



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 31, 2022 – 12:07 AM JST

PDB ID : 7W71  
Title : Crystal structure of the PDZ-C domain of E. coli RseP in complex with 12C7 Fab  
Authors : Hirose, T.; Katagiri, S.; Nogi, T.  
Deposited on : 2021-12-02  
Resolution : 3.20 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	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.30
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.30

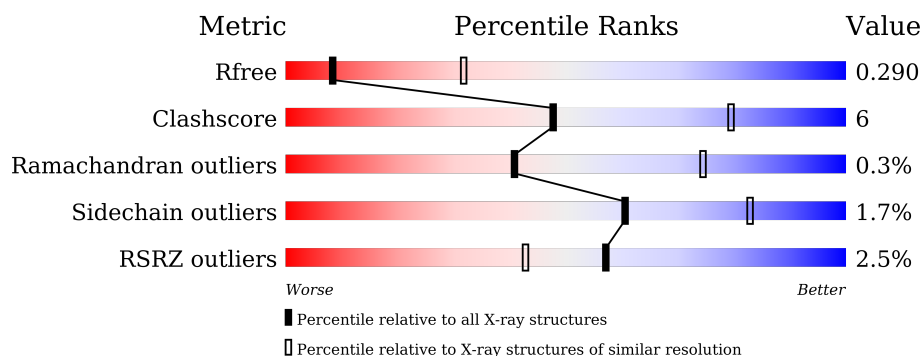
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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))
$R_{free}$	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	93	<div> <div>14%</div> <div> <div></div> <div>82%</div> <div>13%</div> <div>5%</div> </div> </div>
1	B	93	<div> <div>3%</div> <div> <div></div> <div>67%</div> <div>27%</div> <div>• 5%</div> </div> </div>
2	H	218	<div> <div></div> <div> <div></div> <div>82%</div> <div>14%</div> <div>•</div> </div> </div>
2	I	218	<div> <div></div> <div> <div></div> <div>81%</div> <div>16%</div> <div>•</div> </div> </div>
3	L	214	<div> <div>•</div> <div> <div></div> <div>85%</div> <div>14%</div> </div> </div>
3	M	214	<div> <div>3%</div> <div> <div></div> <div>80%</div> <div>18%</div> <div>•</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7811 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 Regulator of sigma-E protease RseP.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	88	Total	C	N	O	S	0	0	0
			657	418	113	125	1			
1	A	88	Total	C	N	O	S	0	0	0
			657	418	113	125	1			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	217	GLY	-	expression tag	UNP P0AEH1
B	218	SER	-	expression tag	UNP P0AEH1
A	217	GLY	-	expression tag	UNP P0AEH1
A	218	SER	-	expression tag	UNP P0AEH1

- Molecule 2 is a protein called Heavy chain of Fab.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	211	Total	C	N	O	S	0	0	0
			1598	1010	264	316	8			
2	I	210	Total	C	N	O	S	0	0	0
			1594	1008	263	315	8			

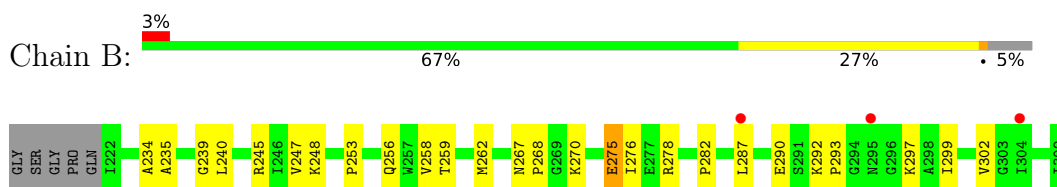
- Molecule 3 is a protein called Light chain of Fab.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	213	Total	C	N	O	S	0	0	0
			1657	1030	281	340	6			
3	M	212	Total	C	N	O	S	0	0	0
			1648	1025	280	337	6			

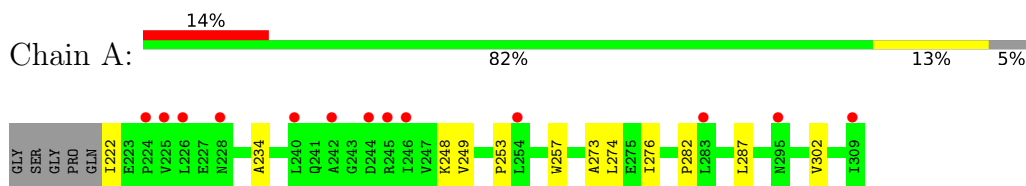
### 3 Residue-property plots [i](#)

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.

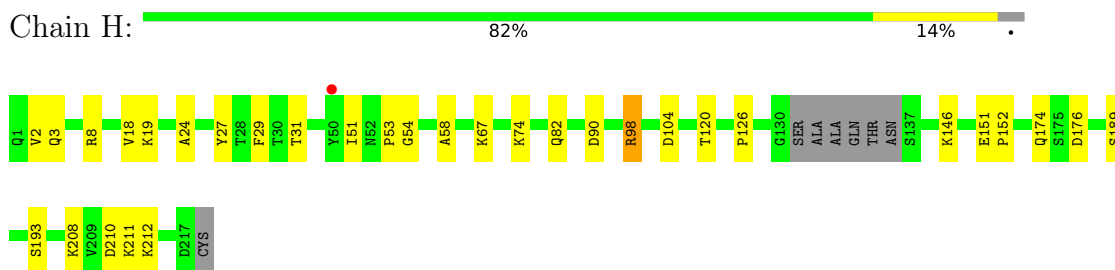
- Molecule 1: Regulator of sigma-E protease RseP



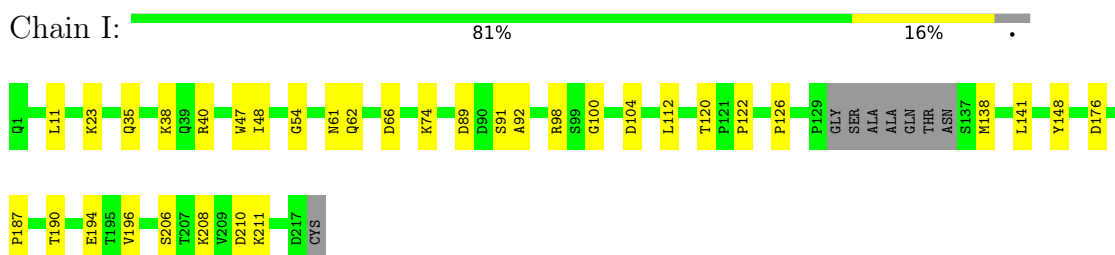
- Molecule 1: Regulator of sigma-E protease RseP



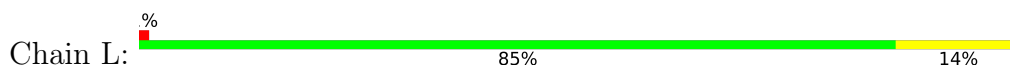
- Molecule 2: Heavy chain of Fab

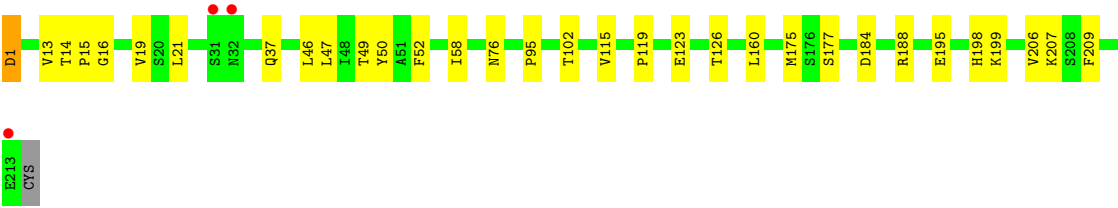


- Molecule 2: Heavy chain of Fab

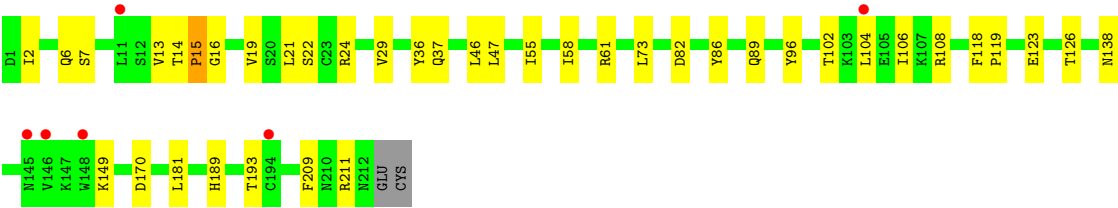
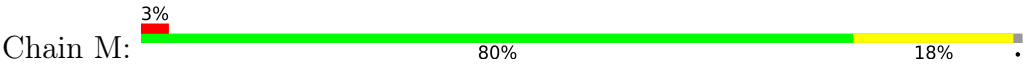


- Molecule 3: Light chain of Fab





● Molecule 3: Light chain of Fab



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.10Å 77.27Å 283.63Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.50 – 3.20 49.50 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.7 (49.50-3.20) 99.9 (49.50-3.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.77 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, $R_{free}$	0.243 , 0.289 0.242 , 0.290	Depositor DCC
$R_{free}$ test set	1098 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	66.5	Xtriage
Anisotropy	0.553	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 31.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	7811	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.77% 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 [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	0.24	0/668	0.45	0/906
1	B	0.25	0/668	0.45	0/906
2	H	0.24	0/1639	0.47	0/2236
2	I	0.24	0/1635	0.46	0/2231
3	L	0.24	0/1696	0.48	0/2305
3	M	0.24	0/1687	0.47	0/2293
All	All	0.24	0/7993	0.47	0/10877

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 [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	657	0	686	7	0
1	B	657	0	686	14	0
2	H	1598	0	1563	22	0
2	I	1594	0	1560	20	0
3	L	1657	0	1569	17	0
3	M	1648	0	1563	24	0
All	All	7811	0	7627	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 6.

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)
3:M:21:LEU:HD22	3:M:102:THR:HG21	1.67	0.77
1:B:248:LYS:HB2	1:B:275:GLU:HB3	1.73	0.71
2:H:51:ILE:HD12	2:H:58:ALA:HB2	1.74	0.69
2:H:210:ASP:HB2	2:I:208:LYS:HB2	1.77	0.66
3:M:149:LYS:HB2	3:M:193:THR:HB	1.78	0.65
3:M:189:HIS:O	3:M:211:ARG:NH2	2.26	0.65
2:H:212:LYS:HB3	2:I:206:SER:HB3	1.78	0.64
2:I:126:PRO:HD3	2:I:211:LYS:HE2	1.80	0.63
3:M:138:ASN:ND2	3:M:170:ASP:OD2	2.32	0.63
2:I:38:LYS:HB2	2:I:48:ILE:HD11	1.82	0.61
2:I:40:ARG:NH1	2:I:89:ASP:O	2.35	0.60
2:H:2:VAL:HG21	2:H:98:ARG:HH12	1.68	0.59
3:M:13:VAL:HG21	3:M:19:VAL:HG22	1.87	0.57
2:I:91:SER:HA	2:I:112:LEU:O	2.05	0.57
3:L:195:GLU:HG2	3:L:206:VAL:HG22	1.85	0.56
3:L:21:LEU:HD22	3:L:102:THR:HG21	1.86	0.56
2:H:104:ASP:N	2:H:104:ASP:OD1	2.39	0.56
3:M:37:GLN:HB2	3:M:47:LEU:HD11	1.87	0.56
3:L:37:GLN:HB2	3:L:47:LEU:HD11	1.87	0.56
3:M:61:ARG:NH1	3:M:82:ASP:OD2	2.37	0.55
2:I:61:ASN:OD1	2:I:62:GLN:N	2.39	0.55
3:L:175:MET:HE3	3:L:177:SER:HB2	1.88	0.55
2:H:208:LYS:HB2	2:I:210:ASP:HB2	1.88	0.54
2:I:35:GLN:HE21	2:I:100:GLY:HA2	1.72	0.54
2:H:67:LYS:HD2	2:H:90:ASP:OD2	2.08	0.54
2:H:174:GLN:HB3	3:L:160:LEU:HD11	1.90	0.53
1:B:256:GLN:O	1:B:259:THR:OG1	2.25	0.52
3:M:19:VAL:HG11	3:M:104:LEU:HD11	1.92	0.52
2:I:66:ASP:OD1	2:I:66:ASP:N	2.41	0.51
3:L:126:THR:HG21	2:I:120:THR:HG23	1.92	0.51
3:L:1:ASP:N	3:L:95:PRO:HD2	2.26	0.51
2:H:54:GLY:HA2	2:H:74:LYS:HD3	1.92	0.51
2:I:104:ASP:OD1	2:I:104:ASP:N	2.43	0.51
1:A:234:ALA:HB3	1:A:302:VAL:HA	1.93	0.50
3:M:47:LEU:HA	3:M:58:ILE:HG21	1.93	0.50
1:B:248:LYS:HG2	1:B:253:PRO:HA	1.93	0.50
2:I:138:MET:HG2	2:I:187:PRO:HA	1.94	0.50
1:B:247:VAL:HG12	1:B:248:LYS:HG3	1.92	0.50
2:H:120:THR:HG23	3:M:126:THR:HG21	1.94	0.49
2:H:126:PRO:HD3	2:H:211:LYS:HE2	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:151:GLU:HG3	2:H:152:PRO:HA	1.94	0.49
2:H:29:PHE:CE2	2:H:53:PRO:HB3	2.48	0.49
1:B:239:GLY:O	1:B:278:ARG:NH2	2.45	0.48
2:I:122:PRO:HB3	2:I:148:TYR:HB3	1.96	0.48
3:L:119:PRO:HB3	3:L:209:PHE:CE2	2.49	0.48
3:M:7:SER:O	3:M:22:SER:OG	2.22	0.48
3:M:6:GLN:NE2	3:M:86:TYR:O	2.41	0.47
2:I:40:ARG:HG2	2:I:92:ALA:HB2	1.96	0.47
2:H:18:VAL:O	2:H:82:GLN:HA	2.15	0.46
3:M:15:PRO:HD3	3:M:106:ILE:HG13	1.95	0.46
3:M:21:LEU:HD12	3:M:73:LEU:HD23	1.96	0.46
1:B:234:ALA:HB3	1:B:302:VAL:HA	1.96	0.46
1:B:258:VAL:O	1:B:262:MET:HG2	2.16	0.46
2:I:190:THR:O	2:I:194:GLU:HB2	2.17	0.45
3:L:14:THR:O	3:L:16:GLY:N	2.50	0.45
1:A:248:LYS:HG2	1:A:253:PRO:HA	1.98	0.45
1:A:276:ILE:O	1:A:282:PRO:HA	2.17	0.45
2:H:211:LYS:HZ1	3:L:123:GLU:HG2	1.82	0.44
3:L:184:ASP:O	3:L:188:ARG:HG3	2.18	0.44
3:M:55:ILE:HG22	3:M:58:ILE:HG12	1.99	0.44
3:L:13:VAL:HG11	3:L:19:VAL:HG22	1.98	0.44
1:B:287:LEU:HD21	1:B:302:VAL:HG11	1.98	0.44
2:I:141:LEU:HD12	2:I:196:VAL:HG11	2.00	0.44
2:H:19:LYS:HE3	2:H:82:GLN:HB3	1.99	0.44
2:H:51:ILE:O	2:H:53:PRO:HD3	2.17	0.44
1:B:292:LYS:HG2	1:B:293:PRO:HD2	1.99	0.44
2:H:146:LYS:HE3	2:H:146:LYS:HB2	1.73	0.44
3:L:46:LEU:HD11	3:L:49:THR:HG22	2.00	0.44
2:H:189:SER:O	2:H:193:SER:OG	2.32	0.43
2:I:54:GLY:HA2	2:I:74:LYS:HE2	1.99	0.43
3:L:115:VAL:HB	3:L:207:LYS:HG3	1.99	0.43
1:B:234:ALA:HB2	1:B:290:GLU:HG2	2.00	0.43
2:I:47:TRP:CD2	3:M:96:TYR:HB2	2.53	0.43
3:M:14:THR:O	3:M:16:GLY:N	2.52	0.43
1:A:222:ILE:HD12	1:A:257:TRP:H	1.83	0.43
2:I:104:ASP:HA	3:M:46:LEU:HD22	1.99	0.43
1:A:273:ALA:HB2	2:H:31:THR:HG23	2.01	0.43
3:M:118:PHE:HA	3:M:119:PRO:HD3	1.92	0.43
2:H:8:ARG:H	2:H:8:ARG:HG2	1.68	0.43
1:A:287:LEU:HD21	1:A:302:VAL:HG11	2.01	0.42
1:B:267:ASN:HB3	1:B:270:LYS:HB3	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:249:VAL:HG12	1:A:274:LEU:HD22	2.02	0.42
1:B:299:ILE:HD12	1:B:299:ILE:HA	1.93	0.42
1:B:276:ILE:O	1:B:282:PRO:HA	2.19	0.42
3:M:36:TYR:HE2	3:M:89:GLN:HB3	1.85	0.42
1:B:235:ALA:HB1	1:B:240:LEU:HB2	2.02	0.42
3:L:47:LEU:HA	3:L:58:ILE:HG21	2.02	0.42
3:M:2:ILE:HD13	3:M:29:VAL:HG12	2.01	0.42
3:L:198:HIS:CG	3:L:199:LYS:H	2.37	0.41
2:H:24:ALA:HB1	2:H:27:TYR:CE1	2.56	0.41
3:M:61:ARG:HH12	3:M:82:ASP:CG	2.23	0.41
3:M:123:GLU:OE1	3:M:123:GLU:N	2.54	0.40
3:L:50:TYR:O	3:L:52:PHE:N	2.47	0.40
3:M:119:PRO:HB3	3:M:209:PHE:CE1	2.57	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	86/93 (92%)	81 (94%)	5 (6%)	0	100	100
1	B	86/93 (92%)	82 (95%)	3 (4%)	1 (1%)	13	49
2	H	207/218 (95%)	196 (95%)	11 (5%)	0	100	100
2	I	206/218 (94%)	193 (94%)	13 (6%)	0	100	100
3	L	211/214 (99%)	192 (91%)	18 (8%)	1 (0%)	29	67
3	M	210/214 (98%)	192 (91%)	17 (8%)	1 (0%)	29	67
All	All	1006/1050 (96%)	936 (93%)	67 (7%)	3 (0%)	41	74

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	268	PRO
3	L	15	PRO
3	M	15	PRO

### 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	73/76 (96%)	73 (100%)	0	100	100
1	B	73/76 (96%)	70 (96%)	3 (4%)	30	66
2	H	181/186 (97%)	178 (98%)	3 (2%)	60	83
2	I	181/186 (97%)	177 (98%)	4 (2%)	52	79
3	L	192/193 (100%)	190 (99%)	2 (1%)	76	90
3	M	191/193 (99%)	188 (98%)	3 (2%)	62	84
All	All	891/910 (98%)	876 (98%)	15 (2%)	60	83

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	245	ARG
1	B	275	GLU
1	B	297	LYS
2	H	3	GLN
2	H	98	ARG
2	H	176	ASP
3	L	1	ASP
3	L	76	ASN
2	I	11	LEU
2	I	23	LYS
2	I	98	ARG
2	I	176	ASP
3	M	24	ARG
3	M	108	ARG
3	M	181	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 monosaccharides 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<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	88/93 (94%)	0.58	13 (14%) 2 1	70, 87, 108, 132	0
1	B	88/93 (94%)	0.41	3 (3%) 45 29	56, 81, 120, 128	0
2	H	211/218 (96%)	0.01	1 (0%) 91 86	24, 56, 84, 97	0
2	I	210/218 (96%)	0.01	0 100 100	32, 55, 76, 95	0
3	L	213/214 (99%)	0.26	3 (1%) 75 63	25, 63, 86, 94	0
3	M	212/214 (99%)	0.29	6 (2%) 53 37	46, 70, 88, 104	0
All	All	1022/1050 (97%)	0.20	26 (2%) 57 43	24, 66, 93, 132	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	295	ASN	4.2
1	B	295	ASN	3.4
3	L	213	GLU	2.9
1	B	304	ILE	2.8
3	M	11	LEU	2.8
3	M	148	TRP	2.8
3	L	32	ASN	2.7
1	A	226	LEU	2.7
1	A	228	ASN	2.7
1	A	224	PRO	2.6
1	A	246	ILE	2.6
1	A	240	LEU	2.5
1	A	225	VAL	2.5
1	A	309	ILE	2.4
1	B	287	LEU	2.4
1	A	245	ARG	2.3
1	A	244	ASP	2.3
1	A	283	LEU	2.3
3	M	104	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
3	L	31	SER	2.1
2	H	50	TYR	2.1
3	M	145	ASN	2.0
3	M	194	CYS	2.0
3	M	146	VAL	2.0
1	A	242	ALA	2.0
1	A	254	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 monosaccharides 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.