



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 02:04 PM UTC

PDB ID : 4QWC / pdb_00004qwc
Title : Ternary Crystal Structures of a Y-family DNA polymerase DPO4 from *Sulfolobus Solfataricus* in Complex with DNA and L-DCDP
Authors : Vyas, R.; Suo, Z.
Deposited on : 2014-07-16
Resolution : 2.40 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

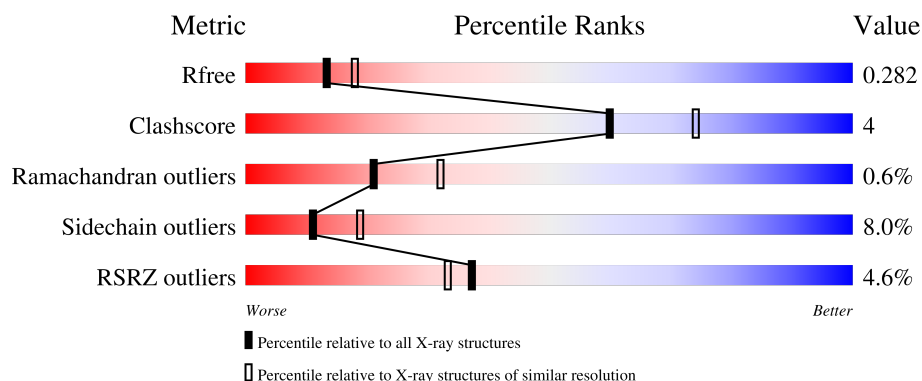
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	343	3% 86% 12% .
1	D	343	7% 85% 12% .
2	B	13	46% 46% 8%
2	E	13	62% 31% 8%
3	C	18	67% 17% 17%

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Mol	Chain	Length	Quality of chain
3	F	18	

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
5	ACT	A	404	-	-	X	-
5	ACT	D	404	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6888 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 DNA polymerase IV.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	342	Total	C	N	O	S	0	0	0
			2752	1765	473	507	7			
1	D	342	Total	C	N	O	S	0	0	0
			2752	1765	473	507	7			

- Molecule 2 is a DNA chain called DNA (5'-D(*GP*GP*CP*TP*AP*CP*AP*GP*GP*AP*CP*TP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	13	Total	C	N	O	P	0	0	0
			263	126	51	74	12			
2	E	13	Total	C	N	O	P	0	0	0
			263	126	51	74	12			

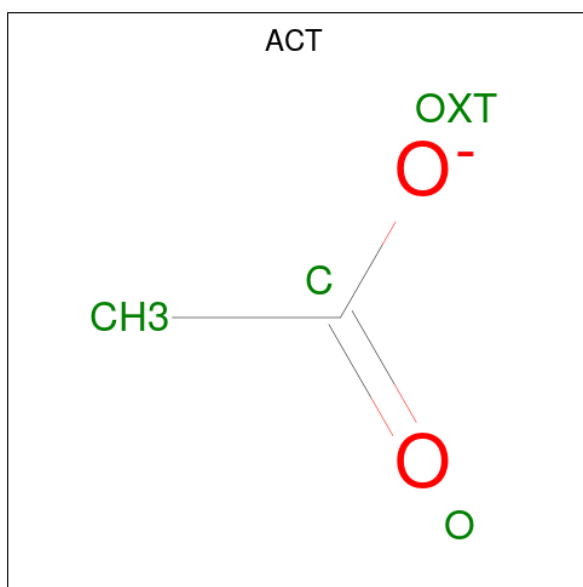
- Molecule 3 is a DNA chain called DNA (5'-D(*TP*TP*CP*AP*GP*GP*AP*GP*TP*CP*CP*TP*GP*TP*AP*GP*CP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	15	Total	C	N	O	P	0	0	0
			309	146	58	90	15			
3	F	15	Total	C	N	O	P	0	0	0
			309	146	58	90	15			

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca).

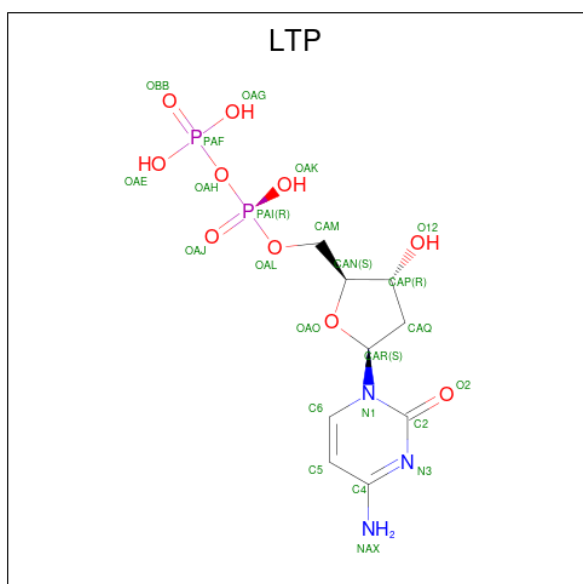
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Ca	0	0
			2	2		
4	D	3	Total	Ca	0	0
			3	3		

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



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

- Molecule 6 is 4-amino-1-{2-deoxy-5-O-[(R)-hydroxy(phosphonooxy)phosphoryl]-beta-L-erythro-pentofuranosyl}pyrimidin-2(1H)-one (CCD ID: LTP) (formula: $C_9H_{15}N_3O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			24	9	3	10	2		
6	D	1	Total	C	N	O	P	0	0
			24	9	3	10	2		

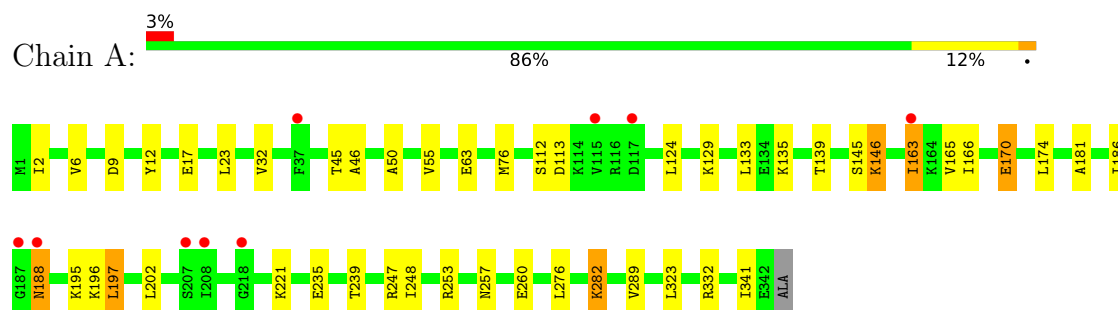
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	80	Total	O	0	0
			80	80		
7	B	9	Total	O	0	0
			9	9		
7	C	14	Total	O	0	0
			14	14		
7	D	57	Total	O	0	0
			57	57		
7	E	5	Total	O	0	0
			5	5		
7	F	10	Total	O	0	0
			10	10		

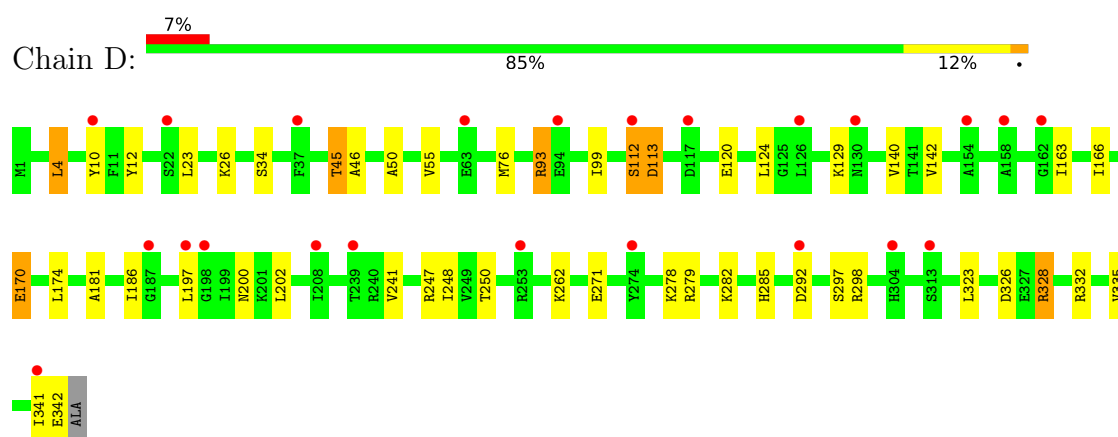
3 Residue-property plots [i](#)

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.

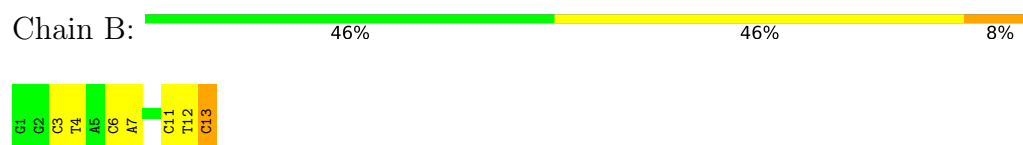
- Molecule 1: DNA polymerase IV



- Molecule 1: DNA polymerase IV



- Molecule 2: DNA (5'-D(*GP*GP*CP*TP*AP*CP*AP*GP*GP*AP*CP*TP*C)-3')



- Molecule 2: DNA (5'-D(*GP*GP*CP*TP*AP*CP*AP*GP*GP*AP*CP*TP*C)-3')



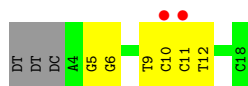
- Molecule 3: DNA (5'-D(*TP*TP*CP*AP*GP*GP*AP*GP*TP*CP*CP*TP*GP*TP*AP*GP*CP*C)-3')

Chain C:  67% 17% 17%



- Molecule 3: DNA (5'-D(*TP*TP*CP*AP*GP*GP*AP*GP*TP*CP*CP*TP*GP*TP*AP*GP*CP*C)-3')

Chain F:  11% 50% 33% 17%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	98.44Å 101.93Å 105.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.46 – 2.40 46.46 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.2 (46.46-2.40) 99.2 (46.46-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.227 , 0.277 0.233 , 0.282	Depositor DCC
R_{free} test set	2110 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	58.0	Xtriage
Anisotropy	0.085	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 57.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6888	wwPDB-VP
Average B, all atoms (Å ²)	70.0	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 73.34 % 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 1.8724e-06. 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: DOC, ACT, CA, LTP

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	0.63	0/2791	0.83	0/3748
1	D	0.59	0/2791	0.81	1/3748 (0.0%)
2	B	0.33	0/275	0.80	0/423
2	E	0.31	0/275	0.68	0/423
3	C	0.36	0/346	0.76	0/532
3	F	0.33	0/346	0.75	0/532
All	All	0.57	0/6824	0.81	1/9406 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	45	THR	N-CA-C	5.23	116.23	108.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2752	0	2895	20	0
1	D	2752	0	2895	22	0
2	B	263	0	147	5	0
2	E	263	0	147	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	309	0	169	2	0
3	F	309	0	169	4	0
4	A	2	0	0	0	0
4	D	3	0	0	0	0
5	A	8	0	6	3	0
5	D	4	0	3	3	0
6	A	24	0	14	1	0
6	D	24	0	14	0	0
7	A	80	0	0	4	0
7	B	9	0	0	0	0
7	C	14	0	0	0	0
7	D	57	0	0	5	0
7	E	5	0	0	1	0
7	F	10	0	0	1	0
All	All	6888	0	6459	57	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 (57) 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)
6:A:405:LTP:OBB	7:A:559:HOH:O	1.84	0.94
2:E:4:DT:H2''	2:E:5:DA:H5''	1.52	0.89
2:B:11:DC:H2'	2:B:12:DT:H71	1.58	0.84
2:B:12:DT:H2'	2:B:13:DOC:O4'	1.85	0.77
1:A:181:ALA:O	5:A:404:ACT:C	2.37	0.73
2:E:13:DOC:H2''	7:E:204:HOH:O	1.90	0.71
2:B:6:DC:H2'	2:B:7:DA:C8	2.31	0.65
3:F:9:DT:H2''	3:F:10:DC:C6	2.34	0.63
1:D:298:ARG:HD2	2:E:8:DG:OP1	1.98	0.63
1:A:166:ILE:HG23	1:A:170:GLU:HB3	1.80	0.62
1:D:250:THR:HG22	1:D:332:ARG:HG2	1.83	0.59
1:D:285:HIS:HB3	7:D:537:HOH:O	2.04	0.57
1:A:32:VAL:HG11	3:C:6:DG:H5'	1.86	0.57
1:D:34:SER:OG	7:D:552:HOH:O	2.18	0.56
1:A:129:LYS:HE3	1:A:163:ILE:HG13	1.89	0.54
2:B:12:DT:H2'	2:B:13:DOC:C4'	2.36	0.54
1:D:4:LEU:CD1	1:D:142:VAL:HG13	2.37	0.54
1:A:195:LYS:O	1:A:197:LEU:N	2.40	0.54
1:A:145:SER:OG	1:A:146:LYS:N	2.39	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:188:ASN:N	1:A:188:ASN:OD1	2.41	0.53
1:D:4:LEU:HD13	1:D:142:VAL:HG13	1.90	0.53
1:A:135:LYS:HD2	7:A:512:HOH:O	2.11	0.50
1:A:289:VAL:HB	1:A:332:ARG:HB2	1.93	0.49
1:D:262:LYS:NZ	7:D:523:HOH:O	2.46	0.48
1:D:186:ILE:O	5:D:404:ACT:OXT	2.32	0.48
3:F:5:DG:H1'	3:F:6:DG:H5''	1.95	0.47
1:D:93:ARG:HD2	1:D:99:ILE:HG21	1.97	0.47
1:A:12:TYR:HB2	1:A:45:THR:HG21	1.96	0.46
1:A:257:ASN:HB3	1:A:260:GLU:HG2	1.97	0.46
3:C:12:DT:H2''	3:C:13:DG:C8	2.51	0.46
1:D:112:SER:O	1:D:113:ASP:CB	2.64	0.45
1:D:181:ALA:O	5:D:404:ACT:C	2.64	0.45
1:D:4:LEU:C	1:D:4:LEU:HD12	2.42	0.45
1:A:2:ILE:HG12	7:A:537:HOH:O	2.17	0.45
1:A:181:ALA:O	5:A:404:ACT:OXT	2.34	0.45
1:D:12:TYR:HB2	1:D:45:THR:CG2	2.46	0.45
1:A:46:ALA:HB1	1:A:50:ALA:HB3	1.99	0.44
1:D:341:ILE:HG22	1:D:342:GLU:N	2.32	0.44
1:A:12:TYR:HB2	1:A:45:THR:CG2	2.48	0.44
1:D:129:LYS:NZ	7:D:530:HOH:O	2.34	0.43
1:A:9:ASP:OD2	1:A:139:THR:HG23	2.18	0.43
2:B:3:DC:H2'	2:B:4:DT:C6	2.54	0.42
1:A:186:ILE:O	5:A:404:ACT:OXT	2.37	0.42
2:E:4:DT:C2'	2:E:5:DA:H5''	2.36	0.42
1:D:166:ILE:HG23	1:D:170:GLU:HB3	2.02	0.42
1:D:46:ALA:HB1	1:D:50:ALA:HB3	2.00	0.42
1:D:10:TYR:HB3	7:D:527:HOH:O	2.20	0.41
1:A:239:THR:HA	7:A:504:HOH:O	2.20	0.41
2:E:11:DC:N3	7:F:104:HOH:O	2.51	0.41
1:D:45:THR:OG1	1:D:46:ALA:N	2.53	0.41
1:D:181:ALA:O	5:D:404:ACT:OXT	2.39	0.41
1:D:247:ARG:NE	1:D:271:GLU:OE1	2.51	0.40
1:D:326:ASP:OD1	1:D:328:ARG:HG2	2.21	0.40
1:A:112:SER:O	1:A:113:ASP:HB2	2.21	0.40
1:A:282:LYS:HD2	1:A:341:ILE:HD13	2.04	0.40
3:F:5:DG:C2'	3:F:6:DG:H5''	2.51	0.40
3:F:11:DC:H2'	3:F:12:DT:C6	2.56	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	340/343 (99%)	328 (96%)	10 (3%)	2 (1%)	21	32
1	D	340/343 (99%)	328 (96%)	10 (3%)	2 (1%)	21	32
All	All	680/686 (99%)	656 (96%)	20 (3%)	4 (1%)	21	32

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	196	LYS
1	A	197	LEU
1	D	292	ASP
1	D	113	ASP

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	301/301 (100%)	278 (92%)	23 (8%)	12	21
1	D	301/301 (100%)	276 (92%)	25 (8%)	10	17
All	All	602/602 (100%)	554 (92%)	48 (8%)	11	19

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	VAL
1	A	17	GLU

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Mol	Chain	Res	Type
1	A	23	LEU
1	A	55	VAL
1	A	63	GLU
1	A	76	MET
1	A	124	LEU
1	A	133	LEU
1	A	146	LYS
1	A	163	ILE
1	A	165	VAL
1	A	170	GLU
1	A	174	LEU
1	A	188	ASN
1	A	202	LEU
1	A	221	LYS
1	A	235	GLU
1	A	247	ARG
1	A	248	ILE
1	A	253	ARG
1	A	276	LEU
1	A	282	LYS
1	A	323	LEU
1	D	4	LEU
1	D	23	LEU
1	D	26	LYS
1	D	55	VAL
1	D	76	MET
1	D	93	ARG
1	D	112	SER
1	D	120	GLU
1	D	124	LEU
1	D	140	VAL
1	D	163	ILE
1	D	170	GLU
1	D	174	LEU
1	D	197	LEU
1	D	200	ASN
1	D	202	LEU
1	D	241	VAL
1	D	248	ILE
1	D	278	LYS
1	D	279	ARG
1	D	282	LYS

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Mol	Chain	Res	Type
1	D	297	SER
1	D	323	LEU
1	D	328	ARG
1	D	335	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	ASN
1	A	285	HIS
1	D	20	ASN
1	D	82	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	DOC	E	13	2,3	16,19,20	0.92	0	20,26,29	1.55	6 (30%)
2	DOC	B	13	2,3	16,19,20	0.85	0	20,26,29	1.14	1 (5%)

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	DOC	E	13	2,3	-	2/7/18/19	0/2/2/2
2	DOC	B	13	2,3	-	1/7/18/19	0/2/2/2

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	13	DOC	C3'-C2'-C1'	2.86	106.17	102.87
2	E	13	DOC	C3'-C2'-C1'	2.70	105.99	102.87
2	E	13	DOC	O2-C2-N3	-2.61	118.22	122.33
2	E	13	DOC	O4'-C1'-N1	2.25	111.86	107.86
2	E	13	DOC	O4'-C4'-C5'	2.22	113.34	109.34
2	E	13	DOC	C2'-C3'-C4'	2.21	106.84	102.75
2	E	13	DOC	C1'-N1-C2	2.12	121.47	117.83

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	13	DOC	C4'-C5'-O5'-P
2	E	13	DOC	C3'-C4'-C5'-O5'
2	E	13	DOC	O4'-C4'-C5'-O5'

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	13	DOC	1	0
2	B	13	DOC	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 5 are monoatomic - leaving 5 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	LTP	A	405	4	24,25,25	1.66	3 (12%)	36,38,38	1.69	5 (13%)
5	ACT	A	403	-	3,3,3	0.83	0	3,3,3	0.77	0
5	ACT	A	404	-	3,3,3	1.09	0	3,3,3	0.76	0
5	ACT	D	404	-	3,3,3	0.74	0	3,3,3	1.00	0
6	LTP	D	405	4	24,25,25	1.58	3 (12%)	36,38,38	1.38	3 (8%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	LTP	A	405	4	-	6/16/28/28	0/2/2/2
6	LTP	D	405	4	-	6/16/28/28	0/2/2/2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	405	LTP	C6-C5	5.08	1.46	1.35
6	D	405	LTP	C6-C5	4.98	1.46	1.35
6	A	405	LTP	C6-N1	4.25	1.48	1.38
6	D	405	LTP	C6-N1	3.86	1.47	1.38
6	D	405	LTP	C2-N1	-2.52	1.34	1.40
6	A	405	LTP	C2-N1	-2.42	1.35	1.40

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	405	LTP	C5-C6-N1	-5.48	112.93	121.84
6	D	405	LTP	C5-C6-N1	-5.17	113.44	121.84
6	A	405	LTP	CAQ-CAR-N1	-3.87	104.13	113.81
6	A	405	LTP	OAQ-CAR-N1	3.08	113.34	107.86
6	A	405	LTP	O2-C2-N3	-2.95	117.69	122.33
6	D	405	LTP	CAQ-CAR-N1	-2.77	106.90	113.81
6	A	405	LTP	C4-N3-C2	2.37	124.00	120.26

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	405	LTP	OAO-CAR-N1	2.20	111.76	107.86

There are no chirality outliers.

All (12) torsion outliers are listed below:

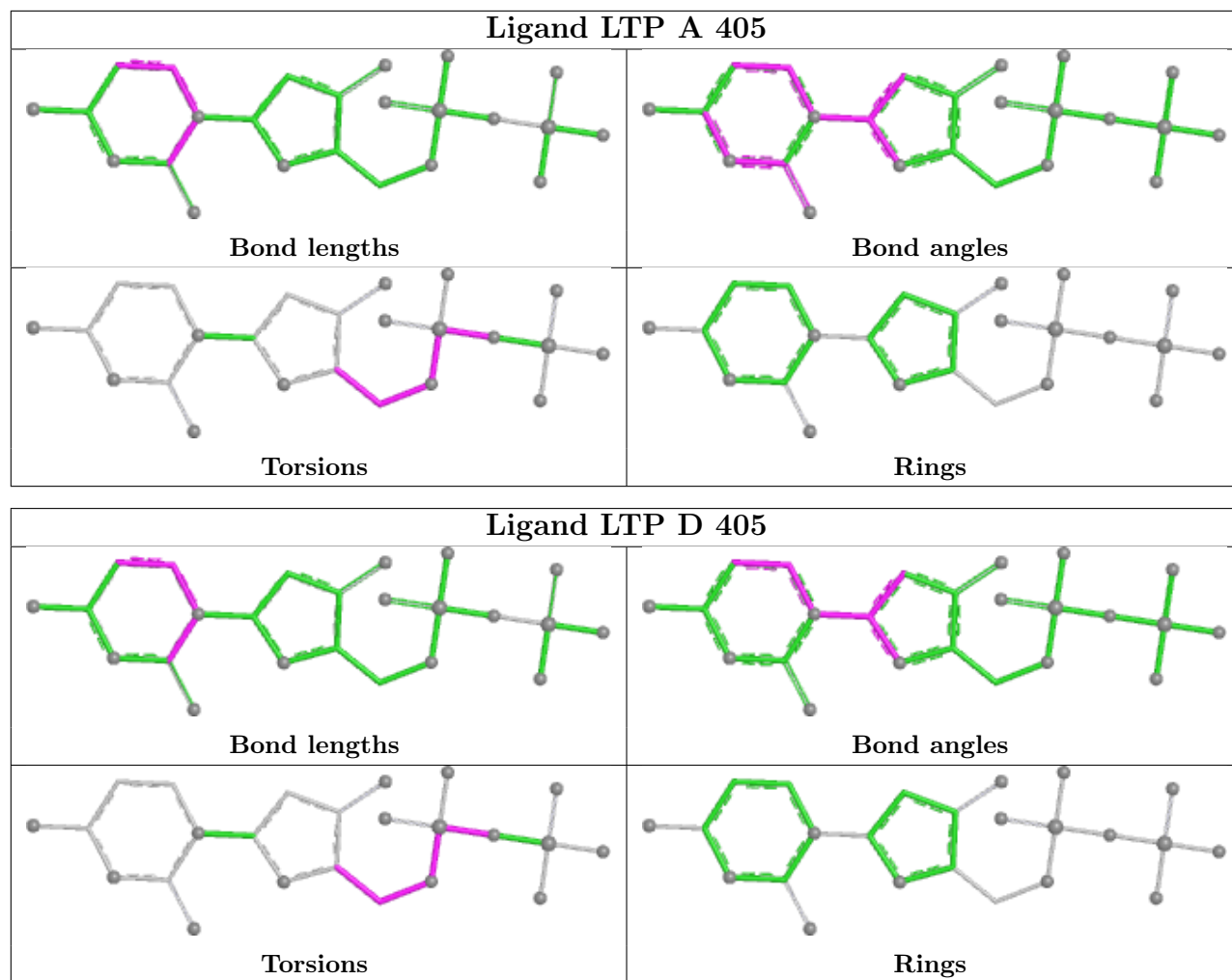
Mol	Chain	Res	Type	Atoms
6	A	405	LTP	CAM-OAL-PAI-OAH
6	A	405	LTP	CAM-OAL-PAI-OAK
6	A	405	LTP	OAL-CAM-CAN-OAO
6	D	405	LTP	PAF-OAH-PAI-OAL
6	D	405	LTP	CAM-OAL-PAI-OAH
6	D	405	LTP	CAM-OAL-PAI-OAK
6	D	405	LTP	OAL-CAM-CAN-OAO
6	A	405	LTP	OAL-CAM-CAN-CAP
6	D	405	LTP	OAL-CAM-CAN-CAP
6	A	405	LTP	PAF-OAH-PAI-OAL
6	A	405	LTP	CAN-CAM-OAL-PAI
6	D	405	LTP	CAN-CAM-OAL-PAI

There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	405	LTP	1	0
5	A	404	ACT	3	0
5	D	404	ACT	3	0

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



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	342/343 (99%)	0.42	9 (2%) 57 53	28, 61, 89, 112	0
1	D	342/343 (99%)	0.68	23 (6%) 24 20	35, 69, 103, 124	0
2	B	12/13 (92%)	0.81	0 100 100	55, 69, 92, 92	0
2	E	12/13 (92%)	0.99	0 100 100	74, 87, 94, 98	0
3	C	15/18 (83%)	0.93	0 100 100	53, 74, 90, 138	0
3	F	15/18 (83%)	1.35	2 (13%) 7 5	64, 95, 117, 149	0
All	All	738/748 (98%)	0.58	34 (4%) 37 33	28, 66, 101, 149	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	187	GLY	3.5
1	D	187	GLY	3.5
1	A	218	GLY	3.5
1	A	37	PHE	3.5
1	D	63	GLU	3.2
3	F	10	DC	3.2
1	D	341	ILE	3.0
1	D	304	HIS	2.8
1	D	130	ASN	2.8
1	D	274	TYR	2.7
1	D	197	LEU	2.5
1	D	112	SER	2.5
1	D	117	ASP	2.4
1	A	117	ASP	2.4
1	D	239	THR	2.4
1	D	94	GLU	2.4
1	D	198	GLY	2.3
3	F	11	DC	2.3
1	D	37	PHE	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	253	ARG	2.3
1	A	207	SER	2.3
1	D	313	SER	2.3
1	D	292	ASP	2.2
1	A	188	ASN	2.1
1	D	126	LEU	2.1
1	D	10	TYR	2.1
1	D	154	ALA	2.1
1	D	22	SER	2.1
1	D	158	ALA	2.1
1	A	163	ILE	2.1
1	D	162	GLY	2.0
1	A	208	ILE	2.0
1	A	115	VAL	2.0
1	D	208	ILE	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	DOC	B	13	18/19	0.88	0.17	75,82,88,88	4
2	DOC	E	13	18/19	0.88	0.15	77,84,91,92	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	ACT	A	403	4/4	0.60	0.21	78,83,84,85	0

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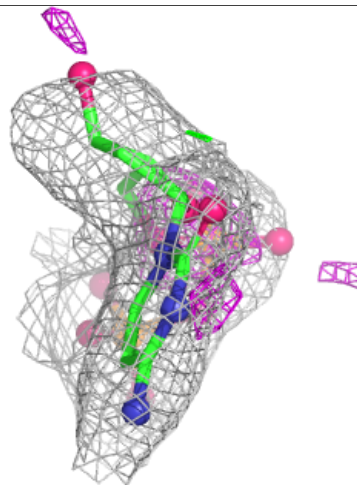
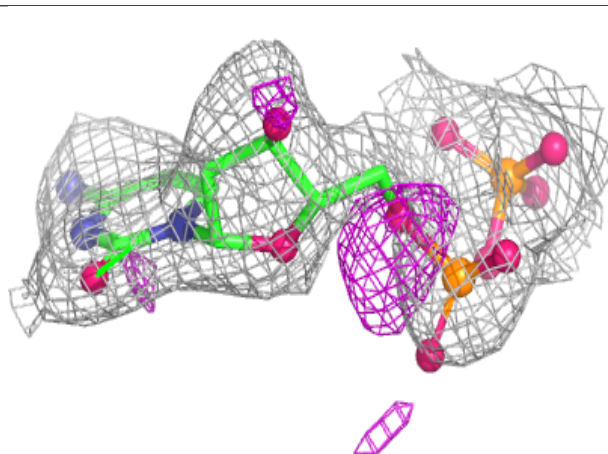
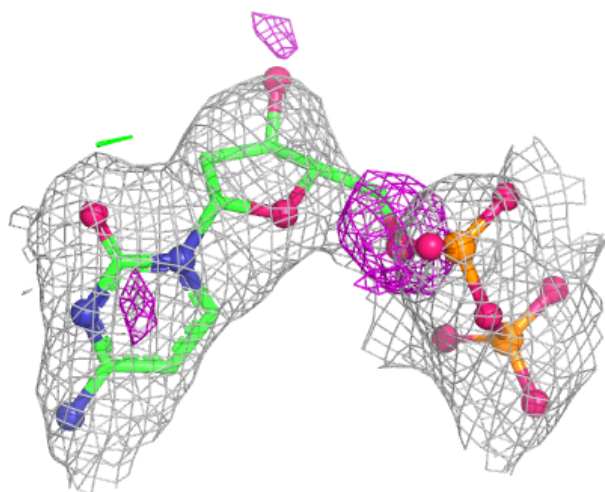
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	ACT	A	404	4/4	0.81	0.16	42,46,46,52	0
4	CA	A	402	1/1	0.90	0.13	88,88,88,88	0
6	LTP	D	405	24/24	0.90	0.12	58,65,70,71	0
4	CA	D	402	1/1	0.91	0.12	86,86,86,86	0
4	CA	D	401	1/1	0.91	0.09	96,96,96,96	0
6	LTP	A	405	24/24	0.94	0.10	47,57,73,79	0
5	ACT	D	404	4/4	0.94	0.08	59,62,64,65	0
4	CA	D	403	1/1	0.99	0.06	52,52,52,52	0
4	CA	A	401	1/1	0.99	0.07	43,43,43,43	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.

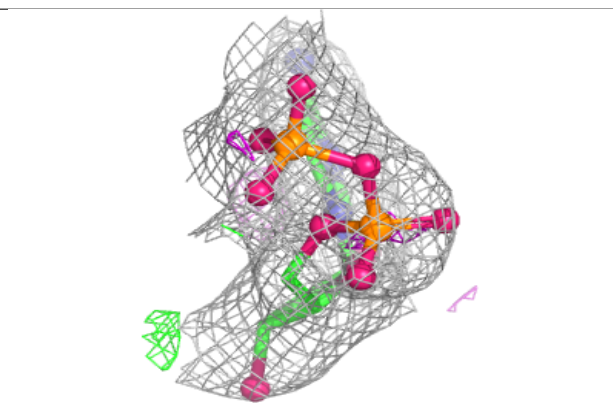
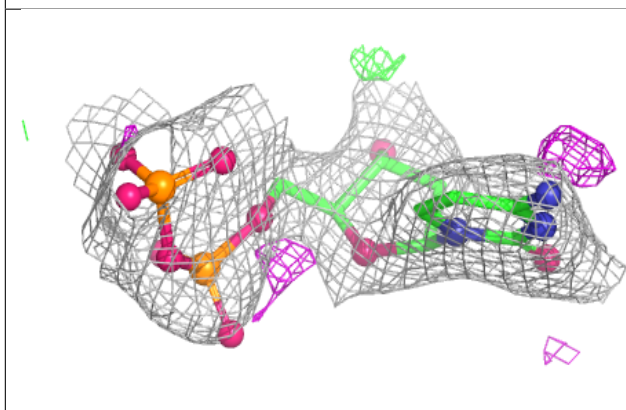
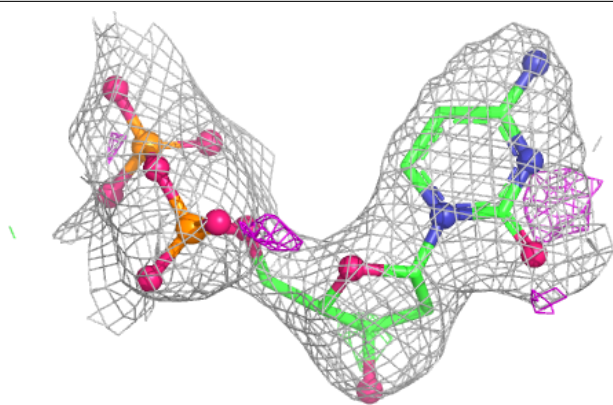
Electron density around LTP D 405:

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 LTP A 405:

$2mF_o - DF_c$ (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.