



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 26, 2020 – 07:29 pm BST

PDB ID : 6CYF  
Title : PcrV fragment with bound Fab  
Authors : Oganessian, V.  
Deposited on : 2018-04-05  
Resolution : 2.78 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

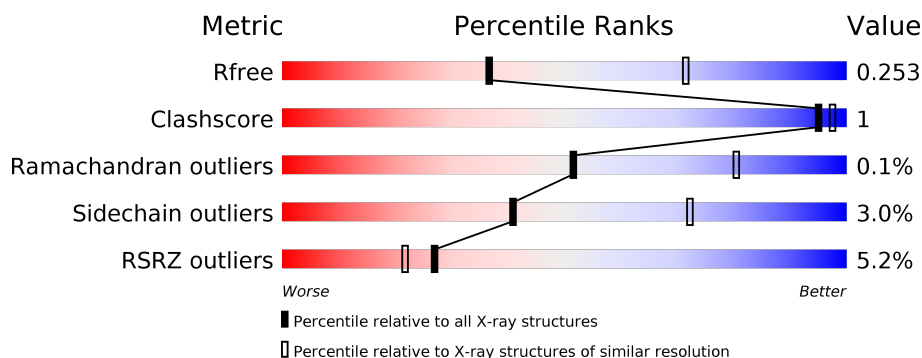
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.78 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	4107 (2.80-2.76)
Clashscore	141614	4575 (2.80-2.76)
Ramachandran outliers	138981	4487 (2.80-2.76)
Sidechain outliers	138945	4489 (2.80-2.76)
RSRZ outliers	127900	4027 (2.80-2.76)

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	128	<div> <div>6%</div> <div>98%</div> <div>..</div> </div>
1	B	128	<div> <div>8%</div> <div>97%</div> <div>..</div> </div>
1	I	128	<div> <div>9%</div> <div>95%</div> <div>5% .</div> </div>
1	Q	128	<div> <div>5%</div> <div>95%</div> <div>5% .</div> </div>
2	C	214	<div> <div>2%</div> <div>95%</div> <div>..</div> </div>
2	E	214	<div> <div>7%</div> <div>94%</div> <div>5% .</div> </div>

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Mol	Chain	Length	Quality of chain
2	L	214	
2	T	214	
3	D	227	
3	F	227	
3	M	227	
3	U	227	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 17256 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 Type III secretion system protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	127	Total	C	N	O	0	0	0
			978	616	165	197			
1	B	126	Total	C	N	O	0	0	0
			967	610	161	196			
1	I	127	Total	C	N	O	0	0	0
			978	616	165	197			
1	Q	127	Total	C	N	O	0	0	0
			978	616	165	197			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	122	ARG	-	expression tag	UNP M4Q7H6
A	123	ASN	-	expression tag	UNP M4Q7H6
A	124	LEU	-	expression tag	UNP M4Q7H6
A	125	ASN	-	expression tag	UNP M4Q7H6
A	126	ALA	-	expression tag	UNP M4Q7H6
A	127	ALA	-	expression tag	UNP M4Q7H6
A	128	ARG	-	expression tag	UNP M4Q7H6
A	129	GLU	-	expression tag	UNP M4Q7H6
A	130	LEU	-	expression tag	UNP M4Q7H6
A	131	PHE	-	expression tag	UNP M4Q7H6
A	249	ARG	-	expression tag	UNP M4Q7H6
B	122	ARG	-	expression tag	UNP M4Q7H6
B	123	ASN	-	expression tag	UNP M4Q7H6
B	124	LEU	-	expression tag	UNP M4Q7H6
B	125	ASN	-	expression tag	UNP M4Q7H6
B	126	ALA	-	expression tag	UNP M4Q7H6
B	127	ALA	-	expression tag	UNP M4Q7H6
B	128	ARG	-	expression tag	UNP M4Q7H6
B	129	GLU	-	expression tag	UNP M4Q7H6
B	130	LEU	-	expression tag	UNP M4Q7H6
B	131	PHE	-	expression tag	UNP M4Q7H6

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Chain	Residue	Modelled	Actual	Comment	Reference
B	249	ARG	-	expression tag	UNP M4Q7H6
I	122	ARG	-	expression tag	UNP M4Q7H6
I	123	ASN	-	expression tag	UNP M4Q7H6
I	124	LEU	-	expression tag	UNP M4Q7H6
I	125	ASN	-	expression tag	UNP M4Q7H6
I	126	ALA	-	expression tag	UNP M4Q7H6
I	127	ALA	-	expression tag	UNP M4Q7H6
I	128	ARG	-	expression tag	UNP M4Q7H6
I	129	GLU	-	expression tag	UNP M4Q7H6
I	130	LEU	-	expression tag	UNP M4Q7H6
I	131	PHE	-	expression tag	UNP M4Q7H6
I	249	ARG	-	expression tag	UNP M4Q7H6
Q	122	ARG	-	expression tag	UNP M4Q7H6
Q	123	ASN	-	expression tag	UNP M4Q7H6
Q	124	LEU	-	expression tag	UNP M4Q7H6
Q	125	ASN	-	expression tag	UNP M4Q7H6
Q	126	ALA	-	expression tag	UNP M4Q7H6
Q	127	ALA	-	expression tag	UNP M4Q7H6
Q	128	ARG	-	expression tag	UNP M4Q7H6
Q	129	GLU	-	expression tag	UNP M4Q7H6
Q	130	LEU	-	expression tag	UNP M4Q7H6
Q	131	PHE	-	expression tag	UNP M4Q7H6
Q	249	ARG	-	expression tag	UNP M4Q7H6

- Molecule 2 is a protein called IgG1 antibody, kappa light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	214	Total	C	N	O	S	0	0	0
			1647	1030	277	334	6			
2	L	214	Total	C	N	O	S	0	0	0
			1647	1030	277	334	6			
2	E	214	Total	C	N	O	S	0	0	0
			1647	1030	277	334	6			
2	T	214	Total	C	N	O	S	0	0	0
			1647	1030	277	334	6			

- Molecule 3 is a protein called IgG1 antibody, heavy chain fragment.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	224	Total	C	N	O	S	0	0	0
			1672	1058	275	330	9			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	M	222	Total	C	N	O	S	0	0	0
			1663	1054	273	328	8			
3	F	223	Total	C	N	O	S	0	0	0
			1669	1057	274	330	8			
3	U	223	Total	C	N	O	S	0	0	0
			1671	1058	274	330	9			

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	7	Total	O	0	0
			7	7		
4	C	12	Total	O	0	0
			12	12		
4	D	12	Total	O	0	0
			12	12		
4	B	2	Total	O	0	0
			2	2		
4	L	13	Total	O	0	0
			13	13		
4	M	7	Total	O	0	0
			7	7		
4	I	4	Total	O	0	0
			4	4		
4	E	9	Total	O	0	0
			9	9		
4	F	7	Total	O	0	0
			7	7		
4	Q	5	Total	O	0	0
			5	5		
4	T	4	Total	O	0	0
			4	4		
4	U	10	Total	O	0	0
			10	10		

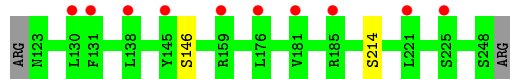
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

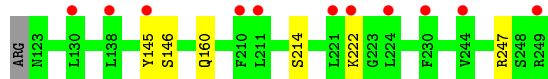
- Molecule 1: Type III secretion system protein



- Molecule 1: Type III secretion system protein



- Molecule 1: Type III secretion system protein



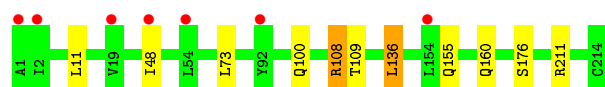
- Molecule 1: Type III secretion system protein



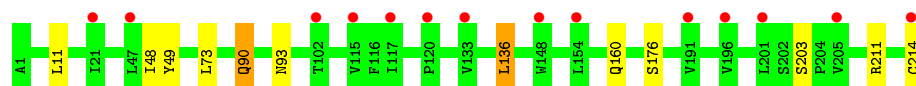
- Molecule 2: IgG1 antibody, kappa light chain



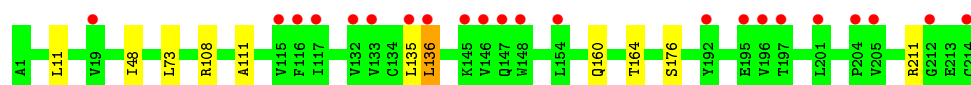
- Molecule 2: IgG1 antibody, kappa light chain



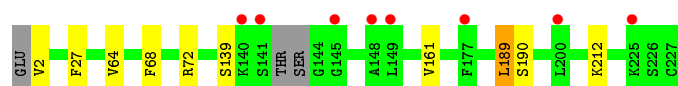
- Molecule 2: IgG1 antibody, kappa light chain



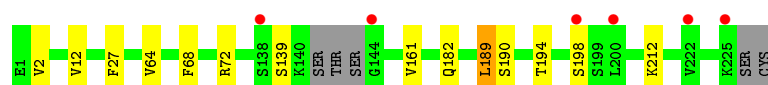
- Molecule 2: IgG1 antibody, kappa light chain



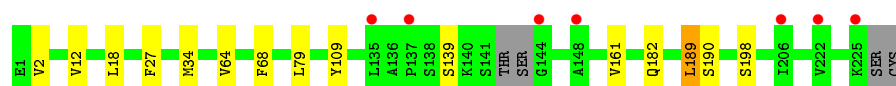
- Molecule 3: IgG1 antibody, heavy chain fragment



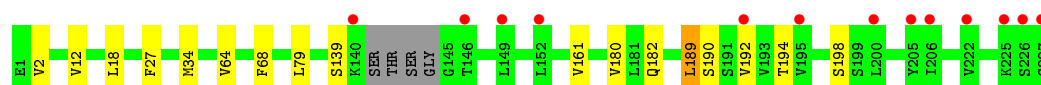
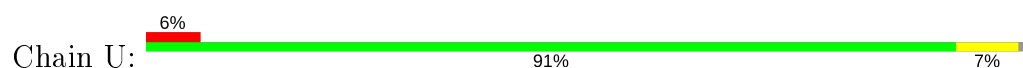
- Molecule 3: IgG1 antibody, heavy chain fragment



- Molecule 3: IgG1 antibody, heavy chain fragment



- Molecule 3: IgG1 antibody, heavy chain fragment





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.69Å 160.38Å 260.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	35.00 – 2.78 136.60 – 2.77	Depositor EDS
% Data completeness (in resolution range)	100.0 (35.00-2.78) 100.0 (136.60-2.77)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.42 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, $R_{free}$	0.215 , 0.249 0.220 , 0.253	Depositor DCC
$R_{free}$ test set	4268 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	67.3	Xtriage
Anisotropy	0.388	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 36.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	17256	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.17% 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	0.49	0/995	0.70	0/1347
1	B	0.47	0/984	0.66	0/1333
1	I	0.48	0/995	0.65	0/1347
1	Q	0.51	0/995	0.68	0/1347
2	C	0.48	0/1683	0.70	0/2284
2	E	0.45	0/1683	0.69	0/2284
2	L	0.49	0/1683	0.70	0/2284
2	T	0.46	0/1683	0.68	0/2284
3	D	0.51	0/1712	0.70	0/2330
3	F	0.47	0/1709	0.68	0/2326
3	M	0.50	0/1703	0.68	0/2318
3	U	0.47	0/1711	0.68	0/2329
All	All	0.48	0/17536	0.68	0/23813

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	978	0	964	0	0
1	B	967	0	951	0	0
1	I	978	0	964	1	0
1	Q	978	0	964	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	1647	0	1597	3	0
2	E	1647	0	1598	6	0
2	L	1647	0	1598	4	0
2	T	1647	0	1597	6	0
3	D	1672	0	1628	5	0
3	F	1669	0	1628	8	0
3	M	1663	0	1623	6	0
3	U	1671	0	1629	8	0
4	A	7	0	0	0	0
4	B	2	0	0	0	0
4	C	12	0	0	0	0
4	D	12	0	0	0	0
4	E	9	0	0	0	0
4	F	7	0	0	0	0
4	I	4	0	0	0	0
4	L	13	0	0	0	0
4	M	7	0	0	0	0
4	Q	5	0	0	0	0
4	T	4	0	0	0	0
4	U	10	0	0	0	0
All	All	17256	0	16741	42	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 1.

The worst 5 of 42 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:E:90:GLN:HE21	2:E:93:ASN:H	1.40	0.68
2:T:135:LEU:HD22	3:U:192:VAL:HG11	1.77	0.64
2:T:108:ARG:NH2	2:T:111:ALA:HB2	2.22	0.55
2:T:160:GLN:HE22	3:U:182:GLN:HA	1.75	0.51
3:F:2:VAL:HG13	3:F:27:PHE:CD1	2.47	0.50

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	125/128 (98%)	122 (98%)	3 (2%)	0	100	100
1	B	124/128 (97%)	121 (98%)	3 (2%)	0	100	100
1	I	125/128 (98%)	122 (98%)	3 (2%)	0	100	100
1	Q	125/128 (98%)	122 (98%)	3 (2%)	0	100	100
2	C	212/214 (99%)	204 (96%)	8 (4%)	0	100	100
2	E	212/214 (99%)	204 (96%)	7 (3%)	1 (0%)	29	58
2	L	212/214 (99%)	204 (96%)	7 (3%)	1 (0%)	29	58
2	T	212/214 (99%)	203 (96%)	8 (4%)	1 (0%)	29	58
3	D	220/227 (97%)	217 (99%)	3 (1%)	0	100	100
3	F	219/227 (96%)	217 (99%)	2 (1%)	0	100	100
3	M	218/227 (96%)	216 (99%)	2 (1%)	0	100	100
3	U	219/227 (96%)	215 (98%)	4 (2%)	0	100	100
All	All	2223/2276 (98%)	2167 (98%)	53 (2%)	3 (0%)	51	80

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	211	ARG
2	L	211	ARG
2	T	211	ARG

### 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	106/107 (99%)	104 (98%)	2 (2%)	57	83
1	B	105/107 (98%)	103 (98%)	2 (2%)	57	83
1	I	106/107 (99%)	102 (96%)	4 (4%)	33	64
1	Q	106/107 (99%)	102 (96%)	4 (4%)	33	64
2	C	187/187 (100%)	180 (96%)	7 (4%)	34	65
2	E	187/187 (100%)	181 (97%)	6 (3%)	39	70
2	L	187/187 (100%)	181 (97%)	6 (3%)	39	70
2	T	187/187 (100%)	183 (98%)	4 (2%)	53	81
3	D	187/190 (98%)	183 (98%)	4 (2%)	53	81
3	F	186/190 (98%)	181 (97%)	5 (3%)	44	75
3	M	185/190 (97%)	178 (96%)	7 (4%)	33	64
3	U	187/190 (98%)	180 (96%)	7 (4%)	34	65
All	All	1916/1936 (99%)	1858 (97%)	58 (3%)	41	72

5 of 58 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	M	198	SER
2	E	11	LEU
3	U	139	SER
3	M	212	LYS
1	I	160	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
2	L	166	GLN
2	E	124	GLN
1	Q	217	GLN
2	L	160	GLN
2	T	124	GLN

### 5.3.3 RNA ⓘ

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 [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	127/128 (99%)	0.72	8 (6%) 20 15	58, 77, 102, 125	1 (0%)
1	B	126/128 (98%)	0.78	10 (7%) 12 9	55, 90, 123, 149	1 (0%)
1	I	127/128 (99%)	0.84	11 (8%) 10 7	57, 83, 109, 126	1 (0%)
1	Q	127/128 (99%)	0.66	7 (5%) 25 19	51, 67, 97, 130	1 (0%)
2	C	214/214 (100%)	0.60	5 (2%) 60 55	48, 66, 88, 131	0
2	E	214/214 (100%)	0.71	14 (6%) 18 14	53, 84, 124, 142	0
2	L	214/214 (100%)	0.50	7 (3%) 46 41	43, 63, 86, 111	0
2	T	214/214 (100%)	0.77	22 (10%) 6 4	50, 87, 130, 143	0
3	D	224/227 (98%)	0.58	8 (3%) 42 37	42, 60, 97, 137	0
3	F	223/227 (98%)	0.58	7 (3%) 49 44	49, 66, 104, 137	0
3	M	222/227 (97%)	0.52	6 (2%) 54 49	42, 59, 100, 139	0
3	U	223/227 (98%)	0.62	13 (5%) 23 18	45, 66, 113, 151	0
All	All	2255/2276 (99%)	0.64	118 (5%) 27 22	42, 69, 114, 151	4 (0%)

The worst 5 of 118 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	T	154	LEU	6.4
2	E	196	VAL	5.1
3	F	225	LYS	5.0
3	M	225	LYS	4.4
3	F	148	ALA	4.4

### 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.