



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 8, 2025 – 09:36 PM JST

PDB ID : 5HAB / pdb_00005hab
Title : Crystal structure of mpy-RNase J (mutant H84A), an archaeal RNase J from Methanobolus psychrophilus R15, complex with RNA
Authors : Li, D.F.; Feng, N.
Deposited on : 2015-12-30
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 : 4-5-2 with Phenix2.0rc1
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.006 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.45.1

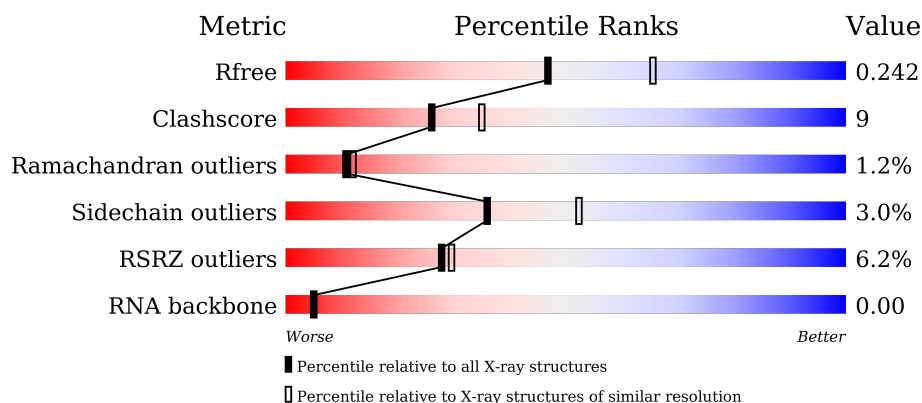
1 Overall quality at a glance

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)
RNA backbone	3690	1032 (2.60-2.00)

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	470	5% 77% 19% ..
1	B	470	7% 75% 21% ..
2	C	5	20% 40% 40%
2	D	5	80% 100%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7691 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 Ribonuclease J.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	456	Total	C	N	O	S	0	0	0
			3544	2226	623	675	20			
1	B	463	Total	C	N	O	S	0	0	0
			3598	2260	633	684	21			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	initiating methionine	UNP K4MAF9
A	-20	GLY	-	expression tag	UNP K4MAF9
A	-19	SER	-	expression tag	UNP K4MAF9
A	-18	SER	-	expression tag	UNP K4MAF9
A	-17	HIS	-	expression tag	UNP K4MAF9
A	-16	HIS	-	expression tag	UNP K4MAF9
A	-15	HIS	-	expression tag	UNP K4MAF9
A	-14	HIS	-	expression tag	UNP K4MAF9
A	-13	HIS	-	expression tag	UNP K4MAF9
A	-12	HIS	-	expression tag	UNP K4MAF9
A	-11	SER	-	expression tag	UNP K4MAF9
A	-10	SER	-	expression tag	UNP K4MAF9
A	-9	GLY	-	expression tag	UNP K4MAF9
A	-8	LEU	-	expression tag	UNP K4MAF9
A	-7	VAL	-	expression tag	UNP K4MAF9
A	-6	PRO	-	expression tag	UNP K4MAF9
A	-5	ARG	-	expression tag	UNP K4MAF9
A	-4	GLY	-	expression tag	UNP K4MAF9
A	-3	SER	-	expression tag	UNP K4MAF9
A	-2	HIS	-	expression tag	UNP K4MAF9
A	-1	MET	-	expression tag	UNP K4MAF9
A	0	ALA	-	expression tag	UNP K4MAF9
A	1	SER	-	expression tag	UNP K4MAF9
A	84	ALA	HIS	engineered mutation	UNP K4MAF9
B	-21	MET	-	initiating methionine	UNP K4MAF9

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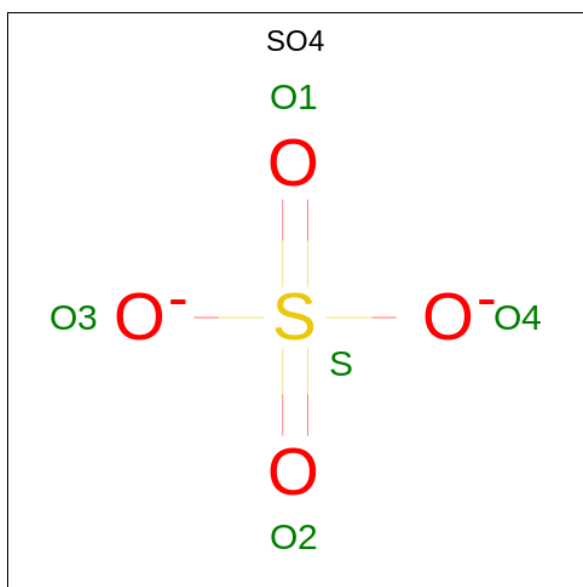
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-20	GLY	-	expression tag	UNP K4MAF9
B	-19	SER	-	expression tag	UNP K4MAF9
B	-18	SER	-	expression tag	UNP K4MAF9
B	-17	HIS	-	expression tag	UNP K4MAF9
B	-16	HIS	-	expression tag	UNP K4MAF9
B	-15	HIS	-	expression tag	UNP K4MAF9
B	-14	HIS	-	expression tag	UNP K4MAF9
B	-13	HIS	-	expression tag	UNP K4MAF9
B	-12	HIS	-	expression tag	UNP K4MAF9
B	-11	SER	-	expression tag	UNP K4MAF9
B	-10	SER	-	expression tag	UNP K4MAF9
B	-9	GLY	-	expression tag	UNP K4MAF9
B	-8	LEU	-	expression tag	UNP K4MAF9
B	-7	VAL	-	expression tag	UNP K4MAF9
B	-6	PRO	-	expression tag	UNP K4MAF9
B	-5	ARG	-	expression tag	UNP K4MAF9
B	-4	GLY	-	expression tag	UNP K4MAF9
B	-3	SER	-	expression tag	UNP K4MAF9
B	-2	HIS	-	expression tag	UNP K4MAF9
B	-1	MET	-	expression tag	UNP K4MAF9
B	0	ALA	-	expression tag	UNP K4MAF9
B	1	SER	-	expression tag	UNP K4MAF9
B	84	ALA	HIS	engineered mutation	UNP K4MAF9

- Molecule 2 is a RNA chain called RNA (5'-R(P*AP*AP*AP*AP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	5	Total	C	N	O	P	0	0	0
			111	50	25	31	5			
2	D	5	Total	C	N	O	P	0	0	0
			111	50	25	31	5			

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	146	Total	O	0	0
			146	146		
4	B	127	Total	O	0	0
			127	127		
4	C	4	Total	O	0	0
			4	4		

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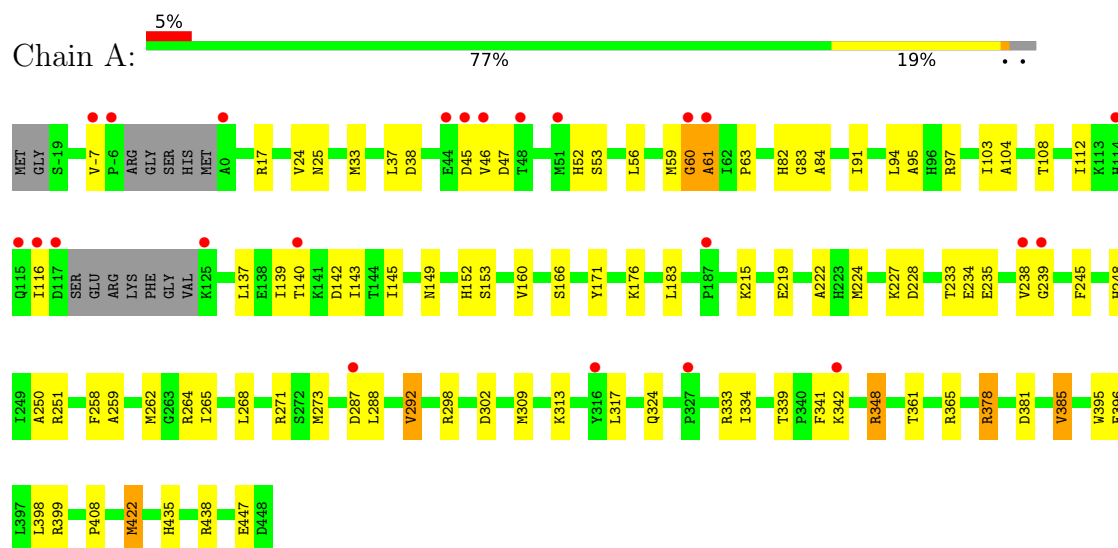
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	5	Total	O	0	0
			5	5		

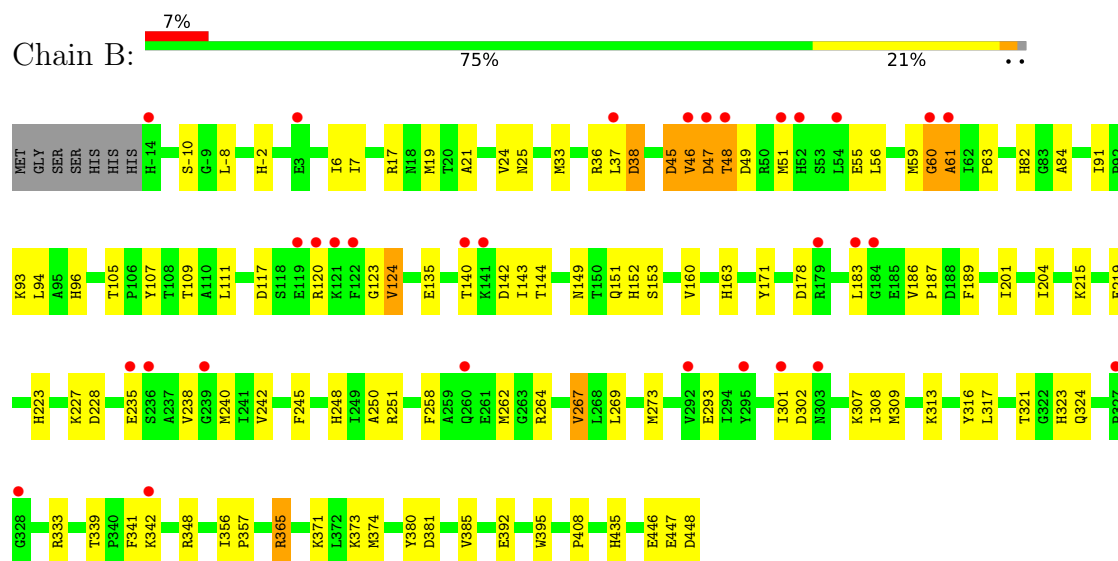
3 Residue-property plots [i](#)

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.

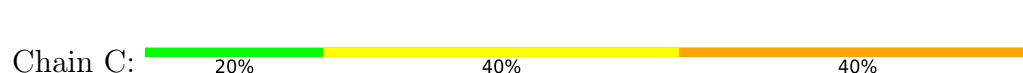
• Molecule 1: Ribonuclease J



• Molecule 1: Ribonuclease J

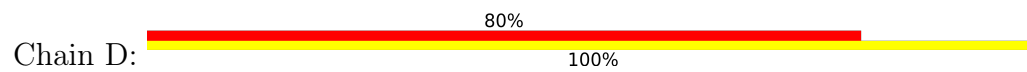


• Molecule 2: RNA (5'-R(P*AP*AP*AP*AP*A)-3')





- Molecule 2: RNA (5'-R(P*AP*AP*AP*AP*A)-3')



4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	169.68Å 169.68Å 167.32Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	55.21 – 2.30 55.21 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.6 (55.21-2.30) 95.2 (55.21-2.30)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.05 (at 2.29Å)	Xtriage
Refinement program	PHENIX DEV_1980	Depositor
R, R_{free}	0.206 , 0.241 0.208 , 0.242	Depositor DCC
R_{free} test set	3119 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	38.9	Xtriage
Anisotropy	0.164	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7691	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.79% 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: SO4

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	0.37	0/3609	0.77	2/4886 (0.0%)
1	B	0.37	0/3664	0.76	2/4959 (0.0%)
2	C	0.13	0/125	0.24	0/191
2	D	0.12	0/125	0.30	0/191
All	All	0.37	0/7523	0.75	4/10227 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	60	GLY	CA-C-N	5.87	132.27	121.70
1	A	60	GLY	C-N-CA	5.87	132.27	121.70
1	B	60	GLY	CA-C-N	5.84	132.21	121.70
1	B	60	GLY	C-N-CA	5.84	132.21	121.70

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	3544	0	3532	64	0
1	B	3598	0	3594	76	0
2	C	111	0	56	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	111	0	56	1	0
3	A	20	0	0	0	0
3	B	25	0	0	1	0
4	A	146	0	0	8	1
4	B	127	0	0	9	0
4	C	4	0	0	0	0
4	D	5	0	0	1	0
All	All	7691	0	7238	136	1

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 9.

All (136) 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:B:339:THR:HG22	1:B:341:PHE:H	1.43	0.83
1:A:233:THR:HG22	1:A:235:GLU:H	1.42	0.83
1:B:19:MET:HE2	1:B:33:MET:HG2	1.59	0.83
1:A:339:THR:HG22	1:A:341:PHE:H	1.47	0.79
1:B:238:VAL:HG11	1:B:348:ARG:HD3	1.64	0.78
1:A:396:GLU:OE1	4:A:601:HOH:O	2.03	0.76
1:B:140:THR:HG22	1:B:142:ASP:H	1.52	0.74
1:B:321:THR:OG1	4:B:601:HOH:O	2.06	0.73
1:A:153:SER:O	4:A:602:HOH:O	2.08	0.71
1:A:302:ASP:OD1	1:A:333:ARG:NH2	2.26	0.69
1:A:83:GLY:O	4:A:603:HOH:O	2.11	0.68
1:B:51:MET:O	1:B:93:LYS:NZ	2.27	0.68
2:D:1:A:OP1	4:D:101:HOH:O	2.12	0.67
1:A:219:GLU:OE1	1:A:251:ARG:NH1	2.28	0.67
1:A:33:MET:HE2	1:A:91:ILE:HA	1.76	0.66
1:A:52:HIS:ND1	4:A:608:HOH:O	2.26	0.66
1:A:309:MET:HE1	1:A:313:LYS:HD3	1.79	0.65
1:B:309:MET:HE3	1:B:341:PHE:HA	1.78	0.64
1:A:309:MET:HE3	1:A:342:LYS:H	1.64	0.63
1:B:33:MET:HE2	1:B:91:ILE:HA	1.81	0.63
1:B:323:HIS:O	1:B:365:ARG:NH1	2.31	0.62
1:B:262:MET:HE3	1:B:264:ARG:HD2	1.81	0.62
1:B:219:GLU:OE1	1:B:251:ARG:NH1	2.34	0.61
1:B:117:ASP:OD2	4:B:602:HOH:O	2.16	0.60
1:B:309:MET:HE3	1:B:342:LYS:H	1.67	0.59
1:B:46:VAL:O	1:B:48:THR:N	2.34	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:135:GLU:OE1	4:B:603:HOH:O	2.17	0.59
1:A:334:ILE:HG12	1:A:339:THR:HG21	1.86	0.58
1:B:45:ASP:O	1:B:47:ASP:N	2.37	0.58
1:A:288:LEU:HD13	1:A:292:VAL:HG11	1.85	0.58
1:B:17:ARG:HB2	1:B:63:PRO:HD3	1.86	0.58
1:B:219:GLU:OE2	4:B:604:HOH:O	2.17	0.58
1:A:378:ARG:HD3	1:B:392:GLU:OE1	2.04	0.57
1:A:140:THR:HG22	1:A:142:ASP:H	1.70	0.57
1:A:33:MET:HE3	1:A:94:LEU:HB2	1.88	0.56
1:B:19:MET:HE3	1:B:63:PRO:HG2	1.88	0.55
1:B:33:MET:CE	1:B:94:LEU:HB2	2.36	0.55
1:B:96:HIS:HB2	1:B:124:VAL:HG13	1.87	0.55
1:B:269:LEU:HD23	1:B:301:ILE:HG23	1.89	0.55
1:B:228:ASP:OD2	4:B:605:HOH:O	2.18	0.55
1:A:238:VAL:HG11	1:A:348:ARG:HD2	1.88	0.55
1:A:339:THR:HG22	1:A:341:PHE:N	2.19	0.55
1:A:378:ARG:HD2	1:B:395:TRP:CE2	2.43	0.54
1:B:19:MET:HE2	1:B:33:MET:CG	2.36	0.54
1:A:309:MET:HE3	1:A:341:PHE:HA	1.90	0.53
1:B:160:VAL:HG13	1:B:171:TYR:HB3	1.91	0.53
1:A:33:MET:CE	1:A:94:LEU:HB2	2.38	0.53
1:A:234:GLU:HG2	4:B:609:HOH:O	2.08	0.53
1:A:245:PHE:HB2	1:A:248:HIS:HB2	1.91	0.53
1:A:262:MET:HE2	1:A:264:ARG:HD2	1.90	0.53
1:B:56:LEU:HD23	1:B:59:MET:HE2	1.90	0.53
1:B:56:LEU:O	1:B:61:ALA:HB3	2.09	0.53
1:A:56:LEU:O	1:A:61:ALA:HB3	2.08	0.53
1:B:371:LYS:HA	1:B:374:MET:HE2	1.92	0.52
1:A:395:TRP:HE3	1:A:422:MET:HE3	1.75	0.52
1:B:373:LYS:NZ	4:B:608:HOH:O	2.28	0.52
1:B:-2:HIS:ND1	1:B:448:ASP:HB3	2.26	0.51
1:B:33:MET:HE3	1:B:94:LEU:HB2	1.92	0.51
1:B:273:MET:HG2	1:B:321:THR:HG23	1.91	0.51
1:B:183:LEU:HD22	1:B:250:ALA:HA	1.92	0.51
1:A:271:ARG:HD3	2:C:5:A:C8	2.46	0.51
1:B:6:ILE:HD12	1:B:204:ILE:HD11	1.93	0.51
1:A:259:ALA:HB2	1:A:317:LEU:HD23	1.94	0.49
1:B:293:GLU:OE1	4:B:606:HOH:O	2.20	0.49
1:B:24:VAL:HB	1:B:143:ILE:HD11	1.95	0.48
1:A:56:LEU:HD23	1:A:59:MET:HE2	1.95	0.47
1:B:7:ILE:HB	1:B:21:ALA:HB3	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:166:SER:OG	1:A:447:GLU:OE2	2.30	0.47
1:B:262:MET:HE2	1:B:317:LEU:HD22	1.97	0.47
1:A:24:VAL:HB	1:A:143:ILE:HD11	1.96	0.47
1:B:267:VAL:HG11	1:B:308:ILE:HD11	1.98	0.46
1:A:33:MET:HE1	1:A:95:ALA:N	2.30	0.46
1:A:112:ILE:O	1:A:116:ILE:HG12	2.16	0.46
1:B:107:TYR:CE2	1:B:111:LEU:HD11	2.51	0.46
1:A:287:ASP:O	4:A:604:HOH:O	2.21	0.46
1:B:187:PRO:HG2	1:B:189:PHE:CE2	2.51	0.46
1:A:56:LEU:O	1:A:60:GLY:N	2.35	0.46
1:A:378:ARG:NH1	1:B:392:GLU:OE2	2.49	0.46
1:A:324:GLN:HB3	1:A:361:THR:HG23	1.97	0.46
1:A:365:ARG:NH2	1:A:381:ASP:OD1	2.49	0.46
1:B:105:THR:O	1:B:109:THR:HG23	2.15	0.46
1:A:103:ILE:HD13	1:A:137:LEU:HD23	1.98	0.45
1:A:222:ALA:HB2	1:A:385:VAL:HB	1.98	0.45
1:A:239:GLY:HA2	1:A:264:ARG:HH12	1.81	0.45
1:B:47:ASP:O	1:B:49:ASP:N	2.50	0.45
1:A:183:LEU:HD12	1:A:183:LEU:HA	1.81	0.45
1:B:245:PHE:HB2	1:B:248:HIS:HB2	1.99	0.45
1:B:339:THR:HG22	1:B:341:PHE:N	2.21	0.45
1:A:398:LEU:HD23	1:A:422:MET:HE1	1.98	0.44
1:B:365:ARG:NH2	1:B:381:ASP:OD1	2.50	0.44
1:A:395:TRP:CE3	1:A:422:MET:HE3	2.52	0.44
1:B:307:LYS:HE2	1:B:316:TYR:OH	2.18	0.44
1:A:228:ASP:OD1	1:B:215:LYS:NZ	2.42	0.44
1:B:140:THR:HB	1:B:143:ILE:HB	2.00	0.44
1:B:309:MET:HE1	1:B:313:LYS:HD3	1.99	0.43
1:B:323:HIS:ND1	1:B:324:GLN:HG2	2.33	0.43
1:B:323:HIS:CE1	1:B:324:GLN:HG2	2.53	0.43
1:B:45:ASP:N	4:B:616:HOH:O	2.51	0.43
1:B:242:VAL:HG23	1:B:317:LEU:HD11	2.00	0.43
1:B:408:PRO:HD2	1:B:435:HIS:O	2.19	0.43
1:A:160:VAL:HG13	1:A:171:TYR:HB3	2.00	0.43
1:B:151:GLN:HG3	1:B:178:ASP:HB3	2.00	0.43
1:A:224:MET:HA	1:A:224:MET:HE2	2.01	0.42
1:A:422:MET:O	1:A:422:MET:HE2	2.20	0.42
1:B:36:ARG:NE	1:B:38:ASP:OD2	2.52	0.42
1:B:302:ASP:OD1	1:B:333:ARG:NH2	2.52	0.42
1:B:93:LYS:HD3	1:B:93:LYS:HA	1.65	0.42
1:A:342:LYS:HG3	4:A:611:HOH:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:139:ILE:HD13	1:A:145:ILE:HG23	2.02	0.42
1:A:183:LEU:HD22	1:A:250:ALA:HA	2.00	0.42
1:B:152:HIS:CG	1:B:153:SER:H	2.37	0.42
1:B:240:MET:HE2	1:B:264:ARG:CZ	2.50	0.42
1:A:46:VAL:HG11	2:C:3:A:H61	1.85	0.42
1:A:82:HIS:CE1	1:A:84:ALA:HB3	2.55	0.42
1:B:82:HIS:CE1	1:B:84:ALA:HB3	2.55	0.42
1:B:60:GLY:N	1:B:61:ALA:HB3	2.36	0.41
1:A:399:ARG:NH1	1:B:235:GLU:OE1	2.53	0.41
1:B:19:MET:HE3	1:B:63:PRO:CG	2.50	0.41
1:B:55:GLU:O	1:B:59:MET:HG3	2.20	0.41
1:A:152:HIS:CG	1:A:153:SER:H	2.38	0.41
1:A:438:ARG:HD2	4:A:649:HOH:O	2.19	0.41
1:A:53:SER:HB2	1:A:97:ARG:HH22	1.85	0.41
1:A:227:LYS:HB2	1:A:258:PHE:CZ	2.56	0.41
1:A:298:ARG:NH1	2:C:5:A:O3'	2.53	0.41
1:A:17:ARG:HB2	1:A:63:PRO:HD3	2.03	0.41
1:B:348:ARG:HG2	1:B:380:TYR:HE1	1.86	0.41
1:B:201:ILE:HD13	1:B:447:GLU:HG3	2.02	0.41
1:B:223:HIS:NE2	3:B:504:SO4:O4	2.43	0.41
1:B:227:LYS:HB2	1:B:258:PHE:CZ	2.56	0.41
1:A:104:ALA:HB1	1:A:108:THR:HB	2.02	0.40
1:A:408:PRO:HD2	1:A:435:HIS:O	2.22	0.40
1:A:268:LEU:HG	1:A:273:MET:HE2	2.03	0.40
1:B:33:MET:HE1	1:B:94:LEU:HB2	2.03	0.40
1:B:356:ILE:HA	1:B:357:PRO:HD3	1.80	0.40
1:A:176:LYS:NZ	4:A:605:HOH:O	2.22	0.40
1:B:144:THR:OG1	1:B:163:HIS:HB2	2.22	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:644:HOH:O	4:A:730:HOH:O[10_665]	2.02	0.18

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	450/470 (96%)	428 (95%)	18 (4%)	4 (1%)	14	17
1	B	461/470 (98%)	432 (94%)	22 (5%)	7 (2%)	8	8
All	All	911/940 (97%)	860 (94%)	40 (4%)	11 (1%)	11	12

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	45	ASP
1	B	46	VAL
1	B	47	ASP
1	B	48	THR
1	A	47	ASP
1	B	45	ASP
1	A	25	ASN
1	A	61	ALA
1	B	61	ALA
1	B	123	GLY
1	B	25	ASN

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	382/393 (97%)	371 (97%)	11 (3%)	37	54
1	B	387/393 (98%)	375 (97%)	12 (3%)	35	51

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	769/786 (98%)	746 (97%)	23 (3%)	36 52

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-7	VAL
1	A	37	LEU
1	A	38	ASP
1	A	149	ASN
1	A	215	LYS
1	A	265	ILE
1	A	292	VAL
1	A	348	ARG
1	A	378	ARG
1	A	385	VAL
1	A	422	MET
1	B	-10	SER
1	B	-8	LEU
1	B	37	LEU
1	B	38	ASP
1	B	120	ARG
1	B	124	VAL
1	B	149	ASN
1	B	186	VAL
1	B	267	VAL
1	B	365	ARG
1	B	385	VAL
1	B	446	GLU

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	18	ASN
1	A	72	ASN
1	A	149	ASN
1	A	358	ASN
1	B	41	GLN
1	B	43	HIS
1	B	115	GLN
1	B	149	ASN
1	B	248	HIS

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Mol	Chain	Res	Type
1	B	260	GLN
1	B	324	GLN
1	B	336	ASN
1	B	358	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	C	4/5 (80%)	4 (100%)	0
2	D	4/5 (80%)	4 (100%)	0
All	All	8/10 (80%)	8 (100%)	0

All (8) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	C	2	A
2	C	3	A
2	C	4	A
2	C	5	A
2	D	2	A
2	D	3	A
2	D	4	A
2	D	5	A

There are no RNA pucker outliers to report.

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](#)

9 ligands are 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	$\# Z > 2$
3	SO4	B	504	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	B	501	-	4,4,4	0.15	0	6,6,6	0.09	0
3	SO4	B	505	-	4,4,4	0.12	0	6,6,6	0.05	0
3	SO4	B	502	-	4,4,4	0.13	0	6,6,6	0.05	0
3	SO4	B	503	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	A	504	-	4,4,4	0.13	0	6,6,6	0.06	0
3	SO4	A	501	-	4,4,4	0.15	0	6,6,6	0.06	0
3	SO4	A	503	-	4,4,4	0.13	0	6,6,6	0.14	0
3	SO4	A	502	-	4,4,4	0.15	0	6,6,6	0.06	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	504	SO4	1	0

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	456/470 (97%)	0.24	23 (5%) 35 36	24, 42, 75, 115	0
1	B	463/470 (98%)	0.42	31 (6%) 25 27	23, 47, 81, 116	0
2	C	5/5 (100%)	1.19	0 100 100	60, 74, 83, 94	0
2	D	5/5 (100%)	2.30	4 (80%) 0 0	87, 97, 112, 125	0
All	All	929/950 (97%)	0.35	58 (6%) 28 29	23, 45, 82, 125	0

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	46	VAL	9.5
1	B	46	VAL	6.7
1	A	60	GLY	4.4
1	A	48	THR	4.3
1	B	60	GLY	3.9
1	A	0	ALA	3.9
1	A	45	ASP	3.4
1	B	239	GLY	3.4
1	A	116	ILE	3.3
1	A	-7	VAL	3.2
1	B	121	LYS	3.2
1	A	-6	PRO	3.1
1	B	342	LYS	3.1
2	D	1	A	3.0
1	B	48	THR	3.0
1	B	47	ASP	2.9
1	A	187	PRO	2.9
1	A	114	HIS	2.9
1	A	125	LYS	2.9
1	B	61	ALA	2.8
1	B	295	TYR	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	292	VAL	2.8
1	B	301	ILE	2.7
1	B	141	LYS	2.6
1	A	327	PRO	2.6
1	B	327	PRO	2.6
1	A	115	GLN	2.6
1	A	44	GLU	2.5
1	B	236	SER	2.5
1	B	52	HIS	2.5
1	A	117	ASP	2.4
1	B	3	GLU	2.4
1	B	120	ARG	2.4
1	B	51	MET	2.4
1	B	328	GLY	2.4
1	A	61	ALA	2.4
1	B	54	LEU	2.4
1	A	238	VAL	2.3
1	B	-14	HIS	2.3
1	B	260	GLN	2.3
2	D	3	A	2.3
1	B	119	GLU	2.3
2	D	5	A	2.3
1	B	37	LEU	2.2
1	B	122	PHE	2.2
2	D	4	A	2.2
1	A	287	ASP	2.2
1	A	51	MET	2.2
1	B	179	ARG	2.2
1	B	303	ASN	2.2
1	B	183	LEU	2.1
1	B	235	GLU	2.1
1	A	342	LYS	2.1
1	A	140	THR	2.1
1	A	316	TYR	2.1
1	A	239	GLY	2.1
1	B	140	THR	2.1
1	B	184	GLY	2.0

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

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](#)

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($\text{\AA}^2$)	Q<0.9
3	SO4	B	502	5/5	0.67	0.11	99,105,122,129	0
3	SO4	A	503	5/5	0.71	0.13	62,74,98,115	0
3	SO4	A	504	5/5	0.76	0.12	85,91,105,113	0
3	SO4	B	503	5/5	0.77	0.12	69,81,94,110	0
3	SO4	B	501	5/5	0.78	0.14	51,63,99,103	0
3	SO4	A	502	5/5	0.83	0.10	69,77,89,100	0
3	SO4	B	504	5/5	0.85	0.11	89,99,118,126	0
3	SO4	A	501	5/5	0.86	0.09	89,92,96,101	0
3	SO4	B	505	5/5	0.93	0.10	50,62,73,75	0

6.5 Other polymers [i](#)

There are no such residues in this entry.