



# Full wwPDB X-ray Structure Validation Report ⓘ

May 18, 2020 – 07:22 pm BST

PDB ID : 3QIT  
Title : Thioesterase Domain From Curacin Biosynthetic Pathway  
Authors : Gehret, J.J.; Smith, J.L.  
Deposited on : 2011-01-27  
Resolution : 1.68 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](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

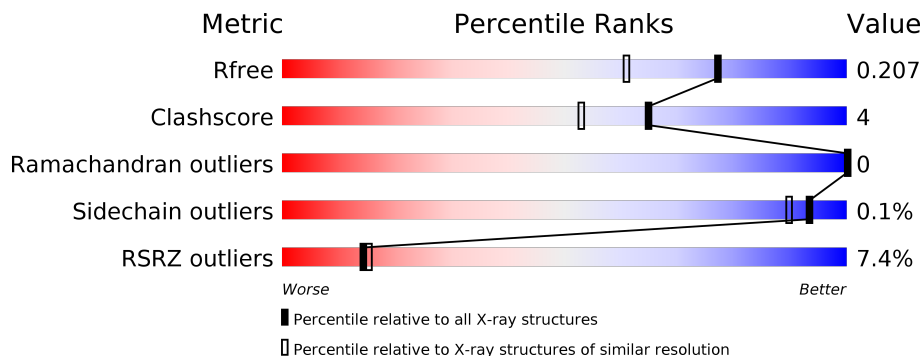
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.68 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	6780 (1.70-1.66)
Clashscore	141614	7310 (1.70-1.66)
Ramachandran outliers	138981	7173 (1.70-1.66)
Sidechain outliers	138945	7172 (1.70-1.66)
RSRZ outliers	127900	6661 (1.70-1.66)

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	286	 3% 90% 8%
1	B	286	 4% 87% 12%
1	C	286	 15% 89% 6% 6%
1	D	286	 7% 90% 9%

## 2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 10020 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 Polyketide synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	281	Total 2218	C 1412	N 380	O 415	S 11	0	12	0
1	B	283	Total 2244	C 1438	N 380	O 414	S 12	0	14	0
1	C	270	Total 2112	C 1343	N 366	O 392	S 11	0	5	0
1	D	283	Total 2243	C 1432	N 384	O 415	S 12	0	13	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	EXPRESSION TAG	UNP D0E8E2
A	-1	ASN	-	EXPRESSION TAG	UNP D0E8E2
A	0	ALA	-	EXPRESSION TAG	UNP D0E8E2
B	-2	SER	-	EXPRESSION TAG	UNP D0E8E2
B	-1	ASN	-	EXPRESSION TAG	UNP D0E8E2
B	0	ALA	-	EXPRESSION TAG	UNP D0E8E2
C	-2	SER	-	EXPRESSION TAG	UNP D0E8E2
C	-1	ASN	-	EXPRESSION TAG	UNP D0E8E2
C	0	ALA	-	EXPRESSION TAG	UNP D0E8E2
D	-2	SER	-	EXPRESSION TAG	UNP D0E8E2
D	-1	ASN	-	EXPRESSION TAG	UNP D0E8E2
D	0	ALA	-	EXPRESSION TAG	UNP D0E8E2

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	371	Total 371	O 371	0	0
2	B	339	Total 339	O 339	0	0

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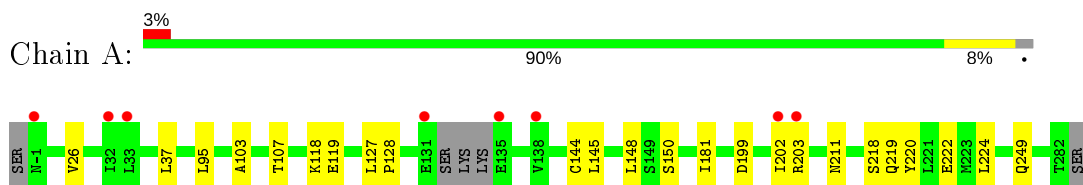
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
2	C	193	Total 193	O 193	0	0
2	D	300	Total 300	O 300	0	0

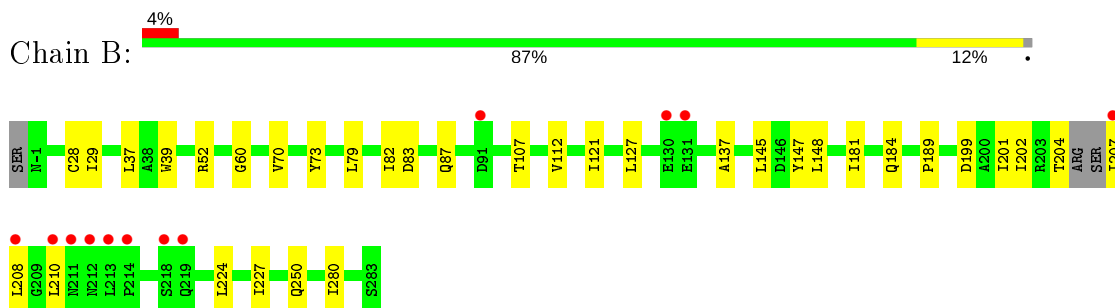
### 3 Residue-property plots [i](#)

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.

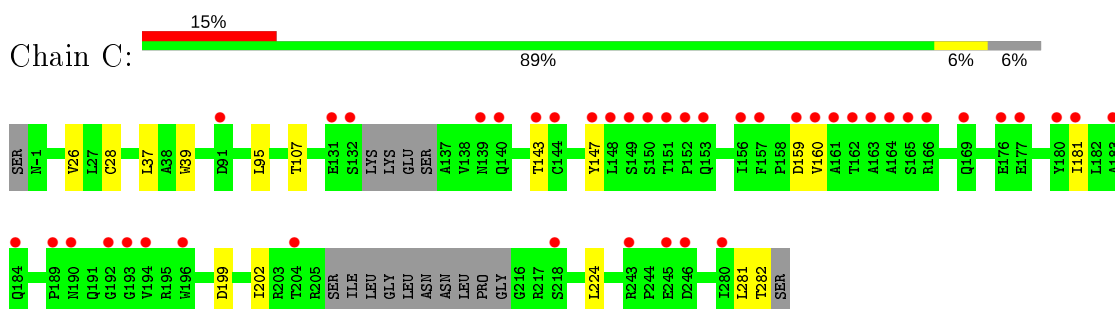
- Molecule 1: Polyketide synthase



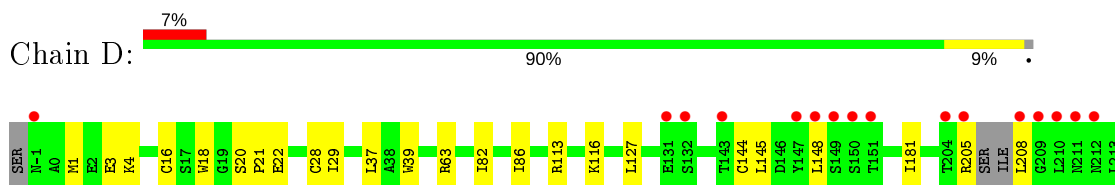
- Molecule 1: Polyketide synthase



- Molecule 1: Polyketide synthase



- Molecule 1: Polyketide synthase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.56Å 86.91Å 87.59Å 90.00° 90.77° 90.00°	Depositor
Resolution (Å)	39.10 – 1.68 37.54 – 1.68	Depositor EDS
% Data completeness (in resolution range)	90.2 (39.10-1.68) 90.3 (37.54-1.68)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.37 (at 1.68Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, $R_{free}$	0.164 , 0.208 0.162 , 0.207	Depositor DCC
$R_{free}$ test set	5806 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.8	Xtriage
Anisotropy	0.246	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 49.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k 0.012 for -h,-l,-k 0.019 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	10020	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.96% 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	0.58	0/2298	0.66	0/3123
1	B	0.55	0/2330	0.62	0/3165
1	C	0.48	0/2169	0.58	0/2946
1	D	0.54	0/2326	0.62	0/3155
All	All	0.54	0/9123	0.62	0/12389

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	2218	0	2276	20	0
1	B	2244	0	2334	25	0
1	C	2112	0	2152	8	0
1	D	2243	0	2325	26	0
2	A	371	0	0	3	0
2	B	339	0	0	1	0
2	C	193	0	0	0	0
2	D	300	0	0	1	0
All	All	10020	0	9087	74	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 4.



All (74) 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:203[B]:ARG:HG3	1:A:203[B]:ARG:HH11	1.22	1.04
1:D:1[B]:MET:HE3	1:D:18:TRP:CZ2	1.96	1.00
1:D:1[B]:MET:CE	1:D:18:TRP:CZ2	2.45	1.00
1:D:1[B]:MET:HE2	1:D:18:TRP:CH2	2.00	0.97
1:D:3:GLU:OE2	1:D:63:ARG:NH1	2.06	0.88
1:D:1[B]:MET:CE	1:D:18:TRP:CH2	2.58	0.86
1:A:203[B]:ARG:HG3	1:A:203[B]:ARG:NH1	1.87	0.85
1:D:1[B]:MET:HE1	1:D:37:LEU:HA	1.59	0.84
1:D:1[B]:MET:HE3	1:D:18:TRP:HZ2	1.43	0.79
1:D:1[B]:MET:CE	1:D:37:LEU:HA	2.14	0.78
1:A:107[B]:THR:HG21	1:A:224:LEU:HD23	1.66	0.78
1:D:1[B]:MET:HE2	1:D:18:TRP:CZ2	2.15	0.77
1:B:107[B]:THR:HG21	1:B:224:LEU:HD23	1.69	0.73
1:D:86:ILE:HG21	1:D:116[B]:LYS:HD3	1.70	0.72
1:D:144:CYS:O	1:D:148:LEU:HG	1.93	0.69
1:A:203[B]:ARG:CG	1:A:203[B]:ARG:HH11	2.03	0.67
1:A:150:SER:O	2:A:306:HOH:O	2.10	0.67
1:B:121:ILE:HD13	1:B:280:ILE:HG12	1.75	0.67
1:A:37:LEU:HD21	1:A:181:ILE:HG22	1.77	0.66
1:B:145[B]:LEU:HD23	1:B:148:LEU:HD12	1.78	0.65
1:B:73:TYR:HB3	1:B:210:LEU:HD21	1.79	0.65
1:B:107[B]:THR:HG23	1:B:227[B]:ILE:HD11	1.78	0.65
1:D:29:ILE:HD12	1:D:82[B]:ILE:HD12	1.79	0.64
1:C:199:ASP:O	1:C:202:ILE:HG12	2.00	0.62
1:B:199:ASP:O	1:B:202[B]:ILE:HG12	1.99	0.61
1:D:1[B]:MET:HE2	1:D:16:CYS:HB3	1.84	0.60
1:B:204:THR:HG21	1:B:208:LEU:HG	1.86	0.58
1:C:107[B]:THR:HG21	1:C:224:LEU:HD23	1.85	0.58
1:A:103:ALA:O	1:A:107[A]:THR:HG23	2.04	0.57
1:B:127:LEU:HG	1:B:250:GLN:HE21	1.69	0.57
1:B:107[B]:THR:HG21	1:B:224:LEU:CD2	2.36	0.56
1:C:37:LEU:HD21	1:C:181:ILE:HG22	1.89	0.55
1:D:1[B]:MET:CE	1:D:16:CYS:HB3	2.37	0.54
1:B:29[B]:ILE:HD13	1:B:82:ILE:HD13	1.89	0.54
1:B:204:THR:OG1	1:B:207:ILE:HB	2.08	0.53
1:B:107[B]:THR:CG2	1:B:227[B]:ILE:HD11	2.39	0.52
1:D:113:ARG:HB3	1:D:116[B]:LYS:HD2	1.92	0.52
1:D:127:LEU:HG	1:D:250:GLN:HE21	1.76	0.51
1:D:1[B]:MET:HE1	1:D:37:LEU:CA	2.36	0.51
1:A:219:GLN:HG3	1:B:137:ALA:HB1	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:20:SER:OG	1:D:22:GLU:HG2	2.11	0.51
1:A:218:SER:O	1:A:222[A]:GLU:HG3	2.11	0.50
1:C:281:LEU:O	1:C:282:THR:HB	2.13	0.49
1:A:95:LEU:HD22	1:A:119:GLU:HB2	1.95	0.49
1:D:37:LEU:HD21	1:D:181:ILE:HG22	1.96	0.48
1:B:147:TYR:CE2	1:B:204:THR:HG21	2.50	0.47
1:B:60:GLY:HA3	1:B:202[A]:ILE:HD11	1.97	0.47
1:A:144:CYS:O	1:A:148:LEU:HG	2.15	0.46
1:A:145:LEU:HD12	1:B:112:VAL:HG11	1.97	0.46
1:B:70:VAL:HG13	1:B:201:ILE:HG12	1.98	0.45
1:D:1[B]:MET:HE3	1:D:37:LEU:HA	1.94	0.45
1:A:211:ASN:HB2	2:A:348:HOH:O	2.17	0.44
1:B:189:PRO:HB3	1:D:21:PRO:HB2	2.00	0.44
1:D:228:GLN:HB2	2:D:536:HOH:O	2.17	0.44
1:A:199:ASP:O	1:A:202:ILE:HG12	2.18	0.44
1:C:28:CYS:HB3	1:C:39:TRP:CE2	2.53	0.43
1:D:28:CYS:HB3	1:D:39:TRP:CE2	2.53	0.43
1:B:83:ASP:O	1:B:87:GLN:HG2	2.19	0.43
1:D:145:LEU:HD23	1:D:148:LEU:HD12	1.99	0.42
1:A:145:LEU:HD23	1:A:148:LEU:HD12	2.01	0.42
1:C:26:VAL:HG22	1:C:95:LEU:HD12	2.01	0.42
1:B:37:LEU:HD21	1:B:181:ILE:HG22	2.02	0.42
1:B:184:GLN:HA	1:D:4[B]:LYS:HE2	2.02	0.42
1:A:118:LYS:HE3	2:A:1173:HOH:O	2.20	0.42
1:A:128:PRO:HB3	1:A:220:TYR:HD2	1.83	0.41
1:B:52:ARG:NH1	2:B:534:HOH:O	2.52	0.41
1:C:159:ASP:CG	1:C:160:VAL:H	2.24	0.41
1:B:28:CYS:HB3	1:B:39:TRP:CE2	2.55	0.41
1:A:127:LEU:HD11	1:A:249:GLN:HB3	2.03	0.41
1:D:208:LEU:HD23	1:D:214:PRO:HD2	2.03	0.41
1:C:143:THR:O	1:C:147:TYR:HD2	2.04	0.40
1:A:26:VAL:HG22	1:A:95:LEU:HD12	2.04	0.40
1:B:204:THR:CG2	1:B:208:LEU:HG	2.51	0.40
1:A:145:LEU:HD11	1:B:79[B]:LEU:HG	2.03	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	289/286 (101%)	283 (98%)	6 (2%)	0	100	100
1	B	293/286 (102%)	284 (97%)	9 (3%)	0	100	100
1	C	269/286 (94%)	260 (97%)	9 (3%)	0	100	100
1	D	292/286 (102%)	286 (98%)	6 (2%)	0	100	100
All	All	1143/1144 (100%)	1113 (97%)	30 (3%)	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	250/243 (103%)	250 (100%)	0	100	100
1	B	254/243 (104%)	254 (100%)	0	100	100
1	C	234/243 (96%)	234 (100%)	0	100	100
1	D	253/243 (104%)	252 (100%)	1 (0%)	91	86
All	All	991/972 (102%)	990 (100%)	1 (0%)	93	90

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	205	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no

such sidechains identified.

### 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 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	281/286 (98%)	0.00	8 (2%) 53 55	12, 21, 41, 91	0
1	B	283/286 (98%)	0.06	12 (4%) 36 38	14, 24, 50, 111	0
1	C	270/286 (94%)	0.74	43 (15%) 1 1	18, 34, 69, 98	0
1	D	283/286 (98%)	0.16	20 (7%) 16 17	14, 24, 58, 85	0
All	All	1117/1144 (97%)	0.23	83 (7%) 14 15	12, 25, 58, 111	0

All (83) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	148	LEU	12.3
1	C	150	SER	8.4
1	A	135	GLU	7.3
1	D	208	LEU	7.1
1	C	163	ALA	7.0
1	B	211	ASN	6.6
1	D	210	LEU	6.5
1	B	207	ILE	6.4
1	B	208	LEU	6.2
1	D	209	GLY	6.1
1	D	215	GLY	5.9
1	C	147	TYR	5.8
1	C	149	SER	5.7
1	C	180	TYR	5.5
1	A	131	GLU	5.4
1	B	210	LEU	5.2
1	C	162	THR	5.1
1	C	132	SER	5.1
1	B	212	ASN	4.8
1	C	156	ILE	4.6
1	C	183	ALA	4.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	161	ALA	4.2
1	D	148	LEU	4.2
1	C	193	GLY	4.1
1	B	214	PRO	3.9
1	D	214	PRO	3.8
1	C	151	THR	3.7
1	C	243	ARG	3.5
1	C	131	GLU	3.5
1	C	140	GLN	3.4
1	C	165	SER	3.4
1	A	203[A]	ARG	3.3
1	D	149	SER	3.2
1	C	190	ASN	3.2
1	D	151	THR	3.2
1	D	132	SER	3.2
1	C	143	THR	3.1
1	D	205	ARG	3.0
1	D	211	ASN	3.0
1	C	139	ASN	2.9
1	D	204	THR	2.9
1	D	-1	ASN	2.9
1	C	181	ILE	2.9
1	C	144	CYS	2.9
1	A	-1	ASN	2.9
1	C	184	GLN	2.8
1	C	159	ASP	2.7
1	C	153	GLN	2.7
1	C	157	PHE	2.7
1	C	245	GLU	2.7
1	C	160	VAL	2.7
1	C	194	VAL	2.6
1	A	138	VAL	2.6
1	B	218	SER	2.6
1	C	189	PRO	2.5
1	C	204	THR	2.5
1	B	131	GLU	2.5
1	C	169	GLN	2.5
1	C	196	TRP	2.5
1	C	176	GLU	2.4
1	B	219	GLN	2.4
1	C	177	GLU	2.4
1	B	91	ASP	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	130	GLU	2.4
1	D	212	ASN	2.3
1	D	131	GLU	2.3
1	A	32	ILE	2.2
1	C	166	ARG	2.2
1	D	143	THR	2.2
1	D	150	SER	2.2
1	C	91	ASP	2.2
1	C	246	ASP	2.2
1	C	280	ILE	2.2
1	D	243	ARG	2.1
1	B	213	LEU	2.1
1	C	218	SER	2.1
1	C	152	PRO	2.1
1	D	147	TYR	2.1
1	A	33	LEU	2.1
1	C	164	ALA	2.1
1	D	228	GLN	2.1
1	A	202	ILE	2.1
1	C	192	GLY	2.0

## 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.