



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 22, 2020 – 05:21 am BST

PDB ID : 3V3K  
Title : Human caspase 9 in complex with bacterial effector protein  
Authors : Moertl, M.; Maskos, K.; Steuber, H.  
Deposited on : 2011-12-13  
Resolution : 3.49 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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.

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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	:	2.11
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)	:	2.11

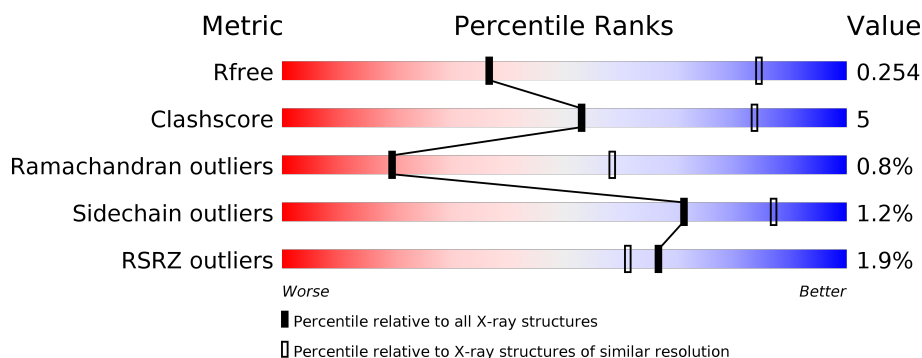
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 3.49 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	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

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 on 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	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 9%, green 79%, grey 11%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>79%</span> <span>9%</span> <span>11%</span> </div> </div>
1	C	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green 75%, yellow 11%, grey 14%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>75%</span> <span>11%</span> <span>14%</span> </div> </div>
1	E	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 2%, yellow 13%, green 75%, grey 12%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>2%</span> <span>75%</span> <span>13%</span> <span>12%</span> </div> </div>
1	G	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green 75%, yellow 10%, grey 15%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>75%</span> <span>10%</span> <span>15%</span> </div> </div>
1	I	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 2%, yellow 12%, green 76%, grey 12%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>2%</span> <span>76%</span> <span>12%</span> <span>12%</span> </div> </div>
1	K	276	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 11%, green 75%, grey 14%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>75%</span> <span>11%</span> <span>14%</span> </div> </div>

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Mol	Chain	Length	Quality of chain
1	M	276	<div><div></div><div></div><div></div></div> <div>76%12%11%</div>
1	O	276	<div><div></div><div></div><div></div></div> <div>74%12%14%</div>
2	B	165	<div><div></div><div></div><div></div></div> <div>2%88%12%</div>
2	D	165	<div><div></div><div></div><div></div></div> <div>5%85%13%</div>
2	F	165	<div><div></div><div></div><div></div></div> <div>2%86%13%</div>
2	H	165	<div><div></div><div></div><div></div></div> <div>2%85%14%</div>
2	J	165	<div><div></div><div></div><div></div></div> <div>2%87%13%</div>
2	L	165	<div><div></div><div></div><div></div></div> <div>5%83%13%</div>
2	N	165	<div><div></div><div></div><div></div></div> <div>1%86%13%</div>
2	P	165	<div><div></div><div></div><div></div></div> <div>5%84%15%</div>

## 2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 25428 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 Caspase-9.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	245	Total	C	N	O	S	29	0	0
			1898	1209	326	348	15			
1	C	237	Total	C	N	O	S	34	0	0
			1839	1172	315	337	15			
1	E	243	Total	C	N	O	S	43	0	0
			1885	1200	324	346	15			
1	G	235	Total	C	N	O	S	26	0	0
			1828	1166	313	334	15			
1	I	244	Total	C	N	O	S	44	0	0
			1890	1203	325	347	15			
1	K	237	Total	C	N	O	S	16	0	0
			1839	1172	315	337	15			
1	M	245	Total	C	N	O	S	37	0	0
			1898	1209	326	348	15			
1	O	237	Total	C	N	O	S	34	0	0
			1839	1172	315	337	15			

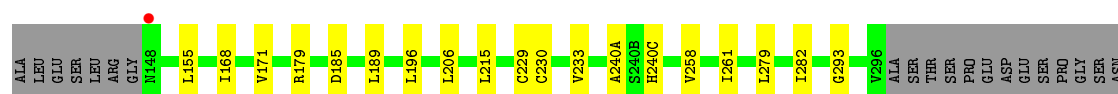
There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	220	ARG	GLN	SEE REMARK 999	UNP P55211
C	220	ARG	GLN	SEE REMARK 999	UNP P55211
E	220	ARG	GLN	SEE REMARK 999	UNP P55211
G	220	ARG	GLN	SEE REMARK 999	UNP P55211
I	220	ARG	GLN	SEE REMARK 999	UNP P55211
K	220	ARG	GLN	SEE REMARK 999	UNP P55211
M	220	ARG	GLN	SEE REMARK 999	UNP P55211
O	220	ARG	GLN	SEE REMARK 999	UNP P55211

- Molecule 2 is a protein called Putative uncharacterized protein ECs1815.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	165	Total	C	N	O	S	54	0	0
			1319	819	226	264	10			
2	D	164	Total	C	N	O	S	114	0	0
			1312	815	225	262	10			
2	F	165	Total	C	N	O	S	56	0	0
			1319	819	226	264	10			
2	H	165	Total	C	N	O	S	58	0	0
			1319	819	226	264	10			
2	J	165	Total	C	N	O	S	78	0	0
			1319	819	226	264	10			
2	L	161	Total	C	N	O	S	112	0	0
			1286	799	222	255	10			
2	N	165	Total	C	N	O	S	95	0	0
			1319	819	226	264	10			
2	P	165	Total	C	N	O	S	112	0	0
			1319	819	226	264	10			

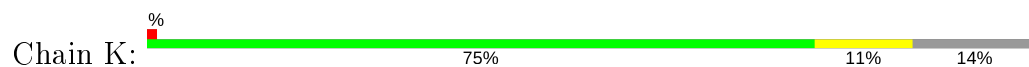




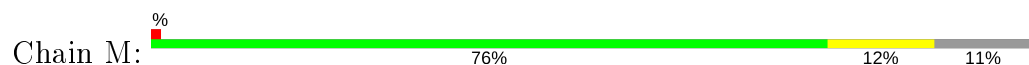
• Molecule 1: Caspase-9



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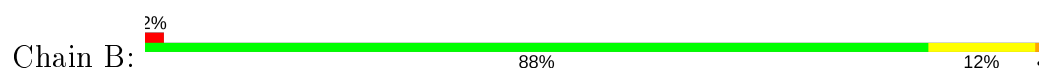
• Molecule 1: Caspase-9



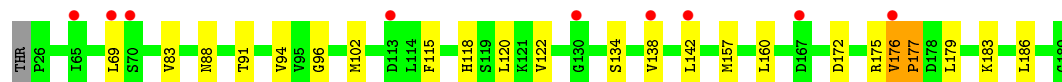
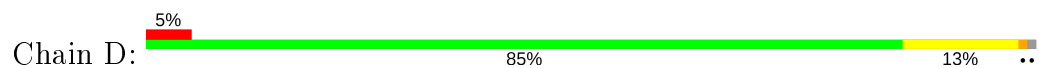
• Molecule 1: Caspase-9



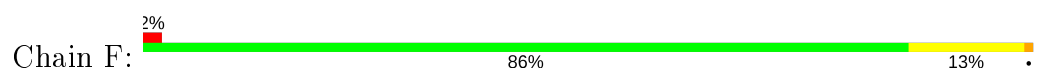
• Molecule 2: Putative uncharacterized protein ECs1815



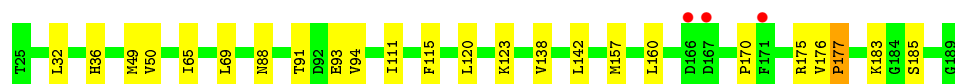
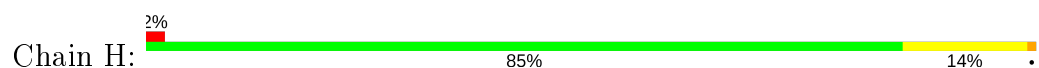
- Molecule 2: Putative uncharacterized protein ECs1815



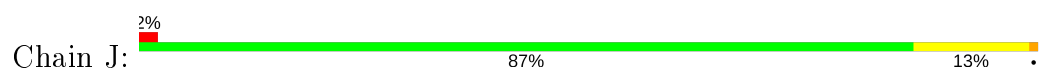
- Molecule 2: Putative uncharacterized protein ECs1815



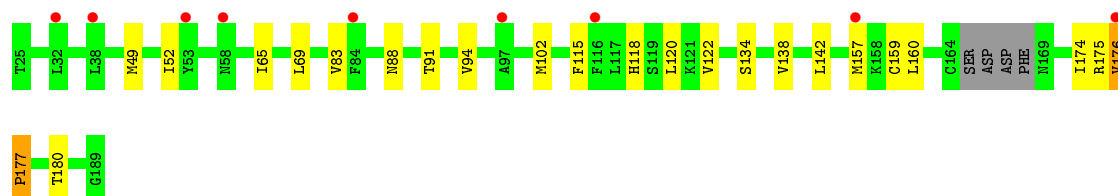
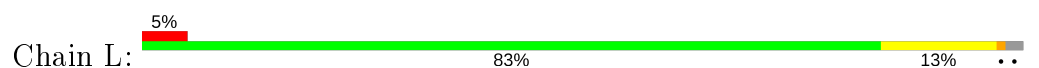
- Molecule 2: Putative uncharacterized protein ECs1815



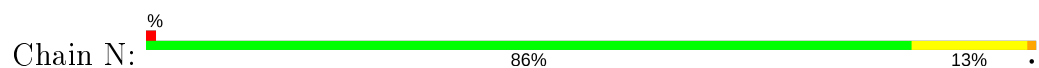
- Molecule 2: Putative uncharacterized protein ECs1815



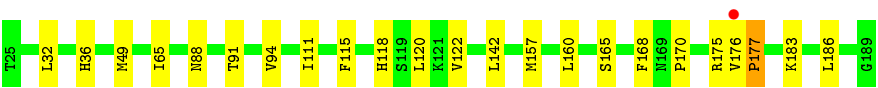
- Molecule 2: Putative uncharacterized protein ECs1815



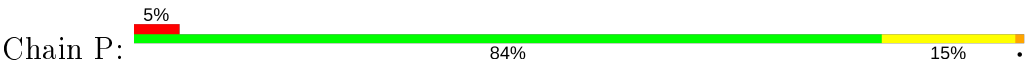
- Molecule 2: Putative uncharacterized protein ECs1815







● Molecule 2: Putative uncharacterized protein ECs1815



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	100.70 Å   209.91 Å   317.23 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	174.08 – 3.49 48.39 – 3.49	Depositor EDS
% Data completeness (in resolution range)	98.4 (174.08-3.49) 98.5 (48.39-3.49)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.92 (at 3.48 Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.239   ,   0.259 0.236   ,   0.254	Depositor DCC
$R_{free}$ test set	1689 reflections (1.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	91.1	Xtriage
Anisotropy	0.282	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 25.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	25428	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	82.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.09% 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	0.39	0/1940	0.52	0/2619
1	C	0.40	1/1881 (0.1%)	0.52	0/2540
1	E	0.40	0/1927	0.52	0/2601
1	G	0.42	0/1870	0.54	0/2525
1	I	0.41	0/1932	0.52	0/2608
1	K	0.40	0/1881	0.52	0/2540
1	M	0.40	0/1940	0.52	0/2619
1	O	0.43	0/1881	0.53	0/2540
2	B	0.45	0/1341	0.52	0/1805
2	D	0.43	0/1334	0.51	0/1794
2	F	0.43	0/1341	0.52	0/1805
2	H	0.45	1/1341 (0.1%)	0.52	0/1805
2	J	0.42	0/1341	0.52	0/1805
2	L	0.43	0/1306	0.50	0/1756
2	N	0.45	0/1341	0.50	0/1805
2	P	0.46	0/1341	0.53	0/1805
All	All	0.42	2/25938 (0.0%)	0.52	0/34972

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	217	GLU	CG-CD	-5.48	1.43	1.51
2	H	93	GLU	CD-OE1	-5.41	1.19	1.25

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	1898	0	1883	17	0
1	C	1839	0	1818	18	0
1	E	1885	0	1867	19	0
1	G	1828	0	1808	18	0
1	I	1890	0	1872	20	0
1	K	1839	0	1818	18	0
1	M	1898	0	1883	21	0
1	O	1839	0	1818	21	0
2	B	1319	0	1272	16	0
2	D	1312	0	1266	14	0
2	F	1319	0	1272	15	0
2	H	1319	0	1272	15	0
2	J	1319	0	1272	14	0
2	L	1286	0	1249	15	0
2	N	1319	0	1272	16	0
2	P	1319	0	1272	15	0
All	All	25428	0	24914	259	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 5.

The worst 5 of 259 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:O:366:LEU:HD22	1:O:398:LEU:HD23	1.62	0.82
2:H:120:LEU:HD22	2:H:142:LEU:HD11	1.67	0.75
2:D:120:LEU:HD22	2:D:142:LEU:HD11	1.70	0.73
1:K:366:LEU:HD22	1:K:398:LEU:HD23	1.72	0.70
2:L:176:VAL:HG12	2:L:177:PRO:HD3	1.77	0.66

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	241/276 (87%)	231 (96%)	10 (4%)	0	100	100
1	C	233/276 (84%)	229 (98%)	4 (2%)	0	100	100
1	E	239/276 (87%)	230 (96%)	9 (4%)	0	100	100
1	G	231/276 (84%)	224 (97%)	7 (3%)	0	100	100
1	I	240/276 (87%)	232 (97%)	8 (3%)	0	100	100
1	K	233/276 (84%)	225 (97%)	8 (3%)	0	100	100
1	M	241/276 (87%)	231 (96%)	10 (4%)	0	100	100
1	O	233/276 (84%)	227 (97%)	6 (3%)	0	100	100
2	B	163/165 (99%)	144 (88%)	15 (9%)	4 (2%)	5	34
2	D	162/165 (98%)	147 (91%)	13 (8%)	2 (1%)	13	50
2	F	163/165 (99%)	146 (90%)	13 (8%)	4 (2%)	5	34
2	H	163/165 (99%)	148 (91%)	12 (7%)	3 (2%)	8	41
2	J	163/165 (99%)	145 (89%)	15 (9%)	3 (2%)	8	41
2	L	157/165 (95%)	146 (93%)	9 (6%)	2 (1%)	12	48
2	N	163/165 (99%)	148 (91%)	12 (7%)	3 (2%)	8	41
2	P	163/165 (99%)	148 (91%)	12 (7%)	3 (2%)	8	41
All	All	3188/3528 (90%)	3001 (94%)	163 (5%)	24 (1%)	19	58

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	177	PRO
2	F	177	PRO
2	H	177	PRO
2	P	177	PRO
2	B	177	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	211/238 (89%)	207 (98%)	4 (2%)	57	80
1	C	205/238 (86%)	203 (99%)	2 (1%)	76	88
1	E	210/238 (88%)	206 (98%)	4 (2%)	57	80
1	G	204/238 (86%)	204 (100%)	0	100	100
1	I	210/238 (88%)	207 (99%)	3 (1%)	67	85
1	K	205/238 (86%)	204 (100%)	1 (0%)	88	94
1	M	211/238 (89%)	207 (98%)	4 (2%)	57	80
1	O	205/238 (86%)	204 (100%)	1 (0%)	88	94
2	B	152/152 (100%)	151 (99%)	1 (1%)	84	93
2	D	151/152 (99%)	148 (98%)	3 (2%)	55	79
2	F	152/152 (100%)	150 (99%)	2 (1%)	69	86
2	H	152/152 (100%)	151 (99%)	1 (1%)	84	93
2	J	152/152 (100%)	149 (98%)	3 (2%)	55	79
2	L	148/152 (97%)	146 (99%)	2 (1%)	67	85
2	N	152/152 (100%)	150 (99%)	2 (1%)	69	86
2	P	152/152 (100%)	150 (99%)	2 (1%)	69	86
All	All	2872/3120 (92%)	2837 (99%)	35 (1%)	71	87

5 of 35 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	F	175	ARG
1	I	390	PHE
1	O	390	PHE
2	H	175	ARG
1	I	292	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	240(E)	GLN
1	I	263	ASN
1	M	240(E)	GLN
2	H	59	ASN
1	M	263	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 carbohydrates 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 ⓘ

### 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	245/276 (88%)	0.12	4 (1%) 72 66	47, 69, 102, 147	11 (4%)
1	C	237/276 (85%)	-0.02	1 (0%) 92 90	51, 70, 95, 115	12 (5%)
1	E	243/276 (88%)	0.03	6 (2%) 57 51	47, 69, 102, 140	15 (6%)
1	G	235/276 (85%)	-0.09	1 (0%) 92 90	51, 71, 93, 118	9 (3%)
1	I	244/276 (88%)	0.00	6 (2%) 57 51	47, 70, 103, 151	16 (6%)
1	K	237/276 (85%)	-0.08	2 (0%) 86 81	51, 71, 95, 115	8 (3%)
1	M	245/276 (88%)	-0.04	4 (1%) 72 66	47, 69, 103, 146	14 (5%)
1	O	237/276 (85%)	-0.13	0 100 100	51, 72, 95, 116	13 (5%)
2	B	165/165 (100%)	0.05	3 (1%) 68 62	60, 90, 125, 139	16 (9%)
2	D	164/165 (99%)	0.35	9 (5%) 25 22	71, 98, 131, 137	31 (18%)
2	F	165/165 (100%)	0.18	3 (1%) 68 62	62, 90, 124, 136	17 (10%)
2	H	165/165 (100%)	0.18	3 (1%) 68 62	70, 98, 134, 140	21 (12%)
2	J	165/165 (100%)	0.10	3 (1%) 68 62	62, 90, 124, 141	24 (14%)
2	L	161/165 (97%)	0.47	9 (5%) 24 22	71, 98, 130, 137	32 (19%)
2	N	165/165 (100%)	0.05	1 (0%) 89 86	62, 90, 124, 141	27 (16%)
2	P	165/165 (100%)	0.41	8 (4%) 30 27	71, 98, 134, 139	33 (20%)
All	All	3238/3528 (91%)	0.08	63 (1%) 66 61	47, 78, 124, 151	299 (9%)

The worst 5 of 63 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	I	141	ALA	6.6
1	E	147	GLY	4.8
2	P	171	PHE	4.2
1	M	141	ALA	4.0
2	P	176	VAL	3.9



## 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 carbohydrates 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.