



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 22, 2024 – 07:28 AM EDT

PDB ID : 3PX7
Title : Crystal Structure of covalent complex of topoisomerase 1A with substrate
Authors : Zhang, Z.; Tse-dinh, Y.C.; Cheng, B.
Deposited on : 2010-12-09
Resolution : 2.30 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : 1.20.1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

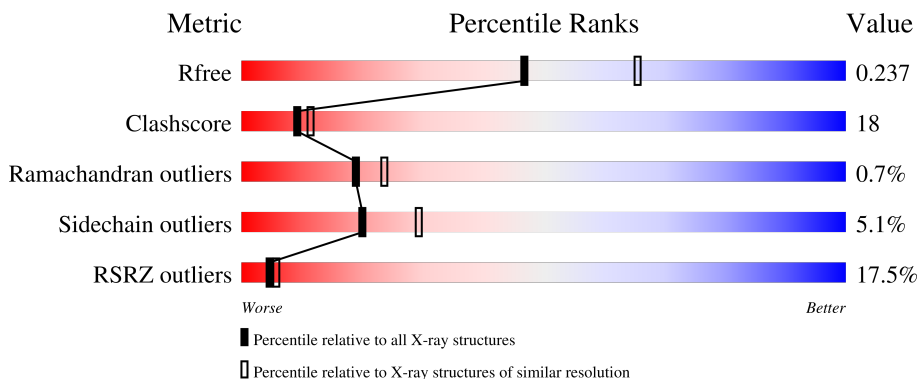
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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}	164625	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)

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	595	
2	B	5	
3	C	8	

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
1	PTR	A	319	-	-	X	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4726 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 topoisomerase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	552	4407	2772	786	831	1	17	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	111	ASN	ASP	engineered mutation	UNP C9QXS7

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	B	2	36	20	4	11	1	0	0	0

- Molecule 3 is a DNA chain called DNA 5'-D(*A*AP*TP*GP*CP*GP*CP*T)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	C	7	140	68	25	41	6	0	0	0

- Molecule 4 is MERCURY (II) ION (three-letter code: HG) (formula: Hg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Hg	0	0
			1	1		
4	B	1	Total	Hg	0	0
			1	1		
4	C	1	Total	Hg	0	0
			1	1		

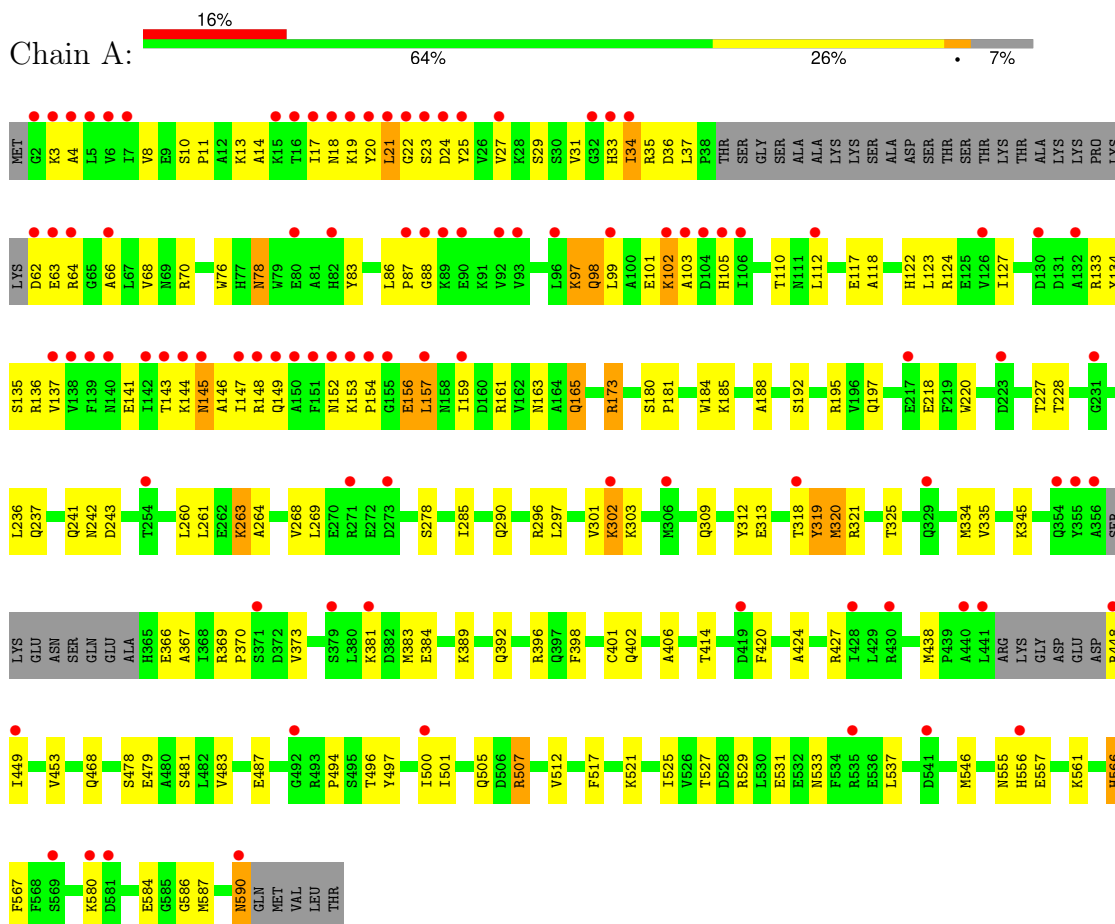
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	133	Total 133	O 133	0	0
5	C	7	Total 7	O 7	0	0

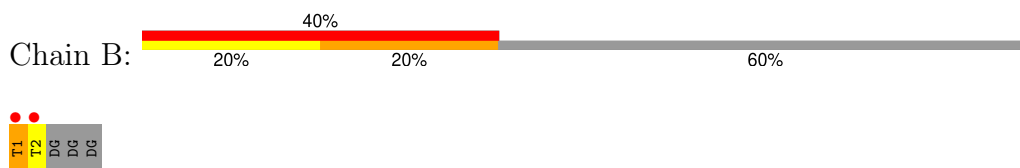
3 Residue-property plots i

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 topoisomerase

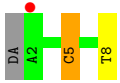


- Molecule 2: DNA 5'-D(*TP*TP*GP*GP*G)-3'



- Molecule 3: DNA 5'-D(*A*AP*TP*GP*CP*GP*CP*T)-3'





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	61.60Å 91.76Å 141.98Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	500.00 – 2.30 77.06 – 2.30	Depositor EDS
% Data completeness (in resolution range)	94.2 (500.00-2.30) 99.0 (77.06-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.57 (at 2.29Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.230 , 0.269 0.237 , 0.237	Depositor DCC
R_{free} test set	1811 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	41.5	Xtrriage
Anisotropy	0.351	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 51.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	4726	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: HG, PTR

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	0.35	0/4475	0.56	0/6043
2	B	0.64	0/39	1.69	1/59 (1.7%)
3	C	0.37	0/156	0.88	1/239 (0.4%)
All	All	0.36	0/4670	0.59	2/6341 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1	DT	P-O3'-C3'	8.46	129.86	119.70
3	C	5	DC	O4'-C1'-N1	6.35	112.44	108.00

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	4407	0	4378	160	0
2	B	36	0	23	5	0
3	C	140	0	80	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	133	0	0	2	0
5	C	7	0	0	0	0
All	All	4726	0	4481	161	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 18.

All (161) 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:A:118:ALA:HB2	1:A:165:GLN:HG2	1.44	1.00
1:A:21:LEU:HD21	1:A:25:TYR:HB2	1.53	0.91
1:A:320:MET:CE	1:A:320:MET:H	1.84	0.90
1:A:302:LYS:H	1:A:302:LYS:HE2	1.35	0.89
1:A:521:LYS:HE3	1:A:525:ILE:HD11	1.57	0.86
1:A:263:LYS:HD2	1:A:263:LYS:C	1.97	0.85
1:A:260:LEU:O	1:A:263:LYS:HE3	1.78	0.83
1:A:33:HIS:O	1:A:34:ILE:HG12	1.79	0.82
1:A:112:LEU:H	1:A:112:LEU:HD23	1.43	0.81
1:A:263:LYS:HD2	1:A:264:ALA:N	1.95	0.81
1:A:320:MET:H	1:A:320:MET:HE3	1.48	0.78
1:A:478:SER:H	1:A:481:SER:HB3	1.48	0.77
1:A:309:GLN:HE22	1:A:321:ARG:NH2	1.85	0.74
1:A:302:LYS:H	1:A:302:LYS:CE	2.01	0.74
1:A:449:ILE:HG13	1:A:449:ILE:O	1.86	0.74
1:A:319:PTR:O1P	1:A:321:ARG:HD2	1.90	0.70
1:A:319:PTR:P	2:B:1:DT:C5'	2.79	0.70
1:A:334:MET:SD	1:A:373:VAL:HG23	2.30	0.70
1:A:118:ALA:CB	1:A:165:GLN:HG2	2.21	0.70
1:A:63:GLU:HB3	1:A:76:TRP:CD2	2.29	0.68
1:A:373:VAL:HG22	1:A:398:PHE:HE2	1.59	0.67
1:A:366:GLU:HG2	1:A:367:ALA:H	1.59	0.67
1:A:147:ILE:HD12	1:A:148:ARG:N	2.10	0.67
1:A:320:MET:CE	1:A:320:MET:N	2.58	0.65
1:A:319:PTR:O3P	3:C:8:DT:H2''	1.97	0.65
1:A:302:LYS:HE3	1:A:479:GLU:OE1	1.97	0.64
1:A:37:LEU:CD1	1:A:173:ARG:HG3	2.27	0.64
1:A:124:ARG:HE	1:A:157:LEU:HD21	1.63	0.64
1:A:35:ARG:NH1	1:A:83:TYR:HB2	2.14	0.63
1:A:309:GLN:HE22	1:A:321:ARG:HH22	1.46	0.63
1:A:319:PTR:HA	1:A:320:MET:CE	2.29	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:236:LEU:HD23	1:A:424:ALA:HB2	1.81	0.62
1:A:66:ALA:O	1:A:70:ARG:HG2	2.01	0.61
1:A:483:VAL:HG23	1:A:501:ILE:HD11	1.82	0.60
1:A:97:LYS:NZ	1:A:127:ILE:HA	2.16	0.60
1:A:278:SER:HB3	1:A:406:ALA:HB3	1.82	0.60
1:A:319:PTR:HA	1:A:320:MET:HE3	1.84	0.59
1:A:312:TYR:CD2	1:A:320:MET:HE1	2.36	0.59
1:A:23:SER:O	1:A:24:ASP:HB3	2.03	0.58
1:A:21:LEU:HD23	1:A:22:GLY:O	2.04	0.58
1:A:112:LEU:H	1:A:112:LEU:CD2	2.14	0.58
1:A:269:LEU:HD12	1:A:414:THR:HG22	1.85	0.58
1:A:156:GLU:N	1:A:156:GLU:OE1	2.36	0.57
1:A:144:LYS:HA	1:A:147:ILE:HG13	1.86	0.57
1:A:19:LYS:C	1:A:21:LEU:H	2.07	0.57
1:A:496:THR:HG22	1:A:500:ILE:HG12	1.87	0.57
1:A:11:PRO:HD2	2:B:2:DT:OP1	2.05	0.57
1:A:313:GLU:OE1	2:B:2:DT:H5'	2.05	0.56
1:A:147:ILE:HD12	1:A:148:ARG:HG3	1.89	0.55
1:A:18:ASN:HA	1:A:21:LEU:HD22	1.89	0.55
1:A:161:ARG:HG3	1:A:161:ARG:HH11	1.72	0.55
1:A:143:THR:HG22	1:A:145:ASN:H	1.72	0.54
1:A:102:LYS:HG2	1:A:102:LYS:O	2.08	0.54
1:A:533:ASN:HD21	1:A:587:MET:HA	1.73	0.54
1:A:285:ILE:HG23	1:A:325:THR:HG22	1.90	0.54
1:A:34:ILE:HD13	1:A:123:LEU:HD23	1.90	0.53
1:A:555:ASN:O	1:A:557:GLU:HG3	2.09	0.53
1:A:260:LEU:O	1:A:263:LYS:CE	2.54	0.53
1:A:527:THR:O	1:A:531:GLU:HG3	2.09	0.53
1:A:124:ARG:HG2	1:A:124:ARG:HH11	1.74	0.52
1:A:144:LYS:HA	1:A:147:ILE:CG1	2.40	0.52
1:A:37:LEU:HD12	1:A:173:ARG:HG3	1.92	0.52
1:A:149:GLN:HA	1:A:152:ASN:OD1	2.09	0.52
1:A:3:LYS:HD3	1:A:102:LYS:HE2	1.90	0.51
1:A:319:PTR:OH	2:B:1:DT:H3'	2.11	0.51
1:A:97:LYS:HZ3	1:A:127:ILE:HA	1.74	0.51
1:A:302:LYS:H	1:A:302:LYS:CD	2.23	0.51
1:A:35:ARG:HG2	1:A:83:TYR:HB3	1.93	0.51
1:A:366:GLU:HG2	1:A:367:ALA:N	2.26	0.51
1:A:13:LYS:O	1:A:17:ILE:HG12	2.11	0.50
1:A:296:ARG:O	1:A:297:LEU:HD23	2.11	0.50
1:A:320:MET:HE3	1:A:320:MET:N	2.19	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:133:ARG:O	1:A:133:ARG:HG2	2.11	0.50
1:A:36:ASP:CG	1:A:37:LEU:H	2.16	0.49
1:A:184:TRP:HA	1:A:188:ALA:O	2.12	0.49
1:A:78:ASN:ND2	1:A:561:LYS:HD3	2.27	0.49
1:A:180:SER:HB2	1:A:181:PRO:HD3	1.95	0.49
1:A:8:VAL:O	1:A:29:SER:HA	2.13	0.48
1:A:97:LYS:NZ	1:A:127:ILE:HG12	2.28	0.48
1:A:112:LEU:HD23	1:A:112:LEU:N	2.22	0.48
1:A:521:LYS:O	1:A:525:ILE:HD13	2.13	0.48
1:A:242:ASN:O	1:A:243:ASP:HB2	2.12	0.48
1:A:290:GLN:CD	1:A:301:VAL:HG13	2.33	0.48
1:A:302:LYS:HD2	1:A:303:LYS:H	1.79	0.48
1:A:335:VAL:HG11	1:A:402:GLN:HG3	1.96	0.48
1:A:580:LYS:O	1:A:586:GLY:HA3	2.14	0.48
1:A:590:ASN:O	1:A:590:ASN:ND2	2.47	0.48
1:A:505:GLN:NE2	1:A:512:VAL:HG23	2.29	0.47
1:A:525:ILE:O	1:A:529:ARG:HG2	2.13	0.47
1:A:105:HIS:NE2	1:A:135:SER:HB2	2.30	0.47
1:A:3:LYS:CD	1:A:102:LYS:HE2	2.44	0.47
1:A:147:ILE:CD1	1:A:148:ARG:HG3	2.45	0.47
1:A:302:LYS:CD	1:A:302:LYS:N	2.78	0.47
1:A:507:ARG:NH2	3:C:5:DC:OP1	2.41	0.47
1:A:218:GLU:OE2	1:A:468:GLN:NE2	2.44	0.47
1:A:117:GLU:HG2	1:A:161:ARG:HB2	1.97	0.47
1:A:195:ARG:HD3	1:A:546:MET:HE1	1.95	0.47
1:A:62:ASP:OD1	1:A:63:GLU:N	2.48	0.46
1:A:384:GLU:HG3	5:A:659:HOH:O	2.13	0.46
1:A:507:ARG:HB2	1:A:507:ARG:NH1	2.31	0.46
1:A:192:SER:OG	1:A:197:GLN:NE2	2.49	0.46
1:A:64:ARG:O	1:A:68:VAL:HG23	2.16	0.46
1:A:268:VAL:HG21	1:A:453:VAL:CG1	2.46	0.46
1:A:31:VAL:HG12	1:A:31:VAL:O	2.15	0.46
1:A:105:HIS:CE1	1:A:135:SER:HB2	2.51	0.45
1:A:227:THR:HG22	1:A:228:THR:O	2.16	0.45
1:A:318:THR:O	1:A:319:PTR:C	2.64	0.45
1:A:369:ARG:HB2	1:A:370:PRO:HD2	1.98	0.45
1:A:4:ALA:HB3	1:A:25:TYR:CD2	2.51	0.45
1:A:124:ARG:HG2	1:A:124:ARG:NH1	2.32	0.45
1:A:220:TRP:CH2	1:A:468:GLN:HB2	2.52	0.45
1:A:14:ALA:HB1	1:A:27:VAL:HG12	1.97	0.45
1:A:479:GLU:HB3	1:A:501:ILE:HD13	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:19:LYS:O	1:A:21:LEU:N	2.48	0.45
2:B:1:DT:C7	2:B:2:DT:H73	2.47	0.44
1:A:18:ASN:O	1:A:22:GLY:N	2.49	0.44
1:A:97:LYS:NZ	1:A:97:LYS:HA	2.33	0.44
1:A:345:LYS:HZ2	1:A:345:LYS:HB3	1.81	0.44
1:A:124:ARG:HG3	1:A:134:TYR:CE2	2.53	0.44
1:A:161:ARG:HG3	1:A:161:ARG:NH1	2.32	0.44
1:A:23:SER:C	1:A:25:TYR:H	2.20	0.44
1:A:35:ARG:NE	1:A:122:HIS:HD2	2.15	0.43
1:A:496:THR:O	1:A:500:ILE:HG12	2.18	0.43
1:A:159:ILE:HG12	1:A:163:ASN:ND2	2.32	0.43
1:A:101:GLU:C	1:A:103:ALA:H	2.21	0.43
1:A:302:LYS:HD2	1:A:302:LYS:N	2.33	0.43
1:A:86:LEU:C	1:A:88:GLY:H	2.20	0.43
1:A:392:GLN:CG	1:A:396:ARG:NH1	2.81	0.43
1:A:392:GLN:CD	1:A:396:ARG:NH1	2.72	0.43
1:A:261:LEU:HD21	1:A:420:PHE:CG	2.53	0.43
1:A:580:LYS:HE3	1:A:584:GLU:OE1	2.18	0.43
1:A:185:LYS:HE3	1:A:185:LYS:HB2	1.83	0.43
1:A:427:ARG:O	1:A:448:ARG:HB3	2.19	0.43
1:A:533:ASN:ND2	1:A:587:MET:HA	2.34	0.43
1:A:11:PRO:HG3	1:A:31:VAL:HG22	2.00	0.42
1:A:479:GLU:HA	1:A:517:PHE:HE1	1.84	0.42
1:A:147:ILE:HD12	1:A:147:ILE:C	2.39	0.42
1:A:149:GLN:HA	1:A:152:ASN:CG	2.38	0.42
1:A:590:ASN:N	1:A:590:ASN:HD22	2.17	0.42
1:A:10:SER:HA	1:A:11:PRO:HD3	1.94	0.42
1:A:268:VAL:HG21	1:A:453:VAL:HG11	2.01	0.42
1:A:494:PRO:HA	1:A:497:TYR:CE2	2.55	0.42
1:A:117:GLU:OE1	1:A:136:ARG:NH1	2.53	0.42
1:A:396:ARG:HB3	1:A:438:MET:HG3	2.01	0.42
1:A:566:HIS:ND1	1:A:567:PHE:N	2.67	0.42
1:A:241:GLN:HG2	1:A:242:ASN:ND2	2.35	0.42
1:A:110:THR:O	1:A:136:ARG:NH2	2.53	0.41
1:A:145:ASN:O	1:A:145:ASN:ND2	2.53	0.41
1:A:86:LEU:O	1:A:88:GLY:N	2.54	0.41
1:A:97:LYS:HZ1	1:A:127:ILE:HG12	1.86	0.41
1:A:98:GLN:HG3	1:A:99:LEU:N	2.35	0.41
1:A:137:VAL:HG12	1:A:154:PRO:HB3	2.01	0.41
1:A:319:PTR:O2P	1:A:319:PTR:HE2	2.20	0.41
1:A:37:LEU:HD13	1:A:173:ARG:HG3	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:260:LEU:C	1:A:263:LYS:HE3	2.37	0.41
1:A:566:HIS:HE1	5:A:666:HOH:O	2.03	0.41
1:A:345:LYS:HB3	1:A:345:LYS:NZ	2.35	0.40
1:A:141:GLU:H	1:A:146:ALA:HB1	1.86	0.40
1:A:19:LYS:C	1:A:21:LEU:N	2.74	0.40
1:A:78:ASN:HD22	1:A:78:ASN:HA	1.61	0.40
1:A:521:LYS:HE3	1:A:525:ILE:CD1	2.41	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	543/595 (91%)	517 (95%)	22 (4%)	4 (1%)	19 23

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	20	TYR
1	A	34	ILE
1	A	87	PRO
1	A	102	LYS

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
1	A	467/503 (93%)	443 (95%)	24 (5%)	20 29

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	LEU
1	A	78	ASN
1	A	97	LYS
1	A	98	GLN
1	A	145	ASN
1	A	153	LYS
1	A	156	GLU
1	A	157	LEU
1	A	165	GLN
1	A	173	ARG
1	A	237	GLN
1	A	263	LYS
1	A	302	LYS
1	A	320	MET
1	A	381	LYS
1	A	383	MET
1	A	389	LYS
1	A	401	CYS
1	A	487	GLU
1	A	507	ARG
1	A	537	LEU
1	A	556	HIS
1	A	566	HIS
1	A	590	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	78	ASN
1	A	111	ASN
1	A	122	HIS
1	A	140	ASN
1	A	145	ASN
1	A	152	ASN
1	A	163	ASN
1	A	165	GLN
1	A	166	GLN

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Mol	Chain	Res	Type
1	A	197	GLN
1	A	237	GLN
1	A	242	ASN
1	A	253	GLN
1	A	309	GLN
1	A	333	ASN
1	A	353	ASN
1	A	505	GLN
1	A	533	ASN
1	A	539	ASN
1	A	548	ASN
1	A	590	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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	PTR	A	319	2,1	15,16,17	2.02	1 (6%)	17,22,24	0.61	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	PTR	A	319	2,1	-	2/10/11/13	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	319	PTR	OH-CZ	-7.63	1.23	1.40

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	319	PTR	N-CA-CB-CG
1	A	319	PTR	C-CA-CB-CG

There are no ring outliers.

1 monomer is involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	319	PTR	8	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 3 are 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 [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

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	551/595 (92%)	0.92	95 (17%) 5 6	23, 45, 93, 106	0
2	B	2/5 (40%)	4.84	2 (100%) 0 0	78, 78, 78, 79	0
3	C	7/8 (87%)	0.68	1 (14%) 7 8	37, 40, 79, 100	0
All	All	560/608 (92%)	0.93	98 (17%) 5 6	23, 45, 93, 106	0

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	142	ILE	6.3
2	B	1	DT	5.3
1	A	21	LEU	5.0
1	A	2	GLY	4.8
1	A	62	ASP	4.6
1	A	4	ALA	4.6
1	A	441	LEU	4.5
1	A	33	HIS	4.5
2	B	2	DT	4.4
1	A	63	GLU	4.3
1	A	140	ASN	4.2
1	A	354	GLN	4.0
1	A	147	ILE	3.9
1	A	356	ALA	3.9
1	A	556	HIS	3.8
1	A	143	THR	3.7
1	A	145	ASN	3.7
1	A	306	MET	3.7
1	A	440	ALA	3.7
1	A	64	ARG	3.6
1	A	154	PRO	3.6
1	A	5	LEU	3.6
1	A	157	LEU	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	23	SER	3.5
1	A	152	ASN	3.4
3	C	2	DA	3.4
1	A	96	LEU	3.4
1	A	99	LEU	3.4
1	A	22	GLY	3.4
1	A	32	GLY	3.3
1	A	428	ILE	3.3
1	A	15	LYS	3.3
1	A	87	PRO	3.2
1	A	3	LYS	3.1
1	A	20	TYR	3.1
1	A	19	LYS	3.0
1	A	302	LYS	3.0
1	A	80	GLU	2.9
1	A	449	ILE	2.9
1	A	144	LYS	2.9
1	A	151	PHE	2.9
1	A	24	ASP	2.9
1	A	132	ALA	2.9
1	A	150	ALA	2.8
1	A	112	LEU	2.8
1	A	104	ASP	2.8
1	A	66	ALA	2.8
1	A	25	TYR	2.7
1	A	27	VAL	2.7
1	A	355	TYR	2.7
1	A	137	VAL	2.7
1	A	126	VAL	2.6
1	A	103	ALA	2.6
1	A	159	ILE	2.6
1	A	581	ASP	2.6
1	A	82	HIS	2.6
1	A	102	LYS	2.6
1	A	329	GLN	2.6
1	A	88	GLY	2.6
1	A	155	GLY	2.6
1	A	153	LYS	2.6
1	A	7	ILE	2.5
1	A	541	ASP	2.5
1	A	318	THR	2.5
1	A	148	ARG	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	106	ILE	2.5
1	A	217	GLU	2.5
1	A	535	ARG	2.5
1	A	34	ILE	2.4
1	A	92	VAL	2.4
1	A	139	PHE	2.4
1	A	6	VAL	2.4
1	A	381	LYS	2.4
1	A	569	SER	2.3
1	A	492	GLY	2.3
1	A	90	GLU	2.3
1	A	590	ASN	2.3
1	A	580	LYS	2.2
1	A	105	HIS	2.2
1	A	231	GLY	2.2
1	A	130	ASP	2.2
1	A	273	ASP	2.2
1	A	254	THR	2.2
1	A	17	ILE	2.2
1	A	16	THR	2.2
1	A	18	ASN	2.1
1	A	419	ASP	2.1
1	A	271	ARG	2.1
1	A	448	ARG	2.1
1	A	149	GLN	2.1
1	A	93	VAL	2.1
1	A	138	VAL	2.1
1	A	223	ASP	2.1
1	A	500	ILE	2.1
1	A	89	LYS	2.1
1	A	379	SER	2.0
1	A	430	ARG	2.0
1	A	371	SER	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(\AA^2)	Q<0.9
1	PTR	A	319	16/17	0.79	0.19	42,49,52,52	0

6.3 Carbohydrates [i](#)

There are no monosaccharides 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(\AA^2)	Q<0.9
4	HG	B	6	1/1	0.94	0.13	52,52,52,52	1
4	HG	A	596	1/1	0.98	0.11	34,34,34,34	1
4	HG	C	9	1/1	0.98	0.23	51,51,51,51	1

6.5 Other polymers [i](#)

There are no such residues in this entry.