Full wwPDB X-ray Structure Validation Report ⓘ

Sep 5, 2023 – 02:26 AM EDT

PDB ID	:	3UND
Title	:	Substrate-bound crystal structure of 2-dehydro-3-deoxyphosphooctonate aldolase from Burkholderia pseudomallei
Authors	:	Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on	:	2011-11-15
Resolution	:	2.10 Å(reported)

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

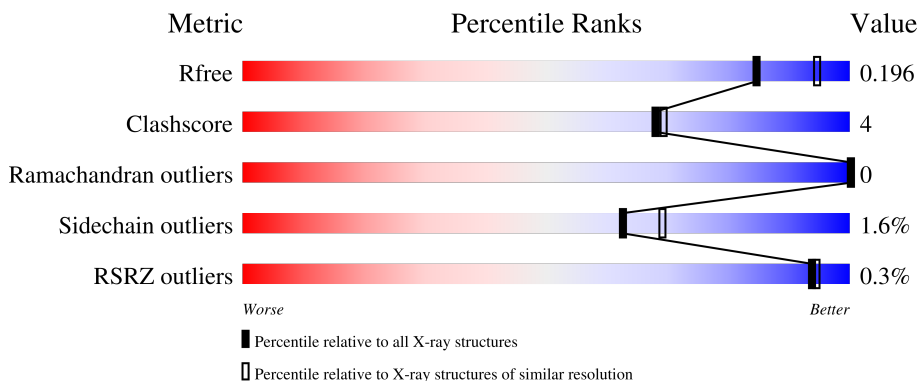|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
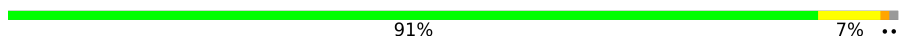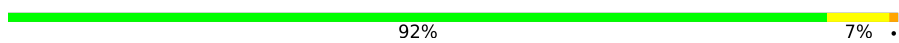*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	Percentile Ranks	Value
Rfree		0.196
Clashscore		4
Ramachandran outliers		0
Sidechain outliers		1.6%
RSRZ outliers		0.3%

Worse — *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	285	91% 7% ··
1	B	285	92% 7% ·
1	C	285	92% 6% ··
1	D	285	92% 6% ·

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 9425 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.
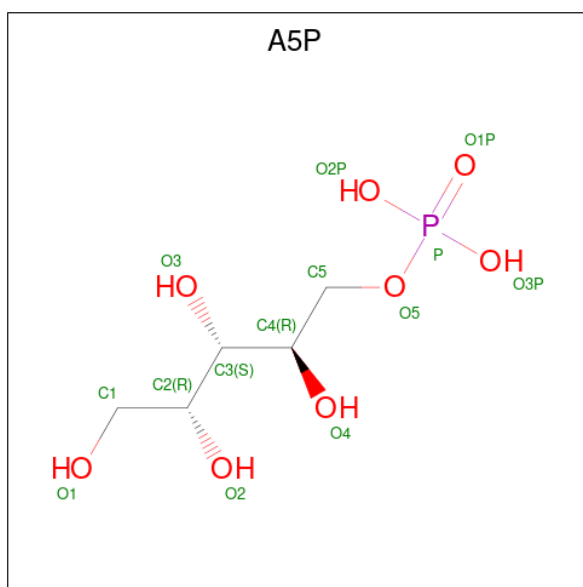
- Molecule 1 is a protein called 2-dehydro-3-deoxyphosphooctonate aldolase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	283	Total 2131	C 1350	N 375	O 393	S 13	0	4	0
1	B	284	Total 2140	C 1355	N 377	O 395	S 13	0	3	0
1	C	282	Total 2127	C 1349	N 373	O 391	S 14	0	4	0
1	D	284	Total 2127	C 1348	N 375	O 391	S 13	0	2	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q3JP68
A	-2	PRO	-	expression tag	UNP Q3JP68
A	-1	GLY	-	expression tag	UNP Q3JP68
A	0	SER	-	expression tag	UNP Q3JP68
B	-3	GLY	-	expression tag	UNP Q3JP68
B	-2	PRO	-	expression tag	UNP Q3JP68
B	-1	GLY	-	expression tag	UNP Q3JP68
B	0	SER	-	expression tag	UNP Q3JP68
C	-3	GLY	-	expression tag	UNP Q3JP68
C	-2	PRO	-	expression tag	UNP Q3JP68
C	-1	GLY	-	expression tag	UNP Q3JP68
C	0	SER	-	expression tag	UNP Q3JP68
D	-3	GLY	-	expression tag	UNP Q3JP68
D	-2	PRO	-	expression tag	UNP Q3JP68
D	-1	GLY	-	expression tag	UNP Q3JP68
D	0	SER	-	expression tag	UNP Q3JP68

- Molecule 2 is ARABINOSE-5-PHOSPHATE (three-letter code: A5P) (formula: $C_5H_{13}O_8P$).

A5P

C1 C2(R) C3(S) C4(R) C5

O3 HO

O1 HO

O2 OH

O4 OH

O5 O

P P

O1P O

O2P HO

O3P OH

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	1
			14	5	8	1		
2	B	1	Total	C	O	P	0	1
			14	5	8	1		
2	C	1	Total	C	O	P	0	1
			14	5	8	1		
2	D	1	Total	C	O	P	0	1
			14	5	8	1		

- Molecule 3 is PHOSPHOENOLPYRUVATE (three-letter code: PEP) (formula: $C_3H_5O_6P$).

PEP

O2' HO

C1 O1 O

C3 C2

O2 O

O3P HO

P P

O1P O

O2P OH
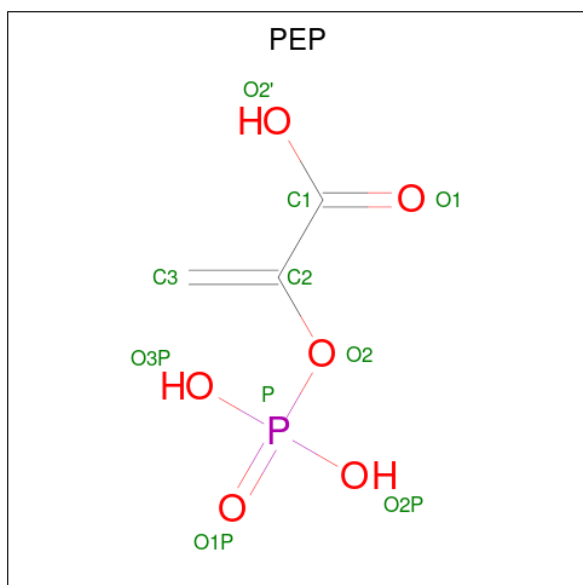
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 10	C 3	O 6	P 1	0	1
3	B	1	Total 10	C 3	O 6	P 1	0	1
3	C	1	Total 10	C 3	O 6	P 1	0	1
3	D	1	Total 10	C 3	O 6	P 1	0	1

- Molecule 4 is 3-deoxy-8-O-phosphono-D-manno-oct-2-ulosonic acid (three-letter code: KD0) (formula: $C_8H_{15}O_{11}P$).
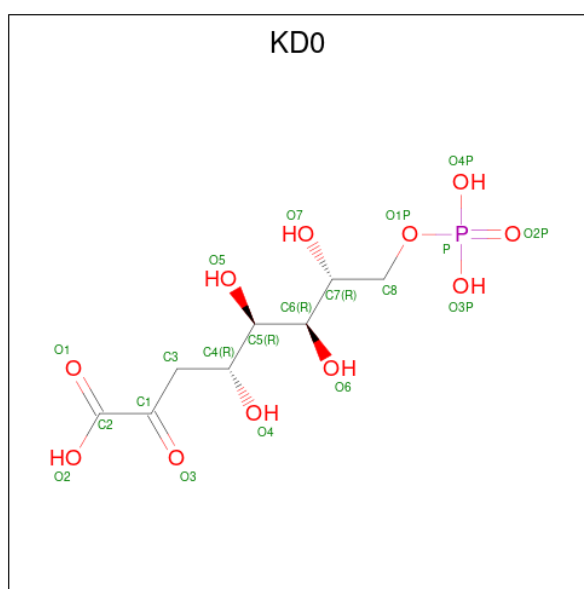
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 20	C 8	O 11	P 1	0	1
4	B	1	Total 20	C 8	O 11	P 1	0	1
4	C	1	Total 20	C 8	O 11	P 1	0	1
4	D	1	Total 20	C 8	O 11	P 1	0	1

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	195	Total 195	O 195	0	0
6	B	145	Total 145	O 145	0	0
6	C	205	Total 205	O 205	0	0
6	D	151	Total 151	O 151	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.
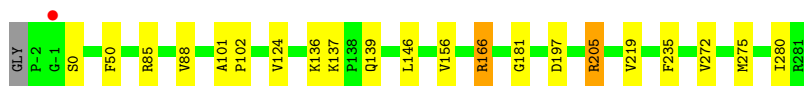
- Molecule 1: 2-dehydro-3-deoxyphosphooctonate aldolase 2
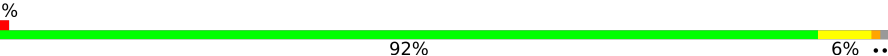
Chain A:

- Molecule 1: 2-dehydro-3-deoxyphosphooctonate aldolase 2

Chain B:

- Molecule 1: 2-dehydro-3-deoxyphosphooctonate aldolase 2

Chain C:

- Molecule 1: 2-dehydro-3-deoxyphosphooctonate aldolase 2

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	46.84Å 146.24Å 178.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.10 48.75 – 2.10	Depositor EDS
% Data completeness (in resolution range)	97.3 (50.00-2.10) 97.4 (48.75-2.10)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.92 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.167 , 0.192 0.170 , 0.196	Depositor DCC
R_{free} test set	3581 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	21.6	Xtriage
Anisotropy	0.193	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 46.9	EDS
L-test for twinning[2]	$< |L| > = 0.46, < L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	9425	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: KD0, PEP, EDO, A5P

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	0.76	0/2181	0.78	2/2953 (0.1%)
1	B	0.67	0/2183	0.71	1/2955 (0.0%)
1	C	0.78	0/2177	0.80	3/2947 (0.1%)
1	D	0.69	0/2172	0.76	2/2941 (0.1%)
All	All	0.73	0/8713	0.76	8/11796 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	183	ARG	NE-CZ-NH1	7.41	124.00	120.30
1	D	244	ARG	NE-CZ-NH1	7.12	123.86	120.30
1	C	205	ARG	NE-CZ-NH2	-6.38	117.11	120.30
1	C	146	LEU	CB-CG-CD2	-6.20	100.46	111.00
1	D	85	ARG	NE-CZ-NH1	6.11	123.35	120.30
1	C	159	ASP	CB-CG-OD1	5.56	123.30	118.30
1	A	205	ARG	NE-CZ-NH2	-5.50	117.55	120.30
1	B	205	ARG	NE-CZ-NH2	-5.43	117.59	120.30

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	2131	0	2165	24	0
1	B	2140	0	2171	12	0
1	C	2127	0	2165	14	0
1	D	2127	0	2160	14	0
2	A	14	0	11	2	0
2	B	14	0	11	1	0
2	C	14	0	11	2	0
2	D	14	0	11	1	0
3	A	10	0	2	2	0
3	B	10	0	2	2	0
3	C	10	0	2	2	0
3	D	10	0	2	3	0
4	A	20	0	12	1	0
4	B	20	0	12	0	0
4	C	20	0	12	1	0
4	D	20	0	12	0	0
5	A	8	0	12	3	0
5	B	8	0	12	1	0
5	C	8	0	12	2	0
5	D	4	0	6	0	0
6	A	195	0	0	5	0
6	B	145	0	0	2	0
6	C	205	0	0	1	0
6	D	151	0	0	5	0
All	All	9425	0	8803	67	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 4.

All (67) 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)
2:A:301[A]:A5P:H12	3:A:304[A]:PEP:C3	2.00	0.92
1:A:98:GLU:HG3	6:A:309:HOH:O	1.84	0.78
2:B:301[A]:A5P:H12	3:B:304[A]:PEP:C3	2.15	0.77
2:C:301[A]:A5P:H12	3:C:304[A]:PEP:C3	2.15	0.74
1:B:124:VAL:HG13	1:B:156:VAL:HG11	1.69	0.72
2:A:301[A]:A5P:C1	3:A:304[A]:PEP:C3	2.69	0.70
1:D:166[A]:ARG:HH11	1:D:175:LEU:HD11	1.59	0.67
2:D:301[A]:A5P:H12	3:D:304[A]:PEP:C3	2.25	0.67
1:A:166[A]:ARG:HH11	1:A:175:LEU:HD11	1.61	0.65
1:A:183:ARG:HH11	1:A:183:ARG:HG3	1.64	0.62

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:244:ARG:HH11	1:D:244:ARG:HG2	1.65	0.62
1:C:217:ARG:NH2	1:D:187:GLU:OE1	2.32	0.62
1:C:184:GLN:NE2	6:C:382:HOH:O	2.24	0.61
1:A:166[B]:ARG:NH2	5:A:282:EDO:O1	2.34	0.61
1:C:166[B]:ARG:NH2	5:C:282:EDO:O1	2.34	0.60
1:C:166[A]:ARG:HH11	1:C:175:LEU:CD1	2.15	0.60
1:C:124:VAL:HG13	1:C:156:VAL:HG11	1.84	0.59
1:A:85:ARG:NH1	6:A:779:HOH:O	2.35	0.59
1:D:124:VAL:HG13	1:D:156:VAL:HG11	1.83	0.59
1:D:166[A]:ARG:HH11	1:D:175:LEU:CD1	2.15	0.59
1:C:137:LYS:HD3	1:C:146:LEU:HD21	1.85	0.58
1:A:166[A]:ARG:HH11	1:A:175:LEU:CD1	2.16	0.58
2:C:301[A]:A5P:C1	3:C:304[A]:PEP:C3	2.81	0.58
1:C:166[A]:ARG:HH11	1:C:175:LEU:HD11	1.69	0.57
1:B:137:LYS:HD3	1:B:146:LEU:HD21	1.86	0.57
1:A:272:VAL:HA	1:A:275:MET:HE2	1.86	0.56
1:B:197:ASP:HA	1:B:235:PHE:HB3	1.87	0.56
1:B:139[B]:GLN:NE2	1:B:166:ARG:CZ	2.71	0.54
1:D:137:LYS:HD3	1:D:146:LEU:HD21	1.90	0.54
1:C:136:LYS:NZ	4:C:306[B]:KD0:O3	2.41	0.53
1:A:219:VAL:HG12	1:B:280:ILE:HD13	1.90	0.53
1:C:197:ASP:HA	1:C:235:PHE:HB3	1.90	0.53
1:A:277:ALA:HB1	6:A:736:HOH:O	2.10	0.51
1:D:272:VAL:HA	1:D:275:MET:HE2	1.93	0.51
1:A:197:ASP:HA	1:A:235:PHE:HB3	1.92	0.51
1:A:219:VAL:CG1	1:B:280:ILE:HD13	2.41	0.51
1:C:272:VAL:HA	1:C:275:MET:HE2	1.93	0.51
1:D:197:ASP:HA	1:D:235:PHE:HB3	1.92	0.50
1:A:137:LYS:HD3	1:A:146:LEU:HD21	1.93	0.50
1:A:46:LEU:HD22	6:A:722:HOH:O	2.11	0.50
1:D:181:GLY:HA3	6:D:399:HOH:O	2.13	0.49
1:B:272:VAL:HA	1:B:275:MET:HE2	1.95	0.49
1:B:181:GLY:HA3	6:B:584:HOH:O	2.13	0.48
1:B:136:LYS:NZ	3:B:304[A]:PEP:O2	2.47	0.47
1:D:42:VAL:O	1:D:46:LEU:HD13	2.14	0.47
1:B:50:PHE:CD2	1:B:88:VAL:HG21	2.50	0.47
1:D:203[B]:GLN:NE2	1:D:248:ASP:OD1	2.30	0.47
1:C:166[B]:ARG:HH22	5:C:282:EDO:HO1	1.60	0.47
1:A:183:ARG:HA	5:A:316:EDO:H11	1.97	0.45
1:A:166[B]:ARG:HH22	5:A:282:EDO:HO1	1.63	0.45
1:A:183:ARG:HH11	1:A:183:ARG:CG	2.29	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:205:ARG:HD3	6:D:766:HOH:O	2.19	0.43
1:A:181:GLY:HA3	6:A:686:HOH:O	2.18	0.43
1:A:166[A]:ARG:NH1	1:A:175:LEU:HD11	2.32	0.43
1:A:136:LYS:NZ	4:A:306[B]:KD0:O3	2.51	0.43
1:A:64:ILE:HB	1:C:152:LYS:HG2	2.01	0.42
3:D:304[A]:PEP:C3	6:D:322:HOH:O	2.67	0.42
5:B:282:EDO:H12	6:B:740:HOH:O	2.19	0.42
1:A:280:ILE:HD13	1:B:219:VAL:CG1	2.50	0.42
1:C:224:ARG:HD3	1:D:228:ALA:O	2.20	0.42
1:D:159:ASP:HB2	6:D:804:HOH:O	2.20	0.42
1:B:101:ALA:HB3	1:B:102:PRO:CD	2.50	0.42
1:A:170:PHE:HB2	1:A:176:VAL:HG12	2.03	0.41
1:C:39:TYR:HB3	1:C:50:PHE:CZ	2.56	0.41
1:A:124:VAL:HG13	1:A:156:VAL:HG11	2.02	0.41
3:D:304[A]:PEP:C2	6:D:322:HOH:O	2.70	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	285/285 (100%)	284 (100%)	1 (0%)	0	100	100
1	B	285/285 (100%)	283 (99%)	2 (1%)	0	100	100
1	C	284/285 (100%)	280 (99%)	4 (1%)	0	100	100
1	D	284/285 (100%)	283 (100%)	1 (0%)	0	100	100
All	All	1138/1140 (100%)	1130 (99%)	8 (1%)	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	228/229 (100%)	223 (98%)	5 (2%)	52	57
1	B	229/229 (100%)	225 (98%)	4 (2%)	60	67
1	C	228/229 (100%)	225 (99%)	3 (1%)	69	75
1	D	227/229 (99%)	222 (98%)	5 (2%)	52	57
All	All	912/916 (100%)	895 (98%)	17 (2%)	62	63

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	85	ARG
1	A	166[A]	ARG
1	A	166[B]	ARG
1	A	183	ARG
1	A	205	ARG
1	B	0	SER
1	B	85	ARG
1	B	166	ARG
1	B	205	ARG
1	C	166[A]	ARG
1	C	166[B]	ARG
1	C	205	ARG
1	D	159	ASP
1	D	166[A]	ARG
1	D	166[B]	ARG
1	D	205	ARG
1	D	244	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

19 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	PEP	D	304[A]	-	9,9,9	1.57	2 (22%)	11,13,13	2.15	3 (27%)
2	A5P	D	301[A]	-	13,13,13	0.44	0	18,18,18	0.75	0
5	EDO	A	316	-	3,3,3	0.37	0	2,2,2	0.89	0
5	EDO	D	316	-	3,3,3	0.31	0	2,2,2	0.90	0
2	A5P	C	301[A]	-	13,13,13	0.63	0	18,18,18	1.12	1 (5%)
5	EDO	A	282	-	3,3,3	0.92	0	2,2,2	0.47	0
3	PEP	A	304[A]	-	9,9,9	1.70	2 (22%)	11,13,13	2.04	6 (54%)
5	EDO	B	316	-	3,3,3	0.47	0	2,2,2	0.65	0
4	KD0	A	306[B]	-	19,19,19	1.36	1 (5%)	25,27,27	1.21	4 (16%)
5	EDO	C	316	-	3,3,3	0.17	0	2,2,2	0.78	0
4	KD0	D	306[B]	-	19,19,19	1.24	2 (10%)	25,27,27	1.47	4 (16%)
5	EDO	B	282	-	3,3,3	0.60	0	2,2,2	0.27	0
2	A5P	A	301[A]	-	13,13,13	0.69	0	18,18,18	1.17	2 (11%)
5	EDO	C	282	-	3,3,3	0.98	0	2,2,2	1.12	0
4	KD0	B	306[B]	-	19,19,19	1.30	1 (5%)	25,27,27	1.16	1 (4%)
2	A5P	B	301[A]	-	13,13,13	0.58	0	18,18,18	0.90	0
3	PEP	B	304[A]	-	9,9,9	1.54	2 (22%)	11,13,13	2.09	3 (27%)
4	KD0	C	306[B]	-	19,19,19	1.50	3 (15%)	25,27,27	0.94	1 (4%)
3	PEP	C	304[A]	-	9,9,9	1.53	2 (22%)	11,13,13	1.55	2 (18%)

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	PEP	D	304[A]	-	-	4/9/9/9	-
2	A5P	D	301[A]	-	-	7/16/16/16	-
5	EDO	A	316	-	-	1/1/1/1	-
5	EDO	D	316	-	-	1/1/1/1	-
2	A5P	C	301[A]	-	-	6/16/16/16	-
5	EDO	A	282	-	-	1/1/1/1	-
3	PEP	A	304[A]	-	-	3/9/9/9	-
5	EDO	B	316	-	-	1/1/1/1	-
4	KD0	A	306[B]	-	-	4/26/26/26	-
5	EDO	C	316	-	-	0/1/1/1	-
4	KD0	D	306[B]	-	-	4/26/26/26	-
5	EDO	B	282	-	-	1/1/1/1	-
2	A5P	A	301[A]	-	-	5/16/16/16	-
5	EDO	C	282	-	-	1/1/1/1	-
4	KD0	B	306[B]	-	-	4/26/26/26	-
2	A5P	B	301[A]	-	-	7/16/16/16	-
3	PEP	B	304[A]	-	-	1/9/9/9	-
4	KD0	C	306[B]	-	-	4/26/26/26	-
3	PEP	C	304[A]	-	-	3/9/9/9	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	306[B]	KD0	C1-C2	-5.01	1.46	1.53
4	B	306[B]	KD0	C1-C2	-4.50	1.47	1.53
4	A	306[B]	KD0	C1-C2	-4.27	1.47	1.53
4	D	306[B]	KD0	C1-C2	-3.94	1.48	1.53
3	A	304[A]	PEP	P-O2	3.73	1.64	1.59
3	B	304[A]	PEP	P-O2	3.15	1.64	1.59
3	D	304[A]	PEP	P-O2	2.92	1.63	1.59
3	D	304[A]	PEP	O2-C2	2.45	1.46	1.39
3	C	304[A]	PEP	O1-C1	2.37	1.28	1.22
4	D	306[B]	KD0	C3-C4	-2.33	1.49	1.53
3	C	304[A]	PEP	C2-C1	-2.22	1.47	1.49
3	B	304[A]	PEP	O2-C2	2.22	1.45	1.39
3	A	304[A]	PEP	O2-C2	2.14	1.45	1.39

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	306[B]	KD0	O2-C2	-2.11	1.24	1.30
4	C	306[B]	KD0	O1-C2	2.00	1.28	1.22

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	304[A]	PEP	O2'-C1-C2	4.56	121.69	113.91
3	B	304[A]	PEP	O2'-C1-C2	3.77	120.34	113.91
3	B	304[A]	PEP	O3P-P-O2	-3.51	94.55	105.25
3	A	304[A]	PEP	O2'-C1-C2	3.30	119.53	113.91
4	D	306[B]	KD0	O2-C2-C1	3.13	122.53	113.97
3	D	304[A]	PEP	O1-C1-C2	-3.11	117.10	121.79
3	C	304[A]	PEP	O3P-P-O2	-3.10	95.79	105.25
4	D	306[B]	KD0	O1-C2-C1	-2.93	117.81	121.72
4	D	306[B]	KD0	C7-C6-C5	-2.77	108.13	112.47
3	A	304[A]	PEP	O2-P-O1P	-2.71	99.70	109.32
3	A	304[A]	PEP	O3P-P-O2P	2.63	117.70	107.64
4	B	306[B]	KD0	O1-C2-C1	-2.55	118.31	121.72
3	C	304[A]	PEP	O3P-P-O2P	2.48	117.12	107.64
2	C	301[A]	A5P	O3P-P-O2P	2.41	116.83	107.64
3	B	304[A]	PEP	O2-C2-C3	-2.40	120.16	124.79
4	A	306[B]	KD0	O1-C2-C1	-2.39	118.53	121.72
2	A	301[A]	A5P	O1-C1-C2	2.34	116.18	111.07
3	A	304[A]	PEP	O1-C1-C2	-2.32	118.29	121.79
4	A	306[B]	KD0	C4-C5-C6	-2.32	108.84	112.47
4	D	306[B]	KD0	O3-C1-C3	-2.29	116.95	121.53
2	A	301[A]	A5P	O3P-P-O5	-2.23	100.80	106.73
3	A	304[A]	PEP	O2P-P-O1P	2.22	119.36	110.68
4	A	306[B]	KD0	O2-C2-C1	2.14	119.83	113.97
3	D	304[A]	PEP	O2P-P-O1P	2.11	118.93	110.68
4	C	306[B]	KD0	C4-C5-C6	-2.09	109.20	112.47
4	A	306[B]	KD0	C7-C6-C5	-2.05	109.25	112.47
3	A	304[A]	PEP	O2-C2-C3	-2.03	120.88	124.79

There are no chirality outliers.

All (58) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301[A]	A5P	C5-O5-P-O3P
3	A	304[A]	PEP	O1-C1-C2-O2
3	A	304[A]	PEP	O2'-C1-C2-C3
3	A	304[A]	PEP	O2'-C1-C2-O2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
3	C	304[A]	PEP	O1-C1-C2-O2
3	C	304[A]	PEP	O2'-C1-C2-C3
3	C	304[A]	PEP	O2'-C1-C2-O2
3	D	304[A]	PEP	O1-C1-C2-C3
3	D	304[A]	PEP	O1-C1-C2-O2
3	D	304[A]	PEP	O2'-C1-C2-C3
3	D	304[A]	PEP	O2'-C1-C2-O2
4	A	306[B]	KD0	C8-O1P-P-O4P
4	A	306[B]	KD0	C8-O1P-P-O3P
4	A	306[B]	KD0	C2-C1-C3-C4
4	B	306[B]	KD0	O7-C7-C8-O1P
4	B	306[B]	KD0	C6-C7-C8-O1P
4	B	306[B]	KD0	C2-C1-C3-C4
4	C	306[B]	KD0	C8-O1P-P-O4P
4	C	306[B]	KD0	C8-O1P-P-O3P
4	D	306[B]	KD0	O7-C7-C8-O1P
4	D	306[B]	KD0	C6-C7-C8-O1P
2	A	301[A]	A5P	O1-C1-C2-O2
2	C	301[A]	A5P	O1-C1-C2-O2
2	A	301[A]	A5P	O1-C1-C2-C3
2	C	301[A]	A5P	O1-C1-C2-C3
2	D	301[A]	A5P	O1-C1-C2-C3
2	B	301[A]	A5P	O1-C1-C2-C3
4	C	306[B]	KD0	O3-C1-C3-C4
4	D	306[B]	KD0	O3-C1-C3-C4
2	A	301[A]	A5P	O4-C4-C5-O5
2	B	301[A]	A5P	O4-C4-C5-O5
2	D	301[A]	A5P	O4-C4-C5-O5
5	A	316	EDO	O1-C1-C2-O2
5	B	316	EDO	O1-C1-C2-O2
5	B	282	EDO	O1-C1-C2-O2
5	C	282	EDO	O1-C1-C2-O2
5	D	316	EDO	O1-C1-C2-O2
2	D	301[A]	A5P	O1-C1-C2-O2
2	A	301[A]	A5P	C3-C4-C5-O5
2	B	301[A]	A5P	C3-C4-C5-O5
2	C	301[A]	A5P	C3-C4-C5-O5
2	D	301[A]	A5P	C3-C4-C5-O5
2	B	301[A]	A5P	C5-O5-P-O1P
4	C	306[B]	KD0	C2-C1-C3-C4
4	D	306[B]	KD0	C2-C1-C3-C4
2	B	301[A]	A5P	C5-O5-P-O2P

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	C	301[A]	A5P	C5-O5-P-O3P
2	D	301[A]	A5P	C5-O5-P-O3P
2	B	301[A]	A5P	O1-C1-C2-O2
4	A	306[B]	KD0	O3-C1-C3-C4
4	B	306[B]	KD0	O3-C1-C3-C4
2	D	301[A]	A5P	C5-O5-P-O1P
3	B	304[A]	PEP	O2'-C1-C2-O2
5	A	282	EDO	O1-C1-C2-O2
2	A	301[A]	A5P	C5-O5-P-O2P
2	C	301[A]	A5P	C5-O5-P-O2P
2	D	301[A]	A5P	C5-O5-P-O2P
2	C	301[A]	A5P	C5-O5-P-O1P

There are no ring outliers.

14 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	304[A]	PEP	3	0
2	D	301[A]	A5P	1	0
5	A	316	EDO	1	0
2	C	301[A]	A5P	2	0
5	A	282	EDO	2	0
3	A	304[A]	PEP	2	0
4	A	306[B]	KD0	1	0
5	B	282	EDO	1	0
2	A	301[A]	A5P	2	0
5	C	282	EDO	2	0
2	B	301[A]	A5P	1	0
3	B	304[A]	PEP	2	0
4	C	306[B]	KD0	1	0
3	C	304[A]	PEP	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand KD0 A 306 (B)

Bond lengths　　Bond angles

Torsions　　Rings

Ligand KD0 D 306 (B)

Bond lengths　　Bond angles

Torsions　　Rings

Ligand KD0 B 306 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand KD0 C 306 (B)

Bond lengths

Bond angles

Torsions

Rings
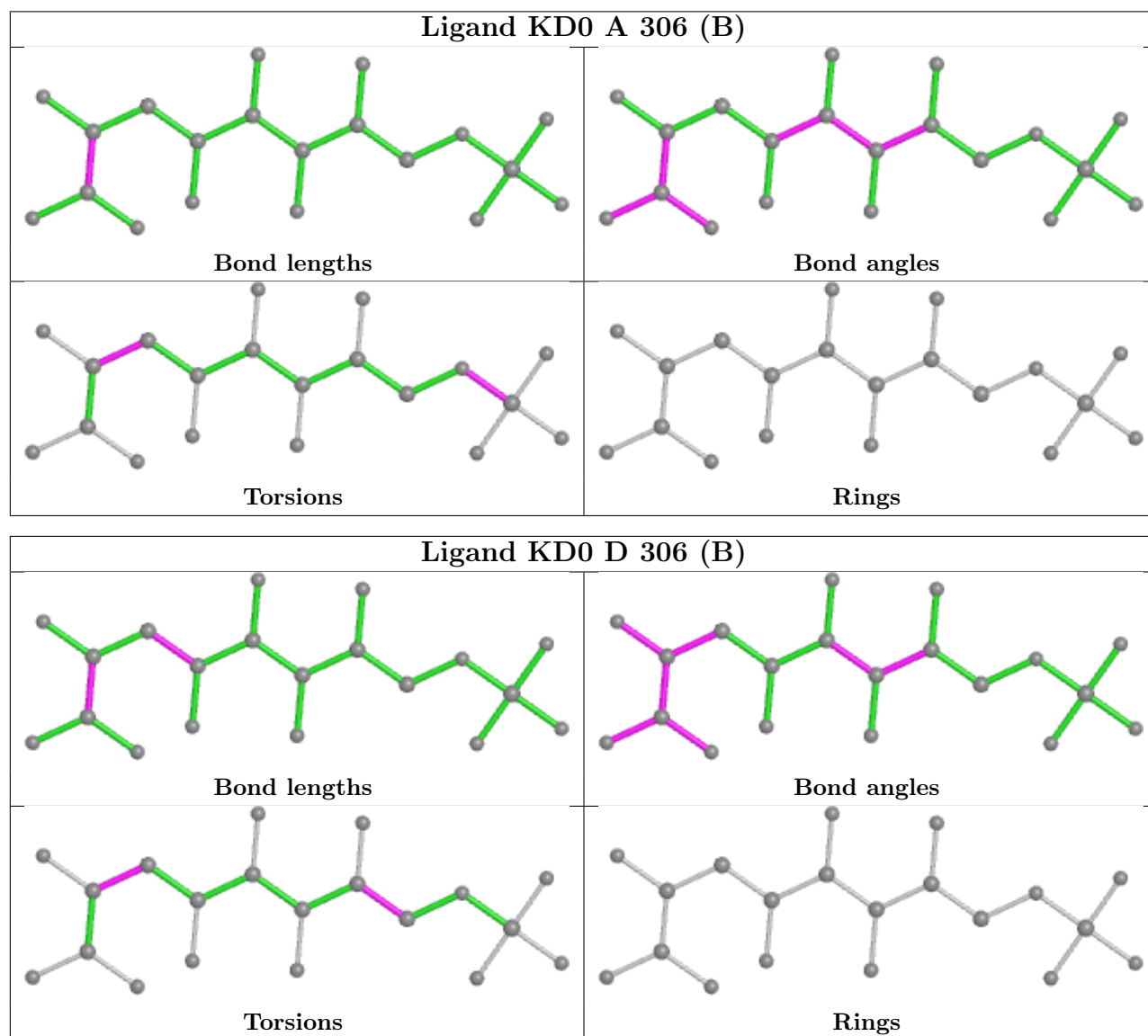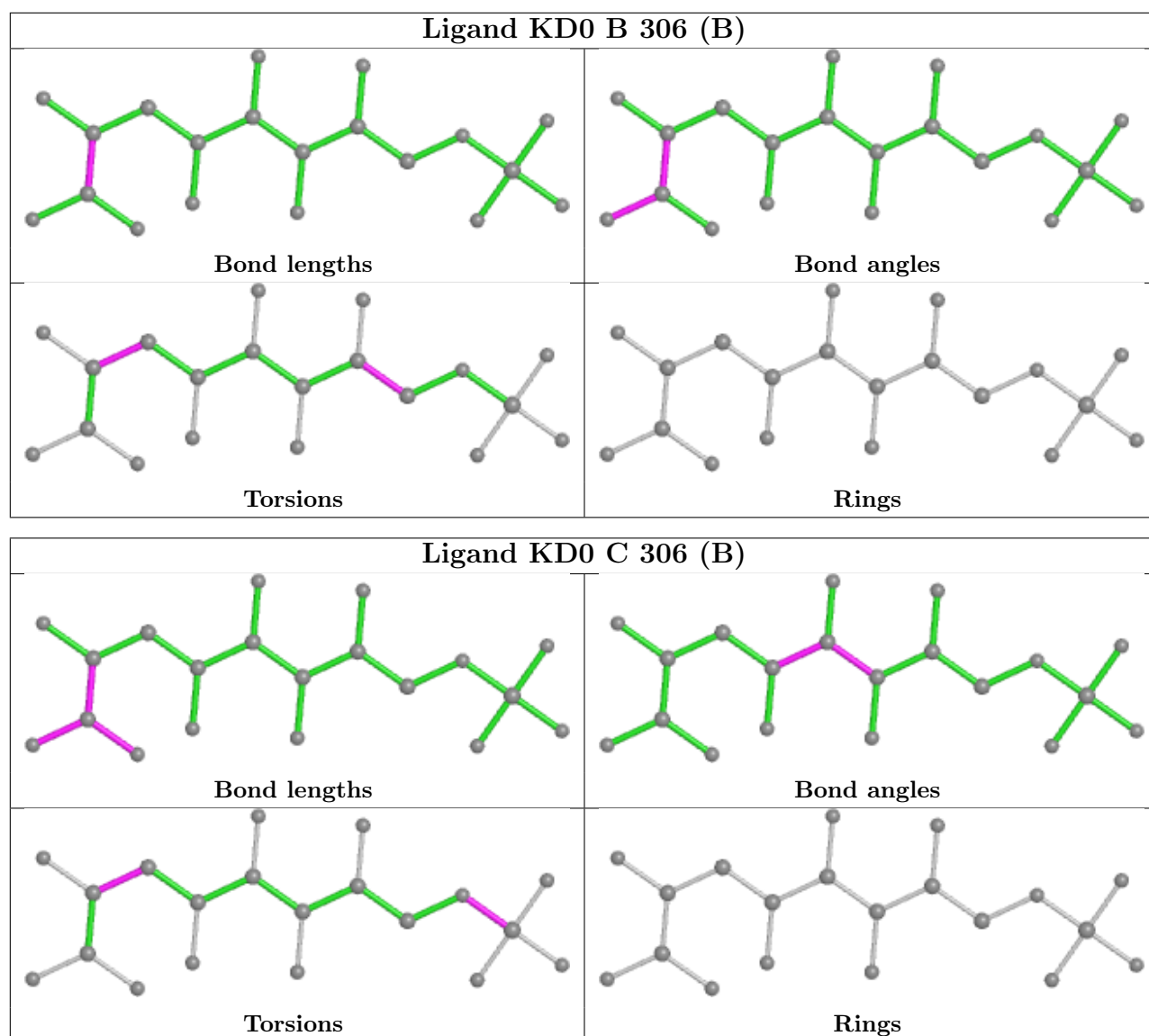
5.7 Other polymers ⓘ

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 ⓘ

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(Å²)	Q<0.9
1	A	283/285 (99%)	-0.62	0	100	100	11, 19, 34, 59	0
1	B	284/285 (99%)	-0.46	1 (0%)	92	93	14, 27, 43, 58	0
1	C	282/285 (98%)	-0.67	2 (0%)	87	89	11, 17, 30, 55	0
1	D	284/285 (99%)	-0.54	0	100	100	14, 27, 42, 70	0
All	All	1133/1140 (99%)	-0.57	3 (0%)	94	94	11, 22, 40, 70	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	277	ALA	2.3
1	C	0	SER	2.2
1	B	-1	GLY	2.1

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no monosaccharides 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
5	EDO	B	282	4/4	0.86	0.15	33,33,37,37	0
5	EDO	C	282	4/4	0.89	0.16	21,22,24,25	0
5	EDO	C	316	4/4	0.90	0.13	31,32,35,35	0
5	EDO	A	282	4/4	0.91	0.14	25,26,27,28	0
5	EDO	A	316	4/4	0.91	0.12	36,37,37,38	0
5	EDO	B	316	4/4	0.94	0.14	43,45,47,47	0
3	PEP	D	304[A]	10/10	0.94	0.13	17,24,25,27	10
3	PEP	A	304[A]	10/10	0.94	0.11	12,18,20,21	10
3	PEP	C	304[A]	10/10	0.94	0.10	12,16,18,19	10
3	PEP	B	304[A]	10/10	0.95	0.12	16,22,22,22	10
5	EDO	D	316	4/4	0.96	0.11	36,37,38,38	0
4	KD0	B	306[B]	20/20	0.97	0.11	18,21,25,25	20
4	KD0	D	306[B]	20/20	0.97	0.10	16,20,23,23	20
2	A5P	B	301[A]	14/14	0.97	0.10	21,28,30,32	14
2	A5P	C	301[A]	14/14	0.98	0.08	13,17,18,20	14
4	KD0	C	306[B]	20/20	0.98	0.08	10,11,12,13	20
2	A5P	D	301[A]	14/14	0.98	0.09	23,29,32,33	14
2	A5P	A	301[A]	14/14	0.98	0.08	14,20,22,22	14
4	KD0	A	306[B]	20/20	0.98	0.08	11,13,14,14	20

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 KD0 B 306 (B):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
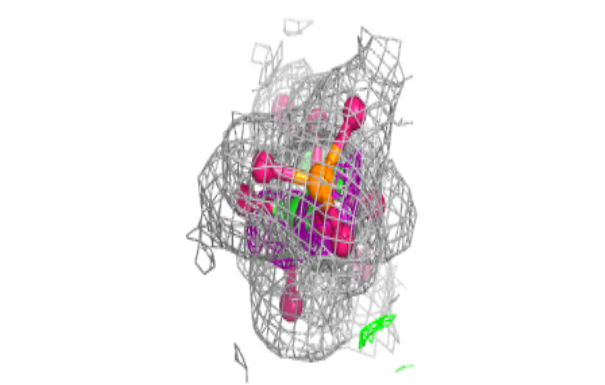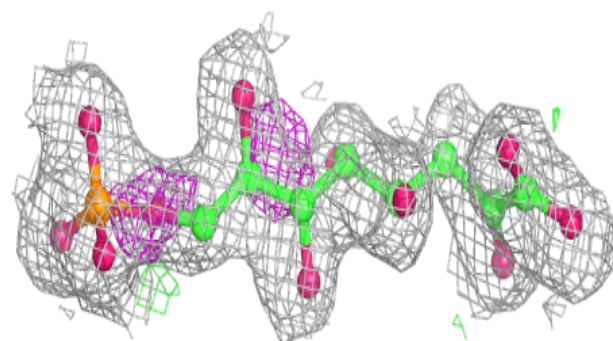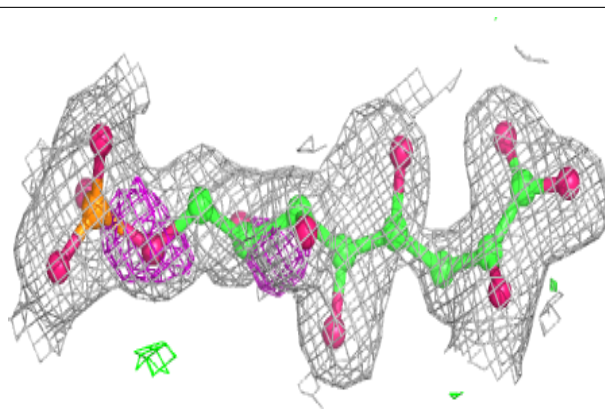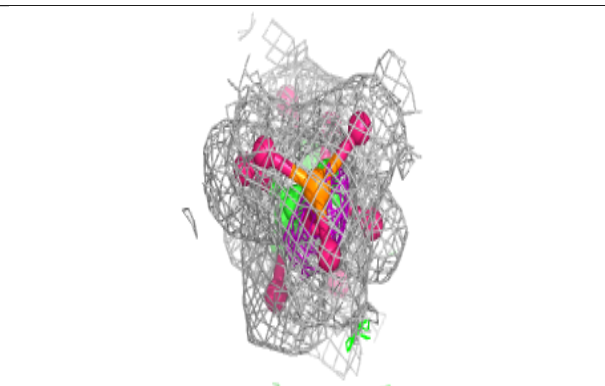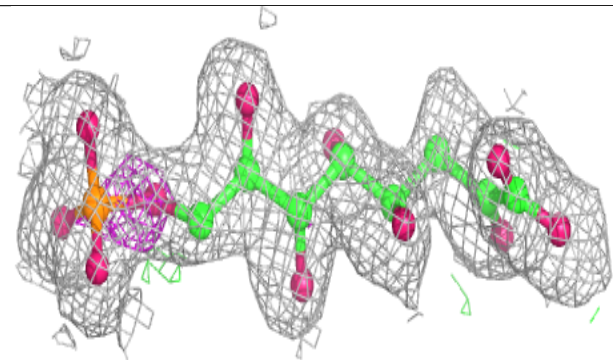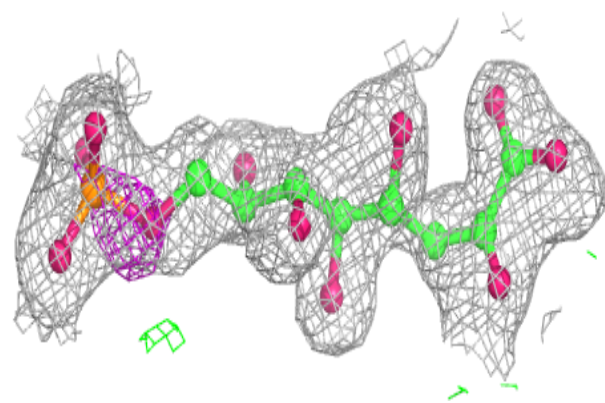mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
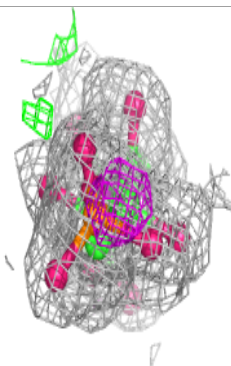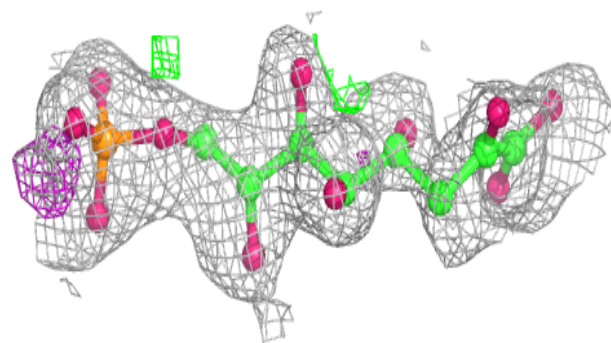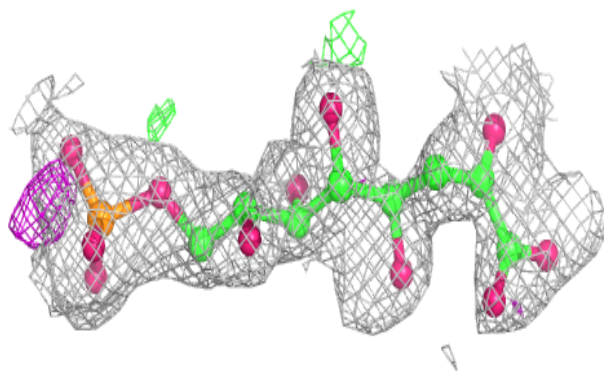
Electron density around KD0 D 306 (B):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
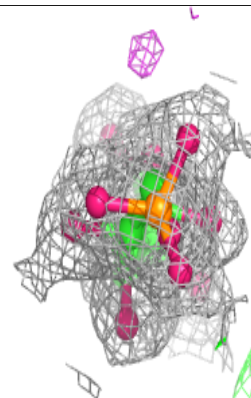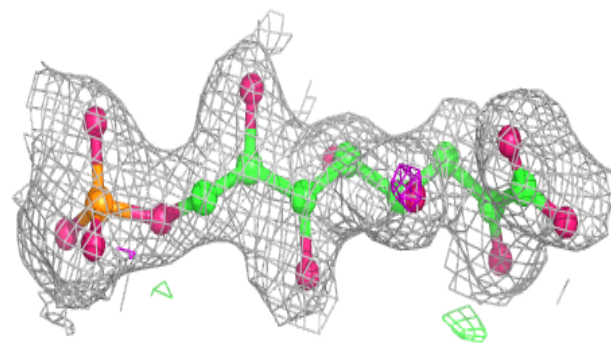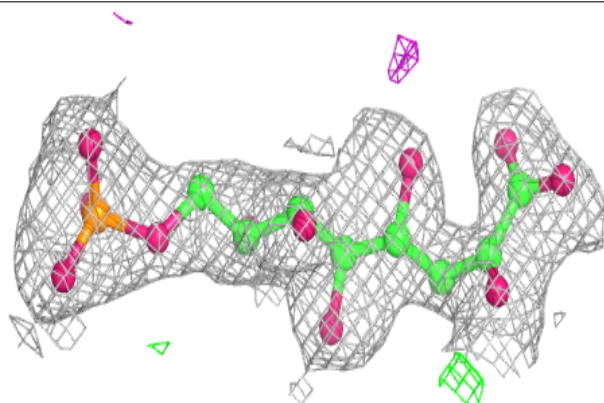
Electron density around KD0 C 306 (B):

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 KD0 A 306 (B):

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.