



Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 02:42 pm BST

PDB ID : 4L3E
Title : The complex between high affinity TCR DMF5(alpha-D26Y,beta-L98W) and human Class I MHC HLA-A2 with the bound MART-1(26-35)(A27L) peptide
Authors : Hellman, L.M.
Deposited on : 2013-06-05
Resolution : 2.56 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 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

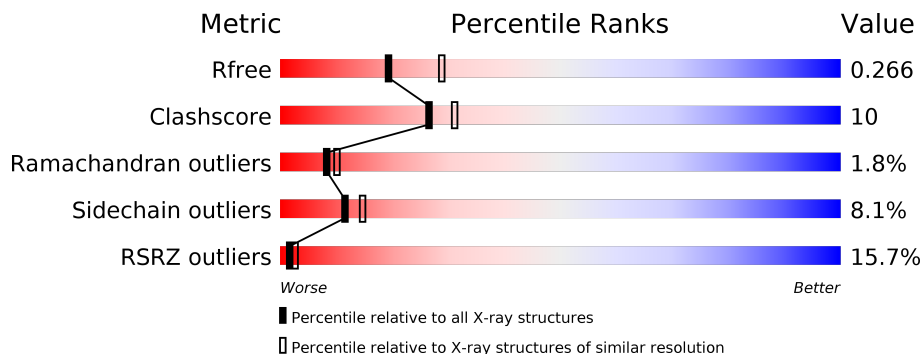
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.56 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	1279 (2.58-2.54)
Clashscore	141614	1327 (2.58-2.54)
Ramachandran outliers	138981	1312 (2.58-2.54)
Sidechain outliers	138945	1312 (2.58-2.54)
RSRZ outliers	127900	1269 (2.58-2.54)

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 ≥ 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	275	
2	B	100	
3	C	10	
4	D	199	
5	E	242	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6615 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	275	2246	1403	409	425	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

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	INITIATING METHIONINE	UNP P61769

- Molecule 3 is a protein called Melanoma antigen recognized by T-cells 1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	10	69	45	10	14	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	2	LEU	ALA	ENGINEERED MUTATION	UNP Q16655

- Molecule 4 is a protein called DMF5 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	199	1549	970	255	316	8	0	0	0

- Molecule 5 is a protein called DMF5 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	242	1902	1196	334	364	8	0	0	0

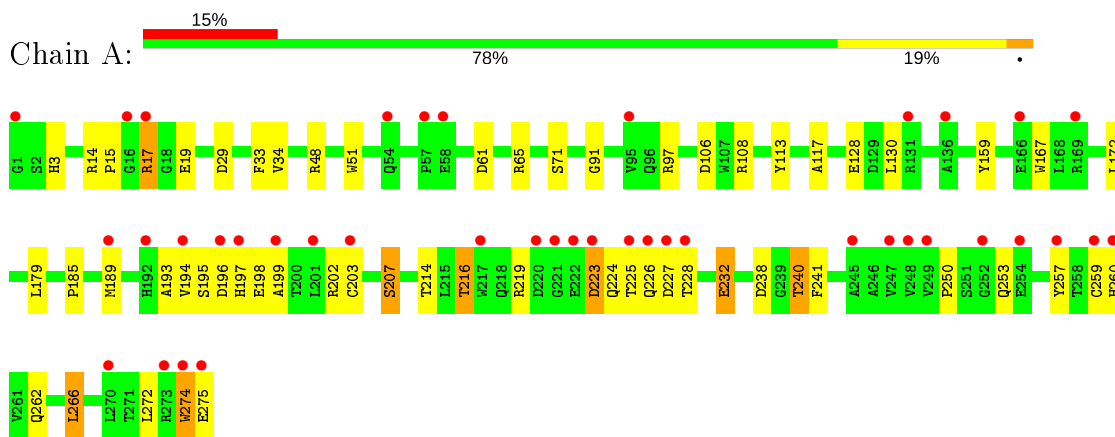
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	4	Total 4	O 4	0	0
6	B	2	Total 2	O 2	0	0
6	C	1	Total 1	O 1	0	0
6	D	3	Total 3	O 3	0	0
6	E	2	Total 2	O 2	0	0

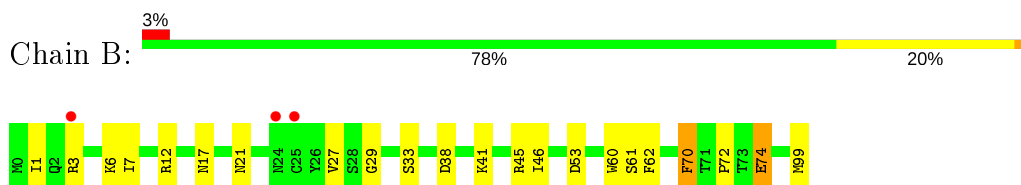
3 Residue-property plots [i](#)

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.

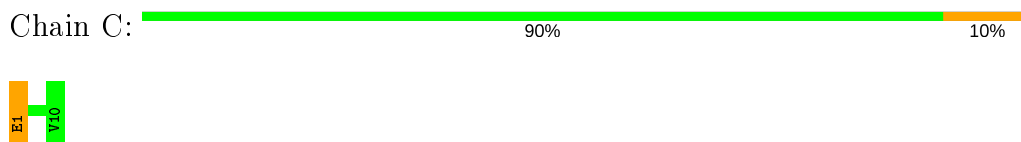
- Molecule 1: HLA class I histocompatibility antigen, A-2 alpha chain



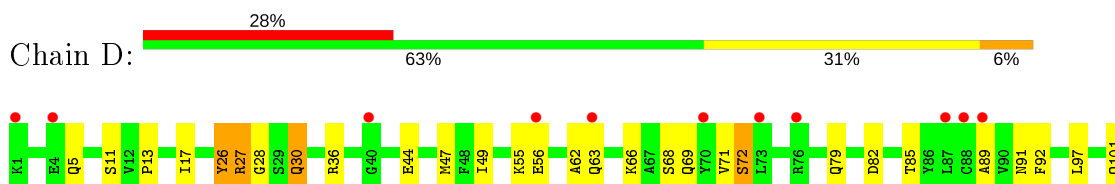
- Molecule 2: Beta-2-microglobulin

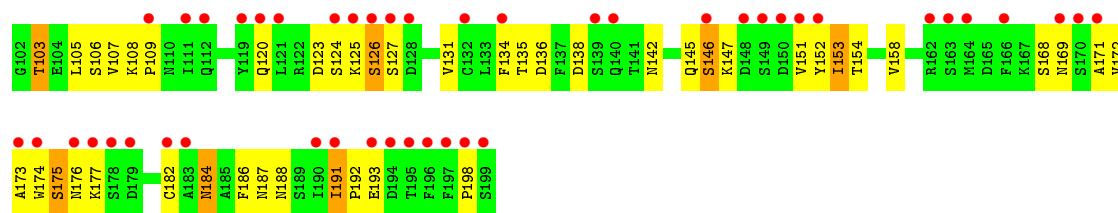


- Molecule 3: Melanoma antigen recognized by T-cells 1

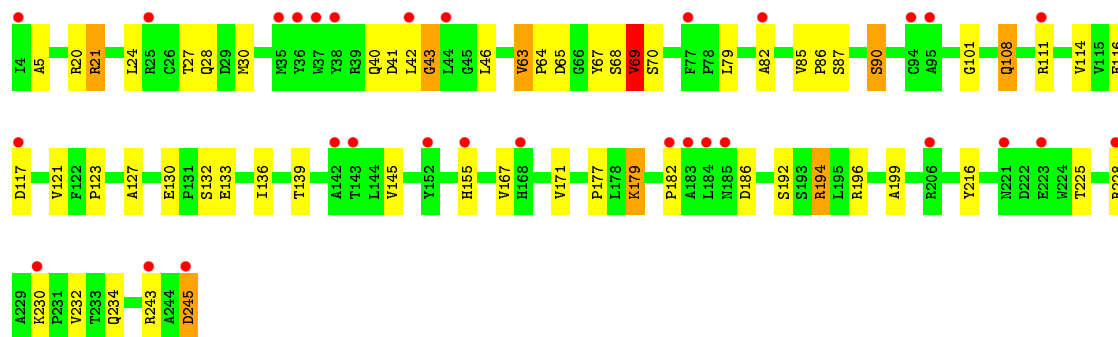
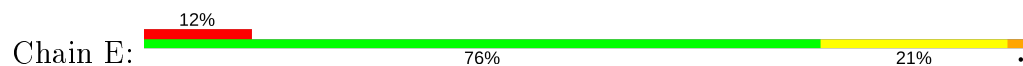


- Molecule 4: DMF5 alpha chain





● Molecule 5: DMF5 beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	227.04Å 49.32Å 92.89Å 90.00° 94.82° 90.00°	Depositor
Resolution (Å)	20.05 – 2.56 20.05 – 2.56	Depositor EDS
% Data completeness (in resolution range)	94.6 (20.05-2.56) 94.8 (20.05-2.56)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.35 (at 2.56Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.229 , 0.266 0.229 , 0.266	Depositor DCC
R_{free} test set	1631 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	58.8	Xtriage
Anisotropy	0.862	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 47.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6615	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.15% 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	0.43	0/2311	0.60	0/3137
2	B	0.44	0/860	0.58	0/1162
3	C	0.79	0/68	0.78	0/90
4	D	0.49	0/1583	0.59	0/2142
5	E	0.45	1/1953 (0.1%)	0.60	1/2663 (0.0%)
All	All	0.46	1/6775 (0.0%)	0.59	1/9194 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	64	PRO	N-CD	5.33	1.55	1.47

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	63	VAL	C-N-CD	5.52	139.99	128.40

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	2246	0	2096	38	0
2	B	837	0	803	15	0
3	C	69	0	79	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	1549	0	1467	58	0
5	E	1902	0	1807	34	0
6	A	4	0	0	0	0
6	B	2	0	0	0	0
6	C	1	0	0	0	0
6	D	3	0	0	0	0
6	E	2	0	0	0	0
All	All	6615	0	6252	132	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 10.

All (132) 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:D:26:TYR:HE1	4:D:28:GLY:HA3	1.16	1.07
4:D:26:TYR:HE1	4:D:28:GLY:CA	1.81	0.93
4:D:26:TYR:CE1	4:D:28:GLY:CA	2.55	0.88
4:D:26:TYR:CE1	4:D:28:GLY:HA3	2.07	0.88
1:A:274:TRP:HE3	1:A:275:GLU:H	1.24	0.85
4:D:109:PRO:HG2	4:D:158:VAL:HG21	1.61	0.80
1:A:250:PRO:O	1:A:253:GLN:NE2	2.15	0.80
4:D:26:TYR:HD1	4:D:28:GLY:H	1.29	0.79
4:D:26:TYR:CD1	4:D:28:GLY:N	2.51	0.78
5:E:41:ASP:OD1	5:E:90:SER:OG	2.01	0.78
5:E:136:ILE:HD11	5:E:199:ALA:HA	1.67	0.76
5:E:130:GLU:OE2	5:E:243:ARG:NH1	2.19	0.75
4:D:26:TYR:HD1	4:D:28:GLY:N	1.85	0.74
4:D:91:ASN:HD22	5:E:101:GLY:HA2	1.53	0.73
4:D:147:LYS:NZ	4:D:187:ASN:OD1	2.22	0.72
1:A:202:ARG:NH1	2:B:99:MET:O	2.23	0.71
5:E:245:ASP:OD1	5:E:245:ASP:N	2.23	0.70
4:D:123:ASP:OD1	4:D:124:SER:N	2.27	0.68
4:D:184:ASN:OD1	4:D:184:ASN:N	2.27	0.68
1:A:216:THR:HG23	1:A:260:HIS:HB2	1.76	0.68
4:D:27:ARG:NH1	4:D:27:ARG:HB2	2.08	0.68
1:A:238:ASP:OD1	1:A:240:THR:HG23	1.94	0.67
5:E:86:PRO:HA	5:E:114:VAL:HB	1.77	0.66
4:D:146:SER:O	4:D:188:ASN:ND2	2.29	0.65
1:A:219:ARG:HB3	1:A:224:GLN:NE2	2.11	0.65
4:D:158:VAL:HG22	4:D:169:ASN:HB3	1.80	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:121:VAL:O	5:E:228:ARG:NH2	2.27	0.62
5:E:155:HIS:HB3	5:E:216:TYR:HB2	1.81	0.62
1:A:185:PRO:HD2	1:A:266:LEU:HD13	1.80	0.62
4:D:172:VAL:HG23	5:E:194:ARG:HE	1.65	0.61
4:D:134:PHE:HB2	4:D:186:PHE:CZ	2.35	0.61
5:E:68:SER:O	5:E:69:VAL:HB	2.00	0.61
5:E:63:VAL:HG23	5:E:63:VAL:O	2.00	0.61
4:D:153:ILE:HD11	4:D:171:ALA:HB1	1.83	0.60
4:D:26:TYR:CE1	4:D:28:GLY:N	2.70	0.59
4:D:154:THR:OG1	5:E:194:ARG:NH2	2.36	0.59
2:B:38:ASP:OD2	2:B:45:ARG:HD2	2.04	0.58
1:A:15:PRO:HG3	1:A:91:GLY:O	2.03	0.57
2:B:41:LYS:HB2	2:B:46:ILE:HD11	1.86	0.57
4:D:91:ASN:ND2	5:E:101:GLY:HA2	2.19	0.57
5:E:85:VAL:HG13	5:E:87:SER:H	1.68	0.56
5:E:41:ASP:O	5:E:43:GLY:N	2.33	0.56
4:D:13:PRO:HA	4:D:108:LYS:HG2	1.87	0.56
1:A:240:THR:OG1	1:A:241:PHE:N	2.38	0.55
1:A:224:GLN:HE22	1:A:257:TYR:HE2	1.54	0.55
5:E:68:SER:OG	5:E:69:VAL:N	2.40	0.55
1:A:51:TRP:CE2	1:A:179:LEU:HD11	2.42	0.55
4:D:151:VAL:HA	4:D:175:SER:HB3	1.88	0.54
1:A:172:LEU:HD23	1:A:179:LEU:HD23	1.89	0.54
1:A:232:GLU:OE2	2:B:6:LYS:HE3	2.08	0.54
1:A:195:SER:O	1:A:197:HIS:N	2.41	0.54
4:D:5:GLN:O	4:D:101:GLN:NE2	2.41	0.54
4:D:27:ARG:HH11	4:D:27:ARG:HB2	1.73	0.53
5:E:123:PRO:HB3	5:E:234:GLN:HE21	1.74	0.53
5:E:133:GLU:O	5:E:136:ILE:HG22	2.09	0.53
4:D:27:ARG:NH1	4:D:27:ARG:CB	2.73	0.52
5:E:40:GLN:HB2	5:E:46:LEU:HD23	1.92	0.52
4:D:105:LEU:HD21	4:D:107:VAL:HG23	1.92	0.52
4:D:66:LYS:O	4:D:69:GLN:NE2	2.42	0.52
1:A:194:VAL:HG13	1:A:198:GLU:HB3	1.93	0.51
4:D:27:ARG:CZ	4:D:27:ARG:CB	2.88	0.51
1:A:159:TYR:HD1	4:D:30:GLN:OE1	1.93	0.51
4:D:49:ILE:HD13	4:D:55:LYS:HB2	1.92	0.50
1:A:203:CYS:SG	1:A:272:LEU:HD11	2.52	0.50
5:E:5:ALA:HB1	5:E:30:MET:HG2	1.94	0.49
5:E:111:ARG:NH1	5:E:155:HIS:HA	2.27	0.49
5:E:24:LEU:HD12	5:E:79:LEU:HD23	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:207:SER:HA	1:A:240:THR:OG1	2.13	0.49
4:D:5:GLN:HB3	4:D:103:THR:HG22	1.94	0.49
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.48	0.49
4:D:89:ALA:HB1	4:D:97:LEU:HD11	1.94	0.49
1:A:48:ARG:NH2	2:B:53:ASP:OD2	2.46	0.49
5:E:108:GLN:CD	5:E:108:GLN:H	2.17	0.49
4:D:26:TYR:C	4:D:26:TYR:CD1	2.85	0.48
4:D:26:TYR:CE1	4:D:28:GLY:C	2.86	0.48
4:D:131:VAL:HG22	4:D:174:TRP:HB3	1.95	0.48
1:A:65:ARG:NH1	4:D:92:PHE:O	2.47	0.48
1:A:15:PRO:HG3	1:A:91:GLY:C	2.35	0.47
2:B:29:GLY:HA2	2:B:61:SER:OG	2.14	0.47
4:D:26:TYR:C	4:D:26:TYR:HD1	2.18	0.47
1:A:214:THR:HB	1:A:262:GLN:HB2	1.97	0.47
4:D:27:ARG:CZ	4:D:27:ARG:HB3	2.45	0.47
1:A:223:ASP:N	1:A:223:ASP:OD1	2.48	0.47
5:E:123:PRO:HB3	5:E:234:GLN:NE2	2.30	0.47
2:B:74:GLU:CD	2:B:74:GLU:H	2.18	0.47
4:D:125:LYS:HD2	5:E:127:ALA:HB2	1.96	0.46
2:B:33:SER:HB3	2:B:62:PHE:CE2	2.50	0.46
1:A:167:TRP:CD2	3:C:1:GLU:HG3	2.51	0.46
4:D:120:GLN:HB2	4:D:182:CYS:SG	2.55	0.46
4:D:30:GLN:HB2	4:D:30:GLN:HE21	1.65	0.46
5:E:139:THR:HG21	5:E:196:ARG:NH2	2.31	0.46
1:A:219:ARG:HB3	1:A:224:GLN:HE21	1.79	0.45
1:A:51:TRP:CZ2	1:A:179:LEU:HD11	2.51	0.45
4:D:82:ASP:O	4:D:105:LEU:HD22	2.17	0.45
4:D:47:MET:SD	4:D:62:ALA:HB2	2.57	0.45
1:A:238:ASP:HB3	2:B:12:ARG:HD3	1.99	0.45
1:A:33:PHE:CD2	1:A:34:VAL:HG13	2.52	0.45
5:E:63:VAL:C	5:E:65:ASP:H	2.20	0.45
1:A:14:ARG:O	1:A:17:ARG:HG3	2.17	0.44
1:A:219:ARG:HD2	1:A:224:GLN:HE21	1.82	0.44
4:D:145:GLN:HA	4:D:153:ILE:CG2	2.48	0.44
1:A:128:GLU:O	1:A:130:LEU:HD13	2.18	0.44
2:B:1:ILE:HG13	2:B:1:ILE:H	1.64	0.44
1:A:61:ASP:HB3	1:A:65:ARG:NH2	2.33	0.43
4:D:138:ASP:N	4:D:138:ASP:OD1	2.52	0.43
4:D:153:ILE:HD12	4:D:154:THR:N	2.34	0.43
2:B:6:LYS:HB2	2:B:6:LYS:HE2	1.74	0.43
4:D:176:ASN:OD1	4:D:177:LYS:N	2.52	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:91:ASN:HD22	5:E:101:GLY:CA	2.25	0.42
1:A:193:ALA:HA	1:A:199:ALA:HA	2.01	0.42
5:E:179:LYS:HD2	5:E:182:PRO:HA	2.01	0.42
4:D:124:SER:O	4:D:126:SER:N	2.52	0.42
1:A:3:HIS:HD2	1:A:29:ASP:OD2	2.03	0.42
2:B:21:ASN:HB3	2:B:70:PHE:CE1	2.54	0.42
4:D:153:ILE:HD12	4:D:154:THR:H	1.84	0.42
4:D:145:GLN:HA	4:D:153:ILE:HG23	2.02	0.42
2:B:7:ILE:HG12	2:B:27:VAL:HG12	2.02	0.42
5:E:20:ARG:NH1	5:E:21:ARG:O	2.53	0.42
5:E:243:ARG:HG3	5:E:245:ASP:H	1.85	0.42
1:A:106:ASP:OD1	1:A:106:ASP:N	2.49	0.41
4:D:145:GLN:O	4:D:147:LYS:N	2.53	0.41
4:D:135:THR:HG22	4:D:136:ASP:CG	2.41	0.41
5:E:230:LYS:HG2	5:E:232:VAL:HG13	2.02	0.41
4:D:152:TYR:O	4:D:173:ALA:HA	2.21	0.41
5:E:63:VAL:C	5:E:65:ASP:N	2.73	0.41
1:A:15:PRO:C	1:A:17:ARG:H	2.23	0.41
1:A:189:MET:SD	1:A:272:LEU:HD13	2.61	0.41
5:E:111:ARG:HB3	5:E:111:ARG:HE	1.53	0.41
4:D:191:ILE:H	4:D:191:ILE:HG13	1.40	0.40
4:D:36:ARG:O	4:D:44:GLU:HG2	2.21	0.40
4:D:63:GLN:HB3	4:D:72:SER:HB2	2.02	0.40
2:B:17:ASN:HA	2:B:72:PRO:O	2.21	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	273/275 (99%)	260 (95%)	9 (3%)	4 (2%)	10 13

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	98/100 (98%)	96 (98%)	2 (2%)	0	100	100
3	C	8/10 (80%)	8 (100%)	0	0	100	100
4	D	197/199 (99%)	177 (90%)	14 (7%)	6 (3%)	4	4
5	E	240/242 (99%)	221 (92%)	14 (6%)	5 (2%)	7	8
All	All	816/826 (99%)	762 (93%)	39 (5%)	15 (2%)	8	10

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	226	GLN
4	D	126	SER
5	E	42	LEU
1	A	196	ASP
1	A	227	ASP
5	E	69	VAL
4	D	146	SER
4	D	175	SER
4	D	192	PRO
5	E	82	ALA
1	A	19	GLU
4	D	193	GLU
4	D	198	PRO
5	E	177	PRO
5	E	43	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	231/231 (100%)	216 (94%)	15 (6%)	17	22
2	B	95/95 (100%)	92 (97%)	3 (3%)	39	51
3	C	7/7 (100%)	6 (86%)	1 (14%)	3	3
4	D	176/176 (100%)	157 (89%)	19 (11%)	6	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	E	204/204 (100%)	184 (90%)	20 (10%)	8	9
All	All	713/713 (100%)	655 (92%)	58 (8%)	11	15

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ARG
1	A	71	SER
1	A	97	ARG
1	A	108	ARG
1	A	113	TYR
1	A	207	SER
1	A	216	THR
1	A	223	ASP
1	A	225	THR
1	A	228	THR
1	A	232	GLU
1	A	240	THR
1	A	259	CYS
1	A	266	LEU
1	A	274	TRP
2	B	3	ARG
2	B	70	PHE
2	B	74	GLU
3	C	1	GLU
4	D	11	SER
4	D	17	ILE
4	D	26	TYR
4	D	27	ARG
4	D	30	GLN
4	D	56	GLU
4	D	68	SER
4	D	71	VAL
4	D	72	SER
4	D	79	GLN
4	D	85	THR
4	D	103	THR
4	D	106	SER
4	D	127	SER
4	D	142	ASN
4	D	153	ILE
4	D	168	SER

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Mol	Chain	Res	Type
4	D	184	ASN
4	D	191	ILE
5	E	21	ARG
5	E	27	THR
5	E	28	GLN
5	E	67	TYR
5	E	69	VAL
5	E	70	SER
5	E	90	SER
5	E	108	GLN
5	E	116	GLU
5	E	117	ASP
5	E	132	SER
5	E	145	VAL
5	E	167	VAL
5	E	171	VAL
5	E	179	LYS
5	E	186	ASP
5	E	192	SER
5	E	194	ARG
5	E	225	THR
5	E	245	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	174	ASN
1	A	192	HIS
1	A	197	HIS
1	A	224	GLN
4	D	37	GLN
4	D	113	ASN
5	E	33	ASN
5	E	40	GLN
5	E	234	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, 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	275/275 (100%)	0.72	41 (14%) 2 3	14, 44, 112, 129	0
2	B	100/100 (100%)	0.29	3 (3%) 50 59	15, 33, 67, 78	0
3	C	10/10 (100%)	0.17	0 100 100	13, 19, 27, 34	0
4	D	199/199 (100%)	1.43	56 (28%) 0 0	31, 72, 130, 159	0
5	E	242/242 (100%)	0.80	30 (12%) 4 6	18, 62, 109, 135	0
All	All	826/826 (100%)	0.86	130 (15%) 2 3	13, 53, 116, 159	0

All (130) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	D	127	SER	7.2
5	E	184	LEU	6.8
4	D	126	SER	6.7
1	A	275	GLU	5.6
1	A	16	GLY	5.6
5	E	42	LEU	5.5
4	D	190	ILE	5.4
4	D	128	ASP	5.4
1	A	257	TYR	5.1
5	E	245	ASP	5.0
4	D	149	SER	5.0
4	D	173	ALA	4.9
1	A	248	VAL	4.8
4	D	112	GLN	4.6
4	D	1	LYS	4.5
4	D	150	ASP	4.5
4	D	132	CYS	4.5
4	D	193	GLU	4.5
4	D	179	ASP	4.4
4	D	111	ILE	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	223	ASP	4.4
5	E	185	ASN	4.3
1	A	225	THR	4.3
4	D	163	SER	4.3
4	D	177	LYS	4.2
1	A	270	LEU	4.2
4	D	194	ASP	4.1
1	A	203	CYS	4.1
5	E	94	CYS	4.1
4	D	199	SER	4.0
1	A	249	VAL	3.9
5	E	44	LEU	3.9
4	D	169	ASN	3.8
4	D	196	PHE	3.8
4	D	182	CYS	3.8
5	E	168	HIS	3.6
1	A	252	GLY	3.5
4	D	152	TYR	3.5
1	A	227	ASP	3.5
1	A	222	GLU	3.5
4	D	164	MET	3.5
1	A	220	ASP	3.5
5	E	223	GLU	3.4
1	A	274	TRP	3.4
4	D	88	CYS	3.3
4	D	176	ASN	3.3
4	D	166	PHE	3.2
2	B	3	ARG	3.2
4	D	162	ARG	3.2
4	D	134	PHE	3.2
1	A	245	ALA	3.2
5	E	206	ARG	3.1
4	D	148	ASP	3.1
1	A	17	ARG	3.1
1	A	221	GLY	3.0
5	E	142	ALA	3.0
4	D	171	ALA	3.0
5	E	38	TYR	3.0
4	D	195	THR	3.0
4	D	139	SER	3.0
4	D	198	PRO	3.0
1	A	260	HIS	2.9

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Mol	Chain	Res	Type	RSRZ
5	E	182	PRO	2.9
5	E	183	ALA	2.9
1	A	194	VAL	2.9
1	A	189	MET	2.9
4	D	70	TYR	2.9
5	E	155	HIS	2.8
1	A	226	GLN	2.8
4	D	178	SER	2.8
5	E	143	THR	2.7
4	D	183	ALA	2.7
5	E	36	TYR	2.7
5	E	37	TRP	2.7
1	A	259	CYS	2.7
4	D	151	VAL	2.7
4	D	125	LYS	2.7
4	D	89	ALA	2.7
1	A	197	HIS	2.6
4	D	140	GLN	2.6
5	E	82	ALA	2.6
1	A	57	PRO	2.5
1	A	54	GLN	2.5
5	E	4	ILE	2.5
1	A	254	GLU	2.5
5	E	25	ARG	2.5
1	A	136	ALA	2.5
1	A	199	ALA	2.5
1	A	192	HIS	2.4
4	D	124	SER	2.4
4	D	4	GLU	2.4
5	E	35	MET	2.4
5	E	152	TYR	2.4
4	D	174	TRP	2.4
1	A	217	TRP	2.3
4	D	76	ARG	2.3
4	D	170	SER	2.3
5	E	243	ARG	2.3
4	D	73	LEU	2.3
4	D	120	GLN	2.3
1	A	196	ASP	2.3
4	D	119	TYR	2.3
4	D	109	PRO	2.3
4	D	56	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
5	E	221	ASN	2.2
1	A	201	LEU	2.2
2	B	24	ASN	2.2
1	A	1	GLY	2.2
1	A	95	VAL	2.2
4	D	191	ILE	2.2
4	D	63	GLN	2.2
5	E	95	ALA	2.1
4	D	87	LEU	2.1
5	E	111	ARG	2.1
5	E	230	LYS	2.1
1	A	58	GLU	2.1
1	A	247	VAL	2.1
1	A	228	THR	2.1
5	E	228	ARG	2.1
4	D	40	GLY	2.1
4	D	146	SER	2.1
1	A	166	GLU	2.1
1	A	273	ARG	2.1
1	A	169	ARG	2.0
2	B	25	CYS	2.0
1	A	131	ARG	2.0
4	D	121	LEU	2.0
4	D	197	PHE	2.0
5	E	77	PHE	2.0
5	E	117	ASP	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.