



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 9, 2023 – 02:38 pm GMT

PDB ID : 1OGA
Title : A structural basis for immunodominant human T-cell receptor recognition.
Authors : Stewart-Jones, G.B.E.; McMichael, A.J.; Bell, J.I.; Stuart, D.I.; Jones, E.Y.
Deposited on : 2003-04-28
Resolution : 1.40 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

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 : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

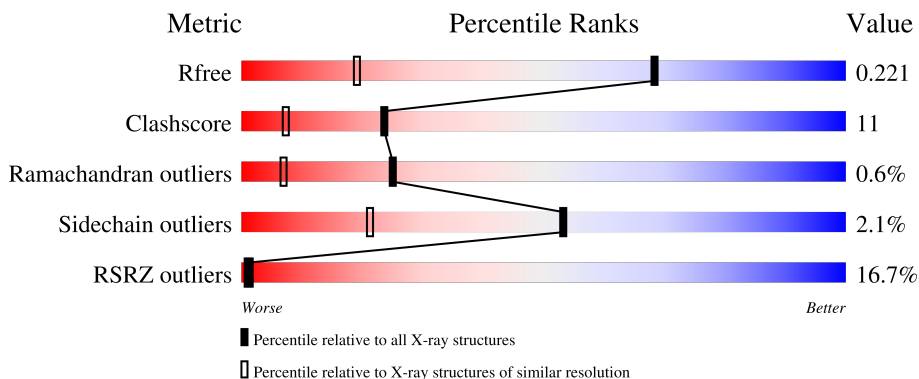
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.40 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	1714 (1.40-1.40)
Clashscore	141614	1812 (1.40-1.40)
Ramachandran outliers	138981	1763 (1.40-1.40)
Sidechain outliers	138945	1762 (1.40-1.40)
RSRZ outliers	127900	1674 (1.40-1.40)

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 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 $\leq 5\%$. 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	215	
5	E	252	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7192 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	276	2254	1408	410	427	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	837	533	141	159	4	0	0	0

- Molecule 3 is a protein called GILGFVFTL.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	9	69	49	9	11	0	0	0

- Molecule 4 is a protein called T-CELL RECEPTOR ALPHA CHAIN V REGION.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	200	1531	959	256	310	6	0	0	1

- Molecule 5 is a protein called T-CELL RECEPTOR BETA CHAIN C REGION.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	241	1933	1218	335	375	5	0	0	1

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	118	LYS	ASN	conflict	UNP P01850
E	119	ASN	LYS	conflict	UNP P01850

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Chain	Residue	Modelled	Actual	Comment	Reference
E	151	TYR	PHE	conflict	UNP P01850
E	189	SER	CYS	conflict	UNP P01850

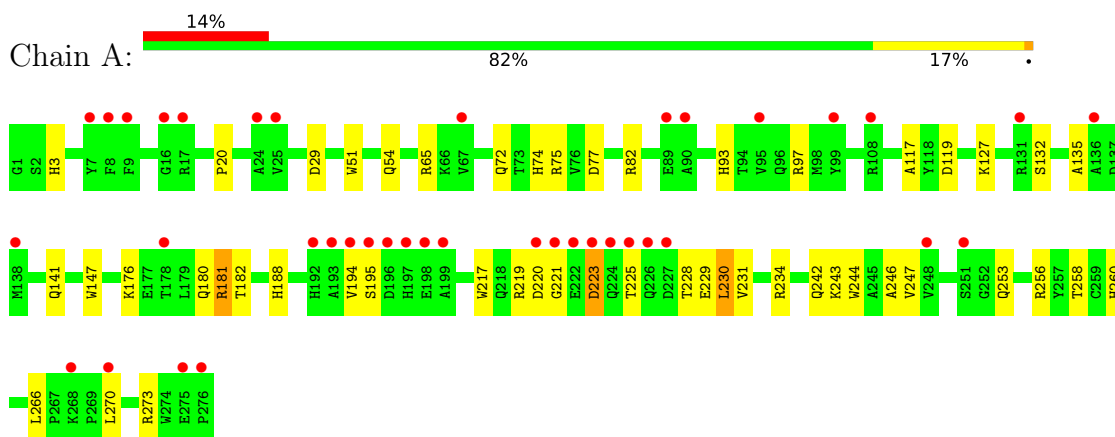
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	192	Total O 192 192	0	0
6	B	105	Total O 105 105	0	0
6	C	7	Total O 7 7	0	0
6	D	108	Total O 108 108	0	0
6	E	156	Total O 156 156	0	0

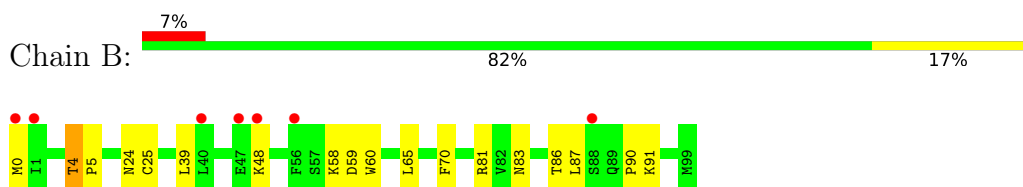
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

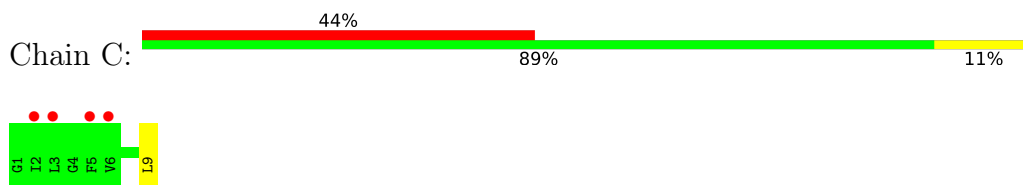
- Molecule 1: HLA CLASS I HISTOCOMPATIBILITY ANTIGEN



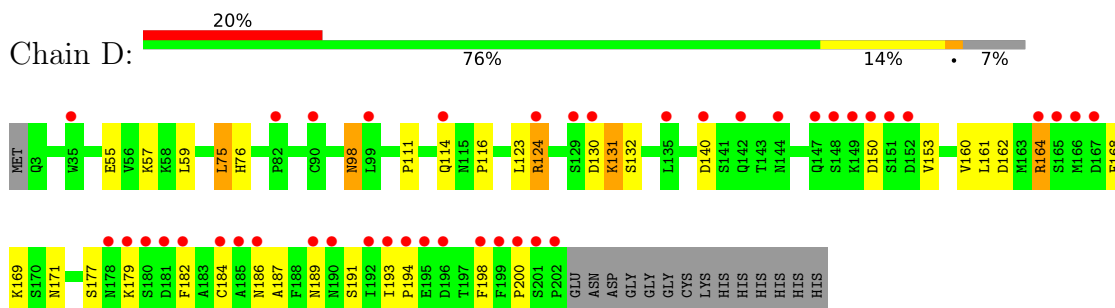
- Molecule 2: BETA-2-MICROGLOBULIN



- Molecule 3: GILGFVFTL

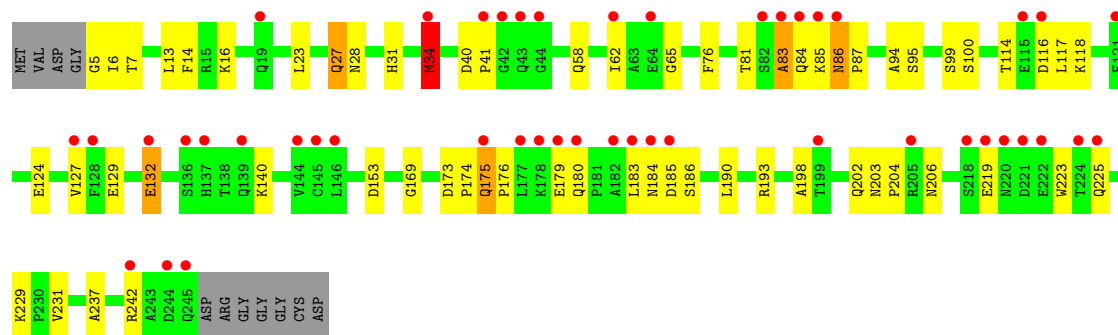


- Molecule 4: T-CELL RECEPTOR ALPHA CHAIN V REGION



- Molecule 5: T-CELL RECEPTOR BETA CHAIN C REGION

Chain E: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.02Å 108.84Å 77.74Å 90.00° 112.46° 90.00°	Depositor
Resolution (Å)	29.98 – 1.40 29.98 – 1.39	Depositor EDS
% Data completeness (in resolution range)	93.0 (29.98-1.40) 92.1 (29.98-1.39)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.51 (at 1.39Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.218 , 0.231 0.208 , 0.221	Depositor DCC
R_{free} test set	9914 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	21.8	Xtrriage
Anisotropy	0.150	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 45.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7192	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.56% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.40	0/2320	0.67	0/3149
2	B	0.45	0/860	0.68	0/1162
3	C	0.71	0/70	0.83	0/92
4	D	0.40	0/1561	0.64	0/2115
5	E	0.42	1/1986 (0.1%)	0.65	1/2702 (0.0%)
All	All	0.42	1/6797 (0.0%)	0.66	1/9220 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	34	MET	CG-SD	-5.39	1.67	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	124	GLU	N-CA-C	-5.05	97.35	111.00

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	A	2254	0	2103	45	0
2	B	837	0	803	11	0
3	C	69	0	75	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	1531	0	1480	38	0
5	E	1933	0	1829	56	0
6	A	192	0	0	5	0
6	B	105	0	0	0	0
6	C	7	0	0	0	0
6	D	108	0	0	0	0
6	E	156	0	0	3	0
All	All	7192	0	6290	144	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 11.

All (144) 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:34:MET:SD	5:E:94:ALA:O	2.19	1.00
4:D:111:PRO:HG2	4:D:160:VAL:HG11	1.55	0.88
4:D:164:ARG:HG2	4:D:164:ARG:HH11	1.36	0.88
1:A:266:LEU:HD13	1:A:270:LEU:HD23	1.61	0.82
5:E:229:LYS:HG3	5:E:231:VAL:HG13	1.62	0.82
5:E:84:GLN:O	5:E:87:PRO:HD3	1.89	0.73
1:A:219:ARG:O	1:A:221:GLY:N	2.19	0.71
5:E:116:ASP:OD1	5:E:118:LYS:HG2	1.91	0.71
5:E:34:MET:CE	5:E:95:SER:HB3	2.20	0.71
5:E:183:LEU:HG	5:E:185:ASP:H	1.56	0.70
1:A:234:ARG:HE	1:A:242:GLN:HE21	1.37	0.70
1:A:229:GLU:HG3	1:A:244:TRP:HZ3	1.56	0.70
1:A:72:GLN:HE22	1:A:75:ARG:HH11	1.40	0.69
4:D:111:PRO:HG2	4:D:160:VAL:CG1	2.23	0.68
4:D:164:ARG:HG2	4:D:164:ARG:NH1	2.01	0.67
1:A:147:TRP:CZ2	3:C:9:LEU:HD23	2.30	0.67
2:B:87:LEU:HD22	2:B:91:LYS:HE3	1.77	0.67
4:D:123:LEU:O	4:D:132:SER:HB2	1.95	0.67
2:B:81:ARG:HH12	2:B:90:PRO:HG2	1.60	0.66
5:E:153:ASP:OD2	5:E:176:PRO:HG2	1.96	0.66
1:A:3:HIS:HD2	1:A:29:ASP:OD2	1.79	0.65
5:E:84:GLN:HG3	5:E:85:LYS:H	1.62	0.64
5:E:27:GLN:HG2	5:E:34:MET:HE2	1.80	0.64
4:D:124:ARG:HD3	4:D:124:ARG:H	1.63	0.63
1:A:230:LEU:HD21	1:A:243:LYS:HE3	1.82	0.61
4:D:124:ARG:H	4:D:124:ARG:CD	2.13	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:230:LEU:C	1:A:230:LEU:HD23	2.21	0.61
4:D:193:ILE:HG23	4:D:194:PRO:HD2	1.83	0.60
1:A:93:HIS:HD2	1:A:119:ASP:OD2	1.82	0.60
4:D:111:PRO:CG	4:D:160:VAL:HG11	2.31	0.60
1:A:188:HIS:HD2	6:A:2158:HOH:O	1.85	0.59
4:D:179:LYS:HA	4:D:179:LYS:HE2	1.84	0.59
1:A:20:PRO:HG2	6:A:2017:HOH:O	2.03	0.57
4:D:75:LEU:HD22	4:D:76:HIS:N	2.19	0.57
1:A:74:HIS:HD2	1:A:77:ASP:OD2	1.87	0.57
5:E:86:ASN:H	5:E:87:PRO:CD	2.18	0.57
4:D:124:ARG:HH11	4:D:124:ARG:HG2	1.70	0.56
4:D:162:ASP:OD1	4:D:164:ARG:HD3	2.05	0.56
1:A:65:ARG:HG3	6:E:2046:HOH:O	2.04	0.56
5:E:242:ARG:HG3	5:E:242:ARG:HH11	1.69	0.56
4:D:186:ASN:HA	4:D:189:ASN:OD1	2.06	0.56
1:A:82:ARG:HH11	1:A:82:ARG:HG2	1.70	0.55
5:E:198:ALA:O	5:E:202:GLN:HG3	2.07	0.55
5:E:27:GLN:HE22	5:E:31:HIS:H	1.54	0.55
1:A:93:HIS:HE1	6:A:2081:HOH:O	1.89	0.55
1:A:234:ARG:HE	1:A:242:GLN:NE2	2.03	0.55
4:D:191:SER:HB2	4:D:193:ILE:HD11	1.89	0.54
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.43	0.54
4:D:59:LEU:N	4:D:59:LEU:HD22	2.21	0.54
5:E:6:ILE:N	5:E:6:ILE:HD12	2.22	0.54
1:A:230:LEU:HD21	1:A:243:LYS:CE	2.38	0.53
2:B:4:THR:HG23	2:B:86:THR:OG1	2.09	0.53
4:D:130:ASP:O	4:D:131:LYS:O	2.27	0.53
4:D:124:ARG:HH12	5:E:129:GLU:CD	2.11	0.53
2:B:48:LYS:NZ	2:B:48:LYS:HB3	2.24	0.52
1:A:229:GLU:HG3	1:A:244:TRP:CZ3	2.41	0.52
2:B:58:LYS:HD3	2:B:59:ASP:N	2.24	0.52
5:E:127:VAL:HG23	5:E:237:ALA:HB3	1.92	0.52
1:A:51:TRP:O	1:A:54:GLN:HG2	2.09	0.52
1:A:217:TRP:CD1	1:A:247:VAL:HG13	2.44	0.52
4:D:184:CYS:HA	4:D:187:ALA:HB2	1.93	0.51
4:D:164:ARG:HD3	4:D:164:ARG:N	2.25	0.51
6:A:2079:HOH:O	2:B:0:MET:HB2	2.10	0.51
5:E:118:LYS:HD2	5:E:225:GLN:CG	2.41	0.51
4:D:150:ASP:HB2	4:D:153:VAL:HG23	1.91	0.51
4:D:160:VAL:HG22	4:D:171:ASN:OD1	2.10	0.51
5:E:34:MET:HE2	5:E:95:SER:HB3	1.91	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:147:TRP:CH2	3:C:9:LEU:HD23	2.46	0.50
5:E:86:ASN:N	5:E:87:PRO:CD	2.74	0.50
5:E:62:ILE:HG13	5:E:62:ILE:O	2.11	0.49
2:B:4:THR:HG22	2:B:5:PRO:HD2	1.94	0.49
5:E:183:LEU:HD12	5:E:184:ASN:H	1.78	0.49
4:D:168:PHE:CD2	5:E:140:LYS:HE2	2.47	0.49
5:E:183:LEU:HG	5:E:185:ASP:N	2.25	0.49
1:A:225:THR:HG22	1:A:225:THR:O	2.12	0.49
4:D:55:GLU:OE1	4:D:57:LYS:HE3	2.13	0.48
4:D:98:ASN:HD22	4:D:98:ASN:C	2.15	0.48
1:A:3:HIS:HE1	6:A:2093:HOH:O	1.95	0.48
1:A:266:LEU:HD22	1:A:270:LEU:HD21	1.95	0.48
5:E:7:THR:HG23	6:E:2002:HOH:O	2.12	0.48
1:A:228:THR:OG1	1:A:247:VAL:HG12	2.14	0.48
4:D:191:SER:HB2	4:D:193:ILE:CD1	2.44	0.48
1:A:74:HIS:HE1	1:A:97:ARG:HH11	1.62	0.47
1:A:181:ARG:HG2	1:A:182:THR:N	2.29	0.47
1:A:127:LYS:HD2	1:A:132:SER:OG	2.15	0.47
1:A:230:LEU:HD23	1:A:231:VAL:O	2.15	0.47
5:E:174:PRO:HD2	6:E:2124:HOH:O	2.14	0.46
5:E:65:GLY:HA3	5:E:83:ALA:HA	1.97	0.46
1:A:253:GLN:NE2	1:A:256:ARG:HH11	2.13	0.46
2:B:25:CYS:HB2	2:B:39:LEU:HD21	1.97	0.46
1:A:258:THR:OG1	1:A:260:HIS:HE1	1.99	0.46
5:E:173:ASP:HB2	5:E:190:LEU:HD12	1.98	0.46
5:E:180:GLN:O	5:E:186:SER:HB2	2.15	0.46
4:D:124:ARG:NH1	5:E:129:GLU:CD	2.70	0.46
5:E:40:ASP:HB3	5:E:41:PRO:HD2	1.97	0.45
4:D:193:ILE:HD12	4:D:193:ILE:N	2.31	0.45
5:E:13:LEU:CD1	5:E:23:LEU:HD22	2.47	0.45
1:A:74:HIS:CE1	1:A:97:ARG:HH11	2.35	0.45
1:A:230:LEU:CD2	1:A:243:LYS:HE3	2.46	0.45
1:A:230:LEU:C	1:A:230:LEU:CD2	2.84	0.45
1:A:229:GLU:HG2	1:A:246:ALA:HB3	1.97	0.45
2:B:58:LYS:HD3	2:B:58:LYS:C	2.37	0.45
4:D:164:ARG:HH12	5:E:169:GLY:H	1.64	0.44
5:E:132:GLU:H	5:E:132:GLU:CD	2.20	0.44
4:D:179:LYS:HA	4:D:179:LYS:CE	2.47	0.44
1:A:266:LEU:HD22	1:A:270:LEU:CD2	2.48	0.43
5:E:179:GLU:O	5:E:180:GLN:NE2	2.50	0.43
5:E:129:GLU:OE1	5:E:242:ARG:CZ	2.67	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:62:ILE:O	5:E:62:ILE:HG23	2.19	0.43
1:A:82:ARG:HG2	1:A:82:ARG:NH1	2.33	0.43
5:E:86:ASN:H	5:E:87:PRO:HD3	1.84	0.43
1:A:266:LEU:CD1	1:A:270:LEU:HD23	2.43	0.43
1:A:135:ALA:HB3	1:A:141:GLN:NE2	2.33	0.43
5:E:202:GLN:O	5:E:204:PRO:HD3	2.19	0.43
2:B:24:ASN:HB3	2:B:65:LEU:HD11	2.01	0.42
5:E:153:ASP:CG	5:E:176:PRO:HG2	2.39	0.42
5:E:173:ASP:HB2	5:E:190:LEU:CD1	2.50	0.42
4:D:164:ARG:HH11	4:D:164:ARG:H	1.65	0.42
5:E:81:THR:O	5:E:83:ALA:N	2.43	0.42
5:E:203:ASN:HB3	5:E:206:ASN:ND2	2.34	0.42
1:A:176:LYS:HG3	1:A:180:GLN:NE2	2.35	0.42
4:D:177:SER:HB3	4:D:182:PHE:CG	2.55	0.42
5:E:5:GLY:N	5:E:28:ASN:OD1	2.52	0.42
1:A:176:LYS:NZ	1:A:176:LYS:CB	2.83	0.42
4:D:198:PHE:CE2	4:D:200:PRO:HG3	2.54	0.42
5:E:99:SER:O	5:E:100:SER:HB2	2.20	0.42
5:E:175:GLN:HE21	5:E:175:GLN:HB2	1.62	0.41
4:D:114:GLN:C	4:D:116:PRO:HD3	2.41	0.41
4:D:162:ASP:OD2	4:D:169:LYS:HE2	2.20	0.41
5:E:16:LYS:NZ	5:E:117:LEU:HD11	2.35	0.41
5:E:219:GLU:OE1	5:E:219:GLU:HA	2.20	0.41
4:D:140:ASP:OD2	4:D:140:ASP:C	2.58	0.41
5:E:34:MET:HG3	5:E:76:PHE:HD2	1.86	0.41
5:E:132:GLU:CD	5:E:132:GLU:N	2.74	0.41
5:E:173:ASP:OD1	5:E:193:ARG:NH2	2.52	0.41
5:E:223:TRP:CZ2	5:E:225:GLN:HB2	2.56	0.41
4:D:124:ARG:CD	4:D:124:ARG:N	2.83	0.40
4:D:161:LEU:C	4:D:161:LEU:HD23	2.42	0.40
5:E:183:LEU:HD12	5:E:184:ASN:N	2.36	0.40
1:A:65:ARG:HD2	5:E:58:GLN:NE2	2.37	0.40
5:E:14:PHE:HZ	5:E:114:THR:HG21	1.85	0.40
5:E:34:MET:HG3	5:E:76:PHE:CD2	2.56	0.40
1:A:194:VAL:O	1:A:195:SER:HB3	2.20	0.40
5:E:16:LYS:NZ	5:E:16:LYS:CB	2.85	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%)	263 (96%)	9 (3%)	2 (1%)	22	5
2	B	98/100 (98%)	98 (100%)	0	0	100	100
3	C	7/9 (78%)	6 (86%)	1 (14%)	0	100	100
4	D	198/215 (92%)	188 (95%)	9 (4%)	1 (0%)	29	9
5	E	239/252 (95%)	226 (95%)	11 (5%)	2 (1%)	19	4
All	All	816/852 (96%)	781 (96%)	30 (4%)	5 (1%)	25	7

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	223	ASP
4	D	131	LYS
5	E	83	ALA
5	E	86	ASN
1	A	220	ASP

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%)	228 (98%)	4 (2%)	60	31
2	B	95/95 (100%)	92 (97%)	3 (3%)	39	9
3	C	7/7 (100%)	7 (100%)	0	100	100
4	D	175/188 (93%)	171 (98%)	4 (2%)	50	18

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	E	212/220 (96%)	208 (98%)	4 (2%)	57	25
All	All	721/742 (97%)	706 (98%)	15 (2%)	53	21

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	181	ARG
1	A	223	ASP
1	A	230	LEU
1	A	273	ARG
2	B	4	THR
2	B	70	PHE
2	B	83	ASN
4	D	75	LEU
4	D	98	ASN
4	D	124	ARG
4	D	164	ARG
5	E	27	GLN
5	E	34	MET
5	E	132	GLU
5	E	175	GLN

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

Mol	Chain	Res	Type
1	A	3	HIS
1	A	54	GLN
1	A	72	GLN
1	A	74	HIS
1	A	93	HIS
1	A	115	GLN
1	A	141	GLN
1	A	188	HIS
1	A	242	GLN
1	A	253	GLN
1	A	260	HIS
2	B	2	GLN
2	B	51	HIS
2	B	83	ASN
4	D	15	GLN
4	D	98	ASN

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Mol	Chain	Res	Type
4	D	114	GLN
5	E	19	GLN
5	E	27	GLN
5	E	43	GLN
5	E	55	ASN
5	E	103	GLN
5	E	175	GLN
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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th 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%)	0.71	39 (14%) 2 2	16, 26, 50, 72	0
2	B	100/100 (100%)	0.59	7 (7%) 16 15	17, 22, 38, 61	0
3	C	9/9 (100%)	1.97	4 (44%) 0 0	17, 17, 19, 25	0
4	D	200/215 (93%)	1.24	42 (21%) 1 0	17, 33, 71, 75	0
5	E	241/252 (95%)	0.97	46 (19%) 1 1	15, 30, 56, 64	0
All	All	826/852 (96%)	0.91	138 (16%) 1 1	15, 28, 61, 75	0

All (138) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	0	MET	9.7
5	E	183	LEU	9.2
1	A	227	ASP	8.7
4	D	180	SER	8.1
5	E	85	LYS	7.9
1	A	196	ASP	7.9
5	E	182	ALA	7.9
4	D	129	SER	7.9
4	D	201	SER	7.8
5	E	220	ASN	7.6
4	D	178	ASN	7.6
4	D	130	ASP	7.5
4	D	202	PRO	7.1
4	D	181	ASP	7.1
4	D	152	ASP	6.9
5	E	84	GLN	6.8
4	D	149	LYS	6.6
5	E	34	MET	6.6
1	A	197	HIS	6.6
4	D	151	SER	6.6

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Mol	Chain	Res	Type	RSRZ
4	D	114	GLN	6.2
5	E	222	GLU	6.0
4	D	182	PHE	5.9
1	A	194	VAL	5.7
4	D	142	GLN	5.7
4	D	150	ASP	5.7
4	D	192	ILE	5.5
4	D	147	GLN	5.1
4	D	179	LYS	5.1
5	E	244	ASP	5.1
4	D	148	SER	4.8
2	B	48	LYS	4.8
1	A	276	PRO	4.7
1	A	9	PHE	4.6
4	D	167	ASP	4.5
5	E	144	VAL	4.4
5	E	224	THR	4.4
5	E	86	ASN	4.2
1	A	136	ALA	4.2
5	E	136	SER	4.0
5	E	184	ASN	4.0
4	D	184	CYS	3.9
1	A	220	ASP	3.9
5	E	41	PRO	3.9
5	E	180	GLN	3.9
4	D	164	ARG	3.9
2	B	1	ILE	3.9
5	E	245	GLN	3.9
5	E	219	GLU	3.8
3	C	3	LEU	3.7
1	A	17	ARG	3.7
5	E	221	ASP	3.6
4	D	144	ASN	3.6
1	A	7	TYR	3.6
5	E	83	ALA	3.5
4	D	189	ASN	3.5
4	D	198	PHE	3.5
4	D	196	ASP	3.4
5	E	42	GLY	3.4
1	A	193	ALA	3.4
5	E	175	GLN	3.3
4	D	190	ASN	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	275	GLU	3.3
5	E	177	LEU	3.3
1	A	195	SER	3.3
5	E	132	GLU	3.2
1	A	251	SER	3.2
1	A	8	PHE	3.2
4	D	193	ILE	3.2
1	A	16	GLY	3.2
4	D	195	GLU	3.1
4	D	165	SER	3.1
4	D	185	ALA	3.1
3	C	2	ILE	3.1
1	A	226	GLN	3.1
1	A	223	ASP	3.1
1	A	268	LYS	3.0
5	E	43	GLN	2.9
5	E	199	THR	2.9
5	E	115	GLU	2.8
1	A	192	HIS	2.8
5	E	145	CYS	2.8
5	E	62	ILE	2.8
1	A	25	VAL	2.7
5	E	44	GLY	2.7
4	D	166	MET	2.7
5	E	116	ASP	2.7
2	B	56	PHE	2.7
5	E	19	GLN	2.7
1	A	99	TYR	2.6
4	D	90	CYS	2.6
1	A	89	GLU	2.6
1	A	67	VAL	2.6
3	C	6	VAL	2.6
1	A	221	GLY	2.6
4	D	140	ASP	2.6
5	E	128	PHE	2.6
1	A	108	ARG	2.5
1	A	248	VAL	2.5
1	A	222	GLU	2.5
1	A	225	THR	2.5
1	A	178	THR	2.4
1	A	95	VAL	2.4
5	E	205	ARG	2.4

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Mol	Chain	Res	Type	RSRZ
5	E	146	LEU	2.4
1	A	198	GLU	2.4
5	E	185	ASP	2.4
4	D	135	LEU	2.4
5	E	82	SER	2.3
4	D	186	ASN	2.3
5	E	139	GLN	2.3
5	E	179	GLU	2.3
5	E	242	ARG	2.3
5	E	218	SER	2.3
5	E	178	LYS	2.3
5	E	127	VAL	2.3
4	D	99	LEU	2.3
3	C	5	PHE	2.2
4	D	124	ARG	2.2
4	D	35	TRP	2.2
1	A	224	GLN	2.2
5	E	225	GLN	2.2
1	A	270	LEU	2.2
5	E	121	PHE	2.1
1	A	131	ARG	2.1
4	D	194	PRO	2.1
1	A	138	MET	2.1
5	E	64	GLU	2.1
4	D	200	PRO	2.1
2	B	88	SER	2.1
1	A	24	ALA	2.1
1	A	90	ALA	2.1
2	B	40	LEU	2.1
5	E	137	HIS	2.0
2	B	47	GLU	2.0
1	A	199	ALA	2.0
4	D	199	PHE	2.0
4	D	82	PRO	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 [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.