



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 06:07 PM UTC

PDB ID : 7KZ6 / pdb_00007kz6
Title : Crystal structure of KabA from Bacillus cereus UW85 with bound cofactor PMP
Authors : Prasertanan, T.; Palmer, D.R.J.; Sanders, D.A.R.
Deposited on : 2020-12-10
Resolution : 1.65 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

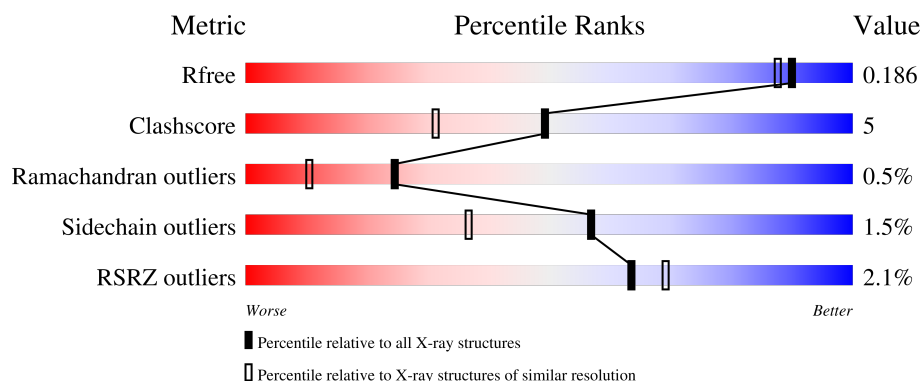
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 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	2563 (1.66-1.66)
Clashscore	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)
RSRZ outliers	180081	2564 (1.66-1.66)

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	445	% 84% 14% .
1	B	445	2% 85% 13% .
1	C	445	% 90% 8% .
1	D	445	4% 86% 13% .

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 15631 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.

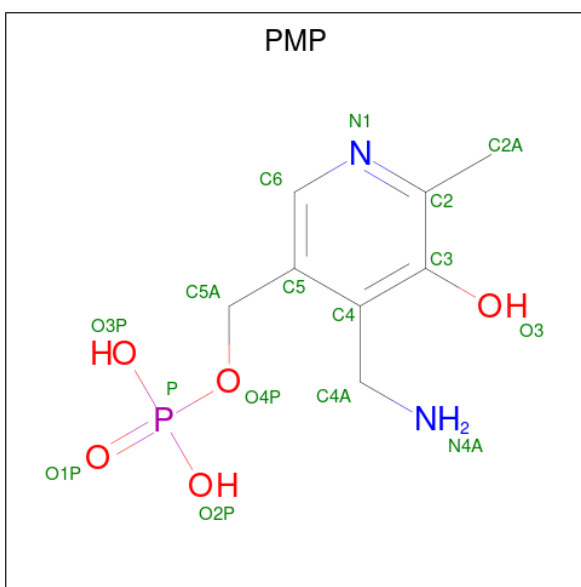
- Molecule 1 is a protein called Aminotransferase class I/II-fold pyridoxal phosphate-dependent enzyme.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	438	Total	C	N	O	S	0	3	0
			3558	2276	606	660	16			
1	B	438	Total	C	N	O	S	0	4	0
			3561	2275	607	663	16			
1	C	438	Total	C	N	O	S	0	7	0
			3585	2290	612	668	15			
1	D	439	Total	C	N	O	S	0	0	0
			3537	2262	603	657	15			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP C0JRF5
A	0	ALA	-	expression tag	UNP C0JRF5
A	1	MET	-	expression tag	UNP C0JRF5
A	2	ASP	-	expression tag	UNP C0JRF5
B	-1	GLY	-	expression tag	UNP C0JRF5
B	0	ALA	-	expression tag	UNP C0JRF5
B	1	MET	-	expression tag	UNP C0JRF5
B	2	ASP	-	expression tag	UNP C0JRF5
C	-1	GLY	-	expression tag	UNP C0JRF5
C	0	ALA	-	expression tag	UNP C0JRF5
C	1	MET	-	expression tag	UNP C0JRF5
C	2	ASP	-	expression tag	UNP C0JRF5
D	-1	GLY	-	expression tag	UNP C0JRF5
D	0	ALA	-	expression tag	UNP C0JRF5
D	1	MET	-	expression tag	UNP C0JRF5
D	2	ASP	-	expression tag	UNP C0JRF5

- Molecule 2 is 4'-DEOXY-4'-AMINOPYRIDOXAL-5'-PHOSPHATE (CCD ID: PMP) (formula: C₈H₁₃N₂O₅P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			16	8	2	5	1		
2	B	1	Total	C	N	O	P	0	0
			16	8	2	5	1		
2	C	1	Total	C	N	O	P	0	0
			16	8	2	5	1		
2	D	1	Total	C	N	O	P	0	0
			16	8	2	5	1		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

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

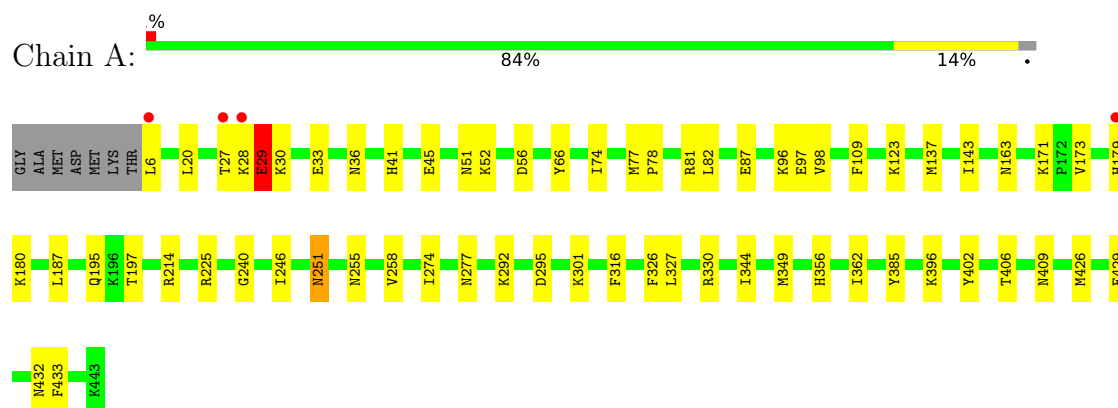
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	356	Total O 356 356	0	0
4	B	284	Total O 284 284	0	0
4	C	344	Total O 344 344	0	0
4	D	230	Total O 230 230	0	0

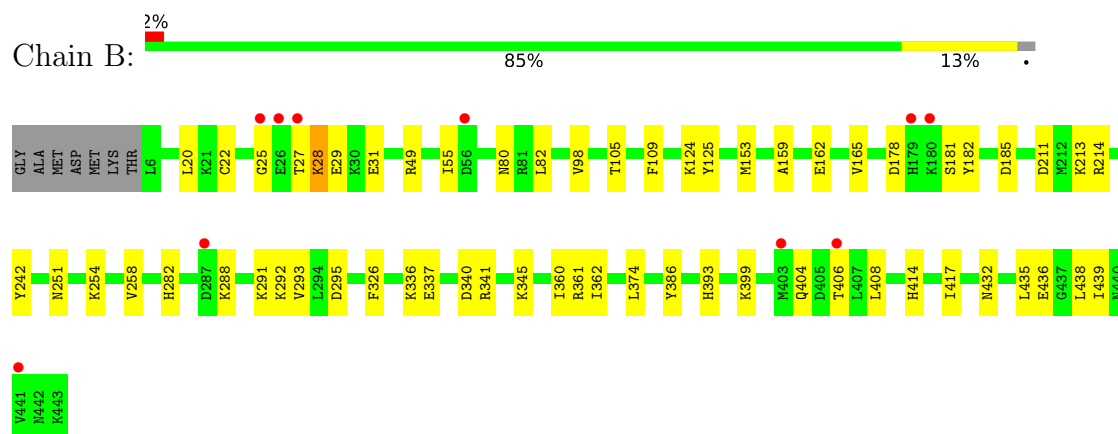
3 Residue-property plots

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

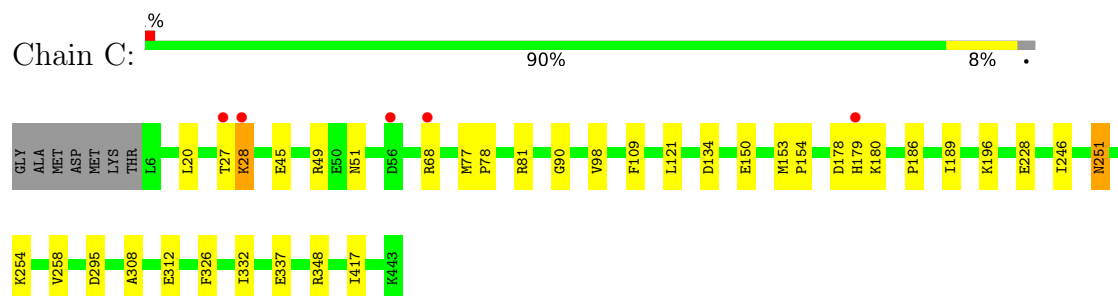
- Molecule 1: Aminotransferase class I/II-fold pyridoxal phosphate-dependent enzyme



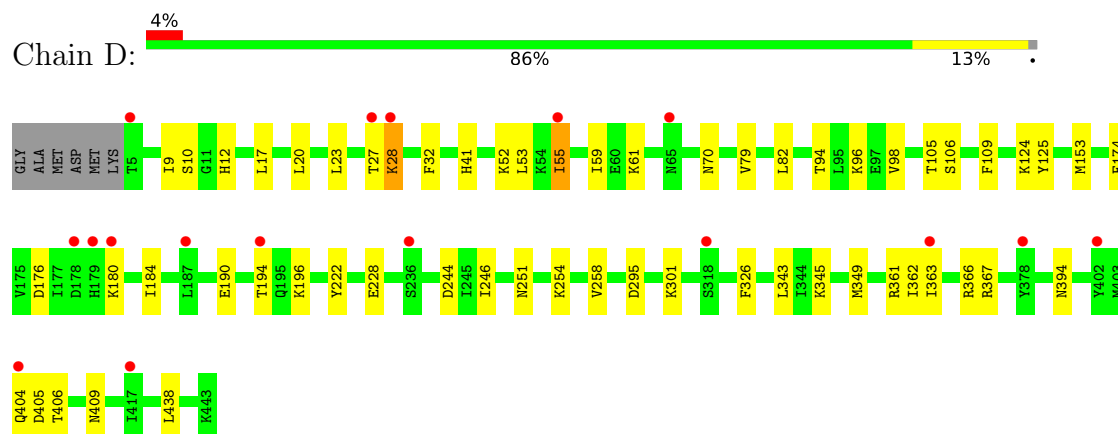
- Molecule 1: Aminotransferase class I/II-fold pyridoxal phosphate-dependent enzyme



- Molecule 1: Aminotransferase class I/II-fold pyridoxal phosphate-dependent enzyme



- Molecule 1: Aminotransferase class I/II-fold pyridoxal phosphate-dependent enzyme



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	66.53Å 66.64Å 112.22Å 77.42° 81.06° 88.34°	Depositor
Resolution (Å)	46.88 – 1.65 46.88 – 1.65	Depositor EDS
% Data completeness (in resolution range)	95.3 (46.88-1.65) 95.3 (46.88-1.65)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.25 (at 1.39Å)	Xtriage
Refinement program	PHENIX dev_2398	Depositor
R, R_{free}	0.168 , 0.201 0.172 , 0.186	Depositor DCC
R_{free} test set	17659 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	22.8	Xtriage
Anisotropy	0.075	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 50.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.019 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	15631	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.15% 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: PMP, EDO

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	0.67	0/3620	0.77	1/4880 (0.0%)
1	B	0.61	0/3622	0.76	2/4881 (0.0%)
1	C	0.62	0/3651	0.76	1/4923 (0.0%)
1	D	0.58	0/3598	0.74	0/4850
All	All	0.62	0/14491	0.75	4/19534 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	185	ASP	CA-C-N	-5.96	113.54	119.56
1	B	185	ASP	C-N-CA	-5.96	113.54	119.56
1	C	27	THR	CB-CA-C	-5.21	99.98	110.30
1	A	251	ASN	CA-CB-CG	5.10	117.70	112.60

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	3558	0	3642	48	0
1	B	3561	0	3642	42	0
1	C	3585	0	3658	25	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	3537	0	3627	42	0
2	A	16	0	11	0	0
2	B	16	0	11	1	0
2	C	16	0	11	1	0
2	D	16	0	10	1	0
3	A	52	0	78	16	0
3	B	12	0	18	4	0
3	C	28	0	42	6	0
3	D	20	0	30	7	0
4	A	356	0	0	10	0
4	B	284	0	0	5	0
4	C	344	0	0	5	0
4	D	230	0	0	6	0
All	All	15631	0	14780	159	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 5.

All (159) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:295:ASP:H	3:C:502:EDO:H22	1.33	0.93
4:C:609:HOH:O	1:D:105:THR:HG21	1.70	0.90
1:A:330:ARG:HH22	1:A:432:ASN:HD21	1.23	0.86
1:B:295:ASP:H	3:B:502:EDO:H11	1.43	0.81
1:A:51:ASN:HB3	3:A:505:EDO:H22	1.61	0.80
1:B:153:MET:HE1	1:B:165:VAL:HG21	1.63	0.79
1:C:337:GLU:CD	1:C:337:GLU:H	1.93	0.77
1:D:295:ASP:H	3:D:503:EDO:H11	1.48	0.76
1:A:295:ASP:HB2	3:A:502:EDO:H12	1.69	0.74
1:D:194:THR:HG22	1:D:196:LYS:H	1.54	0.72
1:B:105:THR:HG21	4:B:863:HOH:O	1.89	0.71
1:C:178[B]:ASP:OD1	1:C:179[B]:HIS:N	2.25	0.69
1:A:225:ARG:HH21	3:A:509:EDO:H11	1.58	0.69
1:D:106:SER:HB3	1:D:301:LYS:NZ	2.08	0.69
1:D:105:THR:HB	3:D:502:EDO:H21	1.76	0.68
1:D:394:ASN:H	3:D:505:EDO:H22	1.60	0.66
1:A:77[B]:MET:SD	3:A:511:EDO:H21	2.36	0.66
1:A:225:ARG:NH2	3:A:509:EDO:H11	2.11	0.66
1:B:417:ILE:HG21	3:B:503:EDO:H22	1.78	0.65
1:C:348:ARG:NH1	4:C:603:HOH:O	2.29	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:6:LEU:N	4:A:607:HOH:O	2.31	0.64
1:A:385:TYR:HE2	3:A:506:EDO:H22	1.62	0.64
3:D:505:EDO:H11	4:D:914:HOH:O	1.97	0.64
1:B:374:LEU:HD11	1:B:438:LEU:HD13	1.80	0.64
1:B:288:LYS:HG2	1:B:291:LYS:HD2	1.80	0.62
1:A:98:VAL:HG22	1:A:109:PHE:CE2	2.36	0.60
3:A:514:EDO:H12	4:A:612:HOH:O	2.01	0.60
1:A:78:PRO:HG2	1:A:81:ARG:HG3	1.83	0.60
1:A:195:GLN:O	3:A:503:EDO:H22	2.02	0.60
1:C:98:VAL:HG22	1:C:109:PHE:CE2	2.36	0.60
1:B:153:MET:CE	1:B:165:VAL:HG21	2.32	0.59
1:A:173:VAL:HG22	3:A:512:EDO:H22	1.84	0.59
1:A:255:ASN:HD21	1:A:356:HIS:HA	1.67	0.59
1:A:402:TYR:CE1	3:A:512:EDO:H11	2.38	0.58
1:A:41:HIS:HD2	4:A:910:HOH:O	1.87	0.58
1:D:70:ASN:ND2	4:D:801:HOH:O	2.35	0.58
1:B:49:ARG:NH2	1:B:55:ILE:H	2.01	0.58
1:B:22:CYS:HA	1:B:27:THR:O	2.04	0.57
1:A:277:ASN:OD1	1:A:301:LYS:NZ	2.37	0.57
1:D:343:LEU:O	1:D:363:ILE:HG22	2.05	0.57
1:B:404:GLN:HB2	4:B:772:HOH:O	2.05	0.56
1:A:51:ASN:O	1:A:52:LYS:HE2	2.04	0.56
1:D:194:THR:HG21	4:D:859:HOH:O	2.05	0.56
1:D:254:LYS:HE2	2:D:501:PMP:N4A	2.20	0.55
1:B:399:LYS:HE2	4:B:855:HOH:O	2.06	0.54
1:A:163:ASN:HD21	1:B:292:LYS:NZ	2.04	0.54
1:B:213:LYS:HG2	1:B:242:TYR:CE2	2.42	0.54
1:D:9:ILE:HD11	1:D:32:PHE:CD2	2.43	0.54
1:D:96:LYS:NZ	4:D:803:HOH:O	2.41	0.54
1:A:77[B]:MET:HE3	1:A:77[B]:MET:HA	1.89	0.54
1:A:123:LYS:HD3	4:A:604:HOH:O	2.07	0.54
1:C:134:ASP:OD2	3:C:503:EDO:H22	2.08	0.53
1:A:77[B]:MET:HE2	1:A:82:LEU:HG	1.89	0.53
1:A:330:ARG:NH2	1:A:432:ASN:HD21	2.01	0.53
1:B:213:LYS:HG2	1:B:242:TYR:CZ	2.44	0.53
1:A:36:ASN:ND2	4:A:615:HOH:O	2.41	0.53
1:C:150:GLU:HG3	1:C:196:LYS:HB3	1.89	0.53
1:D:301:LYS:HB2	3:D:502:EDO:H11	1.90	0.53
1:B:393:HIS:HE1	4:B:614:HOH:O	1.92	0.53
1:D:98:VAL:HG22	1:D:109:PHE:CE2	2.44	0.53
1:B:182:TYR:CE1	1:B:417:ILE:HD12	2.44	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:124:LYS:HE3	1:D:125:TYR:OH	2.09	0.52
1:A:292:LYS:H	1:B:393:HIS:CD2	2.27	0.52
1:A:143:ILE:HA	3:A:509:EDO:H12	1.90	0.52
1:D:52:LYS:HD2	1:D:53:LEU:H	1.73	0.52
1:B:49:ARG:HH21	1:B:55:ILE:HD12	1.74	0.51
1:C:251[B]:ASN:ND2	4:C:609:HOH:O	2.38	0.51
1:D:32:PHE:H	1:D:52:LYS:HZ2	1.58	0.51
1:D:176:ASP:OD2	1:D:409:ASN:HB3	2.10	0.51
1:A:187:LEU:HD23	1:A:214:ARG:NH1	2.26	0.51
1:B:124:LYS:HG2	1:B:125:TYR:CZ	2.47	0.50
1:A:96:LYS:NZ	4:A:620:HOH:O	2.44	0.50
1:B:211:ASP:OD2	1:B:214:ARG:NH1	2.39	0.49
1:B:336:LYS:NZ	1:B:340:ASP:OD2	2.45	0.49
1:B:336:LYS:HZ3	1:B:340:ASP:CG	2.20	0.49
1:D:295:ASP:H	3:D:503:EDO:C1	2.21	0.49
1:A:171:LYS:HB3	3:A:512:EDO:O2	2.13	0.49
1:C:254:LYS:NZ	2:C:501:PMP:H4A2	2.28	0.48
1:B:211:ASP:OD2	1:B:214:ARG:HD2	2.14	0.48
1:C:20:LEU:HD11	1:C:326:PHE:HD1	1.79	0.47
1:B:153:MET:HE1	1:B:165:VAL:CG2	2.40	0.47
1:A:344:ILE:HG22	1:A:362:ILE:HD13	1.96	0.47
1:B:20:LEU:HD11	1:B:326:PHE:HD1	1.79	0.47
1:B:345:LYS:HB2	1:B:361:ARG:HB2	1.97	0.47
1:B:254:LYS:HE2	2:B:501:PMP:N4A	2.30	0.47
1:D:345:LYS:HZ1	1:D:361:ARG:NH2	2.13	0.47
1:B:295:ASP:H	3:B:502:EDO:C1	2.19	0.46
1:D:55:ILE:H	1:D:55:ILE:HG13	1.43	0.46
1:D:124:LYS:HG2	1:D:125:TYR:CZ	2.50	0.46
4:A:769:HOH:O	1:B:282:HIS:HE1	1.99	0.46
1:D:17:LEU:HD21	1:D:349:MET:HG3	1.97	0.46
1:D:366:ARG:HD3	4:D:855:HOH:O	2.16	0.46
1:C:332:ILE:HG23	1:C:348:ARG:HH22	1.80	0.46
1:C:178[B]:ASP:OD1	1:C:180:LYS:HG2	2.16	0.46
1:A:28:LYS:HE3	1:A:29:GLU:HB2	1.96	0.46
1:C:417:ILE:HD12	3:C:504:EDO:H22	1.98	0.45
1:D:10:SER:OG	1:D:12:HIS:HD2	2.00	0.45
1:D:23:LEU:HB3	1:D:59:ILE:HD11	1.97	0.45
1:D:228:GLU:HB2	1:D:246:ILE:HD12	1.98	0.45
1:A:197:THR:O	3:A:503:EDO:H21	2.17	0.45
1:C:150:GLU:HG3	1:C:196:LYS:CB	2.47	0.45
1:B:295:ASP:HB2	3:B:502:EDO:H22	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:90:GLY:HA3	1:C:312:GLU:OE2	2.17	0.44
1:D:20:LEU:HD11	1:D:326:PHE:HD1	1.82	0.44
1:D:41:HIS:HD2	4:D:1010:HOH:O	1.99	0.44
1:D:52:LYS:HD2	1:D:52:LYS:HA	1.84	0.44
1:C:78:PRO:HG2	1:C:81:ARG:HG3	1.98	0.44
3:A:502:EDO:H21	4:A:701:HOH:O	2.17	0.44
1:D:362:ILE:HD12	1:D:367:ARG:HG2	2.00	0.44
3:C:504:EDO:H12	4:C:812:HOH:O	2.17	0.44
1:B:80[A]:ASN:ND2	1:C:49:ARG:HD3	2.32	0.44
1:B:178:ASP:OD2	1:B:181:SER:OG	2.33	0.44
1:A:385:TYR:CE2	3:A:506:EDO:H22	2.47	0.44
1:A:97:GLU:OE2	4:A:601:HOH:O	2.21	0.43
1:A:274:ILE:HG12	3:A:504:EDO:H22	2.00	0.43
3:C:507:EDO:H12	4:C:903:HOH:O	2.19	0.43
1:A:187:LEU:HD23	1:A:214:ARG:HH12	1.82	0.43
1:A:179:HIS:CE1	1:A:409:ASN:OD1	2.72	0.43
1:A:74:ILE:HG12	1:A:433:PHE:CD1	2.54	0.43
1:D:190:GLU:OE2	1:D:222:TYR:OH	2.35	0.43
1:A:327:LEU:HD22	1:A:426:MET:CE	2.49	0.43
1:D:345:LYS:HZ1	1:D:361:ARG:CZ	2.32	0.43
1:D:79:VAL:HA	1:D:82:LEU:HG	2.00	0.43
1:A:6:LEU:HD11	1:A:33:GLU:HG3	2.00	0.43
1:B:98:VAL:HG22	1:B:109:PHE:CE2	2.54	0.42
1:D:438:LEU:HD23	1:D:438:LEU:HA	1.76	0.42
1:A:20:LEU:HD11	1:A:326:PHE:HD1	1.84	0.42
1:B:435:LEU:O	1:B:439:ILE:HG12	2.20	0.42
1:C:28:LYS:H	1:C:28:LYS:HG2	1.39	0.42
1:A:56:ASP:OD2	4:A:602:HOH:O	2.21	0.42
1:C:77:MET:HE2	1:C:77:MET:HB3	1.81	0.42
1:D:106:SER:HB3	1:D:301:LYS:HZ2	1.85	0.42
1:D:32:PHE:H	1:D:52:LYS:NZ	2.18	0.41
1:D:61:LYS:N	1:D:61:LYS:HD2	2.35	0.41
1:A:240:GLY:HA2	1:A:246:ILE:HD11	2.01	0.41
1:A:396:LYS:HA	1:A:396:LYS:HD2	1.84	0.41
1:C:45:GLU:OE2	3:C:507:EDO:H22	2.20	0.41
1:A:87:GLU:HG3	1:A:316:PHE:CE1	2.55	0.41
1:A:349:MET:HE2	1:A:349:MET:HB2	1.80	0.41
1:B:82:LEU:HD22	4:B:848:HOH:O	2.21	0.41
1:D:153:MET:O	1:D:174:PHE:HA	2.20	0.41
1:A:77[B]:MET:HE3	1:A:78:PRO:HD2	2.02	0.41
1:B:360:ILE:CD1	1:B:362:ILE:HD11	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:432:ASN:O	1:B:436:GLU:HG2	2.21	0.41
1:B:337:GLU:O	1:B:341:ARG:HG3	2.21	0.41
1:B:25:GLY:HA2	1:B:28:LYS:HG3	2.01	0.40
1:C:98:VAL:HG21	1:C:308:ALA:CB	2.51	0.40
1:B:408:LEU:HD23	1:B:408:LEU:HA	1.93	0.40
1:C:68:ARG:HH11	1:C:68:ARG:HG3	1.86	0.40
1:B:386:TYR:O	1:B:414:HIS:HE1	2.03	0.40
1:D:94:THR:O	1:D:98:VAL:HG23	2.21	0.40
1:A:66:TYR:CE1	1:A:429:GLU:HG3	2.57	0.40
1:B:159:ALA:O	1:B:162[B]:GLU:HG2	2.22	0.40
1:C:153:MET:HB2	1:C:154:PRO:HD2	2.04	0.40
1:C:186:PRO:HA	1:C:189:ILE:HD12	2.03	0.40
1:D:244:ASP:HA	3:D:506:EDO:H22	2.03	0.40
1:A:137:MET:HE2	1:A:137:MET:HB3	1.82	0.40
1:C:228:GLU:HB2	1:C:246:ILE:HD12	2.01	0.40
1:D:52:LYS:CD	1:D:53:LEU:H	2.34	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	439/445 (99%)	425 (97%)	11 (2%)	3 (1%)	18	6
1	B	440/445 (99%)	424 (96%)	15 (3%)	1 (0%)	43	27
1	C	443/445 (100%)	429 (97%)	12 (3%)	2 (0%)	24	10
1	D	437/445 (98%)	419 (96%)	16 (4%)	2 (0%)	24	10
All	All	1759/1780 (99%)	1697 (96%)	54 (3%)	8 (0%)	24	10

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	51	ASN
1	A	29	GLU
1	A	180	LYS
1	D	28	LYS
1	B	258	VAL
1	C	258	VAL
1	D	258	VAL
1	A	258	VAL

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	399/401 (100%)	393 (98%)	6 (2%)	57	37
1	B	400/401 (100%)	394 (98%)	6 (2%)	57	37
1	C	403/401 (100%)	399 (99%)	4 (1%)	68	52
1	D	397/401 (99%)	388 (98%)	9 (2%)	44	21
All	All	1599/1604 (100%)	1574 (98%)	25 (2%)	57	34

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

Mol	Chain	Res	Type
1	A	27	THR
1	A	29	GLU
1	A	30	LYS
1	A	45	GLU
1	A	251	ASN
1	A	406	THR
1	B	28	LYS
1	B	29	GLU
1	B	31	GLU
1	B	251	ASN
1	B	293	VAL
1	B	406	THR
1	C	28	LYS
1	C	121	LEU

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Mol	Chain	Res	Type
1	C	251[A]	ASN
1	C	251[B]	ASN
1	D	27	THR
1	D	28	LYS
1	D	55	ILE
1	D	180	LYS
1	D	184	ILE
1	D	251	ASN
1	D	404	GLN
1	D	405	ASP
1	D	406	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	HIS
1	A	70	ASN
1	A	103	GLN
1	A	163	ASN
1	A	255	ASN
1	A	404	GLN
1	A	432	ASN
1	B	36	ASN
1	B	103	GLN
1	B	278	GLN
1	B	282	HIS
1	B	379	ASN
1	B	393	HIS
1	B	412	GLN
1	B	425	ASN
1	C	24	GLN
1	C	103	GLN
1	C	329	GLN
1	C	440	ASN
1	D	12	HIS
1	D	24	GLN
1	D	40	ASN
1	D	41	HIS
1	D	271	ASN
1	D	278	GLN
1	D	409	ASN

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

32 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	EDO	A	502	-	3,3,3	0.30	0	2,2,2	0.68	0
3	EDO	A	508	-	3,3,3	0.33	0	2,2,2	0.10	0
3	EDO	B	503	-	3,3,3	0.40	0	2,2,2	0.89	0
3	EDO	D	502	-	3,3,3	0.34	0	2,2,2	0.85	0
3	EDO	A	505	-	3,3,3	0.36	0	2,2,2	0.71	0
2	PMP	B	501	-	16,16,16	1.46	2 (12%)	22,23,23	1.62	4 (18%)
3	EDO	C	507	-	3,3,3	0.34	0	2,2,2	0.25	0
3	EDO	C	508	-	3,3,3	0.32	0	2,2,2	0.28	0
3	EDO	A	513	-	3,3,3	0.29	0	2,2,2	0.43	0
3	EDO	A	507	-	3,3,3	0.30	0	2,2,2	0.40	0
3	EDO	A	511	-	3,3,3	0.26	0	2,2,2	0.86	0
2	PMP	D	501	-	16,16,16	1.13	1 (6%)	22,23,23	1.51	3 (13%)
3	EDO	C	505	-	3,3,3	0.38	0	2,2,2	0.10	0
3	EDO	C	503	-	3,3,3	0.26	0	2,2,2	0.28	0
3	EDO	A	509	-	3,3,3	0.44	0	2,2,2	0.34	0
3	EDO	C	504	-	3,3,3	0.32	0	2,2,2	1.12	0
3	EDO	B	502	-	3,3,3	0.30	0	2,2,2	0.59	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	A	510	-	3,3,3	0.30	0	2,2,2	0.49	0
3	EDO	B	504	-	3,3,3	0.31	0	2,2,2	0.69	0
3	EDO	D	503	-	3,3,3	0.27	0	2,2,2	0.32	0
2	PMP	C	501	-	16,16,16	0.94	0	22,23,23	1.17	1 (4%)
3	EDO	A	504	-	3,3,3	0.35	0	2,2,2	0.23	0
3	EDO	D	505	-	3,3,3	0.36	0	2,2,2	0.59	0
3	EDO	C	506	-	3,3,3	0.31	0	2,2,2	0.58	0
2	PMP	A	501	-	16,16,16	1.10	1 (6%)	22,23,23	1.28	2 (9%)
3	EDO	A	503	-	3,3,3	0.40	0	2,2,2	0.58	0
3	EDO	D	504	-	3,3,3	0.24	0	2,2,2	0.70	0
3	EDO	A	506	-	3,3,3	0.39	0	2,2,2	0.19	0
3	EDO	A	512	-	3,3,3	0.29	0	2,2,2	0.48	0
3	EDO	D	506	-	3,3,3	0.27	0	2,2,2	0.41	0
3	EDO	A	514	-	3,3,3	0.34	0	2,2,2	0.60	0
3	EDO	C	502	-	3,3,3	0.34	0	2,2,2	0.20	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
3	EDO	A	502	-	-	1/1/1/1	-
3	EDO	A	508	-	-	0/1/1/1	-
3	EDO	B	503	-	-	1/1/1/1	-
3	EDO	D	502	-	-	0/1/1/1	-
3	EDO	A	505	-	-	0/1/1/1	-
2	PMP	B	501	-	-	3/8/8/8	0/1/1/1
3	EDO	C	507	-	-	1/1/1/1	-
3	EDO	C	508	-	-	0/1/1/1	-
3	EDO	A	513	-	-	1/1/1/1	-
3	EDO	A	507	-	-	0/1/1/1	-
3	EDO	A	511	-	-	0/1/1/1	-
2	PMP	D	501	-	-	0/8/8/8	0/1/1/1
3	EDO	C	505	-	-	1/1/1/1	-
3	EDO	C	503	-	-	0/1/1/1	-
3	EDO	A	509	-	-	1/1/1/1	-
3	EDO	C	504	-	-	1/1/1/1	-
3	EDO	B	502	-	-	0/1/1/1	-
3	EDO	A	510	-	-	1/1/1/1	-
3	EDO	B	504	-	-	1/1/1/1	-
3	EDO	D	503	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PMP	C	501	-	-	2/8/8/8	0/1/1/1
3	EDO	A	504	-	-	0/1/1/1	-
3	EDO	D	505	-	-	1/1/1/1	-
3	EDO	C	506	-	-	0/1/1/1	-
2	PMP	A	501	-	-	2/8/8/8	0/1/1/1
3	EDO	A	503	-	-	0/1/1/1	-
3	EDO	D	504	-	-	0/1/1/1	-
3	EDO	A	506	-	-	0/1/1/1	-
3	EDO	A	512	-	-	1/1/1/1	-
3	EDO	D	506	-	-	1/1/1/1	-
3	EDO	A	514	-	-	1/1/1/1	-
3	EDO	C	502	-	-	1/1/1/1	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	PMP	C2A-C2	3.48	1.55	1.50
2	A	501	PMP	C5-C4	-2.43	1.37	1.40
2	D	501	PMP	C2A-C2	2.41	1.54	1.50
2	B	501	PMP	C2-N1	-2.28	1.29	1.33

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	PMP	C3-C4-C5	-3.67	115.40	118.73
2	B	501	PMP	C4A-C4-C5	3.15	126.58	120.27
2	B	501	PMP	C4A-C4-C3	-3.10	114.96	120.22
2	B	501	PMP	C5-C6-N1	-2.99	118.97	123.83
2	B	501	PMP	C6-N1-C2	2.87	124.41	119.20
2	C	501	PMP	C2A-C2-C3	2.58	123.82	120.80
2	D	501	PMP	O4P-P-O1P	2.34	112.77	106.44
2	A	501	PMP	C2A-C2-C3	2.20	123.38	120.80
2	A	501	PMP	C3-C2-N1	-2.15	118.25	120.96
2	D	501	PMP	C4A-C4-C5	2.02	124.32	120.27

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	PMP	C5-C4-C4A-N4A
2	B	501	PMP	C5-C4-C4A-N4A

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Mol	Chain	Res	Type	Atoms
2	C	501	PMP	C5-C4-C4A-N4A
3	D	505	EDO	O1-C1-C2-O2
3	D	506	EDO	O1-C1-C2-O2
3	A	514	EDO	O1-C1-C2-O2
3	B	503	EDO	O1-C1-C2-O2
3	B	504	EDO	O1-C1-C2-O2
3	C	505	EDO	O1-C1-C2-O2
3	A	509	EDO	O1-C1-C2-O2
2	B	501	PMP	C5A-O4P-P-O1P
2	A	501	PMP	C3-C4-C4A-N4A
2	B	501	PMP	C3-C4-C4A-N4A
3	A	512	EDO	O1-C1-C2-O2
3	A	513	EDO	O1-C1-C2-O2
3	C	502	EDO	O1-C1-C2-O2
3	A	502	EDO	O1-C1-C2-O2
3	C	504	EDO	O1-C1-C2-O2
3	A	510	EDO	O1-C1-C2-O2
3	C	507	EDO	O1-C1-C2-O2
2	C	501	PMP	C3-C4-C4A-N4A

There are no ring outliers.

22 monomers are involved in 36 short contacts:

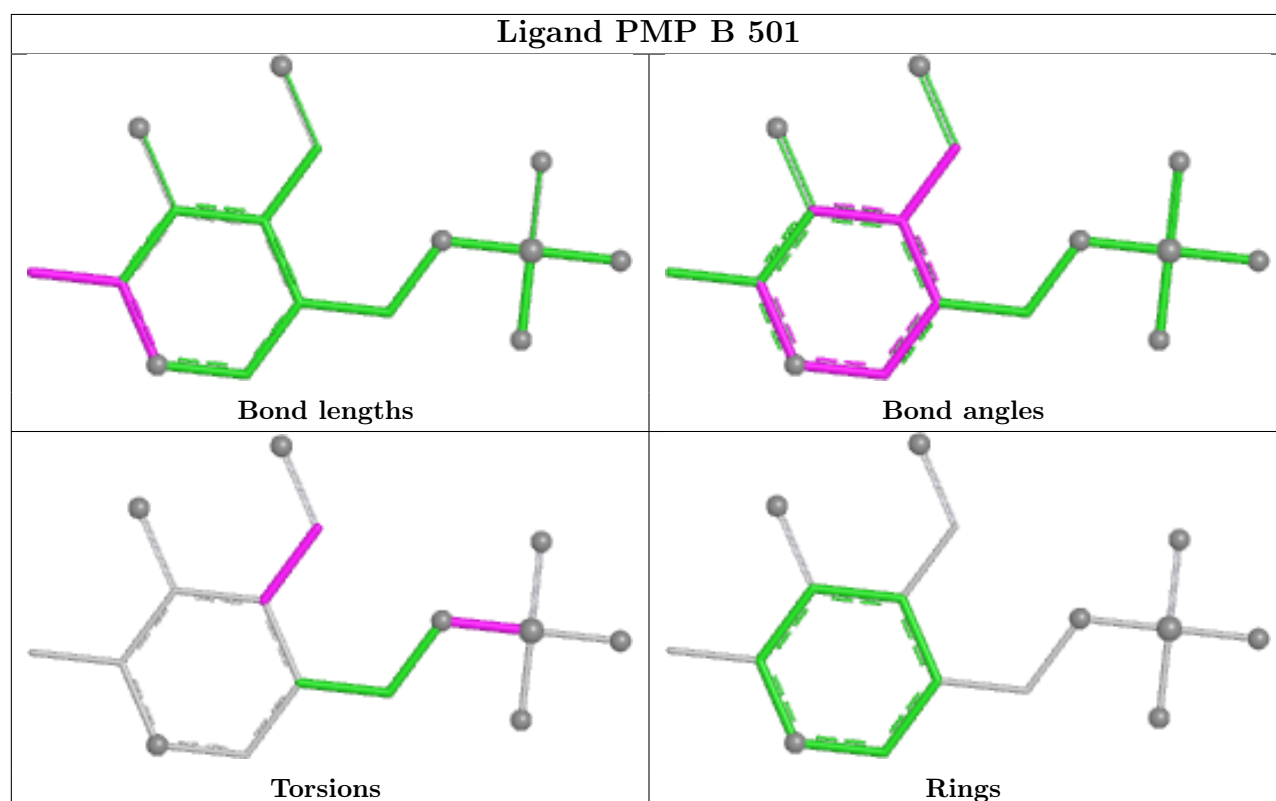
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	502	EDO	2	0
3	B	503	EDO	1	0
3	D	502	EDO	2	0
3	A	505	EDO	1	0
2	B	501	PMP	1	0
3	C	507	EDO	2	0
3	A	511	EDO	1	0
2	D	501	PMP	1	0
3	C	503	EDO	1	0
3	A	509	EDO	3	0
3	C	504	EDO	2	0
3	B	502	EDO	3	0
3	D	503	EDO	2	0
2	C	501	PMP	1	0
3	A	504	EDO	1	0
3	D	505	EDO	2	0
3	A	503	EDO	2	0
3	A	506	EDO	2	0

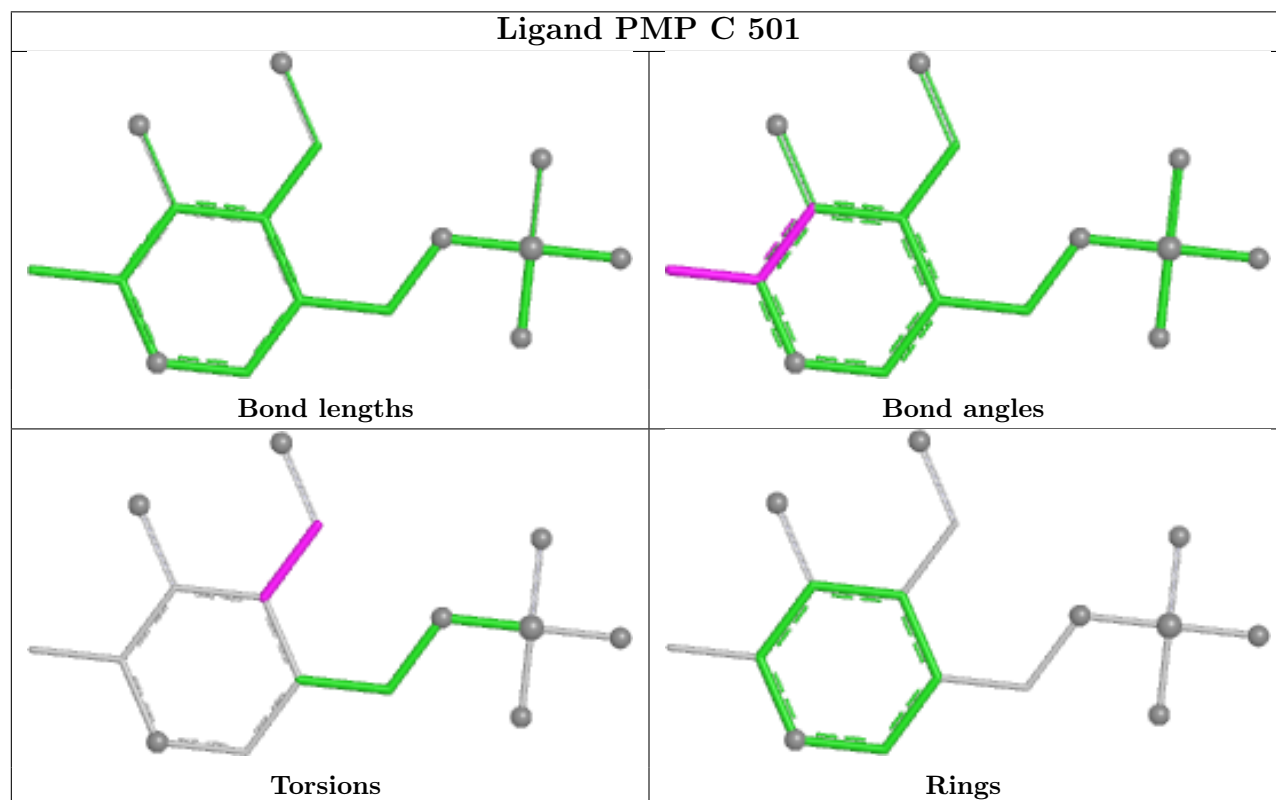
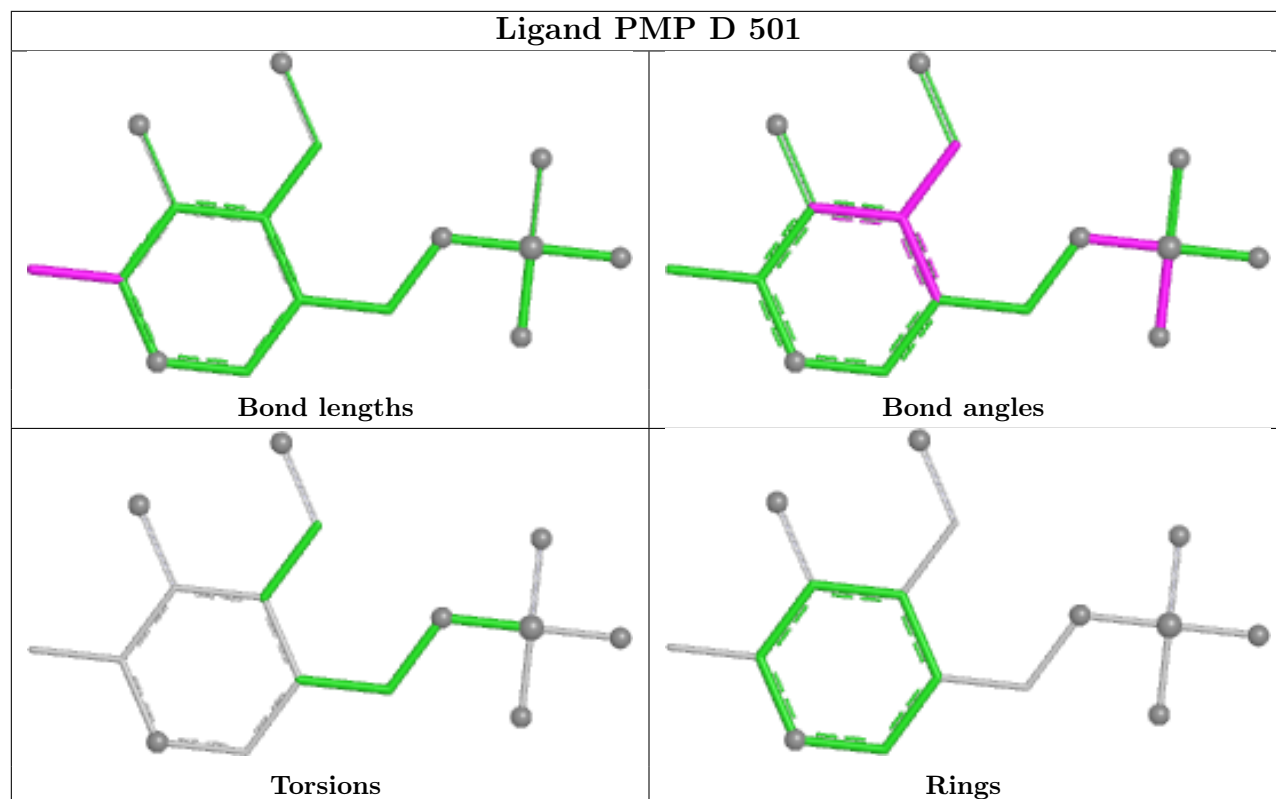
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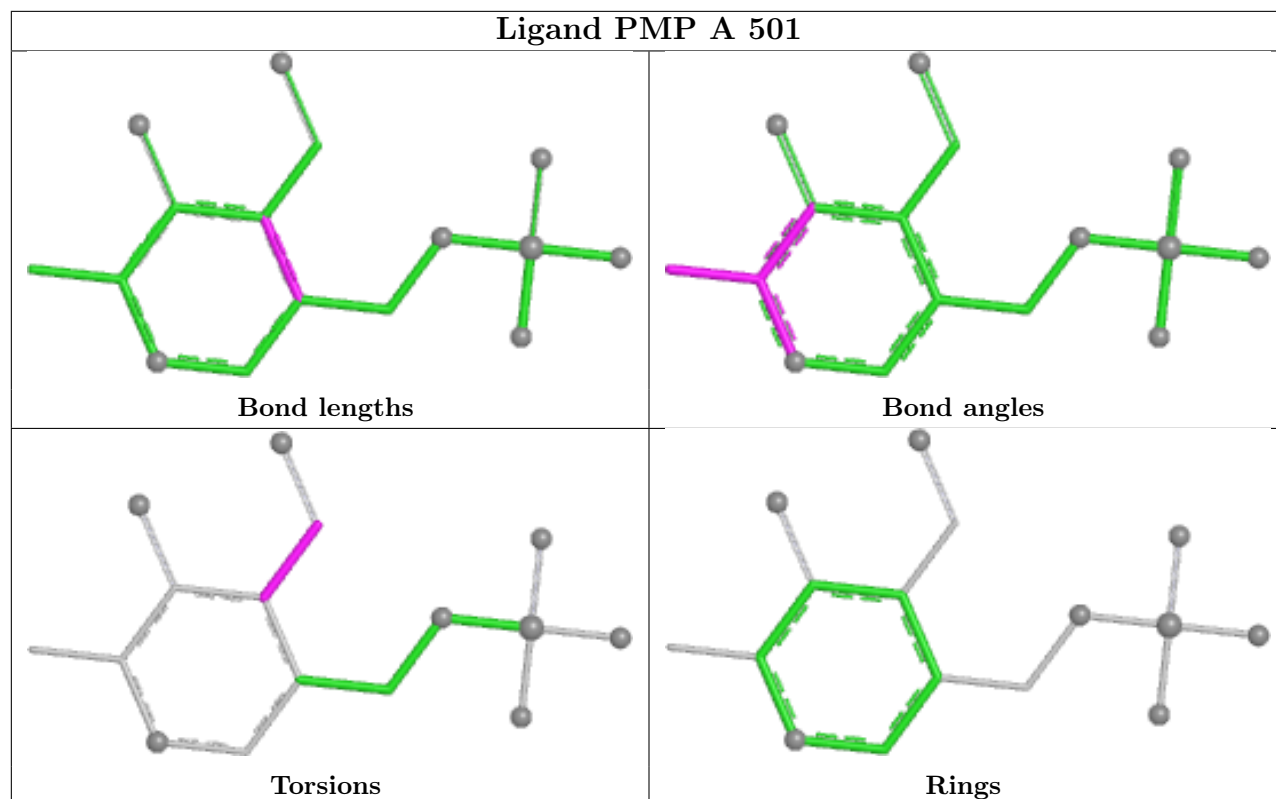
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	512	EDO	3	0
3	D	506	EDO	1	0
3	A	514	EDO	1	0
3	C	502	EDO	1	0

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







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	438/445 (98%)	-0.18	4 (0%) 81 86	11, 26, 49, 90	3 (0%)
1	B	438/445 (98%)	0.18	10 (2%) 61 66	11, 32, 58, 108	4 (0%)
1	C	438/445 (98%)	-0.08	5 (1%) 78 83	9, 28, 51, 90	7 (1%)
1	D	439/445 (98%)	0.42	17 (3%) 43 48	18, 38, 63, 104	0
All	All	1753/1780 (98%)	0.09	36 (2%) 63 69	9, 31, 58, 108	14 (0%)

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	27	THR	5.7
1	D	404	GLN	4.1
1	C	179[A]	HIS	3.6
1	D	179	HIS	3.5
1	C	27	THR	3.3
1	D	363	ILE	3.2
1	B	27	THR	3.2
1	A	28	LYS	3.1
1	D	236	SER	3.0
1	D	28	LYS	2.9
1	D	55	ILE	2.9
1	B	287	ASP	2.9
1	C	28	LYS	2.9
1	A	27	THR	2.8
1	D	5	THR	2.8
1	A	179	HIS	2.7
1	B	25	GLY	2.6
1	B	403[A]	MET	2.6
1	D	187	LEU	2.5
1	D	402	TYR	2.4
1	B	179	HIS	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	406	THR	2.3
1	D	378	TYR	2.3
1	D	194	THR	2.2
1	D	180	LYS	2.2
1	B	26	GLU	2.2
1	B	441	VAL	2.1
1	B	180	LYS	2.1
1	D	318	SER	2.1
1	D	65	ASN	2.1
1	B	56	ASP	2.1
1	C	56	ASP	2.1
1	D	178	ASP	2.1
1	A	6	LEU	2.1
1	D	417	ILE	2.1
1	C	68	ARG	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(Å ²)	Q<0.9
3	EDO	A	514	4/4	0.71	0.16	46,46,49,51	0
3	EDO	A	503	4/4	0.74	0.20	47,51,51,56	0
3	EDO	C	503	4/4	0.76	0.20	34,40,47,54	0
3	EDO	C	505	4/4	0.76	0.17	51,53,53,53	0
3	EDO	A	509	4/4	0.77	0.16	40,40,42,42	0
3	EDO	A	502	4/4	0.78	0.15	27,36,40,43	0
3	EDO	D	505	4/4	0.80	0.16	34,39,46,54	0
3	EDO	A	512	4/4	0.81	0.18	58,62,66,71	0

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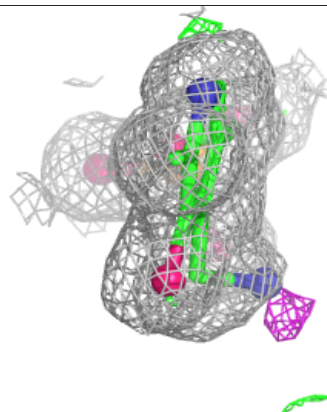
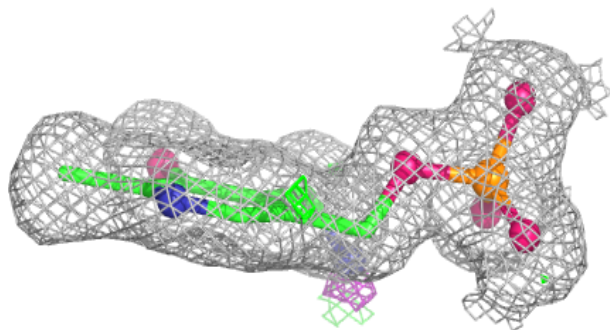
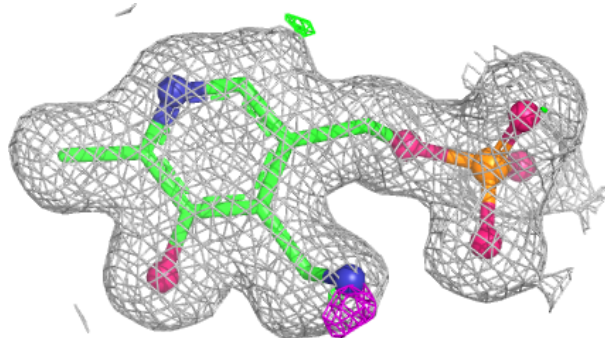
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	C	507	4/4	0.82	0.13	53,54,54,58	0
3	EDO	D	504	4/4	0.82	0.14	49,51,52,54	0
3	EDO	A	510	4/4	0.82	0.16	46,48,48,57	0
3	EDO	D	506	4/4	0.83	0.17	45,48,50,51	0
3	EDO	C	502	4/4	0.84	0.15	40,43,50,53	0
3	EDO	C	506	4/4	0.84	0.14	45,53,57,58	0
3	EDO	A	504	4/4	0.85	0.16	29,37,42,42	0
3	EDO	A	506	4/4	0.87	0.14	35,45,50,54	0
3	EDO	C	508	4/4	0.87	0.15	47,50,52,53	0
3	EDO	C	504	4/4	0.87	0.14	28,32,34,41	0
3	EDO	B	503	4/4	0.87	0.16	39,39,41,42	0
3	EDO	A	513	4/4	0.87	0.11	43,43,48,49	0
3	EDO	B	504	4/4	0.89	0.11	55,56,56,57	0
3	EDO	D	503	4/4	0.90	0.11	36,39,47,50	0
3	EDO	A	511	4/4	0.91	0.14	44,48,48,54	0
3	EDO	D	502	4/4	0.91	0.11	37,39,42,48	0
3	EDO	B	502	4/4	0.91	0.10	31,36,42,47	0
3	EDO	A	507	4/4	0.93	0.11	35,43,44,48	0
3	EDO	A	508	4/4	0.94	0.10	31,35,37,41	0
3	EDO	A	505	4/4	0.94	0.08	30,37,39,43	0
2	PMP	A	501	16/16	0.98	0.05	14,17,25,38	0
2	PMP	B	501	16/16	0.98	0.05	16,21,27,33	0
2	PMP	C	501	16/16	0.98	0.05	14,18,25,35	0
2	PMP	D	501	16/16	0.98	0.06	18,22,26,33	0

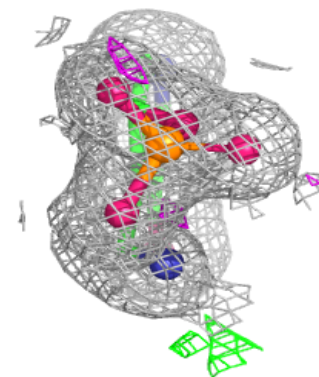
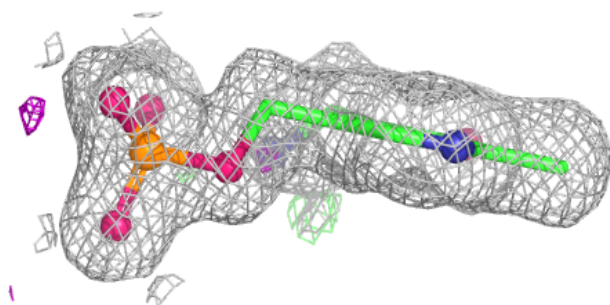
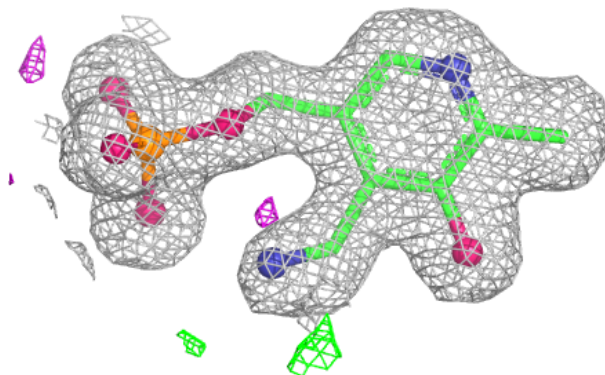
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around PMP A 501:

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

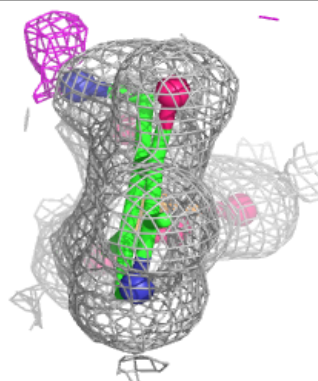
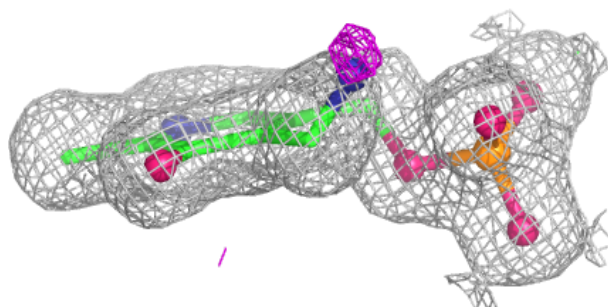
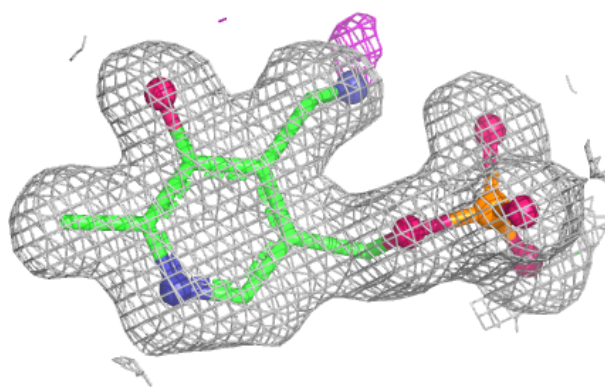
**Electron density around PMP B 501:**

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

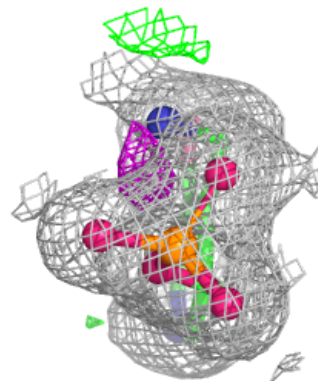
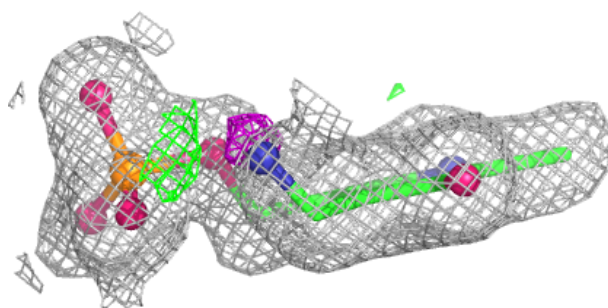
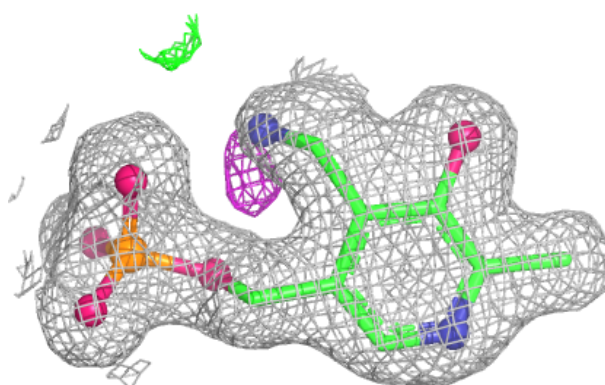


Electron density around PMP C 501:

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

**Electron density around PMP D 501:**

$2mF_o-DF_c$ (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.