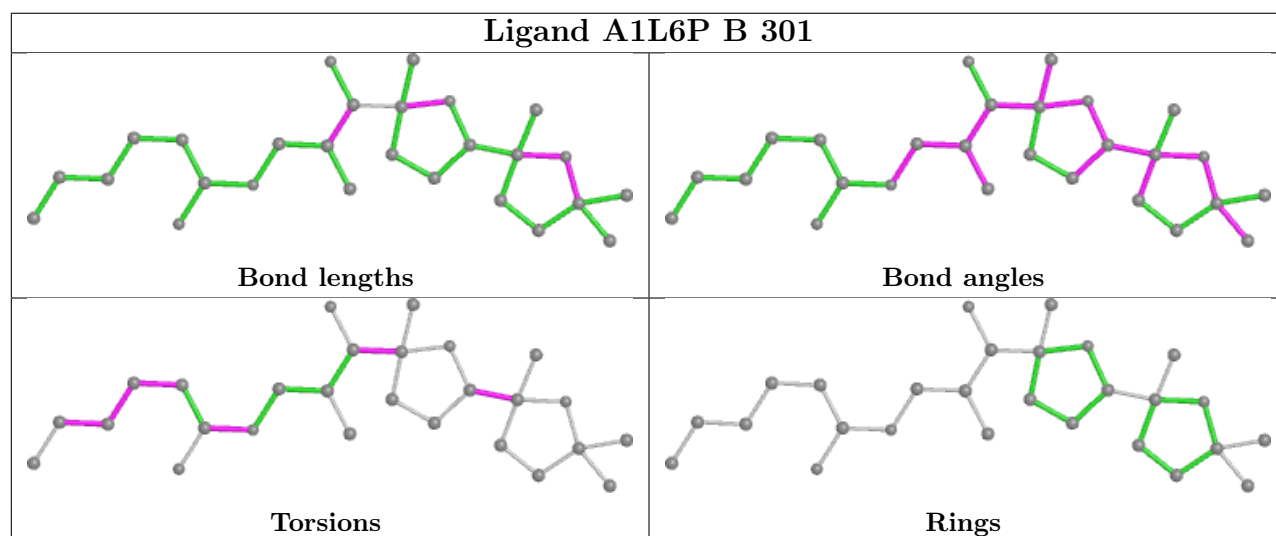
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	A1L6P	1	0
2	B	301	A1L6P	1	0
2	C	301	A1L6P	1	0

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.

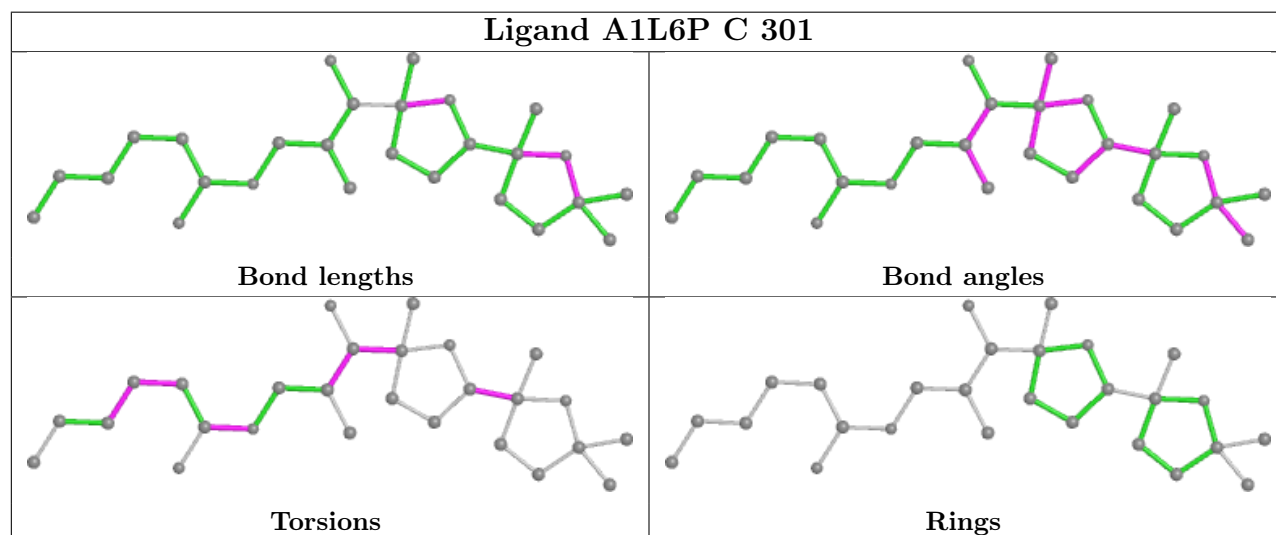
Ligand A1L6P A 301

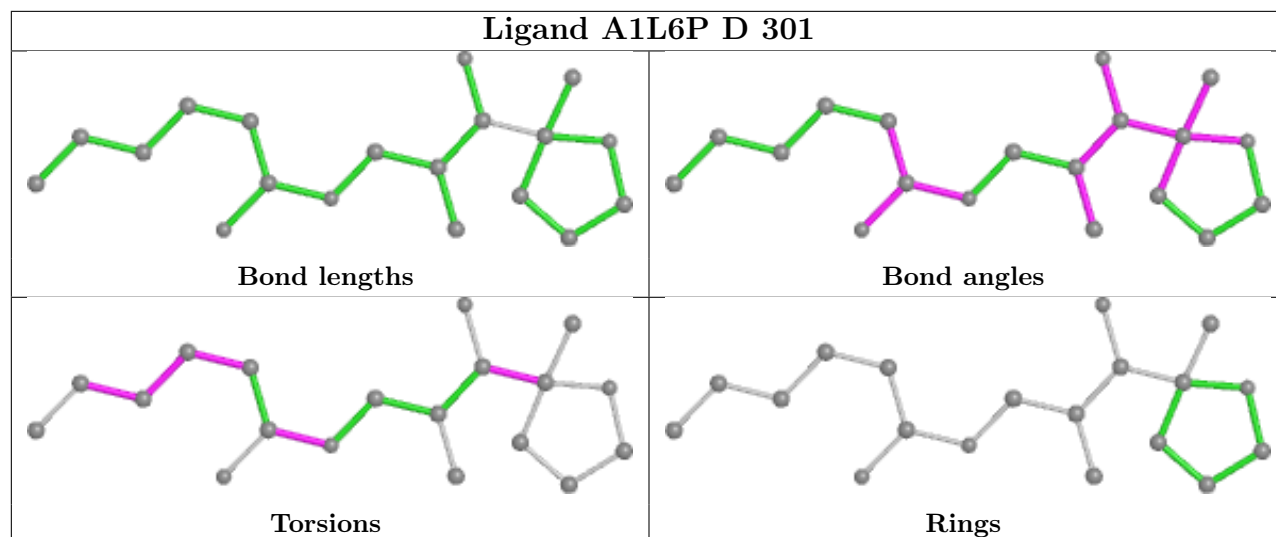


Ligand A1L6P B 301



Ligand A1L6P C 301





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	269/302 (89%)	-0.06	4 (1%)	71 55	46, 68, 92, 124	0
1	B	272/302 (90%)	0.11	3 (1%)	77 61	48, 76, 109, 149	1 (0%)
1	C	272/302 (90%)	0.07	4 (1%)	71 55	54, 76, 103, 121	0
1	D	269/302 (89%)	0.19	8 (2%)	52 34	52, 78, 104, 138	0
All	All	1082/1208 (89%)	0.08	19 (1%)	67 50	46, 74, 102, 149	1 (0%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	146	PRO	4.0
1	D	147	ALA	4.0
1	B	144	SER	3.8
1	D	144	SER	3.8
1	D	0	HIS	3.2
1	C	187	GLY	3.1
1	D	1	MET	3.1
1	D	148	PRO	2.9
1	A	147	ALA	2.8
1	A	236	PRO	2.8
1	D	4	PHE	2.7
1	A	148	PRO	2.3
1	D	138	SER	2.3
1	C	203	LEU	2.2
1	A	235	ARG	2.2
1	C	186	VAL	2.1
1	B	-1	ARG	2.0
1	D	209	THR	2.0
1	C	270	ASP	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](#)

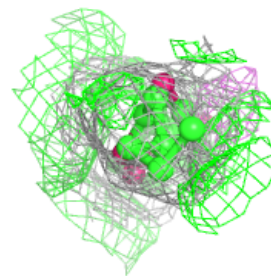
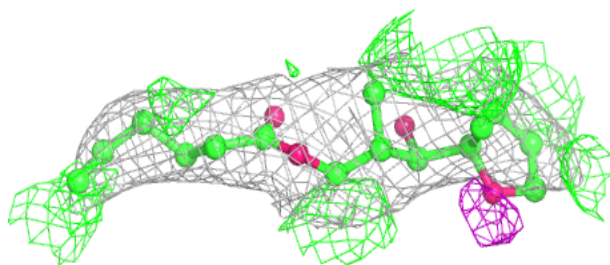
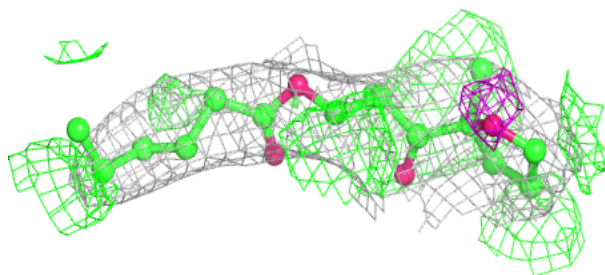
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	A1L6P	D	301	19/27	0.82	0.32	68,98,124,141	0
3	NA	B	302	1/1	0.85	0.21	83,83,83,83	0
2	A1L6P	C	301	27/27	0.87	0.24	59,99,113,118	0
3	NA	C	302	1/1	0.87	0.22	74,74,74,74	0
3	NA	A	302	1/1	0.88	0.16	70,70,70,70	0
3	NA	D	302	1/1	0.88	0.22	83,83,83,83	0
2	A1L6P	A	301	27/27	0.89	0.22	52,83,106,114	0
2	A1L6P	B	301	27/27	0.90	0.22	66,95,121,134	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.

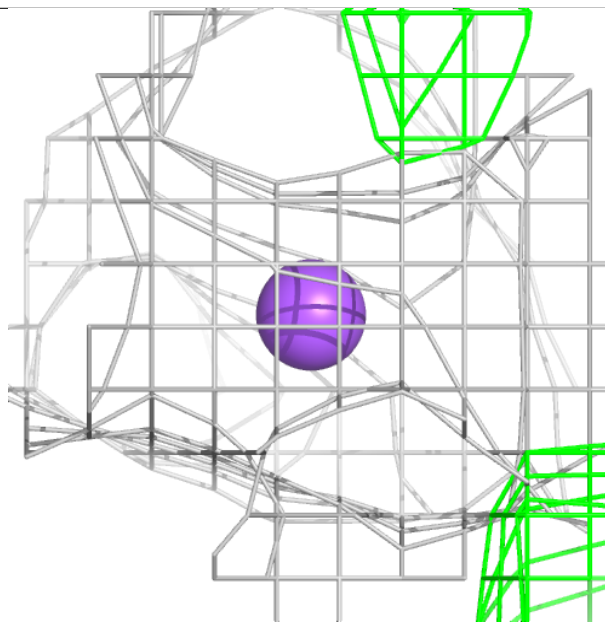
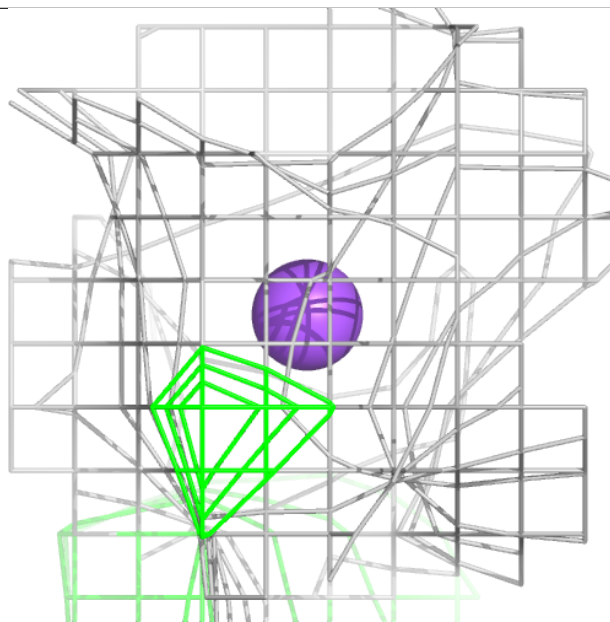
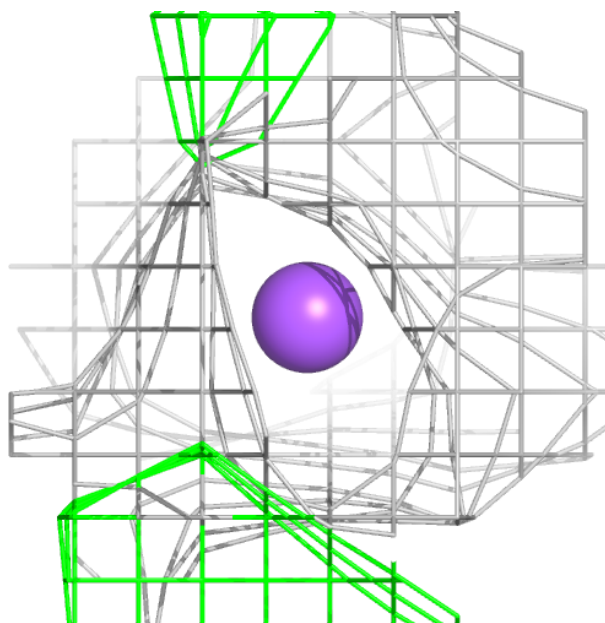
Electron density around A1L6P D 301:

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



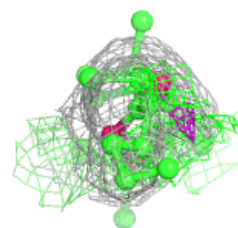
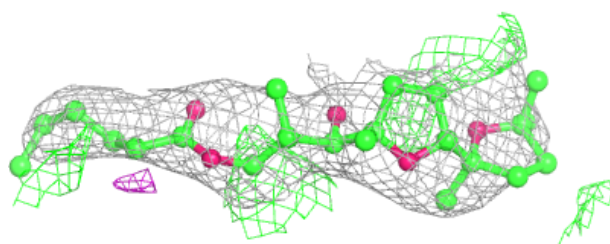
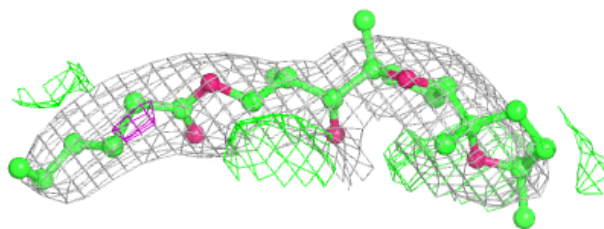
Electron density around NA B 302:

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



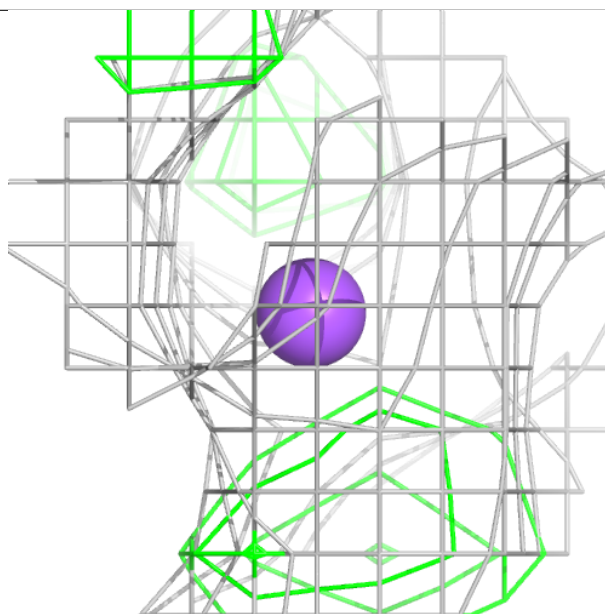
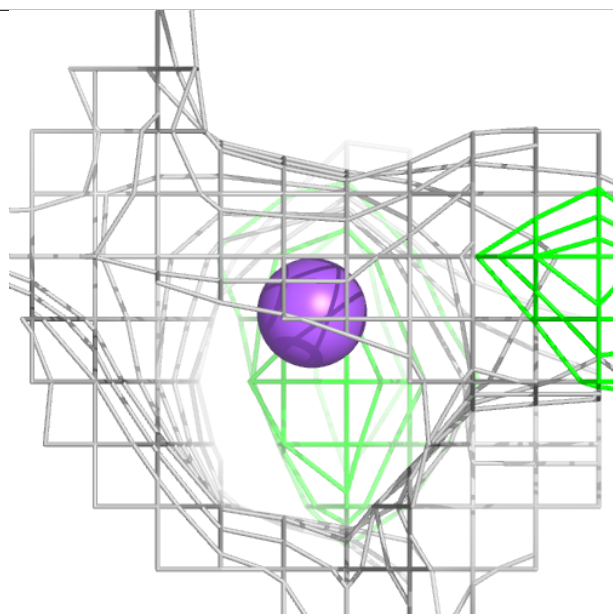
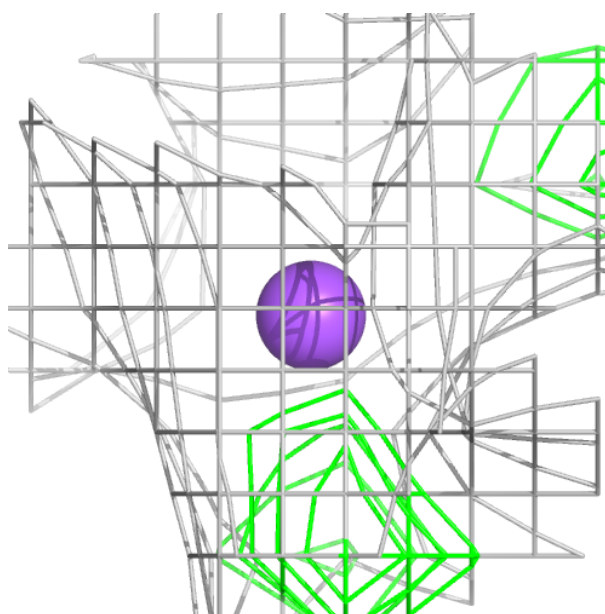
Electron density around A1L6P C 301:

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



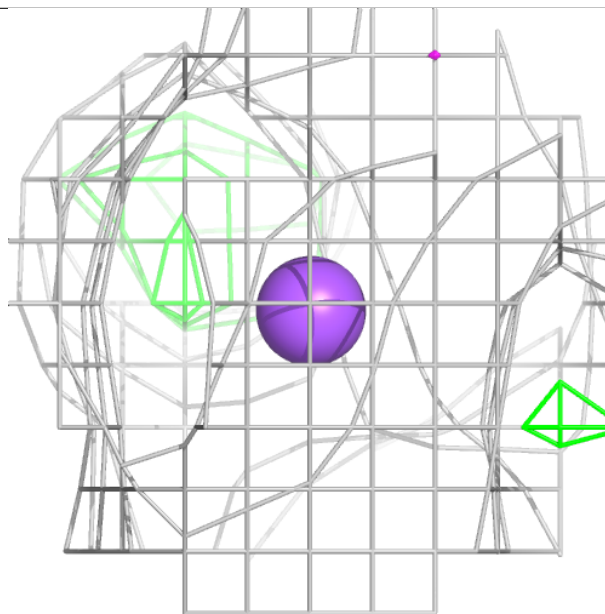
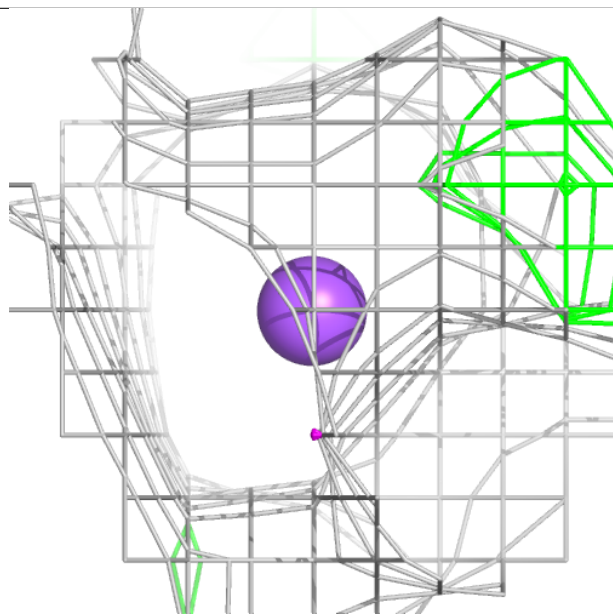
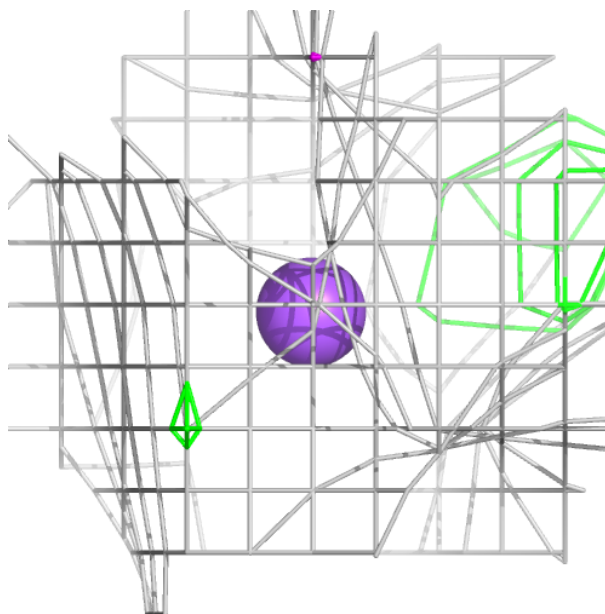
Electron density around NA C 302:

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



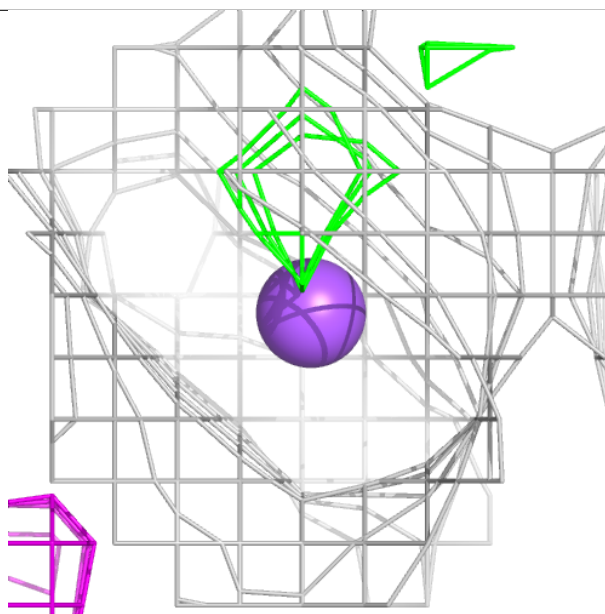
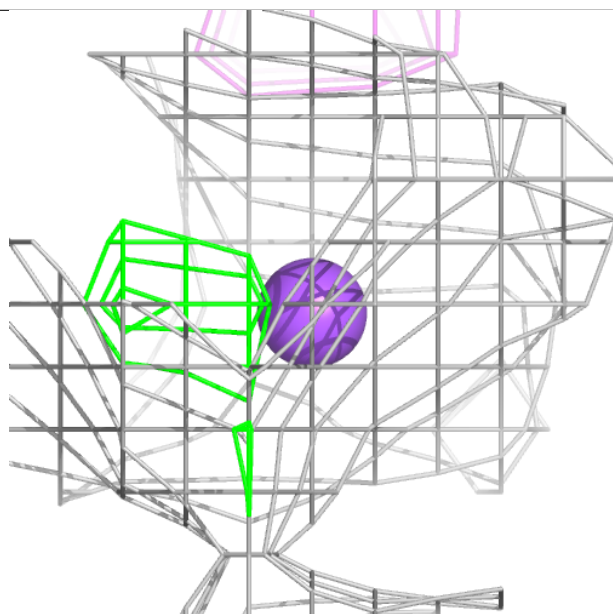
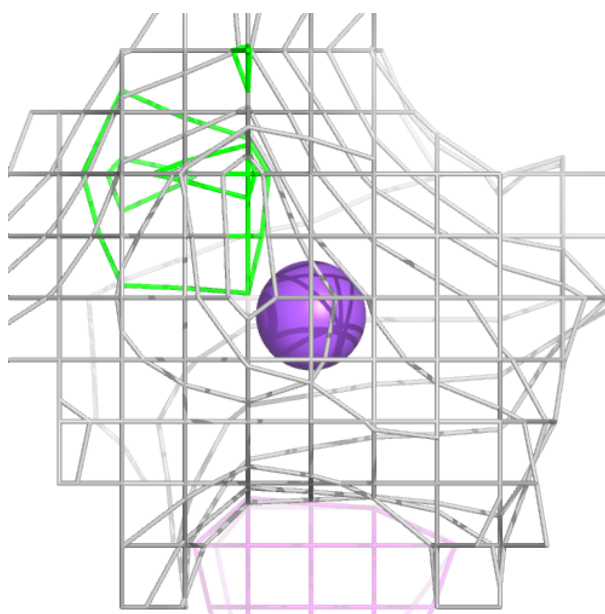
Electron density around NA A 302:

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



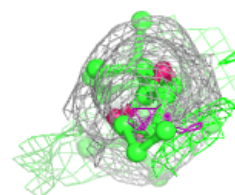
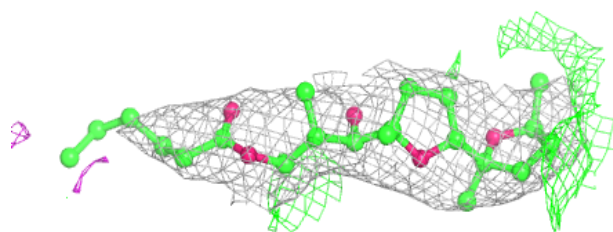
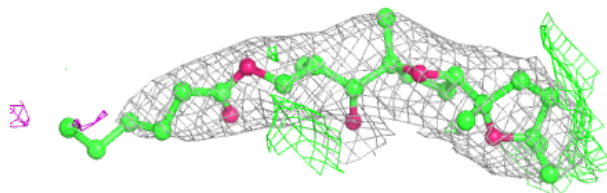
Electron density around NA D 302:

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

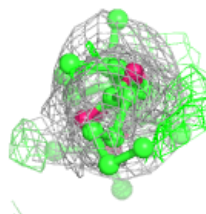
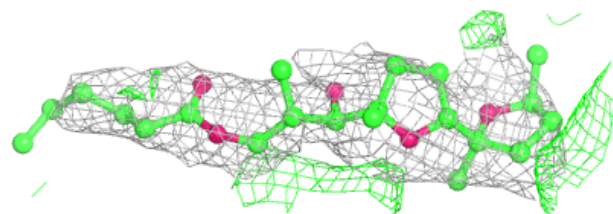
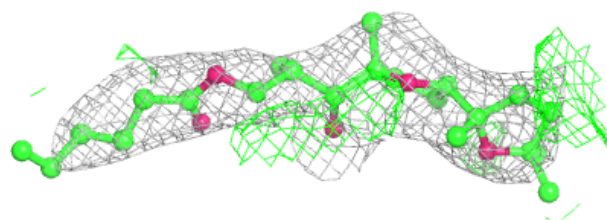


Electron density around A1L6P A 301:

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

**Electron density around A1L6P B 301:**

$2mF_o-DF_c$ (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.