



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 22, 2014 – 08:11 AM EDT

PDB ID : 4O8U  
Title : Structure of PF2046  
Authors : Su, J.; Liu, Z.-J.  
Deposited on : 2013-12-30  
Resolution : 2.35 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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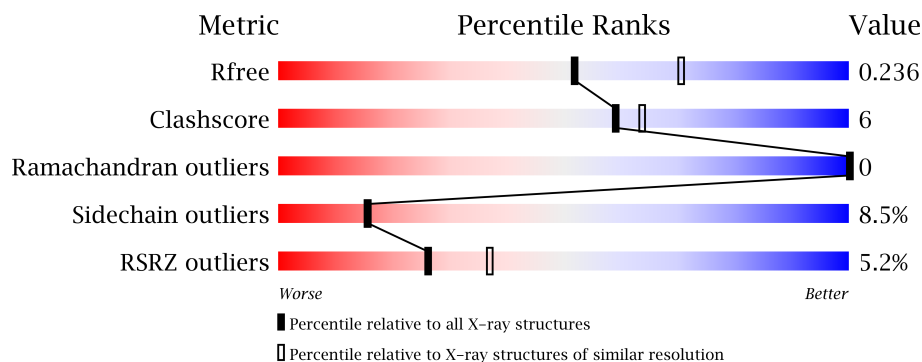
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.16 November 2013  
Xtriage (Phenix) : dev-1439  
EDS : stable22978  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22978

# 1 Overall quality at a glance

The reported resolution of this entry is 2.35 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))
$R_{free}$	66092	4049 (2.38-2.30)
Clashscore	79885	1094 (2.36-2.32)
Ramachandran outliers	78287	1080 (2.36-2.32)
Sidechain outliers	78261	1081 (2.36-2.32)
RSRZ outliers	66119	4050 (2.38-2.30)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	229	
1	B	229	
1	C	229	
1	D	229	
1	E	229	
1	F	229	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 10864 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Uncharacterized protein PF2046.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			
1	B	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			
1	C	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			
1	D	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			
1	E	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			
1	F	227	Total	C	N	O	Se	0	0	0
			1757	1132	296	326	3			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	9	SER	-	EXPRESSION TAG	UNP Q8TZE9
B	9	SER	-	EXPRESSION TAG	UNP Q8TZE9
C	9	SER	-	EXPRESSION TAG	UNP Q8TZE9
D	9	SER	-	EXPRESSION TAG	UNP Q8TZE9
E	9	SER	-	EXPRESSION TAG	UNP Q8TZE9
F	9	SER	-	EXPRESSION TAG	UNP Q8TZE9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	56	Total	O	0	0
			56	56		
2	B	50	Total	O	0	0
			50	50		
2	C	53	Total	O	0	0
			53	53		

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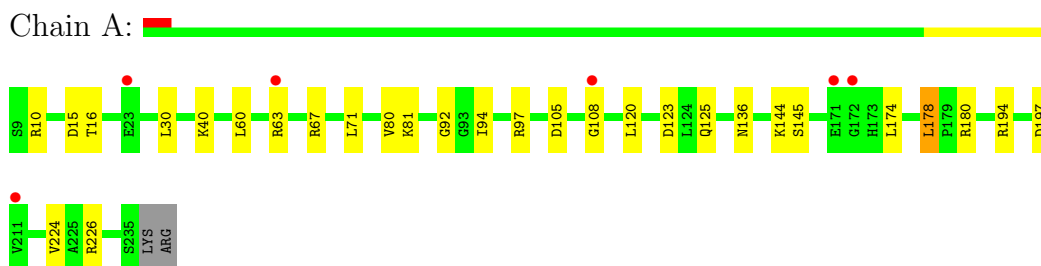
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	51	Total 51	O 51	0	0
2	E	60	Total 60	O 60	0	0
2	F	52	Total 52	O 52	0	0

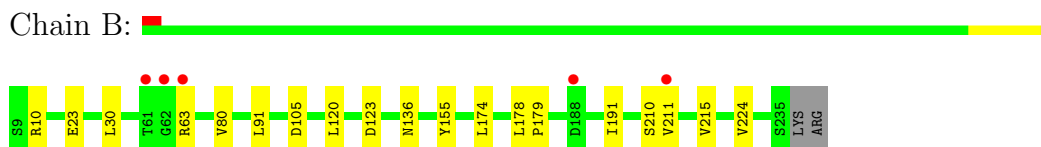
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

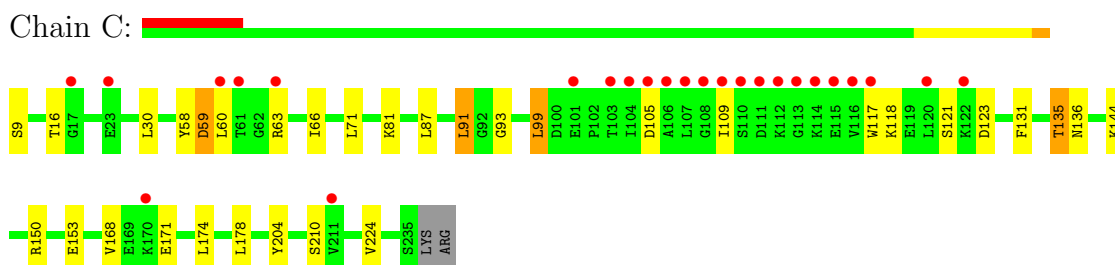
- Molecule 1: Uncharacterized protein PF2046



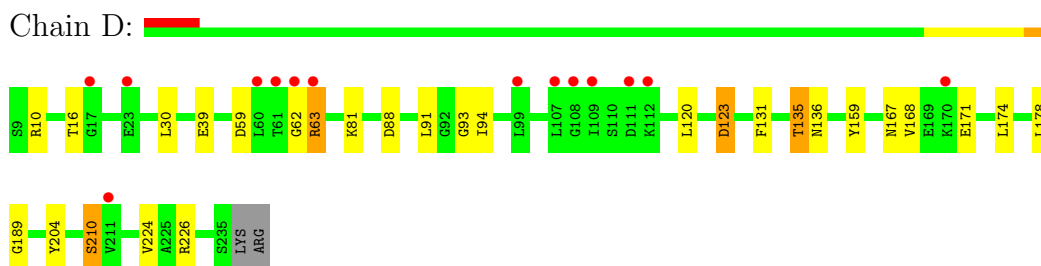
- Molecule 1: Uncharacterized protein PF2046



- Molecule 1: Uncharacterized protein PF2046

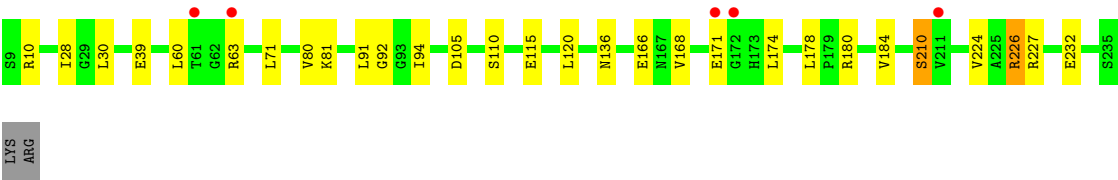


- Molecule 1: Uncharacterized protein PF2046



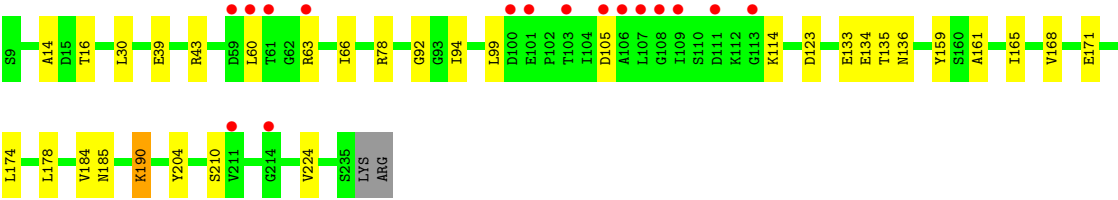
- Molecule 1: Uncharacterized protein PF2046





● Molecule 1: Uncharacterized protein PF2046

Chain F:



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	218.38Å 125.64Å 94.04Å 90.00° 102.86° 90.00°	Depositor
Resolution (Å)	36.07 – 2.35 36.07 – 2.35	Depositor EDS
% Data completeness (in resolution range)	85.1 (36.07-2.35) 81.0 (36.07-2.35)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.03 (at 2.34Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, $R_{free}$	0.201 , 0.238 0.200 , 0.236	Depositor DCC
$R_{free}$ test set	1909 reflections (2.28%)	DCC
Wilson B-factor (Å <sup>2</sup> )	35.2	Xtriage
Anisotropy	0.659	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 34.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 88098 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	10864	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.22% of the height of the origin peak. No significant pseudotranslation is detected.*

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

## 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	0.57	0/1788	0.69	1/2420 (0.0%)
1	B	0.54	0/1788	0.67	1/2420 (0.0%)
1	C	0.57	0/1788	0.68	0/2420
1	D	0.59	0/1788	0.71	1/2420 (0.0%)
1	E	0.60	0/1788	0.67	0/2420
1	F	0.55	0/1788	0.68	1/2420 (0.0%)
All	All	0.57	0/10728	0.68	4/14520 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	91	LEU	N-CA-C	-9.07	86.52	111.00
1	D	180	ARG	CB-CA-C	-6.40	97.60	110.40
1	A	178	LEU	C-N-CD	6.13	141.26	128.40
1	F	92	GLY	N-CA-C	5.74	127.44	113.10

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1757	0	10	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1757	0	10	5	0
1	C	1757	0	10	12	0
1	D	1757	0	10	15	0
1	E	1757	0	10	14	0
1	F	1757	0	10	12	0
2	A	56	0	0	8	0
2	B	50	0	0	2	0
2	C	53	0	0	1	0
2	D	51	0	0	7	0
2	E	60	0	0	7	0
2	F	52	0	0	5	0
All	All	10864	0	60	65	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 6.

All (65) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:D:210:SER:N	2:D:309:HOH:O	1.84	1.10
1:E:210:SER:OG	2:E:353:HOH:O	1.86	0.94
1:A:92:GLY:N	2:A:330:HOH:O	2.12	0.83
1:F:159:TYR:OH	2:F:343:HOH:O	1.98	0.81
1:D:168:VAL:O	1:D:171:GLU:O	1.96	0.81
1:E:81:LYS:NZ	2:E:331:HOH:O	2.14	0.79
1:B:10:ARG:NH1	1:B:80:VAL:O	2.17	0.78
1:D:189:GLY:N	2:D:338:HOH:O	2.17	0.76
1:D:159:TYR:OH	2:D:308:HOH:O	2.04	0.74
1:A:10:ARG:NH1	1:A:80:VAL:O	2.21	0.74
1:C:168:VAL:O	1:C:171:GLU:O	2.05	0.73
1:E:210:SER:N	2:E:353:HOH:O	2.20	0.73
1:D:88:ASP:OD2	2:D:347:HOH:O	2.06	0.73
1:D:167:ASN:ND2	2:D:332:HOH:O	2.22	0.71
1:A:15:ASP:OD1	2:A:317:HOH:O	2.09	0.69
1:D:59:ASP:OD1	2:D:325:HOH:O	2.09	0.69
1:A:200:GLU:O	2:A:302:HOH:O	2.11	0.68
1:E:10:ARG:NH1	1:E:80:VAL:O	2.26	0.68
1:E:166:GLU:OE2	2:E:353:HOH:O	2.12	0.68
1:D:188:ASP:N	2:D:338:HOH:O	2.27	0.68
1:F:168:VAL:O	1:F:171:GLU:O	2.12	0.67
1:E:115:GLU:OE2	1:F:190:LYS:CD	2.44	0.65
1:A:67:ARG:NH1	2:A:346:HOH:O	2.29	0.65
1:B:155:TYR:OH	2:B:348:HOH:O	2.15	0.65

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:108:GLY:N	2:A:351:HOH:O	2.34	0.60
1:F:43:ARG:NH2	2:F:315:HOH:O	2.35	0.59
1:A:81:LYS:NZ	2:A:316:HOH:O	2.34	0.59
1:D:123:ASP:N	1:D:123:ASP:OD1	2.33	0.59
1:F:185:ASN:CB	2:F:344:HOH:O	2.53	0.57
1:E:92:GLY:N	2:E:350:HOH:O	2.39	0.56
1:F:105:ASP:O	1:F:114:LYS:NZ	2.39	0.56
1:D:131:PHE:O	1:D:135:THR:OG1	2.25	0.55
1:F:161:ALA:O	1:F:165:ILE:CD1	2.55	0.54
1:B:105:ASP:OD1	1:C:204:TYR:OH	2.27	0.53
1:E:168:VAL:O	1:E:171:GLU:O	2.27	0.53
1:C:9:SER:N	2:C:302:HOH:O	2.41	0.52
1:D:10:ARG:NH1	1:D:81:LYS:O	2.42	0.52
1:E:110:SER:N	2:E:347:HOH:O	2.44	0.50
1:A:67:ARG:NH2	2:A:346:HOH:O	2.43	0.50
1:C:131:PHE:O	1:C:135:THR:OG1	2.31	0.48
1:C:105:ASP:OD2	1:C:118:LYS:NZ	2.47	0.48
1:C:123:ASP:OD1	1:C:123:ASP:N	2.46	0.48
1:E:91:LEU:N	2:E:350:HOH:O	2.47	0.47
1:D:91:LEU:O	1:D:93:GLY:N	2.47	0.47
1:A:123:ASP:N	1:A:123:ASP:OD1	2.49	0.46
1:C:91:LEU:O	1:C:93:GLY:N	2.49	0.46
1:C:150:ARG:NH1	1:C:153:GLU:OE1	2.50	0.45
1:A:197:ASP:OD2	1:E:227:ARG:NH1	2.50	0.45
1:F:78:ARG:NH2	1:F:134:GLU:OE1	2.50	0.44
1:B:123:ASP:N	1:B:123:ASP:OD1	2.51	0.43
1:C:144:LYS:O	1:D:226:ARG:NE	2.51	0.43
1:F:14:ALA:O	2:F:302:HOH:O	2.21	0.43
1:E:226:ARG:O	1:E:227:ARG:CB	2.66	0.43
1:A:40:LYS:NZ	1:E:232:GLU:OE1	2.52	0.42
1:E:105:ASP:OD1	1:F:204:TYR:OH	2.37	0.42
1:C:117:TRP:O	1:C:121:SER:N	2.52	0.42
1:C:58:TYR:CD1	1:C:59:ASP:N	2.87	0.42
1:D:62:GLY:C	1:D:63:ARG:NE	2.73	0.42
1:A:105:ASP:OD1	1:D:204:TYR:OH	2.38	0.41
1:F:123:ASP:N	1:F:123:ASP:OD1	2.54	0.41
1:B:179:PRO:O	2:B:310:HOH:O	2.22	0.40
1:A:92:GLY:CA	2:A:330:HOH:O	2.64	0.40
1:C:99:LEU:O	1:C:121:SER:OG	2.39	0.40
1:F:133:GLU:CG	2:F:338:HOH:O	2.68	0.40
1:A:97:ARG:O	1:A:125:GLN:NE2	2.55	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	225/229 (98%)	218 (97%)	7 (3%)	0	100	100
1	B	225/229 (98%)	219 (97%)	6 (3%)	0	100	100
1	C	225/229 (98%)	219 (97%)	6 (3%)	0	100	100
1	D	225/229 (98%)	218 (97%)	7 (3%)	0	100	100
1	E	225/229 (98%)	219 (97%)	6 (3%)	0	100	100
1	F	225/229 (98%)	217 (96%)	8 (4%)	0	100	100
All	All	1350/1374 (98%)	1310 (97%)	40 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	183/189 (97%)	166 (91%)	17 (9%)	13	12
1	B	183/189 (97%)	171 (93%)	12 (7%)	24	26
1	C	183/189 (97%)	165 (90%)	18 (10%)	12	11
1	D	183/189 (97%)	169 (92%)	14 (8%)	18	19
1	E	183/189 (97%)	167 (91%)	16 (9%)	15	14
1	F	183/189 (97%)	167 (91%)	16 (9%)	15	14
All	All	1098/1134 (97%)	1005 (92%)	93 (8%)	15	16

All (93) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	THR
1	A	30	LEU
1	A	60	LEU
1	A	63	ARG
1	A	71	LEU
1	A	94	ILE
1	A	120	LEU
1	A	136	ASN
1	A	144	LYS
1	A	145	SER
1	A	174	LEU
1	A	178	LEU
1	A	180	ARG
1	A	194	ARG
1	A	210	SER
1	A	224	VAL
1	A	226	ARG
1	B	23	GLU
1	B	30	LEU
1	B	63	ARG
1	B	120	LEU
1	B	136	ASN
1	B	174	LEU
1	B	178	LEU
1	B	191	ILE
1	B	210	SER
1	B	211	VAL
1	B	215	VAL
1	B	224	VAL
1	C	16	THR
1	C	30	LEU
1	C	59	ASP
1	C	60	LEU
1	C	63	ARG
1	C	66	ILE
1	C	71	LEU
1	C	81	LYS
1	C	87	LEU
1	C	91	LEU
1	C	99	LEU
1	C	109	ILE
1	C	135	THR
1	C	136	ASN

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Mol	Chain	Res	Type
1	C	174	LEU
1	C	178	LEU
1	C	210	SER
1	C	224	VAL
1	D	16	THR
1	D	30	LEU
1	D	39	GLU
1	D	63	ARG
1	D	94	ILE
1	D	120	LEU
1	D	123	ASP
1	D	135	THR
1	D	136	ASN
1	D	174	LEU
1	D	178	LEU
1	D	180	ARG
1	D	210	SER
1	D	224	VAL
1	E	28	ILE
1	E	30	LEU
1	E	39	GLU
1	E	60	LEU
1	E	63	ARG
1	E	71	LEU
1	E	94	ILE
1	E	120	LEU
1	E	136	ASN
1	E	174	LEU
1	E	178	LEU
1	E	180	ARG
1	E	184	VAL
1	E	210	SER
1	E	224	VAL
1	E	226	ARG
1	F	16	THR
1	F	30	LEU
1	F	39	GLU
1	F	60	LEU
1	F	63	ARG
1	F	66	ILE
1	F	94	ILE
1	F	99	LEU

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Mol	Chain	Res	Type
1	F	135	THR
1	F	136	ASN
1	F	174	LEU
1	F	178	LEU
1	F	184	VAL
1	F	190	LYS
1	F	210	SER
1	F	224	VAL

Some 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 chains 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 carbohydrates 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(Å²)	Q<0.9
1	A	227/229 (99%)	0.04	6 (2%)	53	64	27, 47, 72, 102	0
1	B	227/229 (99%)	-0.01	5 (2%)	59	70	26, 46, 73, 96	0
1	C	227/229 (99%)	0.53	25 (11%)	6	10	25, 48, 118, 148	0
1	D	227/229 (99%)	0.47	14 (6%)	20	29	26, 48, 108, 131	0
1	E	227/229 (99%)	0.02	5 (2%)	59	70	25, 48, 71, 106	0
1	F	227/229 (99%)	0.41	16 (7%)	16	24	25, 48, 107, 131	0
All	All	1362/1374 (99%)	0.25	71 (5%)	26	37	25, 48, 95, 148	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	107	LEU	8.0
1	C	109	ILE	6.2
1	D	107	LEU	6.1
1	C	61	THR	6.0
1	C	111	ASP	5.6
1	F	61	THR	5.4
1	D	109	ILE	5.2
1	C	108	GLY	5.1
1	D	108	GLY	4.9
1	D	61	THR	4.9
1	D	111	ASP	4.8
1	F	106	ALA	4.6
1	C	105	ASP	4.6
1	C	60	LEU	4.6
1	C	115	GLU	4.5
1	F	107	LEU	4.4
1	F	63	ARG	4.4
1	D	60	LEU	4.3
1	C	63	ARG	4.2

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Mol	Chain	Res	Type	RSRZ
1	C	117	TRP	4.0
1	C	106	ALA	3.9
1	F	108	GLY	3.7
1	C	112	LYS	3.6
1	E	211	VAL	3.5
1	F	101	GLU	3.5
1	A	63	ARG	3.5
1	C	113	GLY	3.4
1	D	63	ARG	3.3
1	B	61	THR	3.1
1	C	104	ILE	3.1
1	F	105	ASP	3.1
1	C	23	GLU	3.1
1	F	113	GLY	3.1
1	F	60	LEU	3.0
1	F	109	ILE	3.0
1	D	112	LYS	3.0
1	F	103	THR	2.9
1	C	114	LYS	2.9
1	D	211	VAL	2.8
1	D	62	GLY	2.7
1	C	103	THR	2.7
1	A	172	GLY	2.7
1	B	211	VAL	2.6
1	C	122	LYS	2.6
1	B	62	GLY	2.6
1	C	17	GLY	2.6
1	A	211	VAL	2.6
1	A	171	GLU	2.6
1	F	214	GLY	2.5
1	C	110	SER	2.5
1	F	111	ASP	2.5
1	B	63	ARG	2.4
1	E	172	GLY	2.4
1	E	61	THR	2.4
1	C	170	LYS	2.3
1	C	101	GLU	2.3
1	A	23	GLU	2.3
1	D	23	GLU	2.3
1	E	63	ARG	2.3
1	D	170	LYS	2.3
1	D	17	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
1	F	211	VAL	2.2
1	F	59	ASP	2.2
1	A	108	GLY	2.2
1	C	211	VAL	2.2
1	E	171	GLU	2.1
1	B	188	ASP	2.1
1	F	100	ASP	2.1
1	C	116	VAL	2.1
1	D	99	LEU	2.1
1	C	120	LEU	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 carbohydrates 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.