



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 12:45 PM GMT

PDB ID : 3S36  
Title : Structural basis for the function of two anti-VEGF receptor antibodies  
Authors : Franklin, M.C.  
Deposited on : 2011-05-17  
Resolution : 3.20 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

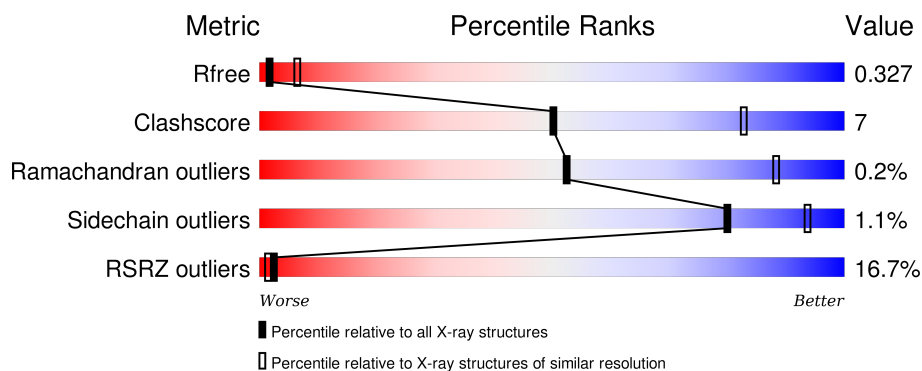
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	1124 (3.24-3.16)
Clashscore	102246	1024 (3.22-3.18)
Ramachandran outliers	100387	1004 (3.22-3.18)
Sidechain outliers	100360	1003 (3.22-3.18)
RSRZ outliers	91569	1129 (3.24-3.16)

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	L	214	<div> <div>15%</div> <div>87%</div> <div>11%</div> <div>.</div> </div>
2	H	221	<div> <div>8%</div> <div>85%</div> <div>12%</div> <div>.</div> </div>
3	X	122	<div> <div>32%</div> <div>73%</div> <div>16%</div> <div>.</div> <div>8%</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4104 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 1121B light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	214	Total	C	N	O	S	0	0	0
			1634	1025	274	329	6			

- Molecule 2 is a protein called 1121B heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	214	Total	C	N	O	S	0	0	0
			1590	1002	268	312	8			

- Molecule 3 is a protein called Vascular endothelial growth factor receptor 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	X	112	Total	C	N	O	S	0	0	0
			880	555	154	167	4			

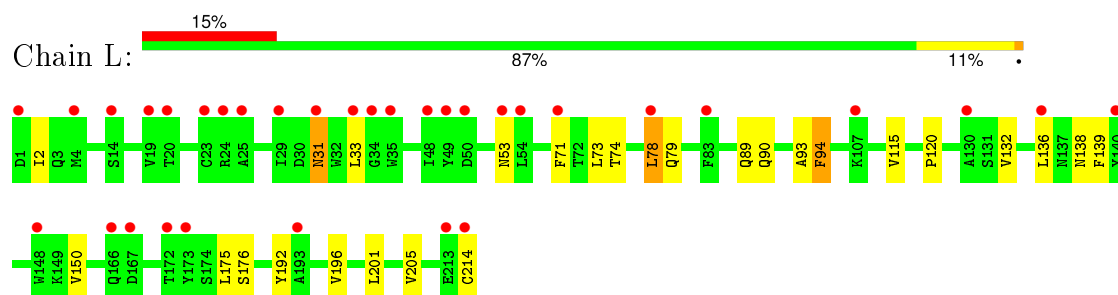
There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
X	217	ALA	-	EXPRESSION TAG	UNP P35968
X	218	ASP	-	EXPRESSION TAG	UNP P35968
X	219	PRO	-	EXPRESSION TAG	UNP P35968

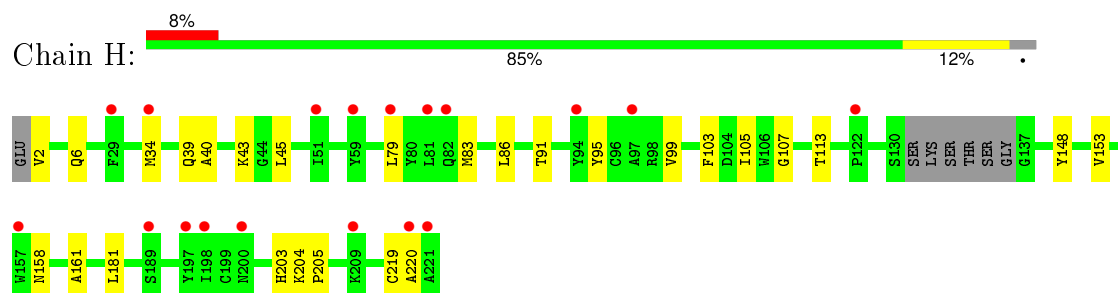
### 3 Residue-property plots

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.

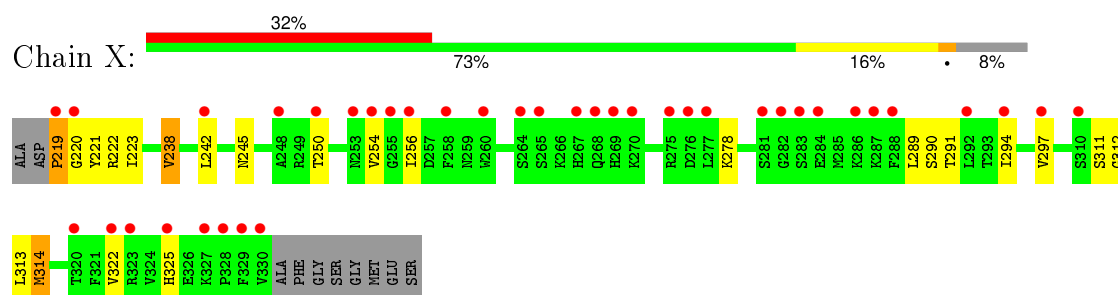
#### • Molecule 1: 1121B light chain



#### • Molecule 2: 1121B heavy chain



#### • Molecule 3: Vascular endothelial growth factor receptor 2



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	64.86 Å 64.86 Å 263.16 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	54.96 – 3.20 54.94 – 3.20	Depositor EDS
% Data completeness (in resolution range)	97.8 (54.96-3.20) 97.8 (54.94-3.20)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.74 (at 3.19 Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, $R_{free}$	0.274 , 0.332 0.277 , 0.327	Depositor DCC
$R_{free}$ test set	522 reflections (4.95%)	DCC
Wilson B-factor (Å <sup>2</sup> )	100.5	Xtriage
Anisotropy	0.602	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 92.9	EDS
Estimated twinning fraction	0.035 for -h,-k,l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 11074 reflections	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	4104	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	124.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.75% 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 [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	L	0.27	0/1670	0.47	2/2267 (0.1%)
2	H	0.25	0/1626	0.45	0/2213
3	X	0.27	0/897	0.80	4/1209 (0.3%)
All	All	0.26	0/4193	0.55	6/5689 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
3	X	311	SER	CB-CA-C	-14.08	83.35	110.10
3	X	219	PRO	N-CA-C	12.88	145.60	112.10
3	X	220	GLY	N-CA-C	10.60	139.61	113.10
3	X	312	GLY	N-CA-C	6.26	128.76	113.10
1	L	138	ASN	N-CA-C	5.56	126.02	111.00
1	L	139	PHE	N-CA-CB	-5.24	101.18	110.60

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	L	1634	0	1585	21	0
2	H	1590	0	1559	20	0
3	X	880	0	886	23	0
All	All	4104	0	4030	57	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 (57) 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)
2:H:2:VAL:HG13	2:H:105:ILE:HD13	1.63	0.80
2:H:2:VAL:HG13	2:H:105:ILE:CD1	2.17	0.73
3:X:250:THR:HG21	3:X:256:ILE:HD11	1.74	0.69
2:H:34:MET:HB3	2:H:79:LEU:HD22	1.77	0.66
1:L:33:LEU:HD12	1:L:89:GLN:O	1.98	0.64
1:L:33:LEU:HD22	1:L:71:PHE:CG	2.33	0.64
1:L:115:VAL:HG21	1:L:196:VAL:HG11	1.82	0.61
1:L:93:ALA:HB2	3:X:219:PRO:O	2.01	0.60
1:L:214:CYS:HA	2:H:219:CYS:HA	1.83	0.59
3:X:222:ARG:HA	3:X:314:MET:HE3	1.86	0.57
1:L:93:ALA:CB	3:X:219:PRO:O	2.52	0.56
2:H:219:CYS:O	2:H:220:ALA:HB3	2.06	0.56
1:L:120:PRO:HD3	1:L:132:VAL:HG22	1.87	0.55
2:H:6:GLN:HE21	2:H:107:GLY:HA3	1.71	0.55
1:L:78:LEU:HD13	1:L:79:GLN:N	2.23	0.54
1:L:94:PHE:HB2	3:X:313:LEU:HD11	1.90	0.53
1:L:93:ALA:HB2	3:X:219:PRO:CB	2.39	0.53
3:X:221:TYR:HA	3:X:254:VAL:HG22	1.90	0.53
2:H:181:LEU:C	2:H:181:LEU:HD12	2.28	0.53
3:X:294:ILE:CG2	3:X:297:VAL:HG12	2.40	0.52
2:H:39:GLN:HB2	2:H:45:LEU:HD23	1.93	0.51
1:L:2:ILE:HD12	1:L:90:GLN:NE2	2.26	0.50
1:L:31:ASN:H	1:L:31:ASN:HD22	1.60	0.50
3:X:221:TYR:CB	3:X:313:LEU:HD12	2.42	0.49
3:X:289:LEU:CD2	3:X:291:THR:HG23	2.43	0.49
3:X:250:THR:CG2	3:X:256:ILE:HD11	2.42	0.49
3:X:221:TYR:HB3	3:X:313:LEU:HD12	1.95	0.49
1:L:33:LEU:HD22	1:L:71:PHE:CD2	2.48	0.48
1:L:93:ALA:HB2	3:X:219:PRO:HB2	1.95	0.48
2:H:40:ALA:HB3	2:H:43:LYS:HG3	1.95	0.47
3:X:242:LEU:HD11	3:X:322:VAL:HG11	1.96	0.47
3:X:222:ARG:HG2	3:X:314:MET:HE1	1.97	0.47
2:H:153:VAL:CG2	2:H:181:LEU:HD21	2.45	0.47
2:H:91:THR:HG23	2:H:113:THR:HA	1.96	0.47
2:H:83:MET:HB3	2:H:86:LEU:HD21	1.97	0.47
2:H:6:GLN:HE22	2:H:95:TYR:HA	1.80	0.47
1:L:201:LEU:HD13	1:L:205:VAL:HG23	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:X:289:LEU:HD23	3:X:290:SER:N	2.32	0.45
3:X:245:ASN:HA	3:X:291:THR:HG22	1.98	0.45
2:H:158:ASN:CB	2:H:161:ALA:HB3	2.47	0.45
3:X:289:LEU:HD21	3:X:291:THR:HG23	2.00	0.44
3:X:238:VAL:HG23	3:X:325:HIS:O	2.17	0.44
1:L:73:LEU:HD23	1:L:74:THR:N	2.34	0.43
2:H:148:TYR:CE2	2:H:153:VAL:HG13	2.53	0.43
3:X:278:LYS:CD	3:X:289:LEU:HD22	2.48	0.43
2:H:99:VAL:HG22	2:H:103:PHE:CD1	2.54	0.43
3:X:223:ILE:HG12	3:X:250:THR:HG22	2.00	0.43
2:H:219:CYS:O	2:H:220:ALA:CB	2.67	0.42
2:H:204:LYS:N	2:H:205:PRO:CD	2.83	0.42
1:L:93:ALA:HA	3:X:219:PRO:O	2.19	0.42
1:L:175:LEU:HD23	1:L:176:SER:N	2.35	0.41
1:L:150:VAL:HG22	1:L:192:TYR:CD1	2.56	0.41
1:L:31:ASN:H	1:L:31:ASN:ND2	2.18	0.41
3:X:294:ILE:HG21	3:X:297:VAL:HG12	2.03	0.40
1:L:136:LEU:N	1:L:136:LEU:HD12	2.37	0.40
2:H:153:VAL:HG12	2:H:203:HIS:HD2	1.85	0.40
2:H:153:VAL:HG12	2:H:203:HIS:CD2	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	L	212/214 (99%)	200 (94%)	12 (6%)	0	100	100
2	H	210/221 (95%)	197 (94%)	13 (6%)	0	100	100
3	X	110/122 (90%)	101 (92%)	8 (7%)	1 (1%)	21	67
All	All	532/557 (96%)	498 (94%)	33 (6%)	1 (0%)	52	88



All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	X	238	VAL

### 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	L	184/184 (100%)	180 (98%)	4 (2%)	60	87
2	H	179/185 (97%)	179 (100%)	0	100	100
3	X	101/107 (94%)	100 (99%)	1 (1%)	82	95
All	All	464/476 (98%)	459 (99%)	5 (1%)	80	94

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	31	ASN
1	L	53	ASN
1	L	78	LEU
1	L	94	PHE
3	X	314	MET

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

Mol	Chain	Res	Type
1	L	31	ASN
1	L	53	ASN
2	H	3	GLN
2	H	6	GLN
2	H	77	ASN
2	H	195	GLN
3	X	253	ASN
3	X	259	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 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	L	214/214 (100%)	0.93	33 (15%) 3 2	88, 125, 190, 220	0
2	H	214/221 (96%)	0.66	18 (8%) 14 7	77, 108, 160, 194	0
3	X	112/122 (91%)	1.98	39 (34%) 0 0	96, 134, 186, 209	0
All	All	540/557 (96%)	1.04	90 (16%) 2 1	77, 119, 181, 220	0

All (90) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	X	219	PRO	21.2
3	X	329	PHE	16.5
3	X	328	PRO	14.4
3	X	220	GLY	10.6
2	H	221	ALA	9.3
3	X	276	ASP	9.1
2	H	220	ALA	6.1
1	L	71	PHE	5.8
3	X	269	HIS	5.6
1	L	23	CYS	5.3
3	X	254	VAL	5.1
1	L	34	GLY	4.9
1	L	33	LEU	4.8
3	X	330	VAL	4.6
1	L	4	MET	4.5
3	X	277	LEU	4.5
1	L	173	TYR	4.3
1	L	213	GLU	4.0
3	X	255	GLY	3.9
3	X	288	PHE	3.9
3	X	281	SER	3.9
1	L	172	THR	3.8
3	X	265	SER	3.8

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Mol	Chain	Res	Type	RSRZ
3	X	256	ILE	3.8
2	H	82	GLN	3.5
3	X	282	GLY	3.5
1	L	35	TRP	3.4
3	X	264	SER	3.4
3	X	275	ARG	3.4
3	X	287	LYS	3.2
1	L	140	TYR	3.2
1	L	29	ILE	3.1
3	X	260	TRP	3.1
1	L	214	CYS	3.1
3	X	253	ASN	3.0
2	H	29	PHE	3.0
2	H	157	TRP	3.0
3	X	270	LYS	2.9
2	H	59	TYR	2.9
1	L	31	ASN	2.9
1	L	193	ALA	2.9
3	X	283	SER	2.9
2	H	198	ILE	2.8
3	X	258	PHE	2.8
2	H	209	LYS	2.8
1	L	148	TRP	2.8
3	X	322	VAL	2.8
3	X	284	GLU	2.7
1	L	54	LEU	2.7
1	L	1	ASP	2.7
3	X	294	ILE	2.7
3	X	250	THR	2.7
3	X	327	LYS	2.6
3	X	248	ALA	2.6
1	L	49	TYR	2.6
1	L	53	ASN	2.6
1	L	78	LEU	2.5
2	H	34	MET	2.5
1	L	166	GLN	2.5
1	L	83	PHE	2.5
3	X	310	SER	2.5
1	L	14	SER	2.5
3	X	268	GLN	2.4
3	X	323	ARG	2.4
2	H	94	TYR	2.4

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Mol	Chain	Res	Type	RSRZ
1	L	167	ASP	2.4
1	L	24	ARG	2.4
3	X	242	LEU	2.4
2	H	197	TYR	2.4
1	L	107	LYS	2.3
1	L	50	ASP	2.3
3	X	267	HIS	2.3
1	L	19	VAL	2.2
2	H	97	ALA	2.2
3	X	292	LEU	2.2
1	L	20	THR	2.2
2	H	81	LEU	2.2
2	H	200	ASN	2.2
1	L	136	LEU	2.2
3	X	297	VAL	2.2
1	L	130	ALA	2.2
2	H	189	SER	2.2
2	H	51	ILE	2.2
3	X	325	HIS	2.2
2	H	122	PRO	2.1
1	L	48	ILE	2.1
2	H	79	LEU	2.1
3	X	320	THR	2.1
1	L	25	ALA	2.0
3	X	286	LYS	2.0

## 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 carbohydrates in this entry.

## 6.4 Ligands ⓘ

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.