



# Full wwPDB X-ray Structure Validation Report ⓘ

May 26, 2020 – 05:37 am BST

PDB ID : 2VLJ  
Title : The Structural Dynamics and Energetics of an Immunodominant T-cell Receptor are Programmed by its Vbeta Domain  
Authors : Ishizuka, J.; Stewart-Jones, G.; Van Der Merwe, A.; Bell, J.; Mcmichael, A.; Jones, Y.  
Deposited on : 2008-01-15  
Resolution : 2.40 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.

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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 : 2.11  
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) : 2.11

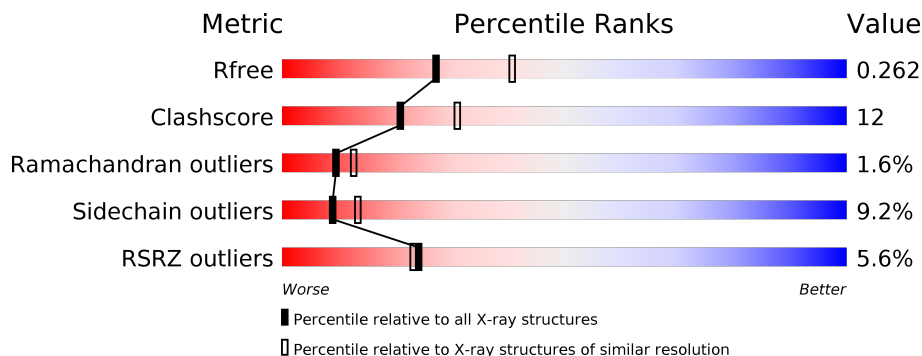
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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))
$R_{free}$	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (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 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	276	
2	B	100	
3	C	9	
4	D	201	
5	E	244	

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6946 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 HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	276	2252	1407	410	426	9	0	0	0

- Molecule 2 is a protein called BETA-2-MICROGLOBULIN.

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

- Molecule 3 is a protein called FLU MATRIX PEPTIDE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	9	68	49	9	10	0	0	0

- Molecule 4 is a protein called JM22 TCR ALPHA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	199	1530	959	255	310	6	0	0	0

- Molecule 5 is a protein called JM22 TCR BETA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	240	1932	1218	334	375	5	0	0	0

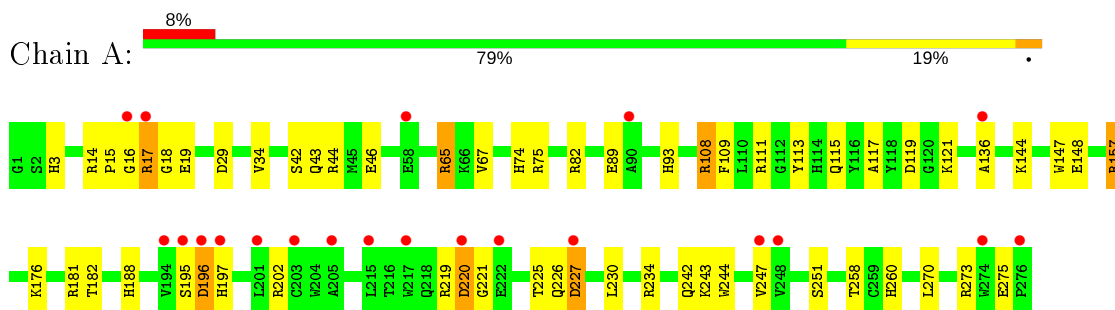
- Molecule 6 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	A	90	Total 90	O 90	0	0
6	B	33	Total 33	O 33	0	0
6	C	3	Total 3	O 3	0	0
6	D	100	Total 100	O 100	0	0
6	E	102	Total 102	O 102	0	0

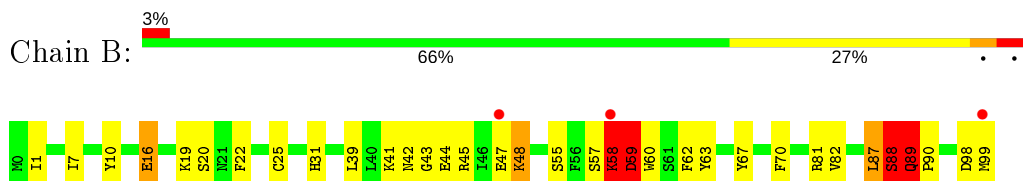
### 3 Residue-property plots [i](#)

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.

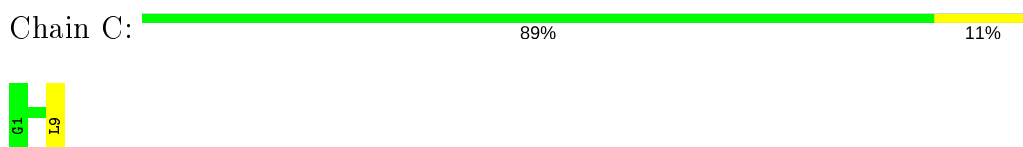
- Molecule 1: HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN



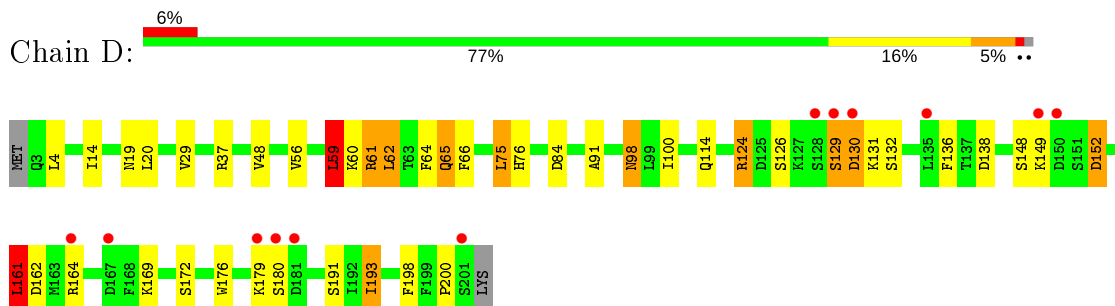
- Molecule 2: BETA-2-MICROGLOBULIN



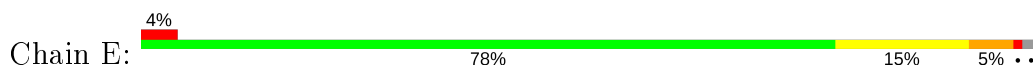
- Molecule 3: FLU MATRIX PEPTIDE

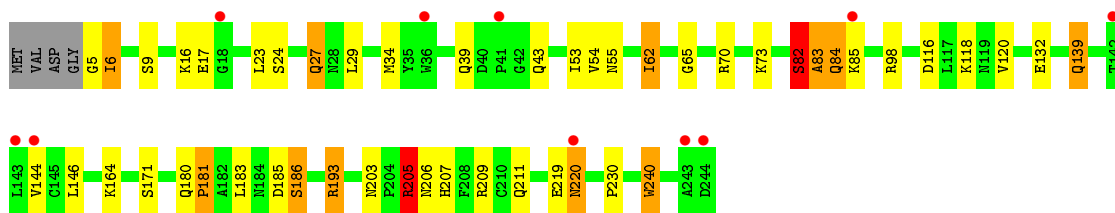


- Molecule 4: JM22 TCR ALPHA CHAIN



- Molecule 5: JM22 TCR BETA CHAIN





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	177.74Å 48.38Å 119.71Å 90.00° 109.97° 90.00°	Depositor
Resolution (Å)	112.51 – 2.40 19.97 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.5 (112.51-2.40) 98.7 (19.97-2.40)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.24 (at 2.41Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.196 , 0.272 0.192 , 0.262	Depositor DCC
$R_{free}$ test set	1877 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	43.1	Xtrriage
Anisotropy	0.808	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 45.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6946	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.22% 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	0.82	2/2317 (0.1%)	0.84	3/3145 (0.1%)
2	B	0.79	0/859	0.86	4/1162 (0.3%)
3	C	0.87	0/69	0.87	0/92
4	D	0.78	0/1560	0.88	4/2113 (0.2%)
5	E	1.20	1/1985 (0.1%)	0.90	6/2700 (0.2%)
All	All	0.94	3/6790 (0.0%)	0.87	17/9212 (0.2%)

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
2	B	0	2
5	E	0	2
All	All	0	4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	205	ARG	NE-CZ	38.03	1.82	1.33
1	A	196	ASP	CG-OD1	11.28	1.51	1.25
1	A	196	ASP	CG-OD2	6.11	1.39	1.25

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	205	ARG	NE-CZ-NH1	12.70	126.65	120.30
5	E	205	ARG	NE-CZ-NH2	-11.10	114.75	120.30
4	D	59	LEU	CA-CB-CG	8.90	135.76	115.30
1	A	196	ASP	CB-CG-OD2	-8.00	111.10	118.30
5	E	205	ARG	CD-NE-CZ	-7.61	112.94	123.60
4	D	161	LEU	CA-CB-CG	7.33	132.15	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	185	ASP	CB-CG-OD1	6.63	124.27	118.30
1	A	157	ARG	NE-CZ-NH1	6.53	123.57	120.30
1	A	44	ARG	NE-CZ-NH2	-6.26	117.17	120.30
2	B	88	SER	N-CA-C	-5.89	95.10	111.00
2	B	58	LYS	N-CA-C	5.68	126.34	111.00
4	D	138	ASP	CB-CG-OD1	5.68	123.41	118.30
2	B	89	GLN	N-CA-C	5.61	126.14	111.00
4	D	61	ARG	NE-CZ-NH1	-5.37	117.61	120.30
5	E	98	ARG	NE-CZ-NH2	5.26	122.93	120.30
2	B	58	LYS	C-N-CA	5.03	134.27	121.70
5	E	23	LEU	CA-CB-CG	5.00	126.81	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	87	LEU	Peptide
2	B	88	SER	Peptide
5	E	82	SER	Peptide
5	E	83	ALA	Peptide

## 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	2252	0	2098	44	0
2	B	836	0	803	33	0
3	C	68	0	75	1	0
4	D	1530	0	1480	41	0
5	E	1932	0	1829	45	0
6	A	90	0	0	10	0
6	B	33	0	0	8	0
6	C	3	0	0	0	0
6	D	100	0	0	4	0
6	E	102	0	0	14	0
All	All	6946	0	6285	157	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 12.

All (157) 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)
5:E:205:ARG:NE	5:E:205:ARG:CZ	1.82	1.41
1:A:17:ARG:HB3	1:A:18:GLY:CA	1.49	1.41
1:A:17:ARG:CB	1:A:18:GLY:HA2	1.52	1.33
5:E:84:GLN:HB2	6:E:2051:HOH:O	1.28	1.28
5:E:6:ILE:HG21	6:E:2056:HOH:O	1.29	1.25
4:D:59:LEU:HD12	4:D:64:PHE:HE2	1.22	1.03
2:B:81:ARG:HD3	6:B:2023:HOH:O	1.57	1.02
4:D:61:ARG:NH1	4:D:84:ASP:OD2	2.00	0.94
1:A:16:GLY:N	1:A:17:ARG:HA	1.84	0.92
4:D:59:LEU:HD12	4:D:64:PHE:CE2	2.06	0.91
1:A:188:HIS:HD2	6:A:2073:HOH:O	1.55	0.88
1:A:65:ARG:HH11	1:A:65:ARG:HB2	1.40	0.87
1:A:65:ARG:HB2	1:A:65:ARG:NH1	1.89	0.86
4:D:56:VAL:HG22	4:D:65:GLN:HG2	1.56	0.86
4:D:124:ARG:HH11	4:D:124:ARG:CG	1.93	0.82
1:A:65:ARG:HH11	1:A:65:ARG:CB	1.93	0.81
5:E:83:ALA:CB	6:E:2053:HOH:O	2.30	0.79
4:D:61:ARG:HH12	4:D:84:ASP:CG	1.85	0.78
4:D:59:LEU:CD1	4:D:64:PHE:CE2	2.67	0.78
1:A:65:ARG:NH1	1:A:65:ARG:CB	2.47	0.76
1:A:19:GLU:OE1	1:A:75:ARG:NH2	2.19	0.76
5:E:6:ILE:CG2	6:E:2056:HOH:O	2.02	0.75
2:B:7:ILE:HG12	2:B:82:VAL:HG21	1.68	0.74
1:A:46:GLU:HG2	6:A:2014:HOH:O	1.87	0.73
1:A:108:ARG:HH11	1:A:108:ARG:HB2	1.52	0.73
4:D:180:SER:HA	6:D:2091:HOH:O	1.89	0.72
2:B:67:TYR:HB2	6:B:2020:HOH:O	1.90	0.72
1:A:219:ARG:O	1:A:221:GLY:HA3	1.89	0.72
5:E:84:GLN:NE2	5:E:84:GLN:HA	2.06	0.71
1:A:65:ARG:HH11	1:A:65:ARG:CG	2.03	0.71
1:A:234:ARG:HE	1:A:242:GLN:HE21	1.39	0.70
5:E:116:ASP:OD1	5:E:118:LYS:HG2	1.92	0.70
5:E:6:ILE:HD12	5:E:6:ILE:H	1.58	0.69
1:A:16:GLY:H	1:A:17:ARG:HD3	1.59	0.66
4:D:124:ARG:HH11	4:D:124:ARG:HG2	1.60	0.66
5:E:205:ARG:CD	5:E:205:ARG:CZ	2.74	0.65
5:E:83:ALA:HB1	6:E:2053:HOH:O	1.97	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:22:PHE:HD2	6:B:2020:HOH:O	1.80	0.63
2:B:88:SER:HB3	2:B:89:GLN:HG2	1.81	0.63
5:E:84:GLN:HG3	5:E:85:LYS:H	1.63	0.63
5:E:139:GLN:HA	5:E:139:GLN:HE21	1.63	0.63
1:A:16:GLY:H	1:A:17:ARG:HA	1.62	0.62
5:E:139:GLN:HG2	6:E:2074:HOH:O	1.99	0.61
2:B:58:LYS:N	2:B:59:ASP:CB	2.64	0.61
4:D:56:VAL:CG2	4:D:65:GLN:HE21	2.14	0.60
2:B:98:ASP:O	2:B:99:MET:SD	2.59	0.59
1:A:157:ARG:HD3	6:A:2062:HOH:O	2.01	0.59
5:E:34:MET:HE3	5:E:70:ARG:NE	2.17	0.59
2:B:99:MET:HB2	6:B:2030:HOH:O	2.02	0.59
4:D:130:ASP:O	4:D:132:SER:HB3	2.02	0.59
2:B:58:LYS:N	2:B:59:ASP:HB2	2.18	0.58
4:D:59:LEU:CD1	4:D:64:PHE:CZ	2.86	0.58
4:D:124:ARG:HH11	4:D:124:ARG:HG3	1.68	0.58
4:D:91:ALA:HA	4:D:100:ILE:O	2.04	0.57
5:E:84:GLN:CG	5:E:85:LYS:H	2.17	0.57
1:A:46:GLU:CG	6:A:2014:HOH:O	2.47	0.56
1:A:202:ARG:HD3	1:A:244:TRP:CE3	2.41	0.56
2:B:88:SER:HB3	2:B:89:GLN:O	2.06	0.56
1:A:226:GLN:O	1:A:227:ASP:HB2	2.05	0.56
4:D:75:LEU:HD12	4:D:76:HIS:N	2.21	0.56
1:A:144:LYS:O	1:A:148:GLU:HG3	2.05	0.55
5:E:6:ILE:HD12	5:E:6:ILE:N	2.21	0.55
5:E:54:VAL:O	5:E:55:ASN:HB2	2.07	0.55
5:E:62:ILE:HG23	5:E:62:ILE:O	2.06	0.55
5:E:203:ASN:HB3	5:E:206:ASN:ND2	2.22	0.55
4:D:152:ASP:OD1	4:D:179:LYS:HG3	2.07	0.55
4:D:56:VAL:HG22	4:D:65:GLN:CG	2.32	0.54
4:D:59:LEU:HD11	4:D:64:PHE:CZ	2.42	0.54
1:A:15:PRO:HB2	1:A:89:GLU:O	2.06	0.54
4:D:29:VAL:HG23	6:D:2016:HOH:O	2.08	0.54
4:D:59:LEU:CD1	4:D:64:PHE:HE2	2.00	0.53
5:E:186:SER:HB3	6:E:2085:HOH:O	2.08	0.53
5:E:82:SER:N	6:E:2050:HOH:O	2.41	0.53
1:A:230:LEU:HD22	1:A:243:LYS:HE3	1.91	0.53
1:A:196:ASP:HB3	6:A:2077:HOH:O	2.08	0.53
4:D:132:SER:N	6:D:2073:HOH:O	2.42	0.52
1:A:258:THR:OG1	1:A:260:HIS:HE1	1.93	0.52
1:A:220:ASP:HB2	1:A:221:GLY:HA3	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:25:CYS:HB2	2:B:39:LEU:HD21	1.91	0.52
5:E:209:ARG:NH2	5:E:211:GLN:HB2	2.25	0.52
2:B:87:LEU:O	6:B:2024:HOH:O	2.19	0.51
4:D:124:ARG:NH1	4:D:124:ARG:HG3	2.26	0.51
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.45	0.51
2:B:22:PHE:HB3	6:B:2020:HOH:O	2.10	0.50
2:B:88:SER:CB	2:B:89:GLN:O	2.59	0.50
4:D:124:ARG:H	4:D:124:ARG:CD	2.25	0.50
5:E:207:HIS:HB2	6:E:2101:HOH:O	2.11	0.50
2:B:57:SER:C	2:B:59:ASP:HB3	2.32	0.50
4:D:75:LEU:C	4:D:75:LEU:HD12	2.32	0.50
2:B:45:ARG:NH2	2:B:47:GLU:HA	2.27	0.49
4:D:191:SER:HB2	4:D:193:ILE:HD13	1.95	0.49
2:B:10:TYR:N	2:B:10:TYR:CD1	2.81	0.49
4:D:129:SER:O	4:D:130:ASP:HB2	2.12	0.49
1:A:147:TRP:CZ2	3:C:9:LEU:HD23	2.48	0.49
1:A:17:ARG:CB	1:A:18:GLY:CA	2.38	0.48
4:D:136:PHE:CZ	4:D:193:ILE:HG13	2.48	0.48
4:D:162:ASP:O	4:D:164:ARG:NH1	2.38	0.48
4:D:19:ASN:HB2	6:D:2013:HOH:O	2.13	0.48
4:D:161:LEU:HB2	5:E:171:SER:HB2	1.96	0.48
1:A:14:ARG:N	1:A:15:PRO:HD3	2.29	0.47
4:D:59:LEU:HD11	4:D:64:PHE:HZ	1.80	0.47
2:B:87:LEU:CA	2:B:88:SER:HB2	2.44	0.47
5:E:34:MET:CE	5:E:70:ARG:NE	2.78	0.47
2:B:99:MET:HB3	6:B:2033:HOH:O	2.14	0.47
4:D:172:SER:OG	5:E:193:ARG:HD2	2.15	0.47
5:E:207:HIS:HD2	5:E:240:TRP:CZ2	2.33	0.47
2:B:45:ARG:HH22	2:B:47:GLU:HG2	1.79	0.47
2:B:31:HIS:CD2	2:B:62:PHE:HE2	2.32	0.47
5:E:34:MET:HE2	5:E:70:ARG:NH2	2.29	0.47
5:E:83:ALA:HB3	6:E:2053:HOH:O	2.04	0.46
4:D:191:SER:CB	4:D:193:ILE:HD13	2.45	0.46
4:D:124:ARG:NH1	4:D:124:ARG:CG	2.61	0.46
1:A:202:ARG:HD2	1:A:244:TRP:CD2	2.50	0.46
5:E:65:GLY:HA3	5:E:83:ALA:HB1	1.97	0.46
4:D:98:ASN:C	4:D:98:ASN:HD22	2.19	0.46
2:B:87:LEU:HB3	2:B:88:SER:HB2	1.97	0.46
2:B:16:GLU:HB2	2:B:19:LYS:HE3	1.98	0.45
2:B:58:LYS:N	2:B:59:ASP:HB3	2.31	0.45
5:E:144:VAL:HG22	5:E:193:ARG:HG3	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:136:PHE:CE2	4:D:193:ILE:HD11	2.51	0.45
5:E:186:SER:N	6:E:2085:HOH:O	2.50	0.45
5:E:5:GLY:N	6:E:2001:HOH:O	2.50	0.44
1:A:157:ARG:CZ	6:A:2062:HOH:O	2.66	0.44
1:A:3:HIS:HD2	1:A:29:ASP:OD2	2.01	0.44
2:B:48:LYS:HA	2:B:48:LYS:HD3	1.80	0.44
1:A:136:ALA:HB3	6:A:2044:HOH:O	2.18	0.44
5:E:120:VAL:HG12	5:E:230:PRO:HB2	2.00	0.43
1:A:197:HIS:HE1	6:A:2076:HOH:O	2.00	0.43
2:B:89:GLN:HA	2:B:90:PRO:HD3	1.87	0.43
4:D:59:LEU:HD13	4:D:62:LEU:HB2	2.00	0.43
1:A:220:ASP:CB	1:A:221:GLY:HA3	2.47	0.43
2:B:81:ARG:CD	6:B:2023:HOH:O	2.37	0.43
5:E:180:GLN:HA	5:E:181:PRO:HD2	1.68	0.43
1:A:242:GLN:NE2	2:B:10:TYR:CD2	2.87	0.43
5:E:16:LYS:CD	6:E:2007:HOH:O	2.66	0.42
5:E:34:MET:HE2	5:E:73:LYS:O	2.19	0.42
5:E:27:GLN:HE21	5:E:29:LEU:H	1.67	0.42
5:E:84:GLN:NE2	5:E:84:GLN:CA	2.81	0.42
4:D:198:PHE:CE2	4:D:200:PRO:HG3	2.55	0.42
4:D:176:TRP:CZ3	5:E:146:LEU:HD21	2.55	0.42
4:D:14:ILE:HD11	4:D:20:LEU:HD23	2.01	0.41
1:A:157:ARG:NE	6:A:2062:HOH:O	2.53	0.41
1:A:242:GLN:HE22	2:B:10:TYR:HD2	1.69	0.41
5:E:39:GLN:HA	6:E:2028:HOH:O	2.21	0.41
1:A:65:ARG:HH11	1:A:65:ARG:HG3	1.81	0.41
1:A:74:HIS:HB3	6:A:2029:HOH:O	2.19	0.41
1:A:111:ARG:HD3	1:A:113:TYR:OH	2.20	0.41
5:E:84:GLN:HE21	5:E:85:LYS:N	2.19	0.41
2:B:55:SER:HB3	2:B:63:TYR:CZ	2.56	0.41
2:B:41:LYS:C	2:B:43:GLY:H	2.25	0.41
1:A:42:SER:O	1:A:43:GLN:HB2	2.21	0.41
4:D:61:ARG:HD2	4:D:61:ARG:HH11	1.67	0.41
5:E:84:GLN:HE21	5:E:84:GLN:HA	1.82	0.40
5:E:27:GLN:NE2	5:E:29:LEU:H	2.18	0.40
5:E:219:GLU:CD	5:E:219:GLU:H	2.24	0.40
1:A:93:HIS:HD2	1:A:119:ASP:OD2	2.04	0.40
2:B:88:SER:HB3	2:B:89:GLN:CA	2.51	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	274/276 (99%)	256 (93%)	15 (6%)	3 (1%)	14	20
2	B	98/100 (98%)	88 (90%)	6 (6%)	4 (4%)	3	2
3	C	7/9 (78%)	6 (86%)	1 (14%)	0	100	100
4	D	197/201 (98%)	186 (94%)	8 (4%)	3 (2%)	10	14
5	E	238/244 (98%)	218 (92%)	17 (7%)	3 (1%)	12	17
All	All	814/830 (98%)	754 (93%)	47 (6%)	13 (2%)	9	13

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	227	ASP
2	B	42	ASN
2	B	88	SER
4	D	129	SER
1	A	220	ASP
2	B	59	ASP
4	D	130	ASP
5	E	82	SER
5	E	220	ASN
2	B	89	GLN
4	D	60	LYS
1	A	109	PHE
5	E	181	PRO

### 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	231/232 (100%)	213 (92%)	18 (8%)	12	19
2	B	95/95 (100%)	85 (90%)	10 (10%)	7	9
3	C	7/7 (100%)	7 (100%)	0	100	100
4	D	175/177 (99%)	156 (89%)	19 (11%)	6	8
5	E	212/215 (99%)	193 (91%)	19 (9%)	9	14
All	All	720/726 (99%)	654 (91%)	66 (9%)	9	13

All (66) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ARG
1	A	34	VAL
1	A	65	ARG
1	A	67	VAL
1	A	82	ARG
1	A	108	ARG
1	A	115	GLN
1	A	121	LYS
1	A	176	LYS
1	A	181	ARG
1	A	182	THR
1	A	195	SER
1	A	225	THR
1	A	247	VAL
1	A	251	SER
1	A	270	LEU
1	A	273	ARG
1	A	275	GLU
2	B	1	ILE
2	B	16	GLU
2	B	20	SER
2	B	44	GLU
2	B	48	LYS
2	B	58	LYS
2	B	59	ASP
2	B	70	PHE
2	B	88	SER
2	B	89	GLN
4	D	4	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	D	37	ARG
4	D	48	VAL
4	D	59	LEU
4	D	62	LEU
4	D	65	GLN
4	D	66	PHE
4	D	75	LEU
4	D	98	ASN
4	D	114	GLN
4	D	124	ARG
4	D	126	SER
4	D	131	LYS
4	D	148	SER
4	D	149	LYS
4	D	152	ASP
4	D	161	LEU
4	D	169	LYS
4	D	193	ILE
5	E	6	ILE
5	E	9	SER
5	E	17	GLU
5	E	24	SER
5	E	27	GLN
5	E	43	GLN
5	E	53	ILE
5	E	62	ILE
5	E	82	SER
5	E	84	GLN
5	E	132	GLU
5	E	139	GLN
5	E	164	LYS
5	E	183	LEU
5	E	186	SER
5	E	193	ARG
5	E	205	ARG
5	E	220	ASN
5	E	240	TRP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	3	HIS

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Mol	Chain	Res	Type
1	A	72	GLN
1	A	93	HIS
1	A	242	GLN
1	A	253	GLN
1	A	260	HIS
2	B	31	HIS
2	B	83	ASN
4	D	25	ASN
4	D	65	GLN
4	D	96	GLN
4	D	98	ASN
4	D	114	GLN
4	D	115	ASN
4	D	142	GLN
5	E	19	GLN
5	E	27	GLN
5	E	84	GLN
5	E	86	ASN
5	E	103	GLN
5	E	139	GLN
5	E	175	GLN
5	E	207	HIS
5	E	233	GLN

### 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	276/276 (100%)	0.18	21 (7%) 13 12	34, 47, 71, 80	0
2	B	100/100 (100%)	0.27	3 (3%) 50 49	39, 49, 57, 67	0
3	C	9/9 (100%)	0.50	0 100 100	28, 30, 33, 33	0
4	D	199/201 (99%)	0.16	12 (6%) 21 20	31, 45, 65, 77	0
5	E	240/244 (98%)	0.19	10 (4%) 36 35	29, 46, 58, 69	0
All	All	824/830 (99%)	0.19	46 (5%) 24 23	28, 47, 65, 80	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	D	129	SER	9.2
4	D	130	ASP	5.9
2	B	99	MET	5.5
5	E	243	ALA	4.7
4	D	167	ASP	4.5
4	D	164	ARG	4.0
5	E	143	LEU	3.6
2	B	58	LYS	3.6
1	A	195	SER	3.4
1	A	217	TRP	3.4
4	D	150	ASP	3.3
4	D	201	SER	3.3
5	E	244	ASP	3.2
5	E	85	LYS	3.1
4	D	180	SER	3.0
1	A	197	HIS	3.0
1	A	16	GLY	2.9
4	D	181	ASP	2.8
1	A	196	ASP	2.8
1	A	136	ALA	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	222	GLU	2.7
5	E	142	THR	2.7
1	A	17	ARG	2.6
1	A	90	ALA	2.6
1	A	276	PRO	2.6
4	D	179	LYS	2.5
4	D	135	LEU	2.4
1	A	201	LEU	2.4
4	D	149	LYS	2.4
5	E	220	ASN	2.3
1	A	247	VAL	2.2
1	A	220	ASP	2.2
1	A	58	GLU	2.2
1	A	248	VAL	2.2
5	E	41	PRO	2.2
4	D	128	SER	2.2
1	A	194	VAL	2.2
1	A	203	CYS	2.1
1	A	205	ALA	2.1
2	B	47	GLU	2.1
5	E	36	TRP	2.1
1	A	227	ASP	2.1
5	E	144	VAL	2.0
5	E	18	GLY	2.0
1	A	274	TRP	2.0
1	A	215	LEU	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

There are no such residues in this entry.