



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:54 PM UTC

PDB ID : 5ZWA / pdb_00005zwa
Title : Crystal structure of Pyridoxal kinase (PdxK) from Salmonella typhimurium in complex with ADP, PL-linked to Lys233 via Schiff base in protomer A and the product (PLP) in protomer B
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Deposited on : 2018-05-14
Resolution : 2.45 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

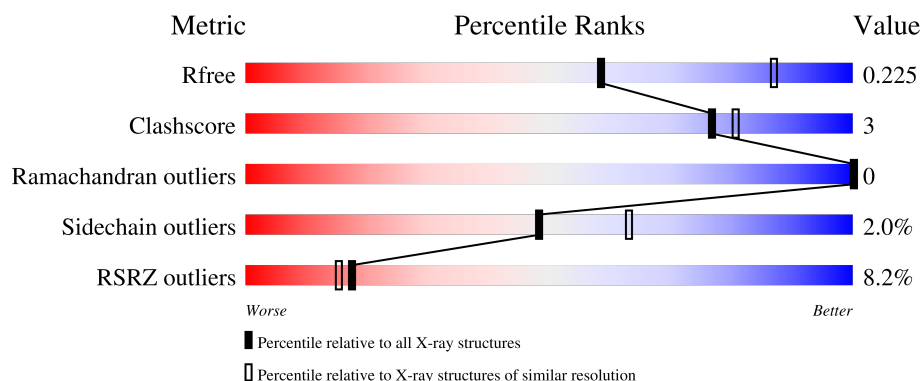
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.45 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	1190 (2.46-2.46)
Clashscore	190562	1229 (2.46-2.46)
Ramachandran outliers	187476	1218 (2.46-2.46)
Sidechain outliers	187428	1218 (2.46-2.46)
RSRZ outliers	180081	1190 (2.46-2.46)

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	296	8% 80% 9% 11%
2	B	296	7% 85% 5% 10%

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 4367 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 Pyridoxine/pyridoxal/pyridoxamine kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	264	Total	C	N	O	S	0	3	0
			1986	1274	326	373	13			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	289	LEU	-	expression tag	UNP A0A0M0PWM4
A	290	GLU	-	expression tag	UNP A0A0M0PWM4
A	291	HIS	-	expression tag	UNP A0A0M0PWM4
A	292	HIS	-	expression tag	UNP A0A0M0PWM4
A	293	HIS	-	expression tag	UNP A0A0M0PWM4
A	294	HIS	-	expression tag	UNP A0A0M0PWM4
A	295	HIS	-	expression tag	UNP A0A0M0PWM4
A	296	HIS	-	expression tag	UNP A0A0M0PWM4

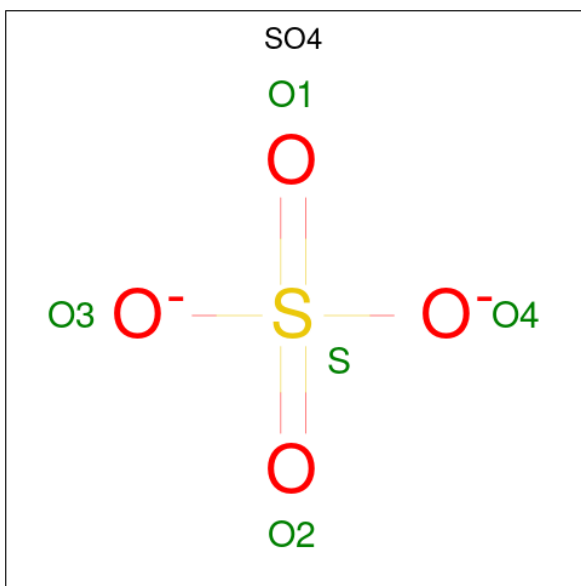
- Molecule 2 is a protein called Pyridoxine/pyridoxal/pyridoxamine kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	266	Total	C	N	O	S	0	2	0
			1987	1274	327	374	12			

There are 8 discrepancies between the modelled and reference sequences:

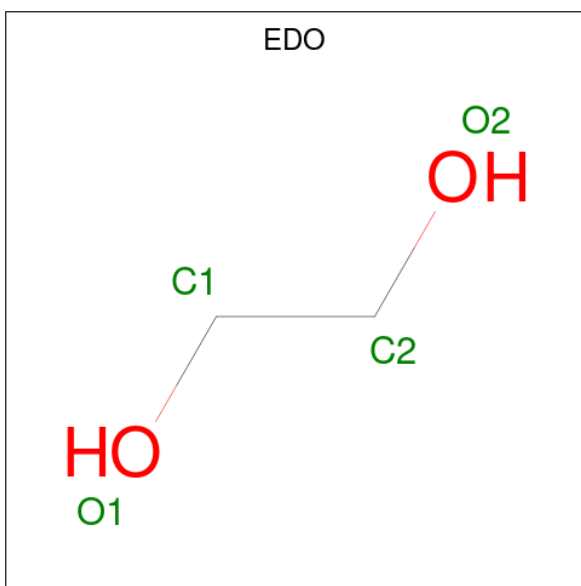
Chain	Residue	Modelled	Actual	Comment	Reference
B	289	LEU	-	expression tag	UNP A0A0M0PWM4
B	290	GLU	-	expression tag	UNP A0A0M0PWM4
B	291	HIS	-	expression tag	UNP A0A0M0PWM4
B	292	HIS	-	expression tag	UNP A0A0M0PWM4
B	293	HIS	-	expression tag	UNP A0A0M0PWM4
B	294	HIS	-	expression tag	UNP A0A0M0PWM4
B	295	HIS	-	expression tag	UNP A0A0M0PWM4
B	296	HIS	-	expression tag	UNP A0A0M0PWM4

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



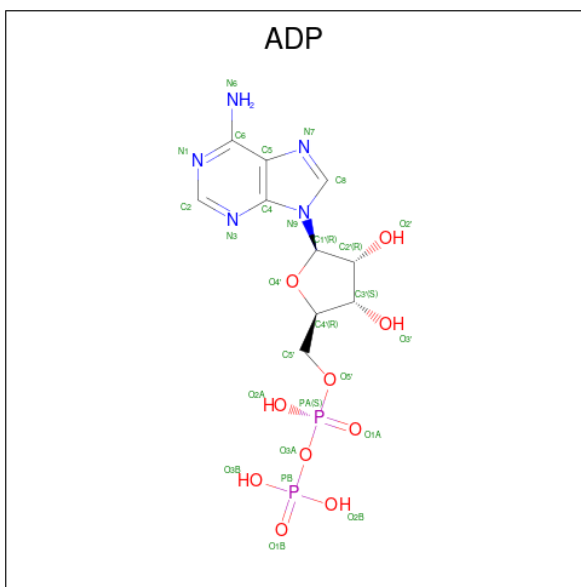
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



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

- Molecule 5 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).

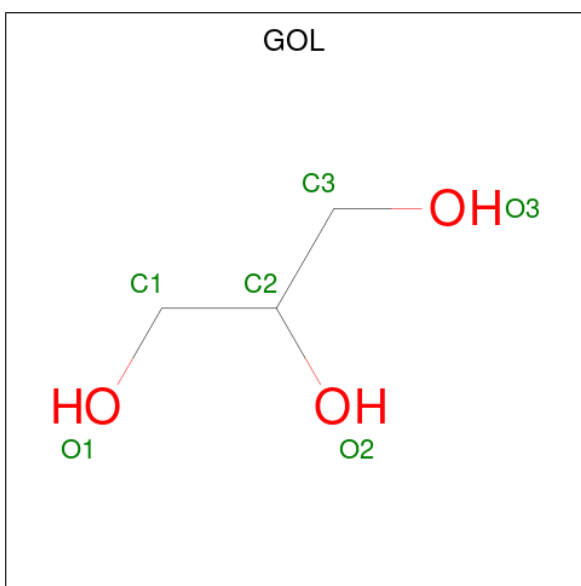


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 6 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

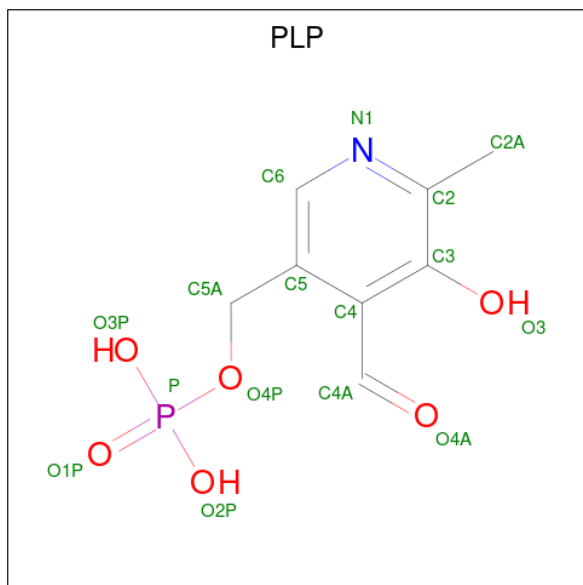
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	2	Total	Mg	0	0
			2	2		

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



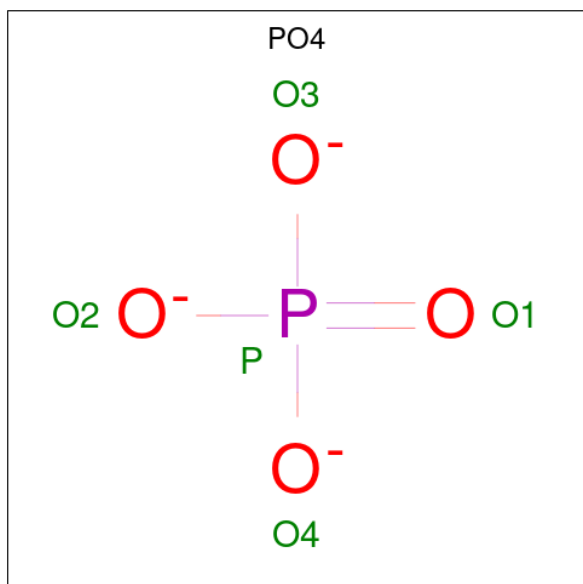
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			6	3	3		
7	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 8 is PYRIDOXAL-5'-PHOSPHATE (CCD ID: PLP) (formula: $C_8H_{10}NO_6P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	B	1	Total	C	N	O	P	0	0
			16	8	1	6	1		

- Molecule 9 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	B	1	Total	O	P	0	0
			5	4	1		

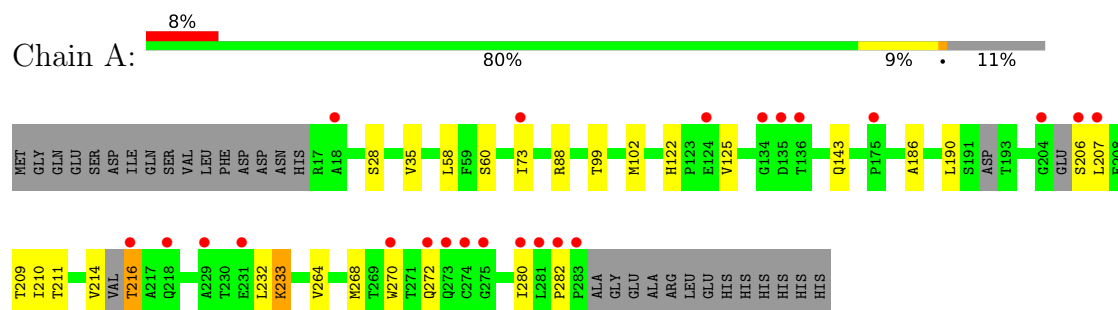
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	116	Total	O	0	0
			116	116		
10	B	141	Total	O	0	0
			141	141		

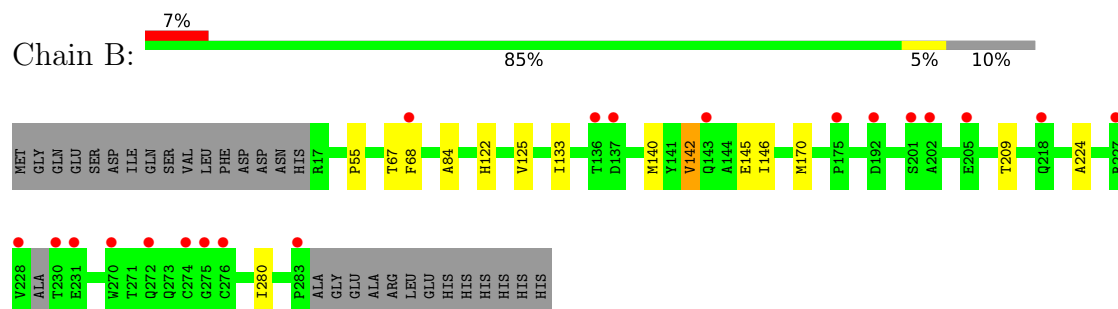
3 Residue-property plots [i](#)

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: Pyridoxine/pyridoxal/pyridoxamine kinase



- Molecule 2: Pyridoxine/pyridoxal/pyridoxamine kinase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	72.26Å 72.26Å 244.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	62.23 – 2.45 62.23 – 2.45	Depositor EDS
% Data completeness (in resolution range)	94.0 (62.23-2.45) 94.0 (62.23-2.45)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.93 (at 2.45Å)	Xtriage
Refinement program	REFMAC 5.8.0069	Depositor
R, R_{free}	0.216 , 0.235 0.221 , 0.225	Depositor DCC
R_{free} test set	1184 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	28.1	Xtriage
Anisotropy	0.326	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 40.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	4367	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.43% 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: CME, GOL, PLP, ADP, EDO, PO4, SO4, MG, JLP

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	0.43	0/1988	0.72	1/2712 (0.0%)
2	B	0.42	0/2013	0.70	0/2753
All	All	0.42	0/4001	0.71	1/5465 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	73	ILE	N-CA-CB	6.32	115.96	110.08

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	1986	0	1973	17	0
2	B	1987	0	1992	11	0
3	A	10	0	0	0	0
3	B	5	0	0	0	0
4	A	24	0	36	0	0
4	B	36	0	54	0	0
5	A	27	0	12	2	0
6	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	6	0	8	0	0
7	B	6	0	8	0	0
8	B	16	0	7	0	0
9	B	5	0	0	0	0
10	A	116	0	0	1	0
10	B	141	0	0	0	0
All	All	4367	0	4090	24	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 3.

All (24) 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:214:VAL:C	1:A:216:THR:N	2.21	0.98
2:B:133:ILE:HG21	2:B:170:MET:HE3	1.82	0.62
1:A:88:ARG:NH2	2:B:67:THR:OG1	2.35	0.58
1:A:270:TRP:CZ3	1:A:282:PRO:HB3	2.42	0.54
1:A:99:THR:HB	1:A:102[A]:MET:CE	2.38	0.54
2:B:209:THR:CG2	2:B:224:ALA:HB1	2.42	0.49
1:A:58:LEU:HD21	2:B:55:PRO:CG	2.43	0.48
2:B:142:VAL:HG22	2:B:146:ILE:HG13	1.95	0.48
1:A:232:LEU:HD12	1:A:268[B]:MET:SD	2.54	0.48
1:A:264:VAL:HG11	5:A:309:ADP:O4'	2.14	0.47
1:A:58:LEU:HD21	2:B:55:PRO:HG2	1.97	0.47
1:A:206:SER:O	1:A:207:LEU:CB	2.63	0.46
1:A:143[A]:GLN:NE2	10:A:402:HOH:O	2.49	0.46
1:A:186:ALA:O	1:A:190:LEU:HD13	2.16	0.46
1:A:60:SER:HB2	2:B:84:ALA:CB	2.46	0.45
2:B:140:MET:HE2	2:B:170:MET:HE1	1.99	0.44
1:A:210:ILE:N	1:A:210:ILE:HD12	2.33	0.43
1:A:28:SER:OG	1:A:233:JLP:N1	2.53	0.42
2:B:68[A]:PHE:O	2:B:68[A]:PHE:CD1	2.73	0.42
2:B:68[A]:PHE:CD1	2:B:68[A]:PHE:C	2.98	0.41
2:B:122:HIS:HB3	2:B:125:VAL:HG23	2.02	0.41
1:A:122:HIS:HB3	1:A:125:VAL:HG23	2.02	0.41
1:A:209:THR:HG21	5:A:309:ADP:H2'	2.03	0.40
1:A:88:ARG:HH11	1:A:88:ARG:HA	1.86	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	257/296 (87%)	251 (98%)	6 (2%)	0	100	100
2	B	263/296 (89%)	257 (98%)	6 (2%)	0	100	100
All	All	520/592 (88%)	508 (98%)	12 (2%)	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	203/241 (84%)	198 (98%)	5 (2%)	42	56
2	B	208/242 (86%)	205 (99%)	3 (1%)	59	72
All	All	411/483 (85%)	403 (98%)	8 (2%)	48	64

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35	VAL
1	A	211	THR
1	A	216	THR
1	A	272	GLN
1	A	280	ILE
2	B	142	VAL
2	B	145	GLU
2	B	280	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	273	GLN
2	B	273	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

3 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	CME	B	126	2	8,9,10	0.77	0	6,9,11	0.61	0
1	CME	A	126	1	8,9,10	0.77	0	6,9,11	0.62	0
1	JLP	A	233	1	19,20,21	2.53	3 (15%)	20,25,27	1.34	3 (15%)

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	CME	B	126	2	-	1/5/8/10	-
1	CME	A	126	1	-	1/5/8/10	-
1	JLP	A	233	1	-	3/12/13/15	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	233	JLP	C3-C2	7.82	1.49	1.41
1	A	233	JLP	C4-C5	5.53	1.49	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	233	JLP	C4-C3	4.77	1.49	1.41

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	233	JLP	C4-C3-C2	-3.54	118.15	120.14
1	A	233	JLP	C3-C4-C5	-2.39	116.36	118.28
1	A	233	JLP	C6-N1-C2	2.36	123.47	119.20

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	233	JLP	N-CA-CB-CG
1	A	233	JLP	C-CA-CB-CG
1	A	126	CME	CE-SD-SG-CB
2	B	126	CME	CE-SD-SG-CB
1	A	233	JLP	CG-CD-CE-NZ

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	233	JLP	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 25 ligands modelled in this entry, 2 are monoatomic - leaving 23 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
5	ADP	A	309	6	28,29,29	1.46	4 (14%)	43,45,45	1.80	9 (20%)
4	EDO	B	307	-	3,3,3	0.44	0	2,2,2	0.33	0
3	SO4	A	302	-	4,4,4	0.42	0	6,6,6	0.09	0
4	EDO	A	306	-	3,3,3	0.44	0	2,2,2	0.33	0
3	SO4	B	301	-	4,4,4	0.44	0	6,6,6	0.14	0
4	EDO	A	303	-	3,3,3	0.43	0	2,2,2	0.33	0
4	EDO	B	304	-	3,3,3	0.41	0	2,2,2	0.38	0
7	GOL	A	312	-	5,5,5	0.34	0	5,5,5	0.23	0
4	EDO	B	310	-	3,3,3	0.43	0	2,2,2	0.31	0
8	PLP	B	302	-	16,16,16	2.78	3 (18%)	20,23,23	1.59	3 (15%)
4	EDO	A	308	-	3,3,3	0.43	0	2,2,2	0.32	0
4	EDO	B	311	-	3,3,3	0.43	0	2,2,2	0.30	0
4	EDO	A	307	-	3,3,3	0.43	0	2,2,2	0.33	0
9	PO4	B	303	-	4,4,4	0.93	0	6,6,6	0.45	0
4	EDO	B	309	-	3,3,3	0.44	0	2,2,2	0.31	0
4	EDO	B	305	-	3,3,3	0.45	0	2,2,2	0.28	0
4	EDO	B	308	-	3,3,3	0.44	0	2,2,2	0.30	0
4	EDO	A	304	-	3,3,3	0.41	0	2,2,2	0.37	0
4	EDO	B	312	-	3,3,3	0.44	0	2,2,2	0.28	0
3	SO4	A	301	-	4,4,4	0.43	0	6,6,6	0.07	0
4	EDO	B	306	-	3,3,3	0.44	0	2,2,2	0.32	0
4	EDO	A	305	-	3,3,3	0.42	0	2,2,2	0.33	0
7	GOL	B	313	-	5,5,5	0.32	0	5,5,5	0.34	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
5	ADP	A	309	6	-	2/16/32/32	0/3/3/3
4	EDO	B	307	-	-	0/1/1/1	-
4	EDO	A	306	-	-	1/1/1/1	-
4	EDO	A	303	-	-	1/1/1/1	-
4	EDO	B	304	-	-	0/1/1/1	-
7	GOL	A	312	-	-	1/4/4/4	-
4	EDO	B	310	-	-	1/1/1/1	-
8	PLP	B	302	-	-	2/8/8/8	0/1/1/1
4	EDO	A	308	-	-	1/1/1/1	-
4	EDO	B	311	-	-	1/1/1/1	-
4	EDO	A	307	-	-	0/1/1/1	-
4	EDO	B	309	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	B	305	-	-	1/1/1/1	-
4	EDO	B	308	-	-	0/1/1/1	-
4	EDO	A	304	-	-	1/1/1/1	-
4	EDO	B	312	-	-	1/1/1/1	-
4	EDO	B	306	-	-	1/1/1/1	-
4	EDO	A	305	-	-	1/1/1/1	-
7	GOL	B	313	-	-	0/4/4/4	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	302	PLP	C3-C2	7.91	1.49	1.41
8	B	302	PLP	C4-C5	5.41	1.49	1.42
8	B	302	PLP	C4-C3	4.93	1.49	1.41
5	A	309	ADP	C5-C4	4.85	1.47	1.39
5	A	309	ADP	C5-C6	2.74	1.48	1.41
5	A	309	ADP	C5-N7	-2.48	1.34	1.39
5	A	309	ADP	C8-N7	2.33	1.36	1.31

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	309	ADP	C5-C4-N3	-5.74	118.82	126.72
8	B	302	PLP	C4-C3-C2	-4.51	117.61	120.14
5	A	309	ADP	N3-C4-N9	4.38	134.62	127.17
5	A	309	ADP	C2-N3-C4	3.87	121.29	111.83
5	A	309	ADP	N3-C2-N1	-3.73	122.94	128.58
5	A	309	ADP	C4-C5-N7	-3.53	106.55	110.58
5	A	309	ADP	C5-N7-C8	2.48	107.35	103.45
8	B	302	PLP	C6-N1-C2	2.41	123.56	119.20
8	B	302	PLP	O4A-C4A-C4	-2.24	119.49	124.80
5	A	309	ADP	C4-N9-C8	2.24	108.09	105.74
5	A	309	ADP	C6-C5-N7	2.17	136.28	132.09
5	A	309	ADP	C2-N1-C6	2.15	122.26	118.73

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	309	ADP	O4'-C4'-C5'-O5'
8	B	302	PLP	C5A-O4P-P-O1P

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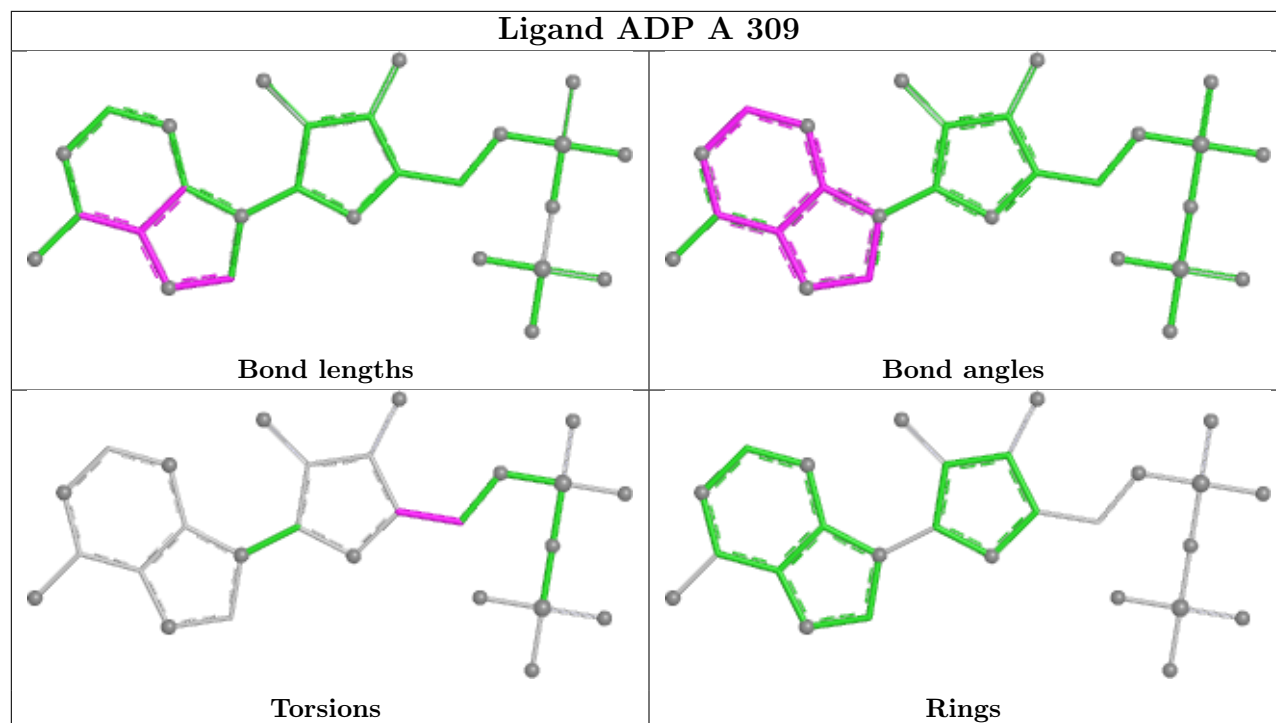
Mol	Chain	Res	Type	Atoms
5	A	309	ADP	C3'-C4'-C5'-O5'
4	B	306	EDO	O1-C1-C2-O2
4	A	303	EDO	O1-C1-C2-O2
4	A	304	EDO	O1-C1-C2-O2
4	B	310	EDO	O1-C1-C2-O2
4	B	312	EDO	O1-C1-C2-O2
7	A	312	GOL	O1-C1-C2-O2
4	B	309	EDO	O1-C1-C2-O2
4	B	305	EDO	O1-C1-C2-O2
4	B	311	EDO	O1-C1-C2-O2
4	A	306	EDO	O1-C1-C2-O2
8	B	302	PLP	C5A-O4P-P-O3P
4	A	305	EDO	O1-C1-C2-O2
4	A	308	EDO	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	309	ADP	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	262/296 (88%)	0.50	23 (8%) 15 13	9, 26, 42, 55	3 (1%)
2	B	265/296 (89%)	0.42	20 (7%) 20 17	10, 24, 41, 58	2 (0%)
All	All	527/592 (89%)	0.46	43 (8%) 17 15	9, 25, 42, 58	5 (0%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	68[A]	PHE	5.8
1	A	274	CYS	4.7
2	B	274	CYS	4.7
1	A	206	SER	4.3
1	A	175	PRO	4.1
1	A	283	PRO	3.9
2	B	275	GLY	3.6
1	A	273	GLN	3.5
1	A	136	THR	3.4
2	B	201	SER	3.3
2	B	272	GLN	3.2
2	B	231	GLU	3.1
2	B	218	GLN	3.0
2	B	228	VAL	2.9
1	A	216	THR	2.8
1	A	231	GLU	2.8
2	B	227	ARG	2.7
2	B	230	THR	2.7
2	B	143	GLN	2.6
2	B	136	THR	2.5
1	A	18	ALA	2.5
1	A	124	GLU	2.5
1	A	218	GLN	2.4
2	B	175	PRO	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	270	TRP	2.4
1	A	207	LEU	2.4
1	A	282	PRO	2.3
1	A	204	GLY	2.3
1	A	135	ASP	2.3
1	A	229	ALA	2.3
1	A	272	GLN	2.3
2	B	202	ALA	2.2
1	A	134	GLY	2.2
1	A	280	ILE	2.2
2	B	276	CYS	2.2
1	A	275	GLY	2.1
1	A	281	LEU	2.1
2	B	205	GLU	2.1
2	B	270	TRP	2.1
2	B	137	ASP	2.1
1	A	73	ILE	2.0
2	B	192	ASP	2.0
2	B	283	PRO	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	JLP	A	233	20/21	0.86	0.17	28,29,31,33	0
1	CME	A	126	10/11	0.87	0.16	32,36,45,47	0
2	CME	B	126	10/11	0.87	0.14	27,33,41,42	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

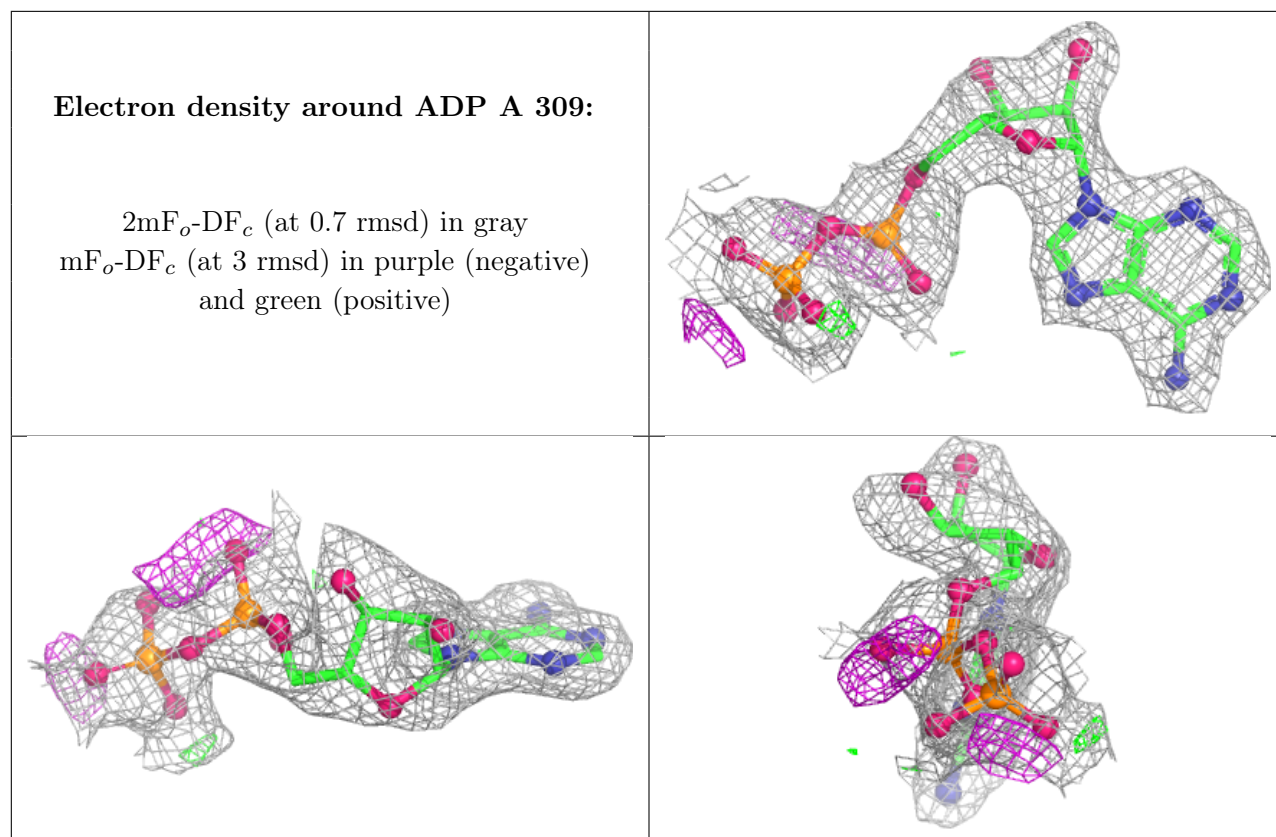
6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	EDO	A	307	4/4	0.58	0.23	43,43,43,44	0
7	GOL	A	312	6/6	0.73	0.18	40,40,40,41	0
8	PLP	B	302	16/16	0.73	0.24	75,78,84,84	0
3	SO4	A	302	5/5	0.76	0.20	102,102,104,104	0
4	EDO	B	312	4/4	0.76	0.18	62,63,63,63	0
4	EDO	A	304	4/4	0.79	0.18	49,49,49,50	0
4	EDO	B	305	4/4	0.80	0.23	55,56,56,56	0
4	EDO	A	308	4/4	0.81	0.19	49,50,50,50	0
4	EDO	A	306	4/4	0.81	0.16	46,46,46,46	0
7	GOL	B	313	6/6	0.81	0.16	43,43,44,44	0
4	EDO	B	308	4/4	0.81	0.23	46,46,47,48	0
3	SO4	A	301	5/5	0.83	0.14	72,72,73,74	0
9	PO4	B	303	5/5	0.84	0.17	63,63,64,64	0
4	EDO	A	305	4/4	0.85	0.18	57,57,58,59	0
4	EDO	A	303	4/4	0.87	0.14	38,38,38,39	0
4	EDO	B	306	4/4	0.87	0.14	39,39,40,40	0
4	EDO	B	307	4/4	0.87	0.13	43,43,43,43	0
4	EDO	B	309	4/4	0.88	0.15	41,41,41,41	0
3	SO4	B	301	5/5	0.88	0.27	60,61,61,61	0
4	EDO	B	310	4/4	0.90	0.11	41,41,41,42	0
4	EDO	B	311	4/4	0.92	0.13	40,40,40,40	0
4	EDO	B	304	4/4	0.92	0.14	42,42,42,43	0
6	MG	A	310	1/1	0.93	0.07	24,24,24,24	0
5	ADP	A	309	27/27	0.94	0.10	17,19,20,20	27
6	MG	A	311	1/1	0.98	0.05	11,11,11,11	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.