Full wwPDB X-ray Structure Validation Report ⓘ

Sep 13, 2023 – 11:29 AM EDT

PDB ID	:	4QOK
Title	:	Structural basis for ineffective T-cell responses to MHC anchor residue improved heteroclitic peptides
Authors	:	Rizkallah, P.J.; Cole, D.K.; Madura, F.; Sewell, A.K.
Deposited on	:	2014-06-20
Resolution	:	3.00 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
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)	:	2.35.1

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 3.00 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	Percentile Ranks	Value
Rfree		0.262
Clashscore		19
Ramachandran outliers		1.4%
Sidechain outliers		2.5%
RSRZ outliers		3.0%

Worse ... *Better*

▮ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution
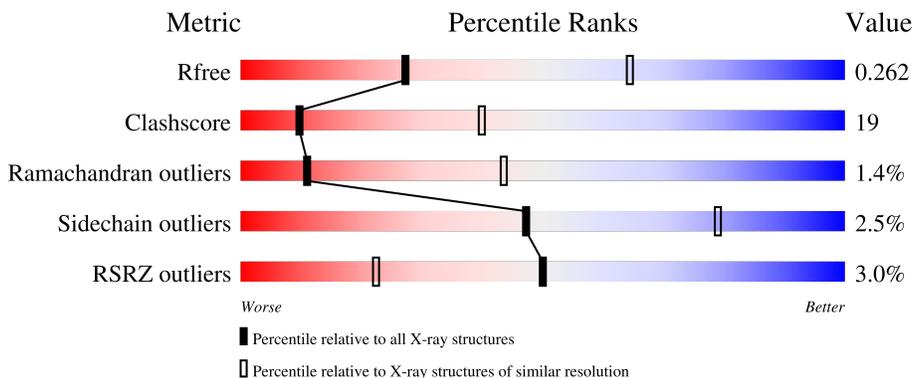
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	4% 72% 24% ·
2	B	100	3% 75% 25%
3	C	10	60% 40%
4	D	194	3% 66% 29% · ·
5	E	244	2% 67% 32% ·

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	EDO	E	302	-	-	-	X

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 6627 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 2263	C 1414	N 413	O 427	S 9	0	1	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total 837	C 533	N 141	O 159	S 4	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	expression tag	UNP P61769

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	10	Total 66	C 42	N 10	O 14	0	0	0

- Molecule 4 is a protein called Mel5 TCR chain alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	194	Total 1498	C 927	N 249	O 314	S 8	0	0	0

- Molecule 5 is a protein called Mel5 TCR chain beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	244	Total 1926	C 1221	N 330	O 370	S 5	0	0	0

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).
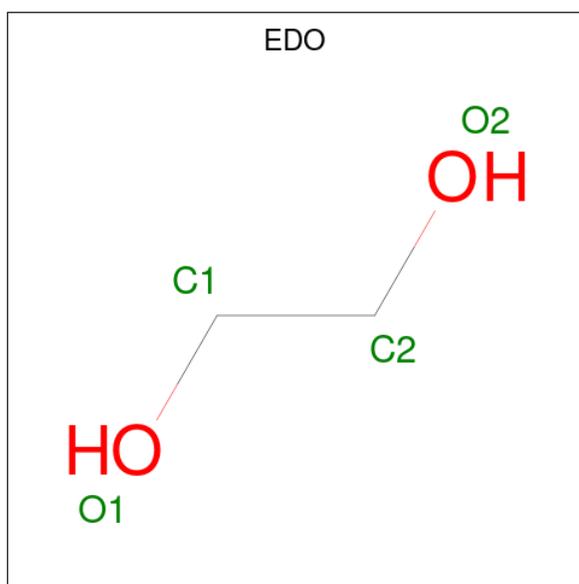
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total 4	C 2	O 2	0	0
6	D	1	Total 4	C 2	O 2	0	0
6	E	1	Total 4	C 2	O 2	0	0
6	E	1	Total 4	C 2	O 2	0	0

- Molecule 7 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	8	Total 8	O 8	0	0
7	D	3	Total 3	O 3	0	0
7	E	10	Total 10	O 10	0	0

3 Residue-property plots ⓘ

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
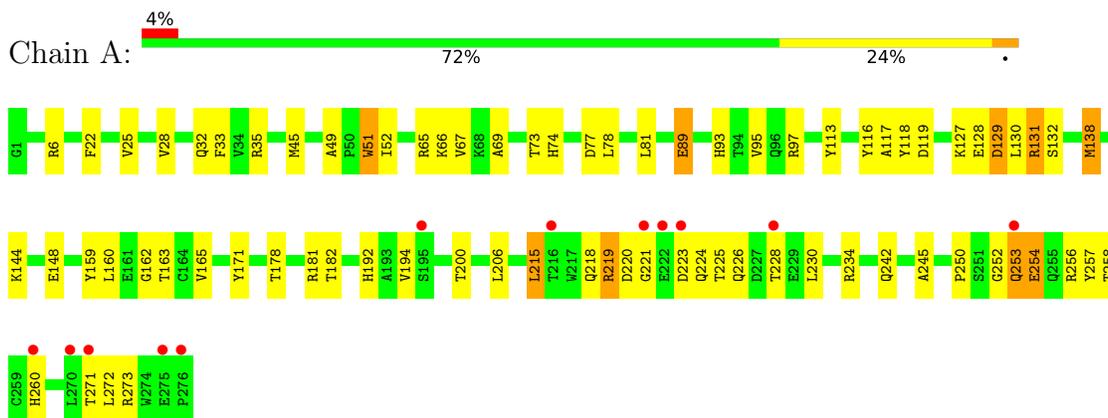
Chain A:

• Molecule 2: Beta-2-microglobulin
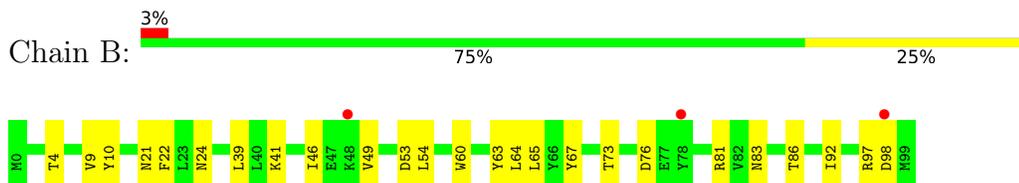
Chain B:

• Molecule 3: Melanoma antigen recognized by T-cells 1 marker peptide

Chain C:

• Molecule 4: Mel5 TCR chain alpha
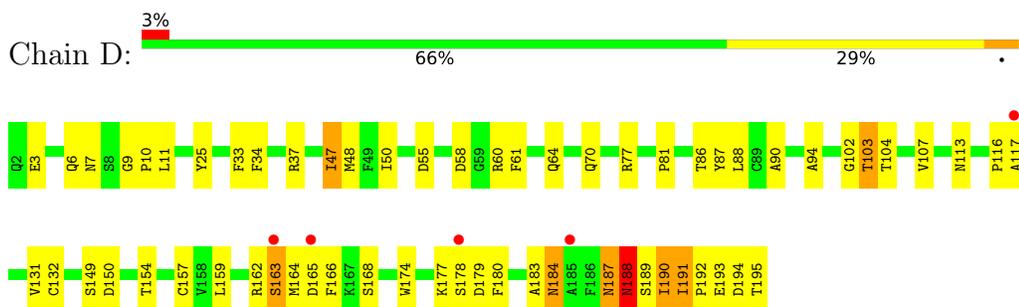
Chain D:

• Molecule 5: Mel5 TCR chain beta

Chain E:

2%

67%   32%

S1 I4 H5 Q6 T10 Q13 S17 P18 L19 C23 T24 V25 T28 S29 N30 P31 N32 L33 Y34 W35 Y36 R37 A40 G41 R42 L46 Y49 Q55 I56 S57 S58 E59 V60 P61 Q62 N63 R72 Q73 F74 I75 L76 L81 L82 L83 S84 C91 A92

W93 S94 G97 L98 G101 E102 L103 F104 F105 G106 E107 K118 P123 V127 P130 S131 E132 I135 Q139 L143 V144 C145 F150 L157 S158 W159 W160 V161 N162 V166 H167 S168 G169 V170 C171 T172 D173 L177 L190 S191 S192 R193 A198 H207

F208 R209 C210 Q211 V212 Q213 F214 Y215 S218 E219 N220 D221 T224 R242 A243 D244

4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α, β, γ	120.69Å 120.69Å 82.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.23 – 3.00 40.23 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (40.23-3.00) 99.9 (40.23-3.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$< I/\sigma(I) >$ [1]	2.96 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.203 , 0.262 0.206 , 0.262	Depositor DCC
R_{free} test set	1219 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å^2)	66.5	Xtriage
Anisotropy	0.193	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 42.4	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.039 for h,-k,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	6627	wwPDB-VP
Average B, all atoms (Å^2)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.23% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: EDO

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	0.78	2/2330 (0.1%)	0.77	2/3164 (0.1%)
2	B	0.68	0/860	0.70	0/1162
3	C	0.75	0/65	0.80	0/86
4	D	0.72	0/1527	0.79	1/2070 (0.0%)
5	E	0.76	1/1979 (0.1%)	0.76	0/2698
All	All	0.75	3/6761 (0.0%)	0.76	3/9180 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	51	TRP	CD2-CE2	6.01	1.48	1.41
5	E	159	TRP	CD2-CE2	5.47	1.48	1.41
1	A	129	ASP	CB-CG	5.27	1.62	1.51

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	129	ASP	CB-CG-OD2	7.66	125.20	118.30
1	A	129	ASP	CB-CG-OD1	-7.07	111.94	118.30
4	D	122	ARG	NE-CZ-NH1	6.21	123.40	120.30

There are no chirality outliers.

There are no planarity outliers.

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	2263	0	2109	76	0
2	B	837	0	803	18	0
3	C	66	0	73	3	0
4	D	1498	0	1410	69	0
5	E	1926	0	1845	98	0
6	A	4	0	6	0	0
6	D	4	0	6	0	0
6	E	8	0	12	0	0
7	A	8	0	0	0	0
7	D	3	0	0	0	0
7	E	10	0	0	0	0
All	All	6627	0	6264	248	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 19.

All (248) 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)
1:A:128:GLU:O	1:A:128:GLU:HG3	1.65	0.97
5:E:135:ILE:HD11	5:E:198:ALA:CB	1.98	0.93
1:A:69:ALA:HB3	5:E:98:LEU:HD21	1.55	0.89
4:D:116:PRO:HB2	4:D:191:ILE:HG22	1.55	0.88
4:D:159:LEU:HD23	5:E:171:CYS:HB2	1.57	0.87
5:E:177:LEU:HD12	5:E:177:LEU:O	1.75	0.87
2:B:54:LEU:HD12	2:B:64:LEU:HD11	1.60	0.84
5:E:63:ASN:ND2	5:E:82:LEU:HD13	1.94	0.83
5:E:25:VAL:CG2	5:E:72:ARG:HB3	2.09	0.83
4:D:188:ASN:HD22	4:D:189:SER:N	1.77	0.82
4:D:189:SER:O	4:D:190:ILE:HG23	1.79	0.82
1:A:220:ASP:OD1	1:A:221:GLY:N	2.14	0.81
1:A:128:GLU:O	1:A:128:GLU:CG	2.29	0.81
5:E:25:VAL:HG22	5:E:72:ARG:HB3	1.63	0.81
1:A:215:LEU:HD12	1:A:215:LEU:O	1.81	0.80
5:E:161:VAL:HG12	5:E:166:VAL:HG11	1.66	0.78
4:D:7:ASN:O	4:D:103:THR:HB	1.84	0.77
5:E:220:ASN:HD22	5:E:221:ASP:N	1.83	0.76
5:E:41:GLY:O	5:E:42:ARG:O	2.05	0.75
5:E:220:ASN:HD22	5:E:220:ASN:C	1.90	0.74
1:A:223:ASP:O	1:A:224:GLN:HG2	1.87	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:177:LEU:HD12	5:E:177:LEU:C	2.08	0.74
1:A:129:ASP:OD2	1:A:130:LEU:N	2.22	0.72
1:A:69:ALA:CB	5:E:98:LEU:HD21	2.20	0.71
5:E:6:GLN:N	5:E:107:GLU:OE1	2.18	0.71
1:A:6:ARG:NE	1:A:113:TYR:OH	2.24	0.71
2:B:54:LEU:CD1	2:B:64:LEU:HD11	2.19	0.71
1:A:178:THR:O	1:A:181:ARG:HG2	1.90	0.71
4:D:122:ARG:CG	4:D:122:ARG:HH11	2.04	0.71
5:E:63:ASN:ND2	5:E:82:LEU:CD1	2.54	0.71
1:A:215:LEU:CD1	1:A:245:ALA:HB2	2.21	0.71
5:E:157:LEU:C	5:E:157:LEU:HD23	2.12	0.70
1:A:49:ALA:O	1:A:52:ILE:HG22	1.92	0.69
4:D:184:ASN:HD22	4:D:184:ASN:N	1.89	0.69
4:D:122:ARG:HH11	4:D:122:ARG:HG2	1.59	0.68
1:A:25:VAL:HG23	1:A:32:GLN:HE21	1.58	0.68
1:A:215:LEU:HD13	1:A:245:ALA:HB2	1.76	0.67
4:D:11:LEU:N	4:D:11:LEU:HD12	2.10	0.67
2:B:81:ARG:HD3	2:B:92:ILE:HD11	1.78	0.66
5:E:161:VAL:HG12	5:E:166:VAL:CG1	2.26	0.66
4:D:187:ASN:N	4:D:187:ASN:HD22	1.96	0.63
1:A:218:GLN:NE2	1:A:260:HIS:ND1	2.47	0.63
2:B:4:THR:HG22	2:B:86:THR:HB	1.79	0.63
2:B:63:TYR:C	2:B:64:LEU:HD12	2.19	0.63
5:E:173:ASP:HB2	5:E:190:LEU:CD1	2.29	0.63
5:E:135:ILE:HD11	5:E:198:ALA:HB2	1.79	0.63
5:E:25:VAL:HG23	5:E:72:ARG:HB3	1.81	0.62
1:A:194:VAL:HG23	1:A:194:VAL:O	1.98	0.62
5:E:220:ASN:C	5:E:220:ASN:ND2	2.53	0.62
4:D:88:LEU:N	4:D:88:LEU:HD12	2.15	0.62
1:A:127:LYS:O	1:A:129:ASP:HA	2.00	0.61
4:D:188:ASN:HD22	4:D:188:ASN:C	2.04	0.61
1:A:252:GLY:O	1:A:254:GLU:N	2.33	0.61
4:D:6:GLN:NE2	4:D:102:GLY:H	1.99	0.61
5:E:135:ILE:HD11	5:E:198:ALA:CA	2.30	0.61
4:D:162:ARG:O	4:D:163:SER:CB	2.49	0.61
5:E:135:ILE:HD11	5:E:198:ALA:HB1	1.82	0.61
5:E:55:GLN:C	5:E:56:ILE:HD12	2.21	0.60
5:E:224:THR:O	5:E:224:THR:HG22	2.01	0.60
4:D:194:ASP:OD2	4:D:195:THR:N	2.35	0.60
5:E:243:ALA:O	5:E:244:ASP:HB2	2.01	0.60
5:E:157:LEU:HD23	5:E:158:SER:N	2.17	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:250:PRO:HG2	1:A:253:GLN:HE21	1.67	0.59
1:A:69:ALA:O	1:A:73:THR:HG23	2.03	0.59
5:E:19:LEU:HD22	5:E:81:LEU:HD21	1.84	0.59
5:E:135:ILE:HD11	5:E:198:ALA:HA	1.85	0.59
5:E:219:GLU:O	5:E:220:ASN:CG	2.40	0.59
4:D:189:SER:O	4:D:190:ILE:HG12	2.02	0.58
1:A:25:VAL:HG23	1:A:32:GLN:NE2	2.18	0.58
5:E:31:PRO:HG2	5:E:33:LEU:HD11	1.84	0.58
5:E:135:ILE:CD1	5:E:198:ALA:HB2	2.34	0.58
5:E:32:ASN:O	5:E:93:TRP:HA	2.05	0.57
4:D:11:LEU:N	4:D:11:LEU:CD1	2.68	0.57
4:D:189:SER:O	4:D:190:ILE:CG2	2.53	0.57
5:E:161:VAL:HA	5:E:207:HIS:O	2.04	0.56
4:D:86:THR:HG21	5:E:42:ARG:HG3	1.86	0.56
5:E:161:VAL:CG1	5:E:166:VAL:HG11	2.36	0.56
1:A:25:VAL:CG2	1:A:32:GLN:NE2	2.68	0.56
1:A:260:HIS:CD2	1:A:271:THR:HB	2.41	0.56
5:E:35:TRP:CD1	5:E:74:PHE:CE2	2.93	0.56
1:A:131:ARG:HG3	1:A:131:ARG:HH11	1.71	0.55
5:E:219:GLU:O	5:E:220:ASN:ND2	2.39	0.55
4:D:88:LEU:N	4:D:88:LEU:CD1	2.69	0.55
4:D:131:VAL:HG23	4:D:174:TRP:HB3	1.88	0.54
1:A:95:VAL:HG11	1:A:116:TYR:OH	2.08	0.54
1:A:129:ASP:OD2	1:A:130:LEU:O	2.24	0.54
5:E:166:VAL:HG23	5:E:166:VAL:O	2.07	0.54
1:A:65:ARG:HH21	4:D:94:ALA:HB1	1.73	0.54
4:D:116:PRO:HB2	4:D:191:ILE:CG2	2.33	0.54
4:D:9:GLY:HA3	4:D:104:THR:HB	1.90	0.54
5:E:173:ASP:HB2	5:E:190:LEU:HD11	1.88	0.54
4:D:191:ILE:HD13	4:D:191:ILE:H	1.73	0.54
5:E:132:GLU:N	5:E:132:GLU:OE1	2.41	0.53
1:A:138:MET:HA	1:A:138:MET:CE	2.37	0.53
5:E:118:LYS:HD3	5:E:118:LYS:C	2.28	0.53
1:A:215:LEU:HD13	1:A:245:ALA:CB	2.39	0.53
2:B:21:ASN:OD1	2:B:22:PHE:N	2.41	0.53
4:D:164:MET:HE2	4:D:166:PHE:CB	2.39	0.53
1:A:163:THR:CG2	3:C:1:GLU:HG2	2.39	0.53
1:A:144:LYS:HG2	1:A:148:GLU:OE2	2.09	0.53
4:D:178:SER:O	4:D:179:ASP:HB3	2.08	0.53
1:A:218:GLN:HG3	1:A:258:THR:HG23	1.91	0.52
5:E:25:VAL:HG22	5:E:72:ARG:CB	2.37	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:117:ALA:HB3	4:D:119:TYR:CZ	2.45	0.52
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.44	0.52
4:D:162:ARG:O	4:D:163:SER:HB3	2.10	0.52
5:E:132:GLU:HA	5:E:135:ILE:HG22	1.92	0.51
5:E:243:ALA:O	5:E:244:ASP:CB	2.58	0.51
4:D:48:MET:HE3	4:D:61:PHE:O	2.11	0.51
2:B:4:THR:HA	2:B:86:THR:OG1	2.10	0.51
2:B:97:ARG:O	2:B:98:ASP:OD1	2.28	0.51
5:E:173:ASP:HB2	5:E:190:LEU:HD12	1.92	0.51
5:E:32:ASN:HB2	5:E:94:SER:OG	2.11	0.50
1:A:225:THR:HG22	1:A:228:THR:HG23	1.94	0.50
4:D:189:SER:C	4:D:190:ILE:HG23	2.31	0.50
1:A:89:GLU:H	1:A:89:GLU:CD	2.15	0.50
4:D:6:GLN:CG	4:D:103:THR:HG22	2.41	0.50
5:E:30:ASN:N	5:E:31:PRO:HD3	2.27	0.50
5:E:81:LEU:C	5:E:82:LEU:HD12	2.32	0.50
5:E:135:ILE:CD1	5:E:198:ALA:CB	2.80	0.50
4:D:164:MET:HE2	4:D:166:PHE:HB2	1.92	0.50
5:E:25:VAL:CG2	5:E:72:ARG:CB	2.86	0.50
1:A:73:THR:CG2	5:E:97:GLY:HA2	2.42	0.50
1:A:131:ARG:HG3	1:A:131:ARG:NH1	2.26	0.50
4:D:157:CYS:C	5:E:171:CYS:SG	2.90	0.50
5:E:60:VAL:HG23	5:E:61:PRO:HD2	1.93	0.50
5:E:143:LEU:N	5:E:143:LEU:HD12	2.27	0.50
5:E:101:GLY:O	5:E:103:LEU:HD12	2.12	0.49
1:A:74:HIS:HE1	1:A:97:ARG:HE	1.61	0.49
1:A:192:HIS:O	1:A:200:THR:HG22	2.13	0.49
4:D:81:PRO:HA	4:D:107:VAL:HB	1.95	0.49
5:E:132:GLU:O	5:E:135:ILE:HG22	2.12	0.49
4:D:10:PRO:C	4:D:11:LEU:HD12	2.33	0.48
1:A:162:GLY:O	1:A:165:VAL:HG22	2.13	0.48
2:B:24:ASN:HB3	2:B:65:LEU:HD11	1.96	0.48
1:A:95:VAL:CG1	1:A:116:TYR:OH	2.62	0.48
1:A:272:LEU:HD23	1:A:273:ARG:O	2.14	0.48
2:B:41:LYS:HB2	2:B:46:ILE:HD11	1.95	0.48
4:D:25:TYR:O	4:D:70:GLN:NE2	2.42	0.48
1:A:159:TYR:CD2	1:A:160:LEU:HD23	2.49	0.47
2:B:63:TYR:O	2:B:64:LEU:HD12	2.14	0.47
1:A:69:ALA:CB	5:E:98:LEU:CD2	2.90	0.47
1:A:129:ASP:O	1:A:130:LEU:HG	2.15	0.47
4:D:163:SER:O	4:D:164:MET:HB3	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:116:PRO:CB	4:D:191:ILE:HG22	2.37	0.47
5:E:32:ASN:O	5:E:33:LEU:HD12	2.14	0.47
4:D:50:ILE:HG23	4:D:50:ILE:O	2.14	0.47
4:D:150:ASP:OD2	4:D:177:LYS:HD3	2.14	0.47
5:E:10:THR:HB	5:E:215:TYR:CD2	2.50	0.47
5:E:82:LEU:HD12	5:E:82:LEU:N	2.29	0.47
5:E:143:LEU:HD12	5:E:143:LEU:H	1.80	0.47
5:E:37:ARG:NH2	5:E:84:SER:O	2.48	0.47
5:E:177:LEU:C	5:E:177:LEU:CD1	2.80	0.47
1:A:28:VAL:HG23	1:A:33:PHE:CE1	2.50	0.46
5:E:219:GLU:O	5:E:220:ASN:CB	2.63	0.46
1:A:206:LEU:HD22	1:A:242:GLN:HG2	1.96	0.46
1:A:81:LEU:HD13	1:A:118:TYR:CG	2.50	0.46
5:E:157:LEU:C	5:E:157:LEU:CD2	2.83	0.46
4:D:34:PHE:HB2	4:D:90:ALA:HB3	1.98	0.46
4:D:188:ASN:C	4:D:188:ASN:ND2	2.69	0.46
5:E:135:ILE:O	5:E:139:GLN:HA	2.15	0.46
2:B:39:LEU:HD12	2:B:49:VAL:HG22	1.98	0.46
4:D:117:ALA:CB	4:D:119:TYR:CZ	2.99	0.46
1:A:272:LEU:HD23	1:A:273:ARG:N	2.31	0.46
1:A:131:ARG:H	1:A:131:ARG:HD2	1.80	0.46
1:A:144:LYS:O	1:A:148:GLU:HG3	2.16	0.45
2:B:73:THR:OG1	2:B:76:ASP:CG	2.54	0.45
4:D:60:ARG:HA	4:D:77:ARG:NH1	2.30	0.45
5:E:49:TYR:CE2	5:E:57:SER:HB2	2.52	0.45
4:D:117:ALA:HB3	4:D:119:TYR:OH	2.17	0.45
5:E:31:PRO:HG2	5:E:33:LEU:CD1	2.46	0.45
5:E:55:GLN:O	5:E:56:ILE:HD12	2.17	0.45
1:A:178:THR:O	1:A:181:ARG:CG	2.64	0.45
1:A:220:ASP:OD2	1:A:256:ARG:HD2	2.17	0.45
1:A:28:VAL:HG23	1:A:33:PHE:CD1	2.52	0.45
1:A:272:LEU:CD2	1:A:273:ARG:O	2.65	0.45
4:D:3:GLU:CD	4:D:3:GLU:H	2.19	0.45
4:D:3:GLU:OE2	4:D:3:GLU:N	2.49	0.45
5:E:224:THR:O	5:E:224:THR:CG2	2.65	0.45
1:A:22:PHE:HE2	1:A:67:VAL:HG22	1.81	0.45
1:A:66:LYS:O	1:A:69:ALA:HB3	2.18	0.44
4:D:183:ALA:C	4:D:184:ASN:HD22	2.21	0.44
5:E:218:SER:O	5:E:221:ASP:HB2	2.18	0.44
4:D:48:MET:CE	4:D:58:ASP:HB3	2.47	0.44
4:D:191:ILE:HD13	4:D:191:ILE:N	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:55:ASP:OD1	4:D:64:GLN:HG2	2.18	0.43
4:D:164:MET:O	4:D:165:ASP:HB3	2.19	0.43
4:D:193:GLU:OE2	4:D:193:GLU:N	2.51	0.43
1:A:219:ARG:HB3	1:A:257:TYR:CE2	2.53	0.43
5:E:4:ILE:HD11	5:E:23:CYS:SG	2.59	0.43
5:E:167:HIS:O	5:E:168:SER:C	2.56	0.43
1:A:230:LEU:HD23	1:A:230:LEU:H	1.83	0.43
2:B:24:ASN:OD1	2:B:67:TYR:HB3	2.18	0.43
4:D:154:THR:HG22	5:E:177:LEU:HD23	2.00	0.43
4:D:187:ASN:N	4:D:187:ASN:ND2	2.65	0.43
5:E:4:ILE:HD11	5:E:91:CYS:SG	2.58	0.43
5:E:92:ALA:HB2	5:E:105:PHE:CD2	2.53	0.43
1:A:127:LYS:HG3	1:A:132:SER:HB2	2.00	0.43
1:A:130:LEU:HB3	1:A:132:SER:H	1.83	0.43
1:A:215:LEU:HD11	1:A:245:ALA:HB2	1.97	0.43
5:E:28:THR:HG21	5:E:93:TRP:CH2	2.53	0.43
1:A:253:GLN:HG3	1:A:254:GLU:H	1.83	0.43
4:D:189:SER:O	4:D:190:ILE:CG1	2.67	0.43
1:A:77:ASP:OD1	3:C:10:VAL:HG22	2.19	0.43
1:A:234:ARG:HD2	2:B:10:TYR:CE2	2.54	0.43
5:E:170:VAL:HG12	5:E:171:CYS:N	2.32	0.43
4:D:87:TYR:C	4:D:88:LEU:HD12	2.40	0.42
5:E:101:GLY:O	5:E:103:LEU:CD1	2.67	0.42
1:A:223:ASP:O	1:A:224:GLN:CG	2.64	0.42
4:D:33:PHE:CD2	4:D:33:PHE:N	2.87	0.42
1:A:69:ALA:HB1	5:E:98:LEU:CD2	2.49	0.42
4:D:184:ASN:N	4:D:184:ASN:ND2	2.59	0.42
5:E:46:LEU:HD23	5:E:59:GLU:HG3	2.00	0.42
5:E:145:CYS:HB2	5:E:159:TRP:CZ2	2.54	0.42
2:B:9:VAL:HG13	2:B:9:VAL:O	2.19	0.42
4:D:131:VAL:HG22	4:D:132:CYS:N	2.35	0.42
4:D:159:LEU:HD12	4:D:168:SER:OG	2.20	0.42
4:D:191:ILE:H	4:D:191:ILE:CD1	2.31	0.42
5:E:132:GLU:HA	5:E:135:ILE:CG2	2.49	0.42
4:D:48:MET:HE3	4:D:61:PHE:C	2.40	0.42
5:E:157:LEU:HD13	5:E:192:SER:HB2	2.01	0.42
4:D:48:MET:HE2	4:D:58:ASP:HB3	2.01	0.42
5:E:132:GLU:C	5:E:135:ILE:HG22	2.40	0.42
1:A:95:VAL:CG1	1:A:116:TYR:CZ	3.03	0.41
3:C:7:ILE:O	3:C:8:LEU:HD23	2.20	0.41
5:E:139:GLN:HA	5:E:139:GLN:NE2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:250:PRO:CG	1:A:253:GLN:HE21	2.33	0.41
4:D:37:ARG:HB2	4:D:47:ILE:HD12	2.02	0.41
1:A:130:LEU:CB	1:A:132:SER:H	2.33	0.41
4:D:122:ARG:HG2	4:D:122:ARG:NH1	2.31	0.41
5:E:13:GLN:HE21	5:E:17:SER:HB2	1.85	0.41
1:A:51:TRP:CZ3	1:A:171:TYR:HB3	2.55	0.41
1:A:182:THR:HG23	1:A:182:THR:O	2.21	0.41
5:E:127:VAL:O	5:E:127:VAL:HG13	2.20	0.41
1:A:45:MET:CE	1:A:67:VAL:HB	2.51	0.40
4:D:121:LEU:HD22	5:E:130:PRO:HA	2.03	0.40
5:E:30:ASN:N	5:E:31:PRO:CD	2.83	0.40
1:A:78:LEU:CD2	1:A:95:VAL:HG23	2.51	0.40
4:D:189:SER:O	4:D:190:ILE:CB	2.69	0.40
5:E:35:TRP:CE2	5:E:76:LEU:HB2	2.56	0.40
5:E:49:TYR:CD2	5:E:57:SER:HB2	2.55	0.40
5:E:123:PRO:HB3	5:E:150:PHE:CD1	2.56	0.40
5:E:209:ARG:NH1	5:E:211:GLN:OE1	2.54	0.40
1:A:35:ARG:HD3	2:B:53:ASP:OD2	2.21	0.40
1:A:93:HIS:HD2	1:A:119:ASP:OD1	2.03	0.40
5:E:34:TYR:N	5:E:92:ALA:O	2.48	0.40
5:E:19:LEU:HB2	5:E:81:LEU:HD21	2.03	0.40
5:E:161:VAL:O	5:E:161:VAL:HG13	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	275/276 (100%)	259 (94%)	14 (5%)	2 (1%)	22	60
2	B	98/100 (98%)	89 (91%)	9 (9%)	0	100	100
3	C	8/10 (80%)	8 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	D	192/194 (99%)	170 (88%)	16 (8%)	6 (3%)	4	23
5	E	242/244 (99%)	226 (93%)	13 (5%)	3 (1%)	13	48
All	All	815/824 (99%)	752 (92%)	52 (6%)	11 (1%)	11	45

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	253	GLN
4	D	149	SER
4	D	163	SER
4	D	190	ILE
5	E	42	ARG
5	E	168	SER
4	D	180	PHE
4	D	192	PRO
5	E	40	ALA
4	D	188	ASN
1	A	254	GLU

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	233/232 (100%)	227 (97%)	6 (3%)	46	78
2	B	95/95 (100%)	94 (99%)	1 (1%)	73	90
3	C	6/6 (100%)	6 (100%)	0	100	100
4	D	172/172 (100%)	164 (95%)	8 (5%)	26	63
5	E	211/211 (100%)	208 (99%)	3 (1%)	67	88
All	All	717/716 (100%)	699 (98%)	18 (2%)	47	79

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	89	GLU
1	A	131	ARG
1	A	138	MET
1	A	215	LEU
1	A	219	ARG
1	A	226	GLN
2	B	83	ASN
4	D	47	ILE
4	D	103	THR
4	D	113	ASN
4	D	122	ARG
4	D	184	ASN
4	D	187	ASN
4	D	188	ASN
4	D	191	ILE
5	E	193	ARG
5	E	213	GLN
5	E	220	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	GLN
1	A	70	HIS
1	A	74	HIS
1	A	86	ASN
1	A	141	GLN
1	A	174	ASN
1	A	226	GLN
1	A	242	GLN
1	A	253	GLN
2	B	31	HIS
2	B	83	ASN
4	D	2	GLN
4	D	6	GLN
4	D	38	GLN
4	D	110	ASN
4	D	120	GLN
4	D	140	GLN
4	D	145	GLN
4	D	184	ASN
4	D	187	ASN
4	D	188	ASN

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Mol	Chain	Res	Type
5	E	13	GLN
5	E	38	GLN
5	E	63	ASN
5	E	119	ASN
5	E	139	GLN
5	E	220	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
6	EDO	E	301	-	3,3,3	0.51	0	2,2,2	0.39	0
6	EDO	A	301	-	3,3,3	0.48	0	2,2,2	0.40	0
6	EDO	E	302	-	3,3,3	0.73	0	2,2,2	0.13	0
6	EDO	D	401	-	3,3,3	0.79	0	2,2,2	0.39	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	E	301	-	-	0/1/1/1	-
6	EDO	A	301	-	-	1/1/1/1	-
6	EDO	E	302	-	-	1/1/1/1	-
6	EDO	D	401	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	301	EDO	O1-C1-C2-O2
6	D	401	EDO	O1-C1-C2-O2
6	E	302	EDO	O1-C1-C2-O2

There are no ring outliers.

No monomer is involved in short contacts.

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%)	-0.01	12 (4%)	35	13	32, 61, 100, 100	0
2	B	100/100 (100%)	0.01	3 (3%)	50	22	36, 72, 100, 100	0
3	C	10/10 (100%)	-0.26	0	100	100	32, 37, 42, 49	0
4	D	194/194 (100%)	-0.03	5 (2%)	56	27	29, 54, 100, 100	0
5	E	244/244 (100%)	-0.15	5 (2%)	65	36	29, 54, 99, 100	0
All	All	824/824 (100%)	-0.06	25 (3%)	50	22	29, 58, 100, 100	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
5	E	243	ALA	4.4
4	D	178	SER	4.0
5	E	244	ASP	3.8
1	A	276	PRO	3.6
1	A	221	GLY	3.4
5	E	162	ASN	3.2
1	A	216	THR	3.2
5	E	207	HIS	3.2
2	B	98	ASP	3.0
1	A	260	HIS	2.9
1	A	195	SER	2.9
1	A	222	GLU	2.8
1	A	228	THR	2.7
1	A	275	GLU	2.7
4	D	163	SER	2.6
1	A	253	GLN	2.5
4	D	117	ALA	2.4
1	A	271	THR	2.4
1	A	223	ASP	2.4
5	E	242	ARG	2.3

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Mol	Chain	Res	Type	RSRZ
4	D	185	ALA	2.2
1	A	270	LEU	2.2
2	B	78	TYR	2.2
2	B	48	LYS	2.0
4	D	165	ASP	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 ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	EDO	E	302	4/4	0.66	0.47	75,79,80,81	0
6	EDO	E	301	4/4	0.83	0.23	79,86,87,88	0
6	EDO	A	301	4/4	0.93	0.28	51,51,52,53	0
6	EDO	D	401	4/4	0.98	0.20	44,44,48,48	0

6.5 Other polymers ⓘ

There are no such residues in this entry.