Full wwPDB X-ray Structure Validation Report (i)

Feb 5, 2024 – 03:38 AM EST

PDB ID	:	1X9S
Title	:	T7 DNA polymerase in complex with a primer/template DNA containing a disordered N-2 aminofluorene on the template, crystallized with dideoxy-CTP as the incoming nucleotide.
Authors	:	Dutta, S.; Li, Y.; Johnson, D.; Dzantiev, L.; Richardson, C.C.; Romano, L.J.; Ellenberger, T.
Deposited on	:	2004-08-24
Resolution	:	2.70 Å(reported)

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

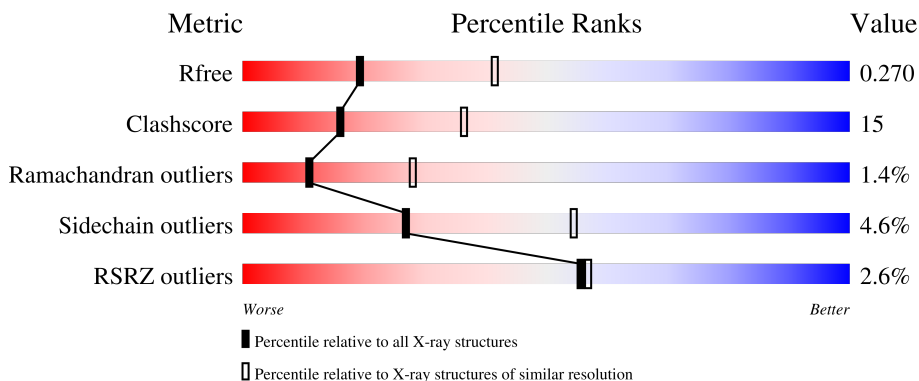|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.70 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.

| | 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	P	22	14% 27% 9% 50%
2	T	26	4% · 23% 15% · 58%
3	A	698	2% · 68% 26% · ·
4	B	108	3% · 68% 29% · ·

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 6462 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 DNA chain called 5'-D(*GP*GP*AP*GP*AP*GP*TP*GP*AP*TP*T*GP *GP*TP*AP*GP*TP*GP*TP*GP*AP*(2DT))-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	P	11	Total 228	C 110	N 43	O 65	P 10	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	T	11	Total 219	C 105	N 39	O 64	P 11	0	0	0

- Molecule 3 is a protein called DNA polymerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	A	673	Total 5189	C 3313	N 887	O 965	S 24	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	LYS	deletion	UNP P00581
A	?	-	ARG	deletion	UNP P00581
A	?	-	PHE	deletion	UNP P00581
A	?	-	GLY	deletion	UNP P00581
A	?	-	SER	deletion	UNP P00581
A	?	-	HIS	deletion	UNP P00581

- Molecule 4 is a protein called Thioredoxin 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	B	105	Total 774	C 500	N 121	O 150	S 3	0	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Mg 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	T	6	Total 6	O 6	0	0
6	A	43	Total 43	O 43	0	0
6	B	2	Total 2	O 2	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: 5'-D(*GP*GP*AP*GP*AP*GP*TP*GP*AP*TP*T*GP*GP*TP*AP*GP*TP*GP*TP*GP*AP*(2DT))-3'

Chain P:
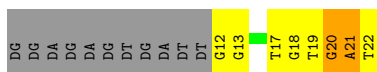
• Molecule 2: 5'-D(*CP*CP*CP*(AFG)P*AP*TP*CP*AP*CP*AP*CP*TP*AP*CP*CP*AP*AP*TP*CP*AP*CP*TP*CP*TP*CP*C)-3'

Chain T:
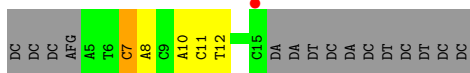
• Molecule 3: DNA polymerase

Chain A:

K587 W588 D597 G598 R599 P606 Q615 L620 K623 L624 I627 M632 E635 L638 D645 M649 V652 H653 D654 E655 C660 E663 E664 I665 A666 Q667 I670 Q674 R678 W679 V680 F686 L689 G694 K695 M696 W700 H704
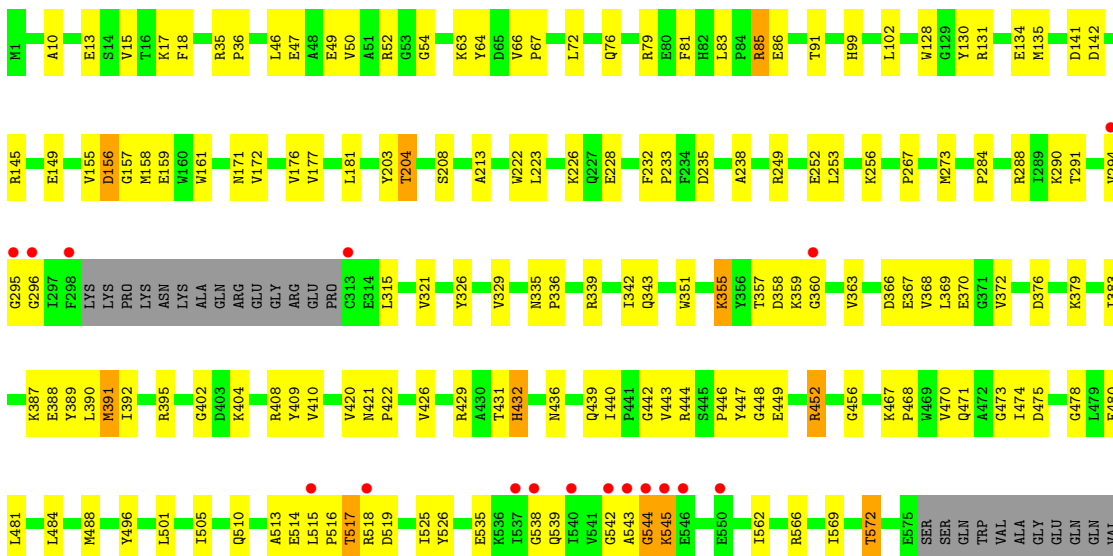
• Molecule 4: Thioredoxin 1

Chain B:

3%

68%   29%

SER ASP K3 I4 T8 D13 T14 L17 C32 A39 P40 D47 E48 Y49 Q50 L53 T54 V55 L58 N63 G71 I72 R73 G74 I75 P76 T77 L78 L79 L80 F81 G84 E85 T89 G92 S95 Q98 F102 A105 N106 L107 ALA

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	104.58Å 211.10Å 51.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.64 – 2.70 46.64 – 2.58	Depositor EDS
% Data completeness (in resolution range)	95.1 (46.64-2.70) 92.8 (46.64-2.58)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	12.40 (at 2.58Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.226 , 0.279 0.217 , 0.270	Depositor DCC
R_{free} test set	1775 reflections (5.16%)	wwPDB-VP
Wilson B-factor (Å^2)	33.7	Xtriage
Anisotropy	0.293	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 43.0	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	6462	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.30% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 2DT, MG

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	P	0.41	0/235	0.85	0/363
2	T	0.52	0/244	0.81	0/372
3	A	0.39	0/5318	0.59	0/7226
4	B	0.34	0/789	0.60	0/1078
All	All	0.39	0/6586	0.62	0/9039

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	P	0	2
2	T	0	1
All	All	0	3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	P	20	DG	Sidechain
1	P	21	DA	Sidechain
2	T	7	DC	Sidechain

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	P	228	0	127	12	0
2	T	219	0	124	6	0
3	A	5189	0	4909	152	0
4	B	774	0	750	18	0
5	A	1	0	0	0	0
6	A	43	0	0	1	0
6	B	2	0	0	0	0
6	T	6	0	0	1	0
All	All	6462	0	5910	179	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 15.

All (179) 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)
3:A:624:LEU:HD12	3:A:680:VAL:HG22	1.49	0.92
3:A:645:ASP:HB3	3:A:665:ILE:HD13	1.52	0.90
3:A:624:LEU:HD11	3:A:679:TRP:HZ3	1.39	0.87
1:P:21:DA:H2'	1:P:22:2DT:H73	1.58	0.86
3:A:674:GLN:NE2	3:A:678:ARG:HH11	1.77	0.81
3:A:355:LYS:HD2	3:A:355:LYS:H	1.47	0.79
4:B:39:ALA:HB3	4:B:40:PRO:HD3	1.66	0.75
3:A:35:ARG:HB3	3:A:36:PRO:HD2	1.70	0.74
3:A:496:TYR:CZ	3:A:505:ILE:HD11	2.22	0.74
2:T:7:DC:H4'	3:A:431:THR:HG22	1.70	0.73
3:A:35:ARG:HH11	3:A:35:ARG:HG3	1.53	0.73
3:A:294:VAL:HG12	3:A:295:GLY:H	1.54	0.71
4:B:3:LYS:HE2	4:B:50:GLN:OE1	1.90	0.71
3:A:535:GLU:HA	3:A:545:LYS:HA	1.74	0.70
4:B:95:SER:OG	4:B:98:GLN:HG3	1.91	0.69
3:A:252:GLU:OE2	3:A:256:LYS:HE3	1.92	0.69
3:A:624:LEU:CD1	3:A:680:VAL:HG22	2.24	0.68
3:A:496:TYR:CE1	3:A:505:ILE:HD11	2.28	0.68
3:A:678:ARG:NH2	3:A:689:LEU:HD21	2.09	0.67

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:674:GLN:HE21	3:A:678:ARG:HH11	1.42	0.67
3:A:366:ASP:OD1	3:A:387:LYS:HD2	1.93	0.67
3:A:535:GLU:HA	3:A:545:LYS:CA	2.25	0.66
3:A:481:LEU:HD21	3:A:525:ILE:HG12	1.78	0.66
3:A:666:ALA:HB3	3:A:696:MET:HE2	1.78	0.66
3:A:315:LEU:HD21	4:B:105:ALA:HB1	1.76	0.65
3:A:538:GLY:HA3	3:A:544:GLY:O	1.96	0.65
3:A:597:ASP:OD1	3:A:599:ARG:HD2	1.97	0.65
3:A:91:THR:HB	3:A:181:LEU:CD1	2.27	0.65
3:A:13:GLU:H	3:A:13:GLU:CD	2.00	0.64
3:A:284:PRO:HA	3:A:288:ARG:HH21	1.62	0.64
3:A:525:ILE:HG23	3:A:526:TYR:N	2.12	0.63
3:A:376:ASP:HB3	3:A:379:LYS:HG3	1.79	0.63
3:A:391:MET:O	3:A:391:MET:HE2	1.98	0.63
3:A:624:LEU:O	3:A:624:LEU:HD13	1.99	0.63
3:A:391:MET:HE3	3:A:395:ARG:HG3	1.81	0.62
3:A:235:ASP:OD2	3:A:238:ALA:HB2	2.00	0.62
3:A:49:GLU:OE2	3:A:54:GLY:HA3	2.00	0.61
3:A:233:PRO:HB2	3:A:456:GLY:O	2.00	0.61
3:A:391:MET:HE1	3:A:392:ILE:HA	1.82	0.61
3:A:448:GLY:O	3:A:452:ARG:HB2	2.00	0.61
3:A:632:MET:HA	3:A:635:GLU:HG2	1.82	0.61
3:A:35:ARG:HB3	3:A:36:PRO:CD	2.31	0.61
3:A:15:VAL:HG22	3:A:72:LEU:HD21	1.82	0.61
1:P:12:DG:H2"	1:P:13:DG:OP2	2.02	0.60
3:A:391:MET:HE2	3:A:391:MET:C	2.21	0.60
3:A:404:LYS:HA	3:A:409:TYR:HE2	1.66	0.59
3:A:678:ARG:HH21	3:A:689:LEU:HD21	1.66	0.59
3:A:86:GLU:HG3	3:A:203:TYR:CE1	2.38	0.58
3:A:667:GLN:OE1	3:A:696:MET:HE3	2.03	0.58
3:A:355:LYS:H	3:A:355:LYS:CD	2.17	0.57
3:A:599:ARG:HD3	3:A:620:LEU:HD11	1.87	0.57
3:A:35:ARG:HG3	3:A:35:ARG:NH1	2.19	0.57
3:A:376:ASP:HB3	3:A:379:LYS:CG	2.34	0.56
3:A:501:LEU:CD2	3:A:689:LEU:HB3	2.35	0.56
3:A:517:THR:C	3:A:519:ASP:H	2.08	0.56
1:P:17:DT:H2"	1:P:18:DG:H5'	1.87	0.56
3:A:624:LEU:HD11	3:A:679:TRP:CZ3	2.30	0.56
3:A:666:ALA:O	3:A:670:ILE:HG13	2.06	0.55
2:T:12:DT:H5"	3:A:335:ASN:HD21	1.72	0.55
3:A:474:ILE:HD12	3:A:474:ILE:N	2.22	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:539:GLN:HA	3:A:542:GLY:O	2.07	0.54
3:A:128:TRP:CE3	3:A:177:VAL:HG13	2.42	0.54
3:A:480:GLU:HA	3:A:480:GLU:OE2	2.08	0.54
3:A:85:ARG:HG3	3:A:222:TRP:CG	2.42	0.54
3:A:63:LYS:HE2	3:A:228:GLU:OE2	2.08	0.54
4:B:3:LYS:HB2	4:B:3:LYS:NZ	2.23	0.53
4:B:17:LEU:HA	4:B:84:GLY:HA2	1.90	0.53
3:A:326:TYR:HB3	4:B:92:GLY:HA2	1.89	0.53
3:A:525:ILE:HG23	3:A:526:TYR:H	1.73	0.52
1:P:17:DT:H2"	1:P:18:DG:C5'	2.39	0.52
3:A:46:LEU:O	3:A:50:VAL:HG23	2.10	0.52
3:A:517:THR:O	3:A:519:ASP:N	2.41	0.52
4:B:4:ILE:HG23	4:B:55:VAL:O	2.10	0.52
3:A:666:ALA:CB	3:A:696:MET:HE2	2.40	0.52
4:B:13:ASP:HA	4:B:17:LEU:HD12	1.92	0.52
3:A:204:THR:O	3:A:208:SER:HB2	2.10	0.52
1:P:21:DA:C2'	1:P:22:2DT:H73	2.37	0.51
3:A:130:TYR:CZ	3:A:134:GLU:HG3	2.45	0.51
2:T:8:DA:H4'	3:A:432:HIS:O	2.10	0.51
2:T:10:DA:H2"	2:T:11:DC:C6	2.44	0.51
3:A:501:LEU:HD21	3:A:689:LEU:HB3	1.92	0.51
3:A:674:GLN:NE2	3:A:678:ARG:NH1	2.52	0.51
3:A:351:TRP:NE1	3:A:372:VAL:HG22	2.26	0.51
3:A:99:HIS:HB3	3:A:102:LEU:HD12	1.93	0.50
3:A:172:VAL:O	3:A:176:VAL:HG23	2.11	0.50
3:A:235:ASP:CG	3:A:238:ALA:HB2	2.32	0.50
3:A:473:GLY:O	3:A:694:GLY:HA2	2.11	0.50
3:A:357:THR:C	3:A:359:LYS:H	2.15	0.50
3:A:569:ILE:O	3:A:572:THR:HB	2.12	0.50
1:P:17:DT:H1'	1:P:18:DG:H5"	1.94	0.50
3:A:543:ALA:O	3:A:545:LYS:N	2.45	0.50
3:A:49:GLU:HA	3:A:52:ARG:NH1	2.26	0.50
3:A:91:THR:HB	3:A:181:LEU:HD12	1.93	0.50
3:A:363:VAL:O	3:A:368:VAL:HG21	2.11	0.50
3:A:421:ASN:HB3	3:A:431:THR:OG1	2.12	0.49
3:A:432:HIS:ND1	3:A:432:HIS:N	2.60	0.49
3:A:351:TRP:CD1	3:A:372:VAL:HG22	2.48	0.49
3:A:484:LEU:O	3:A:488:MET:HG2	2.12	0.49
3:A:510:GLN:O	3:A:513:ALA:O	2.31	0.49
4:B:47:ASP:O	4:B:50:GLN:HB2	2.12	0.49
3:A:223:LEU:O	3:A:226:LYS:HB3	2.13	0.49

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:131:ARG:O	3:A:135:MET:HG2	2.12	0.48
3:A:488:MET:HE1	3:A:496:TYR:CD1	2.47	0.48
4:B:81:PHE:HA	4:B:85:GLU:O	2.13	0.48
3:A:145:ARG:O	3:A:149:GLU:HG3	2.12	0.48
3:A:79:ARG:HD3	6:A:4012:HOH:O	2.13	0.48
3:A:420:VAL:O	3:A:422:PRO:HD3	2.13	0.47
3:A:562:ILE:O	3:A:566:ARG:HG3	2.13	0.47
3:A:436:ASN:O	3:A:439:GLN:HG2	2.15	0.47
4:B:102:PHE:O	4:B:106:ASN:ND2	2.40	0.47
3:A:339:ARG:HA	3:A:342:ILE:HD12	1.95	0.47
3:A:290:LYS:HD3	3:A:291:THR:N	2.29	0.47
3:A:525:ILE:CG2	3:A:526:TYR:N	2.77	0.47
3:A:645:ASP:HB3	3:A:665:ILE:CD1	2.37	0.47
3:A:336:PRO:HB2	3:A:389:TYR:CD1	2.49	0.47
3:A:18:PHE:HB2	3:A:72:LEU:HD13	1.98	0.46
3:A:535:GLU:HA	3:A:545:LYS:C	2.36	0.46
1:P:21:DA:H5”	3:A:440:ILE:O	2.15	0.46
3:A:155:VAL:O	3:A:156:ASP:C	2.54	0.46
3:A:404:LYS:HA	3:A:409:TYR:CE2	2.49	0.46
3:A:249:ARG:O	3:A:253:LEU:HG	2.16	0.46
3:A:391:MET:CE	3:A:395:ARG:HG3	2.46	0.46
3:A:543:ALA:O	3:A:544:GLY:C	2.54	0.46
3:A:294:VAL:HG12	3:A:295:GLY:N	2.25	0.45
3:A:367:GLU:O	3:A:370:GLU:HB3	2.15	0.45
3:A:443:VAL:HB	3:A:449:GLU:OE1	2.16	0.45
3:A:388:GLU:O	3:A:392:ILE:HG12	2.16	0.45
2:T:12:DT:H5”	3:A:335:ASN:ND2	2.30	0.45
3:A:623:LYS:O	3:A:627:ILE:HG13	2.16	0.45
3:A:429:ARG:HD2	3:A:615:GLN:OE1	2.17	0.45
3:A:10:ALA:HB3	3:A:15:VAL:HA	1.99	0.45
3:A:273:MET:CE	3:A:284:PRO:HG3	2.47	0.44
3:A:588:TRP:CH2	3:A:606:PRO:HG3	2.51	0.44
3:A:660:CYS:SG	3:A:666:ALA:HA	2.58	0.44
3:A:213:ALA:HB2	3:A:597:ASP:OD1	2.17	0.44
3:A:471:GLN:HG3	3:A:649:MET:HE1	2.00	0.44
3:A:666:ALA:HB3	3:A:696:MET:CE	2.47	0.44
3:A:470:VAL:HG12	3:A:471:GLN:N	2.32	0.44
3:A:674:GLN:HE21	3:A:678:ARG:NH1	2.11	0.44
4:B:77:THR:HG22	4:B:79:LEU:HD13	2.00	0.44
3:A:442:GLY:O	3:A:448:GLY:HA3	2.17	0.43
3:A:66:VAL:HB	3:A:67:PRO:HD3	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:83:LEU:HD23	3:A:83:LEU:HA	1.83	0.43
3:A:456:GLY:HA2	3:A:471:GLN:OE1	2.18	0.43
3:A:49:GLU:OE1	3:A:52:ARG:NH1	2.51	0.43
1:P:22:2DT:H4'	3:A:652:VAL:HG12	2.01	0.43
3:A:446:PRO:O	3:A:447:TYR:HB2	2.19	0.43
4:B:74:GLY:O	4:B:77:THR:OG1	2.35	0.43
3:A:13:GLU:CD	3:A:13:GLU:N	2.69	0.42
3:A:267:PRO:HA	3:A:329:VAL:HG12	2.01	0.42
4:B:48:GLU:C	4:B:50:GLN:H	2.22	0.42
1:P:22:2DT:H3'2	3:A:654:ASP:OD1	2.19	0.42
3:A:597:ASP:OD2	3:A:620:LEU:HD13	2.18	0.42
3:A:481:LEU:HD21	3:A:525:ILE:CG1	2.48	0.42
3:A:47:GLU:HG3	3:A:81:PHE:HE1	1.85	0.42
3:A:157:GLY:HA2	3:A:159:GLU:OE1	2.19	0.42
3:A:402:GLY:O	3:A:408:ARG:NE	2.52	0.42
3:A:678:ARG:HE	3:A:689:LEU:HD11	1.85	0.42
3:A:368:VAL:HG23	3:A:369:LEU:N	2.35	0.42
3:A:525:ILE:CG2	3:A:526:TYR:H	2.32	0.42
3:A:663:GLU:O	3:A:696:MET:HE1	2.20	0.42
3:A:35:ARG:NH1	3:A:35:ARG:CG	2.83	0.42
3:A:64:TYR:O	3:A:67:PRO:HD2	2.20	0.41
3:A:516:PRO:O	3:A:517:THR:CB	2.68	0.41
3:A:296:GLY:H	3:A:321:VAL:HA	1.86	0.41
3:A:501:LEU:HD22	3:A:689:LEU:HB3	2.01	0.41
3:A:517:THR:C	3:A:519:ASP:N	2.74	0.41
3:A:339:ARG:NH1	3:A:390:LEU:HD13	2.35	0.41
1:P:21:DA:H2"	1:P:22:2DT:H6	2.02	0.41
3:A:158:MET:HA	3:A:161:TRP:CD2	2.56	0.41
1:P:19:DT:C2	1:P:20:DG:N7	2.89	0.41
4:B:71:GLY:O	4:B:72:ILE:C	2.58	0.41
3:A:17:LYS:HA	3:A:76:GLN:OE1	2.21	0.40
3:A:467:LYS:HA	3:A:468:PRO:HD3	1.94	0.40
4:B:8:THR:HA	4:B:63:ASN:OD1	2.20	0.40
1:P:21:DA:H2"	1:P:22:2DT:C6	2.52	0.40
2:T:11:DC:H2'	6:T:4030:HOH:O	2.20	0.40
3:A:383:ILE:O	3:A:387:LYS:HG3	2.20	0.40
4:B:32:CYS:HB2	4:B:75:ILE:HD11	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	A	667/698 (96%)	620 (93%)	37 (6%)	10 (2%)	10	26
4	B	103/108 (95%)	94 (91%)	8 (8%)	1 (1%)	15	37
All	All	770/806 (96%)	714 (93%)	45 (6%)	11 (1%)	11	28

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	A	156	ASP
3	A	544	GLY
3	A	545	LYS
3	A	518	ARG
3	A	515	LEU
4	B	50	GLN
3	A	478	GLY
3	A	653	HIS
3	A	358	ASP
3	A	360	GLY
3	A	517	THR

5.3.2 Protein sidechains (i)

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	
3	A	511/579 (88%)	488 (96%)	23 (4%)	27	55
4	B	78/87 (90%)	74 (95%)	4 (5%)	24	50

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	589/666 (88%)	562 (95%)	27 (5%)	27 54

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	A	85	ARG
3	A	141	ASP
3	A	142	ASP
3	A	171	ASN
3	A	204	THR
3	A	232	PHE
3	A	343	GLN
3	A	355	LYS
3	A	391	MET
3	A	410	VAL
3	A	426	VAL
3	A	432	HIS
3	A	444	ARG
3	A	452	ARG
3	A	475	ASP
3	A	514	GLU
3	A	572	THR
3	A	599	ARG
3	A	638	LEU
3	A	655	GLU
3	A	667	GLN
3	A	686	PHE
3	A	700	TRP
4	B	14	THR
4	B	58	LEU
4	B	80	LEU
4	B	89	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
3	A	266	GLN
3	A	335	ASN
3	A	347	GLN
3	A	439	GLN
3	A	502	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	#$|Z| > 2$
1	2DT	P	22	2,1	17,20,21	0.35	0	22,28,31	0.35	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	2DT	P	22	2,1	-	0/7/18/19	0/2/2/2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	P	22	2DT	6	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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(Å^2)	Q<0.9
1	P	10/22 (45%)	0.03	0	100	100	29, 41, 91, 98	0
2	T	11/26 (42%)	0.16	1 (9%)	9	7	18, 32, 57, 73	0
3	A	673/698 (96%)	-0.12	17 (2%)	57	59	9, 27, 66, 83	0
4	B	105/108 (97%)	0.12	3 (2%)	51	52	20, 35, 53, 64	0
All	All	799/854 (93%)	-0.08	21 (2%)	56	57	9, 29, 65, 98	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	A	545	LYS	5.0
3	A	543	ALA	4.5
3	A	544	GLY	4.3
3	A	294	VAL	3.8
3	A	298	PHE	3.8
3	A	360	GLY	3.4
3	A	538	GLY	3.4
3	A	296	GLY	3.3
3	A	295	GLY	3.2
3	A	537	ILE	3.1
3	A	546	GLU	3.1
3	A	515	LEU	2.9
4	B	53	LEU	2.9
3	A	542	GLY	2.5
3	A	518	ARG	2.4
4	B	84	GLY	2.3
4	B	54	THR	2.3
3	A	313	CYS	2.3
3	A	540	ILE	2.2
3	A	550	GLU	2.2
2	T	15	DC	2.1

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
1	2DT	P	22	19/20	0.97	0.17	22,26,27,29	0

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	MG	A	3001	1/1	0.94	0.28	26,26,26,26	0

6.5 Other polymers ⓘ

There are no such residues in this entry.