



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2018 – 11:23 am GMT

PDB ID : 3SZM  
Title : STRUCTURE OF HUMAN MICROCEPHALIN (MCPH1) TANDEM BRCT  
DOMAINS IN COMPLEX WITH A GAMMA-H2AX PHOSPHOPEPTIDE  
Authors : Singh, N.; Thompson, J.R.; Mer, G.  
Deposited on : 2011-07-19  
Resolution : 2.63 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.

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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  
Mogul : 1.7.3 (157068), CSD as539be (2018)  
Xtrriage (Phenix) : 1.13  
EDS : trunk31020  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk31020

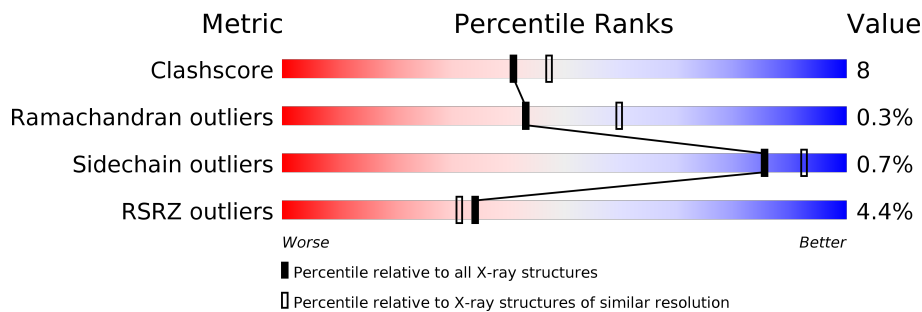
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.63 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))
Clashscore	122126	1233 (2.66-2.62)
Ramachandran outliers	120053	1216 (2.66-2.62)
Sidechain outliers	120020	1216 (2.66-2.62)
RSRZ outliers	108989	1175 (2.66-2.62)

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	199	 2% 80% 15% 5%
1	B	199	 4% 77% 18% 5%
1	C	199	 3% 80% 16% 5%
1	D	199	 4% 85% 10% 5%
1	E	199	 12% 63% 30% 5%
1	F	199	 % 80% 15% 5%
1	G	199	 3% 80% 16% 5%

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Mol	Chain	Length	Quality of chain
1	H	199	<p>4% 81% 15% 5%</p>
2	I	10	<p>10% 60% 40%</p>
2	J	10	<p>10% 50% 10% 40%</p>
2	K	10	<p>50% 50%</p>
2	L	10	<p>10% 40% 20% 40%</p>
2	M	10	<p>10% 60% 40%</p>
2	N	10	<p>10% 60% 40%</p>
2	O	10	<p>10% 60% 40%</p>
2	P	10	<p>10% 50% 50%</p>

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 24877 atoms, of which 12249 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 Microcephalin.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	189	2956	946	1488	249	263	10	0	1	0
1	B	189	2958	948	1488	249	262	11	0	1	0
1	C	191	2996	956	1513	253	264	10	0	0	0
1	D	189	2964	952	1488	249	264	11	0	2	0
1	E	187	2937	945	1472	247	262	11	0	3	0
1	F	189	2971	955	1490	251	265	10	0	3	0
1	G	191	3003	960	1514	253	266	10	0	1	0
1	H	190	2982	956	1500	251	264	11	0	2	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
A	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
A	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
B	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
B	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
B	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
C	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
C	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
C	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
D	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
D	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
D	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
E	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0

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Chain	Residue	Modelled	Actual	Comment	Reference
E	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
E	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
F	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
F	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
F	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
G	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
G	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
G	639	MET	-	EXPRESSION TAG	UNP Q8NEM0
H	637	GLY	-	EXPRESSION TAG	UNP Q8NEM0
H	638	HIS	-	EXPRESSION TAG	UNP Q8NEM0
H	639	MET	-	EXPRESSION TAG	UNP Q8NEM0

- Molecule 2 is a protein called Histone H2A.x.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				P
2	I	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	J	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	K	5	Total	C	H	N	O	P	0	0	0
			77	25	31	6	14	1			
2	L	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	M	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	N	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	O	6	Total	C	H	N	O	P	0	0	0
			94	30	39	8	16	1			
2	P	5	Total	C	H	N	O	P	0	0	0
			77	25	31	6	14	1			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	56	Total	O	0	0
			56	56		
3	B	27	Total	O	0	0
			27	27		
3	C	48	Total	O	0	0
			48	48		
3	D	38	Total	O	0	0
			38	38		

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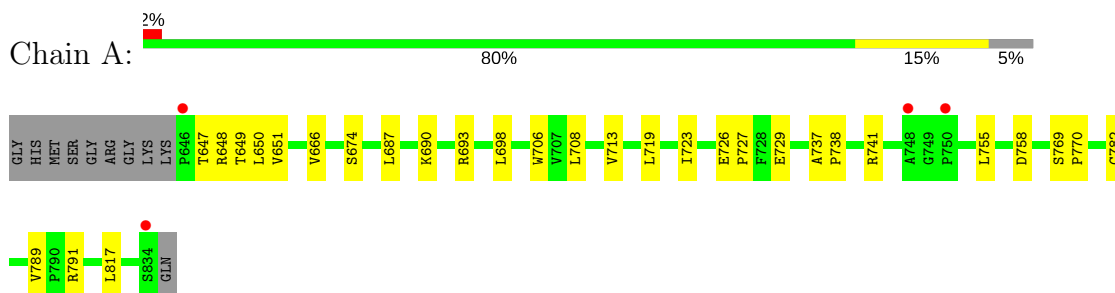
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	37	Total O 37 37	0	0
3	F	48	Total O 48 48	0	0
3	G	65	Total O 65 65	0	0
3	H	38	Total O 38 38	0	0
3	I	5	Total O 5 5	0	0
3	J	4	Total O 4 4	0	0
3	K	2	Total O 2 2	0	0
3	L	5	Total O 5 5	0	0
3	M	1	Total O 1 1	0	0
3	N	6	Total O 6 6	0	0
3	O	8	Total O 8 8	0	0
3	P	4	Total O 4 4	0	0

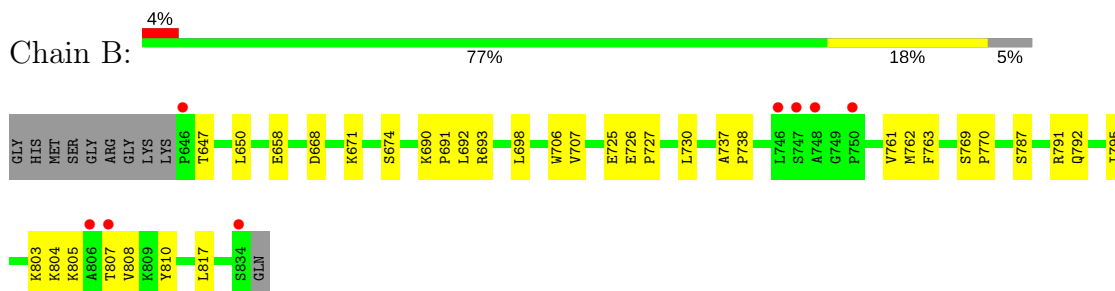
### 3 Residue-property plots [i](#)

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.

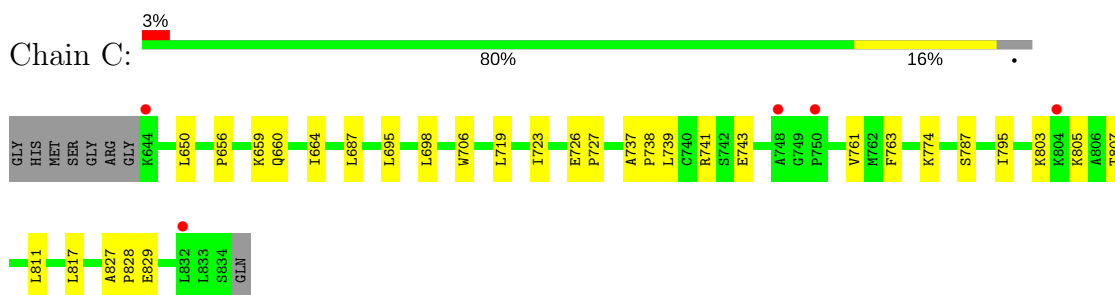
- Molecule 1: Microcephalin



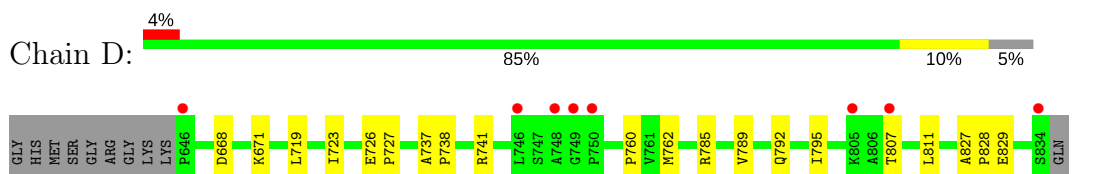
- Molecule 1: Microcephalin



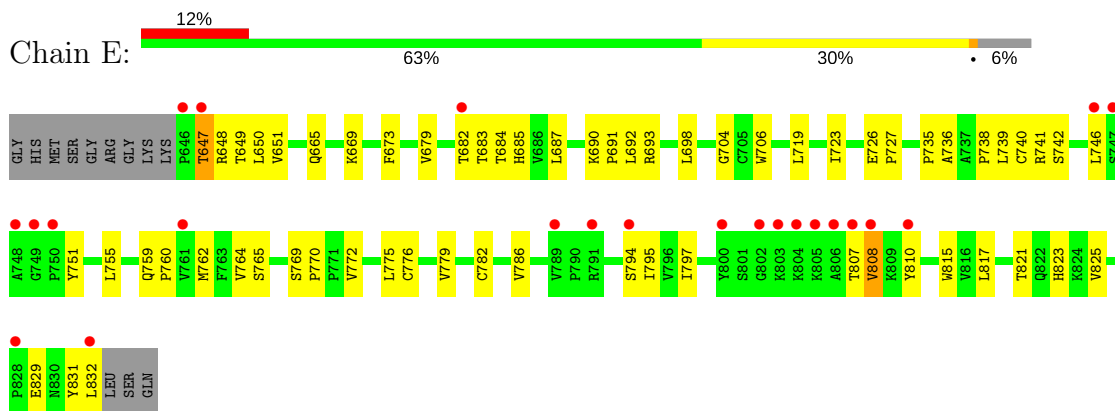
- Molecule 1: Microcephalin



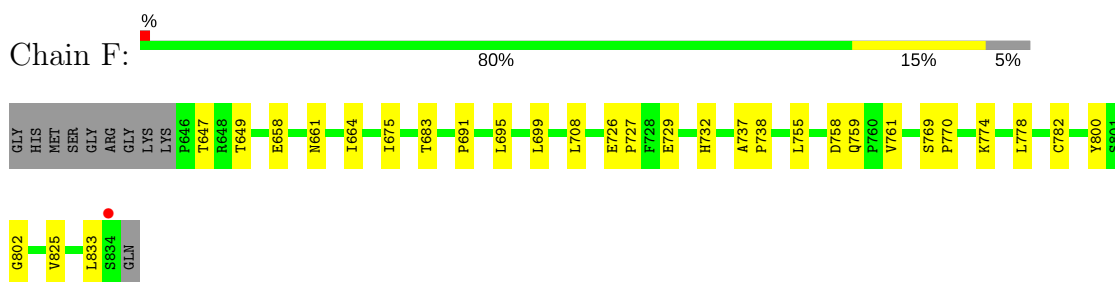
- Molecule 1: Microcephalin



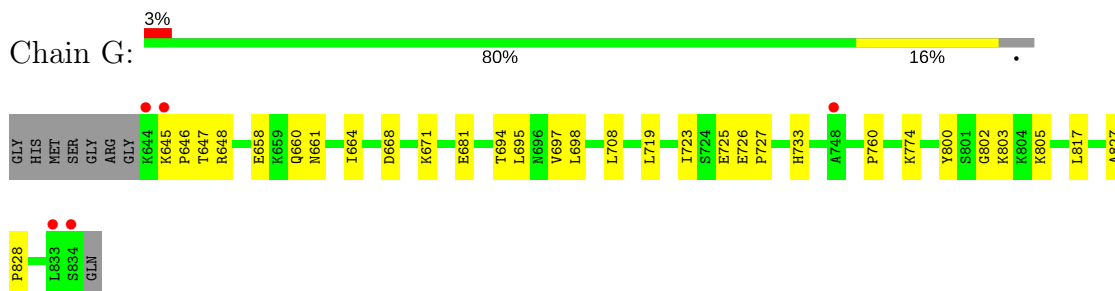
- Molecule 1: Microcephalin



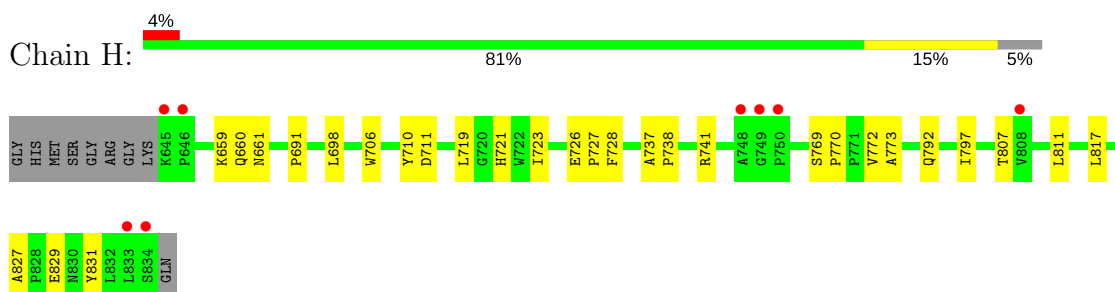
- Molecule 1: Microcephalin



- Molecule 1: Microcephalin



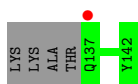
- Molecule 1: Microcephalin



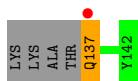
- Molecule 2: Histone H2A.x



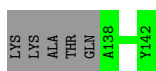




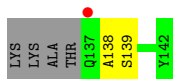
- Molecule 2: Histone H2A.x



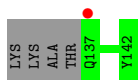
- Molecule 2: Histone H2A.x



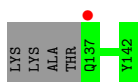
- Molecule 2: Histone H2A.x



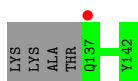
- Molecule 2: Histone H2A.x



- Molecule 2: Histone H2A.x



- Molecule 2: Histone H2A.x



- Molecule 2: Histone H2A.x



LYS	
LYS	
ALA	
THR	
GLN	
A138	
Y442	

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	67.81Å 82.23Å 104.42Å 72.10° 89.87° 80.94°	Depositor
Resolution (Å)	31.37 – 2.63 31.37 – 2.54	Depositor EDS
% Data completeness (in resolution range)	89.7 (31.37-2.63) 85.7 (31.37-2.54)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.96 (at 2.54Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE: 1.6.1_357)	Depositor
R, $R_{free}$	0.201 , 0.252 0.199 , (Not available)	Depositor DCC
$R_{free}$ test set	596 reflections (1.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	52.5	Xtriage
Anisotropy	0.044	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 54.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	24877	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.70% 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

### 5.1 Standard geometry

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

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	0.44	0/1512	0.54	0/2062
1	B	0.44	0/1514	0.52	0/2064
1	C	0.44	0/1524	0.56	0/2077
1	D	0.46	0/1523	0.58	0/2077
1	E	0.45	0/1515	0.58	0/2066
1	F	0.45	0/1532	0.57	0/2089
1	G	0.55	0/1533	0.59	0/2089
1	H	0.44	0/1529	0.56	0/2084
2	I	0.59	0/44	0.42	0/55
2	J	1.04	0/44	0.64	0/55
2	K	0.35	0/35	0.43	0/43
2	L	0.48	0/44	0.46	0/55
2	M	0.52	0/44	0.56	0/55
2	N	0.99	0/44	0.57	0/55
2	O	0.45	0/44	0.48	0/55
2	P	0.49	0/35	0.41	0/43
All	All	0.47	0/12516	0.56	0/17024

There are no bond length outliers.

There are no bond angle outliers.

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	1468	1488	1493	23	0
1	B	1470	1488	1497	24	0
1	C	1483	1513	1513	23	0
1	D	1476	1488	1503	15	0
1	E	1465	1472	1492	54	0
1	F	1481	1490	1506	18	0
1	G	1489	1514	1519	19	0
1	H	1482	1500	1514	20	0
2	I	55	39	39	0	0
2	J	55	39	39	2	0
2	K	46	31	31	0	0
2	L	55	39	39	1	0
2	M	55	39	39	0	0
2	N	55	39	39	0	0
2	O	55	39	39	0	0
2	P	46	31	30	0	0
3	A	56	0	0	1	0
3	B	27	0	0	0	0
3	C	48	0	0	0	0
3	D	38	0	0	2	0
3	E	37	0	0	5	0
3	F	48	0	0	2	0
3	G	65	0	0	1	0
3	H	38	0	0	0	0
3	I	5	0	0	0	0
3	J	4	0	0	0	0
3	K	2	0	0	0	0
3	L	5	0	0	0	0
3	M	1	0	0	0	0
3	N	6	0	0	0	0
3	O	8	0	0	0	0
3	P	4	0	0	0	0
All	All	12628	12249	12332	189	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 8.

All (189) 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:D:668:ASP:O	1:D:671:LYS:HE2	1.79	0.83
1:C:719:LEU:HD13	1:D:726[B]:GLU:HG2	1.61	0.82

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:726[B]:GLU:HG2	1:H:719:LEU:HD13	1.65	0.79
1:B:792:GLN:HG2	1:D:785:ARG:HB2	1.65	0.76
1:E:693:ARG:HH11	1:E:821:THR:HG21	1.51	0.75
1:B:668:ASP:O	1:B:671:LYS:HE2	1.89	0.71
1:C:803:LYS:HE3	1:C:805:LYS:HE2	1.71	0.71
1:G:660:GLN:O	1:G:664:ILE:HG12	1.90	0.70
1:C:737:ALA:HB3	1:C:738:PRO:HD3	1.74	0.70
2:J:137:GLN:HE21	2:J:137:GLN:N	1.91	0.69
1:E:673:PHE:HZ	1:E:685:HIS:HD1	1.41	0.68
1:H:706:TRP:CH2	1:H:741:ARG:HD2	2.30	0.66
1:C:660:GLN:O	1:C:664:ILE:HG12	1.96	0.66
1:E:776:CYS:SG	1:E:786:VAL:HG11	2.36	0.66
1:D:789:VAL:HB	1:D:792:GLN:HG3	1.78	0.66
1:D:726[A]:GLU:HG2	1:D:727:PRO:HD3	1.78	0.65
1:C:811:LEU:HD21	1:C:828:PRO:HB3	1.78	0.64
1:G:681[B]:GLU:CD	1:G:681[B]:GLU:H	2.00	0.64
1:C:664:ILE:HG13	1:F:664:ILE:HG13	1.79	0.64
1:B:690:LYS:HE3	1:B:692:LEU:HD11	1.81	0.63
1:D:741:ARG:HG2	3:D:59:HOH:O	1.98	0.63
1:C:795:ILE:CG2	1:C:811:LEU:HD12	2.29	0.62
1:B:726:GLU:N	1:B:727:PRO:HD2	2.13	0.62
1:G:658:GLU:O	1:G:661:ASN:HB3	2.02	0.60
1:G:733:HIS:HD2	3:G:137:HOH:O	1.85	0.60
1:E:794:SER:HA	1:E:808:VAL:HG13	1.84	0.60
1:E:690:LYS:HG3	1:E:691:PRO:HD2	1.83	0.59
1:F:664:ILE:HD13	1:F:675:ILE:HD12	1.84	0.58
1:D:807:THR:HB	3:D:339:HOH:O	2.02	0.58
1:D:827:ALA:HB1	1:D:829:GLU:OE1	2.05	0.57
1:E:719:LEU:HD12	1:E:723:ILE:HG21	1.86	0.57
1:G:668:ASP:O	1:G:671:LYS:HE2	2.04	0.57
1:D:719:LEU:HD12	1:D:723:ILE:HG21	1.86	0.56
1:E:673:PHE:HZ	1:E:685:HIS:ND1	2.04	0.56
1:E:736:ALA:CB	1:E:823:HIS:HB2	2.36	0.56
1:G:803:LYS:HD3	1:G:805:LYS:HD3	1.88	0.56
1:E:738:PRO:HA	1:E:741:ARG:HE	1.70	0.55
1:F:758:ASP:HA	1:H:792:GLN:HG2	1.87	0.55
1:A:791:ARG:HD3	1:G:760:PRO:HG3	1.88	0.55
1:B:807:THR:HG21	1:D:792:GLN:HA	1.88	0.55
1:B:690:LYS:HG3	1:B:691:PRO:HD2	1.87	0.55
1:H:737:ALA:HB3	1:H:738:PRO:CD	2.37	0.54
1:B:737:ALA:N	1:B:738:PRO:HD2	2.22	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:817:LEU:O	1:E:821:THR:HG23	2.07	0.54
1:E:649:THR:N	1:E:682:THR:HG22	2.23	0.54
1:E:755:LEU:HB3	1:E:782:CYS:HB3	1.90	0.54
1:D:811:LEU:HD21	1:D:828:PRO:HB3	1.89	0.53
1:A:758:ASP:HB2	3:A:17:HOH:O	2.08	0.53
1:C:719:LEU:HD12	1:C:723:ILE:HG21	1.90	0.53
1:E:829:GLU:HB2	3:E:335:HOH:O	2.07	0.53
1:A:726:GLU:N	1:A:727:PRO:CD	2.71	0.53
1:B:762[A]:MET:HG2	1:B:795:ILE:HB	1.89	0.53
1:A:719:LEU:HD12	1:A:723:ILE:HG21	1.91	0.53
1:E:649:THR:OG1	1:E:683:THR:CA	2.57	0.53
1:E:649:THR:OG1	1:E:683:THR:N	2.42	0.52
1:B:761:VAL:CG1	1:B:787:SER:HB2	2.39	0.52
1:C:706:TRP:CZ3	1:C:741:ARG:HD2	2.44	0.52
1:E:649:THR:OG1	1:E:683:THR:HA	2.10	0.52
1:C:706:TRP:CH2	1:C:741:ARG:HD2	2.45	0.52
1:B:693:ARG:HD2	1:B:698:LEU:HD21	1.92	0.51
1:H:797:ILE:HD13	1:H:811:LEU:HB2	1.92	0.51
1:E:698:LEU:HD13	1:E:817:LEU:HD22	1.92	0.51
1:E:762[B]:MET:HG2	1:E:795:ILE:HB	1.92	0.50
1:E:739:LEU:HD23	1:E:739:LEU:N	2.26	0.50
1:F:761:VAL:HG21	1:H:807:THR:HG21	1.93	0.50
1:B:804:LYS:HA	1:B:810:TYR:OH	2.12	0.50
1:E:690:LYS:HE3	1:E:692:LEU:HD11	1.93	0.50
1:G:708:LEU:HD21	1:G:725:GLU:HB3	1.94	0.50
1:E:764:VAL:HB	1:E:772:VAL:HG23	1.93	0.49
1:G:800:TYR:CZ	1:G:802:GLY:HA3	2.47	0.49
1:F:800:TYR:CZ	1:F:802:GLY:HA3	2.48	0.49
1:C:650:LEU:HD21	1:C:687:LEU:HD12	1.93	0.49
1:E:738:PRO:O	1:E:741:ARG:HG3	2.13	0.49
1:H:719:LEU:HD12	1:H:723:ILE:HG21	1.94	0.49
1:A:650:LEU:HD11	1:A:687:LEU:HD11	1.94	0.48
1:C:795:ILE:HG23	1:C:811:LEU:HD12	1.93	0.48
1:A:706:TRP:CH2	1:A:741:ARG:HD2	2.48	0.48
1:C:698:LEU:HD13	1:C:817:LEU:HD22	1.95	0.48
1:D:762[A]:MET:HE3	1:D:795:ILE:HG21	1.95	0.48
1:F:737:ALA:HB3	1:F:738:PRO:HD3	1.95	0.48
1:B:726:GLU:N	1:B:727:PRO:CD	2.77	0.48
1:C:650:LEU:HD11	1:C:687:LEU:HD11	1.96	0.48
1:F:649:THR:OG1	1:F:683:THR:HA	2.14	0.48
1:C:706:TRP:CZ3	1:C:741:ARG:CD	2.97	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:751:TYR:HA	3:E:334:HOH:O	2.13	0.48
1:F:732[A]:HIS:HB3	3:F:82:HOH:O	2.14	0.47
1:E:665:GLN:O	1:E:669:LYS:HG2	2.14	0.47
1:F:695:LEU:HD21	1:F:774:LYS:HG3	1.96	0.47
1:A:693:ARG:HD2	1:A:698:LEU:HD21	1.97	0.47
2:L:138:ALA:O	2:L:139:SEP:C	2.61	0.47
1:G:698:LEU:HD13	1:G:817:LEU:HD22	1.97	0.47
1:G:664:ILE:N	1:G:664:ILE:HD13	2.30	0.47
1:A:737:ALA:HB3	1:A:738:PRO:HD3	1.95	0.47
1:B:769:SER:HA	1:B:770:PRO:C	2.34	0.47
1:H:706:TRP:CZ3	1:H:741:ARG:CD	2.98	0.46
1:E:815:TRP:HD1	1:E:831:TYR:CD1	2.33	0.46
1:G:719:LEU:HD12	1:G:723:ILE:HG21	1.98	0.46
1:A:649:THR:HA	1:A:674:SER:O	2.16	0.46
1:E:693:ARG:CD	1:E:821:THR:HG21	2.46	0.46
1:A:698:LEU:HD13	1:A:817:LEU:HD22	1.98	0.45
1:E:651:VAL:HG21	1:E:679:VAL:HA	1.98	0.45
1:C:695:LEU:HD21	1:C:774:LYS:HG3	1.97	0.45
1:E:815:TRP:HD1	1:E:831:TYR:HD1	1.63	0.45
1:B:698:LEU:HD13	1:B:817:LEU:HD22	1.98	0.45
1:H:726:GLU:N	1:H:727:PRO:CD	2.79	0.45
1:A:737:ALA:N	1:A:738:PRO:HD2	2.31	0.45
1:E:759:GLN:HG2	3:E:350:HOH:O	2.16	0.45
1:B:761:VAL:HG11	1:B:787:SER:HB2	1.97	0.45
1:E:650:LEU:HD21	1:E:687:LEU:HD12	1.99	0.44
1:B:706:TRP:CE2	1:B:725:GLU:HG3	2.52	0.44
1:H:698:LEU:HD13	1:H:817:LEU:HD22	1.99	0.44
1:H:737:ALA:N	1:H:738:PRO:HD2	2.32	0.44
1:D:762[B]:MET:HG2	1:D:795:ILE:HB	2.00	0.44
1:E:741:ARG:HD2	1:E:742:SER:N	2.33	0.44
1:E:815:TRP:HA	1:E:831:TYR:CE1	2.52	0.44
1:F:833:LEU:HD12	3:F:284:HOH:O	2.18	0.44
1:E:769:SER:HA	1:E:770:PRO:C	2.37	0.44
1:A:666:VAL:HG21	1:A:713:VAL:HG13	2.00	0.44
1:A:713:VAL:CG1	1:A:713:VAL:O	2.66	0.44
1:B:650:LEU:HD23	1:B:650:LEU:C	2.37	0.44
1:D:737:ALA:N	1:D:738:PRO:HD2	2.33	0.44
1:E:719:LEU:HD12	1:E:723:ILE:CG2	2.48	0.44
1:G:803:LYS:CD	1:G:805:LYS:HD3	2.48	0.44
2:J:137:GLN:NE2	2:J:137:GLN:N	2.63	0.44
1:A:650:LEU:HD23	1:A:650:LEU:C	2.39	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:789:VAL:HG12	1:A:791:ARG:H	1.83	0.44
1:H:769:SER:HA	1:H:770:PRO:C	2.37	0.44
1:H:827:ALA:HB1	1:H:829:GLU:OE2	2.18	0.43
1:C:763:PHE:HD1	1:C:787:SER:O	2.01	0.43
1:E:765:SER:HB2	1:E:797:ILE:O	2.18	0.43
1:E:648:ARG:HA	1:E:682:THR:HG22	1.99	0.43
1:E:704:GLY:HA2	1:E:740:CYS:HB3	1.99	0.43
1:E:738:PRO:HA	1:E:741:ARG:CG	2.49	0.43
1:E:742:SER:O	1:E:746:LEU:HG	2.18	0.43
1:E:794:SER:C	1:E:808:VAL:CG1	2.86	0.43
1:E:832:LEU:HD11	3:E:192:HOH:O	2.17	0.43
1:B:763:PHE:HD1	1:B:787:SER:O	2.01	0.43
1:C:739:LEU:O	1:C:743:GLU:HG3	2.18	0.43
1:E:685:HIS:CD2	1:E:706:TRP:HB2	2.53	0.43
1:A:647:THR:HG22	1:A:648:ARG:N	2.34	0.43
1:A:737:ALA:HB3	1:A:738:PRO:CD	2.49	0.43
1:B:707:VAL:HG12	1:B:730:LEU:HD12	2.01	0.43
1:C:827:ALA:HB1	1:C:829:GLU:OE2	2.19	0.43
1:F:699:LEU:HD23	1:F:778:LEU:CD2	2.49	0.43
1:F:708:LEU:HD23	1:F:729:GLU:HA	1.99	0.42
1:C:656:PRO:HD2	1:C:659:LYS:HD2	2.01	0.42
1:H:711:ASP:HB2	1:H:728:PHE:CD2	2.55	0.42
1:E:825:VAL:HG21	3:E:350:HOH:O	2.19	0.42
1:F:759:GLN:NE2	1:F:825:VAL:HG11	2.35	0.42
1:B:791:ARG:HG2	1:D:760:PRO:HA	2.01	0.42
1:B:725:GLU:C	1:B:727:PRO:HD2	2.40	0.42
1:A:706:TRP:CE3	1:A:741:ARG:HD3	2.55	0.42
1:A:706:TRP:CZ3	1:A:741:ARG:CD	3.03	0.42
1:E:726[B]:GLU:OE2	1:H:721:HIS:NE2	2.50	0.42
1:E:810:TYR:O	1:E:832:LEU:HD23	2.19	0.42
1:F:755:LEU:HB3	1:F:782:CYS:HB3	2.02	0.41
1:G:647:THR:O	1:G:648:ARG:C	2.59	0.41
1:E:650:LEU:C	1:E:650:LEU:HD23	2.40	0.41
1:H:737:ALA:HB3	1:H:738:PRO:HD3	2.03	0.41
1:A:708:LEU:HD23	1:A:729:GLU:HA	2.02	0.41
1:C:761:VAL:HG11	1:C:787:SER:HB2	2.01	0.41
1:A:755:LEU:HB3	1:A:782:CYS:HB3	2.02	0.41
1:E:760:PRO:HB2	1:E:794:SER:HB3	2.03	0.41
1:F:737:ALA:HB3	1:F:738:PRO:CD	2.50	0.41
1:F:769:SER:HA	1:F:770:PRO:C	2.40	0.41
1:G:695:LEU:HD21	1:G:774:LYS:HG3	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:769:SER:HA	1:A:770:PRO:C	2.41	0.41
1:E:775:LEU:O	1:E:779:VAL:HG23	2.20	0.41
1:C:726:GLU:N	1:C:727:PRO:CD	2.84	0.41
1:F:658:GLU:O	1:F:661:ASN:HB3	2.21	0.41
1:G:645:LYS:HA	1:G:646:PRO:HD3	1.85	0.41
1:H:660:GLN:O	1:H:661:ASN:C	2.59	0.41
1:H:659:LYS:HG2	1:H:710:TYR:CZ	2.56	0.41
1:G:827:ALA:HA	1:G:828:PRO:HD3	1.91	0.41
1:E:648:ARG:HA	1:E:682:THR:CG2	2.51	0.40
1:F:726:GLU:N	1:F:727:PRO:CD	2.84	0.40
1:G:726:GLU:N	1:G:727:PRO:CD	2.84	0.40
1:B:737:ALA:HB3	1:B:738:PRO:HD3	2.03	0.40
1:B:805:LYS:HB2	1:B:808:VAL:HG23	2.02	0.40
1:C:795:ILE:HG21	1:C:811:LEU:HD12	2.04	0.40
1:B:658:GLU:CD	1:B:658:GLU:H	2.25	0.40
1:G:694:THR:OG1	1:G:697:VAL:HG23	2.21	0.40
1:H:772:VAL:HG13	1:H:773:ALA:N	2.36	0.40
1:E:735:PRO:O	1:E:738:PRO:HD2	2.21	0.40
1:H:811:LEU:HA	1:H:831:TYR:O	2.21	0.40
1:A:650:LEU:HD23	1:A:651:VAL:N	2.37	0.40
1:E:647:THR:O	1:E:682:THR:HG23	2.22	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	188/199 (94%)	176 (94%)	12 (6%)	0	100	100
1	B	188/199 (94%)	179 (95%)	8 (4%)	1 (0%)	31	46
1	C	189/199 (95%)	186 (98%)	3 (2%)	0	100	100
1	D	189/199 (95%)	184 (97%)	5 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	188/199 (94%)	180 (96%)	8 (4%)	0	100	100
1	F	190/199 (96%)	184 (97%)	4 (2%)	2 (1%)	16	22
1	G	190/199 (96%)	186 (98%)	4 (2%)	0	100	100
1	H	190/199 (96%)	184 (97%)	5 (3%)	1 (0%)	31	46
2	I	3/10 (30%)	3 (100%)	0	0	100	100
2	J	3/10 (30%)	3 (100%)	0	0	100	100
2	K	2/10 (20%)	2 (100%)	0	0	100	100
2	L	3/10 (30%)	3 (100%)	0	0	100	100
2	M	3/10 (30%)	3 (100%)	0	0	100	100
2	N	3/10 (30%)	3 (100%)	0	0	100	100
2	O	3/10 (30%)	3 (100%)	0	0	100	100
2	P	2/10 (20%)	2 (100%)	0	0	100	100
All	All	1534/1672 (92%)	1481 (96%)	49 (3%)	4 (0%)	43	60

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	647	THR
1	F	647	THR
1	F	691	PRO
1	H	691	PRO

### 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	168/174 (97%)	167 (99%)	1 (1%)	87	94
1	B	168/174 (97%)	166 (99%)	2 (1%)	74	86
1	C	169/174 (97%)	168 (99%)	1 (1%)	87	94
1	D	169/174 (97%)	169 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	168/174 (97%)	164 (98%)	4 (2%)	52	70
1	F	170/174 (98%)	170 (100%)	0	100	100
1	G	170/174 (98%)	170 (100%)	0	100	100
1	H	170/174 (98%)	170 (100%)	0	100	100
2	I	4/7 (57%)	4 (100%)	0	100	100
2	J	4/7 (57%)	3 (75%)	1 (25%)	0	0
2	K	3/7 (43%)	3 (100%)	0	100	100
2	L	4/7 (57%)	4 (100%)	0	100	100
2	M	4/7 (57%)	4 (100%)	0	100	100
2	N	4/7 (57%)	4 (100%)	0	100	100
2	O	4/7 (57%)	4 (100%)	0	100	100
2	P	3/7 (43%)	3 (100%)	0	100	100
All	All	1382/1448 (95%)	1373 (99%)	9 (1%)	85	92

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	690	LYS
1	B	674	SER
1	B	803	LYS
1	C	807	THR
1	E	647	THR
1	E	684	THR
1	E	807	THR
1	E	808	VAL
2	J	137	GLN

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

Mol	Chain	Res	Type
1	C	665	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](#)

8 non-standard protein/DNA/RNA residues 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
2	SEP	I	139	2	9,9,10	1.66	2 (22%)	9,12,14	1.03	0
2	SEP	J	139	2	9,9,10	1.50	1 (11%)	9,12,14	1.05	1 (11%)
2	SEP	K	139	2	9,9,10	1.71	2 (22%)	9,12,14	1.19	1 (11%)
2	SEP	L	139	2	9,9,10	1.42	2 (22%)	9,12,14	1.48	2 (22%)
2	SEP	M	139	2	9,9,10	1.58	2 (22%)	9,12,14	2.40	3 (33%)
2	SEP	N	139	2	9,9,10	1.49	1 (11%)	9,12,14	1.48	2 (22%)
2	SEP	O	139	2	9,9,10	1.37	1 (11%)	9,12,14	1.11	1 (11%)
2	SEP	P	139	2	9,9,10	1.41	1 (11%)	9,12,14	1.55	3 (33%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SEP	I	139	2	-	0/5/8/10	0/0/0/0
2	SEP	J	139	2	-	0/5/8/10	0/0/0/0
2	SEP	K	139	2	-	0/5/8/10	0/0/0/0
2	SEP	L	139	2	-	0/5/8/10	0/0/0/0
2	SEP	M	139	2	-	0/5/8/10	0/0/0/0
2	SEP	N	139	2	-	0/5/8/10	0/0/0/0
2	SEP	O	139	2	-	0/5/8/10	0/0/0/0
2	SEP	P	139	2	-	0/5/8/10	0/0/0/0

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	139	SEP	CA-C	2.16	1.53	1.50
2	L	139	SEP	CA-C	2.21	1.53	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	M	139	SEP	CA-C	2.26	1.53	1.50
2	I	139	SEP	CA-C	2.64	1.53	1.50
2	P	139	SEP	P-O1P	2.68	1.59	1.50
2	L	139	SEP	P-O1P	2.87	1.60	1.50
2	O	139	SEP	P-O1P	2.92	1.60	1.50
2	N	139	SEP	P-O1P	3.23	1.61	1.50
2	M	139	SEP	P-O1P	3.32	1.61	1.50
2	I	139	SEP	P-O1P	3.38	1.62	1.50
2	J	139	SEP	P-O1P	3.43	1.62	1.50
2	K	139	SEP	P-O1P	3.51	1.62	1.50

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	M	139	SEP	P-OG-CB	-4.27	106.53	118.30
2	N	139	SEP	P-OG-CB	-3.12	109.71	118.30
2	L	139	SEP	P-OG-CB	-2.74	110.74	118.30
2	O	139	SEP	P-OG-CB	-2.39	111.70	118.30
2	P	139	SEP	P-OG-CB	-2.32	111.92	118.30
2	J	139	SEP	P-OG-CB	-2.30	111.95	118.30
2	N	139	SEP	OG-CB-CA	2.02	110.16	108.17
2	P	139	SEP	OG-P-O1P	2.02	112.15	106.47
2	K	139	SEP	OG-CB-CA	2.27	110.40	108.17
2	M	139	SEP	O2P-P-OG	2.36	113.00	106.73
2	L	139	SEP	OG-CB-CA	2.40	110.53	108.17
2	P	139	SEP	OG-CB-CA	2.48	110.61	108.17
2	M	139	SEP	OG-CB-CA	4.92	113.02	108.17

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	139	SEP	1	0

## 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, 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	189/199 (94%)	-0.33	4 (2%) 63 59	37, 59, 95, 113	0
1	B	189/199 (94%)	-0.13	8 (4%) 36 33	38, 69, 113, 121	0
1	C	191/199 (95%)	-0.08	5 (2%) 56 52	37, 58, 96, 110	0
1	D	189/199 (94%)	-0.06	8 (4%) 36 33	33, 59, 111, 129	0
1	E	187/199 (93%)	0.40	23 (12%) 4 2	42, 85, 136, 167	0
1	F	189/199 (94%)	-0.28	1 (0%) 90 90	31, 53, 88, 113	0
1	G	191/199 (95%)	-0.18	5 (2%) 56 52	31, 49, 92, 120	0
1	H	190/199 (95%)	-0.05	8 (4%) 36 33	38, 62, 97, 112	0
2	I	5/10 (50%)	0.51	1 (20%) 1 1	40, 50, 67, 101	0
2	J	5/10 (50%)	0.72	1 (20%) 1 1	40, 45, 78, 97	0
2	K	4/10 (40%)	0.35	0 100 100	40, 57, 58, 78	0
2	L	5/10 (50%)	0.21	1 (20%) 1 1	36, 43, 61, 104	0
2	M	5/10 (50%)	0.61	1 (20%) 1 1	37, 50, 74, 106	0
2	N	5/10 (50%)	0.39	1 (20%) 1 1	38, 50, 66, 106	0
2	O	5/10 (50%)	0.13	1 (20%) 1 1	35, 46, 81, 106	0
2	P	4/10 (40%)	0.50	1 (25%) 0 0	46, 59, 67, 85	0
All	All	1553/1672 (92%)	-0.08	69 (4%) 34 31	31, 60, 110, 167	0

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	646	PRO	8.5
1	E	748	ALA	7.7
1	E	807	THR	5.3
1	E	749	GLY	5.1
1	E	805	LYS	4.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	E	832	LEU	4.7
1	E	806	ALA	4.1
2	M	137	GLN	4.1
1	G	644	LYS	4.0
1	H	645	LYS	4.0
2	N	137	GLN	3.9
1	E	828	PRO	3.7
1	E	747	SER	3.6
2	J	137	GLN	3.5
1	H	750	PRO	3.5
1	H	749	GLY	3.4
1	E	804	LYS	3.4
1	C	750	PRO	3.4
1	E	746	LEU	3.4
1	A	748	ALA	3.3
1	E	808	VAL	3.3
1	E	802	GLY	3.3
1	D	646	PRO	3.3
1	H	748	ALA	3.3
1	F	834	SER	3.2
1	E	803	LYS	3.2
1	B	646	PRO	3.2
1	G	645	LYS	3.0
1	B	834	SER	3.0
1	E	791	ARG	3.0
1	D	807	THR	3.0
1	E	750	PRO	3.0
1	E	647	THR	2.9
2	L	137	GLN	2.9
1	G	834	SER	2.9
1	G	833	LEU	2.9
1	A	750	PRO	2.9
1	C	644	LYS	2.9
1	H	646	PRO	2.9
2	I	137	GLN	2.9
1	D	834	SER	2.8
1	C	748	ALA	2.8
1	E	682	THR	2.7
1	B	806	ALA	2.7
1	B	807	THR	2.6
1	C	832	LEU	2.5
1	A	834	SER	2.5

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Mol	Chain	Res	Type	RSRZ
1	H	808	VAL	2.5
1	A	646	PRO	2.5
1	D	750	PRO	2.5
1	G	748	ALA	2.4
1	D	746	LEU	2.4
1	H	834	SER	2.4
1	E	761	VAL	2.4
2	P	138	ALA	2.3
1	B	746	LEU	2.3
1	E	794	SER	2.2
1	E	810	TYR	2.2
1	H	833	LEU	2.2
1	B	747	SER	2.2
1	E	800	TYR	2.2
1	B	748	ALA	2.2
1	E	789	VAL	2.1
1	D	805	LYS	2.1
1	C	804	LYS	2.1
1	D	748	ALA	2.1
1	B	750	PRO	2.0
1	D	749	GLY	2.0
2	O	137	GLN	2.0

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

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
2	SEP	M	139	10/11	0.95	0.12	42,61,75,102	0
2	SEP	N	139	10/11	0.95	0.12	26,42,52,53	0
2	SEP	P	139	10/11	0.96	0.12	31,61,74,74	0
2	SEP	I	139	10/11	0.96	0.12	26,41,55,55	0
2	SEP	O	139	10/11	0.97	0.10	22,33,53,53	0
2	SEP	L	139	10/11	0.97	0.12	26,34,40,45	0
2	SEP	K	139	10/11	0.98	0.09	20,49,68,68	0
2	SEP	J	139	10/11	0.98	0.10	28,45,66,66	0

### 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.