wwPDB X-ray Structure Validation Summary Report (i)

Apr 29, 2024 – 11:11 am BST

PDB ID	:	5O6U
Title	:	Structure of the Cascade-I-Fv R-loop complex from Shewanella putrefaciens
Authors	:	Pausch, P.; Altegoer, F.; Bange, G.
Deposited on	:	2017-06-07
Resolution	:	3.25 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

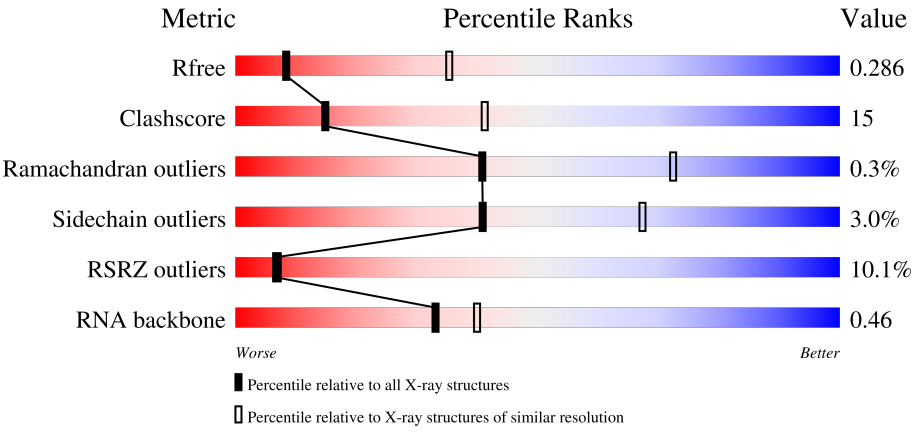
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 3.25 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	1191 (3.30-3.22)
Clashscore	141614	1251 (3.30-3.22)
Ramachandran outliers	138981	1229 (3.30-3.22)
Sidechain outliers	138945	1228 (3.30-3.22)
RSRZ outliers	127900	1154 (3.30-3.22)
RNA backbone	3102	1072 (3.62-2.90)

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	A	43	12% 40% 40% 21%
2	B	182	19% 64% 31% .
3	C	315	10% 66% 17% . 15%
3	D	315	5% 77% 22% .

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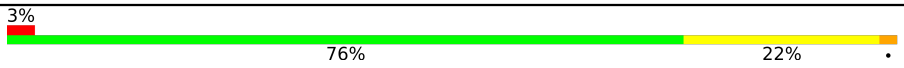
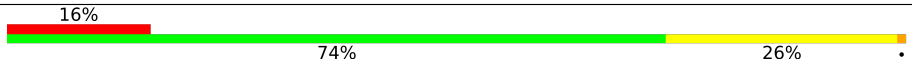
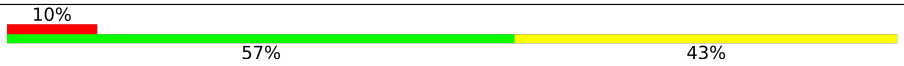
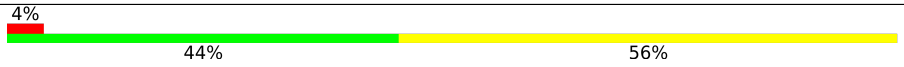
Mol	Chain	Length	Quality of chain
3	E	315	
4	F	336	
5	H	21	
6	I	27	

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 13131 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 RNA chain called crRNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	43	Total	C	N	O	P	0	0	0
			894	400	164	288	42			

- Molecule 2 is a protein called CRISPR-associated protein, Csy4 family.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	182	Total	C	N	O	S	0	0	0
			1452	933	251	264	4			

- Molecule 3 is a protein called Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	267	Total	C	N	O	S	16	0	0
			2127	1348	366	405	8			
3	D	315	Total	C	N	O	S	20	0	0
			2506	1584	429	485	8			
3	E	315	Total	C	N	O	S	16	0	0
			2506	1584	429	485	8			

- Molecule 4 is a protein called Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	336	Total	C	N	O	S	40	0	0
			2659	1695	440	510	14			

- Molecule 5 is a DNA chain called non-target DNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	H	21	Total	C	N	O	P	0	0	0
			420	201	69	129	21			

- Molecule 6 is a DNA chain called target DNA.

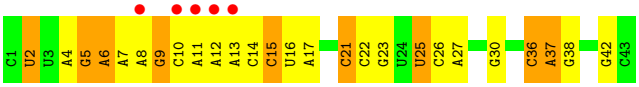
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
6	I	27	567	266	109	165	27	0	0	0

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.

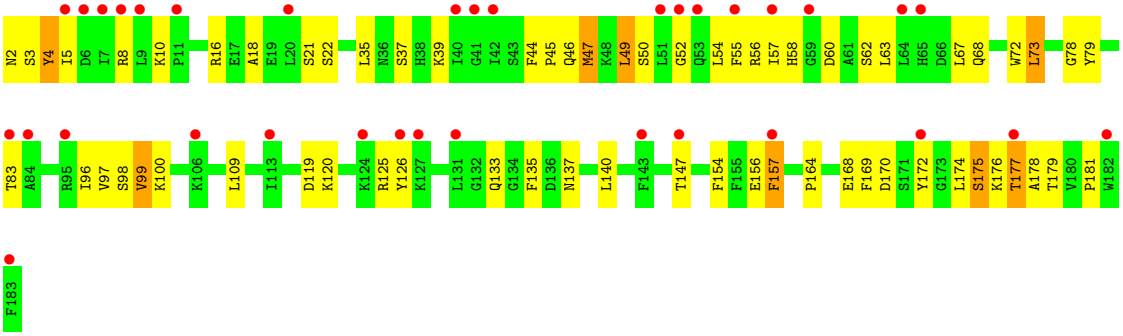
• Molecule 1: crRNA

Chain A:



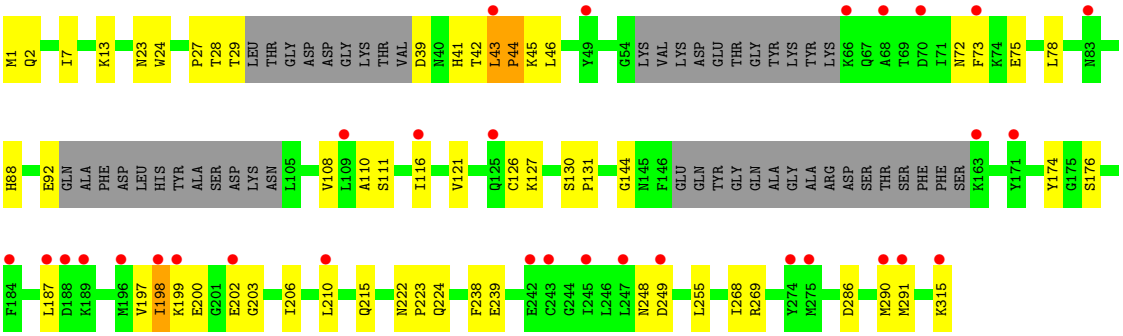
• Molecule 2: CRISPR-associated protein, Csy4 family

Chain B:



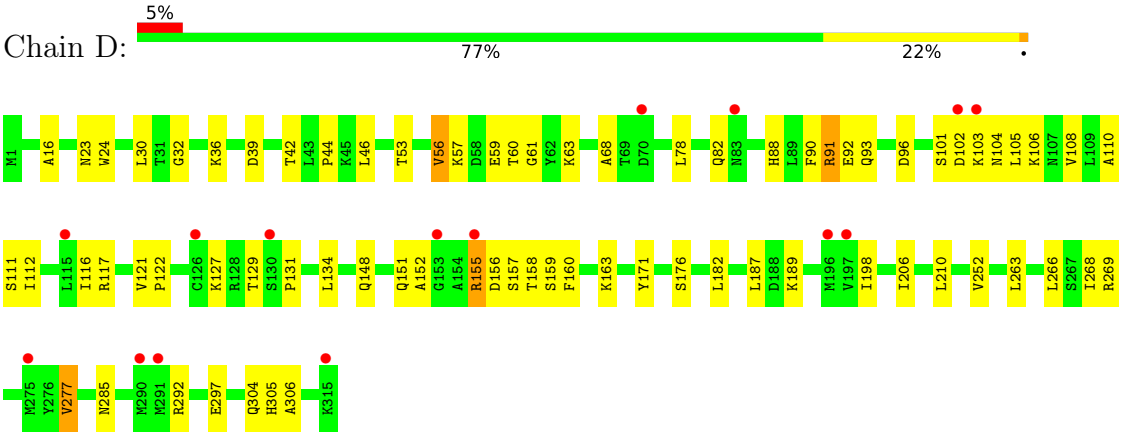
• Molecule 3: Uncharacterized protein

Chain C:



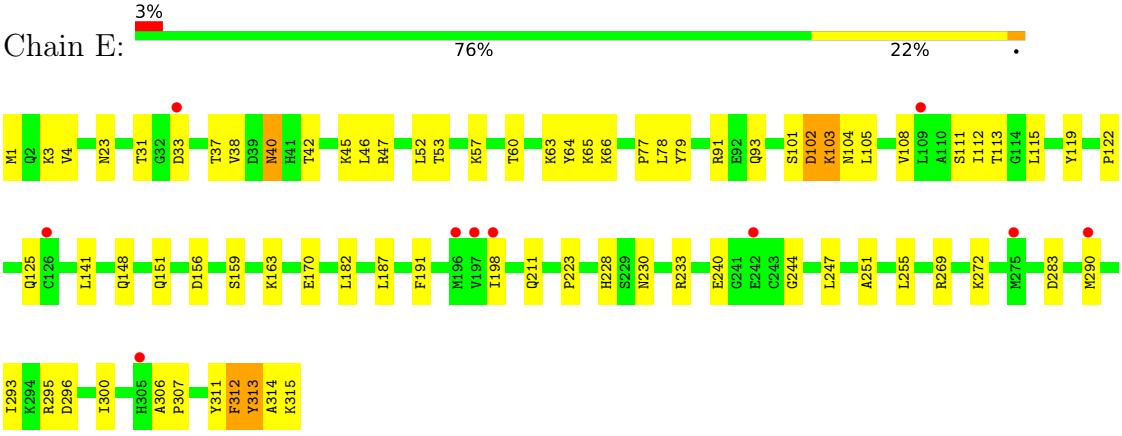
• Molecule 3: Uncharacterized protein

Chain D:



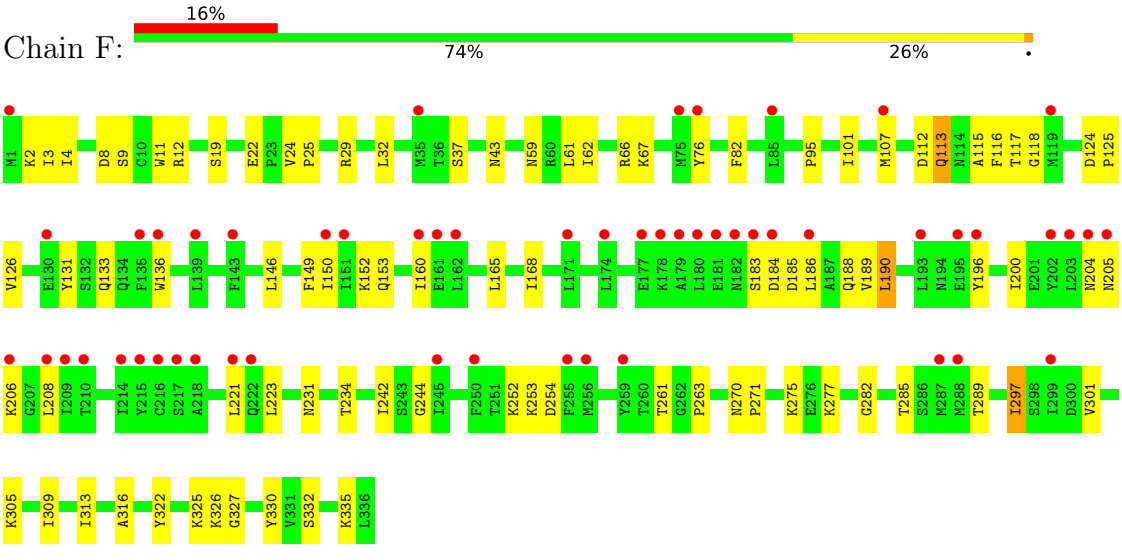
• Molecule 3: Uncharacterized protein

Chain E:



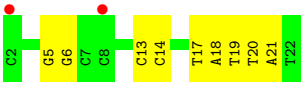
• Molecule 4: Uncharacterized protein

Chain F:



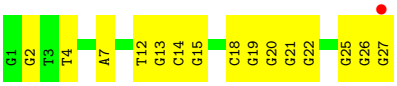
• Molecule 5: non-target DNA

Chain H:



• Molecule 6: target DNA

Chain I:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α, β, γ	143.32Å 143.32Å 172.70Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.91 – 3.25 46.91 – 3.25	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.91-3.25) 90.8 (46.91-3.25)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.14 (at 3.25Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.252 , 0.286 0.255 , 0.286	Depositor DCC
R_{free} test set	1587 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å^2)	89.1	Xtriage
Anisotropy	0.624	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 75.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.038 for -h,-k,l	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	13131	wwPDB-VP
Average B, all atoms (Å^2)	130.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.28% 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	A	0.17	0/999	0.72	0/1555
2	B	0.31	0/1486	0.54	0/2000
3	C	0.28	0/2163	0.52	0/2915
3	D	0.27	0/2554	0.54	0/3446
3	E	0.26	0/2554	0.53	0/3446
4	F	0.23	0/2703	0.41	0/3635
5	H	0.63	0/467	0.92	0/716
6	I	0.50	0/637	0.87	0/985
All	All	0.30	0/13563	0.57	0/18698

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	A	894	0	456	23	0
2	B	1452	0	1460	100	2
3	C	2127	0	2114	68	0
3	D	2506	0	2467	93	1
3	E	2506	0	2467	65	0
4	F	2659	0	2698	61	1
5	H	420	0	238	9	1
6	I	567	0	303	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	13131	0	12203	382	3

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 15.

The worst 5 of 382 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)
2:B:16:ARG:CG	3:D:155:ARG:NH1	1.72	1.48
3:C:27:PRO:CA	3:C:42:THR:HA	1.49	1.42
2:B:16:ARG:HG3	3:D:155:ARG:NH1	1.01	1.33
3:D:57:LYS:HG3	3:D:60:THR:CG2	1.66	1.25
3:D:156:ASP:O	3:D:159:SER:HB2	1.26	1.25

All (3) 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)
2:B:177:THR:OG1	2:B:177:THR:OG1[4_467]	1.46	0.74
2:B:83:THR:OG1	5:H:17:DT:OP1[5_567]	1.92	0.28
3:D:304:GLN:OE1	4:F:95:PRO:O[2_664]	2.17	0.03

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	
2	B	180/182 (99%)	171 (95%)	9 (5%)	0	100	100
3	C	257/315 (82%)	250 (97%)	5 (2%)	2 (1%)	19	52
3	D	313/315 (99%)	304 (97%)	8 (3%)	1 (0%)	41	72
3	E	313/315 (99%)	305 (97%)	7 (2%)	1 (0%)	41	72

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
4	F	334/336 (99%)	322 (96%)	12 (4%)	0	100 100
All	All	1397/1463 (96%)	1352 (97%)	41 (3%)	4 (0%)	41 72

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	44	PRO
3	D	91	ARG
3	C	43	LEU
3	E	91	ARG

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
2	B	158/158 (100%)	149 (94%)	9 (6%)	20 51
3	C	233/272 (86%)	230 (99%)	3 (1%)	69 82
3	D	272/272 (100%)	268 (98%)	4 (2%)	65 80
3	E	272/272 (100%)	263 (97%)	9 (3%)	38 65
4	F	296/296 (100%)	284 (96%)	12 (4%)	30 60
All	All	1231/1270 (97%)	1194 (97%)	37 (3%)	41 67

5 of 37 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	F	152	LYS
4	F	297	ILE
4	F	160	ILE
4	F	200	ILE
3	D	56	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
3	D	82	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	41/43 (95%)	15 (36%)	1 (2%)

5 of 15 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	2	U
1	A	5	G
1	A	6	A
1	A	9	G
1	A	14	C

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	5	G

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

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	A	43/43 (100%)	0.58	5 (11%) 4 4	94, 126, 150, 157	0
2	B	182/182 (100%)	0.99	34 (18%) 1 1	122, 143, 174, 198	0
3	C	267/315 (84%)	0.68	31 (11%) 4 4	97, 130, 162, 201	4 (1%)
3	D	315/315 (100%)	0.41	15 (4%) 30 28	77, 110, 145, 161	5 (1%)
3	E	315/315 (100%)	0.38	10 (3%) 47 45	74, 112, 144, 176	4 (1%)
4	F	336/336 (100%)	0.80	54 (16%) 1 2	85, 129, 221, 260	10 (2%)
5	H	21/21 (100%)	0.52	2 (9%) 8 9	141, 181, 242, 245	0
6	I	27/27 (100%)	0.21	1 (3%) 41 38	100, 132, 229, 234	0
All	All	1506/1554 (96%)	0.61	152 (10%) 7 7	74, 124, 203, 260	23 (1%)

The worst 5 of 152 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	256	MET	9.4
3	C	196	MET	8.0
4	F	119	MET	7.3
5	H	2	DC	6.8
2	B	55	PHE	6.7

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 monosaccharides 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.