Full wwPDB X-ray Structure Validation Report ⓘ

Sep 22, 2025 – 12:11 PM JST

PDB ID	:	8YUC / pdb_00008yuc
Title	:	Crystal structure of SARS-CoV-2 ConSp RBD in complex with antibodies PDI222 Fab and COVA1-16 Fab
Authors	:	Kang, J.M.; Yuan, M.; Han, B.W.; Wilson, I.A.
Deposited on	:	2024-03-27
Resolution	:	4.51 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:

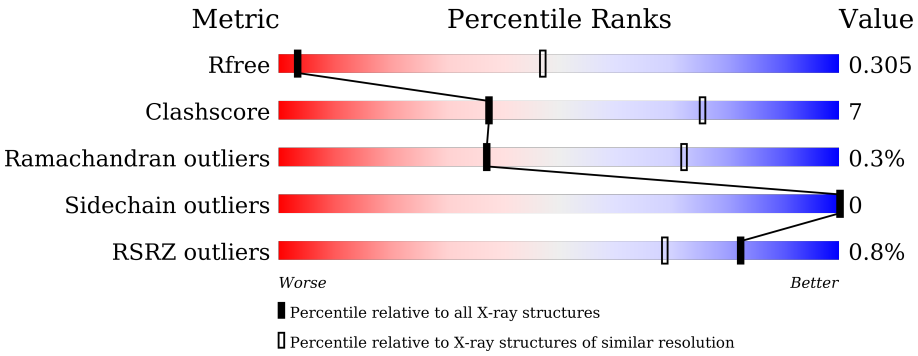
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 4.51 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	1054 (5.14-3.90)
Clashscore	180529	1110 (5.14-3.90)
Ramachandran outliers	177936	1007 (5.12-3.90)
Sidechain outliers	177891	1008 (5.12-3.88)
RSRZ outliers	164620	1050 (5.14-3.90)

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 <=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	G	196	2% 78% 21%
2	A	225	3% 76% 21%
3	B	214	82% 17%
4	H	231	89% 9%
5	L	213	88% 12%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 8167 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 Spike protein S2'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	G	195	Total	C	N	O	S	0	0	0
			1551	998	263	282	8			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	339	HIS	GLY	variant	UNP P0DTC2
G	346	THR	ARG	variant	UNP P0DTC2
G	368	ILE	LEU	variant	UNP P0DTC2
G	371	PHE	SER	variant	UNP P0DTC2
G	373	PRO	SER	variant	UNP P0DTC2
G	375	PHE	SER	variant	UNP P0DTC2
G	376	ALA	THR	variant	UNP P0DTC2
G	405	ASN	ASP	variant	UNP P0DTC2
G	408	SER	ARG	variant	UNP P0DTC2
G	417	ASN	LYS	variant	UNP P0DTC2
G	440	LYS	ASN	variant	UNP P0DTC2
G	444	THR	LYS	variant	UNP P0DTC2
G	445	PRO	VAL	variant	UNP P0DTC2
G	446	SER	GLY	variant	UNP P0DTC2
G	452	ARG	LEU	variant	UNP P0DTC2
G	460	LYS	ASN	variant	UNP P0DTC2
G	477	ASN	SER	variant	UNP P0DTC2
G	478	LYS	THR	variant	UNP P0DTC2
G	484	ALA	GLU	variant	UNP P0DTC2
G	486	PRO	PHE	variant	UNP P0DTC2
G	490	SER	PHE	variant	UNP P0DTC2
G	498	ARG	GLN	variant	UNP P0DTC2
G	501	TYR	ASN	variant	UNP P0DTC2
G	505	HIS	TYR	variant	UNP P0DTC2

- Molecule 2 is a protein called PDI222 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	218	Total	C	N	O	S	0	0	0
			1635	1029	280	316	10			

- Molecule 3 is a protein called PDI222 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	B	213	Total	C	N	O	S	0	0	0
			1630	1019	278	329	4			

- Molecule 4 is a protein called COVA1-16 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	H	226	Total	C	N	O	S	0	0	0
			1719	1083	293	335	8			

- Molecule 5 is a protein called COVA1-16 light chain.

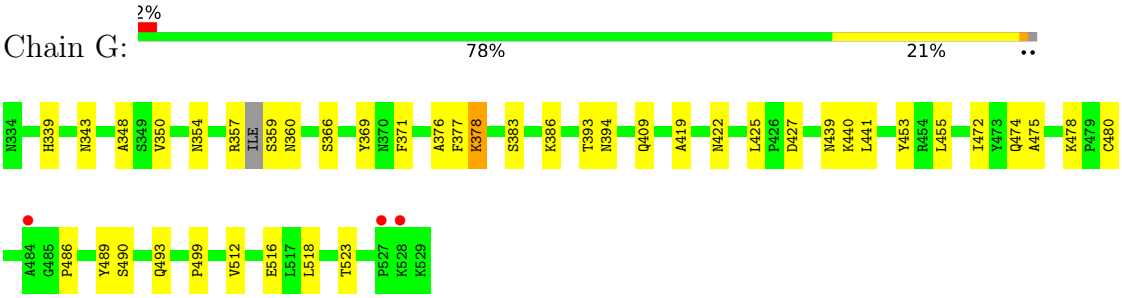
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	L	213	Total	C	N	O	S	0	0	0
			1632	1019	272	337	4			

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.

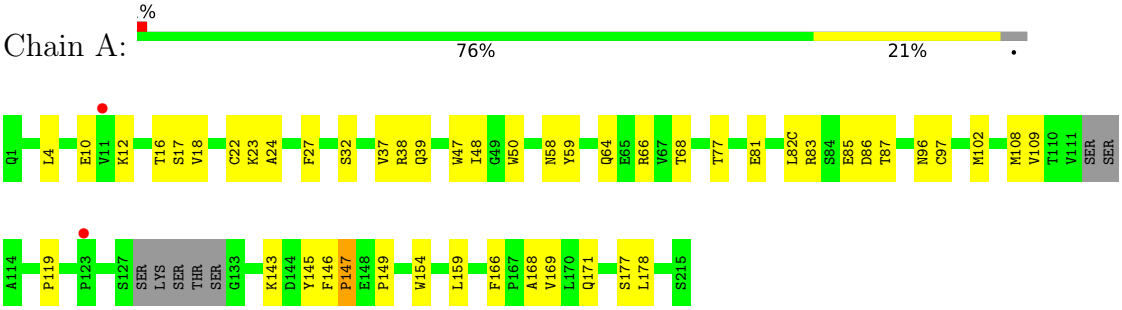
- Molecule 1: Spike protein S2'

Chain G:



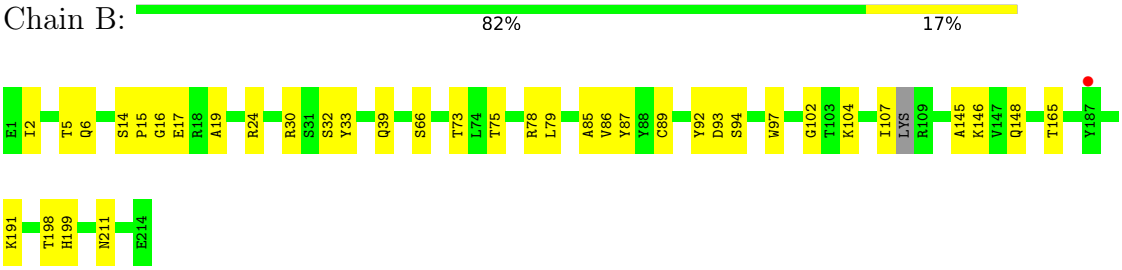
- Molecule 2: PDI222 heavy chain

Chain A:



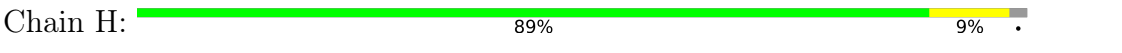
- Molecule 3: PDI222 light chain

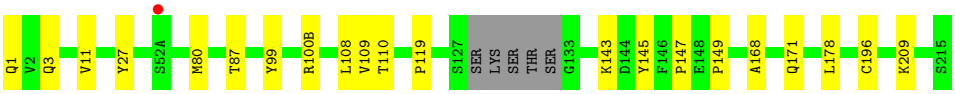
Chain B:



- Molecule 4: COVA1-16 heavy chain

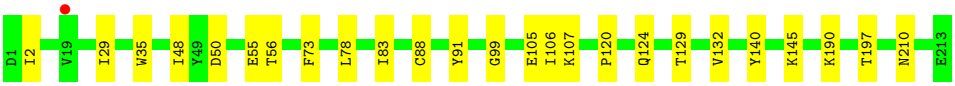
Chain H:





• Molecule 5: COVA1-16 light chain

Chain L:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α, β, γ	127.26Å 127.26Å 240.89Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	22.52 – 4.51 22.52 – 4.51	Depositor EDS
% Data completeness (in resolution range)	98.6 (22.52-4.51) 97.6 (22.52-4.51)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.06 (at 4.57Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.275 , 0.308 0.275 , 0.305	Depositor DCC
R_{free} test set	680 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å^2)	208.2	Xtriage
Anisotropy	0.224	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 253.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.32$, $< L^2 > = 0.16$	Xtriage
Estimated twinning fraction	0.207 for -h,-k,l	Xtriage
F_o,F_c correlation	0.88	EDS
Total number of atoms	8167	wwPDB-VP
Average B, all atoms (Å^2)	260.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.01% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	G	0.15	0/1599	0.40	0/2176
2	A	0.10	0/1672	0.31	0/2277
3	B	0.09	0/1666	0.30	0/2264
4	H	0.10	0/1763	0.30	0/2400
5	L	0.09	0/1667	0.30	0/2269
All	All	0.11	0/8367	0.32	0/11386

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	G	1551	0	1476	36	0
2	A	1635	0	1600	31	0
3	B	1630	0	1563	26	0
4	H	1719	0	1661	14	0
5	L	1632	0	1566	13	0
All	All	8167	0	7866	110	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 7.

All (110) 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:G:474:GLN:HG3	1:G:478:LYS:H	1.47	0.80
5:L:190:LYS:HE2	5:L:210:ASN:HB3	1.66	0.76
3:B:191:LYS:HE2	3:B:211:ASN:HB3	1.69	0.74
1:G:378:LYS:HA	4:H:99:TYR:CD2	2.25	0.72
2:A:119:PRO:HB3	2:A:145:TYR:HB3	1.73	0.70
5:L:120:PRO:HD3	5:L:132:VAL:HG22	1.74	0.68
4:H:143:LYS:NZ	4:H:171:GLN:OE1	2.28	0.66
2:A:38:ARG:HB3	2:A:48:ILE:HD11	1.78	0.64
4:H:11:VAL:HB	4:H:147:PRO:HG3	1.78	0.64
3:B:14:SER:HA	3:B:107:ILE:HG23	1.79	0.63
3:B:5:THR:HB	3:B:24:ARG:HB2	1.80	0.61
4:H:119:PRO:HB3	4:H:145:TYR:HB3	1.82	0.61
3:B:15:PRO:HD3	3:B:107:ILE:HG12	1.83	0.59
2:A:12:LYS:NZ	2:A:17:SER:O	2.31	0.58
4:H:87:THR:HG23	4:H:110:THR:HA	1.86	0.57
2:A:168:ALA:HA	2:A:178:LEU:HB3	1.88	0.56
2:A:143:LYS:NZ	2:A:171:GLN:OE1	2.39	0.56
5:L:145:LYS:HB3	5:L:197:THR:OG1	2.06	0.55
1:G:486:PRO:HB3	3:B:97:TRP:HZ2	1.71	0.55
1:G:359:SER:HB2	1:G:523:THR:OG1	2.06	0.55
2:A:83:ARG:NE	2:A:85:GLU:OE2	2.36	0.55
1:G:475:ALA:HB2	1:G:489:TYR:CE2	2.43	0.53
2:A:23:LYS:HG2	2:A:77:THR:OG1	2.09	0.53
3:B:6:GLN:NE2	3:B:89:CYS:SG	2.82	0.53
4:H:87:THR:HA	4:H:109:VAL:O	2.09	0.53
3:B:145:ALA:HB2	3:B:199:HIS:HD2	1.73	0.53
1:G:369:TYR:C	1:G:371:PHE:H	2.16	0.52
3:B:33:TYR:HB3	3:B:92:TYR:HB2	1.90	0.52
1:G:360:ASN:H	1:G:523:THR:HB	1.74	0.52
3:B:16:GLY:H	3:B:79:LEU:HB2	1.75	0.52
3:B:6:GLN:HG3	3:B:102:GLY:H	1.76	0.51
1:G:475:ALA:HB2	1:G:489:TYR:HE2	1.75	0.51
1:G:486:PRO:HA	2:A:50:TRP:CZ2	2.47	0.50
2:A:59:TYR:HD2	2:A:64:GLN:HG3	1.76	0.50
2:A:12:LYS:HB3	2:A:16:THR:HG21	1.94	0.50
1:G:383:SER:HB2	1:G:386:LYS:HD3	1.93	0.50
1:G:455:LEU:HD22	1:G:493:GLN:HG3	1.94	0.50
1:G:343:ASN:HB2	1:G:371:PHE:HZ	1.77	0.49
5:L:55:GLU:HG3	5:L:56:THR:N	2.28	0.49
1:G:440:LYS:HG3	1:G:441:LEU:HG	1.95	0.48
3:B:19:ALA:HB2	3:B:79:LEU:HD21	1.96	0.48
1:G:425:LEU:HD21	1:G:512:VAL:HG11	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:L:50:ASP:OD1	5:L:91:TYR:OH	2.23	0.47
4:H:168:ALA:HA	4:H:178:LEU:HB3	1.96	0.47
1:G:357:ARG:HD3	1:G:394:ASN:HB3	1.96	0.47
2:A:96:ASN:HA	2:A:102:MET:HE2	1.97	0.47
3:B:66:SER:HB3	3:B:73:THR:HB	1.97	0.47
4:H:1:GLN:O	4:H:3:GLN:HG2	2.15	0.47
5:L:2:ILE:HD13	5:L:29:ILE:HG22	1.97	0.47
1:G:427:ASP:OD2	4:H:27:TYR:HB2	2.14	0.47
2:A:24:ALA:HB1	2:A:27:PHE:CE1	2.50	0.47
1:G:478:LYS:HE3	3:B:32:SER:HB3	1.96	0.46
5:L:83:ILE:HD11	5:L:105:GLU:HA	1.97	0.46
1:G:369:TYR:C	1:G:371:PHE:N	2.74	0.46
2:A:68:THR:OG1	2:A:81:GLU:HB3	2.15	0.46
3:B:146:LYS:HE3	3:B:148:GLN:HB2	1.98	0.46
1:G:474:GLN:HB3	1:G:480:CYS:SG	2.55	0.46
1:G:343:ASN:HB2	1:G:371:PHE:CZ	2.50	0.46
1:G:350:VAL:HG22	1:G:422:ASN:HB3	1.98	0.46
1:G:339:HIS:O	1:G:343:ASN:N	2.41	0.46
1:G:377:PHE:CE2	4:H:100(B):ARG:HB2	2.50	0.45
2:A:24:ALA:HB1	2:A:27:PHE:HE1	1.81	0.45
1:G:378:LYS:HA	4:H:99:TYR:CG	2.51	0.45
3:B:16:GLY:HA2	3:B:78:ARG:HH21	1.81	0.45
1:G:409:GLN:HB3	1:G:419:ALA:HB2	1.97	0.45
4:H:196:CYS:SG	4:H:209:LYS:HB3	2.57	0.45
2:A:108:MET:HE2	2:A:149:PRO:HD3	1.99	0.45
1:G:393:THR:O	1:G:523:THR:OG1	2.29	0.44
2:A:18:VAL:HG12	2:A:82(C):LEU:HD21	1.99	0.44
3:B:2:ILE:HD11	3:B:94:SER:HB3	1.99	0.44
3:B:146:LYS:HB3	3:B:198:THR:OG1	2.17	0.44
2:A:32:SER:HB3	2:A:97:CYS:HB2	2.00	0.44
1:G:439:ASN:HD21	1:G:499:PRO:HA	1.82	0.44
3:B:19:ALA:O	3:B:75:THR:HA	2.18	0.44
3:B:39:GLN:O	3:B:85:ALA:HB1	2.18	0.43
2:A:10:GLU:N	2:A:10:GLU:OE1	2.51	0.43
1:G:516:GLU:HG2	1:G:518:LEU:HG	2.01	0.43
5:L:107:LYS:HA	5:L:140:TYR:OH	2.18	0.43
1:G:366:SER:HA	1:G:369:TYR:CD1	2.54	0.43
5:L:124:GLN:HG2	5:L:129:THR:O	2.19	0.43
2:A:37:VAL:HG12	2:A:47:TRP:HA	2.00	0.43
1:G:376:ALA:HB1	1:G:378:LYS:HD2	2.00	0.43
2:A:50:TRP:CD1	2:A:58:ASN:HB3	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:87:THR:HA	2:A:109:VAL:O	2.19	0.43
2:A:146:PHE:HA	2:A:147:PRO:HA	1.79	0.43
2:A:4:LEU:HD11	2:A:22:CYS:HB3	2.01	0.42
2:A:83:ARG:O	2:A:86:ASP:HB2	2.20	0.42
2:A:12:LYS:HE2	2:A:16:THR:HG21	2.00	0.42
4:H:108:LEU:HD23	4:H:149:PRO:HD3	2.00	0.42
1:G:348:ALA:HB2	1:G:354:ASN:ND2	2.35	0.42
1:G:357:ARG:HD2	1:G:357:ARG:C	2.45	0.42
5:L:35:TRP:HB2	5:L:48:ILE:HB	2.01	0.42
3:B:87:TYR:O	3:B:102:GLY:HA2	2.19	0.42
2:A:39:GLN:NE2	3:B:39:GLN:OE1	2.52	0.42
3:B:17:GLU:O	3:B:79:LEU:HD23	2.19	0.41
2:A:66:ARG:NH2	2:A:86:ASP:OD2	2.53	0.41
5:L:88:CYS:O	5:L:99:GLY:N	2.50	0.41
5:L:78:LEU:HD21	5:L:106:ILE:HG12	2.01	0.41
1:G:478:LYS:HG3	3:B:33:TYR:HE1	1.86	0.41
2:A:169:VAL:HG22	2:A:177:SER:O	2.21	0.41
3:B:86:VAL:HG22	3:B:104:LYS:HD3	2.03	0.41
1:G:453:TYR:HE2	1:G:455:LEU:HD13	1.86	0.41
2:A:166:PHE:CD1	3:B:165:THR:HG23	2.55	0.41
2:A:27:PHE:CE1	2:A:102:MET:HE1	2.56	0.41
1:G:366:SER:HA	1:G:369:TYR:HD1	1.85	0.40
4:H:80:MET:HE3	4:H:80:MET:HB3	1.93	0.40
2:A:154:TRP:HB3	2:A:159:LEU:HD23	2.04	0.40
5:L:35:TRP:CE2	5:L:73:PHE:HB2	2.56	0.40
1:G:472:ILE:HD12	1:G:490:SER:HA	2.04	0.40
3:B:30:ARG:C	3:B:32:SER:H	2.29	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	G	191/196 (97%)	173 (91%)	17 (9%)	1 (0%)	25	64
2	A	212/225 (94%)	205 (97%)	6 (3%)	1 (0%)	25	64
3	B	209/214 (98%)	202 (97%)	6 (3%)	1 (0%)	25	64
4	H	222/231 (96%)	211 (95%)	11 (5%)	0	100	100
5	L	211/213 (99%)	203 (96%)	8 (4%)	0	100	100
All	All	1045/1079 (97%)	994 (95%)	48 (5%)	3 (0%)	37	72

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	G	378	LYS
3	B	93	ASP
2	A	147	PRO

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	168/169 (99%)	168 (100%)	0	100	100
2	A	183/192 (95%)	183 (100%)	0	100	100
3	B	182/187 (97%)	182 (100%)	0	100	100
4	H	190/197 (96%)	190 (100%)	0	100	100
5	L	186/188 (99%)	186 (100%)	0	100	100
All	All	909/933 (97%)	909 (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 (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	G	334	ASN
1	G	414	GLN
2	A	164	HIS

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Mol	Chain	Res	Type
3	B	38	GLN
3	B	101	GLN
3	B	125	GLN
4	H	39	GLN
4	H	43	GLN
4	H	64	GLN
4	H	100(G)	GLN
4	H	101	GLN
4	H	164	HIS
5	L	38	GLN
5	L	79	GLN
5	L	93	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

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, 95^{th} 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	G	195/196 (99%)	-0.04	3 (1%)	71	56	238, 275, 326, 353	0
2	A	218/225 (96%)	-0.01	2 (0%)	81	67	198, 236, 270, 289	0
3	B	213/214 (99%)	-0.10	1 (0%)	87	76	200, 249, 280, 296	0
4	H	226/231 (97%)	-0.07	1 (0%)	89	79	245, 278, 309, 330	0
5	L	213/213 (100%)	-0.09	1 (0%)	87	76	215, 256, 281, 301	0
All	All	1065/1079 (98%)	-0.06	8 (0%)	82	69	198, 260, 304, 353	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	484	ALA	3.5
2	A	11	VAL	2.9
4	H	52(A)	SER	2.9
3	B	187	TYR	2.8
1	G	527	PRO	2.4
5	L	19	VAL	2.1
1	G	528	LYS	2.1
2	A	123	PRO	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

There are no oligosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.