Full wwPDB X-ray Structure Validation Report ⓘ

Oct 13, 2024 – 05:31 pm BST

PDB ID	:	2VLR
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	:	2.30 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*
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.

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

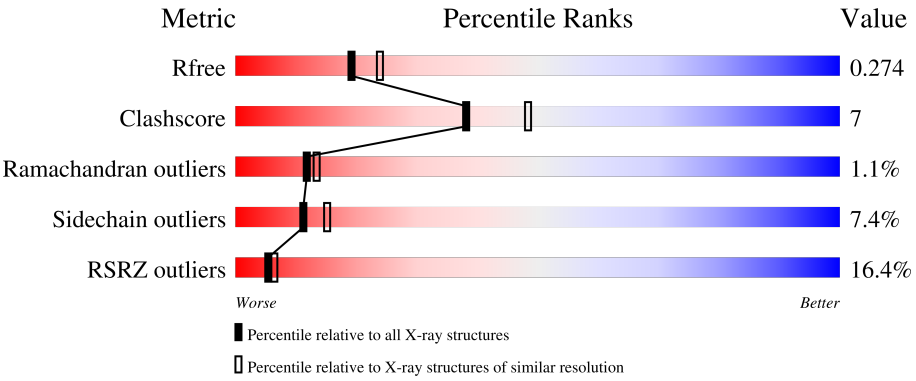
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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}	164625	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)

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 >=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 <=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	23% 87% 12%
1	F	276	34% 76% 20%
2	B	100	7% 81% 15%
2	G	100	6% 79% 17%
3	C	9	89% 11%

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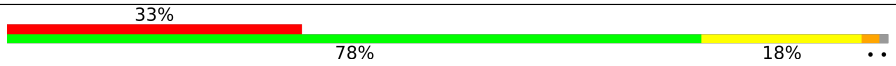
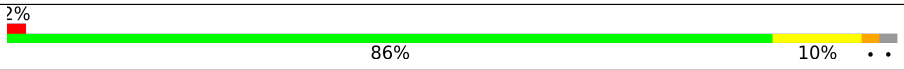
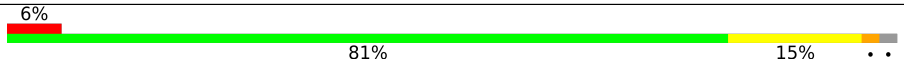
Mol	Chain	Length	Quality of chain
3	H	9	
4	D	201	
4	I	201	
5	E	244	
5	J	244	

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 13819 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
1	A	276	Total	C	N	O	S	1	0	0
			2253	1408	410	426	9			
1	F	276	Total	C	N	O	S	1	0	0
			2253	1408	410	426	9			

- 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			
2	G	100	Total	C	N	O	S	0	0	0
			836	533	141	158	4			

- Molecule 3 is a protein called FLU MATRIX PEPTIDE.

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

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	240	Total	C	N	O	S	0	0	0
			1931	1218	334	374	5			
5	J	240	Total	C	N	O	S	0	0	0
			1931	1218	334	374	5			

- Molecule 6 is water.

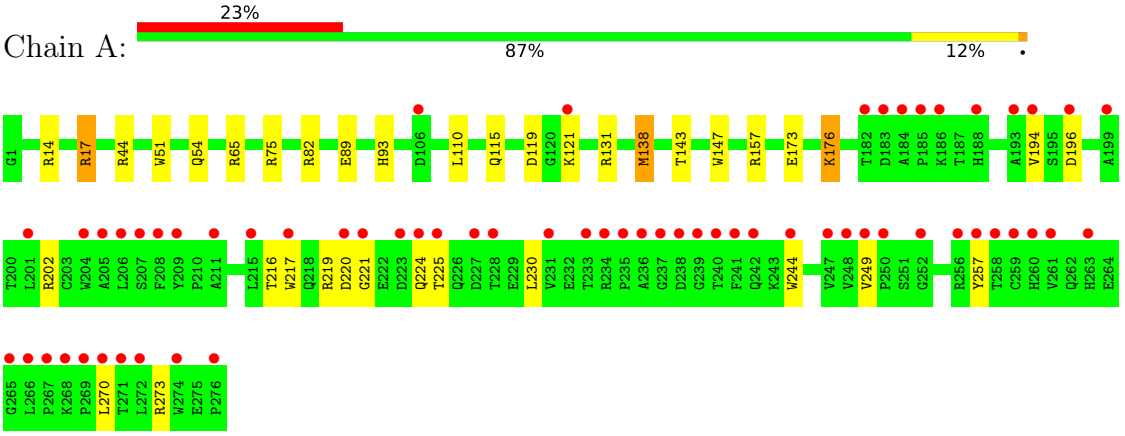
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	90	Total	O	0	0
			90	90		
6	B	36	Total	O	0	0
			36	36		
6	C	6	Total	O	0	0
			6	6		
6	D	75	Total	O	0	0
			75	75		
6	E	99	Total	O	0	0
			99	99		
6	F	79	Total	O	0	0
			79	79		
6	G	36	Total	O	0	0
			36	36		
6	H	5	Total	O	0	0
			5	5		
6	I	70	Total	O	0	0
			70	70		
6	J	87	Total	O	0	0
			87	87		

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.

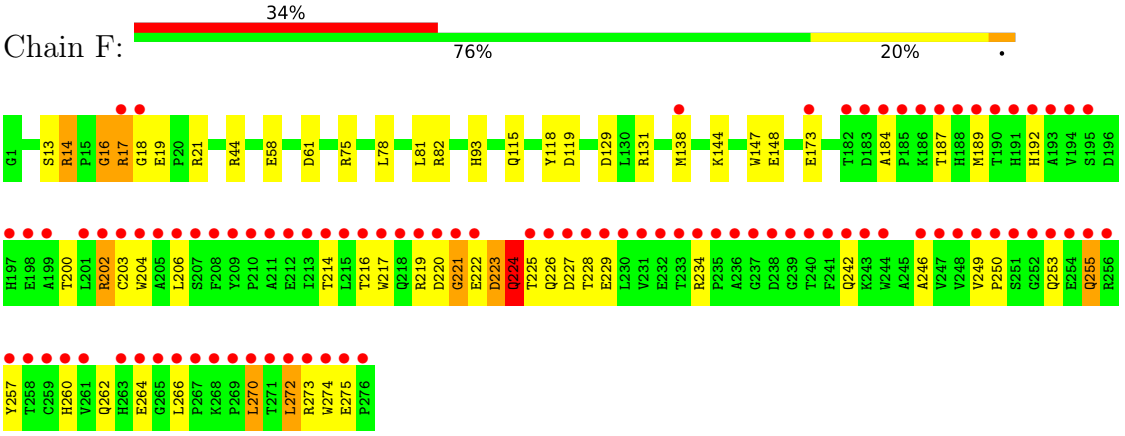
• Molecule 1: HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN

Chain A:



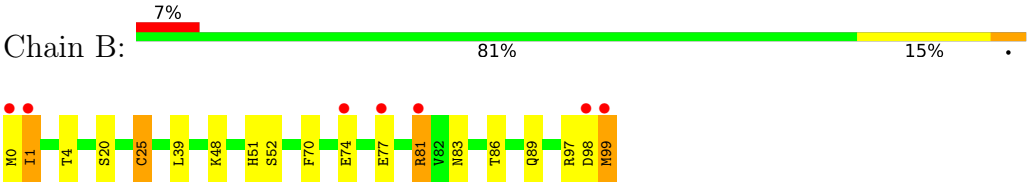
• Molecule 1: HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN

Chain F:



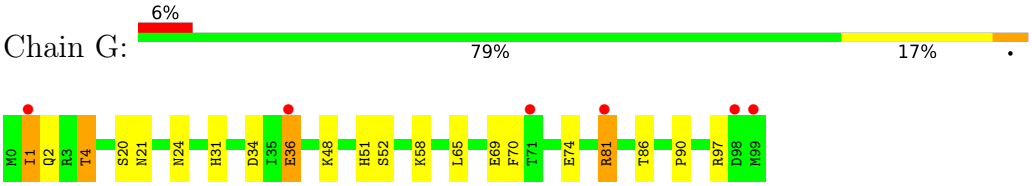
• Molecule 2: BETA-2-MICROGLOBULIN

Chain B:



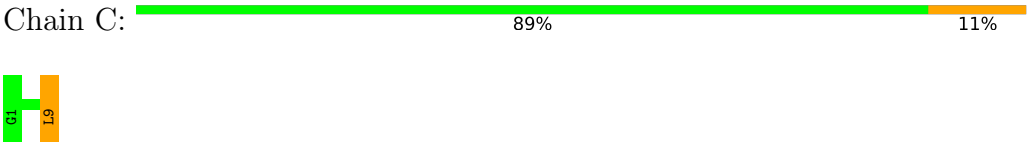
• Molecule 2: BETA-2-MICROGLOBULIN

Chain G:



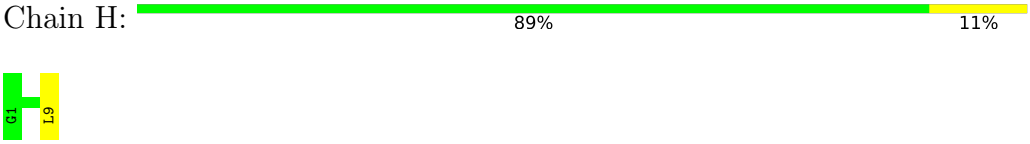
• Molecule 3: FLU MATRIX PEPTIDE

Chain C:



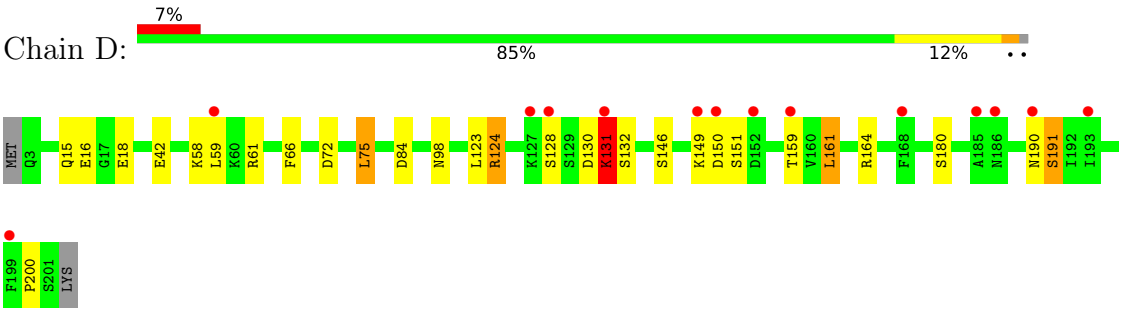
• Molecule 3: FLU MATRIX PEPTIDE

Chain H:



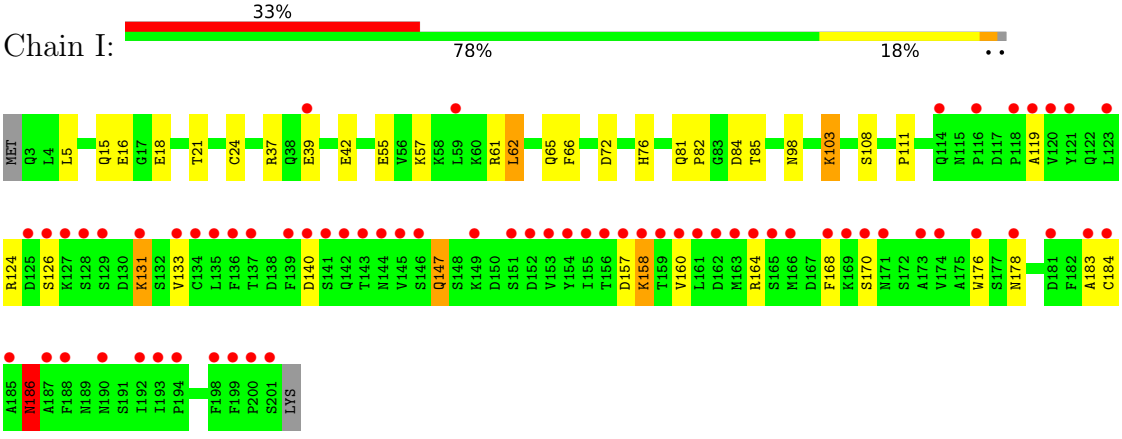
• Molecule 4: JM22 TCR ALPHA CHAIN

Chain D:



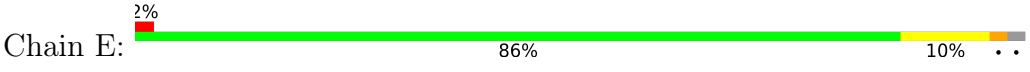
• Molecule 4: JM22 TCR ALPHA CHAIN

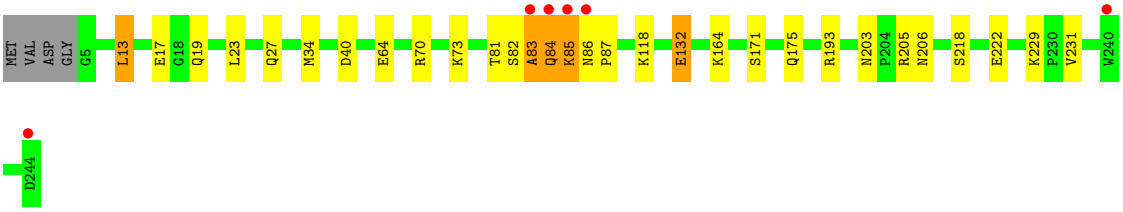
Chain I:



• Molecule 5: JM22 TCR BETA CHAIN

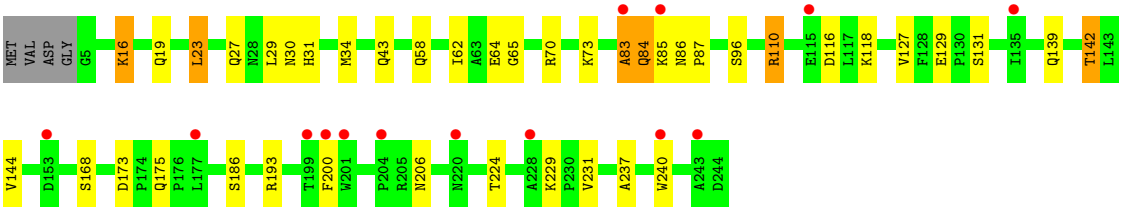
Chain E:





• Molecule 5: JM22 TCR BETA CHAIN

Chain J:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	48.62Å 95.52Å 122.05Å 110.29° 98.64° 93.59°	Depositor
Resolution (Å)	112.51 – 2.30 112.51 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.5 (112.51-2.30) 97.5 (112.51-2.30)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.94 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.219 , 0.281 0.215 , 0.274	Depositor DCC
R_{free} test set	4402 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	39.4	Xtriage
Anisotropy	0.359	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 55.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.001 for -h,-k,h+k+l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	13819	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.72% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	2.71	2/2319 (0.1%)	1.20	5/3149 (0.2%)
1	F	4.06	4/2319 (0.2%)	1.18	6/3149 (0.2%)
2	B	0.78	1/859 (0.1%)	0.72	0/1162
2	G	0.69	0/859	0.68	0/1162
3	C	1.30	0/69	1.03	1/92 (1.1%)
3	H	1.31	0/69	0.93	0/92
4	D	0.93	1/1560 (0.1%)	0.87	3/2113 (0.1%)
4	I	0.90	1/1560 (0.1%)	0.76	1/2113 (0.0%)
5	E	0.95	0/1984	0.82	4/2699 (0.1%)
5	J	0.83	0/1984	0.75	1/2699 (0.0%)
All	All	2.14	9/13582 (0.1%)	0.94	21/18430 (0.1%)

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	F	0	1
5	J	0	1
All	All	0	2

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	224	GLN	CA-CB	185.41	5.61	1.53
1	A	224	GLN	CA-CB	118.31	4.14	1.53
1	F	224	GLN	CB-CG	46.03	2.76	1.52
1	A	224	GLN	CB-CG	-39.50	0.46	1.52
4	I	158	LYS	CE-NZ	13.15	1.81	1.49
1	F	224	GLN	CD-OE1	12.90	1.52	1.24
2	B	25	CYS	CB-SG	6.04	1.92	1.82
1	F	224	GLN	CD-NE2	5.59	1.46	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	16	GLU	CG-CD	5.01	1.59	1.51

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	F	224	GLN	N-CA-CB	-45.82	28.13	110.60
1	A	224	GLN	CA-CB-CG	-43.14	18.49	113.40
1	A	224	GLN	N-CA-CB	-20.84	73.09	110.60
1	F	224	GLN	CB-CA-C	-12.99	84.42	110.40
1	A	224	GLN	CB-CA-C	-12.24	85.92	110.40
1	F	224	GLN	CA-CB-CG	10.71	136.95	113.40
4	D	161	LEU	CA-CB-CG	9.62	137.42	115.30
4	D	75	LEU	CA-CB-CG	7.77	133.17	115.30
1	F	18	GLY	N-CA-C	-6.79	96.13	113.10
1	A	44	ARG	NE-CZ-NH2	-6.59	117.00	120.30
5	E	40	ASP	CB-CG-OD1	6.07	123.76	118.30
5	E	23	LEU	CA-CB-CG	5.91	128.88	115.30
5	J	23	LEU	CA-CB-CG	5.80	128.65	115.30
5	E	13	LEU	CA-CB-CG	5.61	128.20	115.30
1	F	16	GLY	N-CA-C	5.59	127.09	113.10
1	F	129	ASP	CB-CG-OD1	5.41	123.17	118.30
4	I	62	LEU	CA-CB-CG	5.23	127.33	115.30
3	C	9	LEU	CA-CB-CG	5.20	127.27	115.30
1	A	110	LEU	CA-CB-CG	5.19	127.24	115.30
5	E	13	LEU	CB-CG-CD1	-5.15	102.25	111.00
4	D	75	LEU	CB-CG-CD1	5.13	119.71	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	F	17	ARG	Peptide
5	J	84	GLN	Peptide

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	2253	0	2103	17	1
1	F	2253	0	2103	37	2
2	B	836	0	803	13	2
2	G	836	0	803	13	1
3	C	68	0	75	2	0
3	H	68	0	75	1	0
4	D	1530	0	1480	16	0
4	I	1530	0	1480	26	0
5	E	1931	0	1829	24	0
5	J	1931	0	1829	32	0
6	A	90	0	0	7	0
6	B	36	0	0	2	0
6	C	6	0	0	0	0
6	D	75	0	0	1	0
6	E	99	0	0	5	0
6	F	79	0	0	9	0
6	G	36	0	0	2	0
6	H	5	0	0	0	0
6	I	70	0	0	7	0
6	J	87	0	0	7	0
All	All	13819	0	12580	175	3

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 (175) 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)
4:I:158:LYS:CE	4:I:158:LYS:NZ	1.81	1.41
2:G:81:ARG:HH11	2:G:81:ARG:HG2	0.94	1.09
1:A:17:ARG:NH1	6:A:2007:HOH:O	1.91	1.02
5:E:81:THR:O	5:E:83:ALA:N	1.96	0.98
2:G:81:ARG:HG2	2:G:81:ARG:NH1	1.73	0.95
5:E:86:ASN:HB3	6:E:2053:HOH:O	1.66	0.94
1:F:266:LEU:HD22	1:F:270:LEU:HD23	1.56	0.88
4:D:61:ARG:NH1	4:D:84:ASP:OD2	2.07	0.87
4:I:119:ALA:HB1	6:I:2052:HOH:O	1.74	0.86
5:E:84:GLN:NE2	5:E:85:LYS:H	1.73	0.86
5:J:84:GLN:O	5:J:86:ASN:N	2.07	0.85
1:A:17:ARG:NH2	6:A:2007:HOH:O	2.08	0.84
2:B:81:ARG:HH11	2:B:81:ARG:HG2	1.42	0.83
2:G:81:ARG:NH1	2:G:90:PRO:HB3	1.92	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:124:ARG:HH11	4:D:124:ARG:CG	1.93	0.82
5:E:84:GLN:HE21	5:E:85:LYS:H	1.27	0.81
1:F:216:THR:HA	6:F:2063:HOH:O	1.84	0.78
5:J:65:GLY:HA3	5:J:83:ALA:HA	1.63	0.78
2:G:81:ARG:HH11	2:G:81:ARG:CG	1.87	0.77
1:F:17:ARG:HB3	6:F:2005:HOH:O	1.84	0.76
2:B:4:THR:HG22	2:B:86:THR:OG1	1.86	0.76
1:F:217:TRP:HB2	6:F:2066:HOH:O	1.85	0.76
4:D:124:ARG:HH11	4:D:124:ARG:HG3	1.52	0.74
5:J:116:ASP:OD1	5:J:118:LYS:HG2	1.87	0.74
1:A:17:ARG:CZ	6:A:2007:HOH:O	2.25	0.74
5:E:86:ASN:OD1	6:E:2054:HOH:O	2.07	0.72
5:J:34:MET:HE3	5:J:70:ARG:NE	2.05	0.72
1:F:202:ARG:NH1	1:F:246:ALA:HB2	2.06	0.70
4:D:124:ARG:HD3	4:D:124:ARG:H	1.56	0.70
5:J:34:MET:HE2	5:J:70:ARG:NH2	2.06	0.69
4:I:61:ARG:NH1	4:I:84:ASP:OD2	2.24	0.69
4:I:103:LYS:HE3	6:J:2026:HOH:O	1.92	0.68
2:B:98:ASP:HB2	6:B:2036:HOH:O	1.93	0.68
5:J:142:THR:HG22	6:J:2065:HOH:O	1.93	0.67
2:G:2:GLN:HG2	6:G:2001:HOH:O	1.95	0.67
2:G:81:ARG:HH12	2:G:90:PRO:HB3	1.57	0.67
5:E:84:GLN:HE21	5:E:85:LYS:N	1.93	0.66
4:D:146:SER:H	4:D:191:SER:HB3	1.60	0.66
5:J:16:LYS:H	5:J:19:GLN:HE21	1.40	0.66
4:I:140:ASP:HA	6:I:2055:HOH:O	1.95	0.65
5:E:132:GLU:H	5:E:132:GLU:CD	2.01	0.64
1:F:187:THR:OG1	1:F:272:LEU:HD13	1.97	0.63
1:F:228:THR:HA	1:F:246:ALA:O	1.99	0.63
4:I:111:PRO:HG3	4:I:160:VAL:HG11	1.80	0.62
5:J:34:MET:HE2	5:J:70:ARG:HH21	1.65	0.62
5:J:34:MET:CE	5:J:70:ARG:NE	2.64	0.61
4:D:58:LYS:O	4:D:59:LEU:HD13	2.01	0.60
5:J:58:GLN:HG2	6:J:2028:HOH:O	2.01	0.60
4:D:61:ARG:HH12	4:D:84:ASP:CG	2.01	0.60
5:E:34:MET:HE3	5:E:70:ARG:NE	2.17	0.60
5:J:173:ASP:OD1	5:J:193:ARG:NH2	2.35	0.60
2:B:51:HIS:HD2	2:B:52:SER:O	1.86	0.59
4:D:15:GLN:O	4:D:18:GLU:HG3	2.02	0.59
4:I:131:LYS:HG3	6:I:2065:HOH:O	2.02	0.59
1:F:234:ARG:HE	1:F:242:GLN:HE21	1.48	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:93:HIS:HD2	1:A:119:ASP:OD2	1.84	0.59
4:D:131:LYS:HA	6:D:2059:HOH:O	2.02	0.59
2:B:74:GLU:HB2	6:B:2029:HOH:O	2.03	0.58
5:E:81:THR:C	5:E:83:ALA:N	2.56	0.58
5:J:34:MET:CE	5:J:70:ARG:HE	2.17	0.58
5:E:19:GLN:NE2	6:E:2008:HOH:O	2.36	0.58
2:B:1:ILE:CG2	2:B:1:ILE:O	2.51	0.58
4:I:158:LYS:NZ	4:I:158:LYS:CD	2.65	0.57
1:F:184:ALA:O	6:F:2052:HOH:O	2.17	0.57
1:F:229:GLU:HA	6:F:2068:HOH:O	2.04	0.56
4:I:81:GLN:HB3	4:I:82:PRO:HD2	1.87	0.56
1:A:65:ARG:NH1	6:A:2027:HOH:O	2.37	0.56
1:F:234:ARG:HE	1:F:242:GLN:NE2	2.02	0.56
4:I:61:ARG:HH12	4:I:84:ASP:CG	2.09	0.56
5:J:229:LYS:HG3	5:J:231:VAL:HG13	1.87	0.56
1:A:75:ARG:HD2	6:A:2010:HOH:O	2.06	0.55
4:I:183:ALA:O	4:I:186:ASN:ND2	2.39	0.55
1:F:14:ARG:NE	1:F:19:GLU:O	2.39	0.55
1:F:214:THR:HB	1:F:262:GLN:HB2	1.88	0.55
1:F:223:ASP:HA	1:F:224:GLN:HE21	1.72	0.55
4:I:15:GLN:O	4:I:18:GLU:HG3	2.06	0.55
5:J:84:GLN:C	5:J:86:ASN:H	2.00	0.55
4:D:124:ARG:H	4:D:124:ARG:CD	2.20	0.55
4:I:147:GLN:HE21	4:I:147:GLN:H	1.55	0.55
4:I:37:ARG:NH1	4:I:85:THR:O	2.40	0.54
5:J:34:MET:HE3	5:J:70:ARG:HE	1.72	0.54
2:B:81:ARG:HH11	2:B:81:ARG:CG	2.13	0.54
1:A:131:ARG:HE	1:A:157:ARG:NH1	2.05	0.54
4:I:119:ALA:CB	6:I:2052:HOH:O	2.43	0.53
5:J:86:ASN:N	5:J:87:PRO:CD	2.72	0.53
1:F:249:VAL:HB	1:F:250:PRO:HD2	1.91	0.53
5:E:229:LYS:HG3	5:E:231:VAL:HG13	1.91	0.52
1:F:260:HIS:HB2	6:F:2062:HOH:O	2.09	0.52
1:F:202:ARG:HD2	1:F:204:TRP:CD1	2.45	0.52
1:F:147:TRP:CZ2	3:H:9:LEU:HD23	2.45	0.52
1:F:93:HIS:HD2	1:F:119:ASP:OD2	1.92	0.52
5:J:34:MET:CE	5:J:73:LYS:O	2.59	0.51
1:F:192:HIS:O	1:F:200:THR:HB	2.11	0.51
4:I:55:GLU:OE1	4:I:57:LYS:HE3	2.10	0.51
4:D:123:LEU:O	4:D:132:SER:HB2	2.11	0.51
5:E:118:LYS:NZ	6:E:2068:HOH:O	2.45	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:86:ASN:N	5:J:87:PRO:HD2	2.26	0.50
5:E:132:GLU:CD	5:E:132:GLU:N	2.64	0.50
1:A:147:TRP:CZ2	3:C:9:LEU:HD23	2.46	0.50
6:A:2083:HOH:O	2:B:99:MET:HG2	2.10	0.50
2:G:51:HIS:HD2	2:G:52:SER:O	1.95	0.50
4:I:164:ARG:HG2	5:J:168:SER:HB2	1.93	0.49
2:B:25:CYS:HB2	2:B:39:LEU:HD21	1.94	0.49
1:F:13:SER:HB3	1:F:78:LEU:HD13	1.93	0.49
5:J:34:MET:HE1	5:J:73:LYS:O	2.13	0.49
4:D:124:ARG:HH11	4:D:124:ARG:HG2	1.75	0.49
4:I:126:SER:HB3	5:J:129:GLU:HG3	1.95	0.48
1:F:257:TYR:HB2	6:F:2074:HOH:O	2.12	0.48
2:G:31:HIS:ND1	6:G:2011:HOH:O	2.32	0.48
5:J:200:PHE:O	5:J:206:ASN:ND2	2.33	0.48
1:F:202:ARG:HH11	1:F:246:ALA:HB2	1.78	0.48
5:J:64:GLU:OE1	6:J:2039:HOH:O	2.20	0.47
2:B:1:ILE:O	2:B:1:ILE:HG22	2.14	0.47
5:E:84:GLN:HG3	5:E:85:LYS:N	2.28	0.47
1:A:121:LYS:HE3	1:A:121:LYS:HB2	1.65	0.47
4:D:159:THR:HB	5:E:171:SER:OG	2.14	0.47
2:B:4:THR:CG2	2:B:86:THR:OG1	2.61	0.47
4:I:147:GLN:H	4:I:147:GLN:NE2	2.12	0.47
1:A:202:ARG:HD3	1:A:244:TRP:CE3	2.50	0.47
5:E:84:GLN:HE21	5:E:84:GLN:HA	1.80	0.47
1:F:44:ARG:NH2	1:F:61:ASP:OD1	2.48	0.47
1:A:173:GLU:OE1	1:A:176:LYS:NZ	2.47	0.47
5:E:84:GLN:HE21	5:E:84:GLN:CA	2.28	0.47
4:I:168:PHE:HD2	6:I:2063:HOH:O	1.98	0.47
5:E:84:GLN:CG	5:E:85:LYS:N	2.78	0.46
5:E:34:MET:HE2	5:E:70:ARG:NH2	2.30	0.46
1:F:203:CYS:HA	6:F:2054:HOH:O	2.14	0.46
2:G:24:ASN:HB3	2:G:65:LEU:HD11	1.98	0.46
4:I:81:GLN:HB3	4:I:82:PRO:CD	2.46	0.46
5:J:139:GLN:HB2	6:J:2064:HOH:O	2.15	0.46
1:A:219:ARG:O	1:A:221:GLY:N	2.49	0.45
4:I:133:VAL:HG12	4:I:176:TRP:HB3	1.98	0.45
1:A:51:TRP:O	1:A:54:GLN:HG2	2.16	0.45
5:J:34:MET:HE2	5:J:70:ARG:CZ	2.46	0.45
4:I:157:ASP:HB3	6:I:2060:HOH:O	2.15	0.45
1:F:144:LYS:O	1:F:148:GLU:HG3	2.17	0.45
2:B:81:ARG:HG2	2:B:81:ARG:NH1	2.20	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:86:ASN:N	5:E:87:PRO:HD3	2.31	0.45
5:J:110:ARG:HD3	6:J:2061:HOH:O	2.17	0.45
4:D:124:ARG:HG3	4:D:124:ARG:NH1	2.24	0.44
2:B:81:ARG:CG	2:B:81:ARG:NH1	2.75	0.44
4:D:159:THR:HG23	6:E:2083:HOH:O	2.17	0.44
1:F:249:VAL:HB	1:F:250:PRO:CD	2.46	0.44
5:J:16:LYS:HB3	5:J:16:LYS:NZ	2.33	0.44
1:F:81:LEU:HD13	1:F:118:TYR:CD1	2.53	0.44
2:G:4:THR:HG23	2:G:86:THR:OG1	2.17	0.44
5:J:16:LYS:H	5:J:19:GLN:NE2	2.11	0.43
5:J:29:LEU:O	5:J:30:ASN:CB	2.66	0.43
2:G:1:ILE:O	2:G:1:ILE:CG2	2.67	0.43
1:F:274:TRP:CG	1:F:275:GLU:N	2.87	0.43
4:D:130:ASP:OD1	4:D:131:LYS:N	2.43	0.43
1:F:14:ARG:NH1	1:F:21:ARG:HB2	2.34	0.42
4:I:16:GLU:HG2	6:I:2008:HOH:O	2.18	0.42
5:E:34:MET:CE	5:E:73:LYS:O	2.66	0.42
2:G:4:THR:CG2	2:G:86:THR:OG1	2.66	0.42
5:J:31:HIS:HB3	5:J:96:SER:O	2.19	0.42
5:E:203:ASN:HB3	5:E:206:ASN:ND2	2.34	0.42
1:F:202:ARG:HH11	1:F:202:ARG:HB2	1.83	0.42
4:I:5:LEU:HD22	4:I:24:CYS:SG	2.60	0.42
5:J:127:VAL:HG23	5:J:237:ALA:HB3	2.01	0.42
5:J:144:VAL:CG2	6:J:2065:HOH:O	2.67	0.41
1:F:202:ARG:NH1	1:F:202:ARG:HB2	2.36	0.41
1:A:249:VAL:HG22	6:A:2077:HOH:O	2.20	0.41
5:E:34:MET:HE3	5:E:70:ARG:CZ	2.50	0.41
2:G:21:ASN:O	2:G:69:GLU:HG3	2.20	0.41
1:A:217:TRP:CZ3	1:A:257:TYR:HB3	2.56	0.41
1:F:131:ARG:HB2	1:F:131:ARG:CZ	2.51	0.41
1:A:176:LYS:NZ	1:A:176:LYS:HB3	2.36	0.41
1:A:143:THR:HG21	3:C:9:LEU:HD22	2.03	0.40
1:F:219:ARG:O	1:F:221:GLY:N	2.55	0.40
1:F:255:GLN:H	1:F:255:GLN:HG3	1.65	0.40
5:E:34:MET:HE2	5:E:73:LYS:O	2.21	0.40
1:F:189:MET:HA	6:F:2058:HOH:O	2.20	0.40
1:F:206:LEU:HD23	1:F:242:GLN:HB3	2.03	0.40
4:I:21:THR:OG1	4:I:76:HIS:HD2	2.05	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:138:MET:SD	2:G:36:GLU:OE2[1_544]	1.67	0.53
2:B:81:ARG:NH2	1:F:138:MET:SD[1_444]	2.05	0.15
2:B:81:ARG:CZ	1:F:138:MET:SD[1_444]	2.06	0.14

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%)	258 (94%)	15 (6%)	1 (0%)	30 39
1	F	274/276 (99%)	252 (92%)	15 (6%)	7 (3%)	4 3
2	B	98/100 (98%)	91 (93%)	7 (7%)	0	100 100
2	G	98/100 (98%)	95 (97%)	2 (2%)	1 (1%)	13 15
3	C	7/9 (78%)	6 (86%)	1 (14%)	0	100 100
3	H	7/9 (78%)	6 (86%)	1 (14%)	0	100 100
4	D	197/201 (98%)	190 (96%)	5 (2%)	2 (1%)	13 15
4	I	197/201 (98%)	177 (90%)	17 (9%)	3 (2%)	8 8
5	E	238/244 (98%)	229 (96%)	7 (3%)	2 (1%)	16 20
5	J	238/244 (98%)	222 (93%)	14 (6%)	2 (1%)	16 20
All	All	1628/1660 (98%)	1526 (94%)	84 (5%)	18 (1%)	12 13

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	E	82	SER
5	E	83	ALA
1	F	224	GLN
5	J	83	ALA
5	J	85	LYS
4	D	131	LYS
1	F	16	GLY

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Mol	Chain	Res	Type
1	F	220	ASP
1	F	222	GLU
1	F	226	GLN
1	A	220	ASP
4	I	186	ASN
1	F	223	ASP
2	G	97	ARG
4	I	131	LYS
4	I	184	CYS
4	D	200	PRO
1	F	221	GLY

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	232/232 (100%)	218 (94%)	14 (6%)	16 23
1	F	232/232 (100%)	216 (93%)	16 (7%)	13 18
2	B	95/95 (100%)	84 (88%)	11 (12%)	4 5
2	G	95/95 (100%)	85 (90%)	10 (10%)	5 6
3	C	7/7 (100%)	7 (100%)	0	100 100
3	H	7/7 (100%)	7 (100%)	0	100 100
4	D	175/177 (99%)	159 (91%)	16 (9%)	7 9
4	I	175/177 (99%)	161 (92%)	14 (8%)	10 13
5	E	211/214 (99%)	198 (94%)	13 (6%)	15 22
5	J	211/214 (99%)	199 (94%)	12 (6%)	17 25
All	All	1440/1450 (99%)	1334 (93%)	106 (7%)	11 15

All (106) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	ARG
1	A	17	ARG

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Mol	Chain	Res	Type
1	A	82	ARG
1	A	89	GLU
1	A	115	GLN
1	A	138	MET
1	A	176	LYS
1	A	194	VAL
1	A	196	ASP
1	A	216	THR
1	A	225	THR
1	A	230	LEU
1	A	270	LEU
1	A	273	ARG
2	B	0	MET
2	B	1	ILE
2	B	20	SER
2	B	48	LYS
2	B	70	PHE
2	B	77	GLU
2	B	81	ARG
2	B	83	ASN
2	B	89	GLN
2	B	97	ARG
2	B	99	MET
4	D	42	GLU
4	D	66	PHE
4	D	72	ASP
4	D	75	LEU
4	D	98	ASN
4	D	124	ARG
4	D	128	SER
4	D	131	LYS
4	D	149	LYS
4	D	150	ASP
4	D	151	SER
4	D	161	LEU
4	D	164	ARG
4	D	180	SER
4	D	190	ASN
4	D	191	SER
5	E	13	LEU
5	E	17	GLU
5	E	27	GLN

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Mol	Chain	Res	Type
5	E	64	GLU
5	E	84	GLN
5	E	85	LYS
5	E	132	GLU
5	E	164	LYS
5	E	175	GLN
5	E	193	ARG
5	E	205	ARG
5	E	218	SER
5	E	222	GLU
1	F	14	ARG
1	F	58	GLU
1	F	75	ARG
1	F	82	ARG
1	F	115	GLN
1	F	173	GLU
1	F	202	ARG
1	F	224	GLN
1	F	225	THR
1	F	227	ASP
1	F	253	GLN
1	F	255	GLN
1	F	264	GLU
1	F	270	LEU
1	F	272	LEU
1	F	273	ARG
2	G	1	ILE
2	G	4	THR
2	G	20	SER
2	G	34	ASP
2	G	36	GLU
2	G	48	LYS
2	G	58	LYS
2	G	70	PHE
2	G	74	GLU
2	G	81	ARG
4	I	39	GLU
4	I	42	GLU
4	I	62	LEU
4	I	65	GLN
4	I	66	PHE
4	I	72	ASP

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Mol	Chain	Res	Type
4	I	98	ASN
4	I	103	LYS
4	I	108	SER
4	I	124	ARG
4	I	147	GLN
4	I	170	SER
4	I	178	ASN
4	I	186	ASN
5	J	16	LYS
5	J	23	LEU
5	J	27	GLN
5	J	43	GLN
5	J	62	ILE
5	J	110	ARG
5	J	131	SER
5	J	142	THR
5	J	175	GLN
5	J	186	SER
5	J	224	THR
5	J	240	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	93	HIS
1	A	242	GLN
2	B	2	GLN
2	B	51	HIS
2	B	83	ASN
4	D	76	HIS
4	D	98	ASN
4	D	114	GLN
4	D	142	GLN
5	E	27	GLN
5	E	43	GLN
5	E	84	GLN
5	E	175	GLN
5	E	233	GLN
1	F	3	HIS
1	F	72	GLN
1	F	93	HIS
1	F	115	GLN

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Mol	Chain	Res	Type
1	F	224	GLN
1	F	242	GLN
1	F	253	GLN
2	G	51	HIS
4	I	76	HIS
4	I	98	ASN
4	I	142	GLN
4	I	147	GLN
4	I	186	ASN
5	J	19	GLN
5	J	27	GLN
5	J	43	GLN
5	J	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 oligosaccharides 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^{th} 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^2)	Q<0.9
1	A	276/276 (100%)	0.87	63 (22%) 2 3	22, 35, 76, 95	1 (0%)
1	F	276/276 (100%)	1.47	93 (33%) 1 1	21, 38, 81, 94	1 (0%)
2	B	100/100 (100%)	0.72	7 (7%) 24 25	26, 40, 52, 65	0
2	G	100/100 (100%)	0.72	6 (6%) 29 31	26, 40, 54, 64	0
3	C	9/9 (100%)	-0.06	0 100 100	21, 22, 23, 23	0
3	H	9/9 (100%)	-0.05	0 100 100	17, 22, 24, 24	0
4	D	199/201 (99%)	0.49	14 (7%) 24 25	18, 34, 57, 65	0
4	I	199/201 (99%)	1.12	67 (33%) 1 1	19, 36, 82, 84	0
5	E	240/244 (98%)	0.18	6 (2%) 58 59	20, 34, 51, 62	0
5	J	240/244 (98%)	0.52	14 (5%) 30 32	20, 42, 60, 67	0
All	All	1648/1660 (99%)	0.77	270 (16%) 5 6	17, 37, 77, 95	2 (0%)

All (270) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	237	GLY	8.7
1	F	209	TYR	7.3
1	F	235	PRO	7.2
1	F	276	PRO	7.0
1	F	211	ALA	6.9
1	F	241	PHE	6.9
1	F	249	VAL	6.5
1	F	248	VAL	6.1
1	F	239	GLY	5.7
1	F	184	ALA	5.5
1	F	190	THR	5.5
1	F	236	ALA	5.3
1	F	250	PRO	5.2

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Mol	Chain	Res	Type	RSRZ
1	A	237	GLY	5.2
1	F	206	LEU	5.2
1	F	272	LEU	5.1
4	I	192	ILE	5.1
1	F	217	TRP	5.1
1	F	273	ARG	5.1
1	F	232	GLU	5.0
1	F	207	SER	5.0
1	F	240	THR	4.9
1	A	194	VAL	4.9
1	F	271	THR	4.8
1	A	276	PRO	4.7
1	F	230	LEU	4.7
1	F	238	ASP	4.7
1	A	239	GLY	4.7
1	F	183	ASP	4.7
1	F	233	THR	4.6
1	F	258	THR	4.6
1	A	272	LEU	4.6
1	A	236	ALA	4.6
1	F	274	TRP	4.5
1	F	213	ILE	4.5
1	F	204	TRP	4.5
1	F	208	PHE	4.5
1	F	269	PRO	4.4
1	F	268	LYS	4.3
1	F	265	GLY	4.3
1	F	266	LEU	4.3
1	F	228	THR	4.3
1	F	242	GLN	4.3
4	I	126	SER	4.2
1	F	210	PRO	4.2
1	F	186	LYS	4.2
1	F	264	GLU	4.2
4	I	119	ALA	4.1
1	F	270	LEU	4.1
4	I	159	THR	4.1
1	F	234	ARG	4.1
1	F	254	GLU	4.0
1	F	187	THR	4.0
1	F	246	ALA	3.9
1	F	231	VAL	3.9

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Mol	Chain	Res	Type	RSRZ
1	F	182	THR	3.9
1	F	256	ARG	3.8
1	A	274	TRP	3.8
1	F	259	CYS	3.8
1	A	207	SER	3.7
1	F	244	TRP	3.7
1	F	212	GLU	3.6
1	A	235	PRO	3.6
1	F	201	LEU	3.6
4	I	160	VAL	3.6
4	I	161	LEU	3.6
4	I	198	PHE	3.6
1	F	261	VAL	3.6
1	A	270	LEU	3.6
1	F	220	ASP	3.5
1	F	185	PRO	3.5
4	I	158	LYS	3.5
4	I	136	PHE	3.5
1	F	247	VAL	3.5
1	F	205	ALA	3.5
1	A	269	PRO	3.4
4	I	135	LEU	3.4
1	A	221	GLY	3.4
1	F	194	VAL	3.4
2	B	99	MET	3.4
5	E	240	TRP	3.4
2	G	81	ARG	3.4
4	I	168	PHE	3.3
1	A	257	TYR	3.3
4	I	120	VAL	3.3
4	I	133	VAL	3.3
1	F	219	ARG	3.3
1	A	266	LEU	3.3
1	A	271	THR	3.3
1	F	263	HIS	3.3
4	I	118	PRO	3.3
4	I	141	SER	3.3
1	F	189	MET	3.3
4	I	137	THR	3.3
4	I	116	PRO	3.3
1	F	215	LEU	3.3
1	F	221	GLY	3.3

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Mol	Chain	Res	Type	RSRZ
1	F	257	TYR	3.3
4	I	184	CYS	3.3
1	A	261	VAL	3.2
4	I	134	CYS	3.2
1	A	240	THR	3.2
1	F	199	ALA	3.2
1	A	182	THR	3.2
1	F	216	THR	3.2
4	I	193	ILE	3.2
1	A	228	THR	3.2
4	I	114	GLN	3.1
1	F	225	THR	3.1
1	F	191	HIS	3.1
1	A	201	LEU	3.1
1	A	186	LYS	3.1
4	I	131	LYS	3.1
5	J	85	LYS	3.1
5	E	86	ASN	3.1
1	A	265	GLY	3.0
4	I	199	PHE	3.0
1	F	227	ASP	3.0
5	E	83	ALA	3.0
4	I	144	ASN	3.0
4	I	201	SER	3.0
5	J	83	ALA	3.0
1	F	188	HIS	3.0
4	I	39	GLU	3.0
1	A	206	LEU	2.9
4	I	170	SER	2.9
4	D	152	ASP	2.9
1	A	215	LEU	2.9
4	I	59	LEU	2.9
4	I	142	GLN	2.9
1	A	193	ALA	2.9
1	F	229	GLU	2.9
2	B	81	ARG	2.9
1	A	209	TYR	2.9
4	I	154	TYR	2.9
4	I	146	SER	2.9
1	A	199	ALA	2.9
1	A	211	ALA	2.9
2	G	36	GLU	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	249	VAL	2.8
1	F	195	SER	2.8
1	F	192	HIS	2.8
1	A	238	ASP	2.8
1	F	203	CYS	2.8
1	A	184	ALA	2.8
5	J	153	ASP	2.8
1	F	198	GLU	2.8
5	J	243	ALA	2.8
1	F	197	HIS	2.8
4	I	152	ASP	2.8
1	A	208	PHE	2.8
4	D	159	THR	2.8
4	I	123	LEU	2.8
5	E	85	LYS	2.7
2	B	77	GLU	2.7
2	B	98	ASP	2.7
4	I	121	TYR	2.7
2	G	99	MET	2.7
1	A	185	PRO	2.7
4	I	185	ALA	2.7
1	A	244	TRP	2.7
1	A	259	CYS	2.7
4	I	169	LYS	2.7
1	F	267	PRO	2.7
4	I	139	PHE	2.7
4	I	149	LYS	2.7
1	F	17	ARG	2.7
5	J	220	ASN	2.7
4	I	163	MET	2.6
4	D	193	ILE	2.6
1	F	218	GLN	2.6
1	F	202	ARG	2.6
4	I	166	MET	2.6
5	J	115	GLU	2.6
4	I	145	VAL	2.6
1	A	267	PRO	2.6
4	I	129	SER	2.6
5	E	84	GLN	2.6
1	F	253	GLN	2.6
1	F	255	GLN	2.6
1	F	275	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
4	I	190	ASN	2.5
1	F	251	SER	2.5
1	A	220	ASP	2.5
1	A	223	ASP	2.5
4	I	140	ASP	2.5
1	A	204	TRP	2.5
1	F	243	LYS	2.5
4	I	151	SER	2.5
5	J	240	TRP	2.5
1	A	233	THR	2.5
4	I	178	ASN	2.5
4	I	162	ASP	2.4
1	A	241	PHE	2.4
1	A	106	ASP	2.4
1	A	252	GLY	2.4
4	I	174	VAL	2.4
1	A	225	THR	2.4
1	A	250	PRO	2.4
1	F	173	GLU	2.4
1	A	260	HIS	2.4
4	I	187	ALA	2.4
2	B	0	MET	2.4
2	B	74	GLU	2.4
2	B	1	ILE	2.4
2	G	1	ILE	2.4
4	I	155	ILE	2.4
1	A	227	ASP	2.4
1	A	205	ALA	2.4
4	I	143	THR	2.3
5	J	200	PHE	2.3
4	D	149	LYS	2.3
1	A	196	ASP	2.3
4	D	150	ASP	2.3
4	I	125	ASP	2.3
4	I	153	VAL	2.3
4	D	199	PHE	2.3
5	J	204	PRO	2.3
1	A	217	TRP	2.3
5	E	244	ASP	2.3
1	A	242	GLN	2.3
4	D	59	LEU	2.3
1	A	231	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
4	D	190	ASN	2.2
1	A	183	ASP	2.2
4	I	165	SER	2.2
4	I	171	ASN	2.2
1	F	193	ALA	2.2
4	I	173	ALA	2.2
1	A	247	VAL	2.2
2	G	98	ASP	2.2
1	F	18	GLY	2.2
5	J	201	TRP	2.2
1	F	222	GLU	2.2
4	I	194	PRO	2.2
1	A	248	VAL	2.2
1	F	226	GLN	2.2
4	I	127	LYS	2.2
4	I	164	ARG	2.2
1	F	260	HIS	2.2
4	I	183	ALA	2.2
4	D	168	PHE	2.2
4	I	181	ASP	2.2
4	I	128	SER	2.1
5	J	135	ILE	2.1
5	J	177	LEU	2.1
1	A	263	HIS	2.1
5	J	228	ALA	2.1
1	A	258	THR	2.1
2	G	71	THR	2.1
4	I	156	THR	2.1
4	I	200	PRO	2.1
1	A	256	ARG	2.1
4	I	157	ASP	2.1
4	D	127	LYS	2.1
4	D	185	ALA	2.1
5	J	199	THR	2.1
1	F	138	MET	2.1
1	A	188	HIS	2.1
4	D	131	LYS	2.1
4	D	186	ASN	2.1
4	I	176	TRP	2.1
1	A	234	ARG	2.0
4	I	188	PHE	2.0
1	A	121	LYS	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	268	LYS	2.0
1	F	214	THR	2.0
1	F	252	GLY	2.0
4	D	128	SER	2.0
1	A	224	GLN	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 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.