



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:52 PM UTC

PDB ID : 7MFP / pdb_00007mfp
Title : crystal structure of the L136 aminotransferase K185A from acanthamoeba polyphaga mimivirus in the presence of the UDP-viosamine external aldimine
Authors : Seltzner, C.A.; Thoden, J.B.; Holden, H.M.
Deposited on : 2021-04-10
Resolution : 1.85 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

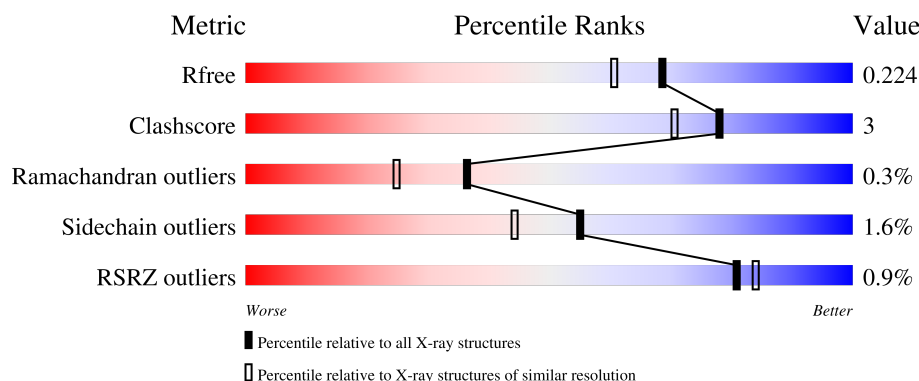
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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	356	93% 5% .
1	B	356	2% 92% 7% ..
1	C	356	2% 91% 7% ..
1	D	356	90% 7% ..

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
4	EDO	D	405	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 12820 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.

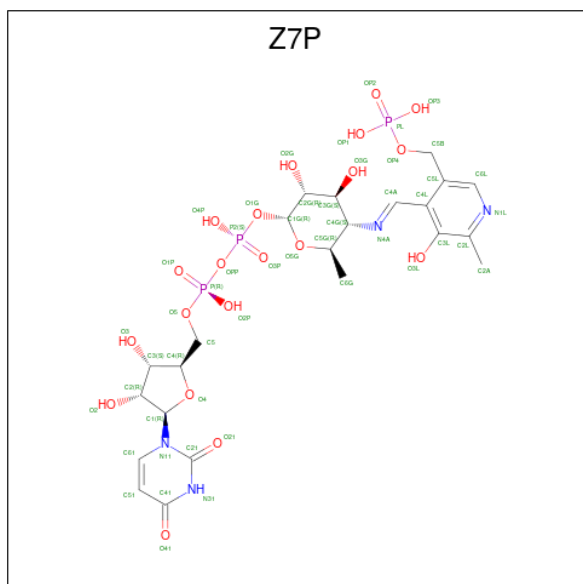
- Molecule 1 is a protein called L136 aminotransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	351	Total	C	N	O	S	0	0	0
			2804	1793	473	527	11			
1	B	354	Total	C	N	O	S	0	1	0
			2829	1808	478	531	12			
1	C	351	Total	C	N	O	S	0	1	0
			2810	1796	474	529	11			
1	D	348	Total	C	N	O	S	0	1	0
			2787	1782	472	522	11			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q5UPL1
A	-2	GLY	-	expression tag	UNP Q5UPL1
A	-1	GLY	-	expression tag	UNP Q5UPL1
A	0	HIS	-	expression tag	UNP Q5UPL1
A	185	ALA	LYS	engineered mutation	UNP Q5UPL1
B	-3	GLY	-	expression tag	UNP Q5UPL1
B	-2	GLY	-	expression tag	UNP Q5UPL1
B	-1	GLY	-	expression tag	UNP Q5UPL1
B	0	HIS	-	expression tag	UNP Q5UPL1
B	185	ALA	LYS	engineered mutation	UNP Q5UPL1
C	-3	GLY	-	expression tag	UNP Q5UPL1
C	-2	GLY	-	expression tag	UNP Q5UPL1
C	-1	GLY	-	expression tag	UNP Q5UPL1
C	0	HIS	-	expression tag	UNP Q5UPL1
C	185	ALA	LYS	engineered mutation	UNP Q5UPL1
D	-3	GLY	-	expression tag	UNP Q5UPL1
D	-2	GLY	-	expression tag	UNP Q5UPL1
D	-1	GLY	-	expression tag	UNP Q5UPL1
D	0	HIS	-	expression tag	UNP Q5UPL1
D	185	ALA	LYS	engineered mutation	UNP Q5UPL1

- Molecule 2 is (2R,3R,4S,5S,6R)-3,4-dihydroxy-5-[(E)-({3-hydroxy-2-methyl-5-[(phosphonoxy)methyl]pyridin-4-yl}methylidene)amino]-6-methyloxan-2-yl [(2R,3S,4R,5R)-5-(2,4-dioxo-3,4-dihydropyrimidin-1(2H)-yl)-3,4-dihydroxyoxolan-2-yl]methyl dihydrogen diphosphate (non-preferred name) (CCD ID: Z7P) (formula: C₂₃H₃₃N₄O₂₀P₃) (labeled as "Ligand of Interest" by depositor).

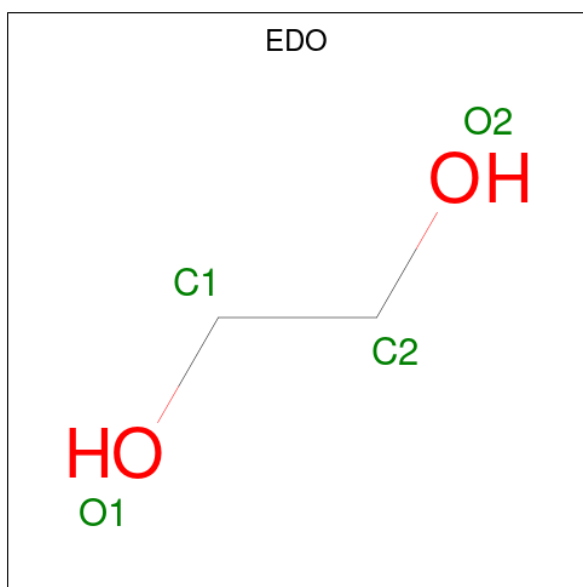


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			50	23	4	20	3		
2	B	1	Total	C	N	O	P	0	0
			50	23	4	20	3		
2	C	1	Total	C	N	O	P	0	0
			50	23	4	20	3		
2	D	1	Total	C	N	O	P	0	0
			50	23	4	20	3		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- 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	B	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

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

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Na 1 1	0	0
5	C	1	Total Na 1 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	325	Total O 325 325	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	355	Total 356	O 356	0	1
6	C	302	Total 302	O 302	0	0
6	D	372	Total 373	O 373	0	1

3 Residue-property plots [i](#)

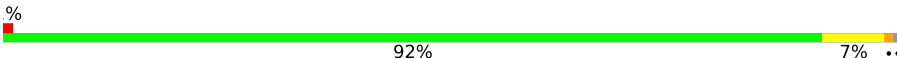
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: L136 aminotransferase

Chain A: 

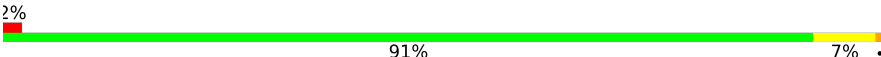


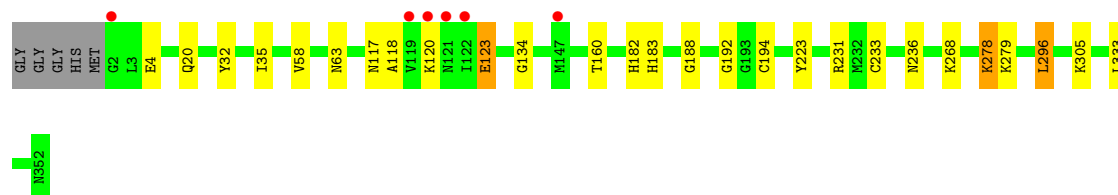
- Molecule 1: L136 aminotransferase

Chain B: 



- Molecule 1: L136 aminotransferase

Chain C: 



- Molecule 1: L136 aminotransferase

Chain D: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	91.03Å 108.55Å 145.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.72 – 1.85 29.72 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.8 (29.72-1.85) 99.8 (29.72-1.85)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.97 (at 1.85Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, R_{free}	0.172 , 0.219 0.180 , 0.224	Depositor DCC
R_{free} test set	6181 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	9.7	Xtriage
Anisotropy	0.094	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 40.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	12820	wwPDB-VP
Average B, all atoms (Å ²)	13.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 27.64 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.1198e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: EDO, Z7P, NA, 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	1.05	1/2865 (0.0%)	1.30	0/3876
1	B	1.08	1/2894 (0.0%)	1.30	2/3914 (0.1%)
1	C	1.06	0/2871	1.28	2/3884 (0.1%)
1	D	1.05	1/2851 (0.0%)	1.29	0/3858
All	All	1.06	3/11481 (0.0%)	1.29	4/15532 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	69	HIS	CE1-NE2	5.98	1.38	1.32
1	B	299	ILE	N-CA	5.17	1.50	1.46
1	A	276	HIS	CE1-NE2	5.06	1.37	1.32

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	268	LYS	CB-CA-C	-5.37	101.06	109.70
1	B	297	ASP	CA-CB-CG	5.26	117.86	112.60
1	C	279	LYS	CB-CA-C	5.26	118.50	109.51
1	B	314	SER	CB-CA-C	5.02	114.96	110.44

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	2804	0	2775	9	0
1	B	2829	0	2802	19	0
1	C	2810	0	2779	16	0
1	D	2787	0	2757	24	0
2	A	50	0	0	1	0
2	B	50	0	0	0	0
2	C	50	0	0	1	0
2	D	50	0	0	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	4	0	6	1	0
4	B	4	0	6	0	0
4	C	4	0	6	0	0
4	D	12	0	18	7	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
6	A	325	0	0	1	0
6	B	356	0	0	4	1
6	C	302	0	0	2	1
6	D	373	0	0	2	0
All	All	12820	0	11149	64	1

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 (64) 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:269:ARG:HD2	1:B:291:ASP:OD2	1.62	0.98
1:D:175:HIS:HE1	6:D:804:HOH:O	1.69	0.76
1:B:233:CYS:HB3	1:B:236:ASN:HD22	1.53	0.73
1:D:153:LEU:H	1:D:175:HIS:HD2	1.36	0.72
1:B:219:GLU:OE1	6:B:501:HOH:O	2.09	0.70
1:D:233:CYS:HB3	1:D:236:ASN:HD22	1.59	0.68
1:D:63:ASN:HD22	4:D:405:EDO:H12	1.59	0.67
1:B:140:ASN:OD1	6:B:502:HOH:O	2.13	0.66
1:C:123:GLU:HA	6:C:697:HOH:O	1.97	0.65
1:D:191:GLU:CG	4:D:405:EDO:H11	2.28	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:118:ALA:O	6:C:501:HOH:O	2.16	0.63
1:B:295:ARG:NH2	1:B:297:ASP:OD2	2.34	0.61
1:A:292:LYS:NZ	1:A:352:ASN:OXT	2.37	0.58
1:D:75:ILE:HG22	1:D:83:LEU:HD11	1.86	0.58
1:D:153:LEU:H	1:D:175:HIS:CD2	2.20	0.58
1:A:219:GLU:O	1:B:308:LYS:NZ	2.38	0.56
1:B:219:GLU:HG2	6:B:501:HOH:O	2.05	0.56
1:B:233:CYS:HB3	1:B:236:ASN:ND2	2.21	0.55
1:D:187:PHE:HB3	1:D:244:LEU:HD21	1.90	0.54
1:B:269:ARG:CD	1:B:291:ASP:OD2	2.48	0.54
1:D:63:ASN:HD22	4:D:405:EDO:C1	2.20	0.53
1:C:32:TYR:CD2	1:D:183:HIS:CE1	2.97	0.52
1:C:231:ARG:O	4:D:405:EDO:H21	2.09	0.52
1:D:233:CYS:HB3	1:D:236:ASN:ND2	2.22	0.52
1:D:308:LYS:HE3	6:D:566:HOH:O	2.10	0.52
1:C:296:LEU:HG	1:C:305:LYS:HG3	1.93	0.51
1:C:20:GLN:OE1	1:D:20:GLN:NE2	2.43	0.51
1:C:117:ASN:HA	1:C:120:LYS:HE3	1.93	0.50
1:D:191:GLU:CB	4:D:405:EDO:H11	2.43	0.49
1:A:79:LEU:HD12	1:A:83:LEU:HD11	1.95	0.48
4:A:404:EDO:H22	6:A:590:HOH:O	2.13	0.48
1:A:32:TYR:CD2	1:B:183:HIS:CE1	3.02	0.48
1:A:96:ASN:ND2	1:B:223:TYR:OH	2.46	0.48
1:C:182:HIS:O	1:C:188:GLY:HA3	2.15	0.47
1:D:63:ASN:ND2	4:D:405:EDO:H12	2.29	0.47
1:A:233:CYS:HB3	1:A:236:ASN:HD22	1.78	0.47
1:B:179:ILE:HG12	1:B:194:CYS:HB3	1.98	0.46
1:B:269:ARG:NH1	1:B:349:ALA:O	2.49	0.46
1:C:223:TYR:OH	1:D:96:ASN:ND2	2.48	0.46
2:A:401:Z7P:N4A	2:A:401:Z7P:O3L	2.48	0.45
1:C:58:VAL:HG13	1:C:194:CYS:SG	2.58	0.44
1:B:186:PRO:HD2	6:B:758:HOH:O	2.16	0.44
1:C:233:CYS:HB3	1:C:236:ASN:HD22	1.82	0.44
1:D:131:ASN:HB3	1:D:135:ASN:O	2.17	0.44
1:D:157:ASN:O	1:D:158:ALA:C	2.60	0.44
1:C:183:HIS:CE1	1:D:32:TYR:CD2	3.06	0.43
1:D:191:GLU:HG3	4:D:405:EDO:H11	2.00	0.43
1:A:75:ILE:HG22	1:A:83:LEU:HD11	1.99	0.43
1:D:296:LEU:HD11	1:D:304[B]:ARG:HA	2.00	0.43
1:C:63:ASN:HA	1:C:192:GLY:C	2.44	0.43
1:B:157:ASN:O	1:B:158:ALA:C	2.60	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:220:LYS:HD3	1:D:220:LYS:HA	1.87	0.42
1:A:209:LEU:HA	1:A:230:TYR:HB2	2.02	0.42
1:C:278:LYS:HA	1:C:278:LYS:HD3	1.80	0.42
1:A:75:ILE:HG22	1:A:83:LEU:CD1	2.50	0.42
1:C:296:LEU:HD23	1:C:296:LEU:HA	1.93	0.41
1:B:273:PHE:CD1	1:B:274:PRO:HD2	2.56	0.41
1:B:296:LEU:HD23	1:B:296:LEU:HA	1.91	0.41
1:B:269:ARG:HD2	1:B:291:ASP:CG	2.42	0.41
2:C:401:Z7P:O3L	2:C:401:Z7P:N4A	2.54	0.41
1:D:209:LEU:HA	1:D:230:TYR:HB2	2.03	0.41
1:D:266:LEU:HD23	1:D:266:LEU:HA	1.95	0.40
1:C:134:GLY:HA2	1:C:160:THR:HG23	2.03	0.40
1:B:5:LYS:HD3	1:B:5:LYS:HA	1.89	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:B:644:HOH:O	6:C:756:HOH:O[3_445]	2.16	0.04

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	349/356 (98%)	334 (96%)	14 (4%)	1 (0%)	36	25
1	B	353/356 (99%)	340 (96%)	12 (3%)	1 (0%)	36	25
1	C	350/356 (98%)	336 (96%)	13 (4%)	1 (0%)	36	25
1	D	347/356 (98%)	336 (97%)	10 (3%)	1 (0%)	36	25
All	All	1399/1424 (98%)	1346 (96%)	49 (4%)	4 (0%)	36	25

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	35	ILE
1	A	35	ILE
1	D	35	ILE
1	C	35	ILE

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	314/316 (99%)	307 (98%)	7 (2%)	45	32
1	B	317/316 (100%)	311 (98%)	6 (2%)	50	38
1	C	315/316 (100%)	310 (98%)	5 (2%)	55	44
1	D	312/316 (99%)	310 (99%)	2 (1%)	78	73
All	All	1258/1264 (100%)	1238 (98%)	20 (2%)	55	44

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	LYS
1	A	120	LYS
1	A	147	MET
1	A	278	LYS
1	A	292	LYS
1	A	298	LYS
1	A	336	ARG
1	B	5	LYS
1	B	79	LEU
1	B	168	LYS
1	B	219	GLU
1	B	292	LYS
1	B	333	LEU
1	C	4	GLU
1	C	123	GLU
1	C	278	LYS
1	C	296	LEU
1	C	333	LEU

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Mol	Chain	Res	Type
1	D	266	LEU
1	D	296	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	96	ASN
1	A	150	ASN
1	A	236	ASN
1	B	117	ASN
1	B	149	HIS
1	B	236	ASN
1	C	20	GLN
1	C	149	HIS
1	C	150	ASN
1	C	236	ASN
1	D	20	GLN
1	D	31	GLN
1	D	63	ASN
1	D	96	ASN
1	D	149	HIS
1	D	150	ASN
1	D	175	HIS
1	D	215	ASN
1	D	236	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

Of 20 ligands modelled in this entry, 10 are monoatomic - leaving 10 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	Z7P	B	401	-	52,53,53	1.49	8 (15%)	74,81,81	1.83	16 (21%)
4	EDO	A	404	-	3,3,3	0.33	0	2,2,2	0.41	0
4	EDO	C	404	-	3,3,3	0.33	0	2,2,2	0.57	0
2	Z7P	A	401	-	52,53,53	1.68	7 (13%)	74,81,81	1.53	16 (21%)
4	EDO	D	404	-	3,3,3	0.11	0	2,2,2	0.06	0
4	EDO	D	405	-	3,3,3	0.25	0	2,2,2	0.80	0
4	EDO	D	406	-	3,3,3	0.11	0	2,2,2	0.06	0
4	EDO	B	404	-	3,3,3	0.25	0	2,2,2	0.22	0
2	Z7P	C	401	-	52,53,53	1.62	8 (15%)	74,81,81	1.65	14 (18%)
2	Z7P	D	401	-	52,53,53	1.81	6 (11%)	74,81,81	1.60	17 (22%)

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	Z7P	B	401	-	-	1/32/68/68	0/4/4/4
4	EDO	A	404	-	-	0/1/1/1	-
4	EDO	C	404	-	-	0/1/1/1	-
2	Z7P	A	401	-	-	1/32/68/68	0/4/4/4
4	EDO	D	404	-	-	0/1/1/1	-
4	EDO	D	405	-	-	0/1/1/1	-
4	EDO	D	406	-	-	1/1/1/1	-
4	EDO	B	404	-	-	0/1/1/1	-
2	Z7P	C	401	-	-	1/32/68/68	0/4/4/4
2	Z7P	D	401	-	-	3/32/68/68	0/4/4/4

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	401	Z7P	C3L-C2L	8.30	1.49	1.41
2	A	401	Z7P	C3L-C2L	6.36	1.47	1.41
2	C	401	Z7P	C3L-C2L	6.35	1.47	1.41
2	D	401	Z7P	C4L-C3L	4.93	1.49	1.41
2	A	401	Z7P	C4L-C3L	4.81	1.49	1.41
2	C	401	Z7P	C4L-C5L	4.63	1.48	1.42
2	A	401	Z7P	C4L-C5L	4.41	1.48	1.42
2	B	401	Z7P	C4L-C5L	4.38	1.48	1.42
2	B	401	Z7P	C4L-C3L	4.13	1.47	1.41
2	D	401	Z7P	C4L-C5L	3.77	1.47	1.42
2	C	401	Z7P	C4L-C3L	3.50	1.46	1.41
2	D	401	Z7P	P-OPP	3.39	1.63	1.59
2	C	401	Z7P	C41-N31	-3.27	1.33	1.38
2	B	401	Z7P	P2-OPP	-2.99	1.56	1.59
2	B	401	Z7P	P-OPP	-2.93	1.56	1.59
2	C	401	Z7P	C51-C41	-2.81	1.37	1.43
2	B	401	Z7P	C41-N31	-2.58	1.34	1.38
2	B	401	Z7P	C61-C51	2.54	1.41	1.35
2	C	401	Z7P	C21-N11	2.51	1.42	1.38
2	C	401	Z7P	C21-N31	-2.49	1.33	1.38
2	A	401	Z7P	C4G-N4A	2.42	1.49	1.46
2	C	401	Z7P	O3L-C3L	-2.41	1.31	1.36
2	B	401	Z7P	C3L-C2L	2.37	1.43	1.41
2	D	401	Z7P	C61-C51	2.34	1.40	1.35
2	B	401	Z7P	O3L-C3L	-2.32	1.31	1.36
2	A	401	Z7P	PL-OP1	-2.15	1.46	1.54
2	A	401	Z7P	C21-N31	-2.12	1.34	1.38
2	A	401	Z7P	C6L-N1L	2.11	1.38	1.34
2	D	401	Z7P	C41-N31	-2.05	1.35	1.38

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	Z7P	C3G-C4G-N4A	6.51	116.89	109.73
2	C	401	Z7P	C4G-N4A-C4A	5.83	128.34	118.19
2	D	401	Z7P	N31-C21-N11	4.42	120.65	114.89
2	B	401	Z7P	C41-N31-C21	-4.29	121.29	126.61
2	D	401	Z7P	O5G-C1G-O1G	-4.23	105.83	111.36
2	B	401	Z7P	N31-C21-N11	4.21	120.37	114.89
2	C	401	Z7P	N31-C21-N11	4.18	120.34	114.89
2	B	401	Z7P	C51-C41-N31	4.16	120.63	114.80
2	B	401	Z7P	C3L-C4L-C5L	-4.15	114.95	118.28
2	D	401	Z7P	C4G-N4A-C4A	4.14	125.39	118.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	Z7P	C41-N31-C21	-3.94	121.72	126.61
2	A	401	Z7P	OP3-PL-OP1	3.69	121.62	107.80
2	B	401	Z7P	C4G-N4A-C4A	3.48	124.25	118.19
2	B	401	Z7P	O3-C3-C2	-3.36	101.04	111.82
2	C	401	Z7P	C6L-N1L-C2L	3.31	125.19	119.20
2	A	401	Z7P	C4L-C3L-C2L	-3.26	118.31	120.14
2	A	401	Z7P	C3G-C4G-N4A	3.22	113.27	109.73
2	D	401	Z7P	C61-N11-C21	-3.20	117.10	121.00
2	C	401	Z7P	C2A-C2L-C3L	3.17	124.50	120.80
2	D	401	Z7P	OP3-PL-OP4	3.03	114.58	106.67
2	A	401	Z7P	O5G-C1G-O1G	-2.95	107.52	111.36
2	B	401	Z7P	C6L-N1L-C2L	2.94	124.53	119.20
2	C	401	Z7P	C3L-C2L-N1L	-2.86	117.36	120.96
2	D	401	Z7P	C41-N31-C21	-2.82	123.11	126.61
2	C	401	Z7P	C51-C41-N31	2.79	118.70	114.80
2	C	401	Z7P	O1G-C1G-C2G	2.74	113.40	108.38
2	B	401	Z7P	C1G-C2G-C3G	2.73	115.76	110.01
2	A	401	Z7P	C4G-N4A-C4A	2.73	122.94	118.19
2	A	401	Z7P	O5-P-O1P	2.70	119.65	108.94
2	B	401	Z7P	O21-C21-N31	-2.68	116.55	121.49
2	A	401	Z7P	N31-C21-N11	2.63	118.32	114.89
2	D	401	Z7P	O1G-C1G-C2G	2.63	113.19	108.38
2	C	401	Z7P	O5G-C1G-O1G	-2.61	107.95	111.36
2	C	401	Z7P	C1G-C2G-C3G	2.59	115.46	110.01
2	B	401	Z7P	O4P-P2-OPP	2.58	114.24	107.27
2	A	401	Z7P	C6L-N1L-C2L	2.55	123.82	119.20
2	D	401	Z7P	C6L-N1L-C2L	2.55	123.82	119.20
2	A	401	Z7P	O3G-C3G-C2G	-2.50	104.48	110.38
2	D	401	Z7P	O21-C21-N11	-2.46	119.59	122.80
2	A	401	Z7P	O3L-C3L-C2L	2.39	122.53	117.58
2	B	401	Z7P	C5L-C4L-C4A	2.38	125.15	121.47
2	D	401	Z7P	O4P-P2-OPP	2.36	113.64	107.27
2	D	401	Z7P	C3G-C4G-N4A	2.34	112.31	109.73
2	C	401	Z7P	O3-C3-C4	-2.32	104.42	111.08
2	B	401	Z7P	O4-C1-N11	2.31	113.59	108.36
2	D	401	Z7P	C51-C41-N31	2.29	118.00	114.80
2	A	401	Z7P	O4-C1-C2	-2.29	101.72	106.62
2	A	401	Z7P	O4P-P2-O3P	2.26	122.95	112.44
2	C	401	Z7P	C61-N11-C21	-2.26	118.25	121.00
2	A	401	Z7P	C51-C41-N31	2.25	117.95	114.80
2	B	401	Z7P	C1-N11-C21	2.19	121.53	117.59
2	D	401	Z7P	C4L-C3L-C2L	-2.19	118.91	120.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	Z7P	O3L-C3L-C2L	2.17	122.07	117.58
2	B	401	Z7P	O41-C41-C51	-2.15	121.45	125.16
2	B	401	Z7P	OP3-PL-OP1	2.13	115.80	107.80
2	A	401	Z7P	O4-C1-N11	2.12	113.17	108.36
2	A	401	Z7P	C1G-C2G-C3G	2.11	114.45	110.01
2	D	401	Z7P	O41-C41-C51	-2.07	121.60	125.16
2	C	401	Z7P	O3G-C3G-C2G	-2.05	105.55	110.38
2	D	401	Z7P	C2A-C2L-N1L	2.03	121.47	117.64
2	D	401	Z7P	C3L-C2L-N1L	-2.03	118.40	120.96
2	D	401	Z7P	O2-C2-C1	2.02	117.07	110.10
2	A	401	Z7P	OP4-C5B-C5L	2.01	113.11	109.36

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	Z7P	C3G-C4G-N4A-C4A
2	B	401	Z7P	C3G-C4G-N4A-C4A
2	C	401	Z7P	C3G-C4G-N4A-C4A
2	D	401	Z7P	C3G-C4G-N4A-C4A
4	D	406	EDO	O1-C1-C2-O2
2	D	401	Z7P	C1G-O1G-P2-O3P
2	D	401	Z7P	P2-OPP-P-O2P

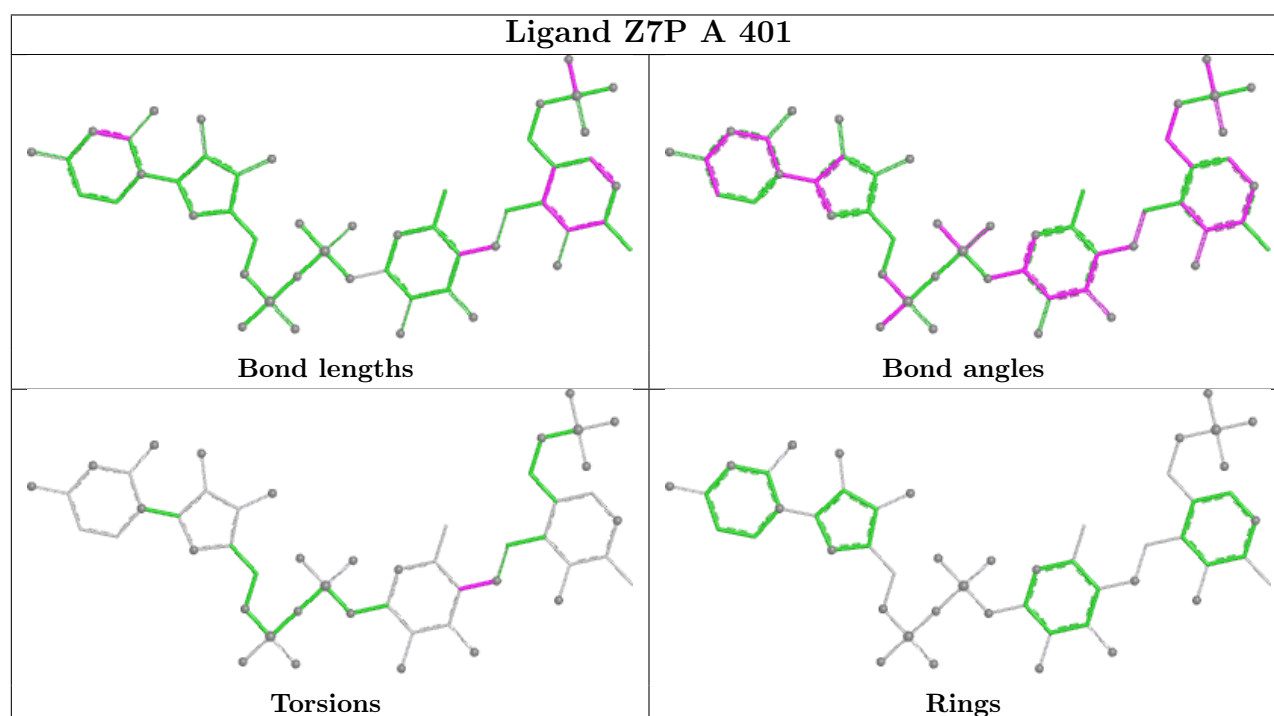
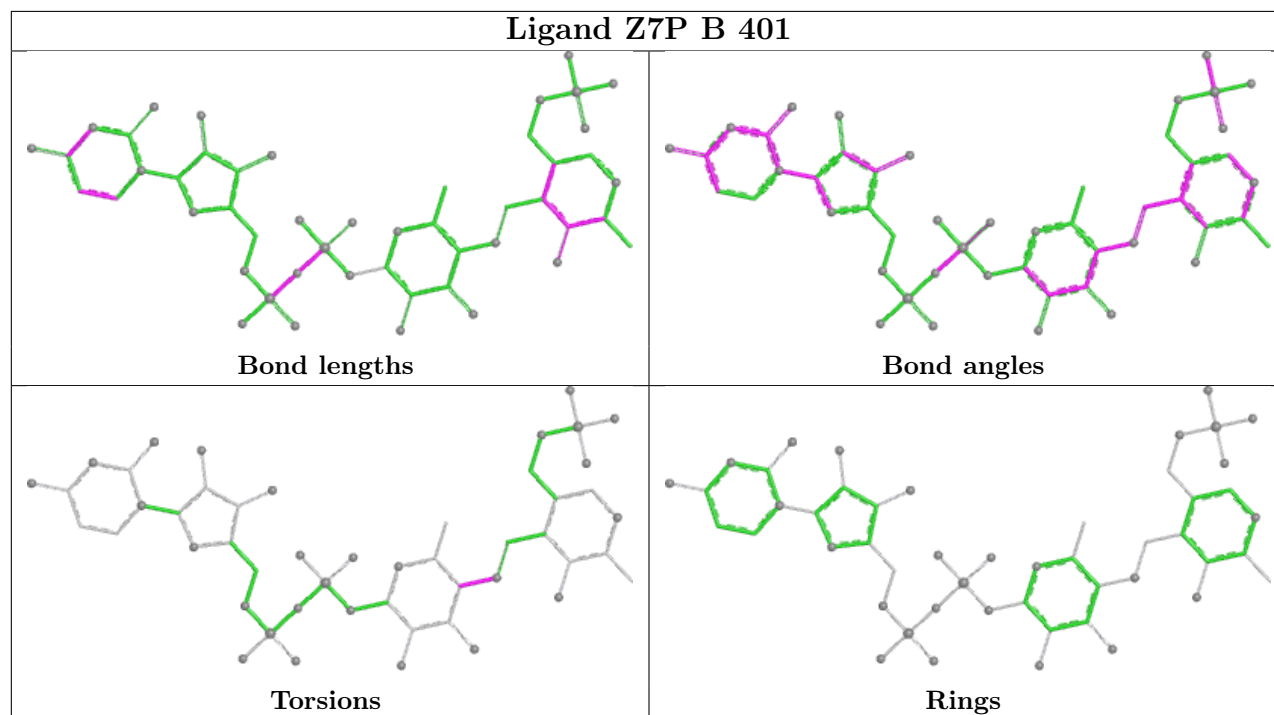
There are no ring outliers.

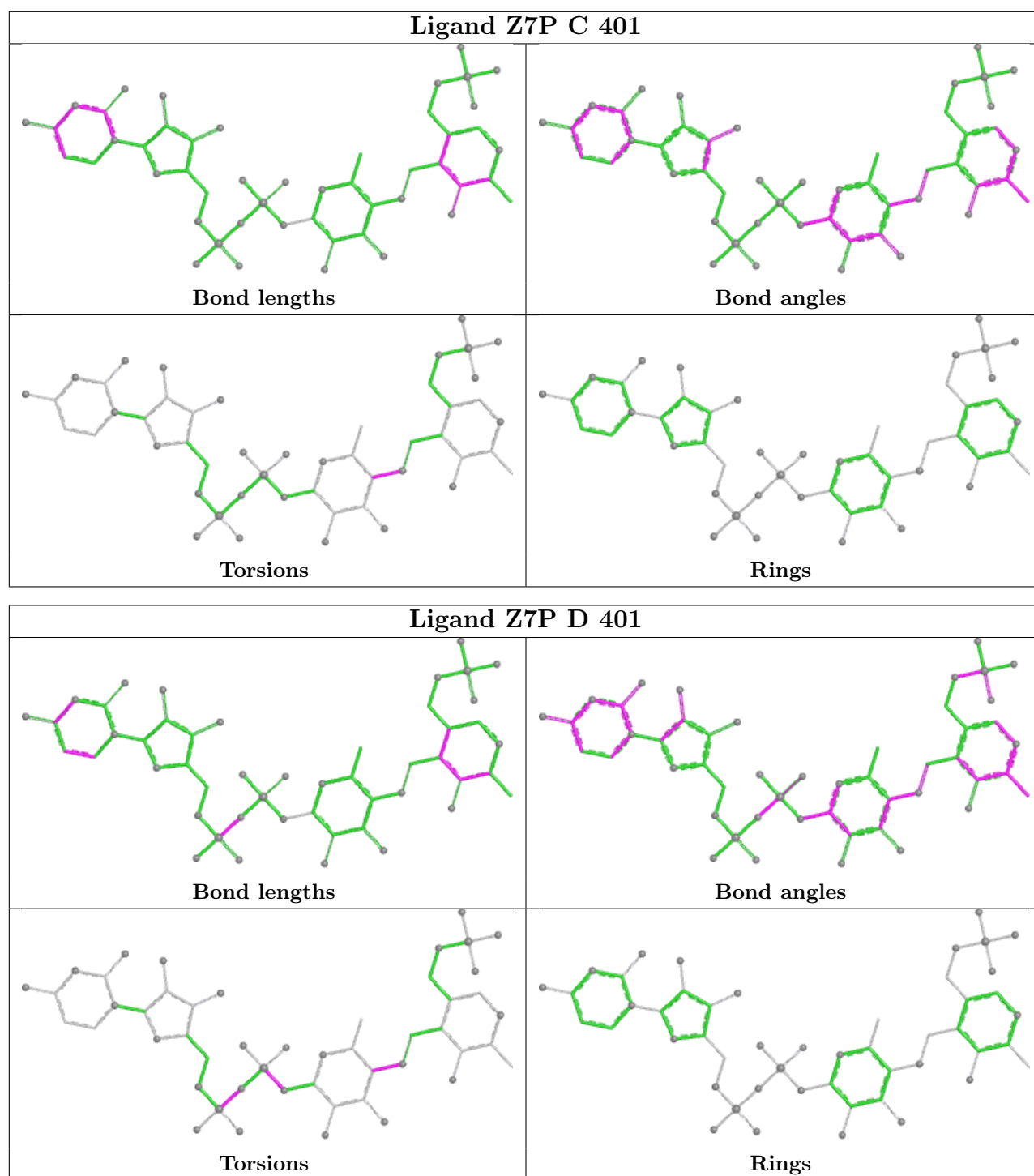
4 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	404	EDO	1	0
2	A	401	Z7P	1	0
4	D	405	EDO	7	0
2	C	401	Z7P	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 ⓘ

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	351/356 (98%)	-0.32	1 (0%) 90 92	5, 12, 26, 47	0
1	B	354/356 (99%)	-0.21	5 (1%) 73 77	4, 12, 32, 47	1 (0%)
1	C	351/356 (98%)	-0.40	6 (1%) 69 73	5, 11, 27, 48	1 (0%)
1	D	348/356 (97%)	-0.53	0 100 100	4, 10, 22, 45	1 (0%)
All	All	1404/1424 (98%)	-0.37	12 (0%) 81 84	4, 11, 27, 48	3 (0%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	120	LYS	3.2
1	C	121	ASN	3.0
1	C	122	ILE	2.7
1	C	2	GLY	2.6
1	B	147	MET	2.6
1	B	312	LEU	2.5
1	C	119	VAL	2.5
1	B	5	LYS	2.4
1	C	147	MET	2.3
1	B	292	LYS	2.2
1	A	220	LYS	2.2
1	B	-1	GLY	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 [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

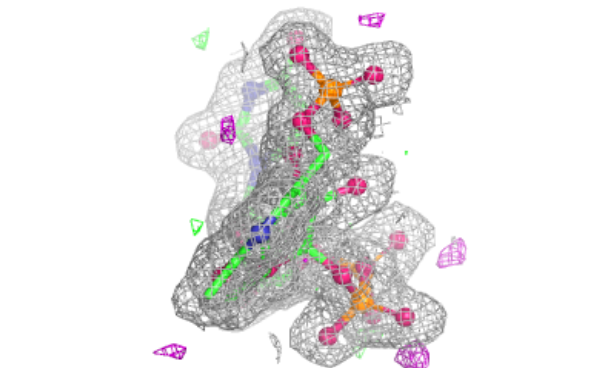
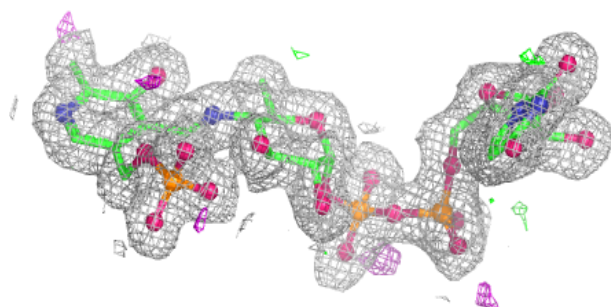
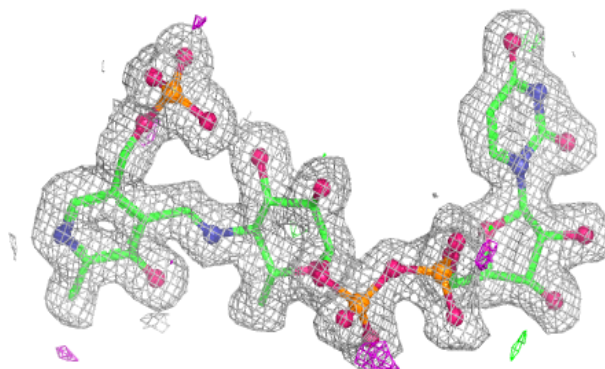
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	EDO	D	406	4/4	0.82	0.15	40,41,41,42	0
4	EDO	A	404	4/4	0.84	0.16	26,28,29,30	0
4	EDO	D	404	4/4	0.87	0.12	28,29,29,30	0
4	EDO	D	405	4/4	0.92	0.14	23,24,25,30	0
4	EDO	C	404	4/4	0.93	0.10	23,25,25,25	0
5	NA	C	405	1/1	0.93	0.07	26,26,26,26	0
3	CL	C	403	1/1	0.94	0.07	28,28,28,28	0
4	EDO	B	404	4/4	0.95	0.07	17,18,18,18	0
5	NA	B	405	1/1	0.96	0.06	35,35,35,35	0
3	CL	C	402	1/1	0.97	0.05	25,25,25,25	0
2	Z7P	D	401	50/50	0.98	0.04	3,5,11,14	0
3	CL	A	402	1/1	0.98	0.03	15,15,15,15	0
3	CL	A	403	1/1	0.98	0.04	23,23,23,23	0
3	CL	B	403	1/1	0.98	0.05	27,27,27,27	0
2	Z7P	A	401	50/50	0.98	0.04	5,5,10,13	0
2	Z7P	B	401	50/50	0.98	0.05	4,9,14,18	0
2	Z7P	C	401	50/50	0.98	0.04	6,7,12,14	0
3	CL	D	403	1/1	0.99	0.05	20,20,20,20	0
3	CL	B	402	1/1	0.99	0.05	16,16,16,16	0
3	CL	D	402	1/1	0.99	0.03	16,16,16,16	0

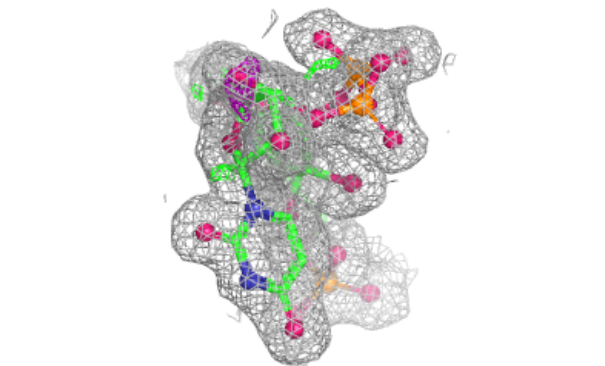
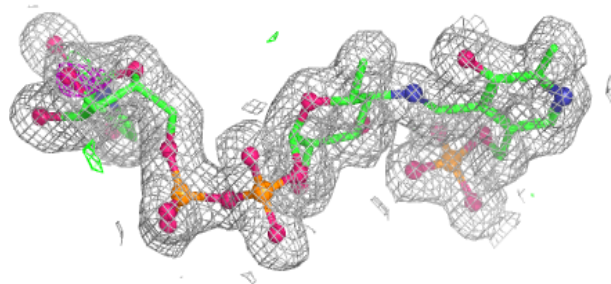
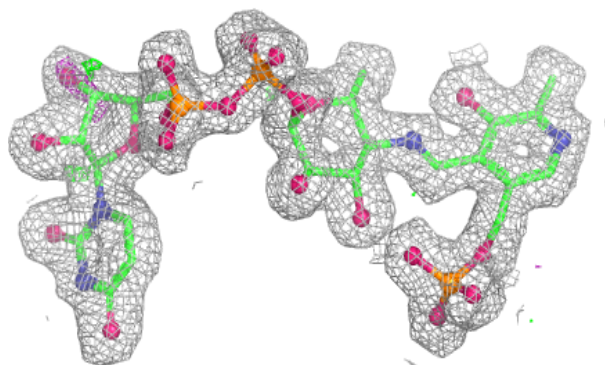
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around Z7P D 401:

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

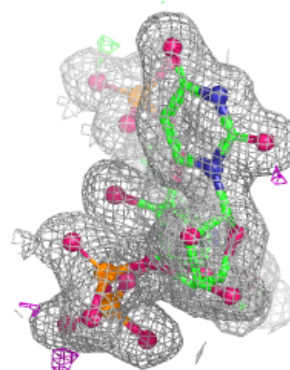
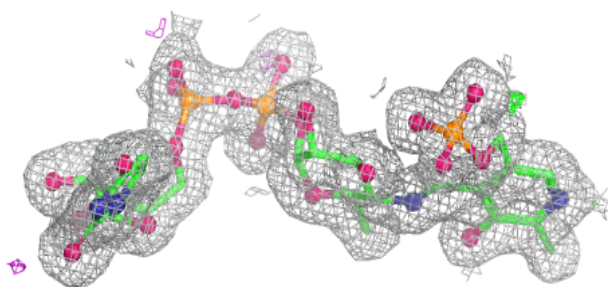
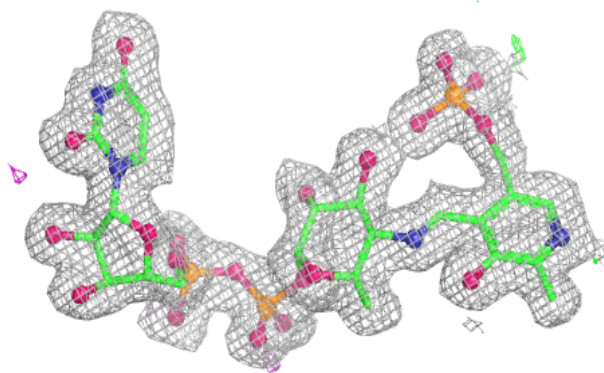
**Electron density around Z7P A 401:**

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

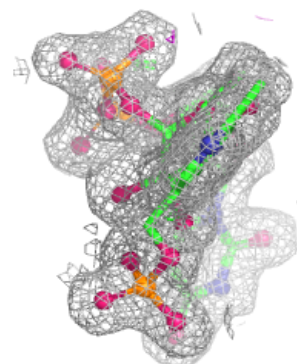
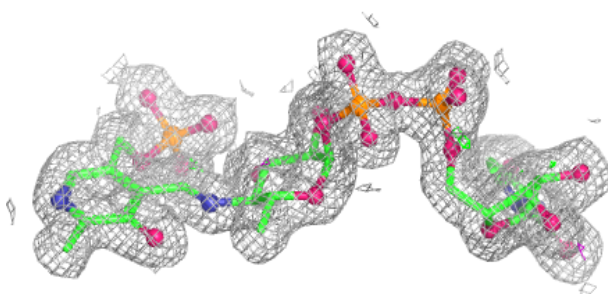
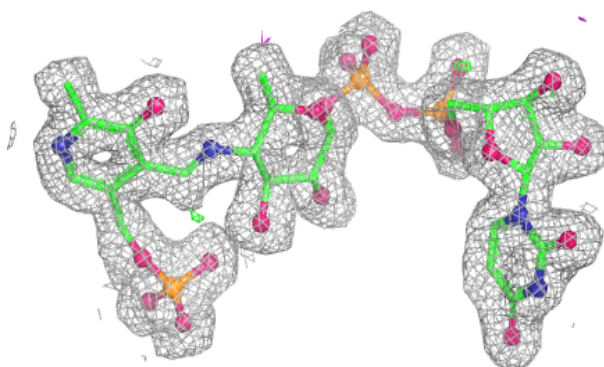


Electron density around Z7P B 401:

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

**Electron density around Z7P C 401:**

$2mF_o-DF_c$ (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.