



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2023 – 05:29 AM EDT

PDB ID : 1UJ3  
Title : Crystal structure of a humanized Fab fragment of anti-tissue-factor antibody in complex with tissue factor  
Authors : Ohto, U.; Mizutani, R.; Nakamura, M.; Adachi, H.; Satow, Y.  
Deposited on : 2003-07-25  
Resolution : 2.10 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2.36  
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) : 2.36

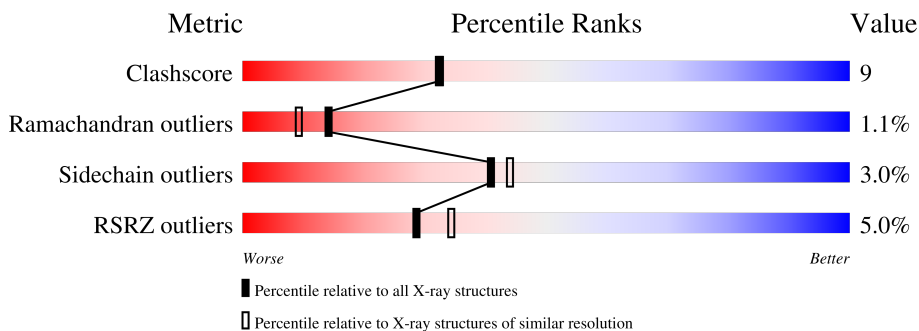
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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))
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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  $\geq 3$ , 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	215	
2	B	217	
3	C	205	

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 5377 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 IgG Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	214	1642	1028	270	338	6	0	0	0

- Molecule 2 is a protein called IgG Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	217	1631	1022	274	326	9	0	0	0

- Molecule 3 is a protein called tissue factor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	205	1640	1038	266	331	5	0	0	0

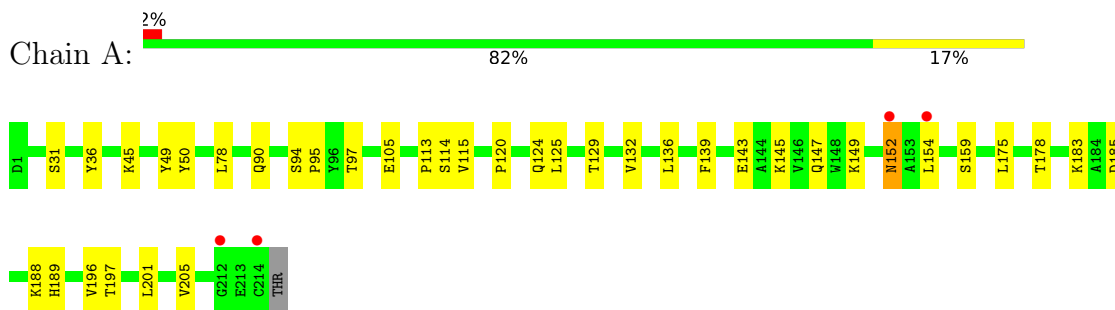
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	164	Total 164	O 164	0	0
4	B	216	Total 216	O 216	0	0
4	C	84	Total 84	O 84	0	0

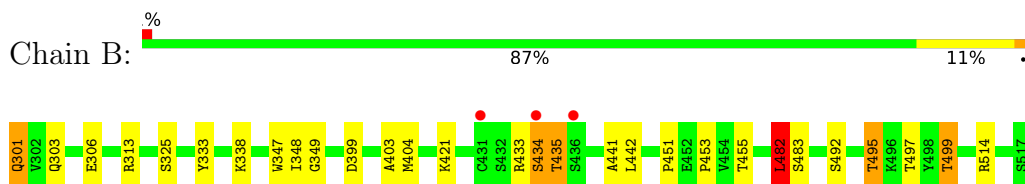
### 3 Residue-property plots [i](#)

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.

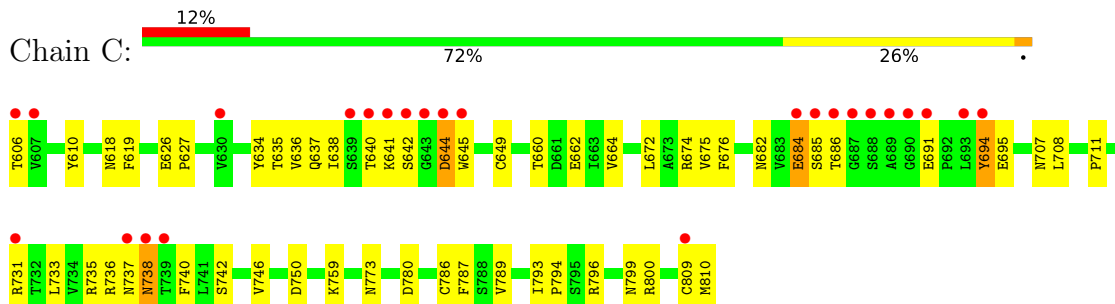
- Molecule 1: IgG Fab light chain



- Molecule 2: IgG Fab heavy chain



- Molecule 3: tissue factor



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	103.05Å 266.00Å 42.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.01 – 2.10 37.01 – 2.10	Depositor EDS
% Data completeness (in resolution range)	90.6 (37.01-2.10) 93.6 (37.01-2.10)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.19 (at 2.10Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.196 , 0.227 0.212 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.5	Xtrriage
Anisotropy	0.176	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 52.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	5377	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.23% 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	0.54	0/1678	0.75	1/2277 (0.0%)
2	B	0.54	0/1670	0.78	2/2275 (0.1%)
3	C	0.46	0/1676	0.73	0/2281
All	All	0.52	0/5024	0.75	3/6833 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	482	LEU	CA-CB-CG	6.32	129.83	115.30
2	B	404	MET	N-CA-C	-5.70	95.61	111.00
1	A	114	SER	N-CA-C	-5.36	96.53	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	36	TYR	Sidechain

### 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	1642	0	1587	24	0
2	B	1631	0	1581	20	0
3	C	1640	0	1592	42	0
4	A	164	0	0	2	0
4	B	216	0	0	3	0
4	C	84	0	0	1	0
All	All	5377	0	4760	85	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 (85) 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)
3:C:707:ASN:HD22	3:C:799:ASN:HD21	1.22	0.85
2:B:433:ARG:HB2	2:B:433:ARG:HH11	1.43	0.84
2:B:338:LYS:HB3	2:B:348:ILE:HD11	1.60	0.84
1:A:136:LEU:HD21	1:A:196:VAL:HG21	1.66	0.75
3:C:708:LEU:HD11	3:C:793:ILE:HG12	1.68	0.74
2:B:301:GLN:N	2:B:301:GLN:CD	2.41	0.73
3:C:707:ASN:ND2	3:C:799:ASN:HD21	1.87	0.72
2:B:433:ARG:HB2	2:B:433:ARG:NH1	2.08	0.67
2:B:441:ALA:O	2:B:442:LEU:HD12	1.95	0.67
1:A:136:LEU:HD21	1:A:196:VAL:CG2	2.28	0.64
2:B:421:LYS:NZ	4:B:1064:HOH:O	2.20	0.63
3:C:786:CYS:HA	3:C:809:CYS:HA	1.80	0.63
3:C:737:ASN:O	3:C:738:ASN:HB2	2.00	0.62
2:B:434:SER:O	2:B:435:THR:HG22	2.01	0.60
2:B:347:TRP:CZ2	2:B:349:GLY:HA2	2.35	0.60
3:C:750:ASP:O	3:C:794:PRO:HD2	2.02	0.60
3:C:676:PHE:CD2	3:C:694:TYR:HB3	2.37	0.59
1:A:188:LYS:HG3	1:A:189:HIS:CE1	2.38	0.58
1:A:201:LEU:HD13	1:A:205:VAL:HG23	1.85	0.57
1:A:120:PRO:HD3	1:A:132:VAL:HG22	1.87	0.56
1:A:145:LYS:HB3	1:A:197:THR:HB	1.86	0.56
3:C:640:THR:C	3:C:642:SER:H	2.09	0.56
2:B:497:THR:HG23	2:B:514:ARG:HD2	1.88	0.55
3:C:645:TRP:CZ3	3:C:674:ARG:HG2	2.42	0.54
1:A:185:ASP:O	1:A:188:LYS:HG2	2.06	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:711:PRO:HB2	3:C:789:VAL:HG13	1.90	0.54
1:A:49:TYR:HB3	2:B:403:ALA:HB2	1.90	0.54
2:B:492:SER:O	2:B:495:THR:HG23	2.08	0.54
3:C:707:ASN:ND2	3:C:799:ASN:ND2	2.57	0.53
2:B:333:TYR:HB2	2:B:399:ASP:HB3	1.89	0.53
1:A:143:GLU:CD	1:A:143:GLU:H	2.12	0.53
2:B:313:ARG:CZ	4:B:1212:HOH:O	2.55	0.53
3:C:637:GLN:HB2	3:C:674:ARG:HG3	1.91	0.53
1:A:136:LEU:CD2	1:A:196:VAL:HG21	2.37	0.52
3:C:637:GLN:HB2	3:C:674:ARG:CG	2.40	0.52
3:C:635:THR:HA	3:C:649:CYS:O	2.10	0.51
1:A:149:LYS:HG2	1:A:154:LEU:HD22	1.92	0.51
1:A:124:GLN:HG2	1:A:129:THR:O	2.12	0.50
3:C:606:THR:N	3:C:686:THR:HG1	2.09	0.50
3:C:731:ARG:HA	3:C:742:SER:HA	1.93	0.50
2:B:482:LEU:HD23	2:B:482:LEU:C	2.32	0.50
3:C:708:LEU:HD21	3:C:793:ILE:HD11	1.93	0.49
3:C:634:TYR:HA	3:C:676:PHE:O	2.14	0.47
3:C:676:PHE:CE2	3:C:694:TYR:HB3	2.49	0.47
3:C:735:ARG:HD2	3:C:740:PHE:CE1	2.49	0.47
3:C:610:TYR:CZ	3:C:626:GLU:HB3	2.50	0.47
3:C:642:SER:HB2	3:C:644:ASP:OD1	2.15	0.47
3:C:640:THR:O	3:C:642:SER:N	2.48	0.47
3:C:638:ILE:HG21	3:C:662:GLU:HG3	1.97	0.47
1:A:145:LYS:HE2	1:A:147:GLN:CD	2.36	0.46
2:B:303:GLN:CG	2:B:325:SER:OG	2.63	0.46
3:C:640:THR:C	3:C:642:SER:N	2.69	0.45
3:C:773:ASN:HB3	4:C:1296:HOH:O	2.16	0.45
1:A:115:VAL:HG22	1:A:136:LEU:HD22	1.98	0.45
1:A:159:SER:HA	1:A:178:THR:O	2.17	0.45
2:B:499:THR:HB	2:B:514:ARG:HA	1.99	0.43
1:A:175:LEU:C	1:A:175:LEU:HD23	2.39	0.43
4:A:872:HOH:O	2:B:483:SER:HB2	2.18	0.43
3:C:619:PHE:CZ	3:C:746:VAL:HG11	2.53	0.43
1:A:149:LYS:HE2	1:A:154:LEU:HD21	2.01	0.43
2:B:433:ARG:HH11	2:B:433:ARG:CB	2.22	0.43
2:B:455:THR:HG23	4:B:1092:HOH:O	2.18	0.43
3:C:636:VAL:HG22	3:C:675:VAL:HG22	2.00	0.43
3:C:674:ARG:HA	3:C:695:GLU:O	2.19	0.43
3:C:618:ASN:O	3:C:619:PHE:HB2	2.19	0.42
3:C:640:THR:HG23	3:C:642:SER:OG	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:143:GLU:CD	1:A:143:GLU:N	2.72	0.42
3:C:736:ARG:O	3:C:737:ASN:ND2	2.52	0.42
2:B:434:SER:O	2:B:435:THR:CG2	2.67	0.42
1:A:113:PRO:HB3	1:A:139:PHE:HB3	2.01	0.42
3:C:787:PHE:HE2	3:C:810:MET:HG2	1.83	0.42
3:C:731:ARG:HH22	3:C:733:LEU:HD23	1.85	0.42
3:C:759:LYS:NZ	3:C:780:ASP:OD2	2.41	0.42
1:A:125:LEU:O	1:A:183:LYS:HD2	2.20	0.41
3:C:660:THR:O	3:C:664:VAL:HG13	2.20	0.41
1:A:31:SER:O	1:A:50:TYR:HA	2.20	0.41
3:C:736:ARG:NH2	3:C:737:ASN:HD22	2.19	0.41
3:C:810:MET:HG3	3:C:810:MET:O	2.21	0.41
1:A:152:ASN:HD22	1:A:152:ASN:HA	1.56	0.41
1:A:45:LYS:HE2	4:A:1022:HOH:O	2.21	0.41
3:C:691:GLU:O	3:C:691:GLU:HG3	2.21	0.40
1:A:94:SER:HA	1:A:95:PRO:C	2.42	0.40
3:C:619:PHE:CE2	3:C:746:VAL:HG11	2.56	0.40
3:C:735:ARG:NH2	3:C:738:ASN:O	2.54	0.40
3:C:796:ARG:HB2	3:C:800:ARG:HB3	2.04	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	212/215 (99%)	206 (97%)	6 (3%)	0	100	100
2	B	215/217 (99%)	206 (96%)	7 (3%)	2 (1%)	17	12
3	C	203/205 (99%)	183 (90%)	15 (7%)	5 (2%)	5	2
All	All	630/637 (99%)	595 (94%)	28 (4%)	7 (1%)	14	9

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	434	SER
2	B	435	THR
3	C	738	ASN
3	C	684	GLU
3	C	641	LYS
3	C	644	ASP
3	C	685	SER

### 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	188/189 (100%)	183 (97%)	5 (3%)	44	48
2	B	185/185 (100%)	178 (96%)	7 (4%)	33	34
3	C	189/189 (100%)	184 (97%)	5 (3%)	46	50
All	All	562/563 (100%)	545 (97%)	17 (3%)	41	44

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	78	LEU
1	A	90	GLN
1	A	97	THR
1	A	105	GLU
1	A	152	ASN
2	B	301	GLN
2	B	306	GLU
2	B	451	PRO
2	B	453	PRO
2	B	482	LEU
2	B	495	THR
2	B	499	THR
3	C	627	PRO
3	C	672	LEU
3	C	682	ASN
3	C	684	GLU

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Mol	Chain	Res	Type
3	C	694	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	152	ASN
1	A	189	HIS
2	B	365	GLN
3	C	682	ASN
3	C	707	ASN
3	C	718	GLN
3	C	737	ASN
3	C	784	ASN

### 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 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, 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	214/215 (99%)	-0.11	4 (1%) 66 71	12, 26, 49, 69	0
2	B	217/217 (100%)	-0.12	3 (1%) 75 78	15, 24, 42, 76	0
3	C	205/205 (100%)	0.78	25 (12%) 4 5	15, 38, 91, 99	0
All	All	636/637 (99%)	0.18	32 (5%) 28 34	12, 27, 64, 99	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	688	SER	15.0
3	C	689	ALA	13.3
3	C	687	GLY	11.6
3	C	686	THR	8.5
3	C	685	SER	7.7
3	C	643	GLY	7.6
3	C	642	SER	7.3
3	C	690	GLY	5.8
3	C	691	GLU	5.5
3	C	644	ASP	5.0
3	C	738	ASN	4.8
3	C	640	THR	4.5
2	B	434	SER	4.2
3	C	737	ASN	4.0
3	C	641	LYS	3.6
3	C	809	CYS	3.4
3	C	607	VAL	3.4
1	A	154	LEU	3.4
1	A	214	CYS	3.4
3	C	739	THR	3.3
2	B	431	CYS	3.1
3	C	630	VAL	3.0
3	C	645	TRP	2.6

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Mol	Chain	Res	Type	RSRZ
3	C	684	GLU	2.6
3	C	731	ARG	2.6
1	A	152	ASN	2.6
3	C	606	THR	2.5
3	C	639	SER	2.5
3	C	694	TYR	2.4
2	B	436	SER	2.3
1	A	212	GLY	2.3
3	C	693	LEU	2.2

## 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 monosaccharides 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.