



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:08 PM UTC

PDB ID : 4LL4 / pdb_00004ll4
Title : The structure of the TRX and TXNIP complex
Authors : Hwang, J.; Kim, M.H.
Deposited on : 2013-07-09
Resolution : 2.70 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

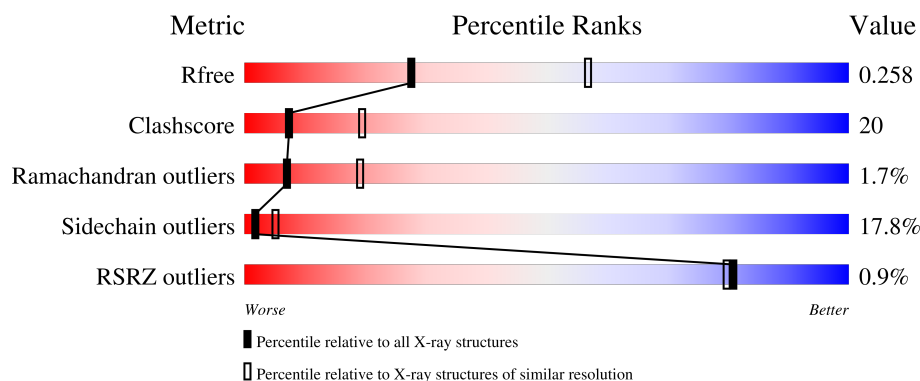
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (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 $\leq 5\%$. 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	315	<div> <div>%</div> <div> <div></div> <div>51%</div> <div>28%</div> <div>8%</div> <div>•</div> <div>12%</div> </div> </div>
1	C	315	<div> <div>%</div> <div> <div></div> <div>48%</div> <div>29%</div> <div>11%</div> <div>•</div> <div>11%</div> </div> </div>
2	B	105	<div> <div></div> <div> <div>47%</div> <div>45%</div> <div>8%</div> <div>•</div> </div> </div>
2	D	105	<div> <div>%</div> <div> <div></div> <div>59%</div> <div>37%</div> <div>•</div> </div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6070 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 Thioredoxin-interacting protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	277	Total	C	N	O	S	0	0	0
			2174	1384	378	401	11			
1	C	281	Total	C	N	O	S	0	0	0
			2197	1397	381	408	11			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	170	SER	CYS	engineered mutation	UNP Q9H3M7
A	205	SER	CYS	engineered mutation	UNP Q9H3M7
A	267	SER	CYS	engineered mutation	UNP Q9H3M7
C	170	SER	CYS	engineered mutation	UNP Q9H3M7
C	205	SER	CYS	engineered mutation	UNP Q9H3M7
C	267	SER	CYS	engineered mutation	UNP Q9H3M7

- Molecule 2 is a protein called Thioredoxin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	105	Total	C	N	O	S	0	0	0
			820	525	128	160	7			
2	D	105	Total	C	N	O	S	0	0	0
			820	525	128	160	7			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	35	ALA	CYS	engineered mutation	UNP P10599
D	35	ALA	CYS	engineered mutation	UNP P10599

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	22	Total 22	O 22	0	0
3	B	4	Total 4	O 4	0	0
3	C	26	Total 26	O 26	0	0
3	D	7	Total 7	O 7	0	0



• Molecule 2: Thioredoxin



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	79.83Å 64.99Å 88.42Å 90.00° 90.88° 90.00°	Depositor
Resolution (Å)	40.00 – 2.70 40.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.5 (40.00-2.70) 99.4 (40.00-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.25 (at 2.72Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.196 , 0.264 0.199 , 0.258	Depositor DCC
R_{free} test set	1947 reflections (7.78%)	wwPDB-VP
Wilson B-factor (Å ²)	57.4	Xtriage
Anisotropy	0.017	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 53.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.031 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6070	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.90% 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

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	1.23	1/2212 (0.0%)	1.33	17/2979 (0.6%)
1	C	1.30	8/2236 (0.4%)	1.39	24/3013 (0.8%)
2	B	1.14	2/835 (0.2%)	1.27	5/1121 (0.4%)
2	D	1.20	1/835 (0.1%)	1.35	5/1121 (0.4%)
All	All	1.24	12/6118 (0.2%)	1.35	51/8234 (0.6%)

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	C	0	1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	21	LYS	CD-CE	7.04	1.73	1.52
1	C	269	ILE	CA-C	6.25	1.60	1.52
1	A	214	ALA	CA-C	-6.18	1.44	1.52
2	D	28	SER	C-O	5.89	1.31	1.23
1	C	216	VAL	CA-CB	-5.75	1.47	1.54
1	C	272	VAL	CA-CB	5.72	1.61	1.54
1	C	129	LEU	CA-C	5.38	1.59	1.52
1	C	136	THR	CA-CB	5.34	1.59	1.53
2	B	92	ALA	C-O	-5.18	1.18	1.23
1	C	272	VAL	C-O	-5.11	1.18	1.24
1	C	182	ALA	CA-CB	-5.10	1.44	1.54
1	C	131	ARG	CA-C	5.05	1.59	1.52

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	134	GLN	CA-C-N	-8.76	111.85	120.52
1	C	134	GLN	C-N-CA	-8.76	111.85	120.52
1	C	223	ALA	N-CA-C	-8.43	97.82	109.95
1	A	134	GLN	CA-C-N	-8.13	111.63	119.76
1	A	134	GLN	C-N-CA	-8.13	111.63	119.76
1	A	83	THR	N-CA-C	7.61	119.21	111.07
2	B	86	VAL	N-CA-C	-7.05	107.01	113.71
2	D	52	VAL	N-CA-C	-6.71	98.52	108.85
1	C	131	ARG	CA-C-N	6.58	128.07	119.84
1	C	131	ARG	C-N-CA	6.58	128.07	119.84
1	C	170	SER	N-CA-C	-6.54	98.73	108.99
2	B	39	LYS	CA-C-N	-6.49	112.49	119.24
2	B	39	LYS	C-N-CA	-6.49	112.49	119.24
2	D	25	VAL	CB-CA-C	-6.48	101.67	110.42
1	C	41	VAL	N-CA-C	6.45	116.92	107.37
1	C	240	ASN	N-CA-C	6.38	119.48	110.23
1	C	266	GLY	N-CA-C	6.34	120.40	112.79
1	A	64	LYS	N-CA-C	6.25	119.44	108.75
1	C	290	LEU	N-CA-C	-6.13	99.70	109.76
1	A	26	LYS	N-CA-C	6.11	118.81	107.99
1	C	91	MET	N-CA-C	5.93	118.78	107.75
1	A	110	LEU	N-CA-C	-5.92	105.36	113.30
2	D	43	HIS	N-CA-C	5.79	117.67	111.36
1	A	226	GLN	CA-C-N	5.68	131.93	121.70
1	A	226	GLN	C-N-CA	5.68	131.93	121.70
1	A	55	LEU	N-CA-C	5.67	117.89	108.99
2	B	64	ASP	N-CA-C	5.59	117.37	111.28
1	A	280	VAL	N-CA-C	-5.56	99.63	107.75
1	A	15	ASN	N-CA-C	5.48	117.25	111.28
1	C	295	VAL	CA-C-N	-5.47	115.56	123.11
1	C	295	VAL	C-N-CA	-5.47	115.56	123.11
1	C	112	THR	N-CA-C	5.43	122.36	110.80
1	C	138	GLU	N-CA-C	5.39	118.01	109.50
1	C	295	VAL	N-CA-C	-5.34	100.63	108.11
1	C	120	CYS	N-CA-C	5.34	116.39	108.86
1	A	92	ARG	N-CA-C	5.33	117.84	108.82
1	C	193	ASP	N-CA-C	-5.30	103.89	110.41
1	A	197	ILE	N-CA-C	5.28	115.50	108.11
1	C	289	ILE	N-CA-C	5.27	115.44	107.75
1	C	224	ASN	N-CA-C	5.20	117.96	109.59
1	A	296	ILE	N-CA-C	5.16	115.91	107.24
2	B	23	VAL	CB-CA-C	5.11	117.79	110.33
2	D	7	SER	N-CA-C	5.10	115.89	108.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	23	VAL	CB-CA-C	-5.09	103.25	110.83
1	C	215	ILE	CA-C-N	-5.06	116.51	123.14
1	C	215	ILE	C-N-CA	-5.06	116.51	123.14
1	C	57	MET	CG-SD-CE	5.05	112.01	100.90
1	A	25	GLU	N-CA-C	5.04	117.97	110.52
1	A	237	VAL	CB-CA-C	-5.03	103.38	110.82
1	A	138	GLU	N-CA-C	5.02	117.01	109.23
1	C	234	LEU	CB-CA-C	-5.01	102.91	111.02

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	107	GLN	Peptide

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	2174	0	2230	89	0
1	C	2197	0	2245	102	0
2	B	820	0	811	37	0
2	D	820	0	810	24	0
3	A	22	0	0	2	0
3	B	4	0	0	1	0
3	C	26	0	0	4	0
3	D	7	0	0	0	0
All	All	6070	0	6096	247	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 20.

All (247) 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:226:GLN:CB	1:A:227:THR:HG22	1.60	1.29

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:226:GLN:CG	1:A:227:THR:HG22	1.86	1.06
2:B:78:GLN:HG2	2:B:88:GLU:HG3	1.34	1.05
1:A:20:VAL:HG22	1:A:144:GLU:HB2	1.36	1.04
1:C:234:LEU:O	1:C:235:SER:HB2	1.60	1.02
1:C:40:ARG:HG2	1:C:88:MET:CE	1.92	1.00
1:A:226:GLN:HG3	1:A:227:THR:CG2	1.95	0.95
1:C:40:ARG:HG2	1:C:88:MET:HE1	1.47	0.95
1:A:226:GLN:CA	1:A:227:THR:HG22	1.97	0.94
2:D:12:GLN:NE2	2:D:12:GLN:HA	1.80	0.93
1:C:221:TYR:CD2	1:C:265:LEU:HD11	2.04	0.93
1:A:226:GLN:HB3	1:A:227:THR:HG22	1.50	0.91
1:A:226:GLN:CG	1:A:227:THR:CG2	2.52	0.86
1:C:170:SER:HB3	1:C:173:ILE:H	1.39	0.86
1:A:25:GLU:HG3	1:A:26:LYS:H	1.42	0.85
1:A:226:GLN:CB	1:A:227:THR:CG2	2.51	0.85
1:A:165:GLU:HG3	1:A:179:SER:HB3	1.59	0.84
1:C:163:LYS:HB3	1:C:181:SER:HB3	1.59	0.84
1:C:89:VAL:HG23	1:C:90:ILE:H	1.43	0.82
1:A:81:GLN:O	1:A:81:GLN:HG3	1.80	0.82
2:B:12:GLN:HA	2:B:15:LEU:HD12	1.61	0.81
1:C:69:TYR:O	1:C:106:PRO:HG2	1.83	0.78
1:A:57:MET:HA	1:A:61:GLN:O	1.83	0.77
2:D:12:GLN:HA	2:D:12:GLN:HE21	1.50	0.76
2:D:78:GLN:HG2	2:D:88:GLU:HG3	1.66	0.76
1:A:226:GLN:HB3	1:A:227:THR:CG2	2.17	0.74
1:C:111:GLY:O	1:C:112:THR:HG23	1.87	0.73
1:C:163:LYS:HB3	1:C:181:SER:CB	2.18	0.73
1:C:129:LEU:C	1:C:130:ASP:OD2	2.32	0.72
1:C:192:GLY:O	1:C:256:ARG:NH2	2.23	0.72
1:C:258:GLN:CA	1:C:258:GLN:HE21	2.03	0.72
1:C:89:VAL:CG2	1:C:90:ILE:N	2.54	0.71
2:D:100:THR:HG22	2:D:104:LEU:HD12	1.73	0.71
1:A:260:ILE:HG22	1:A:261:ARG:N	2.04	0.71
1:C:114:PHE:HE1	1:C:116:GLY:HA3	1.56	0.70
1:C:266:GLY:O	1:C:269:ILE:HG22	1.92	0.70
1:C:26:LYS:HB2	1:C:104:GLU:HG2	1.73	0.70
1:C:131:ARG:HB3	1:C:132:PRO:HD2	1.71	0.70
1:A:42:LYS:HA	1:A:88:MET:HG2	1.72	0.69
1:A:226:GLN:HA	1:A:227:THR:HG22	1.73	0.69
1:A:112:THR:O	1:A:115:LYS:N	2.15	0.69
1:A:233:LYS:HD2	1:C:87:GLU:OE1	1.93	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:41:VAL:HG21	1:C:91:MET:CE	2.24	0.68
1:C:146:VAL:HG13	1:C:146:VAL:O	1.94	0.68
1:C:89:VAL:HG23	1:C:90:ILE:N	2.09	0.68
1:C:90:ILE:O	1:C:90:ILE:HG22	1.93	0.68
1:C:191:GLU:O	1:C:299:ARG:NH1	2.28	0.67
1:C:258:GLN:HE21	1:C:258:GLN:C	2.02	0.67
1:C:40:ARG:HG2	1:C:88:MET:HE2	1.73	0.67
1:C:221:TYR:CG	1:C:265:LEU:HD11	2.29	0.67
2:B:84:GLN:HA	2:B:84:GLN:HE21	1.58	0.67
1:C:223:ALA:HB3	1:C:228:LYS:HD2	1.76	0.67
1:A:57:MET:HE1	1:A:62:GLN:HG3	1.75	0.66
1:C:114:PHE:CE1	1:C:116:GLY:HA3	2.30	0.66
2:D:48:LYS:HD3	2:D:49:TYR:CE2	2.29	0.66
1:A:21:TYR:O	1:A:145:VAL:HA	1.96	0.66
1:A:221:TYR:HB3	1:A:269:ILE:HG22	1.78	0.66
1:C:73:GLU:O	1:C:74:ASP:HB2	1.95	0.66
1:C:265:LEU:HB2	3:C:415:HOH:O	1.97	0.65
1:C:111:GLY:O	1:C:112:THR:CG2	2.44	0.65
1:C:74:ASP:OD1	1:C:75:THR:N	2.30	0.64
1:A:34:GLU:OE2	1:A:96:LYS:HG3	1.98	0.64
2:D:63:GLN:H	2:D:63:GLN:HE21	1.45	0.63
1:C:131:ARG:CB	1:C:132:PRO:HD2	2.28	0.63
1:C:234:LEU:O	1:C:235:SER:CB	2.36	0.63
1:A:115:LYS:O	1:A:115:LYS:HG3	1.98	0.63
1:C:112:THR:HB	1:C:147:ASP:H	1.64	0.63
1:A:81:GLN:OE1	1:A:89:VAL:HG22	1.99	0.62
1:A:222:LEU:HD22	1:C:225:GLY:HA3	1.81	0.62
2:D:12:GLN:NE2	2:D:12:GLN:CA	2.61	0.62
2:B:102:ASN:O	2:B:104:LEU:N	2.32	0.62
1:A:23:SER:OG	1:A:107:GLN:HA	2.00	0.62
1:A:260:ILE:HG22	1:A:261:ARG:H	1.64	0.62
1:A:219:HIS:O	1:A:229:VAL:HA	2.01	0.61
1:C:129:LEU:O	1:C:130:ASP:OD2	2.19	0.60
1:A:117:LYS:HD3	1:A:118:TYR:CE2	2.36	0.60
1:A:223:ALA:O	1:A:226:GLN:HB2	2.01	0.60
1:C:110:LEU:HB3	1:C:123:TYR:OH	2.01	0.60
1:A:32:ILE:HG12	1:A:98:GLU:HG2	1.83	0.60
1:C:258:GLN:H	1:C:258:GLN:NE2	2.00	0.59
1:A:124:TRP:HB3	1:A:142:ASN:HA	1.84	0.59
1:C:258:GLN:CA	1:C:258:GLN:NE2	2.65	0.59
2:D:100:THR:CG2	2:D:104:LEU:HD12	2.33	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:72:TYR:CE1	1:C:103:PHE:HB3	2.38	0.59
2:B:46:SER:HA	2:B:54:PHE:CE1	2.38	0.58
1:A:25:GLU:HG3	1:A:26:LYS:N	2.08	0.57
1:A:23:SER:HA	1:A:110:LEU:HD11	1.86	0.57
1:C:170:SER:HB3	1:C:173:ILE:N	2.17	0.57
1:A:110:LEU:HD13	1:A:145:VAL:HG21	1.88	0.56
1:A:123:TYR:HD1	1:A:143:PHE:CZ	2.23	0.56
1:C:169:SER:O	1:C:207:ARG:NH2	2.37	0.56
2:B:35:ALA:HA	2:B:75:PRO:HG3	1.88	0.55
1:C:288:VAL:HA	3:C:414:HOH:O	2.06	0.55
2:B:84:GLN:HA	2:B:84:GLN:NE2	2.21	0.55
1:C:111:GLY:C	1:C:112:THR:CG2	2.79	0.55
1:A:234:LEU:HB3	1:A:258:GLN:HE21	1.72	0.55
1:C:26:LYS:HA	1:C:104:GLU:HA	1.89	0.55
1:A:260:ILE:CG2	1:A:261:ARG:N	2.70	0.54
2:B:16:ASP:N	2:B:16:ASP:OD1	2.41	0.54
1:A:58:GLN:O	1:A:60:SER:N	2.41	0.54
1:A:80:ASP:CG	1:A:80:ASP:O	2.50	0.54
1:A:118:TYR:CD2	1:A:156:LEU:HD23	2.42	0.54
2:B:22:LEU:HD23	2:B:52:VAL:HG13	1.90	0.54
1:A:170:SER:HB3	1:A:173:ILE:H	1.73	0.53
2:D:12:GLN:HE21	2:D:12:GLN:CA	2.18	0.53
2:B:46:SER:HA	2:B:54:PHE:CZ	2.44	0.53
1:A:114:PHE:CE1	1:A:156:LEU:HB2	2.44	0.53
1:A:195:ILE:HD12	1:A:215:ILE:HD11	1.91	0.53
2:B:62:CYS:O	2:B:63:GLN:C	2.51	0.53
2:D:26:ASP:HB2	2:D:77:PHE:CE1	2.44	0.53
1:A:158:ALA:O	1:A:186:ARG:HA	2.09	0.52
1:C:126:LYS:HD2	1:C:140:LYS:HB2	1.91	0.52
2:B:87:GLY:O	2:B:88:GLU:HB2	2.07	0.52
1:C:114:PHE:HE1	1:C:116:GLY:CA	2.22	0.52
1:C:22:GLY:O	1:C:25:GLU:HG3	2.10	0.52
2:D:59:VAL:O	2:D:63:GLN:HG3	2.09	0.52
1:C:126:LYS:CD	1:C:140:LYS:HB2	2.40	0.52
1:A:7:ILE:HD13	1:A:35:VAL:HG13	1.92	0.51
1:A:226:GLN:HG2	3:A:417:HOH:O	2.10	0.51
2:B:102:ASN:C	2:B:104:LEU:H	2.17	0.51
1:A:219:HIS:CD2	1:A:230:LEU:HD23	2.45	0.51
1:A:226:GLN:HE21	1:A:227:THR:HG21	1.75	0.51
1:A:114:PHE:HE1	1:A:156:LEU:HB2	1.73	0.51
1:C:258:GLN:NE2	1:C:258:GLN:N	2.58	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:163:LYS:CB	1:C:181:SER:HB3	2.36	0.51
1:C:91:MET:SD	1:C:97:TYR:CD2	3.04	0.51
2:B:84:GLN:HE21	2:B:84:GLN:CA	2.24	0.51
1:A:260:ILE:CG2	1:A:261:ARG:H	2.24	0.51
2:B:94:LYS:HG3	3:B:202:HOH:O	2.10	0.50
2:B:101:ILE:HG22	2:B:102:ASN:N	2.26	0.50
1:A:55:LEU:HB3	1:A:64:LYS:HG3	1.93	0.50
1:A:182:ALA:HB1	1:A:278:ILE:HD13	1.93	0.50
1:C:164:LYS:HE2	1:C:289:ILE:O	2.10	0.50
2:B:18:ALA:HB2	2:B:53:ILE:HG13	1.92	0.50
1:C:27:VAL:HB	1:C:103:PHE:CE1	2.47	0.49
1:C:111:GLY:C	1:C:112:THR:HG22	2.36	0.49
1:C:223:ALA:O	1:C:226:GLN:O	2.30	0.49
1:C:72:TYR:CZ	1:C:103:PHE:HB3	2.47	0.49
1:C:41:VAL:HG21	1:C:91:MET:HE2	1.94	0.49
2:B:57:VAL:HG11	2:B:65:VAL:CG1	2.43	0.49
1:C:269:ILE:HG23	1:C:269:ILE:O	2.12	0.49
1:A:277:LEU:HD12	1:A:291:ASP:HA	1.95	0.48
1:C:112:THR:O	1:C:112:THR:OG1	2.29	0.48
1:C:266:GLY:O	1:C:269:ILE:CG2	2.60	0.48
1:C:131:ARG:HB3	1:C:132:PRO:CD	2.41	0.48
1:A:78:LEU:HB2	1:A:81:GLN:HB3	1.95	0.48
1:A:226:GLN:HA	1:A:227:THR:CG2	2.43	0.48
1:C:90:ILE:O	1:C:90:ILE:CG2	2.61	0.48
2:B:22:LEU:HA	2:B:80:PHE:O	2.13	0.48
1:C:19:LYS:HD3	1:C:21:TYR:CE1	2.49	0.48
1:A:227:THR:O	1:A:227:THR:HG23	2.13	0.48
1:C:221:TYR:CD2	1:C:265:LEU:CD1	2.87	0.48
1:A:81:GLN:O	1:A:81:GLN:CG	2.58	0.48
2:B:32:CYS:SG	2:B:34:PRO:HD2	2.55	0.47
2:D:27:PHE:CG	2:D:71:VAL:HG21	2.49	0.47
2:D:39:LYS:HB3	2:D:39:LYS:HE3	1.47	0.47
1:C:112:THR:HG23	3:C:422:HOH:O	2.14	0.47
1:C:246:THR:HG22	2:D:91:GLY:HA2	1.95	0.47
1:C:295:VAL:O	1:C:296:ILE:HG13	2.14	0.47
2:D:89:PHE:CD1	2:D:89:PHE:C	2.92	0.47
1:C:85:GLU:C	1:C:87:GLU:H	2.23	0.47
2:D:59:VAL:HG21	2:D:74:MET:HE3	1.97	0.47
1:A:30:ARG:HH11	1:A:30:ARG:HG2	1.80	0.47
1:A:35:VAL:HG11	1:A:39:THR:OG1	2.14	0.47
1:C:88:MET:HE2	1:C:88:MET:HB3	1.72	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:238:ARG:HH22	1:C:241:HIS:CD2	2.33	0.46
1:A:30:ARG:HG2	1:A:30:ARG:NH1	2.30	0.46
1:A:211:PRO:HG3	1:A:242:ILE:HD11	1.96	0.46
1:A:114:PHE:CE1	1:A:156:LEU:HD13	2.50	0.46
2:B:14:ALA:HA	2:B:17:ALA:HB3	1.97	0.46
2:D:32:CYS:HB3	2:D:35:ALA:HB3	1.98	0.46
1:C:191:GLU:O	1:C:191:GLU:HG2	2.16	0.46
1:A:110:LEU:HD13	1:A:145:VAL:CG2	2.45	0.46
1:C:76:LEU:HD23	1:C:99:TYR:HB3	1.96	0.46
1:C:146:VAL:O	1:C:146:VAL:CG1	2.63	0.46
1:C:166:LYS:NZ	3:C:405:HOH:O	2.49	0.46
2:B:54:PHE:CD1	2:B:54:PHE:N	2.84	0.46
1:C:40:ARG:O	1:C:132:PRO:HD3	2.16	0.46
1:C:55:LEU:HD11	1:C:62:GLN:NE2	2.31	0.46
1:C:70:LEU:O	1:C:70:LEU:HG	2.16	0.46
1:C:30:ARG:HE	1:C:32:ILE:HD11	1.80	0.45
1:C:279:TYR:N	1:C:279:TYR:CD1	2.84	0.45
2:B:79:PHE:N	2:B:79:PHE:CD1	2.84	0.45
1:A:123:TYR:HB3	1:A:143:PHE:CE2	2.52	0.45
2:D:32:CYS:SG	2:D:34:PRO:HD2	2.56	0.45
1:A:226:GLN:HG3	1:A:227:THR:HG21	1.92	0.45
1:A:139:THR:O	1:A:139:THR:HG23	2.17	0.45
1:C:49:CYS:O	1:C:123:TYR:HA	2.15	0.44
1:C:130:ASP:OD2	1:C:130:ASP:N	2.50	0.44
1:A:67:SER:HB3	1:A:271:ARG:HB3	1.99	0.44
2:D:37:MET:O	2:D:40:PRO:HD2	2.17	0.44
2:D:46:SER:HA	2:D:54:PHE:CE1	2.53	0.44
1:A:173:ILE:HD12	1:A:206:SER:HB3	1.98	0.44
2:B:58:ASP:HB3	2:B:61:ASP:HB2	1.99	0.44
1:C:9:SER:OG	1:C:34:GLU:HB2	2.16	0.44
1:C:49:CYS:HA	1:C:70:LEU:O	2.18	0.44
2:D:95:GLU:OE1	2:D:95:GLU:N	2.47	0.44
1:A:81:GLN:HA	1:A:81:GLN:HE21	1.82	0.44
1:A:114:PHE:O	1:A:116:GLY:N	2.51	0.44
1:C:86:ASN:HD22	1:C:86:ASN:HA	1.57	0.44
1:C:224:ASN:HA	1:C:225:GLY:HA2	1.57	0.44
1:A:15:ASN:OD1	1:A:29:GLY:HA2	2.17	0.44
1:A:118:TYR:CG	1:A:156:LEU:HD23	2.53	0.44
2:B:5:ILE:HB	2:B:56:GLU:O	2.17	0.44
1:A:224:ASN:C	1:C:222:LEU:HD13	2.43	0.43
2:D:41:PHE:CE2	2:D:94:LYS:HD3	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:83:THR:O	1:C:87:GLU:HG3	2.18	0.43
1:C:89:VAL:CG2	1:C:90:ILE:H	2.13	0.43
1:A:204:THR:HG22	2:B:34:PRO:HG3	2.01	0.43
1:A:213:ALA:HA	1:A:277:LEU:O	2.19	0.43
2:B:22:LEU:HD23	2:B:52:VAL:CG1	2.48	0.43
2:B:18:ALA:HB2	2:B:53:ILE:CG1	2.49	0.43
1:A:226:GLN:CA	1:A:227:THR:CG2	2.85	0.42
1:A:92:ARG:O	1:A:93:PRO:C	2.61	0.42
1:C:55:LEU:HD21	1:C:62:GLN:NE2	2.35	0.42
1:A:23:SER:CA	1:A:110:LEU:HD11	2.49	0.42
2:B:25:VAL:O	2:B:77:PHE:HA	2.19	0.42
1:A:37:GLU:H	1:A:37:GLU:HG3	1.48	0.42
1:A:88:MET:HE3	1:A:88:MET:HB2	1.89	0.42
1:C:194:GLU:OE1	1:C:256:ARG:NH1	2.52	0.42
1:A:25:GLU:CG	1:A:26:LYS:N	2.81	0.42
2:B:104:LEU:O	2:B:105:VAL:C	2.63	0.42
1:C:89:VAL:C	1:C:90:ILE:HD12	2.45	0.42
1:A:112:THR:HB	1:A:115:LYS:HG2	2.01	0.42
1:C:101:PHE:CD1	1:C:101:PHE:C	2.97	0.41
1:A:164:LYS:NZ	1:A:289:ILE:O	2.51	0.41
1:A:68:GLU:C	1:A:69:TYR:CD1	2.98	0.41
1:C:118:TYR:HE2	1:C:155:ASP:OD1	2.03	0.41
2:B:10:ALA:HA	2:B:13:GLU:OE1	2.20	0.41
1:A:34:GLU:HA	3:A:411:HOH:O	2.21	0.41
2:B:98:GLU:O	2:B:99:ALA:C	2.61	0.41
1:C:58:GLN:OE1	1:C:186:ARG:NH1	2.53	0.41
1:C:22:GLY:O	1:C:23:SER:C	2.62	0.41
1:A:225:GLY:C	1:A:226:GLN:CD	2.88	0.41
2:B:12:GLN:CA	2:B:15:LEU:HD12	2.42	0.41
2:B:77:PHE:O	2:B:88:GLU:HA	2.21	0.41
2:B:94:LYS:O	2:B:97:LEU:HB3	2.20	0.41
2:D:99:ALA:O	2:D:100:THR:C	2.63	0.41
1:C:176:GLY:C	1:C:177:ARG:HG3	2.46	0.40
1:A:156:LEU:O	1:A:156:LEU:HG	2.10	0.40
1:C:47:LEU:HD11	1:C:49:CYS:SG	2.61	0.40
2:B:80:PHE:CD1	2:B:80:PHE:N	2.90	0.40
2:D:19:GLY:H	2:D:21:LYS:HG3	1.86	0.40
1:A:194:GLU:HG2	1:A:254:SER:OG	2.20	0.40
2:B:39:LYS:O	2:B:40:PRO:C	2.62	0.40
1:C:22:GLY:H	1:C:25:GLU:HG3	1.87	0.40
1:C:114:PHE:CE1	1:C:116:GLY:CA	3.01	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	271/315 (86%)	249 (92%)	18 (7%)	4 (2%)	8	22
1	C	275/315 (87%)	249 (90%)	18 (6%)	8 (3%)	3	9
2	B	103/105 (98%)	86 (84%)	16 (16%)	1 (1%)	12	32
2	D	103/105 (98%)	98 (95%)	5 (5%)	0	100	100
All	All	752/840 (90%)	682 (91%)	57 (8%)	13 (2%)	7	19

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	156	LEU
2	B	103	GLU
1	C	38	VAL
1	C	113	SER
1	C	132	PRO
1	C	235	SER
1	A	59	GLY
1	C	25	GLU
1	C	156	LEU
1	A	113	SER
1	A	115	LYS
1	C	131	ARG
1	C	106	PRO

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	242/277 (87%)	201 (83%)	41 (17%)	2	6
1	C	245/277 (88%)	194 (79%)	51 (21%)	1	3
2	B	91/91 (100%)	75 (82%)	16 (18%)	2	5
2	D	91/91 (100%)	80 (88%)	11 (12%)	5	12
All	All	669/736 (91%)	550 (82%)	119 (18%)	2	5

All (119) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	SER
1	A	13	VAL
1	A	25	GLU
1	A	35	VAL
1	A	37	GLU
1	A	38	VAL
1	A	45	ARG
1	A	55	LEU
1	A	61	GLN
1	A	62	GLN
1	A	63	CYS
1	A	65	GLN
1	A	81	GLN
1	A	87	GLU
1	A	90	ILE
1	A	95	ASN
1	A	107	GLN
1	A	117	LYS
1	A	136	THR
1	A	138	GLU
1	A	144	GLU
1	A	163	LYS
1	A	164	LYS
1	A	166	LYS
1	A	170	SER
1	A	175	ASP
1	A	194	GLU
1	A	220	THR
1	A	226	GLN
1	A	229	VAL

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Mol	Chain	Res	Type
1	A	230	LEU
1	A	235	SER
1	A	258	GLN
1	A	259	LYS
1	A	260	ILE
1	A	261	ARG
1	A	270	LEU
1	A	271	ARG
1	A	277	LEU
1	A	281	SER
1	A	292	LEU
2	B	1	MET
2	B	5	ILE
2	B	13	GLU
2	B	16	ASP
2	B	22	LEU
2	B	39	LYS
2	B	44	SER
2	B	50	SER
2	B	63	GLN
2	B	67	SER
2	B	68	GLU
2	B	70	GLU
2	B	79	PHE
2	B	84	GLN
2	B	86	VAL
2	B	96	LYS
1	C	9	SER
1	C	11	GLU
1	C	25	GLU
1	C	26	LYS
1	C	33	VAL
1	C	35	VAL
1	C	37	GLU
1	C	51	VAL
1	C	54	VAL
1	C	55	LEU
1	C	61	GLN
1	C	75	THR
1	C	76	LEU
1	C	77	LEU
1	C	78	LEU

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Mol	Chain	Res	Type
1	C	79	GLU
1	C	85	GLU
1	C	86	ASN
1	C	87	GLU
1	C	88	MET
1	C	89	VAL
1	C	90	ILE
1	C	92	ARG
1	C	95	ASN
1	C	96	LYS
1	C	107	GLN
1	C	112	THR
1	C	115	LYS
1	C	122	ASP
1	C	126	LYS
1	C	129	LEU
1	C	130	ASP
1	C	132	PRO
1	C	147	ASP
1	C	163	LYS
1	C	179	SER
1	C	180	VAL
1	C	185	ASP
1	C	191	GLU
1	C	207	ARG
1	C	226	GLN
1	C	253	LYS
1	C	254	SER
1	C	258	GLN
1	C	265	LEU
1	C	268	ASN
1	C	269	ILE
1	C	288	VAL
1	C	294	LEU
1	C	296	ILE
1	C	298	SER
2	D	8	LYS
2	D	12	GLN
2	D	15	LEU
2	D	21	LYS
2	D	24	VAL
2	D	45	LEU

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Mol	Chain	Res	Type
2	D	48	LYS
2	D	51	ASN
2	D	63	GLN
2	D	82	LYS
2	D	105	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	GLN
1	A	142	ASN
1	A	219	HIS
1	A	226	GLN
1	A	258	GLN
2	B	78	GLN
2	B	84	GLN
2	B	102	ASN
1	C	15	ASN
1	C	62	GLN
1	C	81	GLN
1	C	86	ASN
1	C	95	ASN
1	C	134	GLN
1	C	224	ASN
1	C	258	GLN
2	D	12	GLN
2	D	43	HIS
2	D	63	GLN
2	D	78	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [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	277/315 (87%)	-0.17	2 (0%) 84 83	33, 59, 89, 110	0
1	C	281/315 (89%)	-0.26	4 (1%) 73 72	27, 51, 92, 104	0
2	B	105/105 (100%)	-0.00	0 100 100	28, 70, 125, 143	0
2	D	105/105 (100%)	-0.55	1 (0%) 79 78	23, 45, 78, 91	0
All	All	768/840 (91%)	-0.23	7 (0%) 81 80	23, 55, 97, 143	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	114	PHE	3.3
1	C	112	THR	3.2
1	C	148	LEU	2.9
1	A	144	GLU	2.4
1	C	113	SER	2.3
2	D	19	GLY	2.1
1	A	145	VAL	2.0

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.