



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:59 AM UTC

PDB ID : 2Q6G / pdb\_00002q6g  
Title : Crystal structure of SARS-CoV main protease H41A mutant in complex with an N-terminal substrate  
Authors : Xue, X.Y.; Yang, H.T.; Xue, F.; Bartlam, M.; Rao, Z.H.  
Deposited on : 2007-06-05  
Resolution : 2.50 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](mailto: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>.

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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

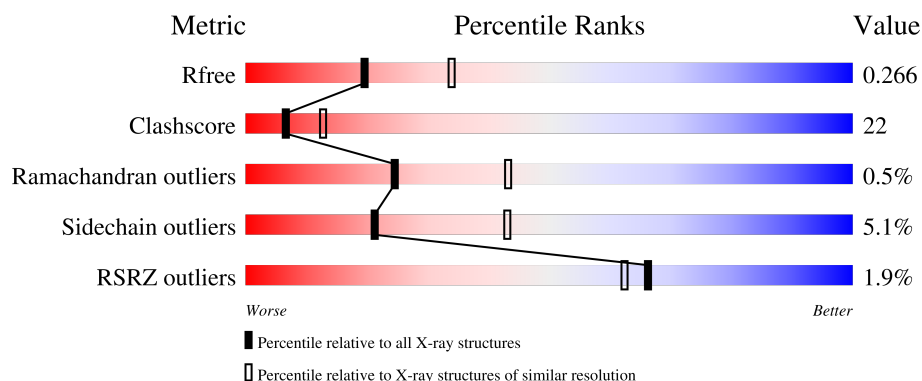
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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  $\geq 3$ , 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	306	<div> <div>0%</div> <div>64%</div> <div>31%</div> <div>.</div> </div>
1	B	306	<div> <div>2%</div> <div>60%</div> <div>35%</div> <div>..</div> </div>
2	C	11	<div> <div>9%</div> <div>18%</div> <div>82%</div> </div>
2	D	11	<div> <div>27%</div> <div>27%</div> <div>36%</div> <div>9%</div> <div>27%</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5059 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 severe acute respiratory syndrome coronavirus (SARS-CoV).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	305	Total	C	N	O	S	0	0	0
			2356	1491	401	442	22			
1	B	302	Total	C	N	O	S	0	0	0
			2331	1473	398	438	22			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	41	ALA	HIS	engineered mutation	UNP P59641
B	41	ALA	HIS	engineered mutation	UNP P59641

- Molecule 2 is a protein called Polypeptide chain.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	11	Total	C	N	O	0	0	0
			84	52	16	16			
2	D	8	Total	C	N	O	0	0	0
			52	31	9	12			

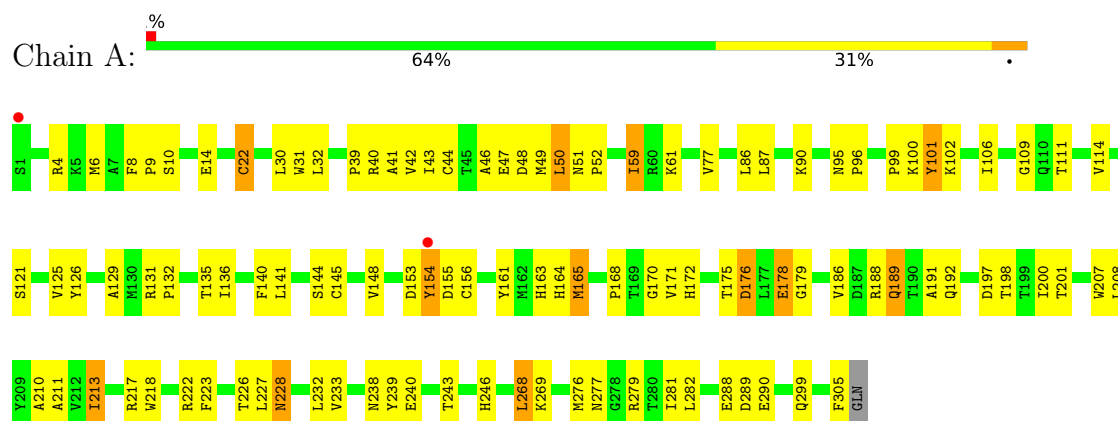
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	119	Total	O	0	0
			119	119		
3	B	108	Total	O	0	0
			108	108		
3	C	6	Total	O	0	0
			6	6		
3	D	3	Total	O	0	0
			3	3		

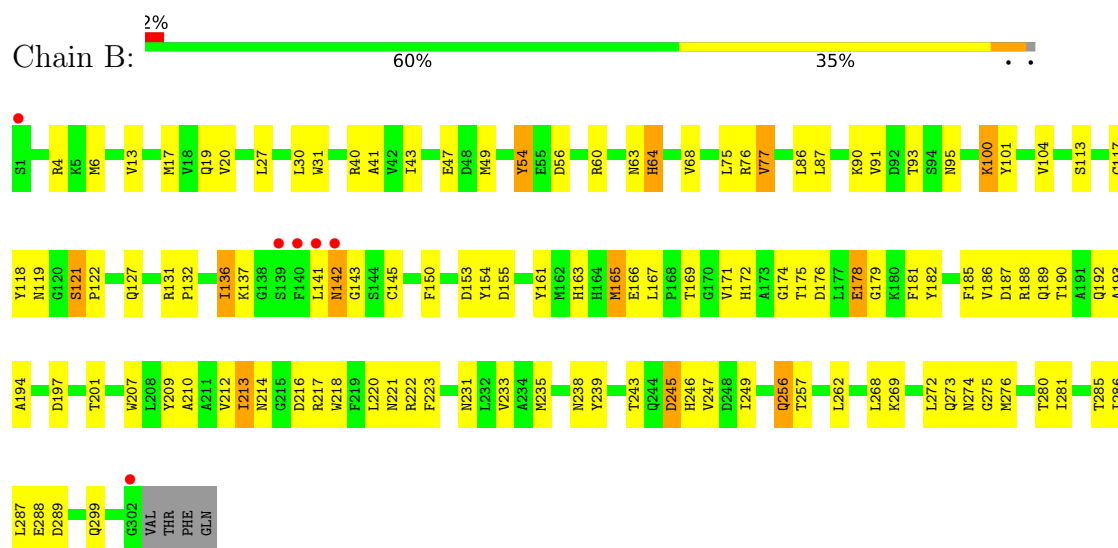
### 3 Residue-property plots [i](#)

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: severe acute respiratory syndrome coronavirus (SARS-CoV)



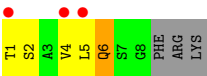
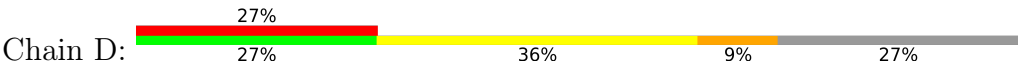
- Molecule 1: severe acute respiratory syndrome coronavirus (SARS-CoV)



- Molecule 2: Polypeptide chain



● Molecule 2: Polypeptide chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.98Å 95.83Å 67.72Å 90.00° 102.92° 90.00°	Depositor
Resolution (Å)	30.00 – 2.50 30.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	95.8 (30.00-2.50) 95.7 (30.00-2.50)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.87 (at 2.39Å)	Xtriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.199 , 0.267 0.200 , 0.266	Depositor DCC
$R_{free}$ test set	1079 reflections (4.29%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.0	Xtriage
Anisotropy	0.304	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 56.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	5059	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.60% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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	0.44	0/2408	0.98	11/3272 (0.3%)
1	B	0.44	0/2382	0.97	10/3236 (0.3%)
2	C	0.46	0/84	1.12	0/109
2	D	0.48	0/51	1.01	0/68
All	All	0.44	0/4925	0.97	21/6685 (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	B	143	GLY	N-CA-C	-8.98	102.06	115.00
1	B	256	GLN	N-CA-C	-7.05	100.56	110.50
1	A	46	ALA	N-CA-C	6.51	119.21	111.33
1	B	178	GLU	N-CA-C	-6.38	105.25	114.12
1	A	165	MET	N-CA-C	6.33	118.39	108.96
1	A	101	TYR	N-CA-C	6.22	116.78	108.38
1	A	217	ARG	N-CA-C	6.17	120.08	111.56
1	B	165	MET	N-CA-C	6.09	116.61	108.38
1	B	100	LYS	N-CA-C	-6.06	100.86	109.96
1	B	101	TYR	N-CA-C	5.91	118.06	109.07
1	A	176	ASP	N-CA-C	-5.88	102.23	110.35
1	B	182	TYR	N-CA-C	-5.73	98.40	108.20
1	A	170	GLY	N-CA-C	-5.62	107.48	115.30
1	A	9	PRO	N-CA-C	-5.53	102.52	111.14
1	A	178	GLU	N-CA-C	-5.25	105.74	113.61
1	A	121	SER	CA-C-N	5.25	125.41	119.90
1	A	121	SER	C-N-CA	5.25	125.41	119.90
1	A	100	LYS	N-CA-C	-5.24	102.63	110.23
1	B	54	TYR	N-CA-C	5.21	117.63	111.33
1	B	201	THR	N-CA-C	5.03	116.77	111.28
1	B	218	TRP	N-CA-C	5.02	116.75	111.28

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	2356	0	2312	100	0
1	B	2331	0	2287	106	0
2	C	84	0	90	14	0
2	D	52	0	55	11	0
3	A	119	0	0	7	0
3	B	108	0	0	4	0
3	C	6	0	0	1	0
3	D	3	0	0	0	0
All	All	5059	0	4744	207	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 22.

All (207) 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:20:VAL:HG22	1:B:68:VAL:HG12	1.40	1.04
1:B:56:ASP:CG	1:B:60:ARG:HH12	1.80	0.89
1:B:4:ARG:H	1:B:299:GLN:HE22	1.22	0.88
1:A:226:THR:HG22	1:A:228:ASN:H	1.39	0.87
1:B:165:MET:HB3	2:D:5:LEU:HD23	1.58	0.83
1:B:276:MET:HE3	1:B:281:ILE:HG13	1.60	0.83
1:A:243:THR:H	1:A:246:HIS:HD2	1.24	0.82
1:B:145:CYS:HB2	2:D:6:GLN:O	1.85	0.77
1:A:243:THR:H	1:A:246:HIS:CD2	2.02	0.76
1:B:209:TYR:O	1:B:213:ILE:HG22	1.85	0.75
1:B:222:ARG:HH11	1:B:222:ARG:HG2	1.50	0.74
1:B:64:HIS:CD2	1:B:64:HIS:H	2.04	0.74
2:C:1:THR:HG22	2:C:2:SER:H	1.51	0.74
1:B:40:ARG:HA	1:B:87:LEU:HG	1.68	0.73
1:B:186:VAL:H	1:B:192:GLN:HE22	1.36	0.72
1:B:217:ARG:HG3	1:B:220:LEU:HD12	1.72	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:210:ALA:HA	1:A:213:ILE:HG22	1.73	0.71
1:B:188:ARG:NE	1:B:190:THR:HG21	2.07	0.70
1:A:102:LYS:HG3	1:A:156:CYS:SG	2.31	0.70
1:B:131:ARG:HH22	1:B:289:ASP:CG	2.00	0.69
1:B:185:PHE:HA	1:B:192:GLN:NE2	2.08	0.68
1:B:118:TYR:OH	1:B:141:LEU:HB2	1.94	0.67
1:B:212:VAL:HA	1:B:216:ASP:O	1.95	0.66
1:B:68:VAL:HG23	1:B:75:LEU:HB3	1.77	0.66
1:B:47:GLU:H	1:B:47:GLU:CD	2.04	0.66
1:A:165:MET:HE2	2:C:3:ALA:HB1	1.77	0.66
1:A:226:THR:HG22	1:A:228:ASN:N	2.10	0.65
1:B:142:ASN:HA	2:D:6:GLN:HB3	1.76	0.65
1:B:163:HIS:HE1	1:B:172:HIS:HB3	1.61	0.65
1:A:51:ASN:HD22	1:A:188:ARG:NH1	1.95	0.64
1:B:19:GLN:NE2	1:B:119:ASN:HD22	1.95	0.63
1:A:145:CYS:HB2	2:C:6:GLN:O	1.98	0.63
1:A:222:ARG:HH11	1:A:222:ARG:HG2	1.64	0.63
1:B:222:ARG:HG2	1:B:222:ARG:NH1	2.16	0.61
1:A:210:ALA:O	1:A:213:ILE:HG22	2.01	0.61
1:A:140:PHE:HB3	1:A:144:SER:OG	2.00	0.61
1:A:226:THR:HG23	3:A:346:HOH:O	2.00	0.61
1:B:49:MET:HE1	2:D:5:LEU:HD12	1.83	0.60
1:A:131:ARG:HD3	1:A:197:ASP:OD1	2.00	0.60
3:A:356:HOH:O	1:B:286:ILE:HD13	2.00	0.60
1:B:233:VAL:HG11	1:B:269:LYS:HG3	1.84	0.60
1:B:4:ARG:H	1:B:299:GLN:NE2	1.97	0.60
1:B:213:ILE:C	1:B:213:ILE:HD13	2.25	0.60
1:B:63:ASN:HB3	1:B:77:VAL:O	2.02	0.59
1:B:127:GLN:HE21	1:B:127:GLN:HA	1.67	0.59
1:A:126:TYR:CE2	1:B:6:MET:HE2	2.38	0.59
1:A:243:THR:N	1:A:246:HIS:HD2	2.00	0.59
1:A:198:THR:HA	1:A:238:ASN:ND2	2.18	0.59
1:B:185:PHE:HZ	1:B:194:ALA:HB2	1.68	0.58
1:B:131:ARG:NH2	1:B:289:ASP:OD2	2.34	0.58
1:B:185:PHE:HA	1:B:192:GLN:HE21	1.69	0.58
1:A:111:THR:HG22	1:A:129:ALA:HB2	1.85	0.58
1:B:189:GLN:OE1	2:D:4:VAL:HA	2.03	0.58
1:A:61:LYS:HE2	3:A:377:HOH:O	2.01	0.58
1:B:131:ARG:HD2	1:B:197:ASP:OD1	2.04	0.57
1:A:210:ALA:CA	1:A:213:ILE:HG22	2.35	0.57
1:A:41:ALA:O	1:A:44:CYS:HB2	2.05	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:276:MET:HE1	1:A:281:ILE:N	2.19	0.57
1:A:154:TYR:HA	3:A:408:HOH:O	2.05	0.56
1:A:171:VAL:HG12	1:A:172:HIS:N	2.20	0.56
1:A:188:ARG:NH1	1:A:188:ARG:HB3	2.20	0.56
1:B:4:ARG:N	1:B:299:GLN:HE22	1.98	0.56
1:A:131:ARG:HH22	1:A:289:ASP:CG	2.13	0.56
1:B:163:HIS:CE1	1:B:172:HIS:HB3	2.41	0.56
1:B:165:MET:HB3	2:D:5:LEU:HA	1.87	0.56
1:A:198:THR:HA	1:A:238:ASN:HD21	1.71	0.56
1:A:164:HIS:CD2	1:A:175:THR:HG23	2.42	0.55
1:A:276:MET:O	1:A:279:ARG:HB2	2.05	0.55
1:B:86:LEU:HG	1:B:179:GLY:HA2	1.86	0.55
1:A:222:ARG:HG2	1:A:222:ARG:NH1	2.20	0.55
1:A:276:MET:HE3	1:A:281:ILE:HG13	1.88	0.55
1:B:49:MET:HE1	2:D:5:LEU:CD1	2.37	0.54
1:A:6:MET:HG3	1:A:299:GLN:CG	2.37	0.54
1:B:68:VAL:HG23	1:B:75:LEU:CB	2.38	0.54
1:B:221:ASN:OD1	1:B:223:PHE:HB2	2.08	0.54
1:A:6:MET:HG3	1:A:299:GLN:CD	2.32	0.54
1:A:276:MET:HE1	1:A:281:ILE:H	1.73	0.54
2:C:10:ARG:O	2:C:11:LYS:HB2	2.07	0.54
1:A:126:TYR:CD2	1:B:6:MET:HE2	2.43	0.54
1:B:56:ASP:O	1:B:60:ARG:NH1	2.40	0.54
1:A:210:ALA:HA	1:A:213:ILE:CG2	2.37	0.54
1:B:31:TRP:CE2	1:B:95:ASN:HB2	2.43	0.54
1:B:41:ALA:HB2	2:D:5:LEU:HD13	1.90	0.53
1:B:49:MET:HE2	1:B:189:GLN:HG3	1.89	0.53
1:A:189:GLN:HG2	2:C:3:ALA:O	2.09	0.53
1:A:10:SER:O	1:A:14:GLU:HG3	2.07	0.53
1:B:188:ARG:CZ	1:B:190:THR:HG21	2.39	0.53
1:B:188:ARG:NE	1:B:190:THR:CG2	2.71	0.53
1:A:22:CYS:HB2	1:A:42:VAL:HG22	1.90	0.53
1:A:48:ASP:O	1:A:52:PRO:HG3	2.09	0.53
2:C:11:LYS:HA	3:C:14:HOH:O	2.09	0.53
2:C:1:THR:HG22	2:C:2:SER:N	2.21	0.52
1:B:167:LEU:HD21	1:B:185:PHE:CE1	2.45	0.52
1:B:280:THR:HG22	1:B:285:THR:HG22	1.92	0.51
1:B:100:LYS:HE3	3:B:379:HOH:O	2.09	0.51
1:B:262:LEU:HD13	3:B:358:HOH:O	2.09	0.51
1:A:50:LEU:O	1:A:188:ARG:HB2	2.11	0.51
1:A:165:MET:HB2	2:C:4:VAL:O	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:239:TYR:OH	1:B:287:LEU:HD12	2.11	0.51
1:A:210:ALA:C	1:A:213:ILE:HG22	2.35	0.51
1:B:64:HIS:CD2	1:B:64:HIS:N	2.73	0.51
1:B:176:ASP:HB2	3:B:309:HOH:O	2.10	0.51
1:A:213:ILE:HD13	1:A:213:ILE:C	2.36	0.50
1:A:163:HIS:CE1	1:A:172:HIS:HB3	2.46	0.50
1:B:19:GLN:HE22	1:B:119:ASN:HD22	1.58	0.50
1:B:193:ALA:HB2	3:B:387:HOH:O	2.11	0.50
1:A:163:HIS:HE1	1:A:172:HIS:HB3	1.77	0.50
1:A:277:ASN:HD22	1:A:277:ASN:N	2.08	0.49
1:A:47:GLU:OE1	1:A:47:GLU:N	2.36	0.49
1:A:86:LEU:HG	1:A:179:GLY:HA2	1.94	0.49
1:A:168:PRO:HB3	2:C:1:THR:HB	1.94	0.49
1:A:213:ILE:HD13	1:A:213:ILE:O	2.13	0.49
1:A:171:VAL:CG1	1:A:172:HIS:N	2.76	0.49
1:B:186:VAL:H	1:B:192:GLN:NE2	2.07	0.49
1:B:76:ARG:O	1:B:91:VAL:HA	2.12	0.49
1:A:153:ASP:O	1:A:155:ASP:N	2.46	0.49
1:A:141:LEU:HD12	1:A:141:LEU:N	2.28	0.49
1:A:191:ALA:HA	2:C:2:SER:HA	1.94	0.49
1:A:132:PRO:HD2	1:A:197:ASP:OD2	2.13	0.48
1:A:211:ALA:HA	1:A:282:LEU:HG	1.95	0.48
1:A:40:ARG:HA	1:A:87:LEU:HG	1.94	0.48
1:A:40:ARG:O	1:A:43:ILE:HG12	2.13	0.48
1:A:135:THR:HB	1:A:171:VAL:CG1	2.43	0.48
1:B:31:TRP:CD2	1:B:95:ASN:HB2	2.48	0.48
1:B:77:VAL:HA	1:B:90:LYS:O	2.14	0.48
1:B:217:ARG:HG2	1:B:217:ARG:O	2.14	0.48
1:A:228:ASN:O	1:A:232:LEU:HG	2.14	0.48
1:A:90:LYS:CE	3:A:322:HOH:O	2.62	0.47
1:A:131:ARG:CD	1:A:197:ASP:OD1	2.61	0.47
1:A:276:MET:CE	1:A:281:ILE:HG13	2.44	0.47
1:B:40:ARG:CZ	1:B:54:TYR:CD1	2.97	0.47
2:D:1:THR:HG22	2:D:1:THR:O	2.15	0.47
1:A:186:VAL:H	1:A:192:GLN:HE22	1.61	0.47
1:A:126:TYR:CD1	1:B:4:ARG:HG2	2.50	0.47
1:B:175:THR:HG22	1:B:181:PHE:HA	1.96	0.47
1:A:8:PHE:HE1	1:A:305:PHE:CZ	2.33	0.47
1:A:51:ASN:N	1:A:52:PRO:HD3	2.30	0.47
1:B:217:ARG:HG3	1:B:220:LEU:CD1	2.44	0.46
1:A:233:VAL:HG21	1:A:269:LYS:HG3	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:VAL:CG2	1:B:75:LEU:HB3	2.44	0.46
1:B:169:THR:OG1	1:B:171:VAL:HG22	2.15	0.46
1:A:109:GLY:HA2	1:A:200:ILE:HD13	1.96	0.46
1:A:290:GLU:OE1	1:B:4:ARG:NH2	2.48	0.46
1:B:269:LYS:O	1:B:273:GLN:HG3	2.16	0.46
1:A:165:MET:HE2	2:C:3:ALA:CB	2.45	0.45
1:A:99:PRO:O	1:A:101:TYR:HD2	1.97	0.45
1:B:13:VAL:HG21	1:B:150:PHE:CE2	2.51	0.45
1:A:136:ILE:HG13	1:A:136:ILE:O	2.16	0.45
1:B:49:MET:CE	2:D:5:LEU:HD12	2.44	0.45
1:A:4:ARG:NH1	1:B:137:LYS:O	2.49	0.45
1:B:49:MET:HB3	1:B:189:GLN:HG3	1.98	0.45
3:A:356:HOH:O	1:B:286:ILE:HG21	2.16	0.45
1:B:17:MET:HE2	1:B:117:CYS:SG	2.57	0.45
1:B:239:TYR:CZ	1:B:272:LEU:HD21	2.52	0.45
1:A:39:PRO:HB3	1:A:164:HIS:CE1	2.53	0.44
1:A:226:THR:HG22	1:A:227:LEU:N	2.33	0.44
1:B:274:ASN:O	1:B:275:GLY:C	2.59	0.44
1:B:127:GLN:HA	1:B:127:GLN:NE2	2.31	0.44
1:A:50:LEU:C	1:A:52:PRO:HD3	2.42	0.44
1:A:208:LEU:HD11	1:A:268:LEU:HG	1.99	0.44
1:A:277:ASN:C	1:A:279:ARG:H	2.24	0.44
1:B:132:PRO:HD2	1:B:197:ASP:OD2	2.18	0.43
1:B:166:GLU:HG3	1:B:172:HIS:CD2	2.54	0.43
1:A:95:ASN:HA	1:A:96:PRO:HD3	1.88	0.43
1:B:145:CYS:HB2	2:D:6:GLN:C	2.43	0.43
1:B:231:ASN:O	1:B:235:MET:HG3	2.18	0.43
1:A:145:CYS:HB2	2:C:6:GLN:C	2.43	0.43
1:B:188:ARG:HE	1:B:190:THR:CG2	2.30	0.43
1:A:6:MET:HB2	1:A:299:GLN:HE21	1.84	0.43
1:A:218:TRP:CD1	1:A:279:ARG:NH1	2.87	0.43
1:B:186:VAL:N	1:B:192:GLN:HE22	2.08	0.43
1:A:114:VAL:O	1:A:125:VAL:HA	2.19	0.43
1:B:136:ILE:HG23	1:B:172:HIS:HB2	2.01	0.42
1:B:49:MET:CE	1:B:189:GLN:HG3	2.49	0.42
1:A:111:THR:HG22	1:A:129:ALA:CB	2.48	0.42
2:C:9:PHE:HE2	2:C:11:LYS:HG2	1.85	0.42
1:A:31:TRP:CE2	1:A:95:ASN:HB2	2.54	0.42
1:A:49:MET:O	1:A:189:GLN:HB2	2.19	0.42
1:A:32:LEU:HD13	1:A:101:TYR:CE1	2.55	0.42
1:B:185:PHE:CA	1:B:192:GLN:NE2	2.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:207:TRP:CE2	1:B:288:GLU:HB3	2.54	0.42
1:A:201:THR:HG23	1:A:239:TYR:HD2	1.85	0.42
1:B:40:ARG:O	1:B:43:ILE:HG12	2.20	0.42
1:B:113:SER:OG	1:B:127:GLN:NE2	2.53	0.42
1:B:161:TYR:CE1	1:B:174:GLY:HA3	2.55	0.42
1:A:210:ALA:O	1:A:213:ILE:CG2	2.68	0.42
1:B:153:ASP:O	1:B:154:TYR:HB2	2.19	0.42
1:A:165:MET:HE3	2:C:5:LEU:HD23	2.02	0.41
1:A:207:TRP:CE2	1:A:288:GLU:HB2	2.54	0.41
1:A:277:ASN:N	1:A:277:ASN:ND2	2.68	0.41
1:B:121:SER:HA	1:B:122:PRO:HD3	1.87	0.41
1:A:176:ASP:C	1:A:178:GLU:H	2.28	0.41
1:A:90:LYS:HD2	3:A:369:HOH:O	2.20	0.41
1:B:131:ARG:CD	1:B:197:ASP:OD1	2.68	0.41
1:A:59:ILE:HD13	1:A:59:ILE:HA	1.91	0.41
1:B:13:VAL:HG21	1:B:150:PHE:CD2	2.56	0.41
1:B:27:LEU:HD12	1:B:27:LEU:C	2.47	0.40
1:A:207:TRP:CD2	1:A:288:GLU:HB2	2.57	0.40
1:B:207:TRP:O	1:B:210:ALA:HB3	2.21	0.40
1:B:210:ALA:HA	1:B:213:ILE:CG2	2.51	0.40
1:B:256:GLN:C	1:B:257:THR:HG23	2.46	0.40
1:A:148:VAL:HA	1:A:161:TYR:O	2.21	0.40
1:A:223:PHE:CD1	1:A:223:PHE:N	2.90	0.40
1:B:243:THR:H	1:B:246:HIS:CD2	2.40	0.40
1:B:19:GLN:O	1:B:68:VAL:HA	2.21	0.40
1:B:210:ALA:O	1:B:214:ASN:HB2	2.21	0.40
1:B:245:ASP:O	1:B:249:ILE:HG13	2.22	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	303/306 (99%)	286 (94%)	16 (5%)	1 (0%)	36	55
1	B	300/306 (98%)	277 (92%)	22 (7%)	1 (0%)	36	55
2	C	9/11 (82%)	9 (100%)	0	0	100	100
2	D	6/11 (54%)	4 (67%)	1 (17%)	1 (17%)	0	0
All	All	618/634 (98%)	576 (93%)	39 (6%)	3 (0%)	24	43

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	6	GLN
1	A	154	TYR
1	B	187	ASP

### 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	261/262 (100%)	250 (96%)	11 (4%)	26	52
1	B	258/262 (98%)	243 (94%)	15 (6%)	18	38
2	C	9/9 (100%)	9 (100%)	0	100	100
2	D	6/9 (67%)	5 (83%)	1 (17%)	2	4
All	All	534/542 (98%)	507 (95%)	27 (5%)	21	43

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	CYS
1	A	30	LEU
1	A	50	LEU
1	A	59	ILE
1	A	77	VAL
1	A	106	ILE
1	A	189	GLN
1	A	213	ILE

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Mol	Chain	Res	Type
1	A	228	ASN
1	A	240	GLU
1	A	268	LEU
1	B	30	LEU
1	B	64	HIS
1	B	77	VAL
1	B	93	THR
1	B	104	VAL
1	B	121	SER
1	B	136	ILE
1	B	142	ASN
1	B	155	ASP
1	B	178	GLU
1	B	213	ILE
1	B	238	ASN
1	B	245	ASP
1	B	247	VAL
1	B	268	LEU
2	D	2	SER

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	51	ASN
1	A	107	GLN
1	A	142	ASN
1	A	192	GLN
1	A	238	ASN
1	A	246	HIS
1	A	256	GLN
1	A	277	ASN
1	A	299	GLN
1	B	19	GLN
1	B	64	HIS
1	B	119	ASN
1	B	127	GLN
1	B	164	HIS
1	B	192	GLN
1	B	244	GLN
1	B	246	HIS
1	B	256	GLN
1	B	274	ASN

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Mol	Chain	Res	Type
1	B	299	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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	305/306 (99%)	-0.27	2 (0%) 84 81	12, 26, 50, 80	0
1	B	302/306 (98%)	-0.14	6 (1%) 65 61	13, 29, 57, 120	0
2	C	11/11 (100%)	0.60	1 (9%) 15 13	26, 35, 62, 77	0
2	D	8/11 (72%)	1.46	3 (37%) 1 1	43, 49, 73, 104	0
All	All	626/634 (98%)	-0.17	12 (1%) 66 62	12, 28, 58, 120	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	140	PHE	5.5
1	B	139	SER	3.2
1	B	142	ASN	3.1
2	D	1	THR	2.7
1	B	141	LEU	2.7
2	D	4	VAL	2.6
1	A	1	SER	2.5
2	D	5	LEU	2.4
1	B	302	GLY	2.4
2	C	11	LYS	2.2
1	A	154	TYR	2.1
1	B	1	SER	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.