



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 10:32 AM GMT

PDB ID : 3ME1  
Title : Crystal Structure of the Desulfovibrio vulgaris Urea Transporter in the P3(1) Space Group at 3.86  
Authors : Levin, E.J.; Zhou, M.; New York Consortium on Membrane Protein Structure (NYCOMPS)  
Deposited on : 2010-03-31  
Resolution : 3.86 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  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
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) : trunk26865

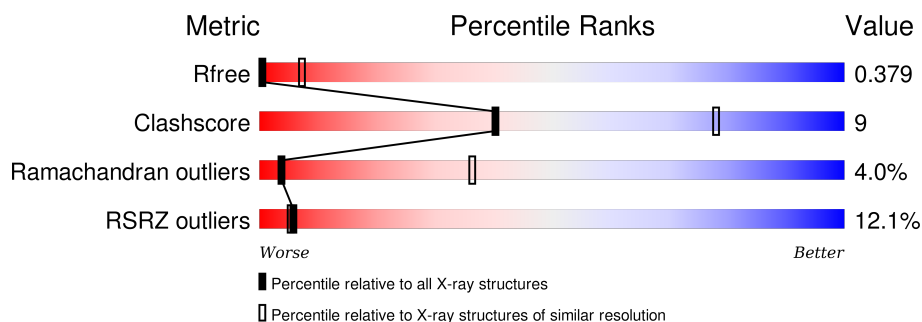
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.86 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))
$R_{free}$	91344	1000 (4.20-3.52)
Clashscore	102246	1090 (4.20-3.52)
Ramachandran outliers	100387	1046 (4.20-3.52)
RSRZ outliers	91569	1004 (4.20-3.52)

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	A	335	<div> <div>10%</div> <div>84%</div> <div>10%</div> <div>• •</div> </div>
1	B	335	<div> <div>10%</div> <div>86%</div> <div>9%</div> <div>• •</div> </div>
1	C	335	<div> <div>14%</div> <div>83%</div> <div>9%</div> <div>• 7%</div> </div>

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 4673 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.

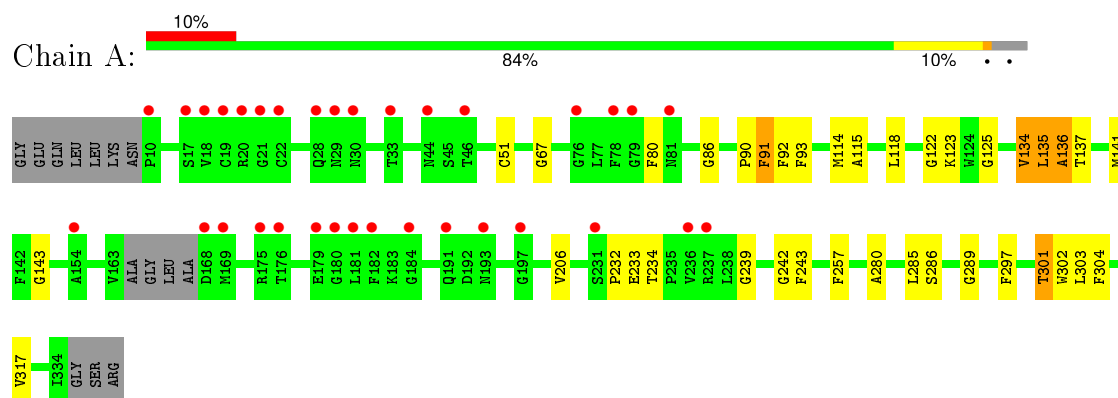
- Molecule 1 is a protein called Urea transporter.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	321	Total	C	N	O	0	0	0
			1569	927	321	321			
1	B	323	Total	C	N	O	0	0	0
			1579	933	323	323			
1	C	312	Total	C	N	O	0	0	0
			1525	901	312	312			

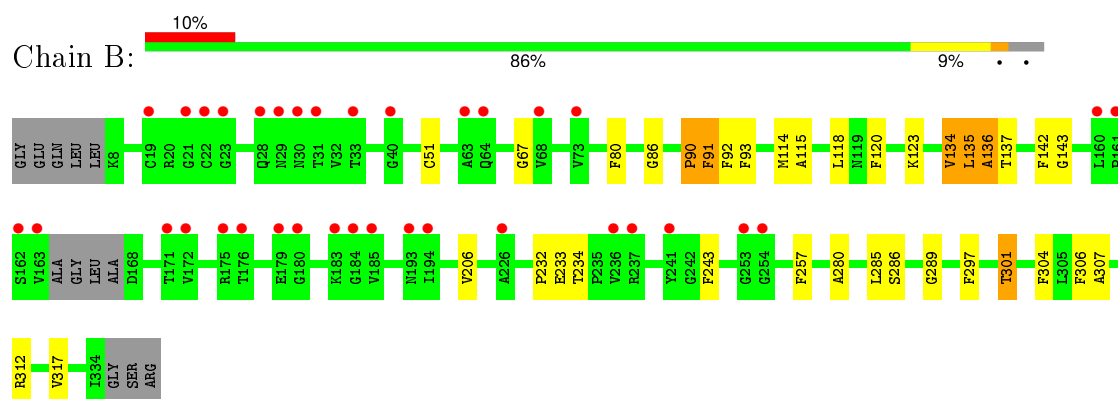
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

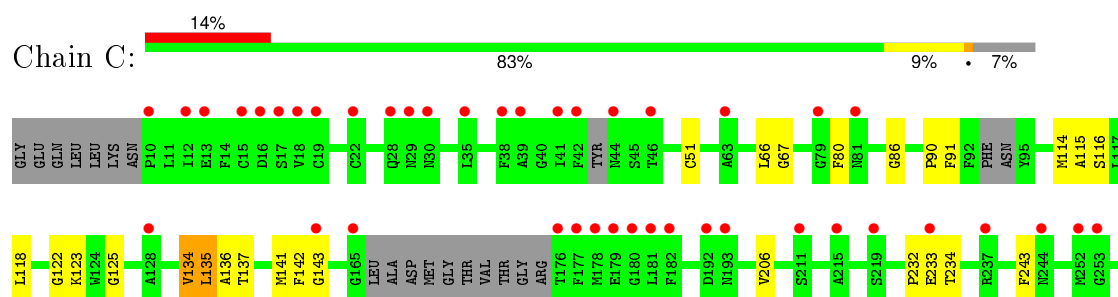
#### • Molecule 1: Urea transporter

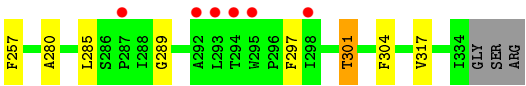


#### • Molecule 1: Urea transporter



#### • Molecule 1: Urea transporter





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	103.20Å 103.20Å 141.50Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	34.81 – 3.86 48.48 – 3.86	Depositor EDS
% Data completeness (in resolution range)	97.4 (34.81-3.86) 97.6 (48.48-3.86)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.41 (at 3.88Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.4_486)	Depositor
R, $R_{free}$	0.321 , 0.387 0.311 , 0.379	Depositor DCC
$R_{free}$ test set	773 reflections (5.03%)	DCC
Wilson B-factor (Å <sup>2</sup> )	174.8	Xtriage
Anisotropy	0.404	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.61 , 4648.5	EDS
Estimated twinning fraction	0.016 for -h,-k,l 0.125 for h,-h-k,-l 0.036 for -k,-h,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 15418 reflections	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	4673	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	251.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.98% 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, 0.375 respectively for untwinned datasets, and 0.333, 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	0.28	0/1567	0.47	0/2169
1	B	0.29	0/1577	0.47	0/2183
1	C	0.22	0/1521	0.44	0/2102
All	All	0.27	0/4665	0.46	0/6454

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	1569	0	757	24	0
1	B	1579	0	760	25	0
1	C	1525	0	739	20	0
All	All	4673	0	2256	60	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 9.

All (60) 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:280:ALA:HB1	1:B:142:PHE:CB	2.25	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:280:ALA:HB1	1:C:142:PHE:CB	2.30	0.61
1:C:134:VAL:O	1:C:136:ALA:N	2.35	0.59
1:A:134:VAL:O	1:A:136:ALA:N	2.36	0.59
1:B:134:VAL:O	1:B:136:ALA:N	2.36	0.58
1:A:91:PHE:O	1:A:93:PHE:N	2.37	0.57
1:B:91:PHE:O	1:B:93:PHE:N	2.34	0.55
1:A:232:PRO:O	1:A:234:THR:N	2.40	0.54
1:C:285:LEU:O	1:C:289:GLY:N	2.41	0.54
1:A:91:PHE:C	1:A:93:PHE:H	2.11	0.53
1:B:280:ALA:HA	1:C:143:GLY:N	2.24	0.53
1:B:114:MET:O	1:B:118:LEU:N	2.39	0.53
1:B:232:PRO:O	1:B:234:THR:N	2.42	0.52
1:C:232:PRO:O	1:C:234:THR:N	2.43	0.51
1:B:312:ARG:N	1:C:66:LEU:O	2.43	0.51
1:B:285:LEU:O	1:B:289:GLY:N	2.45	0.50
1:A:301:THR:O	1:A:304:PHE:N	2.44	0.50
1:A:280:ALA:HA	1:B:143:GLY:N	2.27	0.49
1:A:114:MET:O	1:A:118:LEU:N	2.43	0.49
1:A:285:LEU:O	1:A:289:GLY:N	2.46	0.48
1:B:136:ALA:O	1:B:137:THR:C	2.52	0.48
1:B:115:ALA:O	1:B:118:LEU:N	2.47	0.47
1:C:257:PHE:HA	1:C:317:VAL:H	1.81	0.46
1:A:257:PHE:HA	1:A:317:VAL:H	1.80	0.46
1:A:134:VAL:O	1:A:135:LEU:C	2.55	0.45
1:B:232:PRO:C	1:B:234:THR:H	2.20	0.45
1:C:232:PRO:C	1:C:234:THR:H	2.21	0.45
1:B:91:PHE:C	1:B:93:PHE:H	2.16	0.45
1:A:297:PHE:O	1:A:301:THR:CB	2.64	0.44
1:C:114:MET:O	1:C:118:LEU:N	2.42	0.44
1:A:122:GLY:O	1:A:125:GLY:N	2.48	0.44
1:C:137:THR:O	1:C:141:MET:N	2.51	0.44
1:B:297:PHE:O	1:B:301:THR:CB	2.66	0.44
1:C:134:VAL:O	1:C:137:THR:N	2.51	0.44
1:B:307:ALA:HA	1:C:115:ALA:HB1	1.99	0.44
1:C:297:PHE:O	1:C:301:THR:CB	2.66	0.44
1:A:115:ALA:O	1:A:118:LEU:N	2.51	0.43
1:A:280:ALA:CB	1:B:142:PHE:CB	2.95	0.43
1:B:306:PHE:CB	1:C:116:SER:HA	2.47	0.43
1:C:134:VAL:O	1:C:135:LEU:C	2.57	0.43
1:A:232:PRO:C	1:A:234:THR:H	2.22	0.43
1:A:286:SER:C	1:A:289:GLY:H	2.22	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:134:VAL:O	1:B:137:THR:N	2.52	0.43
1:B:51:CYS:O	1:B:86:GLY:HA3	2.19	0.43
1:B:134:VAL:O	1:B:135:LEU:C	2.58	0.42
1:A:301:THR:O	1:A:303:LEU:N	2.53	0.42
1:A:134:VAL:O	1:A:137:THR:N	2.52	0.42
1:B:257:PHE:HA	1:B:317:VAL:H	1.85	0.42
1:B:301:THR:O	1:B:304:PHE:N	2.52	0.41
1:C:122:GLY:O	1:C:125:GLY:N	2.50	0.41
1:A:301:THR:O	1:A:302:TRP:C	2.58	0.41
1:A:137:THR:O	1:A:141:MET:N	2.54	0.41
1:C:115:ALA:O	1:C:118:LEU:N	2.53	0.41
1:A:239:GLY:O	1:A:242:GLY:N	2.53	0.41
1:C:51:CYS:O	1:C:86:GLY:HA3	2.20	0.41
1:B:286:SER:C	1:B:289:GLY:H	2.24	0.41
1:A:143:GLY:N	1:C:280:ALA:HA	2.36	0.41
1:C:301:THR:O	1:C:304:PHE:N	2.52	0.41
1:B:90:PRO:O	1:B:93:PHE:O	2.39	0.40
1:A:51:CYS:O	1:A:86:GLY:HA3	2.21	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	317/335 (95%)	261 (82%)	43 (14%)	13 (4%)	3	35
1	B	319/335 (95%)	259 (81%)	46 (14%)	14 (4%)	3	34
1	C	304/335 (91%)	248 (82%)	45 (15%)	11 (4%)	4	40
All	All	940/1005 (94%)	768 (82%)	134 (14%)	38 (4%)	4	36

All (38) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	233	GLU
1	B	233	GLU
1	A	91	PHE
1	A	92	PHE
1	A	134	VAL
1	A	135	LEU
1	B	91	PHE
1	B	92	PHE
1	B	134	VAL
1	B	135	LEU
1	C	91	PHE
1	C	134	VAL
1	C	135	LEU
1	C	233	GLU
1	A	301	THR
1	B	301	THR
1	C	123	LYS
1	C	301	THR
1	A	80	PHE
1	A	243	PHE
1	B	80	PHE
1	B	243	PHE
1	C	80	PHE
1	C	243	PHE
1	A	123	LYS
1	A	136	ALA
1	B	120	PHE
1	B	123	LYS
1	B	136	ALA
1	B	67	GLY
1	A	67	GLY
1	A	206	VAL
1	B	206	VAL
1	C	206	VAL
1	A	90	PRO
1	C	90	PRO
1	B	90	PRO
1	C	67	GLY

### 5.3.2 Protein sidechains ⓘ

There are no protein residues with a non-rotameric sidechain to report in this entry.

### 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 ⓘ

### 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	A	321/335 (95%)	0.11	33 (10%) 9 6	78, 198, 350, 453	0
1	B	323/335 (96%)	0.13	35 (10%) 8 6	53, 206, 375, 478	0
1	C	312/335 (93%)	0.52	48 (15%) 3 3	141, 316, 463, 556	0
All	All	956/1005 (95%)	0.25	116 (12%) 6 5	53, 235, 431, 556	0

All (116) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	176	THR	10.6
1	B	162	SER	9.1
1	A	79	GLY	8.6
1	C	39	ALA	8.4
1	C	29	ASN	8.4
1	A	29	ASN	8.4
1	B	180	GLY	8.0
1	B	161	PRO	8.0
1	C	237	ARG	7.9
1	C	180	GLY	7.1
1	C	193	ASN	6.9
1	A	22	CYS	6.6
1	A	17	SER	6.5
1	A	30	ASN	5.8
1	C	178	MET	5.5
1	A	180	GLY	5.4
1	C	18	VAL	5.4
1	C	17	SER	5.2
1	A	184	GLY	5.2
1	B	171	THR	5.1
1	B	183	LYS	4.9
1	A	76	GLY	4.8
1	A	20	ARG	4.7

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Mol	Chain	Res	Type	RSRZ
1	B	176	THR	4.7
1	A	18	VAL	4.6
1	C	13	GLU	4.6
1	C	253	GLY	4.6
1	C	19	CYS	4.5
1	C	192	ASP	4.5
1	B	194	ILE	4.4
1	B	179	GLU	4.4
1	C	215	ALA	4.3
1	C	179	GLU	4.3
1	C	38	PHE	4.1
1	B	40	GLY	4.0
1	B	63	ALA	3.9
1	C	81	ASN	3.9
1	A	168	ASP	3.7
1	B	33	THR	3.7
1	C	181	LEU	3.7
1	B	30	ASN	3.6
1	C	233	GLU	3.5
1	A	182	PHE	3.5
1	C	30	ASN	3.4
1	C	10	PRO	3.4
1	A	154	ALA	3.4
1	A	231	SER	3.4
1	A	19	CYS	3.4
1	C	211	SER	3.4
1	A	21	GLY	3.3
1	A	176	THR	3.3
1	A	44	ASN	3.3
1	B	226	ALA	3.3
1	C	44	ASN	3.2
1	B	22	CYS	3.1
1	C	46	THR	3.1
1	C	12	ILE	3.1
1	A	179	GLU	3.0
1	C	42	PHE	3.0
1	A	197	GLY	2.9
1	B	184	GLY	2.9
1	A	169	MET	2.9
1	B	193	ASN	2.8
1	B	29	ASN	2.8
1	B	160	LEU	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	172	VAL	2.8
1	C	287	PRO	2.8
1	C	41	ILE	2.7
1	B	19	CYS	2.7
1	C	143	GLY	2.7
1	C	28	GLN	2.7
1	A	78	PHE	2.7
1	B	68	VAL	2.7
1	A	33	THR	2.7
1	C	15	CYS	2.6
1	C	177	PHE	2.6
1	C	244	ASN	2.6
1	C	295	TRP	2.6
1	B	23	GLY	2.6
1	A	193	ASN	2.6
1	B	175	ARG	2.6
1	C	252	MET	2.5
1	B	28	GLN	2.5
1	A	181	LEU	2.5
1	C	16	ASP	2.5
1	B	73	VAL	2.5
1	C	294	THR	2.5
1	C	293	LEU	2.5
1	C	22	CYS	2.4
1	C	182	PHE	2.4
1	C	292	ALA	2.4
1	B	21	GLY	2.4
1	C	219	SER	2.4
1	B	163	VAL	2.4
1	B	254	GLY	2.4
1	A	28	GLN	2.3
1	C	128	ALA	2.3
1	A	191	GLN	2.3
1	A	175	ARG	2.2
1	C	35	LEU	2.2
1	A	10	PRO	2.1
1	A	46	THR	2.1
1	B	185	VAL	2.1
1	B	64	GLN	2.1
1	C	298	ILE	2.1
1	A	81	ASN	2.1
1	A	236	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	241	TYR	2.1
1	B	237	ARG	2.1
1	C	79	GLY	2.0
1	B	236	VAL	2.0
1	C	63	ALA	2.0
1	B	253	GLY	2.0
1	A	237	ARG	2.0
1	C	165	GLY	2.0
1	B	31	THR	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.