



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 01:34 PM UTC

PDB ID : 1H7S / pdb_00001h7s
Title : N-terminal 40kDa fragment of human PMS2
Authors : Guarne, A.; Junop, M.S.; Yang, W.
Deposited on : 2001-07-10
Resolution : 1.95 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
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (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

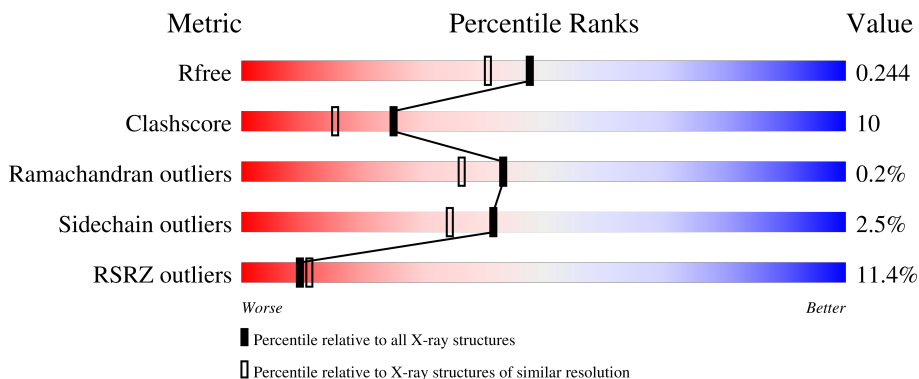
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 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	3494 (1.96-1.96)
Clashscore	190562	3612 (1.96-1.96)
Ramachandran outliers	187476	3587 (1.96-1.96)
Sidechain outliers	187428	3587 (1.96-1.96)
RSRZ outliers	180081	3495 (1.96-1.96)

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	365	 9% 69% 17% • 12%
1	B	365	 10% 63% 18% • 17%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 5113 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 PMS1 PROTEIN HOMOLOG 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	N	O	S				Se
1	A	321	2486	1566	428	476	12	4	0	0	0
1	B	302	2337	1472	402	447	12	4	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	136	MSE	MET	modified residue	UNP P54278
A	184	MSE	MET	modified residue	UNP P54278
A	312	MSE	MET	modified residue	UNP P54278
A	362	MSE	MET	modified residue	UNP P54278
B	136	MSE	MET	modified residue	UNP P54278
B	184	MSE	MET	modified residue	UNP P54278
B	312	MSE	MET	modified residue	UNP P54278
B	362	MSE	MET	modified residue	UNP P54278

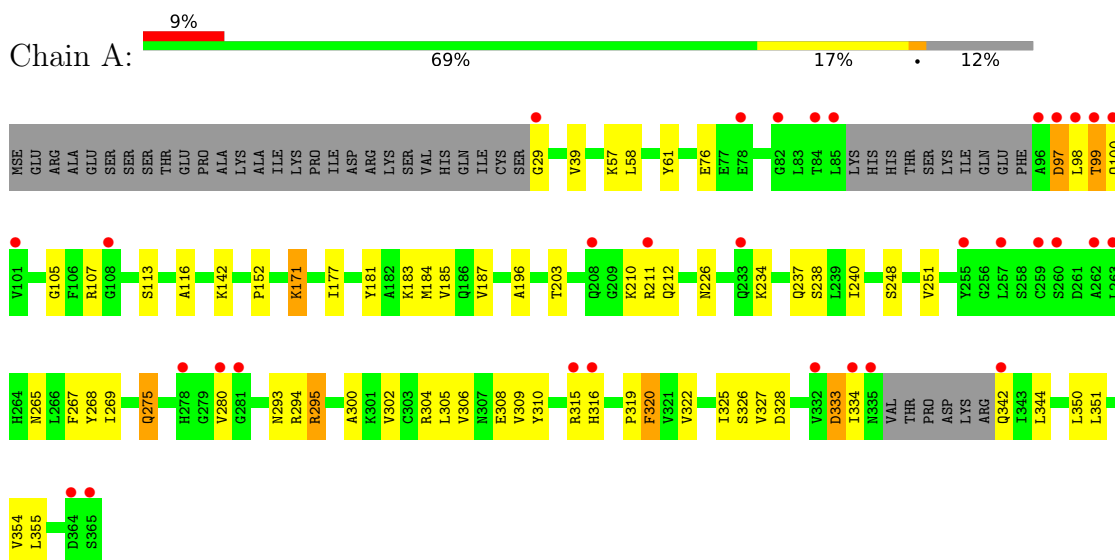
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	156	Total	O	0	0
			156	156		
2	B	134	Total	O	0	0
			134	134		

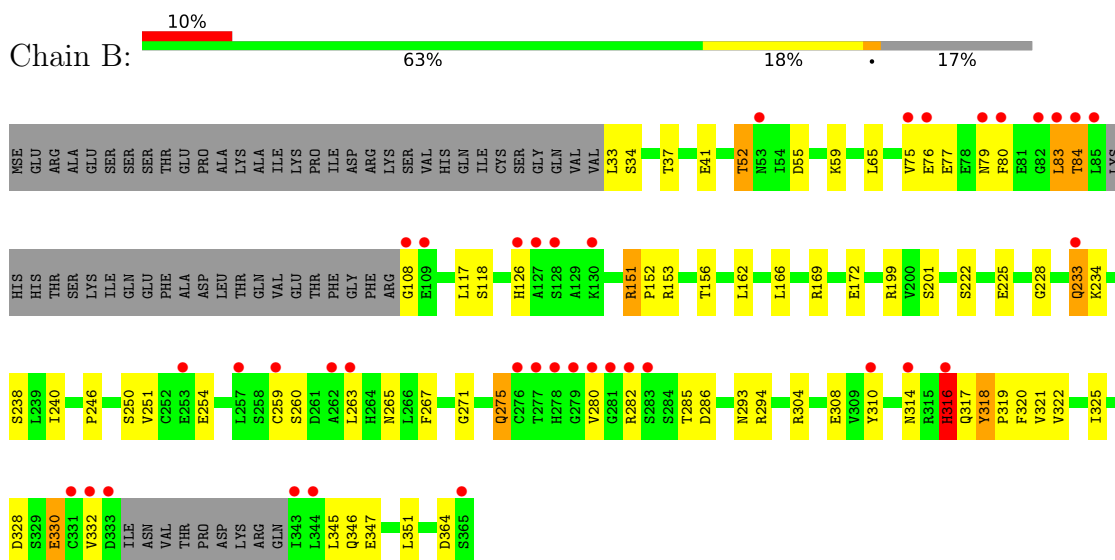
3 Residue-property plots [i](#)

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: PMS1 PROTEIN HOMOLOG 2



• Molecule 1: PMS1 PROTEIN HOMOLOG 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	74.16Å 74.85Å 135.34Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.96 – 1.95 19.96 – 1.95	Depositor EDS
% Data completeness (in resolution range)	96.8 (19.96-1.95) 96.7 (19.96-1.95)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.26 (at 1.93Å)	Xtrriage
Refinement program	CNS 0.9	Depositor
R, R_{free}	0.218 , 0.243 0.218 , 0.244	Depositor DCC
R_{free} test set	5471 reflections (10.03%)	wwPDB-VP
Wilson B-factor (Å ²)	27.2	Xtrriage
Anisotropy	0.306	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 42.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.032 for k,h,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	5113	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.93% 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](#)

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	0.48	0/2523	0.98	9/3403 (0.3%)
1	B	0.42	0/2372	0.94	12/3198 (0.4%)
All	All	0.45	0/4895	0.96	21/6601 (0.3%)

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	97	ASP	N-CA-C	7.54	120.67	109.59
1	A	320	PHE	N-CA-C	-7.10	98.98	110.20
1	A	316	HIS	N-CA-C	6.45	119.86	112.57
1	B	246	PRO	N-CA-C	-6.33	103.81	110.58
1	B	320	PHE	N-CA-C	-6.23	99.86	109.76
1	B	83	LEU	N-CA-C	6.20	124.00	110.80
1	A	275	GLN	N-CA-C	-6.04	102.51	110.43
1	B	316	HIS	N-CA-C	5.86	117.42	109.11
1	A	97	ASP	CB-CA-C	-5.76	101.61	110.26
1	B	321	VAL	N-CA-C	5.66	116.43	108.17
1	B	166	LEU	CA-C-N	5.57	126.81	119.84
1	B	166	LEU	C-N-CA	5.57	126.81	119.84
1	B	364	ASP	N-CA-C	-5.50	105.44	111.82
1	A	61	TYR	N-CA-C	5.46	119.77	113.38
1	A	315	ARG	N-CA-C	5.46	117.67	111.11
1	B	52	THR	N-CA-C	-5.42	105.47	113.61
1	A	177	ILE	N-CA-C	5.29	116.02	110.62
1	B	275	GLN	N-CA-C	-5.23	103.63	110.53
1	B	234	LYS	N-CA-C	-5.20	105.23	112.45
1	A	328	ASP	N-CA-C	-5.19	101.96	109.59
1	B	330	GLU	N-CA-C	5.06	118.23	111.75

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	2486	0	2488	47	0
1	B	2337	0	2343	48	0
2	A	156	0	0	2	0
2	B	134	0	0	5	0
All	All	5113	0	4831	94	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 10.

All (94) 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:83:LEU:O	1:B:84:THR:HG23	1.70	0.91
1:B:151:ARG:HD3	1:B:152:PRO:O	1.75	0.87
1:A:238:SER:HB2	1:A:280:VAL:HG13	1.64	0.78
1:B:75:VAL:HG11	1:B:83:LEU:HD11	1.71	0.72
1:B:172:GLU:HG2	2:B:2069:HOH:O	1.88	0.71
1:B:325:ILE:HD13	1:B:351:LEU:HD21	1.71	0.71
1:B:77:GLU:HA	1:B:80:PHE:CE1	2.27	0.70
1:A:238:SER:HB2	1:A:280:VAL:CG1	2.23	0.68
1:A:58:LEU:HD13	1:A:184:MSE:HE1	1.76	0.67
1:A:58:LEU:CD1	1:A:184:MSE:HE1	2.24	0.67
1:B:304:ARG:O	1:B:308:GLU:HG3	1.96	0.66
1:B:238:SER:HB2	1:B:280:VAL:CG1	2.28	0.64
1:B:83:LEU:HA	1:B:108:GLY:HA2	1.81	0.63
1:A:234:LYS:HA	1:A:237:GLN:HE21	1.64	0.62
1:B:304:ARG:HD2	2:B:2130:HOH:O	2.02	0.60
1:B:238:SER:HB2	1:B:280:VAL:HG13	1.83	0.60
1:A:99:THR:HG23	1:A:99:THR:O	2.03	0.59
1:B:77:GLU:HA	1:B:80:PHE:CZ	2.37	0.59
1:A:105:GLY:HA3	1:A:113:SER:HB3	1.84	0.58
1:B:318:TYR:CD1	1:B:318:TYR:N	2.73	0.56
1:A:142:LYS:HD2	2:A:2057:HOH:O	2.05	0.56
1:A:248:SER:OG	1:A:251:VAL:HG23	2.06	0.56
1:B:314:ASN:OD1	1:B:317:GLN:HB2	2.06	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:183:LYS:HE3	1:A:187:VAL:HG23	1.88	0.56
1:B:83:LEU:O	1:B:84:THR:CG2	2.51	0.55
1:B:228:GLY:HA3	1:B:233:GLN:NE2	2.21	0.55
1:A:57:LYS:HE2	2:A:2097:HOH:O	2.05	0.55
1:A:203:THR:HB	1:A:211:ARG:HG3	1.89	0.55
1:B:34:SER:H	1:B:37:THR:HG1	1.54	0.55
1:B:59:LYS:HB2	1:B:65:LEU:HB3	1.90	0.53
1:A:107:ARG:CZ	1:A:116:ALA:HB2	2.38	0.53
1:A:300:ALA:O	1:A:304:ARG:HG3	2.09	0.53
1:B:260:SER:O	1:B:263:LEU:HB2	2.08	0.53
1:A:295:ARG:CG	1:A:295:ARG:HH11	2.21	0.53
1:A:305:LEU:O	1:A:309:VAL:HG23	2.09	0.53
1:A:302:VAL:O	1:A:306:VAL:HG23	2.09	0.53
1:A:240:ILE:HG23	1:A:275:GLN:HG2	1.91	0.52
1:A:350:LEU:O	1:A:354:VAL:HG23	2.10	0.52
1:A:234:LYS:HA	1:A:237:GLN:NE2	2.25	0.52
1:A:39:VAL:HG21	1:A:184:MSE:HE2	1.92	0.52
1:B:285:THR:HG23	1:B:318:TYR:CD2	2.45	0.52
1:A:334:ILE:HA	1:A:342:GLN:O	2.10	0.51
1:B:294:ARG:HD2	2:B:2083:HOH:O	2.10	0.51
1:B:33:LEU:HD23	1:B:117:LEU:HD12	1.93	0.51
1:B:75:VAL:HG21	1:B:83:LEU:HD11	1.93	0.51
1:B:151:ARG:NH2	1:B:156:THR:OG1	2.44	0.50
1:B:153:ARG:NH1	1:B:153:ARG:HB3	2.27	0.50
1:B:293:ASN:O	1:B:294:ARG:HB2	2.12	0.50
1:A:99:THR:O	1:A:99:THR:CG2	2.55	0.49
1:A:325:ILE:HD13	1:A:351:LEU:HD21	1.94	0.49
1:B:83:LEU:HA	1:B:108:GLY:CA	2.43	0.49
1:A:152:PRO:HB3	1:B:52:THR:HB	1.95	0.49
1:A:295:ARG:HG3	1:A:295:ARG:NH1	2.27	0.48
1:A:333:ASP:HB3	1:A:344:LEU:HB2	1.96	0.47
1:A:265:ASN:C	1:A:265:ASN:HD22	2.23	0.47
1:A:295:ARG:HH11	1:A:295:ARG:HG3	1.81	0.46
1:B:76:GLU:HG2	1:B:126:HIS:CD2	2.50	0.46
1:A:310:TYR:CD2	1:A:319:PRO:HD3	2.50	0.46
1:B:251:VAL:O	1:B:254:GLU:HB2	2.16	0.46
1:B:318:TYR:N	1:B:318:TYR:HD1	2.13	0.46
1:A:320:PHE:CE1	1:A:322:VAL:HG23	2.51	0.45
1:B:250:SER:O	1:B:254:GLU:HG3	2.17	0.45
1:B:282:ARG:NH2	1:B:286:ASP:OD2	2.36	0.45
1:B:328:ASP:OD1	1:B:330:GLU:HG2	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:98:LEU:HA	1:A:98:LEU:HD23	1.73	0.44
1:A:171:LYS:HA	1:A:171:LYS:HD3	1.76	0.44
1:B:233:GLN:NE2	2:B:2106:HOH:O	2.49	0.44
1:A:295:ARG:CG	1:A:295:ARG:NH1	2.81	0.44
1:B:41:GLU:HG3	2:B:2004:HOH:O	2.18	0.44
1:B:316:HIS:O	1:B:317:GLN:HG3	2.18	0.44
1:B:346:GLN:O	1:B:347:GLU:HB2	2.17	0.43
1:A:267:PHE:HD1	1:A:327:VAL:CG1	2.31	0.43
1:A:183:LYS:HA	1:A:183:LYS:HD2	1.76	0.43
1:B:271:GLY:HA3	1:B:322:VAL:O	2.18	0.43
1:B:118:SER:HB3	1:B:162:LEU:HA	2.01	0.43
1:B:199:ARG:HG2	1:B:199:ARG:NH1	2.34	0.43
1:B:240:ILE:HG23	1:B:275:GLN:HG2	2.01	0.42
1:B:332:VAL:HG22	1:B:345:LEU:CD2	2.50	0.42
1:A:293:ASN:O	1:A:294:ARG:HB2	2.18	0.42
1:A:238:SER:CB	1:A:280:VAL:HG13	2.41	0.42
1:B:55:ASP:OD1	1:B:201:SER:OG	2.38	0.42
1:A:269:ILE:HD13	1:A:355:LEU:CD2	2.50	0.42
1:B:265:ASN:ND2	1:B:267:PHE:H	2.18	0.42
1:A:320:PHE:C	1:A:320:PHE:CD1	2.98	0.41
1:B:199:ARG:HG2	1:B:199:ARG:HH11	1.84	0.41
1:A:29:GLY:HA3	1:A:100:GLN:O	2.20	0.41
1:A:196:ALA:HA	1:A:226:ASN:HD21	1.86	0.41
1:A:268:TYR:HB2	1:A:326:SER:HB3	2.02	0.41
1:A:181:TYR:O	1:A:185:VAL:HG23	2.21	0.41
1:A:210:LYS:CE	1:A:212:GLN:HE22	2.34	0.40
1:A:58:LEU:HD11	1:A:184:MSE:HE1	1.99	0.40
1:B:222:SER:HB3	1:B:225:GLU:HG3	2.03	0.40
1:A:210:LYS:HE3	1:A:212:GLN:HE22	1.87	0.40
1:B:310:TYR:CD2	1:B:319:PRO:HD3	2.56	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	315/365 (86%)	307 (98%)	8 (2%)	0	100	100
1	B	296/365 (81%)	281 (95%)	14 (5%)	1 (0%)	36	28
All	All	611/730 (84%)	588 (96%)	22 (4%)	1 (0%)	43	36

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	84	THR

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	284/320 (89%)	277 (98%)	7 (2%)	42	34
1	B	268/320 (84%)	261 (97%)	7 (3%)	40	33
All	All	552/640 (86%)	538 (98%)	14 (2%)	42	34

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	GLU
1	A	97	ASP
1	A	99	THR
1	A	171	LYS
1	A	295	ARG
1	A	308	GLU
1	A	333	ASP
1	B	79	ASN
1	B	151	ARG
1	B	169	ARG
1	B	233	GLN
1	B	259	CYS

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Mol	Chain	Res	Type
1	B	316	HIS
1	B	318	TYR

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	140	ASN
1	A	208	GLN
1	A	212	GLN
1	A	237	GLN
1	A	265	ASN
1	A	342	GLN
1	B	53	ASN
1	B	140	ASN
1	B	160	GLN
1	B	233	GLN
1	B	265	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

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	317/365 (86%)	0.53	32 (10%) 12 14	19, 31, 59, 65	0
1	B	298/365 (81%)	0.61	38 (12%) 7 9	19, 32, 63, 73	0
All	All	615/730 (84%)	0.57	70 (11%) 10 11	19, 32, 61, 73	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	83	LEU	8.2
1	B	278	HIS	4.5
1	B	84	THR	4.5
1	A	334	ILE	4.5
1	A	99	THR	4.3
1	B	85	LEU	4.3
1	A	316	HIS	4.1
1	A	278	HIS	4.0
1	A	100	GLN	3.8
1	B	80	PHE	3.8
1	A	233	GLN	3.7
1	A	85	LEU	3.6
1	B	75	VAL	3.5
1	A	365	SER	3.4
1	A	84	THR	3.4
1	A	101	VAL	3.3
1	B	108	GLY	3.3
1	B	82	GLY	3.2
1	A	29	GLY	3.1
1	B	259	CYS	3.1
1	A	335	ASN	3.0
1	B	53	ASN	3.0
1	A	315	ARG	2.9
1	B	280	VAL	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	96	ALA	2.9
1	B	344	LEU	2.9
1	A	78	GLU	2.9
1	B	109	GLU	2.9
1	B	316	HIS	2.9
1	A	97	ASP	2.8
1	B	365	SER	2.8
1	B	130	LYS	2.8
1	A	257	LEU	2.8
1	B	343	ILE	2.8
1	A	98	LEU	2.7
1	B	332	VAL	2.7
1	B	333	ASP	2.7
1	B	127	ALA	2.6
1	B	281	GLY	2.6
1	B	76	GLU	2.5
1	A	108	GLY	2.5
1	B	331	CYS	2.5
1	B	233	GLN	2.5
1	A	263	LEU	2.4
1	A	211	ARG	2.4
1	A	259	CYS	2.4
1	B	263	LEU	2.4
1	A	280	VAL	2.4
1	B	257	LEU	2.3
1	A	332	VAL	2.3
1	A	262	ALA	2.3
1	B	310	TYR	2.3
1	B	279	GLY	2.3
1	B	283	SER	2.2
1	B	253	GLU	2.2
1	B	314	ASN	2.1
1	B	276	CYS	2.1
1	B	126	HIS	2.1
1	B	79	ASN	2.1
1	A	255	TYR	2.1
1	A	82	GLY	2.1
1	A	281	GLY	2.1
1	A	364	ASP	2.1
1	B	282	ARG	2.1
1	A	260	SER	2.0
1	B	128	SER	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	262	ALA	2.0
1	A	208	GLN	2.0
1	A	342	GLN	2.0
1	B	277	THR	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.