



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:42 AM GMT

PDB ID : 2IAL  
Title : Structural basis for recognition of mutant self by a tumor-specific, MHC class II-restricted TCR  
Authors : Deng, L.; Langley, R.J.; Mariuzza, R.A.  
Deposited on : 2006-09-08  
Resolution : 1.92 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/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  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

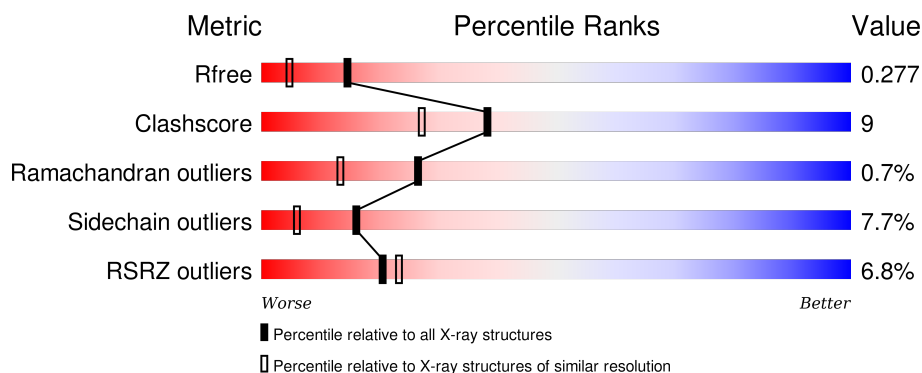
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.92 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))
$R_{free}$	91344	5832 (1.94-1.90)
Clashscore	102246	6540 (1.94-1.90)
Ramachandran outliers	100387	6464 (1.94-1.90)
Sidechain outliers	100360	6465 (1.94-1.90)
RSRZ outliers	91569	5846 (1.94-1.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	202	<div> <div>19%</div> <div> <div></div> <div>75%</div> <div>20%</div> <div>• •</div> </div> </div>
1	C	202	<div> <div>4%</div> <div> <div></div> <div>81%</div> <div>12%</div> <div>• •</div> </div> </div>
2	B	240	<div> <div>%</div> <div> <div></div> <div>74%</div> <div>21%</div> <div>•</div> </div> </div>
2	D	240	<div> <div>4%</div> <div> <div></div> <div>75%</div> <div>19%</div> <div>5%</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7105 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 CD4+ T cell receptor E8 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	196	Total	C	N	O	S	0	0	0
			1534	961	258	308	7			
1	C	195	Total	C	N	O	S	0	0	0
			1526	957	257	305	7			

- Molecule 2 is a protein called CD4+ T cell receptor E8 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	239	Total	C	N	O	S	0	0	0
			1901	1206	324	362	9			
2	D	239	Total	C	N	O	S	0	0	0
			1901	1206	324	362	9			

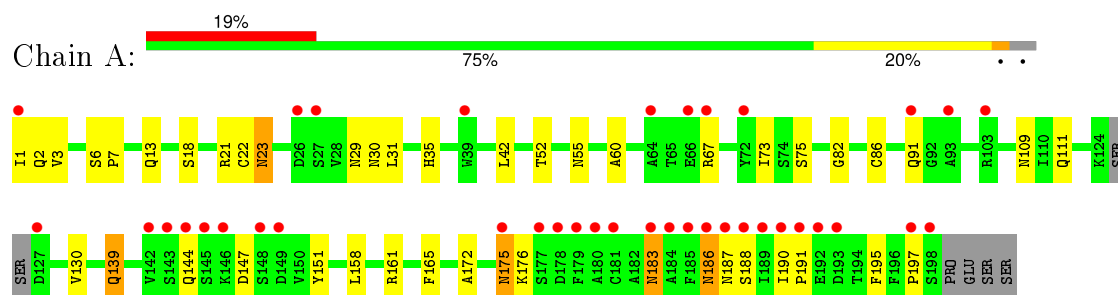
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	27	Total	O	0	0
			27	27		
3	B	94	Total	O	0	0
			94	94		
3	C	44	Total	O	0	0
			44	44		
3	D	78	Total	O	0	0
			78	78		

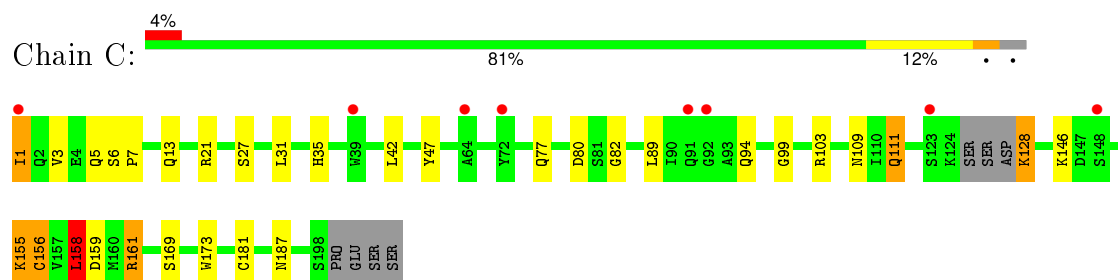
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

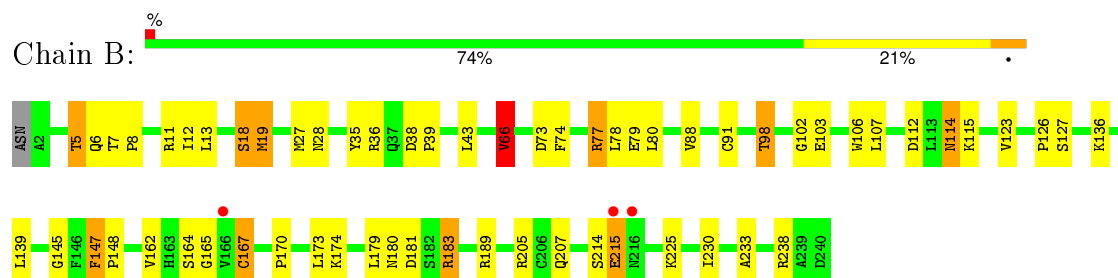
- Molecule 1: CD4+ T cell receptor E8 alpha chain



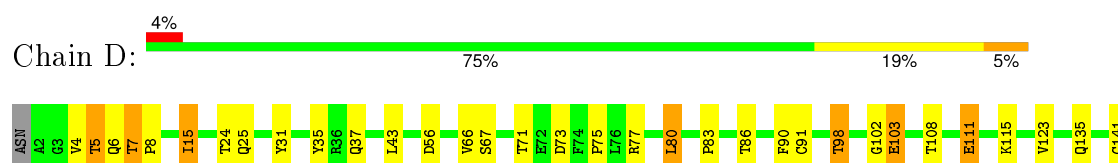
- Molecule 1: CD4+ T cell receptor E8 alpha chain

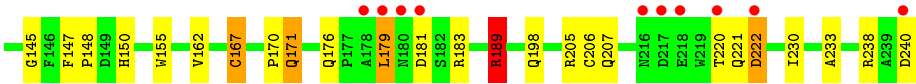


- Molecule 2: CD4+ T cell receptor E8 beta chain



- Molecule 2: CD4+ T cell receptor E8 beta chain





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	170.04Å 65.66Å 84.82Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.31 – 1.92 44.31 – 1.92	Depositor EDS
% Data completeness (in resolution range)	94.1 (44.31-1.92) 94.1 (44.31-1.92)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.03 (at 1.92Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.208 , 0.265 0.222 , 0.277	Depositor DCC
$R_{free}$ test set	3493 reflections (5.32%)	DCC
Wilson B-factor (Å <sup>2</sup> )	26.1	Xtriage
Anisotropy	0.178	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 38.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	1 of 69225 reflections (0.001%)	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	7105	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.78% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

## 5 Model quality

### 5.1 Standard geometry

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	0.80	0/1566	0.83	0/2129
1	C	0.92	2/1558 (0.1%)	0.95	4/2118 (0.2%)
2	B	1.02	3/1956 (0.2%)	0.96	10/2666 (0.4%)
2	D	0.97	2/1956 (0.1%)	0.91	2/2666 (0.1%)
All	All	0.94	7/7036 (0.1%)	0.92	16/9579 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	C	0	1
2	B	0	4
2	D	0	3
All	All	0	10

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	103	GLU	CG-CD	7.21	1.62	1.51
2	B	103	GLU	CG-CD	6.27	1.61	1.51
2	D	167	CYS	CB-SG	-6.04	1.72	1.82
2	B	35	TYR	CD1-CE1	5.68	1.47	1.39
2	B	167	CYS	CB-SG	-5.55	1.72	1.81
1	C	173	TRP	CB-CG	5.36	1.59	1.50
1	C	181	CYS	CB-SG	5.16	1.91	1.82

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	158	LEU	CA-CB-CG	9.59	137.37	115.30

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	183	ARG	NE-CZ-NH2	-8.99	115.80	120.30
2	B	183	ARG	NE-CZ-NH1	8.03	124.31	120.30
1	C	156	CYS	CA-CB-SG	7.66	127.79	114.00
2	D	7	THR	C-N-CD	-6.98	105.25	120.60
2	D	189	ARG	NE-CZ-NH2	-6.89	116.86	120.30
2	B	147	PHE	C-N-CD	-6.39	106.55	120.60
1	C	42	LEU	CB-CG-CD2	-6.31	100.27	111.00
2	B	107	LEU	CB-CG-CD1	-6.03	100.75	111.00
2	B	43	LEU	CA-CB-CG	5.48	127.91	115.30
2	B	36	ARG	NE-CZ-NH1	-5.46	117.57	120.30
2	B	173	LEU	CA-CB-CG	5.41	127.74	115.30
1	C	159	ASP	CB-CG-OD1	5.41	123.17	118.30
2	B	80	LEU	CA-CB-CG	5.40	127.71	115.30
2	B	66	VAL	CG1-CB-CG2	5.31	119.40	110.90
2	B	19	MET	CG-SD-CE	-5.06	92.10	100.20

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	6	SER	Mainchain,Peptide
2	B	147	PHE	Mainchain,Peptide
2	B	7	THR	Mainchain,Peptide
1	C	6	SER	Peptide
2	D	147	PHE	Mainchain,Peptide
2	D	7	THR	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	1534	0	1463	36	0
1	C	1526	0	1459	21	0
2	B	1901	0	1800	40	0
2	D	1901	0	1800	40	0
3	A	27	0	0	0	0
3	B	94	0	0	6	0

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	44	0	0	2	0
3	D	78	0	0	6	0
All	All	7105	0	6522	122	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 9.

All (122) 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:175:ASN:H	1:A:175:ASN:ND2	1.75	0.84
1:A:21:ARG:HE	1:A:23:ASN:HD21	1.22	0.83
1:A:55:ASN:HD21	1:C:161:ARG:HH22	1.24	0.83
2:B:77:ARG:HD3	2:B:79:GLU:OE2	1.79	0.83
2:B:170:PRO:HD2	3:B:322:HOH:O	1.80	0.81
2:B:180:ASN:HB3	3:B:307:HOH:O	1.79	0.81
2:B:112:ASP:HB2	2:B:114:ASN:ND2	1.95	0.81
2:B:98:THR:CG2	3:B:321:HOH:O	2.31	0.78
2:B:5:THR:HG23	3:B:245:HOH:O	1.86	0.76
1:C:111:GLN:CD	1:C:111:GLN:H	1.90	0.75
1:A:55:ASN:ND2	1:C:161:ARG:HH22	1.86	0.73
2:D:123:VAL:HG23	2:D:233:ALA:HB3	1.72	0.72
1:A:147:ASP:OD2	1:A:176:LYS:NZ	2.22	0.71
1:A:21:ARG:HE	1:A:23:ASN:ND2	1.89	0.69
1:A:183:ASN:HA	1:A:186:ASN:OD1	1.92	0.69
2:B:112:ASP:HB2	2:B:114:ASN:HD21	1.57	0.69
2:D:238:ARG:HG2	2:D:240:ASP:HB2	1.75	0.68
2:B:115:LYS:HD3	2:B:181:ASP:OD1	1.94	0.68
1:A:13:GLN:HB3	1:A:109:ASN:HD21	1.60	0.66
1:C:111:GLN:H	1:C:111:GLN:NE2	1.94	0.65
2:D:24:THR:HG23	2:D:73:ASP:OD1	1.97	0.64
2:B:114:ASN:HD22	2:B:114:ASN:H	1.44	0.62
2:D:221:GLN:HG3	2:D:222:ASP:N	2.15	0.62
1:C:3:VAL:HB	3:C:244:HOH:O	1.99	0.62
2:B:215:GLU:CD	2:B:215:GLU:H	2.03	0.62
2:D:170:PRO:HD2	3:D:301:HOH:O	1.98	0.61
1:C:5:GLN:HE21	1:C:99:GLY:HA3	1.66	0.61
2:D:171:GLN:HE21	2:D:171:GLN:H	1.47	0.60
1:A:175:ASN:H	1:A:175:ASN:HD22	1.48	0.60
2:D:150:HIS:HD2	3:D:298:HOH:O	1.83	0.59
1:A:3:VAL:CG1	1:A:86:CYS:SG	2.90	0.59

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:161:ARG:HE	2:D:205:ARG:HH21	1.50	0.58
1:A:161:ARG:HE	2:D:205:ARG:NH2	2.01	0.58
2:D:221:GLN:HG3	2:D:222:ASP:H	1.68	0.57
2:B:214:SER:O	2:B:225:LYS:NZ	2.29	0.57
1:C:13:GLN:HE21	1:C:109:ASN:ND2	2.03	0.57
2:D:6:GLN:NE2	2:D:91:CYS:H	2.02	0.57
2:D:145:GLY:O	2:D:183:ARG:HD3	2.04	0.56
2:B:6:GLN:HE22	2:B:91:CYS:H	1.51	0.56
1:C:158:LEU:HD22	3:C:242:HOH:O	2.04	0.56
2:B:98:THR:HG23	3:B:321:HOH:O	1.97	0.56
2:B:115:LYS:CD	2:B:181:ASP:OD1	2.54	0.56
2:D:5:THR:HG23	3:D:303:HOH:O	2.05	0.56
1:A:175:ASN:N	1:A:175:ASN:ND2	2.51	0.55
1:C:169:SER:OG	2:D:189:ARG:HD3	2.06	0.55
2:B:114:ASN:ND2	2:B:114:ASN:H	2.03	0.55
1:A:13:GLN:HE21	1:A:109:ASN:HD22	1.55	0.55
2:D:6:GLN:HE21	2:D:102:GLY:HA3	1.72	0.54
1:A:158:LEU:HD11	2:B:165:GLY:O	2.07	0.54
2:D:6:GLN:HE22	2:D:90:PHE:HA	1.73	0.53
1:A:158:LEU:HB2	2:B:167:CYS:HB2	1.91	0.53
2:B:145:GLY:O	2:B:183:ARG:HD3	2.09	0.52
2:D:15:ILE:HD11	2:D:83:PRO:HG3	1.91	0.52
2:D:171:GLN:NE2	3:D:301:HOH:O	2.42	0.52
2:D:171:GLN:HE21	2:D:171:GLN:N	2.08	0.51
2:D:67:SER:O	2:D:75:PRO:HD2	2.10	0.51
1:A:195:PHE:CE2	1:A:197:PRO:HG3	2.46	0.51
2:B:66:VAL:HG13	2:B:74:PHE:HE1	1.76	0.50
2:B:6:GLN:HE21	2:B:102:GLY:HA3	1.76	0.50
2:B:207:GLN:HG3	2:B:230:ILE:HG23	1.94	0.50
2:B:6:GLN:NE2	2:B:91:CYS:H	2.10	0.50
1:C:1:ILE:N	1:C:27:SER:OG	2.43	0.50
2:B:174:LYS:HE2	3:B:328:HOH:O	2.12	0.49
1:A:161:ARG:HH21	2:D:205:ARG:HH21	1.59	0.49
1:A:165:PHE:CE2	2:B:136:LYS:HE2	2.47	0.48
2:B:112:ASP:OD2	2:B:114:ASN:ND2	2.47	0.48
1:A:1:ILE:HG13	1:A:2:GLN:N	2.29	0.48
1:C:47:TYR:HB2	2:D:98:THR:HG22	1.95	0.47
1:C:94:GLN:HG3	2:D:31:TYR:CE1	2.49	0.47
1:A:165:PHE:CD2	2:B:136:LYS:HE2	2.50	0.47
1:A:111:GLN:HA	1:A:111:GLN:OE1	2.14	0.47
1:A:139:GLN:H	1:A:139:GLN:HG2	1.56	0.46

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:38:ASP:HB3	2:B:39:PRO:HD2	1.97	0.46
2:D:198:GLN:HA	2:D:238:ARG:O	2.16	0.46
2:B:18:SER:HB2	2:B:77:ARG:NH1	2.31	0.46
2:D:123:VAL:HG23	2:D:233:ALA:CB	2.44	0.45
2:B:145:GLY:O	2:B:183:ARG:CD	2.64	0.45
2:D:176:GLN:OE1	2:D:179:LEU:HD13	2.17	0.45
1:A:29:ASN:OD1	1:A:30:ASN:ND2	2.48	0.45
2:D:238:ARG:HD2	3:D:285:HOH:O	2.17	0.45
1:A:175:ASN:N	1:A:175:ASN:HD22	2.13	0.44
2:D:37:GLN:HB2	2:D:43:LEU:HD23	1.99	0.44
2:B:126:PRO:HD3	2:B:139:LEU:HG	1.98	0.44
2:B:13:LEU:HD11	2:B:19:MET:HB2	2.00	0.44
1:C:35:HIS:CE1	1:C:82:GLY:HA3	2.53	0.44
2:D:86:THR:HG23	2:D:108:THR:HA	2.00	0.44
1:C:158:LEU:HB2	2:D:167:CYS:HB2	2.00	0.44
2:D:35:TYR:HB3	2:D:43:LEU:HD22	2.00	0.43
2:D:207:GLN:HG3	2:D:230:ILE:HG23	2.00	0.43
2:B:77:ARG:CD	2:B:79:GLU:OE2	2.57	0.43
1:C:155:LYS:HA	1:C:169:SER:O	2.18	0.43
1:A:161:ARG:NH1	2:B:164:SER:HB2	2.33	0.43
1:C:146:LYS:HD2	1:C:187:ASN:HD21	1.83	0.43
1:A:13:GLN:HB3	1:A:109:ASN:ND2	2.31	0.43
2:D:103:GLU:HG2	3:D:302:HOH:O	2.18	0.43
2:D:80:LEU:N	2:D:80:LEU:HD23	2.34	0.43
1:A:151:TYR:O	1:A:172:ALA:HA	2.19	0.42
2:D:6:GLN:HE22	2:D:91:CYS:H	1.66	0.42
2:D:111:GLU:HG3	2:D:115:LYS:NZ	2.34	0.42
1:A:52:THR:HA	1:A:60:ALA:O	2.20	0.42
2:B:88:VAL:HG22	2:B:106:TRP:CD1	2.55	0.42
1:C:111:GLN:N	1:C:111:GLN:CD	2.61	0.42
1:C:35:HIS:HE1	1:C:82:GLY:HA3	1.84	0.42
2:B:11:ARG:NH1	2:B:12:ILE:O	2.53	0.42
1:C:13:GLN:HB3	1:C:109:ASN:HD21	1.85	0.42
2:B:66:VAL:CG1	2:B:74:PHE:HE1	2.33	0.42
2:D:15:ILE:HD11	2:D:83:PRO:HD3	2.02	0.41
1:A:3:VAL:HG13	1:A:22:CYS:SG	2.60	0.41
2:B:205:ARG:NH1	2:B:207:GLN:HB2	2.35	0.41
2:D:123:VAL:HG22	2:D:206:CYS:SG	2.60	0.41
1:A:1:ILE:HG13	1:A:2:GLN:H	1.86	0.41
2:B:27:MET:O	2:B:28:ASN:HB2	2.20	0.41
1:A:158:LEU:HD23	1:A:158:LEU:C	2.41	0.41

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:123:VAL:HG23	2:B:233:ALA:HB3	2.03	0.41
1:C:77:GLN:O	1:C:80:ASP:HB2	2.21	0.41
1:C:128:LYS:HE2	1:C:128:LYS:HB2	1.84	0.41
1:A:161:ARG:NE	2:D:205:ARG:HH21	2.17	0.41
1:A:18:SER:HB2	1:A:73:ILE:HB	2.03	0.41
2:B:77:ARG:HG3	2:B:78:LEU:N	2.35	0.40
2:D:141:CYS:HB2	2:D:155:TRP:CZ2	2.55	0.40
1:A:35:HIS:HE1	1:A:82:GLY:HA3	1.87	0.40
1:A:3:VAL:HG11	1:A:86:CYS:SG	2.61	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	192/202 (95%)	177 (92%)	14 (7%)	1 (0%)	34	20
1	C	191/202 (95%)	182 (95%)	8 (4%)	1 (0%)	34	20
2	B	237/240 (99%)	231 (98%)	4 (2%)	2 (1%)	24	11
2	D	237/240 (99%)	229 (97%)	6 (2%)	2 (1%)	24	11
All	All	857/884 (97%)	819 (96%)	32 (4%)	6 (1%)	26	13

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	148	PRO
1	C	7	PRO
2	D	8	PRO
2	B	8	PRO
2	D	148	PRO
1	A	191	PRO

### 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	176/182 (97%)	160 (91%)	16 (9%)	12	4
1	C	175/182 (96%)	164 (94%)	11 (6%)	22	10
2	B	206/207 (100%)	193 (94%)	13 (6%)	22	10
2	D	206/207 (100%)	187 (91%)	19 (9%)	11	4
All	All	763/778 (98%)	704 (92%)	59 (8%)	16	6

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	PRO
1	A	23	ASN
1	A	31	LEU
1	A	42	LEU
1	A	67	ARG
1	A	75	SER
1	A	91	GLN
1	A	130	VAL
1	A	139	GLN
1	A	144	GLN
1	A	175	ASN
1	A	183	ASN
1	A	186	ASN
1	A	187	ASN
1	A	188	SER
1	A	190	ILE
2	B	5	THR
2	B	18	SER
2	B	66	VAL
2	B	73	ASP
2	B	77	ARG
2	B	98	THR
2	B	114	ASN
2	B	127	SER

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
2	B	162	VAL
2	B	179	LEU
2	B	189	ARG
2	B	215	GLU
2	B	238	ARG
1	C	1	ILE
1	C	21	ARG
1	C	31	LEU
1	C	89	LEU
1	C	103	ARG
1	C	111	GLN
1	C	128	LYS
1	C	155	LYS
1	C	156	CYS
1	C	158	LEU
1	C	161	ARG
2	D	4	VAL
2	D	5	THR
2	D	15	ILE
2	D	25	GLN
2	D	56	ASP
2	D	66	VAL
2	D	71	THR
2	D	77	ARG
2	D	80	LEU
2	D	98	THR
2	D	111	GLU
2	D	135	GLN
2	D	162	VAL
2	D	171	GLN
2	D	179	LEU
2	D	181	ASP
2	D	189	ARG
2	D	220	THR
2	D	222	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	GLN
1	A	23	ASN
1	A	35	HIS

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	44	ASN
1	A	55	ASN
1	A	109	ASN
1	A	175	ASN
2	B	6	GLN
2	B	114	ASN
2	B	171	GLN
1	C	5	GLN
1	C	35	HIS
1	C	109	ASN
1	C	168	ASN
1	C	187	ASN
2	D	6	GLN
2	D	22	GLN
2	D	65	ASN
2	D	150	HIS
2	D	171	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 ⓘ

There are no chain breaks in this entry.



## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	196/202 (97%)	1.06	38 (19%) 1 2	21, 37, 68, 77	0
1	C	195/202 (96%)	0.33	8 (4%) 41 45	17, 28, 43, 57	0
2	B	239/240 (99%)	0.28	3 (1%) 79 82	15, 25, 39, 58	0
2	D	239/240 (99%)	0.29	10 (4%) 40 44	17, 28, 46, 55	0
All	All	869/884 (98%)	0.47	59 (6%) 20 23	15, 29, 51, 77	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	187	ASN	8.2
1	A	189	ILE	6.2
1	C	1	ILE	6.1
1	A	191	PRO	6.1
1	A	193	ASP	6.0
2	D	220	THR	5.7
1	A	1	ILE	5.4
1	A	192	GLU	4.8
2	D	178	ALA	4.8
1	A	181	CYS	4.8
1	A	143	SER	4.7
2	D	240	ASP	4.7
1	C	123	SER	4.6
1	A	178	ASP	4.6
1	A	177	SER	4.1
1	A	26	ASP	3.9
1	A	142	VAL	3.8
1	A	198	SER	3.8
1	A	188	SER	3.7
1	A	184	ALA	3.7
1	A	190	ILE	3.6

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	A	146	LYS	3.5
1	A	148	SER	3.4
1	A	127	ASP	3.4
1	A	186	ASN	3.3
1	A	93	ALA	3.2
1	A	64	ALA	3.1
1	A	175	ASN	3.1
2	D	180	ASN	3.1
2	D	218	GLU	3.1
2	B	216	ASN	2.9
1	A	39	TRP	2.9
1	A	183	ASN	2.8
1	A	145	SER	2.7
2	D	181	ASP	2.7
1	C	148	SER	2.7
1	A	91	GLN	2.6
1	A	179	PHE	2.6
1	A	197	PRO	2.6
1	A	72	TYR	2.6
2	D	222	ASP	2.6
1	C	72	TYR	2.5
1	C	92	GLY	2.5
1	C	64	ALA	2.5
1	A	67	ARG	2.5
1	A	27	SER	2.5
2	D	179	LEU	2.4
1	C	39	TRP	2.4
1	A	180	ALA	2.4
1	A	144	GLN	2.3
1	A	185	PHE	2.3
1	A	149	ASP	2.3
2	B	166	VAL	2.3
2	D	216	ASN	2.3
2	B	215	GLU	2.2
1	A	66	GLU	2.2
1	C	91	GLN	2.2
2	D	217	ASP	2.1
1	A	103	ARG	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 carbohydrates 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.