



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:44 PM UTC

PDB ID : 8QCK / pdb_00008qck
Title : Crystal structure of mycothiol disulfide reductase Mtr from Mycobacterium smegmatis
Authors : Gutierrez-Fernandez, J.; Hammerstad, M.; Hersleth, H.-P.
Deposited on : 2023-08-27
Resolution : 4.70 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

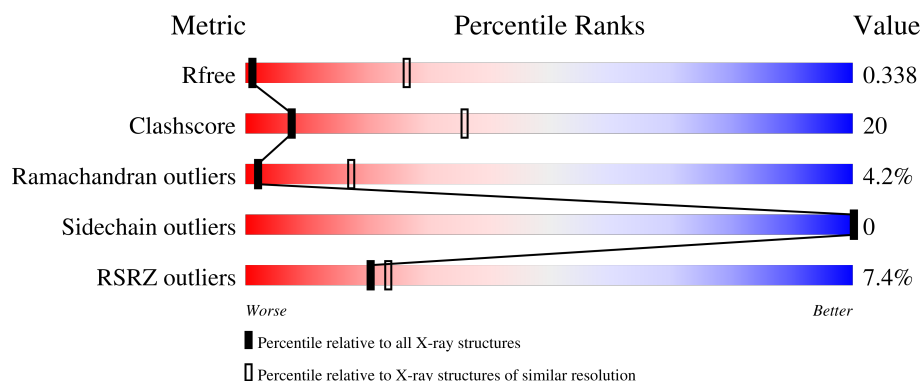
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.70 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	1020 (5.48-3.92)
Clashscore	190562	1005 (5.40-3.96)
Ramachandran outliers	187476	1095 (5.50-3.90)
Sidechain outliers	187428	1077 (5.50-3.90)
RSRZ outliers	180081	1015 (5.48-3.92)

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	461	7% 56% 41% .
1	B	461	7% 62% 37% .

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 7036 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.

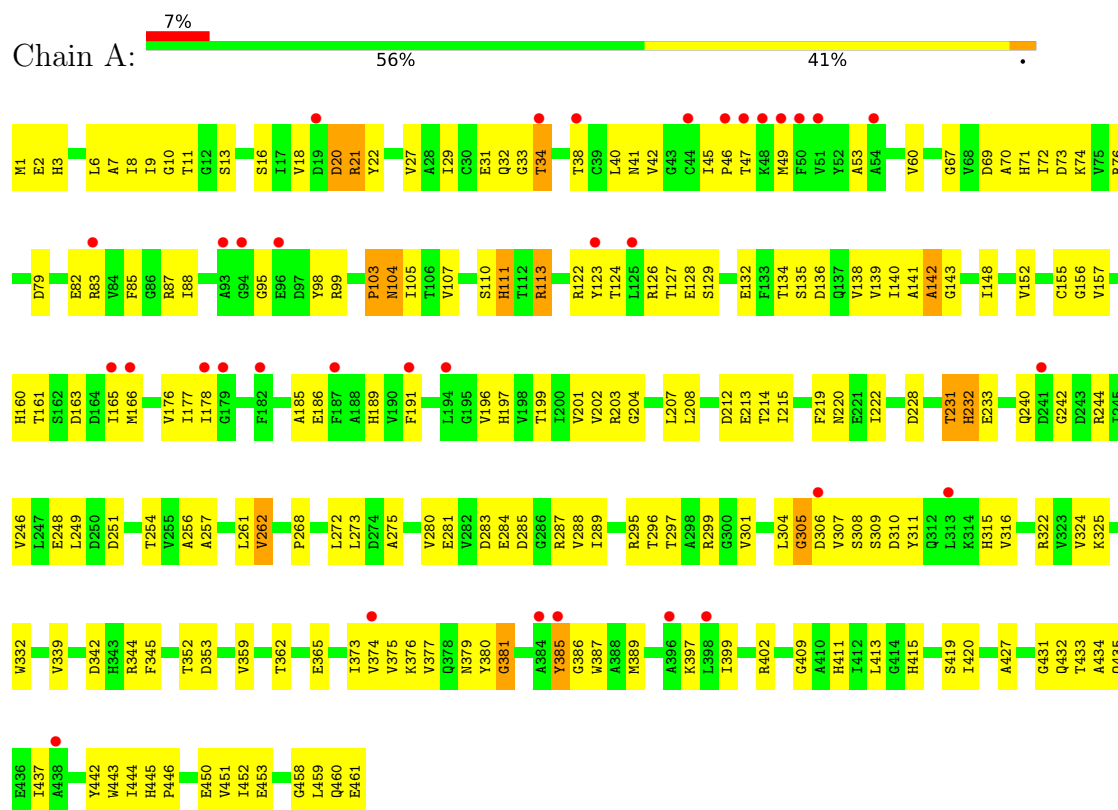
- Molecule 1 is a protein called Pyridine nucleotide-disulfide oxidoreductase dimerization region.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	461	Total	C	N	O	S	0	0	0
			3518	2198	621	688	11			
1	B	461	Total	C	N	O	S	0	0	0
			3518	2198	621	688	11			

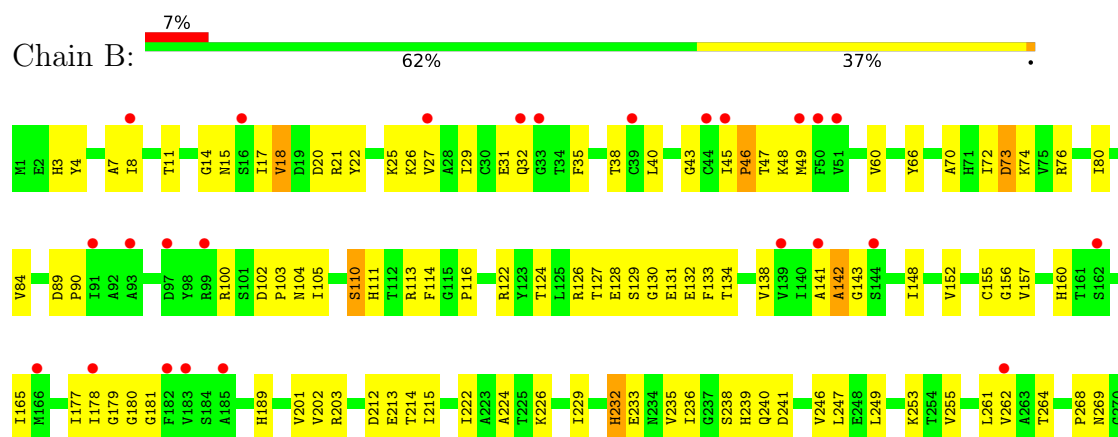
3 Residue-property plots

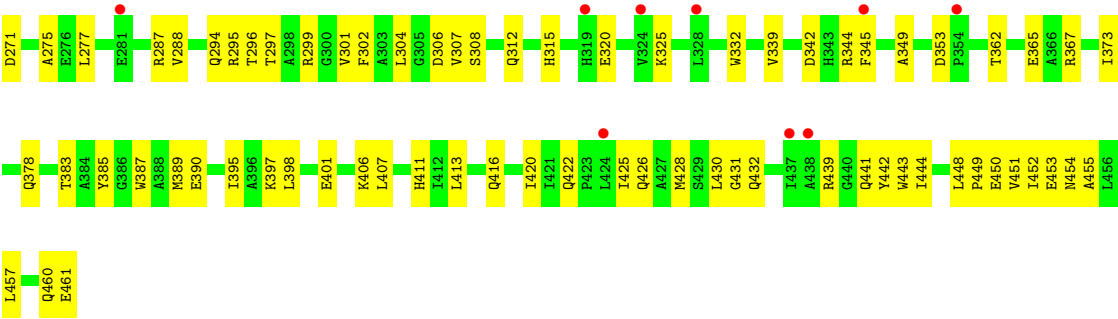
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Pyridine nucleotide-disulfide oxidoreductase dimerization region



- Molecule 1: Pyridine nucleotide-disulfide oxidoreductase dimerization region





4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	51.96Å 209.56Å 241.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.37 – 4.70 49.37 – 4.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.37-4.70) 99.2 (49.37-4.70)	Depositor EDS
R_{merge}	0.64	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.67 (at 4.64Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.292 , 0.338 0.292 , 0.338	Depositor DCC
R_{free} test set	717 reflections (9.86%)	wwPDB-VP
Wilson B-factor (Å ²)	25.8	Xtriage
Anisotropy	2.398	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.25 , 81.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	7036	wwPDB-VP
Average B, all atoms (Å ²)	113.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.05% 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	0.16	0/3586	0.45	0/4878
1	B	0.16	0/3586	0.47	0/4878
All	All	0.16	0/7172	0.46	0/9756

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3518	0	3429	151	0
1	B	3518	0	3429	146	0
All	All	7036	0	6858	281	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 (281) 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:249:LEU:HD23	1:A:251:ASP:H	1.38	0.86
1:A:42:VAL:HG23	1:A:163:ASP:HA	1.59	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:268:PRO:HB3	1:A:307:VAL:HA	1.66	0.77
1:A:322:ARG:HA	1:A:325:LYS:HE2	1.68	0.76
1:B:420:ILE:HG23	1:B:452:ILE:HD11	1.67	0.76
1:A:283:ASP:O	1:A:285:ASP:N	2.18	0.76
1:A:8:ILE:HB	1:A:29:ILE:HG23	1.70	0.74
1:B:177:ILE:HG23	1:B:261:LEU:HD22	1.67	0.74
1:B:3:HIS:CD2	1:B:122:ARG:HD2	2.23	0.74
1:B:306:ASP:HB3	1:B:312:GLN:HA	1.69	0.73
1:B:362:THR:HG22	1:B:365:GLU:HG2	1.70	0.73
1:A:207:LEU:HB2	1:A:208:LEU:HD12	1.70	0.72
1:A:40:LEU:HA	1:A:45:ILE:HB	1.71	0.71
1:A:385:TYR:O	1:A:387:TRP:N	2.22	0.71
1:B:165:ILE:HD13	1:B:261:LEU:HD12	1.71	0.71
1:A:215:ILE:HG23	1:A:413:LEU:HD23	1.72	0.71
1:B:378:GLN:NE2	1:B:451:VAL:O	2.22	0.71
1:A:32:GLN:HA	1:A:110:SER:HA	1.71	0.71
1:B:46:PRO:O	1:B:48:LYS:N	2.24	0.70
1:A:34:THR:OG1	1:A:41:ASN:ND2	2.26	0.69
1:A:444:ILE:O	1:B:315:HIS:ND1	2.27	0.68
1:A:442:TYR:OH	1:B:342:ASP:O	2.09	0.68
1:B:420:ILE:HD11	1:B:448:LEU:HG	1.74	0.68
1:A:374:VAL:HG21	1:A:460:GLN:H	1.59	0.67
1:B:215:ILE:HG12	1:B:395:ILE:HD11	1.77	0.67
1:B:378:GLN:HE22	1:B:454:ASN:HB2	1.60	0.66
1:A:148:ILE:HD13	1:A:152:VAL:HB	1.77	0.65
1:B:367:ARG:HH21	1:B:373:ILE:HB	1.62	0.65
1:A:176:VAL:HG23	1:A:257:ALA:HB3	1.78	0.65
1:B:20:ASP:O	1:B:22:TYR:N	2.30	0.65
1:A:27:VAL:HB	1:A:105:ILE:HG13	1.80	0.64
1:A:165:ILE:HD13	1:A:261:LEU:HD12	1.80	0.63
1:A:248:GLU:HA	1:A:254:THR:HG22	1.78	0.63
1:A:444:ILE:HD12	1:A:444:ILE:H	1.62	0.63
1:A:359:VAL:O	1:A:409:GLY:HA2	1.97	0.63
1:B:127:THR:C	1:B:129:SER:H	2.06	0.63
1:A:178:ILE:HD11	1:A:262:VAL:HG13	1.79	0.63
1:B:212:ASP:HB3	1:B:215:ILE:HB	1.79	0.63
1:B:110:SER:HB3	1:B:129:SER:OG	1.99	0.63
1:B:294:GLN:NE2	1:B:320:GLU:OE1	2.31	0.63
1:B:450:GLU:O	1:B:453:GLU:HB2	1.99	0.63
1:A:420:ILE:HG23	1:A:452:ILE:HD11	1.80	0.62
1:A:212:ASP:HB3	1:A:215:ILE:HB	1.79	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:389:MET:HE1	1:A:415:HIS:HB2	1.81	0.61
1:B:235:VAL:HG23	1:B:247:LEU:HD13	1.82	0.61
1:B:215:ILE:HG23	1:B:413:LEU:HD23	1.82	0.61
1:A:111:HIS:ND1	1:A:128:GLU:HB3	2.15	0.61
1:B:155:CYS:SG	1:B:156:GLY:N	2.74	0.60
1:A:141:ALA:HB2	1:A:304:LEU:HD13	1.83	0.60
1:A:240:GLN:NE2	1:A:242:GLY:O	2.35	0.60
1:B:17:ILE:HA	1:B:325:LYS:HE3	1.83	0.60
1:A:446:PRO:HG2	1:B:48:LYS:HG3	1.84	0.60
1:A:53:ALA:HB2	1:A:83:ARG:HH22	1.67	0.59
1:A:139:VAL:HG11	1:A:324:VAL:HG11	1.84	0.59
1:B:49:MET:HG2	1:B:84:VAL:HG22	1.84	0.59
1:B:148:ILE:HD13	1:B:152:VAL:HB	1.85	0.59
1:A:375:VAL:HG22	1:A:399:ILE:HG12	1.84	0.59
1:B:11:THR:HG22	1:B:31:GLU:CD	2.28	0.59
1:B:295:ARG:HD2	1:B:302:PHE:HE1	1.68	0.58
1:A:95:GLY:HA2	1:A:98:TYR:HD2	1.68	0.58
1:A:435:GLN:CD	1:A:435:GLN:H	2.11	0.58
1:B:460:GLN:HG2	1:B:461:GLU:HG3	1.84	0.58
1:A:29:ILE:HD12	1:A:99:ARG:HG3	1.85	0.58
1:A:123:TYR:OH	1:A:299:ARG:N	2.36	0.58
1:B:306:ASP:OD1	1:B:306:ASP:N	2.35	0.57
1:A:344:ARG:HG3	1:A:345:PHE:N	2.20	0.57
1:B:116:PRO:HG3	1:B:277:LEU:HD13	1.86	0.56
1:A:185:ALA:HB2	1:A:208:LEU:HD11	1.86	0.56
1:A:138:VAL:H	1:A:301:VAL:HG12	1.69	0.56
1:B:8:ILE:HB	1:B:29:ILE:HG23	1.86	0.56
1:A:311:TYR:HB2	1:A:316:VAL:HG21	1.88	0.56
1:B:17:ILE:HG13	1:B:18:VAL:H	1.70	0.56
1:B:444:ILE:H	1:B:444:ILE:HD12	1.71	0.56
1:A:38:THR:HG23	1:A:42:VAL:HG13	1.88	0.56
1:A:246:VAL:HG22	1:A:256:ALA:HB2	1.88	0.56
1:A:178:ILE:HG22	1:A:201:VAL:HB	1.88	0.56
1:A:305:GLY:O	1:A:307:VAL:N	2.38	0.56
1:A:20:ASP:O	1:A:22:TYR:N	2.39	0.55
1:A:177:ILE:HG23	1:A:261:LEU:HD22	1.87	0.55
1:B:383:THR:HG21	1:B:451:VAL:HA	1.88	0.55
1:B:80:ILE:O	1:B:84:VAL:HG23	2.06	0.55
1:A:397:LYS:HE2	1:A:399:ILE:HD11	1.88	0.55
1:B:7:ALA:O	1:B:138:VAL:HA	2.06	0.55
1:B:288:VAL:HB	1:B:308:SER:HB2	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437:ILE:HG23	1:B:426:GLN:HE21	1.72	0.55
1:A:287:ARG:HH22	1:A:310:ASP:HB3	1.71	0.54
1:B:142:ALA:HB3	1:B:307:VAL:HG21	1.90	0.54
1:A:305:GLY:HA2	1:A:309:SER:HB2	1.90	0.54
1:A:450:GLU:O	1:A:453:GLU:HB2	2.08	0.54
1:A:296:THR:OG1	1:A:297:THR:N	2.40	0.54
1:B:180:GLY:HA3	1:B:202:VAL:HG23	1.90	0.54
1:A:9:ILE:HD12	1:A:140:ILE:HG23	1.90	0.54
1:A:304:LEU:O	1:A:308:SER:HB3	2.07	0.53
1:B:269:ASN:H	1:B:307:VAL:HG23	1.72	0.53
1:A:29:ILE:H	1:A:107:VAL:HG22	1.73	0.53
1:B:157:VAL:HG12	1:B:240:GLN:HB2	1.90	0.53
1:B:138:VAL:O	1:B:301:VAL:HA	2.09	0.53
1:B:232:HIS:CD2	1:B:233:GLU:H	2.27	0.53
1:A:295:ARG:HH12	1:A:332:TRP:HB3	1.74	0.53
1:A:213:GLU:OE1	1:A:213:GLU:N	2.31	0.52
1:B:17:ILE:HG13	1:B:18:VAL:N	2.25	0.52
1:B:32:GLN:CD	1:B:32:GLN:H	2.18	0.52
1:B:344:ARG:HG3	1:B:345:PHE:HD1	1.74	0.52
1:B:430:LEU:O	1:B:432:GLN:N	2.43	0.51
1:B:141:ALA:O	1:B:143:GLY:N	2.43	0.51
1:B:345:PHE:CE2	1:B:425:ILE:HG23	2.46	0.51
1:B:385:TYR:CG	1:B:448:LEU:HD13	2.46	0.51
1:A:219:PHE:CD1	1:A:222:ILE:HD11	2.46	0.51
1:B:38:THR:O	1:B:43:GLY:N	2.29	0.51
1:B:32:GLN:OE1	1:B:32:GLN:N	2.41	0.51
1:B:40:LEU:HA	1:B:45:ILE:HD12	1.93	0.51
1:A:189:HIS:ND1	1:A:353:ASP:HB2	2.25	0.51
1:B:49:MET:HE2	1:B:84:VAL:HA	1.92	0.50
1:A:161:THR:OG1	1:A:163:ASP:OD2	2.30	0.50
1:B:49:MET:HG2	1:B:84:VAL:HG13	1.93	0.50
1:B:138:VAL:HG12	1:B:301:VAL:HG12	1.94	0.50
1:A:127:THR:C	1:A:129:SER:H	2.20	0.50
1:A:141:ALA:O	1:A:143:GLY:N	2.45	0.50
1:A:202:VAL:HG13	1:A:204:GLY:H	1.77	0.50
1:B:177:ILE:HG12	1:B:261:LEU:HD13	1.93	0.50
1:A:18:VAL:HG21	1:A:99:ARG:HE	1.77	0.50
1:A:202:VAL:HG22	1:A:203:ARG:H	1.75	0.50
1:B:160:HIS:O	1:B:262:VAL:N	2.37	0.50
1:B:385:TYR:CD2	1:B:448:LEU:HD13	2.47	0.50
1:B:129:SER:O	1:B:131:GLU:N	2.40	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:376:LYS:NZ	1:A:458:GLY:HA3	2.27	0.49
1:A:41:ASN:OD1	1:A:42:VAL:HG12	2.12	0.49
1:B:296:THR:OG1	1:B:297:THR:N	2.45	0.49
1:A:99:ARG:HB3	1:A:105:ILE:HG21	1.93	0.49
1:B:224:ALA:HA	1:B:229:ILE:HG12	1.94	0.49
1:B:3:HIS:NE2	1:B:122:ARG:HD2	2.28	0.49
1:B:202:VAL:HG22	1:B:203:ARG:H	1.76	0.49
1:B:439:ARG:HG3	1:B:457:LEU:HD21	1.94	0.49
1:A:135:SER:OG	1:A:136:ASP:N	2.46	0.49
1:A:446:PRO:CG	1:B:48:LYS:HG3	2.43	0.49
1:A:451:VAL:HG23	1:A:452:ILE:HD12	1.94	0.49
1:A:72:ILE:O	1:A:74:LYS:N	2.46	0.49
1:A:212:ASP:HB2	1:A:411:HIS:CD2	2.48	0.49
1:A:443:TRP:HA	1:B:422:GLN:NE2	2.28	0.49
1:B:114:PHE:HB2	1:B:275:ALA:HA	1.94	0.48
1:A:427:ALA:HA	1:A:432:GLN:HB2	1.95	0.48
1:B:76:ARG:O	1:B:80:ILE:HG13	2.13	0.48
1:A:60:VAL:HG23	1:A:70:ALA:HB3	1.96	0.48
1:A:359:VAL:O	1:A:409:GLY:CA	2.60	0.48
1:B:345:PHE:HE2	1:B:425:ILE:HG23	1.77	0.48
1:A:202:VAL:HG12	1:A:231:THR:O	2.14	0.48
1:A:287:ARG:O	1:A:308:SER:HA	2.12	0.48
1:B:345:PHE:CG	1:B:428:MET:HE2	2.49	0.48
1:A:67:GLY:HA2	1:B:76:ARG:HD2	1.95	0.48
1:A:103:PRO:O	1:A:105:ILE:N	2.44	0.48
1:B:238:SER:O	1:B:239:HIS:ND1	2.47	0.48
1:B:428:MET:C	1:B:428:MET:HE3	2.38	0.48
1:B:213:GLU:HG2	1:B:214:THR:H	1.79	0.48
1:B:304:LEU:O	1:B:307:VAL:HG12	2.14	0.48
1:A:233:GLU:OE1	1:A:249:LEU:HD21	2.14	0.47
1:B:178:ILE:HG22	1:B:201:VAL:HB	1.95	0.47
1:B:4:TYR:HA	1:B:26:LYS:HE2	1.96	0.47
1:B:14:GLY:HA2	1:B:17:ILE:HG12	1.96	0.47
1:A:232:HIS:CD2	1:A:233:GLU:H	2.33	0.47
1:B:124:THR:HA	1:B:134:THR:HG22	1.97	0.47
1:B:160:HIS:HB2	1:B:165:ILE:HD12	1.96	0.47
1:B:189:HIS:CG	1:B:353:ASP:HB2	2.48	0.47
1:A:123:TYR:HH	1:A:299:ARG:N	2.12	0.47
1:A:124:THR:HG23	1:A:134:THR:HG22	1.97	0.47
1:B:241:ASP:OD2	1:B:246:VAL:HB	2.15	0.47
1:A:207:LEU:HG	1:A:220:ASN:OD1	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:419:SER:HA	1:B:449:PRO:HG3	1.97	0.47
1:B:189:HIS:ND1	1:B:353:ASP:HB2	2.29	0.47
1:B:344:ARG:HG3	1:B:345:PHE:N	2.30	0.47
1:A:18:VAL:HG21	1:A:99:ARG:NE	2.30	0.47
1:A:45:ILE:HD13	1:B:387:TRP:HZ3	1.79	0.47
1:A:69:ASP:HB2	1:B:74:LYS:HB3	1.97	0.46
1:B:295:ARG:HH22	1:B:299:ARG:HG3	1.81	0.46
1:A:13:SER:O	1:A:16:SER:OG	2.28	0.46
1:B:132:GLU:HG3	1:B:133:PHE:N	2.29	0.46
1:A:6:LEU:O	1:A:27:VAL:HA	2.15	0.46
1:A:379:ASN:O	1:A:381:GLY:N	2.49	0.46
1:A:433:THR:OG1	1:A:434:ALA:N	2.48	0.46
1:A:176:VAL:HG23	1:A:257:ALA:CB	2.43	0.46
1:B:401:GLU:HB3	1:B:406:LYS:HB3	1.96	0.46
1:B:406:LYS:HG2	1:B:407:LEU:H	1.80	0.46
1:B:89:ASP:HB2	1:B:90:PRO:HD3	1.98	0.46
1:B:249:LEU:HD12	1:B:253:LYS:O	2.16	0.46
1:A:203:ARG:HG3	1:A:203:ARG:HH11	1.80	0.46
1:A:207:LEU:HD12	1:A:207:LEU:O	2.16	0.46
1:B:416:GLN:O	1:B:420:ILE:HD12	2.16	0.45
1:A:47:THR:C	1:A:49:MET:H	2.25	0.45
1:B:49:MET:CG	1:B:84:VAL:HG22	2.46	0.45
1:A:268:PRO:HD2	1:A:285:ASP:O	2.15	0.45
1:B:155:CYS:SG	1:B:157:VAL:HG22	2.56	0.45
1:A:186:GLU:HA	1:A:352:THR:HG22	1.98	0.45
1:B:8:ILE:HD12	1:B:29:ILE:HG12	1.97	0.45
1:B:398:LEU:HD22	1:B:455:ALA:HB1	1.99	0.45
1:B:11:THR:OG1	1:B:15:ASN:N	2.50	0.45
1:B:268:PRO:HG2	1:B:287:ARG:HG3	1.98	0.45
1:A:113:ARG:NE	1:A:272:LEU:O	2.37	0.45
1:A:155:CYS:SG	1:A:156:GLY:N	2.90	0.45
1:B:342:ASP:OD1	1:B:344:ARG:HG2	2.17	0.45
1:A:110:SER:OG	1:A:111:HIS:N	2.50	0.45
1:B:345:PHE:CD1	1:B:428:MET:HE2	2.51	0.45
1:A:46:PRO:HB2	1:A:166:MET:HE1	1.99	0.44
1:A:199:THR:HG23	1:A:228:ASP:HB3	1.99	0.44
1:A:85:PHE:CE2	1:A:88:ILE:HD11	2.52	0.44
1:A:87:ARG:HH22	1:B:390:GLU:HG3	1.81	0.44
1:B:299:ARG:HD2	1:B:332:TRP:CE3	2.52	0.44
1:B:222:ILE:O	1:B:226:LYS:HG2	2.17	0.44
1:B:246:VAL:HA	1:B:255:VAL:O	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:389:MET:HE3	1:B:389:MET:HB3	1.83	0.44
1:B:31:GLU:HB2	1:B:100:ARG:NH2	2.31	0.44
1:A:113:ARG:HD3	1:A:273:LEU:C	2.42	0.44
1:B:22:TYR:HB3	1:B:25:LYS:HD2	1.99	0.44
1:A:126:ARG:HG2	1:A:132:GLU:HG3	2.00	0.44
1:A:362:THR:H	1:A:365:GLU:HG2	1.82	0.44
1:A:160:HIS:HB2	1:A:165:ILE:HD12	2.00	0.44
1:A:402:ARG:NH2	1:A:460:GLN:HE21	2.16	0.44
1:B:72:ILE:O	1:B:74:LYS:N	2.51	0.44
1:A:20:ASP:HB2	1:A:21:ARG:NH2	2.33	0.44
1:A:275:ALA:HB1	1:A:280:VAL:HB	2.00	0.44
1:A:376:LYS:HZ1	1:A:458:GLY:HA3	1.81	0.43
1:A:435:GLN:HE21	1:A:461:GLU:HB2	1.82	0.43
1:A:444:ILE:HG21	1:B:349:ALA:HB2	1.99	0.43
1:A:95:GLY:HA2	1:A:98:TYR:CD2	2.49	0.43
1:A:11:THR:HG23	1:A:31:GLU:OE1	2.19	0.43
1:A:213:GLU:HG2	1:A:214:THR:H	1.83	0.43
1:B:113:ARG:HG2	1:B:126:ARG:HB2	2.00	0.43
1:A:1:MET:HG2	1:A:2:GLU:N	2.33	0.43
1:A:207:LEU:HD13	1:A:219:PHE:HD2	1.82	0.43
1:B:232:HIS:CG	1:B:233:GLU:H	2.35	0.43
1:A:155:CYS:SG	1:A:157:VAL:HG22	2.58	0.43
1:A:148:ILE:HG22	1:A:262:VAL:HG11	2.01	0.43
1:A:281:GLU:OE1	1:A:289:ILE:HG21	2.19	0.43
1:B:215:ILE:HD12	1:B:411:HIS:HB3	2.01	0.43
1:A:122:ARG:HB3	1:A:135:SER:O	2.19	0.43
1:A:342:ASP:O	1:B:442:TYR:OH	2.31	0.43
1:A:191:PHE:HB3	1:A:196:VAL:CG1	2.49	0.42
1:A:10:GLY:HA3	1:A:142:ALA:H	1.84	0.42
1:A:79:ASP:HA	1:A:82:GLU:HG3	2.01	0.42
1:B:345:PHE:HB3	1:B:428:MET:HE2	2.00	0.42
1:A:71:HIS:O	1:B:70:ALA:HA	2.19	0.42
1:B:7:ALA:HB3	1:B:138:VAL:HB	2.01	0.42
1:B:271:ASP:N	1:B:271:ASP:OD1	2.51	0.42
1:B:383:THR:O	1:B:387:TRP:HB2	2.18	0.42
1:A:232:HIS:CG	1:A:233:GLU:H	2.38	0.42
1:A:377:VAL:HG12	1:A:397:LYS:HB2	2.01	0.42
1:B:299:ARG:C	1:B:301:VAL:H	2.28	0.42
1:A:437:ILE:H	1:A:437:ILE:HG13	1.72	0.42
1:B:27:VAL:HB	1:B:105:ILE:HG22	2.02	0.42
1:B:48:LYS:H	1:B:48:LYS:HG2	1.71	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:295:ARG:HH21	1:A:299:ARG:HA	1.84	0.42
1:B:110:SER:OG	1:B:111:HIS:N	2.53	0.42
1:A:315:HIS:HB2	1:B:442:TYR:HD1	1.84	0.41
1:A:373:ILE:CG2	1:A:375:VAL:HG23	2.50	0.41
1:B:116:PRO:HD3	1:B:126:ARG:NH2	2.35	0.41
1:B:378:GLN:HE21	1:B:451:VAL:C	2.25	0.41
1:A:402:ARG:HB3	1:A:460:GLN:HE22	1.85	0.41
1:B:60:VAL:HG23	1:B:70:ALA:CB	2.50	0.41
1:B:296:THR:HG21	1:B:301:VAL:HG23	2.03	0.41
1:B:378:GLN:NE2	1:B:454:ASN:HB2	2.30	0.41
1:A:420:ILE:HD13	1:A:420:ILE:HA	1.89	0.41
1:A:76:ARG:HB3	1:A:79:ASP:OD2	2.21	0.41
1:A:7:ALA:HB3	1:A:138:VAL:HB	2.03	0.41
1:A:374:VAL:HG22	1:A:459:LEU:HG	2.03	0.41
1:B:179:GLY:HA2	1:B:264:THR:HG22	2.03	0.41
1:B:31:GLU:HG3	1:B:35:PHE:HA	2.02	0.41
1:B:113:ARG:N	1:B:126:ARG:O	2.51	0.41
1:A:33:GLY:O	1:A:34:THR:O	2.39	0.40
1:A:296:THR:HG21	1:A:301:VAL:HG23	2.03	0.40
1:A:342:ASP:OD1	1:A:344:ARG:HG2	2.20	0.40
1:B:268:PRO:HB2	1:B:287:ARG:HA	2.03	0.40
1:B:395:ILE:HD12	1:B:397:LYS:HE2	2.04	0.40
1:B:441:GLN:HG3	1:B:443:TRP:NE1	2.37	0.40
1:A:69:ASP:O	1:B:73:ASP:HB2	2.22	0.40
1:A:104:ASN:C	1:A:105:ILE:HD12	2.46	0.40
1:A:197:HIS:CE1	1:A:228:ASP:HB2	2.56	0.40
1:B:3:HIS:HA	1:B:134:THR:O	2.21	0.40
1:B:233:GLU:O	1:B:249:LEU:HD21	2.22	0.40
1:A:3:HIS:NE2	1:A:122:ARG:HD2	2.36	0.40
1:A:287:ARG:NH2	1:A:310:ASP:HB3	2.36	0.40
1:B:66:TYR:HE1	1:B:389:MET:O	2.05	0.40
1:B:102:ASP:HA	1:B:103:PRO:HA	1.88	0.40
1:B:367:ARG:NE	1:B:373:ILE:HD12	2.37	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	459/461 (100%)	369 (80%)	66 (14%)	24 (5%)	1	15
1	B	459/461 (100%)	378 (82%)	66 (14%)	15 (3%)	3	21
All	All	918/922 (100%)	747 (81%)	132 (14%)	39 (4%)	2	17

All (39) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	34	THR
1	A	231	THR
1	A	232	HIS
1	A	284	GLU
1	A	306	ASP
1	A	385	TYR
1	A	386	GLY
1	B	21	ARG
1	B	73	ASP
1	B	110	SER
1	B	232	HIS
1	B	339	VAL
1	B	431	GLY
1	A	20	ASP
1	A	73	ASP
1	A	103	PRO
1	A	104	ASN
1	A	262	VAL
1	A	288	VAL
1	A	380	TYR
1	A	431	GLY
1	B	130	GLY
1	B	142	ALA
1	B	181	GLY
1	A	21	ARG

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Mol	Chain	Res	Type
1	A	142	ALA
1	A	339	VAL
1	A	445	HIS
1	B	47	THR
1	B	104	ASN
1	B	128	GLU
1	A	111	HIS
1	A	244	ARG
1	A	381	GLY
1	B	46	PRO
1	B	236	ILE
1	A	113	ARG
1	B	18	VAL
1	A	305	GLY

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	371/371 (100%)	371 (100%)	0	100	100
1	B	371/371 (100%)	371 (100%)	0	100	100
All	All	742/742 (100%)	742 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	HIS
1	A	319	HIS
1	A	371	HIS
1	A	416	GLN
1	B	111	HIS
1	B	234	ASN
1	B	294	GLN

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Mol	Chain	Res	Type
1	B	343	HIS
1	B	379	ASN
1	B	415	HIS
1	B	435	GLN

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

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	461/461 (100%)	0.86	34 (7%)	20 23	65, 111, 165, 193	0
1	B	461/461 (100%)	0.83	34 (7%)	20 23	68, 110, 150, 172	0
All	All	922/922 (100%)	0.85	68 (7%)	20 23	65, 111, 159, 193	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	50	PHE	4.7
1	B	51	VAL	4.2
1	B	328	LEU	4.1
1	A	50	PHE	4.1
1	A	51	VAL	4.0
1	A	187	PHE	3.5
1	A	93	ALA	3.4
1	A	44	CYS	3.3
1	A	191	PHE	3.2
1	B	437	ILE	3.2
1	B	162	SER	3.1
1	A	54	ALA	3.0
1	B	45	ILE	3.0
1	A	374	VAL	2.9
1	B	178	ILE	2.9
1	A	48	LYS	2.9
1	A	47	THR	2.8
1	B	424	LEU	2.8
1	B	438	ALA	2.8
1	A	384	ALA	2.8
1	B	39	CYS	2.8
1	B	183	VAL	2.7
1	B	91	ILE	2.7
1	B	27	VAL	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	166	MET	2.7
1	B	166	MET	2.7
1	A	385	TYR	2.7
1	A	19	ASP	2.6
1	B	33	GLY	2.6
1	B	44	CYS	2.6
1	B	262	VAL	2.6
1	A	96	GLU	2.6
1	A	83	ARG	2.6
1	A	34	THR	2.5
1	B	93	ALA	2.5
1	A	38	THR	2.5
1	A	94	GLY	2.5
1	A	438	ALA	2.5
1	A	46	PRO	2.5
1	A	182	PHE	2.5
1	A	179	GLY	2.4
1	A	165	ILE	2.4
1	A	398	LEU	2.4
1	B	324	VAL	2.4
1	A	306	ASP	2.4
1	B	49	MET	2.4
1	A	123	TYR	2.3
1	B	8	ILE	2.3
1	B	144	SER	2.3
1	B	345	PHE	2.3
1	B	354	PRO	2.3
1	B	141	ALA	2.3
1	A	49	MET	2.3
1	B	281	GLU	2.3
1	B	139	VAL	2.3
1	A	241	ASP	2.2
1	A	396	ALA	2.2
1	A	178	ILE	2.2
1	A	125	LEU	2.2
1	A	194	LEU	2.2
1	B	32	GLN	2.2
1	B	16	SER	2.2
1	B	182	PHE	2.2
1	B	99	ARG	2.1
1	B	319	HIS	2.1
1	B	185	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	97	ASP	2.0
1	A	313	LEU	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.