



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2023 – 09:48 PM EDT

PDB ID : 3DMM  
Title : Crystal structure of the CD8 alpha beta/H-2Dd complex  
Authors : Wang, R.; Natarajan, K.; Margulies, D.H.  
Deposited on : 2008-07-01  
Resolution : 2.60 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

<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>.

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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 : 2.35  
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

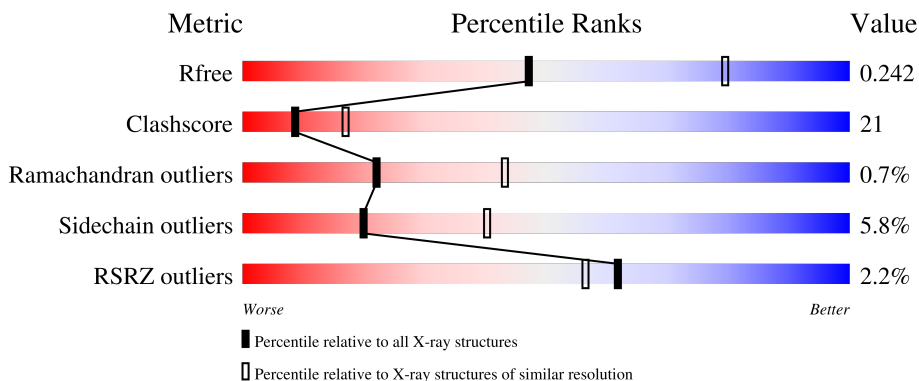
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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  $\geq 3$ , 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	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 65%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 33%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 0.5%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 0.5%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 19%; height: 10px; background-color: grey;"></div> </div> <p style="margin-top: 5px;">65% 33% .</p>
2	B	100	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 69%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 26%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2.5%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 0.5%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: grey;"></div> </div> <p style="margin-top: 5px;">69% 26% . .</p>
3	P	10	<div style="display: flex; align-items: center;"> <div style="width: 60%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 40%; height: 10px; background-color: yellow; margin-right: 2px;"></div> </div> <p style="margin-top: 5px;">60% 40%</p>
4	C	166	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 33%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 32%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 0.5%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 29%; height: 10px; background-color: grey;"></div> </div> <p style="margin-top: 5px;">3% 33% 32% 5% . 29%</p>
5	D	150	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 41%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 34%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 0.5%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 18%; height: 10px; background-color: grey;"></div> </div> <p style="margin-top: 5px;">4% 41% 34% 5% . 18%</p>

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 5094 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 H-2 class I histocompatibility antigen, D-D alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	274	2249	1411	407	422	9	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP P01900

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	100	826	528	139	151	8	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 Q91XJ8

- Molecule 3 is a protein called Synthetic peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	P	10	76	48	16	12	0	0	0

- Molecule 4 is a protein called T-cell surface glycoprotein CD8 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	C	118	938	602	152	177	7	0	0	0

- Molecule 5 is a protein called T-cell surface glycoprotein CD8 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	D	123	968	618	159	186	5	0	0	0

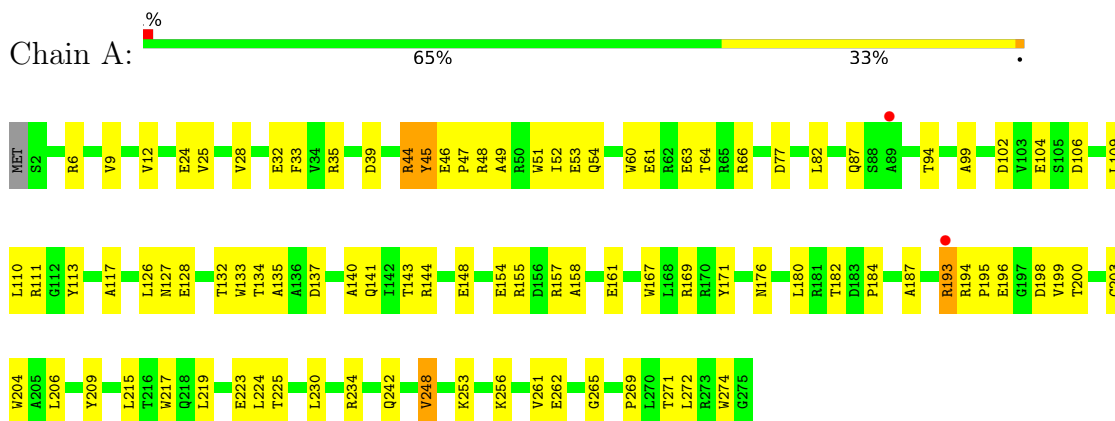
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	24	Total 24	O 24	0	0
6	B	10	Total 10	O 10	0	0
6	P	1	Total 1	O 1	0	0
6	D	2	Total 2	O 2	0	0

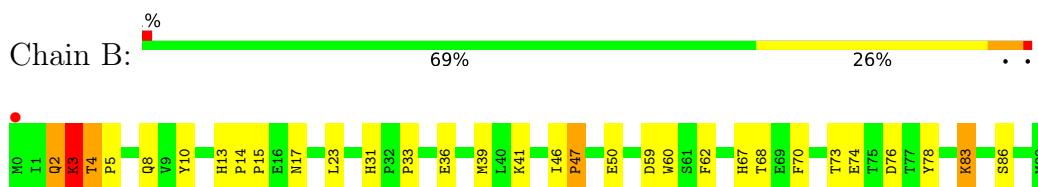
### 3 Residue-property plots [i](#)

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: H-2 class I histocompatibility antigen, D-D alpha chain



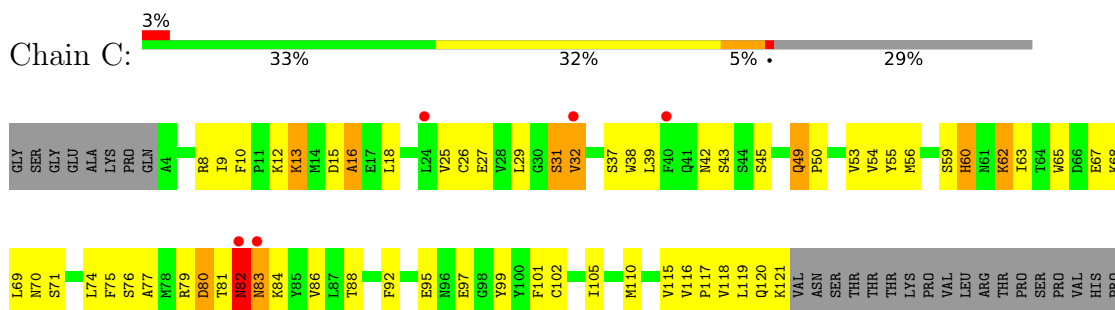
- Molecule 2: Beta-2 microglobulin



- Molecule 3: Synthetic peptide



- Molecule 4: T-cell surface glycoprotein CD8 alpha chain



THR  
GLY  
THR  
SER  
GLN  
PRO  
GLN  
ARG  
PRO  
GLU  
ASP  
CYS  
ARG  
PRO  
ARG  
GLY  
SER  
VAL  
LYS  
GLY  
THR  
GLY

• Molecule 5: T-cell surface glycoprotein CD8 beta chain

Chain D: 4% 41% 34% 5% 18%

SER SER ALA L1 I2 Q3 T4 P5 T12 N13 M18 S19 C20 E21 V22 K23 S24 L25 S26 K27 L28 T29 W33 L34 Q38 D39 P40 K41 D42 K43 Y44 F47 L48 Y59 V63 D64 K65 K66 R67 N68 I69 D75 S76 R77 R78 P79 M84 N85 V86 K87 P88

E89 D92 F95 C96 A97 T98 V99 P102 K103 M104 V105 F106 G107 T108 G109 T110 V114 V117 L118 P119 T120 A122 P123 THR LYS LYS THR THR LEU LYS MET LYS LYS LYS LYS CYS PRO PHE PRO HIS PRO PRO THR THR GLN LYS GLY

## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	79.47Å 96.69Å 97.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.32 – 2.60 43.32 – 2.60	Depositor EDS
% Data completeness (in resolution range)	91.8 (43.32-2.60) 95.9 (43.32-2.60)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.42 (at 2.61Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.248 , 0.292 0.233 , 0.242	Depositor DCC
$R_{free}$ test set	1182 reflections (5.17%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	53.2	Xtrriage
Anisotropy	0.490	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 40.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.017 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	5094	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% 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, 0.333 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	0.49	0/2312	0.66	0/3138
2	B	0.50	0/852	0.83	3/1154 (0.3%)
3	P	0.50	0/77	0.76	0/101
4	C	0.62	0/959	1.09	7/1295 (0.5%)
5	D	0.47	0/988	1.31	13/1336 (1.0%)
All	All	0.52	0/5188	0.93	23/7024 (0.3%)

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
5	D	1	1

There are no bond length outliers.

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	24	SER	CB-CA-C	25.44	158.44	110.10
4	C	82	ASN	C-N-CA	17.75	166.07	121.70
5	D	41	LYS	N-CA-C	-15.42	69.37	111.00
5	D	24	SER	C-N-CA	15.33	160.02	121.70
4	C	82	ASN	CB-CA-C	-13.45	83.50	110.40
4	C	82	ASN	N-CA-C	-12.14	78.21	111.00
5	D	42	ASP	N-CA-CB	-10.85	91.07	110.60
2	B	2	GLN	N-CA-C	9.73	137.28	111.00
4	C	80	ASP	CB-CA-C	9.08	128.56	110.40
4	C	31	SER	CB-CA-C	-8.34	94.26	110.10
5	D	42	ASP	CB-CA-C	7.98	126.35	110.40
2	B	47	PRO	N-CA-C	7.65	131.99	112.10
4	C	80	ASP	N-CA-C	-7.43	90.92	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	16	ALA	CB-CA-C	-7.22	99.27	110.10
5	D	40	PRO	N-CA-C	-6.98	93.96	112.10
5	D	24	SER	N-CA-C	-6.70	92.92	111.00
5	D	122	ALA	CB-CA-C	-6.54	100.28	110.10
5	D	119	PRO	N-CA-CB	5.92	110.40	103.30
5	D	40	PRO	CB-CA-C	5.71	126.27	112.00
5	D	76	SER	CB-CA-C	-5.50	99.64	110.10
5	D	65	LYS	CB-CA-C	-5.49	99.43	110.40
2	B	3	LYS	N-CA-CB	-5.08	101.45	110.60
5	D	25	ILE	CB-CA-C	5.08	121.76	111.60

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	D	24	SER	CA

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	D	24	SER	Peptide

## 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	2249	0	2114	62	1
2	B	826	0	806	24	0
3	P	76	0	82	5	0
4	C	938	0	933	67	0
5	D	968	0	977	63	1
6	A	24	0	0	0	0
6	B	10	0	0	0	0
6	D	2	0	0	0	0
6	P	1	0	0	0	0
All	All	5094	0	4912	205	1

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 21.

All (205) 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:C:81:THR:O	4:C:82:ASN:C	1.99	0.99
5:D:2:ILE:HD12	5:D:2:ILE:H	1.24	0.99
4:C:60:HIS:HD2	4:C:62:LYS:HD3	1.33	0.89
4:C:81:THR:C	4:C:82:ASN:O	1.96	0.88
4:C:53:VAL:HG12	4:C:54:VAL:HG23	1.55	0.87
4:C:68:LYS:H	4:C:68:LYS:HD2	1.43	0.83
4:C:56:MET:CE	4:C:77:ALA:HB1	2.09	0.83
4:C:115:VAL:HG23	5:D:44:TYR:HA	1.63	0.81
4:C:39:LEU:HD21	5:D:104:MET:HE3	1.65	0.78
4:C:60:HIS:CD2	4:C:62:LYS:HD3	2.19	0.78
5:D:66:LYS:HD3	5:D:68:ASN:OD1	1.83	0.78
5:D:64:ASP:O	5:D:65:LYS:HB3	1.82	0.76
1:A:51:TRP:O	1:A:54:GLN:HG2	1.85	0.75
2:B:3:LYS:HG3	2:B:31:HIS:HB3	1.68	0.75
4:C:56:MET:HE3	4:C:77:ALA:HB1	1.69	0.74
1:A:133:TRP:HB2	1:A:144:ARG:HG3	1.72	0.72
4:C:68:LYS:HD2	4:C:68:LYS:N	2.05	0.72
5:D:28:LEU:HD12	5:D:28:LEU:O	1.91	0.71
5:D:59:TYR:HB3	5:D:63:VAL:HG23	1.73	0.70
4:C:69:LEU:HD13	4:C:69:LEU:O	1.91	0.70
2:B:3:LYS:NZ	2:B:3:LYS:HB3	2.06	0.70
5:D:39:ASP:O	5:D:40:PRO:C	2.31	0.68
4:C:63:ILE:HG22	4:C:65:TRP:NE1	2.08	0.68
5:D:2:ILE:HD12	5:D:2:ILE:N	2.05	0.68
1:A:9:VAL:HG13	1:A:24:GLU:HG2	1.74	0.68
1:A:47:PRO:HG3	1:A:60:TRP:CZ2	2.29	0.68
5:D:120:THR:O	5:D:121:THR:HG23	1.94	0.68
5:D:2:ILE:H	5:D:2:ILE:CD1	2.00	0.67
5:D:39:ASP:O	5:D:41:LYS:O	2.14	0.65
5:D:118:LEU:HD13	5:D:119:PRO:O	1.96	0.65
1:A:44:ARG:HA	1:A:64:THR:HG23	1.79	0.64
4:C:81:THR:HG22	4:C:83:ASN:ND2	2.12	0.64
5:D:1:LEU:HD13	5:D:105:VAL:HG11	1.79	0.64
4:C:26:CYS:HB2	4:C:38:TRP:CZ2	2.33	0.64
5:D:122:ALA:HB1	5:D:123:PRO:CD	2.28	0.63
4:C:115:VAL:HG21	5:D:43:LYS:HE3	1.79	0.63
4:C:18:LEU:HG	4:C:120:GLN:OE1	1.99	0.62
4:C:68:LYS:H	4:C:68:LYS:CD	2.12	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:D:86:VAL:HG22	5:D:114:VAL:HG21	1.80	0.62
4:C:60:HIS:ND1	4:C:60:HIS:N	2.45	0.62
4:C:63:ILE:HG22	4:C:65:TRP:HE1	1.64	0.62
4:C:80:ASP:O	4:C:81:THR:C	2.38	0.62
1:A:35:ARG:HB3	1:A:48:ARG:HD2	1.82	0.61
1:A:63:GLU:HA	1:A:63:GLU:OE1	2.00	0.61
4:C:37:SER:HB3	5:D:104:MET:HE2	1.82	0.61
1:A:196:GLU:OE1	1:A:196:GLU:N	2.34	0.61
5:D:86:VAL:CG2	5:D:114:VAL:HG21	2.30	0.61
1:A:262:GLU:OE2	1:A:269:PRO:HB3	2.01	0.61
1:A:135:ALA:HB3	1:A:141:GLN:NE2	2.16	0.60
4:C:81:THR:O	4:C:82:ASN:O	2.07	0.60
4:C:67:GLU:HA	4:C:70:ASN:OD1	2.01	0.60
1:A:66:ARG:CZ	3:P:2:GLY:HA3	2.33	0.59
5:D:122:ALA:HB1	5:D:123:PRO:HD2	1.83	0.59
1:A:187:ALA:HA	1:A:204:TRP:O	2.03	0.58
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.38	0.58
4:C:74:LEU:HG	4:C:75:PHE:CD1	2.38	0.58
4:C:49:GLN:HG2	5:D:108:THR:HA	1.85	0.58
5:D:118:LEU:HD13	5:D:118:LEU:C	2.24	0.57
2:B:23:LEU:HG	2:B:39:MET:HE1	1.85	0.57
4:C:56:MET:HE1	4:C:77:ALA:HB1	1.84	0.57
5:D:122:ALA:O	5:D:123:PRO:C	2.42	0.57
2:B:17:ASN:ND2	2:B:74:GLU:HG2	2.20	0.57
1:A:144:ARG:HD3	1:A:148:GLU:OE2	2.04	0.57
1:A:199:VAL:O	1:A:248:VAL:HA	2.05	0.57
4:C:65:TRP:HZ3	4:C:75:PHE:HB2	1.70	0.57
2:B:17:ASN:HD21	2:B:74:GLU:HG2	1.69	0.57
1:A:6:ARG:HH21	1:A:113:TYR:HE2	1.52	0.56
5:D:1:LEU:HD13	5:D:105:VAL:CG1	2.35	0.56
1:A:193:ARG:HG3	1:A:193:ARG:O	2.04	0.56
1:A:272:LEU:HD12	1:A:272:LEU:N	2.20	0.56
2:B:36:GLU:HB2	2:B:83:LYS:HB3	1.86	0.56
1:A:215:LEU:CD2	1:A:261:VAL:HG22	2.35	0.56
1:A:32:GLU:OE2	1:A:48:ARG:HD3	2.05	0.55
5:D:118:LEU:HD13	5:D:118:LEU:O	2.07	0.55
4:C:54:VAL:HG12	4:C:55:TYR:N	2.22	0.55
1:A:219:LEU:HB3	1:A:224:LEU:HD21	1.89	0.55
4:C:81:THR:O	4:C:83:ASN:N	2.40	0.54
5:D:77:ARG:O	5:D:79:PRO:HD3	2.07	0.54
4:C:92:PHE:CE2	4:C:120:GLN:HB2	2.43	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:C:13:LYS:HA	4:C:117:PRO:HD2	1.90	0.53
1:A:28:VAL:HG23	1:A:33:PHE:CE1	2.43	0.53
4:C:16:ALA:O	4:C:120:GLN:HA	2.09	0.53
5:D:41:LYS:HB2	5:D:41:LYS:NZ	2.24	0.53
1:A:143:THR:HG23	3:P:10:ILE:HA	1.91	0.52
4:C:76:SER:HB3	4:C:88:THR:OG1	2.09	0.52
1:A:184:PRO:HG3	1:A:265:GLY:O	2.10	0.52
5:D:18:MET:HE1	5:D:110:THR:HB	1.92	0.52
4:C:39:LEU:HD12	4:C:101:PHE:CE2	2.46	0.51
4:C:74:LEU:HD23	4:C:74:LEU:N	2.25	0.51
5:D:28:LEU:HB3	5:D:75:ASP:O	2.10	0.51
4:C:25:VAL:HG13	4:C:86:VAL:HG22	1.92	0.51
5:D:117:VAL:HG12	5:D:118:LEU:N	2.25	0.51
4:C:81:THR:O	4:C:83:ASN:ND2	2.43	0.50
1:A:234:ARG:HB2	2:B:10:TYR:CZ	2.46	0.50
2:B:33:PRO:HG3	2:B:62:PHE:CE1	2.47	0.50
1:A:111:ARG:HD3	1:A:128:GLU:OE2	2.12	0.50
4:C:43:SER:C	4:C:45:SER:H	2.15	0.50
5:D:20:CYS:O	5:D:79:PRO:HD2	2.12	0.50
5:D:118:LEU:HD22	5:D:119:PRO:N	2.26	0.50
4:C:70:ASN:O	4:C:71:SER:HB2	2.11	0.49
5:D:13:ASN:HA	5:D:85:ASN:HA	1.93	0.49
1:A:12:VAL:HG13	1:A:94:THR:HG22	1.94	0.49
1:A:111:ARG:HG2	1:A:111:ARG:HH11	1.77	0.49
2:B:41:LYS:HG3	2:B:78:TYR:CE1	2.47	0.49
4:C:59:SER:HB2	4:C:60:HIS:ND1	2.27	0.49
4:C:67:GLU:HB2	4:C:68:LYS:HD2	1.94	0.49
4:C:79:ARG:HG2	4:C:80:ASP:H	1.77	0.48
5:D:40:PRO:O	5:D:41:LYS:HB2	2.13	0.48
4:C:13:LYS:HE2	4:C:15:ASP:OD2	2.13	0.48
4:C:119:LEU:HD12	4:C:119:LEU:N	2.29	0.48
5:D:28:LEU:HB3	5:D:75:ASP:HB2	1.95	0.48
5:D:23:LYS:O	5:D:24:SER:C	2.51	0.48
5:D:33:TRP:O	5:D:48:LEU:HB3	2.12	0.48
5:D:33:TRP:CZ3	5:D:96:CYS:HB3	2.49	0.48
5:D:38:GLN:HA	5:D:43:LYS:HG3	1.93	0.48
5:D:117:VAL:HG12	5:D:118:LEU:H	1.79	0.48
1:A:77:ASP:OD1	3:P:9:THR:HB	2.14	0.48
4:C:10:PHE:CD1	4:C:12:LYS:HE2	2.50	0.47
5:D:63:VAL:HG11	5:D:69:ILE:HG13	1.97	0.47
1:A:127:ASN:OD1	1:A:134:THR:OG1	2.33	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:45:TYR:CD2	1:A:63:GLU:HB3	2.50	0.47
2:B:59:ASP:O	2:B:60:TRP:HB2	2.15	0.47
2:B:3:LYS:HB3	2:B:3:LYS:HZ3	1.79	0.46
5:D:34:LEU:HD12	5:D:47:PHE:HA	1.96	0.46
5:D:28:LEU:CB	5:D:75:ASP:HB2	2.46	0.46
1:A:104:GLU:C	1:A:106:ASP:N	2.69	0.45
5:D:3:GLN:HE21	5:D:109:GLY:H	1.64	0.45
5:D:2:ILE:HD13	5:D:21:GLU:HB3	1.98	0.45
2:B:46:ILE:HG21	2:B:68:THR:HG21	1.99	0.45
4:C:9:ILE:HA	4:C:25:VAL:O	2.17	0.45
2:B:23:LEU:O	2:B:67:HIS:HA	2.17	0.45
5:D:118:LEU:CD1	5:D:119:PRO:O	2.63	0.45
1:A:182:THR:HA	1:A:209:TYR:O	2.17	0.44
4:C:27:GLU:HA	4:C:83:ASN:O	2.17	0.44
5:D:40:PRO:O	5:D:41:LYS:CB	2.65	0.44
2:B:3:LYS:HB3	2:B:3:LYS:HZ2	1.79	0.44
1:A:176:ASN:OD1	1:A:180:LEU:HD12	2.17	0.44
5:D:59:TYR:CB	5:D:63:VAL:HG23	2.45	0.44
5:D:5:PRO:O	5:D:110:THR:HG23	2.18	0.44
1:A:25:VAL:HG22	1:A:35:ARG:HG3	1.98	0.43
5:D:3:GLN:OE1	5:D:18:MET:CE	2.67	0.43
1:A:66:ARG:NH2	3:P:2:GLY:HA3	2.34	0.43
1:A:126:LEU:HD12	1:A:132:THR:O	2.18	0.43
1:A:253:LYS:HD2	1:A:256:LYS:NZ	2.33	0.43
1:A:104:GLU:C	1:A:106:ASP:H	2.21	0.43
4:C:8:ARG:CZ	4:C:29:LEU:CD1	2.97	0.43
4:C:10:PHE:CE1	4:C:12:LYS:HE2	2.52	0.43
4:C:99:TYR:CD2	4:C:99:TYR:N	2.86	0.43
4:C:110:MET:O	5:D:47:PHE:HB2	2.18	0.43
5:D:77:ARG:C	5:D:79:PRO:HD3	2.38	0.43
1:A:195:PRO:HD2	1:A:196:GLU:OE1	2.18	0.43
1:A:248:VAL:HG11	4:C:62:LYS:HE3	2.01	0.43
4:C:42:ASN:O	4:C:45:SER:HB3	2.19	0.43
4:C:116:VAL:HA	4:C:117:PRO:HD3	1.83	0.43
1:A:206:LEU:CD2	1:A:242:GLN:HG3	2.49	0.43
2:B:74:GLU:OE1	2:B:74:GLU:HA	2.19	0.43
1:A:99:ALA:HA	1:A:113:TYR:O	2.19	0.43
4:C:54:VAL:CG1	4:C:55:TYR:N	2.82	0.43
2:B:4:THR:HA	2:B:5:PRO:HD3	1.68	0.42
4:C:8:ARG:HB2	4:C:27:GLU:HB3	2.00	0.42
2:B:10:TYR:CD1	2:B:10:TYR:N	2.87	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:73:THR:OG1	2:B:76:ASP:OD2	2.35	0.42
1:A:206:LEU:HD23	1:A:242:GLN:HG3	2.00	0.42
5:D:3:GLN:HE22	5:D:95:PHE:HA	1.83	0.42
5:D:12:THR:HG23	5:D:87:LYS:HD3	2.00	0.42
1:A:33:PHE:C	1:A:48:ARG:HB2	2.40	0.42
4:C:31:SER:O	4:C:32:VAL:C	2.58	0.42
4:C:42:ASN:ND2	4:C:95:GLU:O	2.53	0.42
2:B:3:LYS:NZ	2:B:3:LYS:CB	2.78	0.42
4:C:37:SER:HB3	5:D:104:MET:CE	2.49	0.42
1:A:154:GLU:H	1:A:154:GLU:CD	2.23	0.42
1:A:155:ARG:HH11	3:P:6:ALA:HB1	1.85	0.42
1:A:49:ALA:O	1:A:52:ILE:HG22	2.18	0.42
1:A:234:ARG:NH1	2:B:8:GLN:OE1	2.47	0.42
5:D:18:MET:CE	5:D:110:THR:HB	2.49	0.42
4:C:97:GLU:HG3	4:C:119:LEU:HA	2.02	0.42
1:A:157:ARG:CG	1:A:158:ALA:N	2.82	0.42
5:D:1:LEU:O	5:D:107:GLY:HA2	2.20	0.41
5:D:43:LYS:HG2	5:D:44:TYR:N	2.34	0.41
1:A:135:ALA:HB1	1:A:140:ALA:HB3	2.02	0.41
2:B:13:HIS:O	2:B:14:PRO:C	2.59	0.41
4:C:79:ARG:CG	4:C:80:ASP:H	2.33	0.41
2:B:2:GLN:OE1	2:B:86:SER:HA	2.20	0.41
1:A:167:TRP:O	1:A:171:TYR:CD2	2.74	0.41
4:C:49:GLN:HA	4:C:50:PRO:HD3	1.85	0.41
4:C:81:THR:HB	4:C:84:LYS:NZ	2.36	0.41
5:D:99:VAL:HG12	5:D:104:MET:HG2	2.02	0.41
5:D:23:LYS:O	5:D:77:ARG:NH2	2.53	0.41
5:D:12:THR:O	5:D:13:ASN:HB2	2.21	0.41
1:A:102:ASP:O	1:A:110:LEU:HB2	2.21	0.41
1:A:271:THR:C	1:A:272:LEU:HD12	2.40	0.41
4:C:92:PHE:HE1	4:C:118:VAL:HG12	1.86	0.41
4:C:105:ILE:HD11	4:C:110:MET:CE	2.51	0.41
1:A:44:ARG:O	1:A:46:GLU:HG3	2.21	0.41
1:A:82:LEU:HD22	1:A:87:GLN:HB2	2.02	0.41
1:A:203:CYS:HB2	1:A:217:TRP:CZ2	2.56	0.41
2:B:46:ILE:HA	2:B:47:PRO:HD3	1.89	0.40
1:A:109:LEU:CD2	1:A:161:GLU:HG2	2.51	0.40
1:A:230:LEU:O	1:A:230:LEU:HD12	2.21	0.40
4:C:79:ARG:O	4:C:80:ASP:HB3	2.22	0.40
1:A:111:ARG:NH1	1:A:128:GLU:OE2	2.55	0.40
1:A:199:VAL:CG1	1:A:200:THR:N	2.82	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:194:ARG:NE	1:A:198:ASP:OD1	2.38	0.40
5:D:89:GLU:H	5:D:89:GLU:CD	2.24	0.40
5:D:89:GLU:OE1	5:D:89:GLU:N	2.52	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:53:GLU:OE2	5:D:120:THR:O[4_445]	2.14	0.06

## 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	272/275 (99%)	257 (94%)	14 (5%)	1 (0%)	34	57
2	B	98/100 (98%)	86 (88%)	12 (12%)	0	100	100
3	P	8/10 (80%)	7 (88%)	1 (12%)	0	100	100
4	C	116/166 (70%)	93 (80%)	21 (18%)	2 (2%)	9	18
5	D	121/150 (81%)	100 (83%)	20 (16%)	1 (1%)	19	39
All	All	615/701 (88%)	543 (88%)	68 (11%)	4 (1%)	22	43

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	D	41	LYS
1	A	223	GLU
4	C	82	ASN
4	C	32	VAL

### 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	229/230 (100%)	219 (96%)	10 (4%)	28	53
2	B	94/94 (100%)	88 (94%)	6 (6%)	17	35
3	P	7/7 (100%)	7 (100%)	0	100	100
4	C	110/151 (73%)	103 (94%)	7 (6%)	17	35
5	D	113/139 (81%)	104 (92%)	9 (8%)	12	24
All	All	553/621 (89%)	521 (94%)	32 (6%)	20	40

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	ASP
1	A	44	ARG
1	A	45	TYR
1	A	61	GLU
1	A	137	ASP
1	A	169	ARG
1	A	193	ARG
1	A	225	THR
1	A	248	VAL
1	A	274	TRP
2	B	3	LYS
2	B	4	THR
2	B	15	PRO
2	B	50	GLU
2	B	70	PHE
2	B	83	LYS
4	C	13	LYS
4	C	49	GLN
4	C	60	HIS
4	C	62	LYS
4	C	83	ASN
4	C	102	CYS
4	C	121	LYS

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Mol	Chain	Res	Type
5	D	2	ILE
5	D	29	THR
5	D	34	LEU
5	D	64	ASP
5	D	84	MET
5	D	92	ASP
5	D	98	THR
5	D	102	PRO
5	D	121	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	174	ASN

### 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	274/275 (99%)	-0.32	2 (0%) 87 86	25, 47, 74, 121	0
2	B	100/100 (100%)	-0.31	1 (1%) 82 80	26, 42, 58, 92	0
3	P	10/10 (100%)	-0.47	0 100 100	42, 46, 49, 49	0
4	C	118/166 (71%)	0.41	5 (4%) 36 29	40, 74, 113, 126	0
5	D	123/150 (82%)	0.22	6 (4%) 29 23	37, 56, 101, 114	0
All	All	625/701 (89%)	-0.08	14 (2%) 62 56	25, 51, 95, 126	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	C	32	VAL	8.1
5	D	122	ALA	6.3
5	D	24	SER	6.0
5	D	25	ILE	5.9
5	D	28	LEU	3.8
5	D	123	PRO	3.7
4	C	82	ASN	3.6
4	C	83	ASN	2.9
1	A	193	ARG	2.5
1	A	89	ALA	2.5
2	B	0	MET	2.5
4	C	40	PHE	2.4
5	D	26	SER	2.2
4	C	24	LEU	2.0

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.