Full wwPDB X-ray Structure Validation Report ⓘ

Sep 11, 2023 – 04:03 PM EDT

PDB ID	:	4LSZ
Title	:	Caspase-7 in Complex with DARPin D7.18
Authors	:	Fluetsch, A.; Lukarska, M.; Gruetter, M.G.
Deposited on	:	2013-07-23
Resolution	:	2.26 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 ⓘ 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 ⓘ) were used in the production of this report:

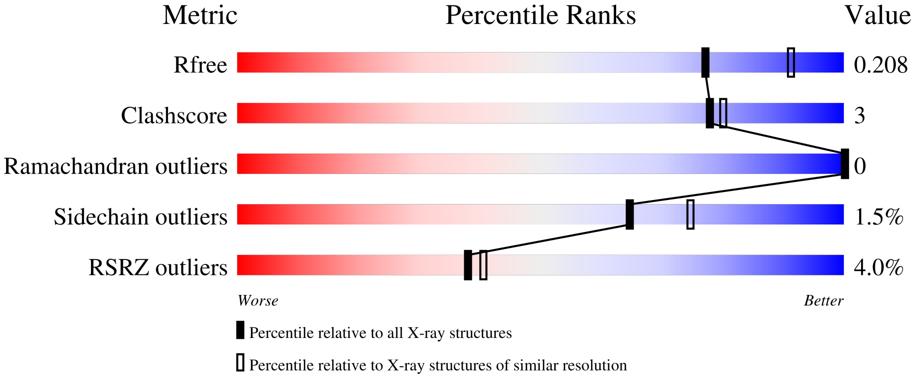
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

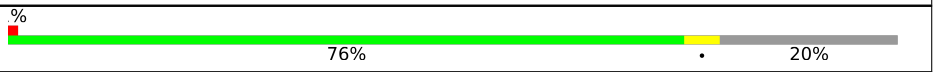
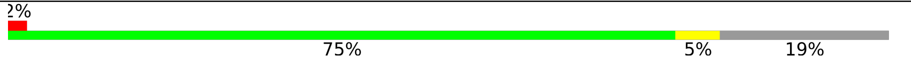
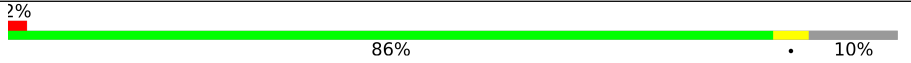
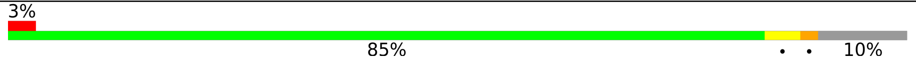
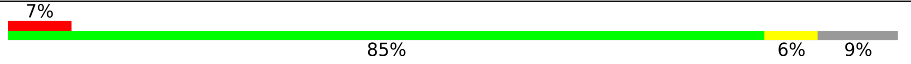
The reported resolution of this entry is 2.26 Å.

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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	175	
1	C	175	
2	B	105	
2	D	105	
3	E	169	

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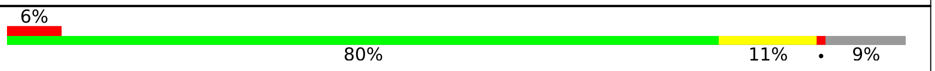
Mol	Chain	Length	Quality of chain
3	F	169	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6245 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-7 subunit p20.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	140	Total	C	N	O	S	0	1	0
			1106	695	189	211	11			
1	C	141	Total	C	N	O	S	0	0	0
			1105	694	189	211	11			

- Molecule 2 is a protein called Caspase-7 subunit p10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	94	Total	C	N	O	S	0	0	0
			780	502	133	141	4			
2	D	95	Total	C	N	O	S	0	0	0
			787	507	134	142	4			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	304	LEU	-	expression tag	UNP P55210
B	305	GLU	-	expression tag	UNP P55210
B	306	HIS	-	expression tag	UNP P55210
B	307	HIS	-	expression tag	UNP P55210
B	308	HIS	-	expression tag	UNP P55210
B	309	HIS	-	expression tag	UNP P55210
B	310	HIS	-	expression tag	UNP P55210
B	311	HIS	-	expression tag	UNP P55210
D	304	LEU	-	expression tag	UNP P55210
D	305	GLU	-	expression tag	UNP P55210
D	306	HIS	-	expression tag	UNP P55210
D	307	HIS	-	expression tag	UNP P55210
D	308	HIS	-	expression tag	UNP P55210
D	309	HIS	-	expression tag	UNP P55210
D	310	HIS	-	expression tag	UNP P55210
D	311	HIS	-	expression tag	UNP P55210

- Molecule 3 is a protein called DARPin D7.18.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
3	E	153	Total C N O S 1163 724 199 238 2	0	1	0
3	F	154	Total C N O S 1163 726 197 238 2	0	0	0

- Molecule 4 is water.

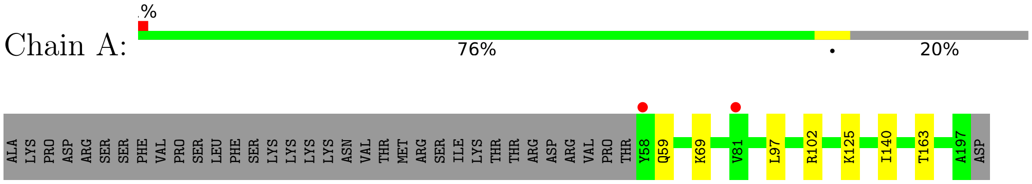
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	40	Total O 40 40	0	0
4	B	19	Total O 19 19	0	0
4	C	25	Total O 25 25	0	0
4	D	26	Total O 26 26	0	0
4	E	17	Total O 17 17	0	0
4	F	14	Total O 14 14	0	0

3 Residue-property plots ⓘ

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.

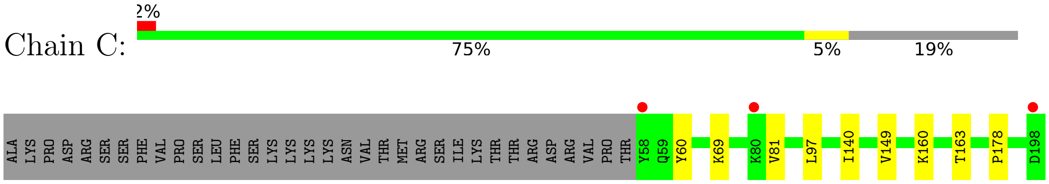
- Molecule 1: Caspase-7 subunit p20

Chain A:



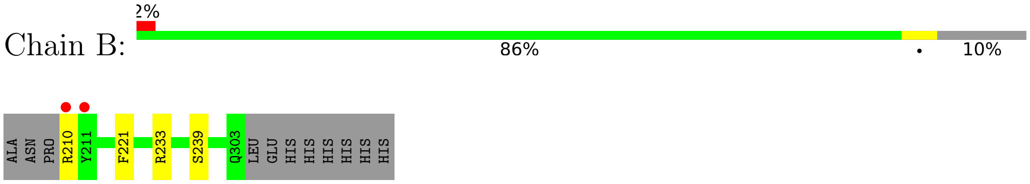
- Molecule 1: Caspase-7 subunit p20

Chain C:



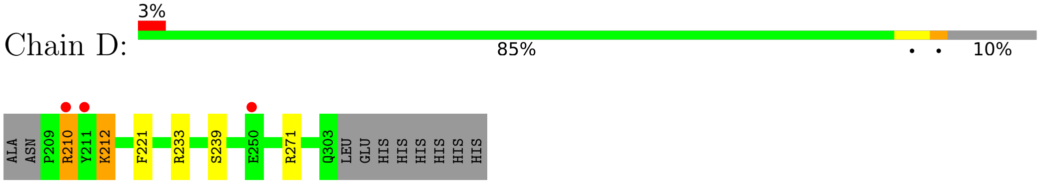
- Molecule 2: Caspase-7 subunit p10

Chain B:



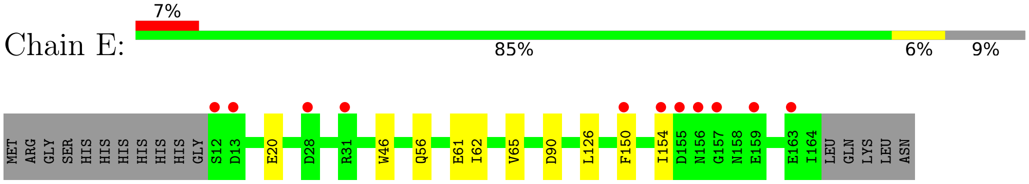
- Molecule 2: Caspase-7 subunit p10

Chain D:



- Molecule 3: DARPin D7.18

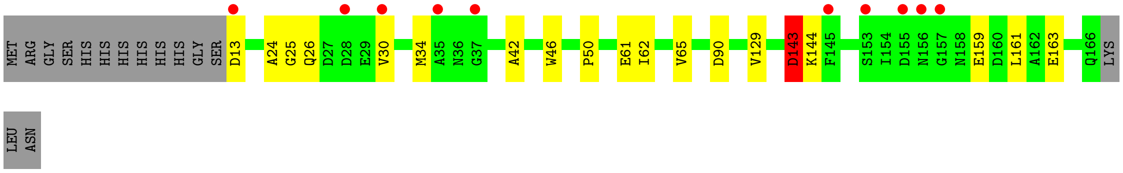
Chain E:



- Molecule 3: DARPin D7.18

Chain F:


6%
80%
11%
•
9%


MET
ARG
GLY
SER
HIS
HIS
HIS
HIS
HIS
HIS
GLY
SER
D13
A24
G25
Q26
D27
D28
E29
V30
M34
A35
N36
G37
A42
W46
P50
E61
I62
V65
D90
V129
D143
K144
F145
S153
I154
D155
N156
G157
N158
E159
D160
L161
A162
E163
Q166
LYS
LEU
ASN

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	59.84Å 82.31Å 95.08Å 90.00° 91.86° 90.00°	Depositor
Resolution (Å)	12.93 – 2.26 12.93 – 2.26	Depositor EDS
% Data completeness (in resolution range)	99.5 (12.93-2.26) 99.8 (12.93-2.26)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.78 (at 2.26Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.175 , 0.208 0.175 , 0.208	Depositor DCC
R_{free} test set	1719 reflections (4.00%)	wwPDB-VP
Wilson B-factor (Å^2)	40.9	Xtriage
Anisotropy	0.562	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 45.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.028 for h,-k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	6245	wwPDB-VP
Average B, all atoms (Å^2)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 42.23 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.1025e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[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	0.42	0/1123	0.53	0/1505
1	C	0.44	0/1122	0.53	0/1504
2	B	0.41	0/803	0.55	0/1086
2	D	0.44	0/811	0.57	0/1097
3	E	0.37	0/1180	0.52	0/1606
3	F	0.38	0/1180	0.52	1/1607 (0.1%)
All	All	0.41	0/6219	0.53	1/8405 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	F	143	ASP	CB-CG-OD2	5.23	123.00	118.30

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	1106	0	1089	8	0
1	C	1105	0	1088	5	0
2	B	780	0	753	2	0
2	D	787	0	761	7	0
3	E	1163	0	1118	7	0
3	F	1163	0	1120	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	40	0	0	3	0
4	B	19	0	0	0	0
4	C	25	0	0	1	0
4	D	26	0	0	1	0
4	E	17	0	0	1	0
4	F	14	0	0	0	0
All	All	6245	0	5929	35	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 3.

All (35) 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:A:102:ARG:HH12	3:E:20:GLU:CD	2.00	0.65
2:D:210:ARG:HH21	2:D:210:ARG:CG	2.11	0.64
1:C:160:LYS:NZ	4:C:224:HOH:O	2.25	0.63
2:D:210:ARG:HH21	2:D:210:ARG:HG2	1.66	0.60
3:F:25:GLY:HA2	3:F:62:ILE:HD12	1.84	0.59
1:A:59:GLN:CG	4:A:202:HOH:O	2.52	0.56
2:D:271:ARG:NH2	4:D:414:HOH:O	2.38	0.56
1:A:163:THR:HG21	2:B:221:PHE:HE1	1.71	0.55
1:A:97:LEU:HD13	1:A:140:ILE:HG21	1.87	0.55
3:F:24:ALA:HB3	3:F:26:GLN:HG2	1.90	0.54
3:E:150:PHE:CE2	3:E:154:ILE:HD11	2.43	0.53
1:C:97:LEU:HD13	1:C:140:ILE:HG21	1.90	0.53
1:C:163:THR:HG21	2:D:221:PHE:HE1	1.74	0.53
3:E:56:GLN:NE2	4:E:209:HOH:O	2.26	0.51
1:C:69:LYS:HD3	3:F:46:TRP:CH2	2.45	0.51
3:F:42:ALA:O	3:F:50:PRO:HD3	2.11	0.51
3:E:61:GLU:H	3:E:61:GLU:CD	2.13	0.51
3:F:13:ASP:OD1	3:F:13:ASP:N	2.44	0.50
3:F:30:VAL:O	3:F:34:MET:HG2	2.12	0.50
3:F:62:ILE:HA	3:F:65:VAL:HG12	1.92	0.50
2:D:210:ARG:CZ	2:D:212:LYS:HD3	2.41	0.50
2:D:210:ARG:CG	2:D:210:ARG:NH2	2.72	0.49
2:D:233:ARG:HA	2:D:239:SER:HA	1.95	0.49
3:F:159:GLU:O	3:F:163:GLU:HG3	2.12	0.48
2:B:233:ARG:HA	2:B:239:SER:HA	1.94	0.48
3:F:61:GLU:H	3:F:61:GLU:CD	2.17	0.47
1:C:60:TYR:CD1	1:C:178:PRO:HD3	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:24:ALA:CB	3:F:26:GLN:HG2	2.44	0.47
3:F:129:VAL:HG21	3:F:161:LEU:HD11	1.97	0.46
1:A:102:ARG:NH1	3:E:20:GLU:OE1	2.48	0.45
1:A:59:GLN:HG2	4:A:202:HOH:O	2.17	0.44
3:E:62:ILE:HA	3:E:65:VAL:HG12	1.99	0.43
1:A:59:GLN:HG3	4:A:202:HOH:O	2.14	0.42
3:F:143:ASP:O	3:F:144:LYS:C	2.57	0.42
1:A:69:LYS:HD3	3:E:46:TRP:CH2	2.57	0.40

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	139/175 (79%)	138 (99%)	1 (1%)	0	100	100
1	C	139/175 (79%)	138 (99%)	1 (1%)	0	100	100
2	B	92/105 (88%)	92 (100%)	0	0	100	100
2	D	93/105 (89%)	93 (100%)	0	0	100	100
3	E	152/169 (90%)	149 (98%)	3 (2%)	0	100	100
3	F	152/169 (90%)	148 (97%)	4 (3%)	0	100	100
All	All	767/898 (85%)	758 (99%)	9 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	120/153 (78%)	119 (99%)	1 (1%)	81	88
1	C	120/153 (78%)	118 (98%)	2 (2%)	60	71
2	B	86/96 (90%)	85 (99%)	1 (1%)	71	80
2	D	87/96 (91%)	85 (98%)	2 (2%)	50	59
3	E	119/132 (90%)	117 (98%)	2 (2%)	60	71
3	F	119/132 (90%)	117 (98%)	2 (2%)	60	71
All	All	651/762 (85%)	641 (98%)	10 (2%)	65	75

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	125	LYS
2	B	210	ARG
1	C	81	VAL
1	C	149	VAL
2	D	210	ARG
2	D	212	LYS
3	E	90	ASP
3	E	126	LEU
3	F	90	ASP
3	F	143	ASP

Sometimes 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 molecules 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 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, 95th 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	140/175 (80%)	-0.33	2 (1%)	75	77	37, 50, 71, 100	0
1	C	141/175 (80%)	-0.25	3 (2%)	63	66	39, 50, 70, 110	0
2	B	94/105 (89%)	-0.25	2 (2%)	63	66	34, 46, 76, 114	0
2	D	95/105 (90%)	-0.25	3 (3%)	47	50	35, 47, 74, 125	0
3	E	153/169 (90%)	0.12	11 (7%)	15	16	44, 63, 110, 124	0
3	F	154/169 (91%)	0.11	10 (6%)	18	20	45, 64, 97, 112	0
All	All	777/898 (86%)	-0.12	31 (3%)	38	40	34, 54, 94, 125	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	E	12	SER	5.4
3	F	157	GLY	3.8
3	E	163	GLU	3.6
1	C	198	ASP	3.6
3	F	13	ASP	3.5
2	D	211	TYR	3.3
3	E	155	ASP	3.3
3	F	30	VAL	3.2
2	D	210	ARG	3.2
3	E	13	ASP	3.1
2	B	210	ARG	3.0
1	C	58	TYR	2.8
3	E	157	GLY	2.7
3	F	37	GLY	2.7
3	E	156	ASN	2.6
3	E	31	ARG	2.6
1	C	80	LYS	2.6
3	E	159	GLU	2.6
3	F	153	SER	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	81	VAL	2.5
3	F	156	ASN	2.4
3	F	28	ASP	2.4
3	F	155	ASP	2.4
3	E	154	ILE	2.4
2	B	211	TYR	2.3
3	F	145	PHE	2.3
3	E	150	PHE	2.3
3	E	28	ASP	2.2
1	A	58	TYR	2.2
3	F	35	ALA	2.1
2	D	250	GLU	2.1

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.