



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 17, 2026 – 10:38 PM UTC

PDB ID : 2YHY / pdb_00002yhy
Title : Structure of N-Acetylmannosamine kinase in complex with N- acetylmannosamine and ADP
Authors : Martinez, J.; Nguyen, L.D.; Tauberger, E.; Hinderlich, S.; Reutter, W.; Fan, H.; Saenger, W.; Moniot, S.
Deposited on : 2011-05-10
Resolution : 1.82 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

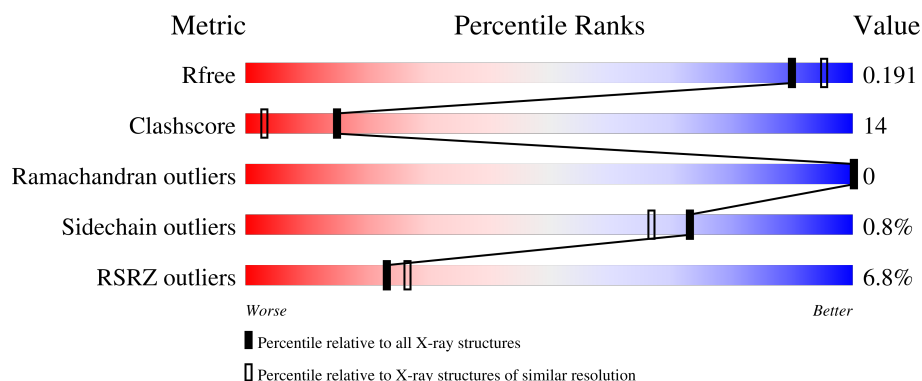
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.82 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	343	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
9	ADP	A	1727	-	-	X	-

2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 2725 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 BIFUNCTIONAL UDP-N-ACETYLGLUCOSAMINE 2-EPI MERASE/N-ACETYLMANNOSAMINE KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	308	Total	C	N	O	S	0	18	0
			2414	1514	424	461	15			

There are 28 discrepancies between the modelled and reference sequences:

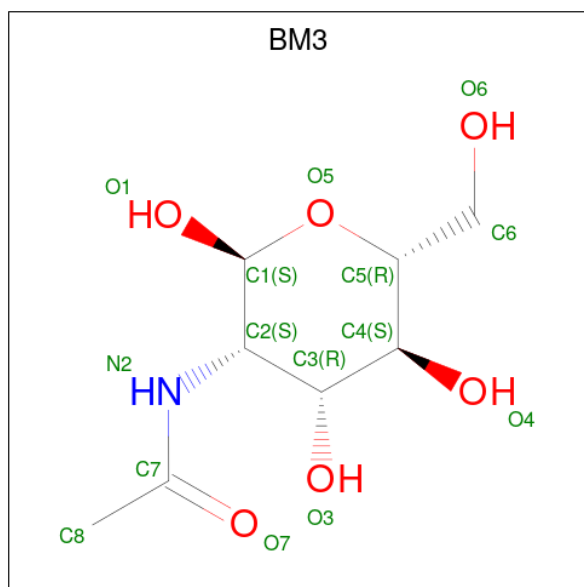
Chain	Residue	Modelled	Actual	Comment	Reference
A	378	MET	-	expression tag	UNP Q9Y223
A	379	GLY	-	expression tag	UNP Q9Y223
A	380	SER	-	expression tag	UNP Q9Y223
A	381	SER	-	expression tag	UNP Q9Y223
A	382	HIS	-	expression tag	UNP Q9Y223
A	383	HIS	-	expression tag	UNP Q9Y223
A	384	HIS	-	expression tag	UNP Q9Y223
A	385	HIS	-	expression tag	UNP Q9Y223
A	386	HIS	-	expression tag	UNP Q9Y223
A	387	HIS	-	expression tag	UNP Q9Y223
A	388	SER	-	expression tag	UNP Q9Y223
A	389	SER	-	expression tag	UNP Q9Y223
A	390	GLY	-	expression tag	UNP Q9Y223
A	391	LEU	-	expression tag	UNP Q9Y223
A	392	VAL	-	expression tag	UNP Q9Y223
A	393	PRO	-	expression tag	UNP Q9Y223
A	394	ARG	-	expression tag	UNP Q9Y223
A	395	GLY	-	expression tag	UNP Q9Y223
A	396	SER	-	expression tag	UNP Q9Y223
A	397	HIS	-	expression tag	UNP Q9Y223
A	398	MET	-	expression tag	UNP Q9Y223
A	399	GLU	-	expression tag	UNP Q9Y223
A	400	ASN	-	expression tag	UNP Q9Y223
A	401	LEU	-	expression tag	UNP Q9Y223
A	402	TYR	-	expression tag	UNP Q9Y223
A	403	PHE	-	expression tag	UNP Q9Y223

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Chain	Residue	Modelled	Actual	Comment	Reference
A	404	GLN	-	expression tag	UNP Q9Y223
A	405	GLY	-	expression tag	UNP Q9Y223

- Molecule 2 is 2-acetamido-2-deoxy-alpha-D-mannopyranose (CCD ID: BM3) (formula: $C_8H_{15}NO_6$).

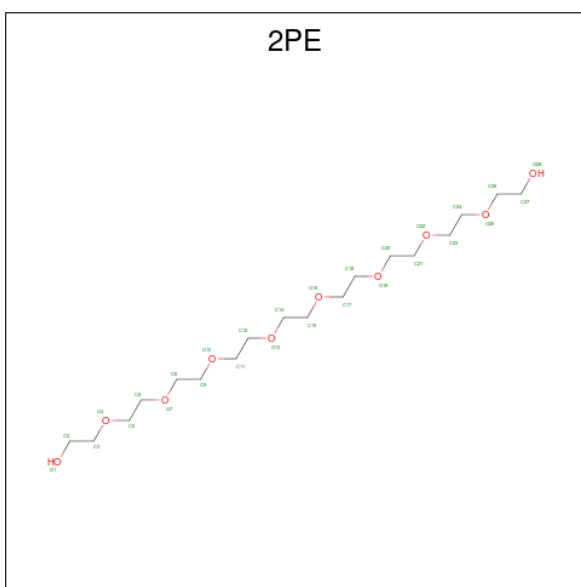


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			15	8	1	6		

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

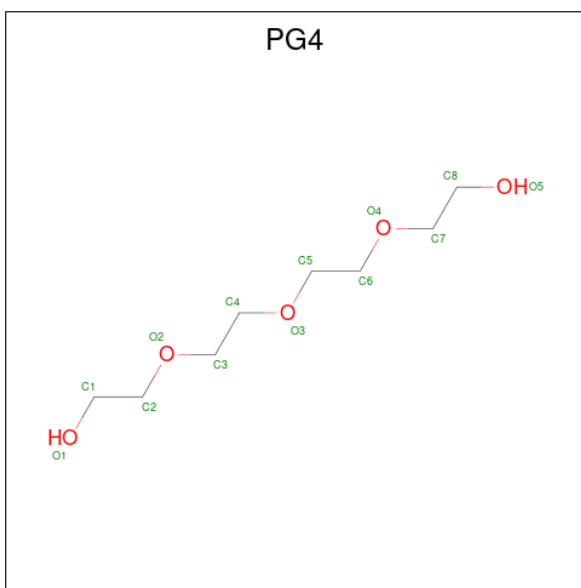
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Ca	0	1
			2	2		

- Molecule 4 is NONAETHYLENE GLYCOL (CCD ID: 2PE) (formula: $C_{18}H_{38}O_{10}$).



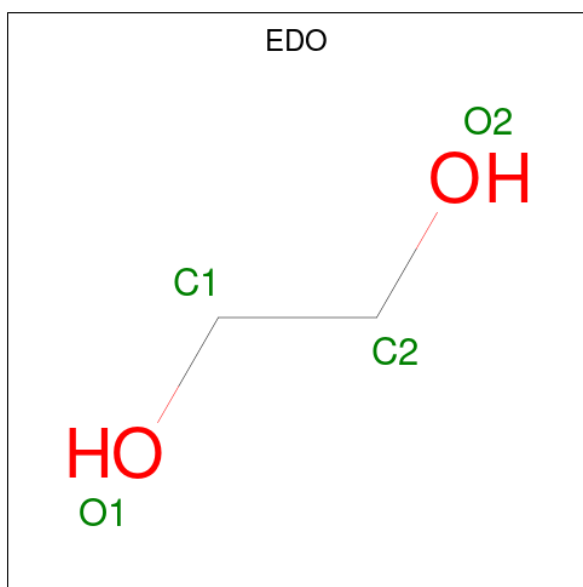
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			19	12	7		

- Molecule 5 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $\text{C}_8\text{H}_{18}\text{O}_5$).



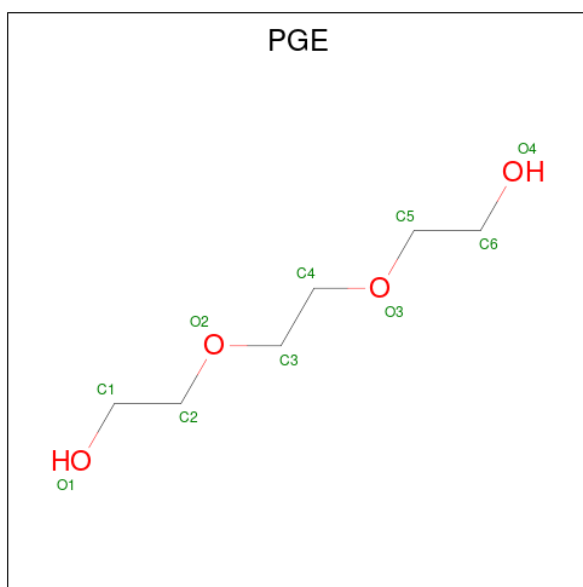
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $\text{C}_2\text{H}_6\text{O}_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	1
			8	4	4		

- Molecule 7 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: C₆H₁₄O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			10	6	4		

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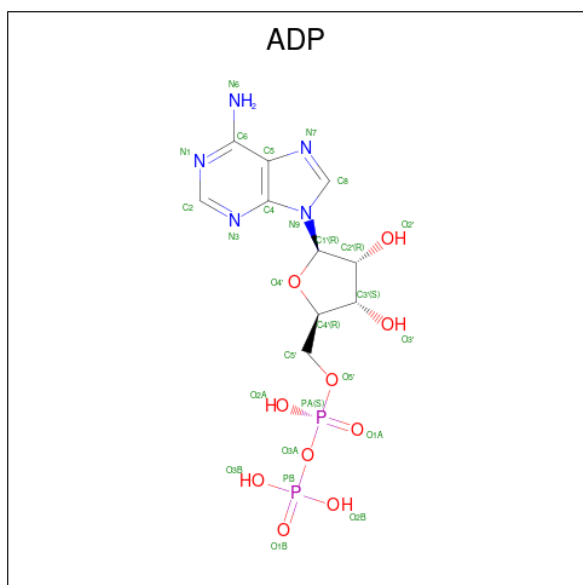
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O 7 4 3	0	0
7	A	1	Total C O 7 4 3	0	0

- Molecule 8 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total Mg 1 1	0	0

- Molecule 9 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 10 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	1	Total Cl 1 1	0	0

- Molecule 11 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	1	Total 1	Zn 1	0	0

- Molecule 12 is water.

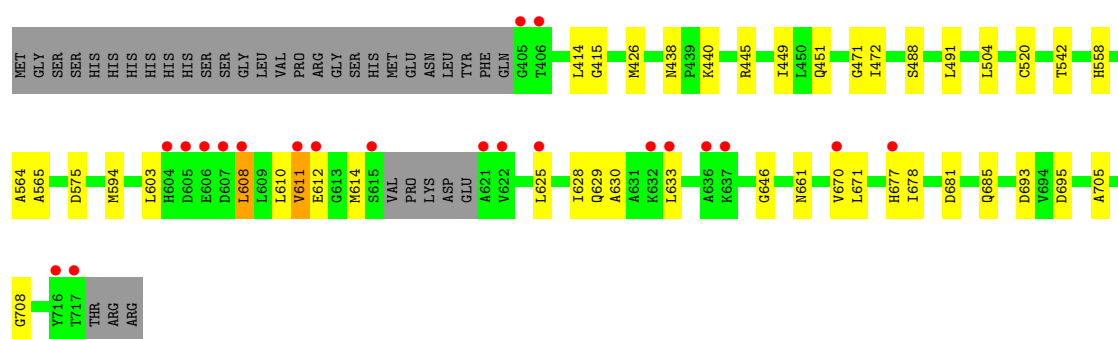
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	198	Total 198	O 198	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: BIFUNCTIONAL UDP-N-ACETYLGLUCOSAMINE 2-EPIMERASE/N-ACETYLMANNOSAMINE KINASE

Chain A: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	90.38Å 90.38Å 101.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.26 – 1.82 41.26 – 1.82	Depositor EDS
% Data completeness (in resolution range)	100.0 (41.26-1.82) 100.0 (41.26-1.82)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.55 (at 1.82Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.152 , 0.182 0.167 , 0.191	Depositor DCC
R_{free} test set	1910 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	25.1	Xtriage
Anisotropy	0.157	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 44.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	2725	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.63% 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: PG4, EDO, MG, PGE, ADP, CA, ZN, 2PE, BM3, 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	1.35	7/2446 (0.3%)	1.07	0/3315

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	705	ALA	CA-CB	7.03	1.64	1.53
1	A	564	ALA	CA-CB	6.65	1.64	1.53
1	A	471	GLY	CA-C	-5.39	1.48	1.52
1	A	542	THR	N-CA	-5.26	1.39	1.46
1	A	661	ASN	C-O	5.21	1.26	1.23
1	A	565	ALA	CA-CB	5.15	1.61	1.53
1	A	575	ASP	C-O	-5.00	1.17	1.24

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2414	0	2434	67	0
2	A	15	0	15	1	0
3	A	2	0	0	0	0
4	A	19	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	7	0	9	5	0
6	A	16	0	24	8	0
7	A	24	0	32	1	0
8	A	1	0	0	0	0
9	A	27	0	12	10	0
10	A	1	0	0	0	0
11	A	1	0	0	0	0
12	A	198	0	0	6	0
All	All	2725	0	2551	70	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 14.

All (70) 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:670:VAL:HG11	9:A:1727:ADP:N1	1.56	1.18
1:A:611:VAL:CG2	1:A:614:MET:HE2	1.75	1.17
1:A:611:VAL:HG22	1:A:614:MET:CE	1.77	1.14
1:A:670:VAL:CG1	9:A:1727:ADP:C2	2.36	1.07
1:A:670:VAL:HG11	9:A:1727:ADP:C2	1.91	1.03
1:A:611:VAL:HG22	1:A:614:MET:HE2	1.38	0.98
1:A:415:GLY:HA2	12:A:2007:HOH:O	1.66	0.95
1:A:677[B]:HIS:NE2	1:A:678[B]:ILE:CD1	2.30	0.94
1:A:670:VAL:HG13	9:A:1727:ADP:C2	2.06	0.89
1:A:670:VAL:CG1	9:A:1727:ADP:N1	2.37	0.88
1:A:611:VAL:HG23	1:A:614:MET:HE2	1.57	0.85
1:A:677[B]:HIS:CD2	1:A:678[B]:ILE:H	1.92	0.85
1:A:693[B]:ASP:OD1	5:A:1720:PG4:H22	1.77	0.84
1:A:670:VAL:HG11	9:A:1727:ADP:C6	2.12	0.83
1:A:625:LEU:HD11	9:A:1727:ADP:C6	2.15	0.82
1:A:558:HIS:H	6:A:1728[B]:EDO:H21	1.46	0.78
1:A:677[B]:HIS:NE2	1:A:678[B]:ILE:HG13	2.00	0.76
1:A:558:HIS:H	6:A:1728[A]:EDO:H22	1.49	0.76
1:A:472:ILE:HD11	1:A:504:LEU:HD22	1.67	0.74
1:A:677[B]:HIS:NE2	1:A:678[B]:ILE:HD12	2.03	0.74
1:A:677[B]:HIS:CD2	1:A:678[B]:ILE:HG13	2.24	0.72
1:A:414[B]:LEU:HD21	1:A:449:ILE:HD11	1.70	0.72
1:A:414[A]:LEU:HD21	1:A:445:ARG:HD3	1.73	0.71
1:A:440:LYS:HE2	7:A:1725:PGE:O1	1.91	0.70
1:A:677[B]:HIS:NE2	1:A:678[B]:ILE:CG1	2.55	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:558:HIS:H	6:A:1728[A]:EDO:C2	2.05	0.69
1:A:677[B]:HIS:CE1	1:A:678[B]:ILE:HG13	2.28	0.68
1:A:614:MET:HE1	1:A:630:ALA:HB2	1.76	0.67
1:A:558:HIS:H	6:A:1728[B]:EDO:C2	2.08	0.66
1:A:614:MET:HE1	1:A:630:ALA:CB	2.27	0.64
1:A:677[B]:HIS:NE2	1:A:678[B]:ILE:HD11	2.15	0.62
1:A:451[B]:GLN:CG	6:A:1724:EDO:H11	2.30	0.62
1:A:558:HIS:HB2	6:A:1728[A]:EDO:H21	1.82	0.61
1:A:693[B]:ASP:OD1	5:A:1720:PG4:C2	2.48	0.61
1:A:491:LEU:HD21	1:A:594[A]:MET:SD	2.41	0.60
1:A:677[B]:HIS:CD2	1:A:678[B]:ILE:N	2.70	0.58
1:A:677[B]:HIS:CG	1:A:678[B]:ILE:N	2.75	0.55
1:A:611:VAL:HG22	1:A:614:MET:HE3	1.79	0.55
1:A:426[A]:MET:O	1:A:426[A]:MET:HG3	2.05	0.54
1:A:625:LEU:O	1:A:629:GLN:HG3	2.07	0.53
9:A:1727:ADP:PA	12:A:2009:HOH:O	2.68	0.52
1:A:451[B]:GLN:OE1	6:A:1724:EDO:H12	2.09	0.51
1:A:414[A]:LEU:HG	1:A:438:ASN:ND2	2.26	0.50
1:A:611:VAL:CG2	1:A:614:MET:CE	2.49	0.50
1:A:695:ASP:OD1	5:A:1720:PG4:O2	2.30	0.50
9:A:1727:ADP:O1A	12:A:2009:HOH:O	2.20	0.50
1:A:451[B]:GLN:HG2	6:A:1724:EDO:H11	1.94	0.50
1:A:625:LEU:HD11	9:A:1727:ADP:N1	2.27	0.49
1:A:646:GLY:HA3	1:A:678[A]:ILE:HG21	1.93	0.49
1:A:610:LEU:HA	1:A:614:MET:HE3	1.95	0.49
1:A:625:LEU:HD12	12:A:2154:HOH:O	2.12	0.48
1:A:603:LEU:HD22	1:A:608:LEU:HB3	1.95	0.48
1:A:594[A]:MET:HE2	12:A:2152:HOH:O	2.13	0.47
1:A:677[B]:HIS:CG	1:A:678[B]:ILE:H	2.28	0.47
1:A:677[B]:HIS:CE1	1:A:678[B]:ILE:HD11	2.50	0.46
1:A:426[B]:MET:HB3	1:A:426[B]:MET:HE2	1.70	0.45
1:A:520:CYS:O	1:A:708:GLY:HA3	2.16	0.45
1:A:628:ILE:HD11	1:A:671:LEU:CD2	2.47	0.45
1:A:677[B]:HIS:CE1	1:A:678[B]:ILE:CG1	2.97	0.44
1:A:629:GLN:O	1:A:633:LEU:HG	2.18	0.44
1:A:611:VAL:O	1:A:612:GLU:C	2.57	0.44
5:A:1720:PG4:H12	12:A:2162:HOH:O	2.17	0.44
1:A:488:SER:HB3	2:A:1000:BM3:H8C1	1.99	0.44
1:A:611:VAL:N	1:A:614:MET:HE3	2.34	0.43
1:A:414[A]:LEU:HG	1:A:438:ASN:HD21	1.84	0.43
1:A:608:LEU:HD22	1:A:608:LEU:HA	1.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:677[B]:HIS:CE1	1:A:678[B]:ILE:CD1	2.98	0.42
1:A:681[A]:ASP:O	1:A:685[A]:GLN:HG3	2.19	0.42
1:A:491:LEU:CD2	1:A:594[A]:MET:SD	3.07	0.41
1:A:693[B]:ASP:O	5:A:1720:PG4:O2	2.40	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	322/343 (94%)	316 (98%)	6 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	263/279 (94%)	261 (99%)	2 (1%)	73	67

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	608	LEU
1	A	611	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](#)

Of 16 ligands modelled in this entry, 5 are monoatomic - leaving 11 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	$\# Z > 2$
6	EDO	A	1728[B]	-	3,3,3	0.52	0	2,2,2	1.04	0
2	BM3	A	1000	-	15,15,15	1.42	2 (13%)	21,21,21	1.35	2 (9%)
6	EDO	A	1724	-	3,3,3	0.51	0	2,2,2	0.30	0
4	2PE	A	1719	-	18,18,27	0.61	0	17,17,26	0.72	0
5	PG4	A	1720	-	6,6,12	0.59	0	5,5,11	1.62	1 (20%)
7	PGE	A	1725	-	6,6,9	0.60	0	5,5,8	0.88	0
6	EDO	A	1721	-	3,3,3	0.29	0	2,2,2	0.27	0
9	ADP	A	1727	8	28,29,29	1.49	5 (17%)	43,45,45	2.24	18 (41%)
6	EDO	A	1728[A]	-	3,3,3	0.30	0	2,2,2	0.85	0
7	PGE	A	1722	-	9,9,9	0.50	0	8,8,8	0.39	0
7	PGE	A	1726	-	6,6,9	0.41	0	5,5,8	0.41	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
6	EDO	A	1728[B]	-	-	0/1/1/1	-
2	BM3	A	1000	-	-	0/6/26/26	0/1/1/1
6	EDO	A	1724	-	-	1/1/1/1	-
4	2PE	A	1719	-	-	1/16/16/25	-
5	PG4	A	1720	-	-	2/4/4/10	-
7	PGE	A	1725	-	-	2/4/4/7	-
6	EDO	A	1721	-	-	1/1/1/1	-
9	ADP	A	1727	8	-	2/16/32/32	0/3/3/3
6	EDO	A	1728[A]	-	-	1/1/1/1	-
7	PGE	A	1722	-	-	4/7/7/7	-
7	PGE	A	1726	-	-	3/4/4/7	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	A	1727	ADP	C5-C4	4.37	1.46	1.39
9	A	1727	ADP	C4-N9	-3.04	1.31	1.37
2	A	1000	BM3	C1-C2	-2.90	1.49	1.52
2	A	1000	BM3	C3-C2	-2.74	1.48	1.53
9	A	1727	ADP	C5-C6	2.52	1.48	1.41
9	A	1727	ADP	C8-N7	2.29	1.36	1.31
9	A	1727	ADP	C5-N7	-2.02	1.35	1.39

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	A	1727	ADP	C4-N9-C8	5.50	111.51	105.74
9	A	1727	ADP	N3-C2-N1	-4.31	122.06	128.58
9	A	1727	ADP	N9-C8-N7	-3.70	108.68	113.94
9	A	1727	ADP	O3B-PB-O3A	-3.55	92.73	104.64
9	A	1727	ADP	O2A-PA-O3A	3.48	116.68	107.27
9	A	1727	ADP	C4-N9-C1'	-3.40	118.69	126.63
9	A	1727	ADP	N3-C4-N9	3.32	132.81	127.17
5	A	1720	PG4	C3-O2-C2	3.24	127.44	113.26
9	A	1727	ADP	C5-C4-N3	-3.18	122.33	126.72
2	A	1000	BM3	C1-C2-N2	-3.11	107.13	110.73
9	A	1727	ADP	C2-N3-C4	3.09	119.37	111.83
9	A	1727	ADP	C4-C5-N7	-2.96	107.20	110.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	A	1727	ADP	C2-N1-C6	2.94	123.56	118.73
9	A	1727	ADP	C6-C5-N7	2.74	137.38	132.09
9	A	1727	ADP	C5-N7-C8	2.73	107.75	103.45
9	A	1727	ADP	O4'-C1'-C2'	2.67	112.33	106.62
9	A	1727	ADP	O3B-PB-O2B	2.51	117.23	107.80
9	A	1727	ADP	O2A-PA-O1A	2.21	122.73	112.44
2	A	1000	BM3	C8-C7-N2	-2.17	112.52	116.12
9	A	1727	ADP	C2'-C1'-N9	-2.03	108.25	113.30
9	A	1727	ADP	O3'-C3'-C2'	-2.01	105.36	111.82

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	1725	PGE	C1-C2-O2-C3
7	A	1725	PGE	O2-C3-C4-O3
7	A	1726	PGE	O2-C3-C4-O3
7	A	1726	PGE	O1-C1-C2-O2
7	A	1722	PGE	O1-C1-C2-O2
6	A	1724	EDO	O1-C1-C2-O2
5	A	1720	PG4	O1-C1-C2-O2
6	A	1721	EDO	O1-C1-C2-O2
6	A	1728[A]	EDO	O1-C1-C2-O2
9	A	1727	ADP	C3'-C4'-C5'-O5'
7	A	1722	PGE	O3-C5-C6-O4
7	A	1726	PGE	C1-C2-O2-C3
5	A	1720	PG4	O2-C3-C4-O3
4	A	1719	2PE	C2-C3-O4-C5
9	A	1727	ADP	O4'-C4'-C5'-O5'
7	A	1722	PGE	C1-C2-O2-C3
7	A	1722	PGE	O2-C3-C4-O3

There are no ring outliers.

7 monomers are involved in 25 short contacts:

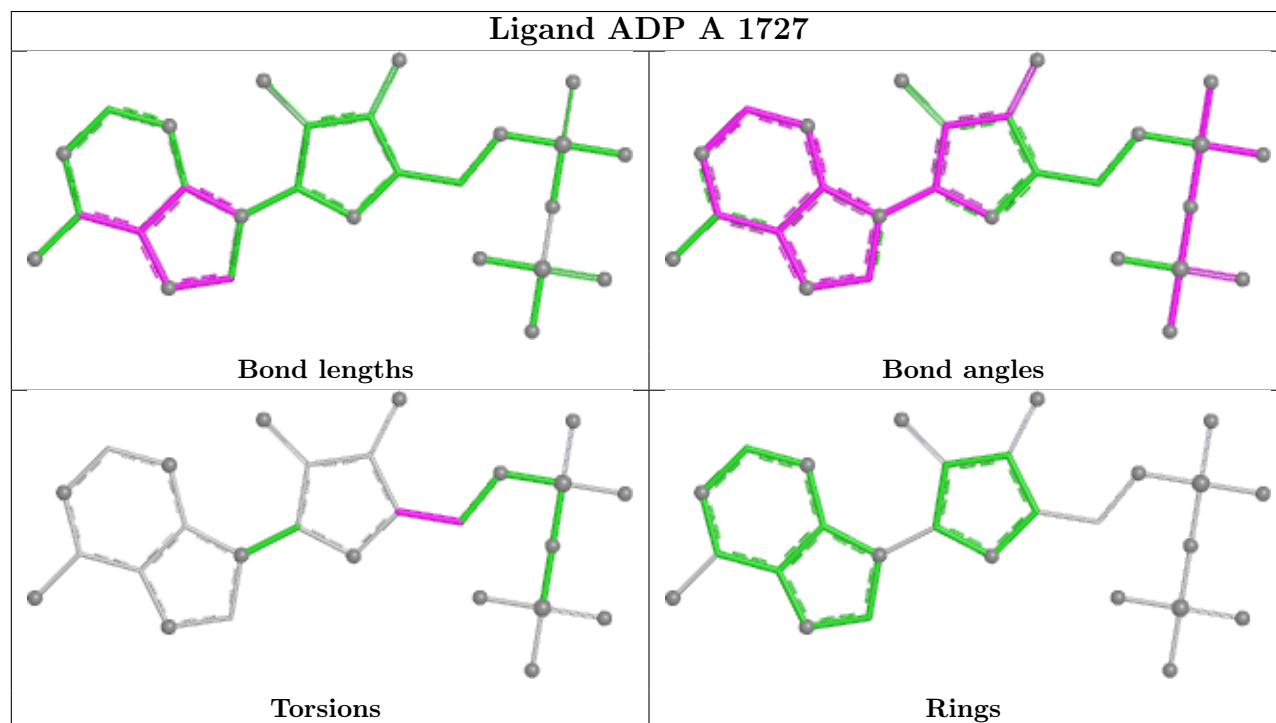
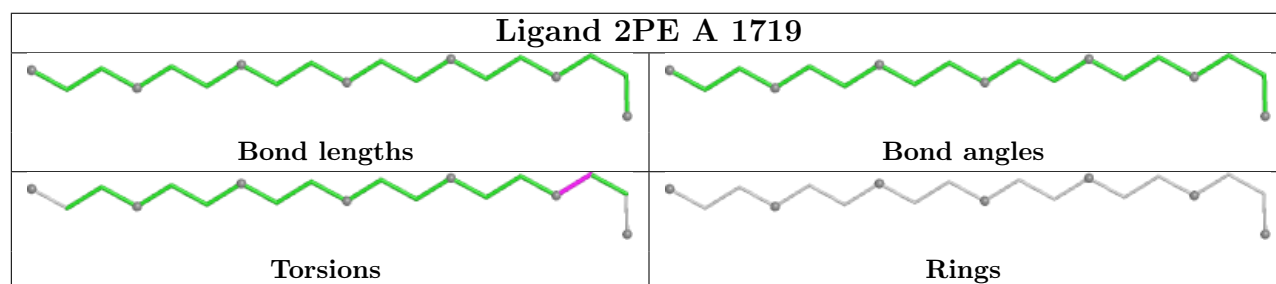
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	1728[B]	EDO	2	0
2	A	1000	BM3	1	0
6	A	1724	EDO	3	0
5	A	1720	PG4	5	0
7	A	1725	PGE	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	A	1727	ADP	10	0
6	A	1728[A]	EDO	3	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	308/343 (89%)	-0.04	21 (6%)	23 27	9, 24, 74, 110	18 (5%)

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	621	ALA	5.8
1	A	717	THR	4.0
1	A	612	GLU	4.0
1	A	615	SER	3.8
1	A	405	GLY	3.8
1	A	622	VAL	3.5
1	A	625	LEU	3.4
1	A	608	LEU	3.1
1	A	670	VAL	3.1
1	A	611	VAL	2.9
1	A	604	HIS	2.5
1	A	677[A]	HIS	2.5
1	A	406	THR	2.5
1	A	605	ASP	2.5
1	A	716	TYR	2.4
1	A	633	LEU	2.4
1	A	607	ASP	2.3
1	A	636	ALA	2.3
1	A	606	GLU	2.2
1	A	637	LYS	2.2
1	A	632	LYS	2.1

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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

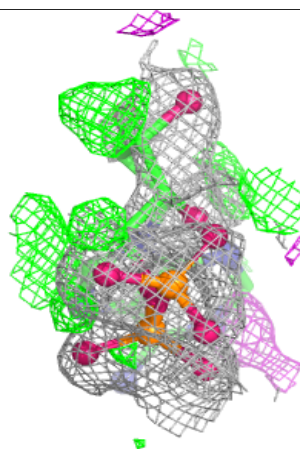
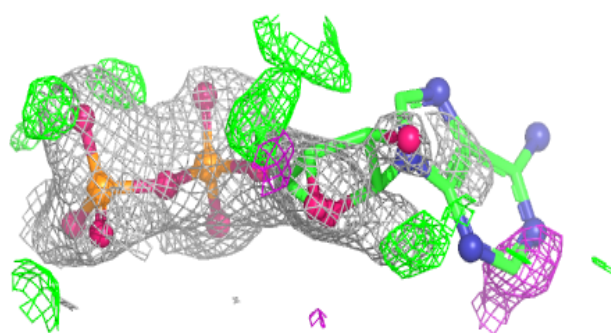
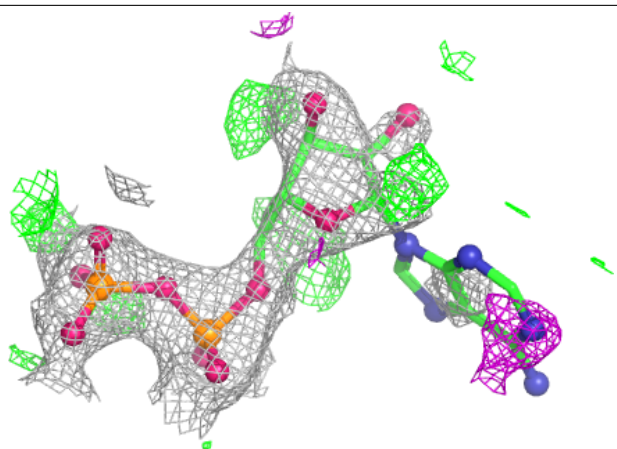
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	PGE	A	1722	10/10	0.80	0.19	74,76,79,79	0
9	ADP	A	1727	27/27	0.82	0.19	28,57,73,75	27
5	PG4	A	1720	7/13	0.83	0.13	33,45,56,59	0
6	EDO	A	1724	4/4	0.84	0.19	58,60,61,66	0
7	PGE	A	1725	7/10	0.86	0.15	61,63,64,64	0
6	EDO	A	1728[B]	4/4	0.89	0.14	21,25,26,30	4
6	EDO	A	1728[A]	4/4	0.89	0.14	20,21,21,26	4
7	PGE	A	1726	7/10	0.93	0.14	50,54,57,58	0
6	EDO	A	1721	4/4	0.93	0.12	56,57,58,59	0
4	2PE	A	1719	19/28	0.95	0.08	26,34,39,40	0
2	BM3	A	1000	15/15	0.98	0.04	13,15,18,18	0
3	CA	A	1718[A]	1/1	0.99	0.06	21,21,21,21	1
8	MG	A	1723	1/1	0.99	0.08	28,28,28,28	0
3	CA	A	1718[B]	1/1	0.99	0.06	29,29,29,29	1
10	CL	A	1729	1/1	1.00	0.04	21,21,21,21	0
11	ZN	A	2000	1/1	1.00	0.02	18,18,18,18	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.

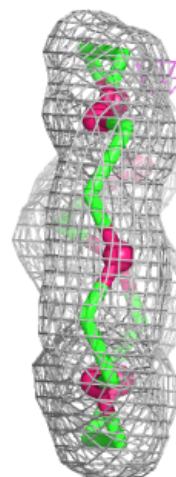
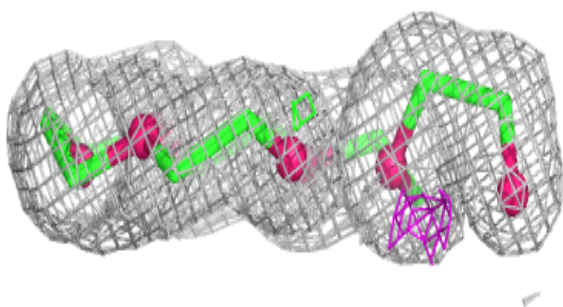
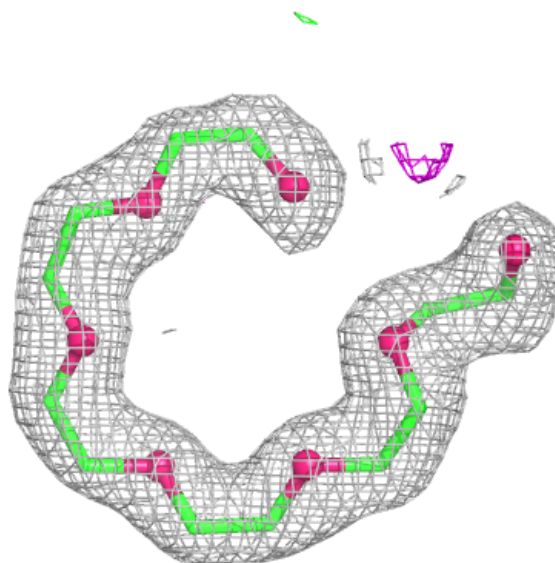
Electron density around ADP A 1727:

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



Electron density around 2PE A 1719:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.