



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 08:43 am GMT

PDB ID : 3V1T  
Title : Crystal structure of a putative ketoacyl reductase (FabG4) from Mycobacterium tuberculosis H37Rv at 1.9 Angstrom resolution  
Authors : Dutta, D.; Bhattacharyya, S.; Das, A.K.  
Deposited on : 2011-12-10  
Resolution : 1.88 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

<http://wwpdb.org/validation/2016/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)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

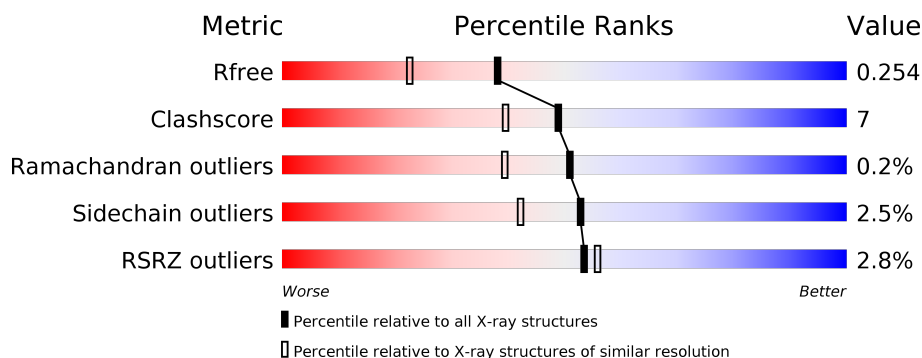
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.88 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))
$R_{free}$	100719	7505 (1.90-1.86)
Clashscore	112137	8369 (1.90-1.86)
Ramachandran outliers	110173	8279 (1.90-1.86)
Sidechain outliers	110143	8280 (1.90-1.86)
RSRZ outliers	101464	7571 (1.90-1.86)

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. 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	C	462	<div> <div>2%</div> <div> <div></div> <div>76%</div> <div>11%</div> <div>12%</div> </div> </div>
1	D	462	<div> <div>3%</div> <div> <div></div> <div>81%</div> <div>7%</div> <div>11%</div> </div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6490 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 3-oxoacyl-(Acyl-carrier-protein) reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	407	Total	C	N	O	S	0	0	0
			2906	1819	515	566	6			
1	D	409	Total	C	N	O	S	0	0	0
			2920	1826	520	568	6			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-7	HIS	-	EXPRESSION TAG	UNP O53665
C	-6	HIS	-	EXPRESSION TAG	UNP O53665
C	-5	HIS	-	EXPRESSION TAG	UNP O53665
C	-4	HIS	-	EXPRESSION TAG	UNP O53665
C	-3	HIS	-	EXPRESSION TAG	UNP O53665
C	-2	HIS	-	EXPRESSION TAG	UNP O53665
C	-1	GLY	-	EXPRESSION TAG	UNP O53665
C	0	SER	-	EXPRESSION TAG	UNP O53665
D	-7	HIS	-	EXPRESSION TAG	UNP O53665
D	-6	HIS	-	EXPRESSION TAG	UNP O53665
D	-5	HIS	-	EXPRESSION TAG	UNP O53665
D	-4	HIS	-	EXPRESSION TAG	UNP O53665
D	-3	HIS	-	EXPRESSION TAG	UNP O53665
D	-2	HIS	-	EXPRESSION TAG	UNP O53665
D	-1	GLY	-	EXPRESSION TAG	UNP O53665
D	0	SER	-	EXPRESSION TAG	UNP O53665

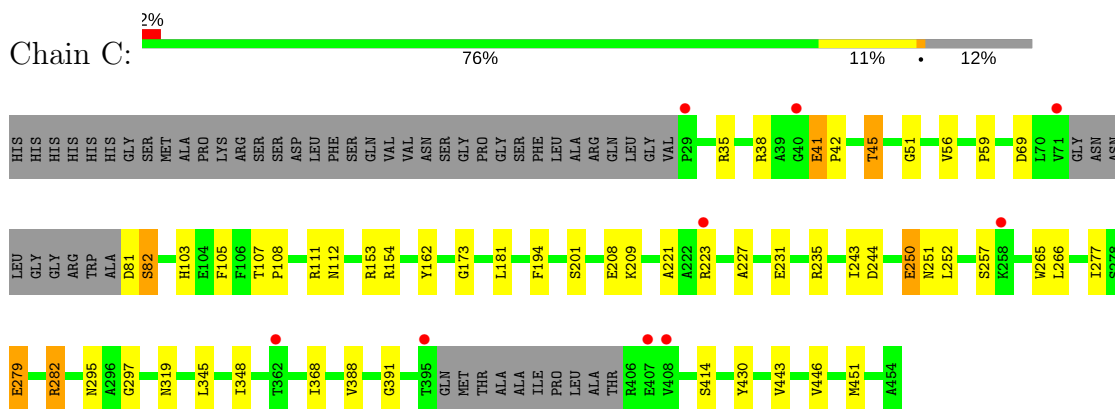
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	340	Total	O	0	0
			340	340		
2	D	324	Total	O	0	0
			324	324		

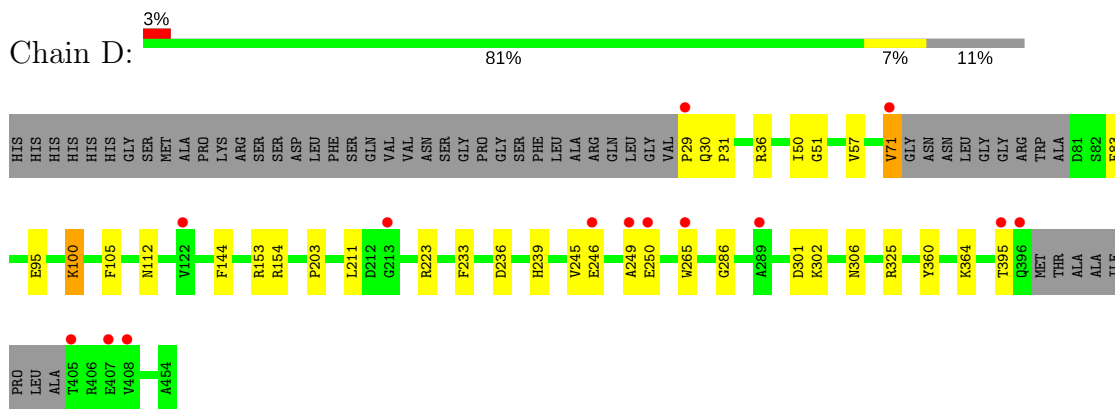
### 3 Residue-property plots [i](#)

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: 3-oxoacyl-(Acyl-carrier-protein) reductase



- Molecule 1: 3-oxoacyl-(Acyl-carrier-protein) reductase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	57.39Å 57.59Å 71.49Å 99.24° 102.98° 117.04°	Depositor
Resolution (Å)	66.39 – 1.88 19.63 – 1.88	Depositor EDS
% Data completeness (in resolution range)	90.9 (66.39-1.88) 81.4 (19.63-1.88)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.35 (at 1.87Å)	Xtriage
Refinement program	REFMAC 5.5.0095	Depositor
R, $R_{free}$	0.180 , 0.253 0.194 , 0.254	Depositor DCC
$R_{free}$ test set	2280 reflections (4.22%)	DCC
Wilson B-factor (Å <sup>2</sup> )	22.9	Xtriage
Anisotropy	0.165	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 41.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.018 for -k,-h,-l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6490	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.15% 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	C	1.05	2/2948 (0.1%)	0.92	2/4009 (0.0%)
1	D	0.99	1/2962 (0.0%)	0.89	1/4028 (0.0%)
All	All	1.02	3/5910 (0.1%)	0.91	3/8037 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	414	SER	CB-OG	6.02	1.50	1.42
1	C	162	TYR	CD1-CE1	5.14	1.47	1.39
1	D	144	PHE	CE1-CZ	5.05	1.47	1.37

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	235	ARG	NE-CZ-NH1	6.54	123.57	120.30
1	C	235	ARG	NE-CZ-NH2	-6.37	117.12	120.30
1	D	36	ARG	NE-CZ-NH1	5.92	123.26	120.30

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	C	2906	0	2893	50	0
1	D	2920	0	2904	29	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	340	0	0	27	0
2	D	324	0	0	23	0
All	All	6490	0	5797	79	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 7.

All (79) 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:C:208:GLU:HG2	2:C:657:HOH:O	1.40	1.22
1:C:103:HIS:HB3	2:C:642:HOH:O	1.51	1.10
1:D:233:PHE:HA	2:D:665:HOH:O	1.49	1.09
1:C:223:ARG:HD2	2:C:680:HOH:O	1.75	0.87
1:D:211:LEU:HD12	2:D:665:HOH:O	1.75	0.85
1:D:236:ASP:HB2	2:D:665:HOH:O	1.77	0.85
1:C:252:LEU:CD1	2:C:655:HOH:O	2.31	0.77
1:C:81:ASP:C	2:C:639:HOH:O	2.22	0.76
1:C:252:LEU:HD13	2:C:655:HOH:O	1.91	0.69
1:C:221:ALA:HB3	2:C:655:HOH:O	1.92	0.68
1:D:325:ARG:HD3	2:D:724:HOH:O	1.94	0.67
1:C:45:THR:HG23	2:C:764:HOH:O	1.95	0.66
1:D:223:ARG:HD3	2:D:730:HOH:O	1.97	0.63
1:C:282:ARG:HB2	1:C:282:ARG:HH11	1.65	0.62
1:C:103:HIS:CD2	2:C:642:HOH:O	2.53	0.61
1:D:239:HIS:CD2	2:D:494:HOH:O	2.55	0.60
1:C:103:HIS:CG	2:C:642:HOH:O	2.55	0.59
1:D:50:ILE:HG22	1:D:57:VAL:HG23	1.85	0.58
1:C:82:SER:HB3	2:C:584:HOH:O	2.02	0.58
1:D:29:PRO:HB3	2:D:486:HOH:O	2.04	0.58
1:C:388:VAL:HG13	1:C:446:VAL:HG23	1.86	0.58
1:D:100:LYS:HE3	2:D:755:HOH:O	2.03	0.57
1:D:265:TRP:HA	2:D:667:HOH:O	2.05	0.56
1:C:111:ARG:CB	2:C:457:HOH:O	2.54	0.56
1:D:83:PHE:CD2	1:D:112:ASN:HB3	2.40	0.56
1:C:69:ASP:HB2	2:C:601:HOH:O	2.07	0.55
1:C:223:ARG:NH1	1:C:251:ASN:HD21	2.05	0.54
1:C:208:GLU:CG	2:C:657:HOH:O	2.20	0.54
1:C:103:HIS:CB	2:C:642:HOH:O	2.25	0.54
1:C:368:ILE:HG23	1:C:443:VAL:HG21	1.90	0.53
1:C:81:ASP:O	2:C:639:HOH:O	2.18	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:245:VAL:C	2:D:667:HOH:O	2.47	0.53
1:D:265:TRP:CA	2:D:667:HOH:O	2.57	0.53
1:C:82:SER:CB	2:C:584:HOH:O	2.57	0.52
1:D:286:GLY:HA2	2:D:566:HOH:O	2.09	0.52
1:D:71:VAL:C	2:D:525:HOH:O	2.47	0.52
1:C:252:LEU:HD11	2:C:655:HOH:O	2.02	0.50
1:C:41:GLU:HG3	1:C:42:PRO:HD2	1.93	0.50
1:D:239:HIS:NE2	2:D:494:HOH:O	2.35	0.50
1:C:153:ARG:NH2	2:C:492:HOH:O	2.46	0.49
1:C:279:GLU:HG2	2:C:691:HOH:O	2.12	0.48
1:D:203:PRO:HD3	2:D:731:HOH:O	2.14	0.48
1:C:250:GLU:HG2	1:C:251:ASN:N	2.29	0.47
1:D:265:TRP:CB	2:D:667:HOH:O	2.63	0.47
1:D:153:ARG:HD3	2:D:729:HOH:O	2.15	0.47
1:D:265:TRP:HE3	2:D:613:HOH:O	1.97	0.46
1:C:223:ARG:NH1	1:C:251:ASN:ND2	2.63	0.46
1:C:82:SER:N	2:C:639:HOH:O	2.42	0.46
1:C:35:ARG:NH2	1:C:42:PRO:O	2.49	0.46
1:C:153:ARG:CD	2:C:761:HOH:O	2.62	0.46
1:C:297:GLY:HA2	1:C:319:ASN:OD1	2.15	0.46
1:D:51:GLY:HA3	1:D:105:PHE:CE1	2.51	0.46
1:C:153:ARG:HD3	2:C:761:HOH:O	2.16	0.45
1:C:451:MET:CE	2:C:741:HOH:O	2.64	0.45
1:C:295:ASN:HA	1:C:345:LEU:HD23	1.97	0.45
1:D:265:TRP:HB3	2:D:667:HOH:O	2.17	0.45
1:C:56:VAL:O	1:C:59:PRO:HD2	2.17	0.45
1:C:348:ILE:HD12	1:C:391:GLY:HA2	1.98	0.45
1:D:30:GLN:CB	1:D:31:PRO:HD2	2.46	0.45
1:D:360:TYR:CZ	1:D:364:LYS:HE3	2.51	0.45
1:C:173:GLY:HA2	1:C:201:SER:OG	2.18	0.44
1:D:153:ARG:NH2	2:D:531:HOH:O	2.49	0.44
1:C:244:ASP:O	1:C:265:TRP:HA	2.18	0.44
1:C:227:ALA:O	1:C:231:GLU:HG3	2.19	0.43
1:C:51:GLY:HA3	1:C:105:PHE:CE1	2.53	0.43
1:C:266:LEU:HD21	1:C:277:ILE:HG13	2.01	0.43
1:C:38:ARG:O	1:C:41:GLU:HB2	2.19	0.43
1:C:81:ASP:CB	2:C:653:HOH:O	2.67	0.42
1:D:154:ARG:HD2	2:D:622:HOH:O	2.19	0.42
1:C:181:LEU:HD21	1:C:194:PHE:CZ	2.55	0.41
1:C:282:ARG:CG	1:C:282:ARG:HH11	2.34	0.41
1:C:154:ARG:NH1	2:C:661:HOH:O	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:301:ASP:O	1:D:302:LYS:HE2	2.20	0.41
1:C:107:THR:HB	1:C:108:PRO:HD3	2.03	0.41
1:C:250:GLU:CG	1:C:251:ASN:N	2.84	0.41
1:C:282:ARG:CB	1:C:282:ARG:HH11	2.31	0.40
1:D:246:GLU:HA	2:D:667:HOH:O	2.22	0.40
1:C:243:ILE:C	2:C:655:HOH:O	2.59	0.40
1:D:306:ASN:HB3	2:D:733:HOH:O	2.20	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	C	401/462 (87%)	394 (98%)	7 (2%)	0	100	100
1	D	403/462 (87%)	390 (97%)	11 (3%)	2 (0%)	32	19
All	All	804/924 (87%)	784 (98%)	18 (2%)	2 (0%)	51	39

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	249	ALA
1	D	395	THR

### 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	C	285/338 (84%)	275 (96%)	10 (4%)	41	28
1	D	286/338 (85%)	282 (99%)	4 (1%)	71	67
All	All	571/676 (84%)	557 (98%)	14 (2%)	53	42

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	41	GLU
1	C	45	THR
1	C	82	SER
1	C	112	ASN
1	C	209	LYS
1	C	250	GLU
1	C	257	SER
1	C	279	GLU
1	C	282	ARG
1	C	430	TYR
1	D	71	VAL
1	D	95	GLU
1	D	100	LYS
1	D	250	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	192	GLN
1	C	251	ASN
1	C	284	HIS
1	D	103	HIS
1	D	192	GLN

### 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 [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

### 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(Å <sup>2</sup> )	Q<0.9
1	C	407/462 (88%)	0.07	9 (2%) 62 65	14, 23, 41, 60	0
1	D	409/462 (88%)	0.15	14 (3%) 46 48	14, 26, 44, 62	0
All	All	816/924 (88%)	0.11	23 (2%) 53 56	14, 25, 43, 62	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	408	VAL	6.8
1	D	405	THR	4.3
1	C	40	GLY	4.2
1	D	396	GLN	4.2
1	C	408	VAL	4.0
1	D	395	THR	4.0
1	C	395	THR	3.9
1	D	29	PRO	3.6
1	D	265	TRP	3.3
1	C	29	PRO	3.1
1	D	407	GLU	3.0
1	D	250	GLU	2.8
1	D	249	ALA	2.7
1	C	362	THR	2.6
1	D	289	ALA	2.5
1	C	258	LYS	2.4
1	C	71	VAL	2.4
1	C	223	ARG	2.4
1	C	407	GLU	2.2
1	D	122	VAL	2.2
1	D	71	VAL	2.2
1	D	246	GLU	2.1
1	D	213	GLY	2.1

## 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.