



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:28 PM UTC

PDB ID : 3U58 / pdb_00003u58
Title : Crystal Structure of the Tetrahymena telomerase processivity factor Teb1 AB
Authors : Zeng, Z.; Huang, J.; Yang, Y.; Lei, M.
Deposited on : 2011-10-11
Resolution : 2.61 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
Xtriage (Phenix)	:	2.0
EDS	:	3.0
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

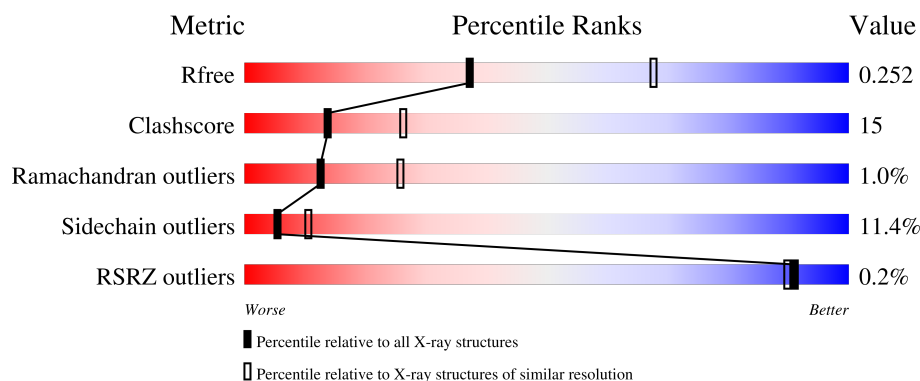
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.61 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.



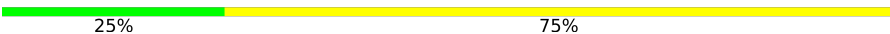
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4951 (2.64-2.60)
Clashscore	190562	5303 (2.64-2.60)
Ramachandran outliers	187476	5217 (2.64-2.60)
Sidechain outliers	187428	5217 (2.64-2.60)
RSRZ outliers	180081	4950 (2.64-2.60)

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	213	64% 27% 8%
1	B	213	62% 31% 5%
1	C	213	67% 26% 6%
1	D	213	68% 26% 5%
2	E	4	50% 50%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	4	 25%75%
2	G	4	 25%75%
2	H	4	 25%75%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 7378 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 Tetrahymena Teb1 AB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	213	Total	C	N	O	S	0	0	0
			1759	1128	290	338	3			
1	B	210	Total	C	N	O	S	0	0	0
			1739	1118	287	331	3			
1	C	211	Total	C	N	O	S	0	0	0
			1743	1120	288	332	3			
1	D	210	Total	C	N	O	S	0	0	0
			1739	1118	287	331	3			

- Molecule 2 is a DNA chain called DNA (5'-D(*GP*GP*GP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	4	Total	C	N	O	P	0	0	0
			83	40	17	23	3			
2	H	4	Total	C	N	O	P	0	0	0
			83	40	17	23	3			
2	F	4	Total	C	N	O	P	0	0	0
			83	40	17	23	3			
2	G	4	Total	C	N	O	P	0	0	0
			83	40	17	23	3			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	15	Total	O	0	0
			15	15		
3	B	20	Total	O	0	0
			20	20		
3	C	11	Total	O	0	0
			11	11		
3	D	17	Total	O	0	0
			17	17		

Continued on next page...

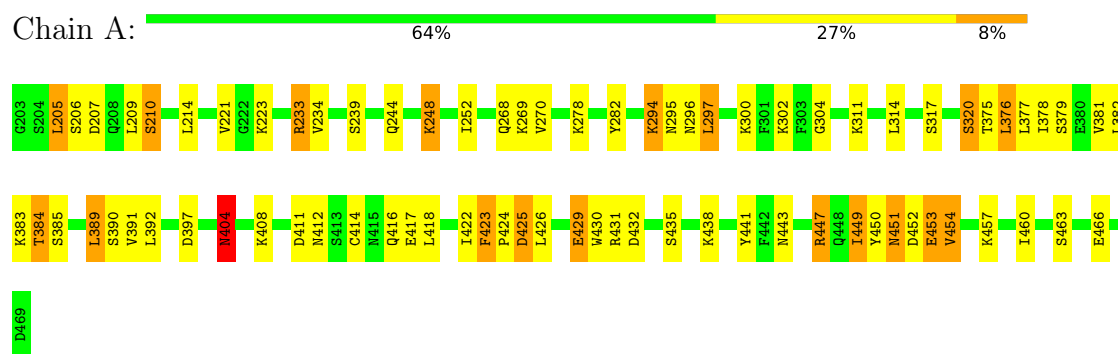
Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	1	Total	O	0	0
			1	1		
3	H	1	Total	O	0	0
			1	1		
3	F	1	Total	O	0	0
			1	1		

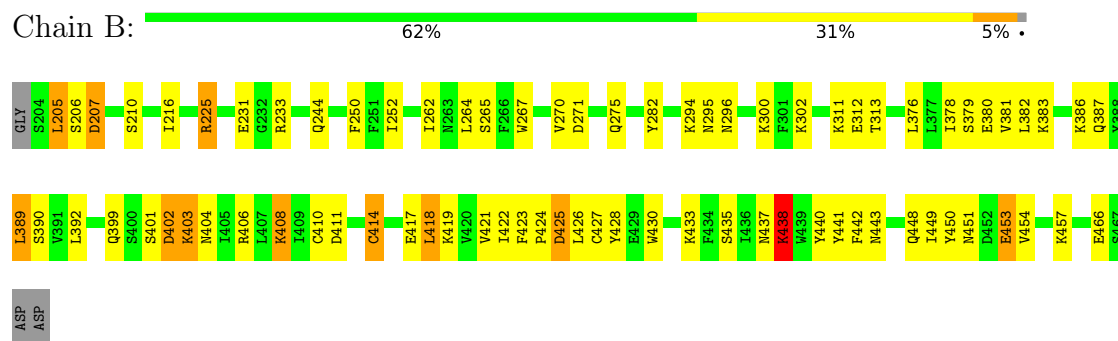
3 Residue-property plots

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.

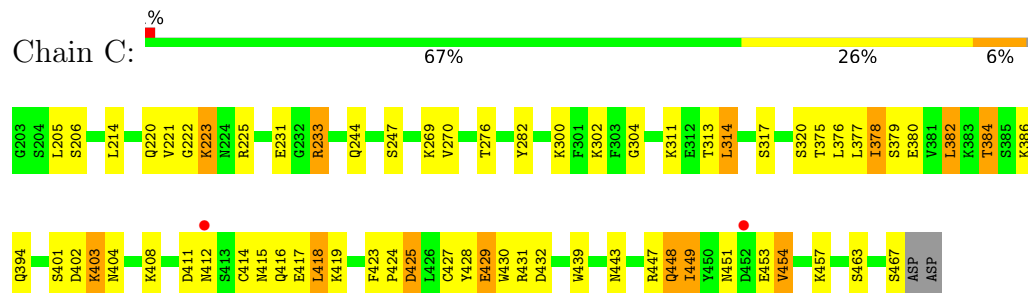
• Molecule 1: Tetrahymena Teb1 AB



• Molecule 1: Tetrahymena Teb1 AB



• Molecule 1: Tetrahymena Teb1 AB



• Molecule 1: Tetrahymena Teb1 AB

Chain D:  68% 26% 5%



• Molecule 2: DNA (5'-D(*GP*GP*GP*T)-3')

Chain E:  50% 50%

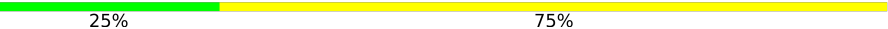


• Molecule 2: DNA (5'-D(*GP*GP*GP*T)-3')

Chain H:  25% 75%

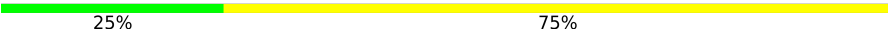


• Molecule 2: DNA (5'-D(*GP*GP*GP*T)-3')

Chain F:  25% 75%



• Molecule 2: DNA (5'-D(*GP*GP*GP*T)-3')

Chain G:  25% 75%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	83.05Å 83.11Å 82.89Å 108.45° 111.59° 108.42°	Depositor
Resolution (Å)	33.58 – 2.61 33.58 – 2.61	Depositor EDS
% Data completeness (in resolution range)	94.0 (33.58-2.61) 93.7 (33.58-2.61)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.51 (at 2.61Å)	Xtriage
Refinement program	PHENIX 1.7 _650	Depositor
R, R_{free}	0.219 , 0.259 0.212 , 0.252	Depositor DCC
R_{free} test set	4907 reflections (10.09%)	wwPDB-VP
Wilson B-factor (Å ²)	51.0	Xtriage
Anisotropy	0.032	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 27.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage

Continued on next page...

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.

Continued from previous page...

Property	Value	Source
Estimated twinning fraction	0.000 for $h+k+l, -l, -h$ 0.000 for $-l, h+k+l, -k$ 0.429 for $h+k+l, -h, -k$ 0.429 for $-k, -l, h+k+l$ 0.000 for $-k, h+k+l, -h$ 0.000 for $-l, -h, h+k+l$ 0.000 for $k, -h-k-l, l$ 0.000 for $-h-k-l, h, l$ 0.000 for l, h, k 0.000 for k, l, h 0.000 for $h, l, -h-k-l$ 0.000 for $h, -h-k-l, k$ 0.000 for $l, k, -h-k-l$ 0.000 for $-h-k-l, k, h$ 0.019 for $k, h, -h-k-l$ 0.000 for $-h, -k, h+k+l$ 0.438 for $l, -h-k-l, h$ 0.019 for $-l, -k, -h$ 0.019 for $-h-k-l, l, k$ 0.000 for $h+k+l, -k, -l$ 0.000 for $-k, -h, -l$ 0.018 for $-h, h+k+l, -l$ 0.000 for $-h, -l, -k$	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7378	wwPDB-VP
Average B, all atoms ($\text{\AA}^2$)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.39% of the height of the origin peak. No significant pseudotranslation is detected.*

5 Model quality

5.1 Standard geometry

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	0.43	0/1794	0.88	11/2414 (0.5%)
1	B	0.39	0/1774	0.82	3/2387 (0.1%)
1	C	0.42	0/1778	0.81	4/2392 (0.2%)
1	D	0.40	0/1774	0.86	6/2387 (0.3%)
2	E	0.24	0/93	0.65	0/143
2	F	0.27	0/93	0.81	0/143
2	G	0.25	0/93	0.75	0/143
2	H	0.25	0/93	0.76	0/143
All	All	0.41	0/7492	0.84	24/10152 (0.2%)

There are no bond length outliers.

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	315	GLY	N-CA-C	8.60	133.56	113.18
1	A	384	THR	CB-CA-C	-8.57	95.38	109.53
1	D	396	VAL	CB-CA-C	7.82	119.40	110.88
1	C	403	LYS	CB-CA-C	7.81	117.56	109.83
1	B	437	ASN	CB-CA-C	-7.80	99.18	111.51
1	A	383	LYS	N-CA-C	7.17	122.16	113.41
1	C	404	ASN	N-CA-CB	-7.01	98.44	111.13
1	A	385	SER	N-CA-C	6.95	121.36	113.02
1	D	423	PHE	CA-C-N	6.83	128.38	119.84
1	D	423	PHE	C-N-CA	6.83	128.38	119.84
1	A	453	GLU	N-CA-C	-6.72	98.45	109.40
1	A	383	LYS	CB-CA-C	-6.45	97.96	109.24
1	B	438	LYS	N-CA-C	-6.34	99.87	109.95
1	A	423	PHE	CA-C-N	6.21	127.61	119.84
1	A	423	PHE	C-N-CA	6.21	127.61	119.84
1	D	316	GLY	N-CA-C	-6.00	99.45	110.97
1	C	403	LYS	N-CA-C	5.98	122.59	113.51
1	D	404	ASN	N-CA-C	5.96	117.46	108.46
1	A	452	ASP	N-CA-C	-5.83	104.20	111.90

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	385	SER	N-CA-CB	-5.81	102.05	110.47
1	A	404	ASN	N-CA-CB	-5.69	101.27	110.71
1	B	404	ASN	N-CA-CB	-5.60	101.11	110.57
1	C	314	LEU	N-CA-C	5.15	116.58	111.07
1	A	454	VAL	N-CA-C	5.05	114.56	106.88

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	1759	0	1729	55	0
1	B	1739	0	1718	59	0
1	C	1743	0	1721	51	0
1	D	1739	0	1718	44	0
2	E	83	0	47	2	0
2	F	83	0	47	3	0
2	G	83	0	47	2	0
2	H	83	0	47	2	0
3	A	15	0	0	3	0
3	B	20	0	0	4	0
3	C	11	0	0	0	0
3	D	17	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	H	1	0	0	0	0
All	All	7378	0	7074	209	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 (209) 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:C:378:ILE:HD12	1:C:411:ASP:HB2	1.32	1.10
1:A:378:ILE:HG12	1:A:411:ASP:HB3	1.63	0.81
1:C:403:LYS:O	1:C:424:PRO:HD3	1.82	0.79
1:B:406:ARG:HH11	1:B:419:LYS:HZ3	1.30	0.79
1:D:402:ASP:O	1:D:403:LYS:HB2	1.86	0.75
1:D:423:PHE:HB3	1:D:424:PRO:HD2	1.69	0.75
1:A:376:LEU:HD12	1:A:376:LEU:H	1.51	0.74
1:B:406:ARG:HH11	1:B:419:LYS:NZ	1.85	0.74
1:C:269:LYS:HE2	1:C:304:GLY:HA2	1.71	0.73
1:B:231:GLU:CD	1:B:311:LYS:HE2	2.15	0.72
2:F:4:DT:OP2	2:F:4:DT:H2'	1.90	0.72
1:A:384:THR:HG23	1:A:384:THR:O	1.90	0.72
1:A:397:ASP:HB3	1:A:408:LYS:HB2	1.72	0.72
1:D:424:PRO:O	1:D:425:ASP:HB2	1.91	0.71
1:C:233:ARG:HD3	1:C:282:TYR:CZ	2.25	0.71
1:B:233:ARG:HD3	1:B:282:TYR:CZ	2.26	0.71
1:A:423:PHE:HB3	1:A:424:PRO:HD2	1.72	0.70
1:C:424:PRO:O	1:C:425:ASP:HB2	1.93	0.69
1:C:378:ILE:CD1	1:C:411:ASP:HB2	2.16	0.69
1:C:378:ILE:HD13	1:C:379:SER:H	1.56	0.68
1:A:389:LEU:HD13	3:A:3:HOH:O	1.94	0.67
1:D:312:GLU:OE1	2:G:1:DG:H5'	1.94	0.67
1:A:378:ILE:CG1	1:A:411:ASP:HB3	2.25	0.67
1:C:423:PHE:HB3	1:C:424:PRO:HD2	1.76	0.66
1:A:378:ILE:HG13	1:A:379:SER:N	2.09	0.66
1:B:423:PHE:HB3	1:B:424:PRO:HD2	1.78	0.66
1:B:411:ASP:OD2	1:B:414:CYS:HB2	1.96	0.65
1:A:207:ASP:O	1:A:210:SER:HB2	1.96	0.65
1:A:376:LEU:HD13	1:A:381:VAL:HG22	1.78	0.65
1:C:222:GLY:HA2	1:D:233:ARG:HH22	1.61	0.65
1:B:225:ARG:HG3	1:C:282:TYR:OH	1.97	0.64
1:A:378:ILE:HG13	1:A:379:SER:H	1.61	0.64
1:B:424:PRO:O	1:B:425:ASP:HB2	1.96	0.63
1:D:233:ARG:HD3	1:D:282:TYR:CZ	2.33	0.63
1:A:317:SER:O	1:A:320:SER:HB2	1.99	0.62
1:B:389:LEU:HD13	3:B:2:HOH:O	2.00	0.62
1:B:406:ARG:NH1	1:B:419:LYS:NZ	2.48	0.61
1:B:271:ASP:O	1:B:275:GLN:HG2	2.01	0.60
1:D:397:ASP:HB3	1:D:408:LYS:HB2	1.82	0.60
1:A:423:PHE:HE1	1:A:457:LYS:HE2	1.65	0.60
1:B:389:LEU:HB2	3:B:2:HOH:O	2.01	0.59
1:D:435:SER:HB2	1:D:438:LYS:CD	2.32	0.59

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:4:DT:H6	2:H:4:DT:H5'	1.66	0.59
1:A:423:PHE:CE1	1:A:457:LYS:HE2	2.38	0.58
1:A:378:ILE:CD1	1:A:411:ASP:HB3	2.34	0.58
1:C:429:GLU:HB3	1:C:430:TRP:CD1	2.39	0.58
1:C:244:GLN:HB2	1:C:247:SER:HB3	1.85	0.58
1:D:448:GLN:HG2	1:D:449:ILE:H	1.68	0.58
1:D:396:VAL:C	1:D:436:ILE:HD11	2.29	0.57
1:B:378:ILE:HB	1:B:411:ASP:OD2	2.03	0.57
1:B:435:SER:HB2	1:B:438:LYS:HD3	1.86	0.57
1:A:233:ARG:HD3	1:A:282:TYR:CZ	2.40	0.57
1:C:317:SER:HB2	1:C:320:SER:OG	2.05	0.57
1:C:448:GLN:OE1	1:C:457:LYS:HD3	2.04	0.56
1:C:378:ILE:HD12	1:C:411:ASP:CB	2.21	0.56
1:C:424:PRO:HA	1:C:427:CYS:SG	2.45	0.56
1:A:449:ILE:HG12	1:A:454:VAL:HG12	1.88	0.56
1:B:225:ARG:HG3	1:C:282:TYR:CZ	2.40	0.56
1:B:231:GLU:OE2	1:B:311:LYS:HE2	2.06	0.56
1:C:379:SER:HB3	1:C:414:CYS:HB2	1.88	0.55
1:C:423:PHE:CB	1:C:424:PRO:HD2	2.36	0.55
1:A:381:VAL:HG21	1:A:391:VAL:HG22	1.87	0.55
2:F:2:DG:H2''	2:F:3:DG:OP1	2.07	0.55
1:D:396:VAL:O	1:D:436:ILE:HD11	2.07	0.54
1:B:451:ASN:H	1:B:453:GLU:CD	2.15	0.54
1:B:378:ILE:HG13	1:B:411:ASP:HB3	1.90	0.54
1:B:424:PRO:HA	1:B:427:CYS:SG	2.48	0.54
1:C:402:ASP:HA	1:C:431:ARG:NH1	2.22	0.54
1:B:392:LEU:HD13	1:B:441:TYR:CD1	2.43	0.54
1:B:421:VAL:C	1:B:422:ILE:HD13	2.33	0.54
1:D:423:PHE:CB	1:D:424:PRO:HD2	2.38	0.54
2:H:2:DG:H2''	2:H:3:DG:OP1	2.08	0.53
1:A:392:LEU:HD13	1:A:441:TYR:CE1	2.44	0.53
1:D:269:LYS:HE2	1:D:304:GLY:HA2	1.91	0.53
1:B:408:LYS:HA	1:B:418:LEU:O	2.09	0.52
1:A:376:LEU:HD11	1:A:389:LEU:HB2	1.91	0.52
1:C:394:GLN:HB3	1:C:439:TRP:CE2	2.45	0.52
1:A:389:LEU:HB2	3:A:3:HOH:O	2.11	0.51
1:A:384:THR:O	1:A:384:THR:CG2	2.56	0.51
1:D:284:TYR:CZ	1:D:311:LYS:HE2	2.45	0.51
1:A:376:LEU:HD13	1:A:381:VAL:CG2	2.41	0.51
1:B:376:LEU:CD1	1:B:381:VAL:HG22	2.41	0.50
1:B:433:LYS:O	1:B:433:LYS:HG2	2.11	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:378:ILE:HG12	1:C:414:CYS:HB3	1.94	0.50
1:B:392:LEU:HD13	1:B:441:TYR:CE1	2.47	0.50
1:C:402:ASP:HA	1:C:431:ARG:HH12	1.76	0.50
2:E:2:DG:H2"	2:E:3:DG:OP1	2.11	0.50
1:A:375:THR:HA	1:A:390:SER:O	2.12	0.49
1:B:422:ILE:HD13	1:B:422:ILE:N	2.26	0.49
1:D:265:SER:HB2	1:D:267:TRP:NE1	2.27	0.49
1:D:403:LYS:O	1:D:424:PRO:HD3	2.12	0.49
1:B:231:GLU:OE1	1:B:311:LYS:HE2	2.11	0.49
1:D:293:PHE:O	1:D:294:LYS:HB2	2.11	0.49
1:C:244:GLN:HG3	1:C:247:SER:HB3	1.94	0.49
1:C:375:THR:HA	1:C:390:SER:O	2.12	0.49
1:A:450:TYR:C	1:A:450:TYR:CD2	2.91	0.48
1:B:205:LEU:HD23	1:B:206:SER:H	1.77	0.48
1:D:270:VAL:HG23	1:D:271:ASP:N	2.28	0.48
1:A:294:LYS:C	1:A:296:ASN:H	2.21	0.48
1:A:209:LEU:HD11	1:A:314:LEU:HD11	1.94	0.48
1:D:378:ILE:HG12	1:D:411:ASP:CG	2.38	0.48
1:A:381:VAL:HG21	1:A:391:VAL:CG2	2.44	0.48
1:B:311:LYS:C	1:B:312:GLU:O	2.57	0.48
1:A:300:LYS:HE2	2:E:2:DG:O6	2.14	0.48
2:G:2:DG:H2"	2:G:3:DG:OP1	2.13	0.48
1:B:225:ARG:CG	1:C:282:TYR:CZ	2.97	0.47
1:D:248:LYS:HB3	1:D:270:VAL:HG21	1.97	0.47
1:A:422:ILE:HG23	1:A:426:LEU:HD23	1.97	0.47
1:B:423:PHE:CD1	1:B:457:LYS:HE3	2.49	0.47
1:A:205:LEU:HD23	1:A:206:SER:N	2.30	0.47
1:A:423:PHE:HB3	1:A:424:PRO:CD	2.41	0.47
1:B:401:SER:OG	1:B:402:ASP:N	2.47	0.47
1:B:423:PHE:HB3	1:B:424:PRO:CD	2.45	0.47
1:C:205:LEU:HD23	1:C:206:SER:H	1.80	0.47
1:A:392:LEU:HD13	1:A:441:TYR:CD1	2.50	0.47
1:C:233:ARG:HD3	1:C:282:TYR:OH	2.14	0.47
1:C:384:THR:CG2	1:C:386:LYS:HG2	2.44	0.47
1:C:231:GLU:OE1	1:C:311:LYS:NZ	2.48	0.47
1:C:451:ASN:C	1:C:453:GLU:H	2.23	0.47
1:D:451:ASN:O	1:D:452:ASP:HB2	2.15	0.47
1:B:294:LYS:C	1:B:296:ASN:H	2.20	0.47
1:D:293:PHE:HB2	1:D:298:GLU:HB3	1.97	0.47
1:D:392:LEU:HD13	1:D:441:TYR:CE1	2.49	0.47
1:C:449:ILE:HG13	1:C:454:VAL:HG23	1.97	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:403:LYS:O	1:B:424:PRO:HD3	2.15	0.46
1:C:378:ILE:HD13	1:C:379:SER:N	2.28	0.46
1:A:269:LYS:HE2	1:A:304:GLY:HA2	1.98	0.46
1:A:443:ASN:HB2	1:A:463:SER:OG	2.16	0.46
1:D:209:LEU:HD11	1:D:314:LEU:HD11	1.97	0.46
1:B:399:GLN:HB2	1:B:406:ARG:HB2	1.98	0.46
1:B:300:LYS:HE2	2:F:2:DG:O6	2.15	0.46
1:B:312:GLU:O	1:B:313:THR:HB	2.15	0.46
1:A:278:LYS:HE3	1:A:460:ILE:O	2.16	0.46
1:B:422:ILE:HG23	1:B:426:LEU:HD23	1.98	0.46
1:B:207:ASP:O	1:B:210:SER:HB2	2.16	0.45
1:D:375:THR:C	1:D:376:LEU:HD12	2.41	0.45
1:C:419:LYS:HE3	1:C:419:LYS:HB2	1.77	0.45
1:D:424:PRO:O	1:D:425:ASP:CB	2.63	0.45
1:D:264:LEU:HG	1:D:299:LEU:HB2	1.99	0.45
1:A:423:PHE:CB	1:A:424:PRO:HD2	2.44	0.45
1:B:216:ILE:HD13	1:B:262:ILE:HB	1.98	0.45
1:A:423:PHE:CB	1:A:424:PRO:CD	2.95	0.45
1:B:225:ARG:HG3	1:B:225:ARG:H	1.64	0.45
1:B:378:ILE:HB	1:B:411:ASP:CG	2.42	0.45
1:B:390:SER:N	3:B:2:HOH:O	2.49	0.45
1:C:449:ILE:HG13	1:C:454:VAL:CG2	2.47	0.45
1:D:458:ASN:HB2	1:D:462:SER:HB2	1.99	0.45
1:D:379:SER:O	1:D:382:LEU:CD2	2.65	0.45
1:A:214:LEU:HD11	1:A:223:LYS:HE2	1.98	0.45
1:A:451:ASN:C	1:A:453:GLU:N	2.73	0.45
1:D:311:LYS:O	1:D:314:LEU:HB2	2.17	0.44
1:C:447:ARG:CZ	1:C:454:VAL:HG21	2.48	0.44
1:A:311:LYS:O	1:A:314:LEU:HB2	2.17	0.44
1:B:399:GLN:HG3	3:B:14:HOH:O	2.17	0.44
1:B:448:GLN:NE2	1:B:457:LYS:HD3	2.32	0.43
1:C:214:LEU:HD11	1:C:223:LYS:HE3	1.99	0.43
1:A:390:SER:N	3:A:3:HOH:O	2.51	0.43
1:A:429:GLU:HG3	1:A:430:TRP:CD1	2.52	0.43
1:D:378:ILE:CG1	1:D:411:ASP:HB2	2.48	0.43
1:D:394:GLN:HA	1:D:438:LYS:O	2.18	0.43
1:A:297:LEU:HD12	1:A:297:LEU:HA	1.79	0.43
1:B:428:TYR:C	1:B:430:TRP:H	2.26	0.43
1:A:424:PRO:O	1:A:425:ASP:HB2	2.18	0.43
1:B:423:PHE:CE1	1:B:457:LYS:HE3	2.53	0.43
1:D:375:THR:HA	1:D:390:SER:O	2.18	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:451:ASN:C	1:D:453:GLU:H	2.26	0.43
1:B:265:SER:HB2	1:B:267:TRP:NE1	2.33	0.43
1:C:233:ARG:HB2	1:C:282:TYR:CE1	2.53	0.43
1:C:392:LEU:HD11	1:C:467:SER:HB2	2.01	0.43
1:C:300:LYS:HE2	1:C:302:LYS:HD2	2.00	0.43
1:C:403:LYS:HG2	1:C:428:TYR:OH	2.19	0.43
1:B:390:SER:HA	1:B:442:PHE:O	2.19	0.42
1:D:379:SER:HB3	1:D:414:CYS:SG	2.59	0.42
1:D:435:SER:HB2	1:D:438:LYS:HD2	2.00	0.42
1:A:248:LYS:O	1:A:270:VAL:HG21	2.19	0.42
1:B:294:LYS:O	1:B:295:ASN:HB2	2.18	0.42
1:B:411:ASP:OD1	1:B:411:ASP:N	2.51	0.42
1:A:244:GLN:HG3	1:B:387:GLN:OE1	2.19	0.42
1:D:396:VAL:HG11	1:D:410:CYS:SG	2.60	0.42
1:C:378:ILE:HD13	1:C:378:ILE:N	2.35	0.42
1:D:293:PHE:HB2	1:D:298:GLU:HG2	2.02	0.42
1:D:423:PHE:HB3	1:D:424:PRO:CD	2.45	0.42
1:A:435:SER:HB2	1:A:438:LYS:HD2	2.02	0.42
1:A:378:ILE:HD13	1:A:411:ASP:HB3	2.01	0.41
1:B:390:SER:HB3	1:B:443:ASN:HA	2.01	0.41
1:B:438:LYS:HB3	1:B:440:TYR:CE1	2.54	0.41
1:D:289:GLU:OE2	1:D:303:PHE:CE1	2.73	0.41
1:C:378:ILE:HD11	1:C:414:CYS:H	1.85	0.41
1:A:377:LEU:O	1:A:381:VAL:HG23	2.19	0.41
1:A:389:LEU:HD21	1:A:447:ARG:HG3	2.02	0.41
1:A:234:VAL:HG22	1:A:252:ILE:HD12	2.03	0.41
1:A:404:ASN:OD1	1:A:404:ASN:C	2.64	0.41
1:C:378:ILE:CG1	1:C:414:CYS:HB3	2.50	0.41
1:C:379:SER:O	1:C:382:LEU:HB3	2.21	0.41
1:D:297:LEU:HD12	1:D:297:LEU:HA	1.68	0.41
1:B:250:PHE:HD2	1:B:270:VAL:HG13	1.85	0.41
1:A:375:THR:HG23	1:A:375:THR:O	2.20	0.40
1:B:225:ARG:HD2	1:C:282:TYR:CE1	2.56	0.40
1:C:375:THR:C	1:C:376:LEU:HD23	2.47	0.40
1:C:424:PRO:O	1:C:425:ASP:CB	2.66	0.40
1:D:380:GLU:O	1:D:383:LYS:N	2.52	0.40
1:D:411:ASP:HB3	1:D:413:SER:H	1.85	0.40
1:D:455:GLN:HG3	1:D:455:GLN:O	2.20	0.40
1:B:406:ARG:NH1	1:B:419:LYS:HZ3	2.07	0.40
1:C:408:LYS:HA	1:C:418:LEU:O	2.22	0.40
1:A:376:LEU:HD12	1:A:390:SER:O	2.22	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:443:ASN:HB2	1:C:463:SER:OG	2.21	0.40
1:B:406:ARG:NH1	1:B:419:LYS:HZ1	2.16	0.40
1:C:384:THR:HG22	1:C:386:LYS:HG2	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	
1	A	211/213 (99%)	193 (92%)	15 (7%)	3 (1%)	9	17
1	B	208/213 (98%)	189 (91%)	18 (9%)	1 (0%)	24	44
1	C	209/213 (98%)	195 (93%)	13 (6%)	1 (0%)	24	44
1	D	208/213 (98%)	193 (93%)	12 (6%)	3 (1%)	9	17
All	All	836/852 (98%)	770 (92%)	58 (7%)	8 (1%)	12	26

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	425	ASP
1	B	425	ASP
1	C	425	ASP
1	D	425	ASP
1	A	295	ASN
1	D	294	LYS
1	A	294	LYS
1	D	424	PRO

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	199/199 (100%)	173 (87%)	26 (13%)	4	7
1	B	197/199 (99%)	171 (87%)	26 (13%)	4	7
1	C	197/199 (99%)	172 (87%)	25 (13%)	4	8
1	D	197/199 (99%)	184 (93%)	13 (7%)	15	32
All	All	790/796 (99%)	700 (89%)	90 (11%)	5	10

All (90) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	205	LEU
1	A	210	SER
1	A	221	VAL
1	A	233	ARG
1	A	239	SER
1	A	248	LYS
1	A	268	GLN
1	A	297	LEU
1	A	302	LYS
1	A	320	SER
1	A	376	LEU
1	A	382	LEU
1	A	389	LEU
1	A	404	ASN
1	A	412	ASN
1	A	414	CYS
1	A	416	GLN
1	A	417	GLU
1	A	418	LEU
1	A	429	GLU
1	A	431	ARG
1	A	432	ASP
1	A	447	ARG
1	A	449	ILE

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	451	ASN
1	A	466	GLU
1	B	205	LEU
1	B	207	ASP
1	B	225	ARG
1	B	244	GLN
1	B	252	ILE
1	B	264	LEU
1	B	302	LYS
1	B	379	SER
1	B	380	GLU
1	B	382	LEU
1	B	383	LYS
1	B	386	LYS
1	B	389	LEU
1	B	402	ASP
1	B	403	LYS
1	B	408	LYS
1	B	410	CYS
1	B	414	CYS
1	B	417	GLU
1	B	418	LEU
1	B	438	LYS
1	B	449	ILE
1	B	450	TYR
1	B	453	GLU
1	B	454	VAL
1	B	466	GLU
1	C	220	GLN
1	C	221	VAL
1	C	223	LYS
1	C	225	ARG
1	C	233	ARG
1	C	270	VAL
1	C	276	THR
1	C	313	THR
1	C	314	LEU
1	C	377	LEU
1	C	378	ILE
1	C	380	GLU
1	C	382	LEU
1	C	384	THR

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	401	SER
1	C	412	ASN
1	C	415	ASN
1	C	416	GLN
1	C	417	GLU
1	C	418	LEU
1	C	429	GLU
1	C	432	ASP
1	C	448	GLN
1	C	449	ILE
1	C	454	VAL
1	D	233	ARG
1	D	248	LYS
1	D	265	SER
1	D	268	GLN
1	D	275	GLN
1	D	297	LEU
1	D	311	LYS
1	D	320	SER
1	D	389	LEU
1	D	417	GLU
1	D	432	ASP
1	D	449	ILE
1	D	450	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	260	GLN
1	A	296	ASN
1	A	443	ASN
1	B	242	GLN
1	B	263	ASN
1	B	275	GLN
1	B	404	ASN
1	B	448	GLN
1	C	443	ASN
1	C	461	HIS
1	D	260	GLN
1	D	292	GLN
1	D	451	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](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	213/213 (100%)	-0.60	0 100 100	32, 54, 106, 124	0
1	B	210/213 (98%)	-0.65	0 100 100	32, 54, 103, 125	0
1	C	211/213 (99%)	-0.61	2 (0%) 81 78	33, 54, 105, 122	0
1	D	210/213 (98%)	-0.64	0 100 100	32, 54, 103, 129	0
2	E	4/4 (100%)	-1.12	0 100 100	48, 51, 58, 70	0
2	F	4/4 (100%)	-1.08	0 100 100	49, 51, 60, 75	0
2	G	4/4 (100%)	-1.21	0 100 100	48, 50, 59, 70	0
2	H	4/4 (100%)	-1.08	0 100 100	49, 49, 60, 74	0
All	All	860/868 (99%)	-0.63	2 (0%) 91 90	32, 54, 104, 129	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	452	ASP	2.2
1	C	412	ASN	2.1

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.