



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 03:54 PM GMT

PDB ID : 3VXR  
Title : The complex between H27-14 TCR and HLA-A24 bound to HIV-1 Nef134-10(wt) peptide  
Authors : Shimizu, A.; Fukai, S.; Yamagata, A.; Iwamoto, A.  
Deposited on : 2012-09-20  
Resolution : 2.40 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

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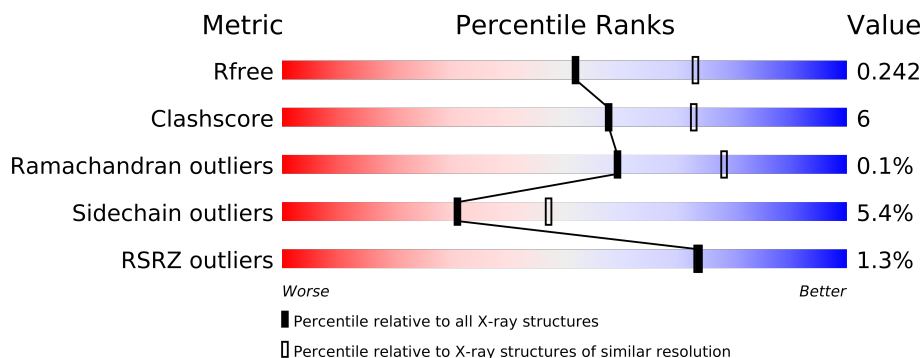
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 2.40 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))
$R_{free}$	66092	2207 (2.40-2.40)
Clashscore	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)
RSRZ outliers	66119	2210 (2.40-2.40)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	275	
2	B	100	
3	D	207	
4	E	244	
5	C	10	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 6861 atoms, of which 0 are hydrogen and 0 are deuterium.

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 HLA class I histocompatibility antigen, A-24 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	274	Total	C	N	O	S	0	0	0
			2222	1382	403	427	10			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	EXPRESSION TAG	UNP P05534

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total	C	N	O	S	0	0	0
			836	533	141	158	4			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	EXPRESSION TAG	UNP P61769

- Molecule 3 is a protein called H27-14 TCR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	194	Total	C	N	O	S	0	0	0
			1493	924	256	305	8			

- Molecule 4 is a protein called H27-14 TCR beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	E	242	Total	C	N	O	S	0	0	0
			1954	1226	347	375	6			

- Molecule 5 is a protein called 10-mer peptide from Protein Nef.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	C	10	Total	C	N	O	S	0	0	0
			92	64	14	13	1			

- Molecule 6 is water.

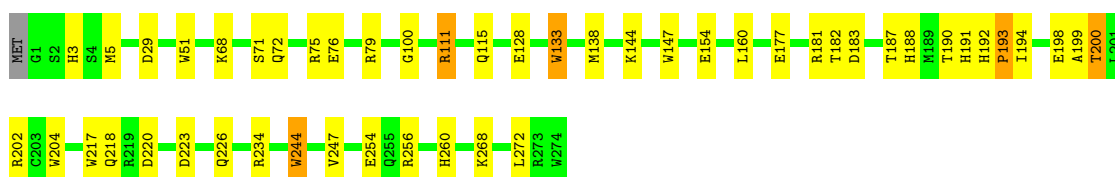
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	79	Total	O	0	0
			79	79		
6	B	44	Total	O	0	0
			44	44		
6	D	56	Total	O	0	0
			56	56		
6	E	83	Total	O	0	0
			83	83		
6	C	2	Total	O	0	0
			2	2		

### 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: HLA class I histocompatibility antigen, A-24 alpha chain

Chain A: 



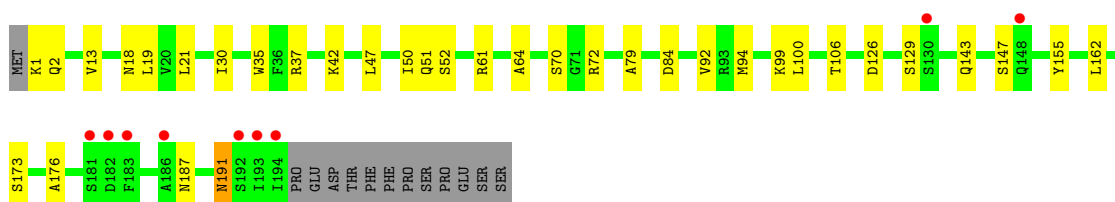
- Molecule 2: Beta-2-microglobulin

Chain B: 



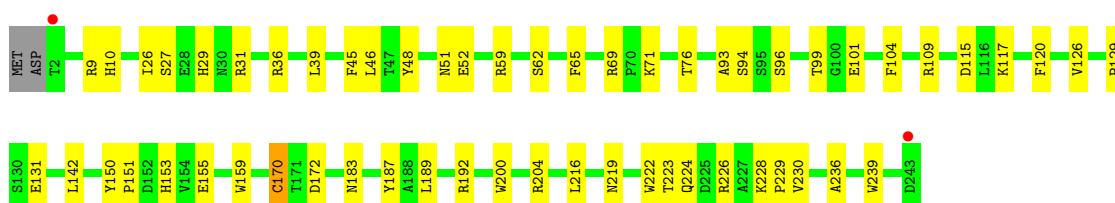
- Molecule 3: H27-14 TCR alpha chain

Chain D: 



- Molecule 4: H27-14 TCR beta chain

Chain E: 



- Molecule 5: 10-mer peptide from Protein Nef

Chain C: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	221.45Å 47.74Å 113.99Å 90.00° 119.91° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 32.94 – 2.40	Depositor EDS
% Data completeness (in resolution range)	91.2 (50.00-2.40) 91.2 (32.94-2.40)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.74 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.199 , 0.242 0.199 , 0.242	Depositor DCC
$R_{free}$ test set	1895 reflections (5.30%)	DCC
Wilson B-factor (Å <sup>2</sup> )	26.4	Xtriage
Anisotropy	0.184	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 17.9	EDS
Estimated twinning fraction	0.028 for -h-2*1,-k,l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	1 of 37637 reflections (0.003%)	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	6861	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.41% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 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	0.56	6/2282 (0.3%)	0.59	0/3092
2	B	0.51	0/859	0.56	0/1162
3	D	0.41	1/1517 (0.1%)	0.59	0/2054
4	E	0.55	3/2006 (0.1%)	0.60	0/2724
5	C	0.72	0/97	0.62	0/130
All	All	0.52	10/6761 (0.1%)	0.59	0/9162

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	244	TRP	CD2-CE2	5.57	1.48	1.41
4	E	239	TRP	CD2-CE2	5.36	1.47	1.41
4	E	200	TRP	CD2-CE2	5.19	1.47	1.41
4	E	159	TRP	CD2-CE2	5.12	1.47	1.41
1	A	51	TRP	CD2-CE2	5.11	1.47	1.41
1	A	147	TRP	CD2-CE2	5.09	1.47	1.41
3	D	35	TRP	CD2-CE2	5.08	1.47	1.41
1	A	204	TRP	CD2-CE2	5.08	1.47	1.41
1	A	133	TRP	CD2-CE2	5.06	1.47	1.41
1	A	217	TRP	CD2-CE2	5.04	1.47	1.41

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the



chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2222	0	2082	24	0
2	B	836	0	803	11	0
3	D	1493	0	1455	16	0
4	E	1954	0	1850	36	0
5	C	92	0	85	0	0
6	A	79	0	0	5	0
6	B	44	0	0	1	0
6	C	2	0	0	0	0
6	D	56	0	0	0	0
6	E	83	0	0	6	0
All	All	6861	0	6275	81	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 6.

All (81) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
4:E:27:SER:HB2	6:E:323:HOH:O	1.73	0.89
1:A:72:GLN:HE21	4:E:51:ASN:HD22	1.33	0.74
1:A:3:HIS:HD2	1:A:29:ASP:OD2	1.72	0.73
3:D:37:ARG:HB2	3:D:47:LEU:HD11	1.74	0.68
1:A:188:HIS:HE1	6:A:313:HOH:O	1.75	0.68
1:A:223:ASP:HB3	6:A:319:HOH:O	1.92	0.67
3:D:126:ASP:HB3	3:D:129:SER:O	1.95	0.65
2:B:42:ASN:ND2	2:B:77:GLU:H	1.96	0.63
3:D:21:LEU:CD1	3:D:106:THR:HG21	2.31	0.61
2:B:17:ASN:OD1	2:B:97:ARG:NH2	2.34	0.60
4:E:51:ASN:O	4:E:69:ARG:HD3	2.01	0.59
4:E:99:THR:HG21	6:E:342:HOH:O	2.03	0.58
1:A:234:ARG:HH11	2:B:8:GLN:NE2	2.01	0.58
4:E:224:GLN:HE22	4:E:226:ARG:HE	1.53	0.57
3:D:162:LEU:HB3	4:E:170:CYS:HB3	1.87	0.57
4:E:224:GLN:NE2	4:E:226:ARG:HE	2.02	0.57
4:E:115:ASP:OD1	4:E:117:LYS:HG2	2.06	0.56
1:A:193:PRO:O	1:A:198:GLU:O	2.26	0.54
3:D:61:ARG:NH2	3:D:84:ASP:OD1	2.36	0.53
1:A:111:ARG:HG2	6:A:314:HOH:O	2.09	0.52
4:E:96:SER:HB3	4:E:99:THR:HG22	1.90	0.52
4:E:10:HIS:HE1	4:E:155:GLU:OE2	1.93	0.52
4:E:99:THR:HG23	4:E:101:GLU:H	1.75	0.52

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
4:E:150:TYR:O	4:E:187:TYR:CE2	2.63	0.52
1:A:191:HIS:HE1	1:A:254:GLU:OE1	1.93	0.52
1:A:188:HIS:CE1	6:A:313:HOH:O	2.56	0.51
1:A:192:HIS:HB2	1:A:200:THR:HG23	1.93	0.51
1:A:193:PRO:O	1:A:199:ALA:HA	2.11	0.50
3:D:173:SER:OG	4:E:192:ARG:HD2	2.11	0.49
4:E:222:TRP:HB2	4:E:228:LYS:HG3	1.94	0.49
2:B:42:ASN:HD21	2:B:77:GLU:H	1.60	0.48
1:A:190:THR:OG1	1:A:202:ARG:HB3	2.14	0.48
4:E:52:GLU:HB2	4:E:69:ARG:O	2.14	0.47
4:E:131:GLU:HG2	6:E:368:HOH:O	2.13	0.47
3:D:92:VAL:HG23	3:D:94:MET:CE	2.44	0.47
3:D:2:GLN:HE21	3:D:94:MET:HE1	1.80	0.47
4:E:216:LEU:HD13	4:E:229:PRO:HG2	1.96	0.46
2:B:36:GLU:HB2	2:B:83:ASN:HB3	1.97	0.46
1:A:220:ASP:OD2	1:A:256:ARG:HD2	2.16	0.46
1:A:72:GLN:NE2	4:E:51:ASN:HD22	2.10	0.46
4:E:10:HIS:HD2	4:E:153:HIS:ND1	2.14	0.45
1:A:202:ARG:HD3	1:A:244:TRP:CE3	2.51	0.45
3:D:30:ILE:HD12	3:D:94:MET:HE2	1.99	0.45
3:D:13:VAL:HG21	3:D:19:LEU:HD21	1.99	0.45
1:A:218:GLN:HA	1:A:223:ASP:HA	1.99	0.45
4:E:126:VAL:HG23	4:E:236:ALA:HB3	1.99	0.45
2:B:2:GLN:HB2	6:B:128:HOH:O	2.16	0.45
3:D:191:ASN:OD1	3:D:191:ASN:N	2.50	0.45
4:E:150:TYR:O	4:E:187:TYR:HE2	1.99	0.44
4:E:62:SER:HB3	4:E:65:PHE:HD1	1.83	0.44
1:A:5:MET:O	1:A:100:GLY:HA3	2.17	0.44
2:B:51:HIS:HD2	2:B:52:SER:O	2.00	0.44
4:E:26:ILE:O	4:E:29:HIS:HB2	2.18	0.43
1:A:72:GLN:HE22	1:A:75:ARG:HH11	1.65	0.43
4:E:228:LYS:HD2	4:E:230:VAL:CG1	2.49	0.43
4:E:219:ASN:HB3	6:E:332:HOH:O	2.17	0.43
3:D:50:ILE:HD11	3:D:64:ALA:HB1	2.00	0.43
4:E:151:PRO:HB2	6:E:362:HOH:O	2.18	0.43
1:A:260:HIS:HB3	6:A:311:HOH:O	2.18	0.43
3:D:155:TYR:O	3:D:176:ALA:HA	2.18	0.43
4:E:31:ARG:O	4:E:94:SER:HA	2.19	0.43
4:E:62:SER:HB3	4:E:65:PHE:CD1	2.53	0.43
2:B:25:CYS:HB2	2:B:39:LEU:HD21	2.01	0.43
1:A:133:TRP:HB2	1:A:144:LYS:HG3	2.00	0.43
1:A:68:LYS:O	1:A:71:SER:HB3	2.19	0.42

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
4:E:93:ALA:HB2	4:E:104:PHE:CD2	2.54	0.42
2:B:22:PHE:CE1	2:B:69:GLU:HG3	2.55	0.42
4:E:172:ASP:HB2	4:E:189:LEU:HD12	2.01	0.42
4:E:150:TYR:C	4:E:150:TYR:CD1	2.90	0.42
4:E:129:PRO:HD3	4:E:142:LEU:HG	2.00	0.42
4:E:10:HIS:CE1	4:E:155:GLU:OE2	2.71	0.41
3:D:70:SER:HB3	3:D:72:ARG:HG3	2.01	0.41
1:A:111:ARG:HD3	1:A:128:GLU:HG3	2.03	0.41
4:E:71:LYS:HE2	6:E:363:HOH:O	2.19	0.41
1:A:187:THR:HB	1:A:272:LEU:HD21	2.02	0.41
2:B:23:LEU:O	2:B:67:TYR:HA	2.21	0.41
3:D:99:LYS:HD3	4:E:45:PHE:CD2	2.56	0.40
1:A:193:PRO:O	1:A:194:ILE:HB	2.21	0.40
4:E:36:ARG:HB2	4:E:46:LEU:HD11	2.03	0.40
3:D:18:ASN:ND2	3:D:79:ALA:H	2.18	0.40
2:B:21:ASN:HB3	2:B:70:PHE:CE2	2.57	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone ⓘ

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	272/275 (99%)	260 (96%)	11 (4%)	1 (0%)	43	61
2	B	98/100 (98%)	95 (97%)	3 (3%)	0	100	100
3	D	192/207 (93%)	187 (97%)	5 (3%)	0	100	100
4	E	240/244 (98%)	234 (98%)	6 (2%)	0	100	100
5	C	8/10 (80%)	8 (100%)	0	0	100	100
All	All	810/836 (97%)	784 (97%)	25 (3%)	1 (0%)	59	78

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	193	PRO

### 5.3.2 Protein sidechains ⓘ

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	230/231 (100%)	215 (94%)	15 (6%)	24	36
2	B	95/95 (100%)	93 (98%)	2 (2%)	66	84
3	D	172/185 (93%)	163 (95%)	9 (5%)	32	49
4	E	213/215 (99%)	202 (95%)	11 (5%)	32	49
5	C	9/9 (100%)	7 (78%)	2 (22%)	1	1
All	All	719/735 (98%)	680 (95%)	39 (5%)	31	47

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	GLU
1	A	79	ARG
1	A	111	ARG
1	A	115	GLN
1	A	138	MET
1	A	154	GLU
1	A	160	LEU
1	A	177	GLU
1	A	181	ARG
1	A	182	THR
1	A	183	ASP
1	A	200	THR
1	A	226	GLN
1	A	247	VAL
1	A	268	LYS
2	B	70	PHE
2	B	80	CYS
3	D	1	LYS
3	D	42	LYS
3	D	51	GLN
3	D	52	SER

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Mol	Chain	Res	Type
3	D	100	LEU
3	D	143	GLN
3	D	147	SER
3	D	187	ASN
3	D	191	ASN
4	E	9	ARG
4	E	39	LEU
4	E	48	TYR
4	E	59	ARG
4	E	76	THR
4	E	109	ARG
4	E	120	PHE
4	E	170	CYS
4	E	183	ASN
4	E	204	ARG
4	E	223	THR
5	C	1	ARG
5	C	2	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	HIS
1	A	72	GLN
1	A	93	HIS
1	A	114	HIS
1	A	188	HIS
1	A	191	HIS
1	A	218	GLN
1	A	224	GLN
1	A	226	GLN
2	B	2	GLN
2	B	8	GLN
2	B	24	ASN
2	B	42	ASN
2	B	51	HIS
3	D	18	ASN
3	D	51	GLN
3	D	190	ASN
4	E	10	HIS
4	E	17	GLN
4	E	54	GLN

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Mol	Chain	Res	Type
4	E	174	GLN
4	E	206	HIS
4	E	224	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains 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 ⓘ

There are no carbohydrates in this entry.

### 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

### 5.7 Other polymers ⓘ

There are no such residues in this entry.

### 5.8 Polymer linkage issues

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	274/275 (99%)	-0.35	0 100 100	17, 26, 40, 50	0
2	B	100/100 (100%)	-0.38	0 100 100	17, 23, 42, 56	0
3	D	194/207 (93%)	-0.16	9 (4%) 31 29	18, 29, 65, 87	0
4	E	242/244 (99%)	-0.32	2 (0%) 83 82	18, 27, 39, 65	0
5	C	10/10 (100%)	0.19	0 100 100	16, 20, 26, 26	0
All	All	820/836 (98%)	-0.29	11 (1%) 74 73	16, 27, 47, 87	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	193	ILE	6.1
4	E	2	THR	4.7
3	D	181	SER	3.9
3	D	183	PHE	3.2
3	D	182	ASP	3.1
4	E	243	ASP	2.9
3	D	130	SER	2.8
3	D	194	ILE	2.6
3	D	192	SER	2.5
3	D	186	ALA	2.3
3	D	148	GLN	2.1

### 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

There are no such residues in this entry.