



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 23, 2021 – 03:13 PM EST

PDB ID : 1Q6W  
Title : X-Ray structure of Monoamine oxidase regulatory protein from *Archaeoglobus fulgus*  
Authors : Fedorov, A.A.; Fedorov, E.V.; Thirumuruhan, R.; Almo, S.C.; Burley, S.K.;  
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Deposited on : 2003-08-14  
Resolution : 2.81 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  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.16  
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) : 2.16

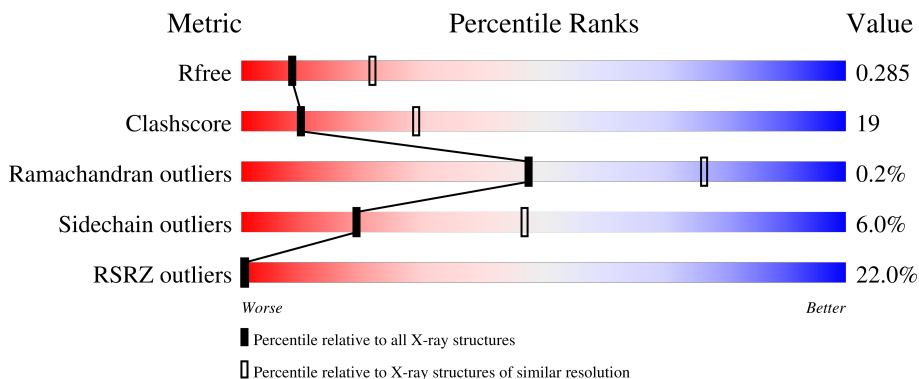
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.81 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	3617 (2.84-2.80)
Clashscore	141614	4060 (2.84-2.80)
Ramachandran outliers	138981	3978 (2.84-2.80)
Sidechain outliers	138945	3980 (2.84-2.80)
RSRZ outliers	127900	3552 (2.84-2.80)

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	161	 2% 60% 32% • 6%
1	B	161	 % 59% 32% • 6%
1	C	161	 % 61% 30% • 5%
1	D	161	 % 63% 29% • 6%
1	E	161	 % 63% 29% • 6%

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Mol	Chain	Length	Quality of chain
1	F	161	<p>%</p> <p>60% 31% • 6%</p>
1	G	161	<p>40% 57% 33% • 7%</p>
1	H	161	<p>48% 53% 37% • 7%</p>
1	I	161	<p>14% 52% 37% • 7%</p>
1	J	161	<p>19% 55% 35% • 7%</p>
1	K	161	<p>60% 57% 34% • 7%</p>
1	L	161	<p>57% 60% 30% •• 7%</p>

## 2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 14224 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 monoamine oxidase regulatory protein, putative.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	A	151	1192	779	190	221	2	0	0	0
1	B	151	1192	779	190	221	2	0	0	0
1	C	153	1208	790	192	223	1 2	0	0	0
1	D	151	1192	779	190	221	2	0	0	0
1	E	151	1192	779	190	221	2	0	0	0
1	F	151	1192	779	190	221	2	0	0	0
1	G	149	1176	770	185	219	2	0	0	0
1	H	149	1176	770	185	219	2	0	0	0
1	I	149	1176	770	185	219	2	0	0	0
1	J	149	1176	770	185	219	2	0	0	0
1	K	149	1176	770	185	219	2	0	0	0
1	L	149	1176	770	185	219	2	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	69	MSE	MET	modified residue	UNP O28346
A	78	MSE	MET	modified residue	UNP O28346
B	69	MSE	MET	modified residue	UNP O28346
B	78	MSE	MET	modified residue	UNP O28346
C	69	MSE	MET	modified residue	UNP O28346

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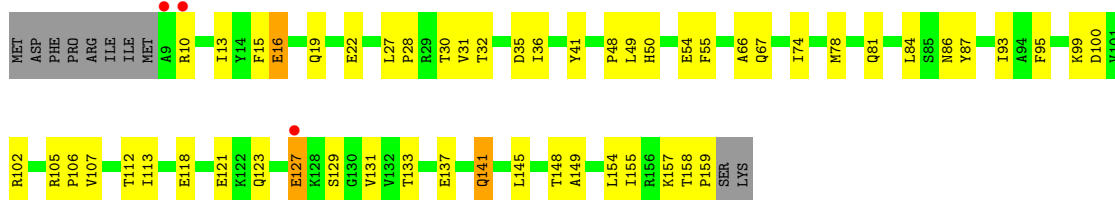
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<b>Chain</b>	<b>Residue</b>	<b>Modelled</b>	<b>Actual</b>	<b>Comment</b>	<b>Reference</b>
C	78	MSE	MET	modified residue	UNP O28346
D	69	MSE	MET	modified residue	UNP O28346
D	78	MSE	MET	modified residue	UNP O28346
E	69	MSE	MET	modified residue	UNP O28346
E	78	MSE	MET	modified residue	UNP O28346
F	69	MSE	MET	modified residue	UNP O28346
F	78	MSE	MET	modified residue	UNP O28346
G	69	MSE	MET	modified residue	UNP O28346
G	78	MSE	MET	modified residue	UNP O28346
H	69	MSE	MET	modified residue	UNP O28346
H	78	MSE	MET	modified residue	UNP O28346
I	69	MSE	MET	modified residue	UNP O28346
I	78	MSE	MET	modified residue	UNP O28346
J	69	MSE	MET	modified residue	UNP O28346
J	78	MSE	MET	modified residue	UNP O28346
K	69	MSE	MET	modified residue	UNP O28346
K	78	MSE	MET	modified residue	UNP O28346
L	69	MSE	MET	modified residue	UNP O28346
L	78	MSE	MET	modified residue	UNP O28346

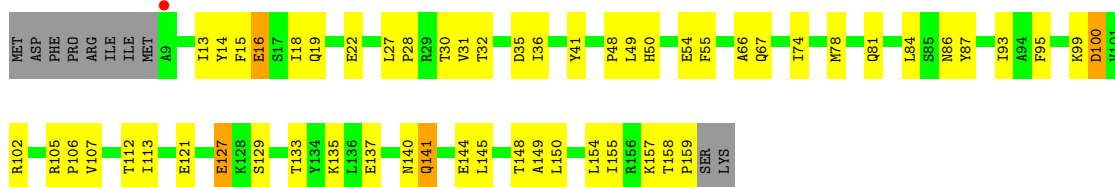
### 3 Residue-property plots [i](#)

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.

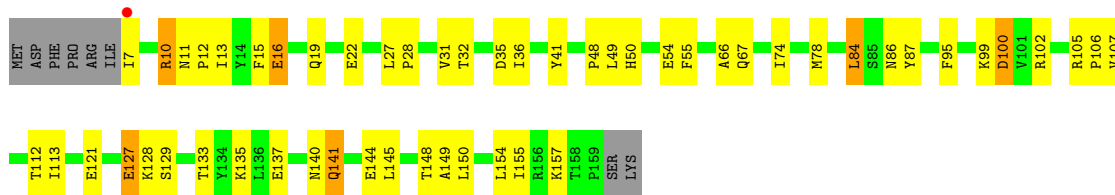
- Molecule 1: monoamine oxidase regulatory protein, putative



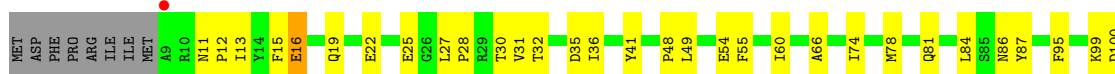
- Molecule 1: monoamine oxidase regulatory protein, putative



- Molecule 1: monoamine oxidase regulatory protein, putative



- Molecule 1: monoamine oxidase regulatory protein, putative

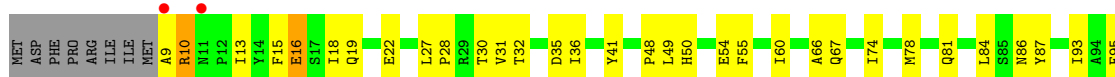




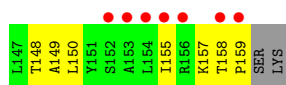
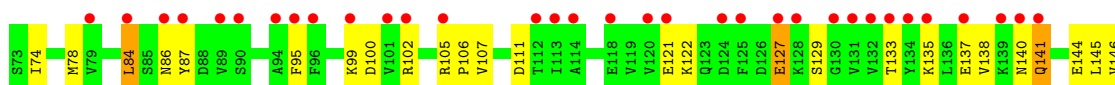
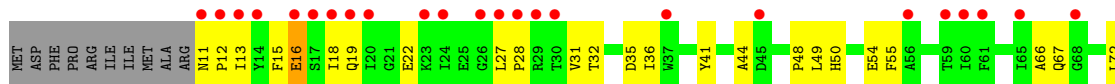
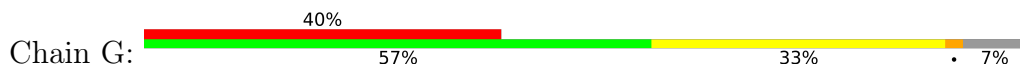
- Molecule 1: monoamine oxidase regulatory protein, putative



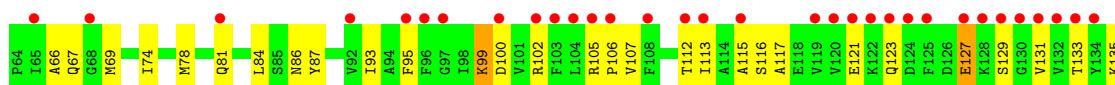
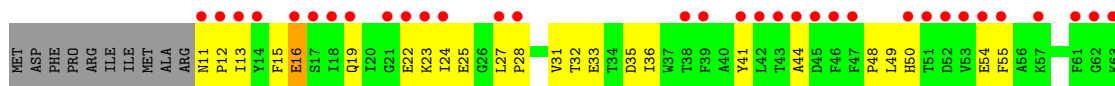
- Molecule 1: monoamine oxidase regulatory protein, putative



- Molecule 1: monoamine oxidase regulatory protein, putative

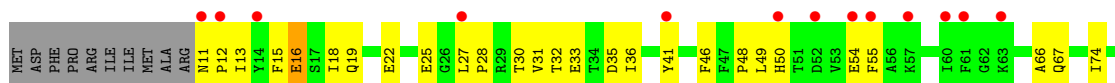


- Molecule 1: monoamine oxidase regulatory protein, putative



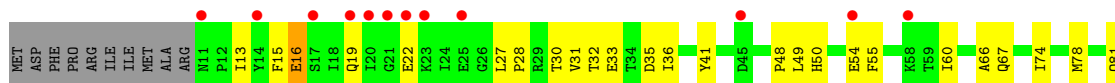


- Molecule 1: monoamine oxidase regulatory protein, putative



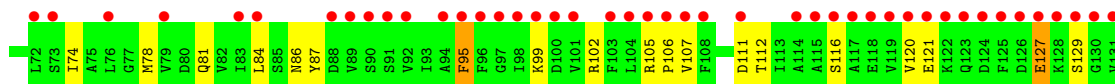
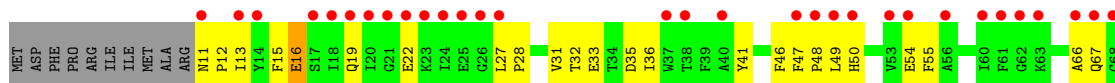
LYS

- Molecule 1: monoamine oxidase regulatory protein, putative



T158  
P159  
SER  
LYS

- Molecule 1: monoamine oxidase regulatory protein, putative

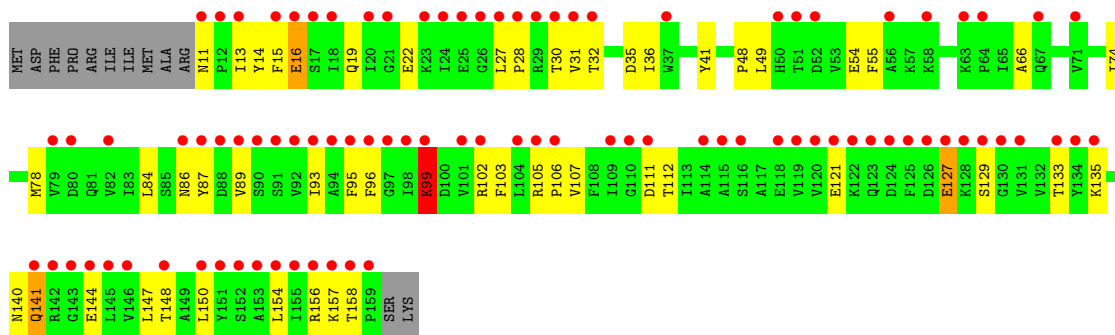


V132  
T133  
Y134  
K135  
L136  
E137  
V138  
K139  
M140  
Q141  
G143  
E144  
L145  
V146  
L147  
T148  
A149  
L150  
Y151  
S152  
A153  
L154  
I155  
R156  
K157  
T158  
P159  
SER  
LYS

- Molecule 1: monoamine oxidase regulatory protein, putative







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.74Å 136.50Å 127.43Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.81 25.05 – 2.81	Depositor EDS
% Data completeness (in resolution range)	95.8 (20.00-2.81) 96.7 (25.05-2.81)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.84 (at 2.80Å)	Xtrriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.242 , 0.276 0.257 , 0.285	Depositor DCC
$R_{free}$ test set	2763 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	56.7	Xtrriage
Anisotropy	0.322	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 78.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.005 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	14224	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	96.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.79% 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	0.47	0/1214	0.65	0/1643
1	B	0.48	0/1214	0.67	0/1643
1	C	0.46	0/1230	0.65	0/1664
1	D	0.43	0/1214	0.65	0/1643
1	E	0.43	0/1214	0.64	0/1643
1	F	0.46	0/1214	0.66	0/1643
1	G	0.31	0/1198	0.61	0/1622
1	H	0.31	0/1198	0.60	0/1622
1	I	0.35	0/1198	0.62	0/1622
1	J	0.31	0/1198	0.61	0/1622
1	K	0.29	0/1198	0.60	0/1622
1	L	0.30	0/1198	0.60	0/1622
All	All	0.39	0/14488	0.63	0/19611

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	1192	0	1218	46	1
1	B	1192	0	1218	51	0
1	C	1208	0	1238	43	1
1	D	1192	0	1218	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1192	0	1218	42	0
1	F	1192	0	1218	47	0
1	G	1176	0	1200	52	0
1	H	1176	0	1200	59	0
1	I	1176	0	1200	60	0
1	J	1176	0	1200	55	0
1	K	1176	0	1200	56	0
1	L	1176	0	1200	46	0
All	All	14224	0	14528	552	1

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 19.

The worst 5 of 552 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:H:41:TYR:HB3	1:K:41:TYR:HB3	1.25	1.11
1:D:41:TYR:HB3	1:F:41:TYR:HB3	1.37	1.06
1:A:74:ILE:HG22	1:A:78:MSE:HE2	1.39	1.05
1:G:99:LYS:HB3	1:G:150:LEU:HB3	1.36	1.04
1:E:74:ILE:HG22	1:E:78:MSE:HE2	1.40	1.03

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:GLU:OE1	1:C:128:LYS:NZ[4_456]	2.16	0.04

## 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	149/161 (92%)	144 (97%)	5 (3%)	0	100	100
1	B	149/161 (92%)	143 (96%)	6 (4%)	0	100	100
1	C	151/161 (94%)	145 (96%)	6 (4%)	0	100	100
1	D	149/161 (92%)	145 (97%)	4 (3%)	0	100	100
1	E	149/161 (92%)	144 (97%)	5 (3%)	0	100	100
1	F	149/161 (92%)	144 (97%)	4 (3%)	1 (1%)	22	51
1	G	147/161 (91%)	143 (97%)	4 (3%)	0	100	100
1	H	147/161 (91%)	143 (97%)	3 (2%)	1 (1%)	22	51
1	I	147/161 (91%)	142 (97%)	5 (3%)	0	100	100
1	J	147/161 (91%)	144 (98%)	3 (2%)	0	100	100
1	K	147/161 (91%)	143 (97%)	4 (3%)	0	100	100
1	L	147/161 (91%)	142 (97%)	4 (3%)	1 (1%)	22	51
All	All	1778/1932 (92%)	1722 (97%)	53 (3%)	3 (0%)	47	76

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	99	LYS
1	F	10	ARG
1	H	99	LYS

### 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	130/138 (94%)	123 (95%)	7 (5%)	22	51
1	B	130/138 (94%)	122 (94%)	8 (6%)	18	45
1	C	132/138 (96%)	122 (92%)	10 (8%)	13	35
1	D	130/138 (94%)	123 (95%)	7 (5%)	22	51
1	E	130/138 (94%)	122 (94%)	8 (6%)	18	45
1	F	130/138 (94%)	122 (94%)	8 (6%)	18	45

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	129/138 (94%)	122 (95%)	7 (5%)	22	51
1	H	129/138 (94%)	122 (95%)	7 (5%)	22	51
1	I	129/138 (94%)	122 (95%)	7 (5%)	22	51
1	J	129/138 (94%)	120 (93%)	9 (7%)	15	39
1	K	129/138 (94%)	122 (95%)	7 (5%)	22	51
1	L	129/138 (94%)	120 (93%)	9 (7%)	15	39
All	All	1556/1656 (94%)	1462 (94%)	94 (6%)	19	47

5 of 94 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	54	GLU
1	G	95	PHE
1	L	16	GLU
1	F	84	LEU
1	F	141	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 32 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	141	GLN
1	H	81	GLN
1	L	81	GLN
1	G	141	GLN
1	H	86	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 monosaccharides 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	149/161 (92%)	-0.27	3 (2%) 65 56	17, 38, 90, 134	0
1	B	149/161 (92%)	-0.30	1 (0%) 87 84	21, 40, 76, 116	0
1	C	151/161 (93%)	-0.18	1 (0%) 87 84	22, 45, 94, 122	0
1	D	149/161 (92%)	-0.21	1 (0%) 87 84	18, 44, 104, 153	0
1	E	149/161 (92%)	-0.19	2 (1%) 77 72	18, 41, 98, 129	0
1	F	149/161 (92%)	-0.30	2 (1%) 77 72	22, 39, 81, 125	0
1	G	147/161 (91%)	2.30	64 (43%) 0 0	76, 151, 187, 198	0
1	H	147/161 (91%)	2.18	77 (52%) 0 0	72, 159, 186, 199	0
1	I	147/161 (91%)	0.80	22 (14%) 2 1	43, 98, 152, 171	0
1	J	147/161 (91%)	1.10	30 (20%) 1 0	53, 121, 169, 200	0
1	K	147/161 (91%)	2.87	97 (65%) 0 0	108, 171, 197, 200	0
1	L	147/161 (91%)	3.17	91 (61%) 0 0	89, 172, 196, 200	0
All	All	1778/1932 (92%)	0.90	391 (21%) 0 0	17, 84, 186, 200	0

The worst 5 of 391 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	94	ALA	19.0
1	K	130	GLY	12.4
1	L	153	ALA	11.0
1	K	129	SER	10.3
1	L	154	LEU	10.1

### 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.