



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:50 AM UTC

PDB ID : 4QV5 / pdb_00004qv5
Title : yCP beta5-M45I mutant
Authors : Huber, E.M.; Heinemeyer, W.; Groll, M.
Deposited on : 2014-07-14
Resolution : 2.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

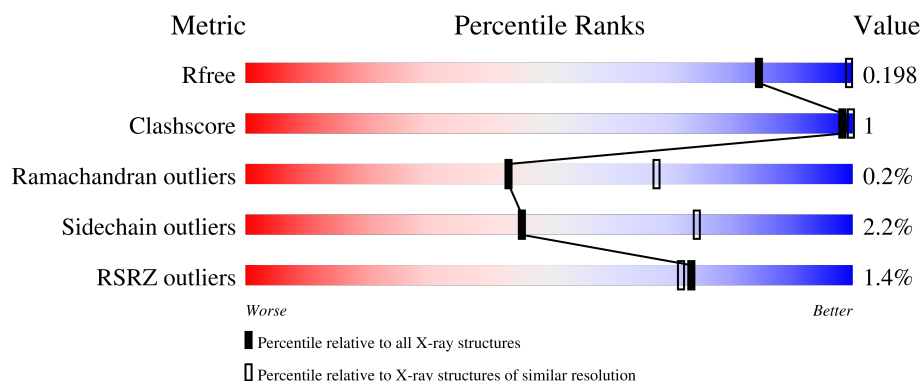
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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 $\leq 5\%$. 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	250	0% 98% 2%
1	O	250	2% 98% 0%
2	B	258	3% 90% 5% 5%
2	P	258	3% 90% 5% 2%
3	C	254	2% 88% 5% 6%

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Mol	Chain	Length	Quality of chain
3	Q	254	
4	D	260	
4	R	260	
5	E	234	
5	S	234	
6	F	288	
6	T	288	
7	G	252	
7	U	252	
8	H	232	
8	V	232	
9	I	205	
9	W	205	
10	J	198	
10	X	198	
11	K	212	
11	Y	212	
12	L	222	
12	Z	222	
13	M	246	
13	a	246	
14	N	196	
14	b	196	

2 Entry composition

There are 17 unique types of molecules in this entry. The entry contains 49867 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 Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	250	Total	C	N	O	S	0	0	0
			1915	1219	315	377	4			
1	O	250	Total	C	N	O	S	0	0	0
			1915	1219	315	377	4			

- Molecule 2 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	244	Total	C	N	O	S	0	0	0
			1904	1201	321	379	3			
2	P	244	Total	C	N	O	S	0	0	0
			1904	1201	321	379	3			

- Molecule 3 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	240	Total	C	N	O	S	0	0	0
			1881	1176	329	372	4			
3	Q	240	Total	C	N	O	S	0	0	0
			1881	1176	329	372	4			

- Molecule 4 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	235	Total	C	N	O	S	0	0	0
			1813	1136	304	366	7			
4	R	235	Total	C	N	O	S	0	0	0
			1813	1136	304	366	7			

- Molecule 5 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	231	Total	C	N	O	S	0	0	0
			1773	1114	307	348	4			
5	S	231	Total	C	N	O	S	0	0	0
			1773	1114	307	348	4			

- Molecule 6 is a protein called Probable proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	F	243	Total	C	N	O	S	0	0	0
			1892	1203	329	356	4			
6	T	243	Total	C	N	O	S	0	0	0
			1892	1203	329	356	4			

- Molecule 7 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	G	241	Total	C	N	O	S	0	0	0
			1907	1214	320	365	8			
7	U	241	Total	C	N	O	S	0	0	0
			1907	1214	320	365	8			

- Molecule 8 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	H	226	Total	C	N	O	S	0	0	0
			1719	1082	298	332	7			
8	V	226	Total	C	N	O	S	0	0	0
			1719	1082	298	332	7			

- Molecule 9 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
9	I	204	Total	C	N	O	S	0	0	0
			1581	1010	258	305	8			
9	W	204	Total	C	N	O	S	0	0	0
			1581	1010	258	305	8			

- Molecule 10 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
10	J	195	Total	C	N	O	S	0	0	0
			1561	992	264	299	6			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
10	X	195	Total	C	N	O	S	0	0	0
			1561	992	264	299	6			

- Molecule 11 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
11	K	212	Total	C	N	O	S	0	0	0
			1644	1046	280	312	6			
11	Y	212	Total	C	N	O	S	0	0	0
			1644	1046	280	312	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	45	ILE	MET	engineered mutation	UNP P30656
Y	45	ILE	MET	engineered mutation	UNP P30656

- Molecule 12 is a protein called Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
12	L	222	Total	C	N	O	S	0	0	0
			1757	1115	303	335	4			
12	Z	222	Total	C	N	O	S	0	0	0
			1757	1115	303	335	4			

- Molecule 13 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
13	M	233	Total	C	N	O	S	0	0	0
			1824	1154	312	351	7			
13	a	233	Total	C	N	O	S	0	0	0
			1824	1154	312	351	7			

- Molecule 14 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
14	N	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			
14	b	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			

- Molecule 15 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
15	G	1	Total Mg 1 1	0	0
15	H	1	Total Mg 1 1	0	0
15	K	2	Total Mg 2 2	0	0
15	N	1	Total Mg 1 1	0	0
15	V	1	Total Mg 1 1	0	0
15	Y	1	Total Mg 1 1	0	0

- Molecule 16 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
16	G	1	Total Cl 1 1	0	0
16	U	1	Total Cl 1 1	0	0

- Molecule 17 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
17	A	17	Total O 17 17	0	0
17	B	14	Total O 14 14	0	0
17	C	11	Total O 11 11	0	0
17	D	11	Total O 11 11	0	0
17	E	13	Total O 13 13	0	0
17	F	10	Total O 10 10	0	0
17	G	30	Total O 30 30	0	0
17	H	12	Total O 12 12	0	0
17	I	19	Total O 19 19	0	0
17	J	22	Total O 22 22	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
17	K	23	Total 23	O 23	0	0
17	L	32	Total 32	O 32	0	0
17	M	27	Total 27	O 27	0	0
17	N	25	Total 25	O 25	0	0
17	O	8	Total 8	O 8	0	0
17	P	7	Total 7	O 7	0	0
17	Q	10	Total 10	O 10	0	0
17	R	13	Total 13	O 13	0	0
17	S	8	Total 8	O 8	0	0
17	T	14	Total 14	O 14	0	0
17	U	23	Total 23	O 23	0	0
17	V	16	Total 16	O 16	0	0
17	W	20	Total 20	O 20	0	0
17	X	11	Total 11	O 11	0	0
17	Y	23	Total 23	O 23	0	0
17	Z	26	Total 26	O 26	0	0
17	a	17	Total 17	O 17	0	0
17	b	30	Total 30	O 30	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.

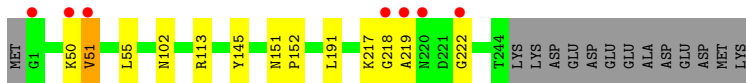
- Molecule 1: Proteasome subunit alpha type-2



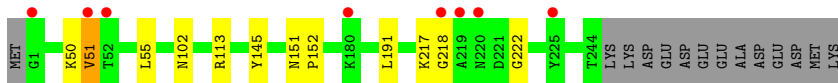
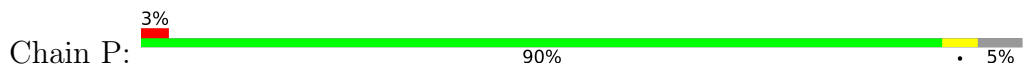
- Molecule 1: Proteasome subunit alpha type-2



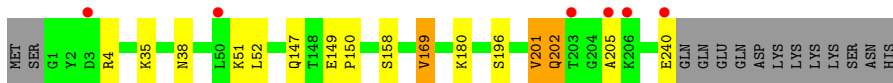
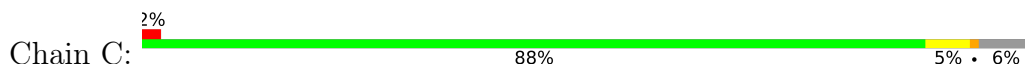
- Molecule 2: Proteasome subunit alpha type-3



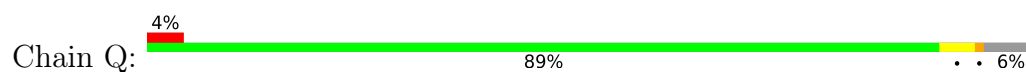
- Molecule 2: Proteasome subunit alpha type-3



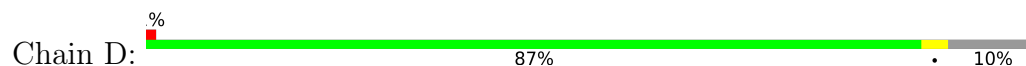
- Molecule 3: Proteasome subunit alpha type-4



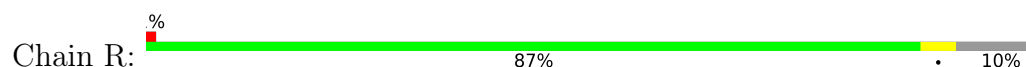
- Molecule 3: Proteasome subunit alpha type-4



- Molecule 4: Proteasome subunit alpha type-5



- Molecule 4: Proteasome subunit alpha type-5



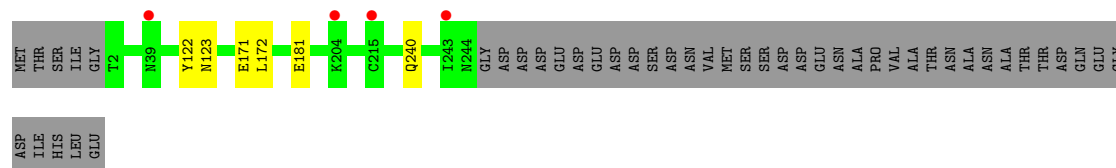
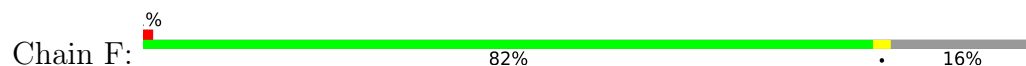
- Molecule 5: Proteasome subunit alpha type-6



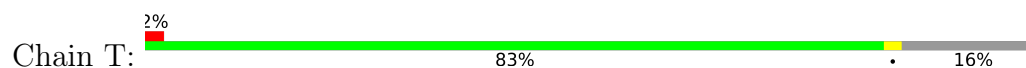
- Molecule 5: Proteasome subunit alpha type-6

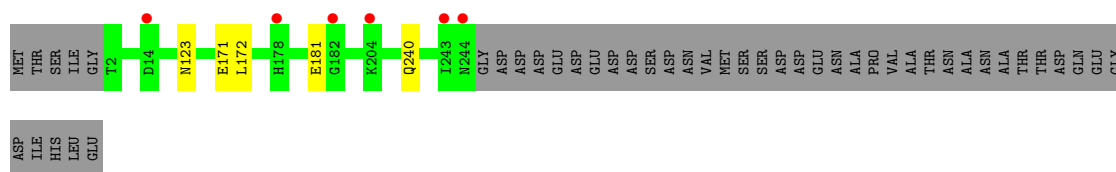


- Molecule 6: Probable proteasome subunit alpha type-7

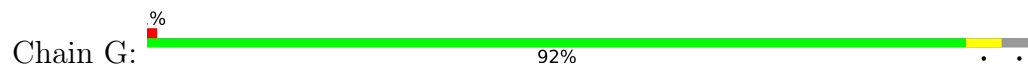


- Molecule 6: Probable proteasome subunit alpha type-7





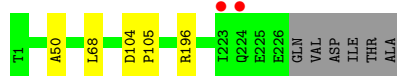
- Molecule 7: Proteasome subunit alpha type-1



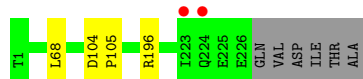
- Molecule 7: Proteasome subunit alpha type-1



- Molecule 8: Proteasome subunit beta type-2



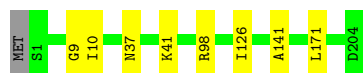
- Molecule 8: Proteasome subunit beta type-2



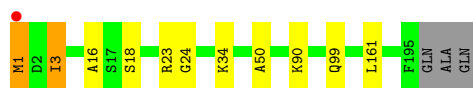
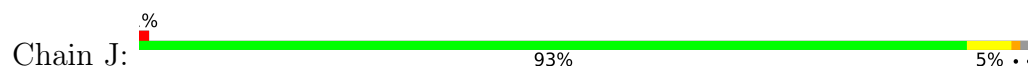
- Molecule 9: Proteasome subunit beta type-3



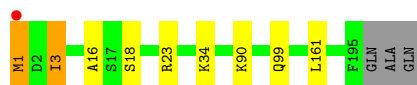
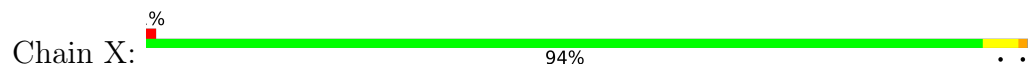
- Molecule 9: Proteasome subunit beta type-3



- Molecule 10: Proteasome subunit beta type-4



- Molecule 10: Proteasome subunit beta type-4



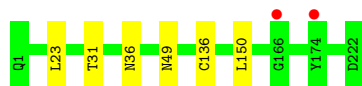
- Molecule 11: Proteasome subunit beta type-5



- Molecule 11: Proteasome subunit beta type-5



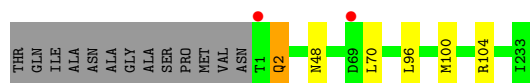
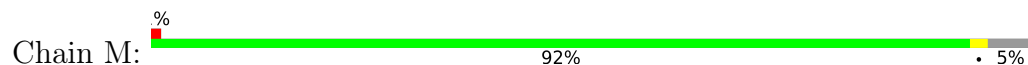
- Molecule 12: Proteasome subunit beta type-6



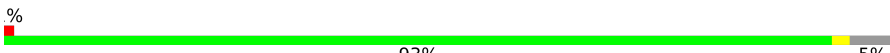
- Molecule 12: Proteasome subunit beta type-6

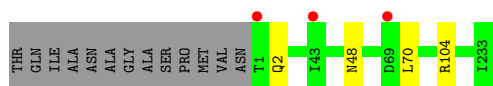


- Molecule 13: Proteasome subunit beta type-7

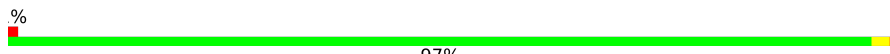


● Molecule 13: Proteasome subunit beta type-7

Chain a:  93% 5%

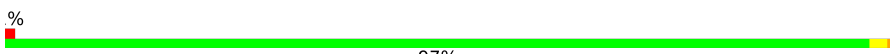


● Molecule 14: Proteasome subunit beta type-1

Chain N:  97% ..



● Molecule 14: Proteasome subunit beta type-1

Chain b:  97% ..



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	134.40Å 301.14Å 144.12Å 90.00° 112.72° 90.00°	Depositor
Resolution (Å)	15.00 – 2.70 15.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	98.6 (15.00-2.70) 98.0 (15.00-2.70)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.78 (at 2.69Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.189 , 0.217 (Not available) , 0.198	Depositor DCC
R_{free} test set	14129 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	55.3	Xtriage
Anisotropy	0.079	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 57.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	49867	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.08% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.39	0/1952	0.68	0/2642
1	O	0.40	0/1952	0.68	0/2642
2	B	0.40	0/1934	0.67	0/2618
2	P	0.40	0/1934	0.67	0/2618
3	C	0.39	0/1910	0.69	1/2586 (0.0%)
3	Q	0.39	0/1910	0.69	1/2586 (0.0%)
4	D	0.38	0/1837	0.65	0/2475
4	R	0.38	0/1837	0.65	0/2475
5	E	0.40	0/1800	0.65	0/2433
5	S	0.39	0/1800	0.66	0/2433
6	F	0.39	0/1932	0.68	0/2609
6	T	0.39	0/1932	0.69	0/2609
7	G	0.38	0/1945	0.66	0/2634
7	U	0.39	0/1945	0.66	0/2634
8	H	0.38	0/1750	0.62	0/2373
8	V	0.38	0/1750	0.63	0/2373
9	I	0.38	0/1611	0.66	0/2174
9	W	0.38	0/1611	0.67	0/2174
10	J	0.43	0/1589	0.67	0/2142
10	X	0.42	0/1589	0.68	0/2142
11	K	0.37	0/1681	0.65	0/2275
11	Y	0.37	0/1681	0.65	0/2275
12	L	0.37	0/1795	0.66	0/2420
12	Z	0.37	0/1795	0.66	0/2420
13	M	0.39	0/1855	0.66	0/2514
13	a	0.39	0/1855	0.66	0/2514
14	N	0.37	0/1541	0.66	0/2087
14	b	0.37	0/1541	0.66	0/2087
All	All	0.39	0/50264	0.66	2/67964 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	Q	201	VAL	N-CA-C	5.42	116.15	110.62
3	C	201	VAL	N-CA-C	5.42	116.15	110.62

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	1915	0	1929	1	0
1	O	1915	0	1929	1	0
2	B	1904	0	1904	4	0
2	P	1904	0	1904	3	0
3	C	1881	0	1895	5	0
3	Q	1881	0	1895	4	0
4	D	1813	0	1797	1	0
4	R	1813	0	1797	2	0
5	E	1773	0	1775	1	0
5	S	1773	0	1775	3	0
6	F	1892	0	1883	1	0
6	T	1892	0	1883	0	0
7	G	1907	0	1901	3	0
7	U	1907	0	1901	4	0
8	H	1719	0	1719	2	0
8	V	1719	0	1719	2	0
9	I	1581	0	1574	5	0
9	W	1581	0	1574	3	0
10	J	1561	0	1569	4	0
10	X	1561	0	1569	3	0
11	K	1644	0	1597	3	0
11	Y	1644	0	1597	2	0
12	L	1757	0	1711	1	0
12	Z	1757	0	1711	1	0
13	M	1824	0	1832	2	0
13	a	1824	0	1832	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
14	N	1512	0	1481	2	0
14	b	1512	0	1481	2	0
15	G	1	0	0	0	0
15	H	1	0	0	0	0
15	K	2	0	0	0	0
15	N	1	0	0	0	0
15	V	1	0	0	0	0
15	Y	1	0	0	0	0
16	G	1	0	0	0	0
16	U	1	0	0	0	0
17	A	17	0	0	0	0
17	B	14	0	0	0	0
17	C	11	0	0	0	0
17	D	11	0	0	0	0
17	E	13	0	0	0	0
17	F	10	0	0	0	0
17	G	30	0	0	0	0
17	H	12	0	0	0	0
17	I	19	0	0	0	0
17	J	22	0	0	0	0
17	K	23	0	0	0	0
17	L	32	0	0	0	0
17	M	27	0	0	1	0
17	N	25	0	0	0	0
17	O	8	0	0	0	0
17	P	7	0	0	0	0
17	Q	10	0	0	0	0
17	R	13	0	0	0	0
17	S	8	0	0	0	0
17	T	14	0	0	0	0
17	U	23	0	0	0	0
17	V	16	0	0	0	0
17	W	20	0	0	0	0
17	X	11	0	0	0	0
17	Y	23	0	0	0	0
17	Z	26	0	0	0	0
17	a	17	0	0	0	0
17	b	30	0	0	0	0
All	All	49867	0	49134	60	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 1.

All (60) 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)
11:Y:35:ILE:HD11	11:Y:45:ILE:HD11	1.77	0.66
11:K:35:ILE:HD11	11:K:45:ILE:HD11	1.77	0.66
14:b:152:VAL:HA	14:b:175:MET:HE1	1.90	0.54
3:Q:201:VAL:O	3:Q:202:GLN:HB3	2.09	0.53
3:C:201:VAL:O	3:C:202:GLN:HB3	2.09	0.52
14:N:152:VAL:HA	14:N:175:MET:HE1	1.90	0.52
1:A:1:MET:HG3	6:F:122:TYR:CZ	2.46	0.51
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.94	0.50
3:C:201:VAL:O	3:C:202:GLN:CB	2.59	0.49
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.94	0.49
10:J:1:MET:HG2	10:J:34:LYS:HE3	1.93	0.49
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.42	0.49
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.60	0.49
10:X:1:MET:HG2	10:X:34:LYS:HE3	1.93	0.49
10:X:3:ILE:HG23	10:X:18:SER:HB3	1.95	0.49
10:J:3:ILE:HG23	10:J:18:SER:HB3	1.95	0.49
14:b:83:LYS:HG3	14:b:119:VAL:CG2	2.43	0.49
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.96	0.48
7:U:23:PHE:O	7:U:26:THR:HB	2.15	0.47
9:I:9:GLY:HA3	9:I:41:LYS:HE2	1.96	0.47
7:G:23:PHE:O	7:G:26:THR:HB	2.14	0.46
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.97	0.46
2:P:50:LYS:O	2:P:51:VAL:C	2.58	0.46
2:B:50:LYS:O	2:B:51:VAL:C	2.59	0.45
13:M:2:GLN:NE2	17:M:326:HOH:O	2.48	0.45
3:Q:169:VAL:HG23	3:Q:196:SER:HB2	1.99	0.45
12:L:31:THR:HG23	12:L:36:ASN:HD21	1.82	0.45
3:C:35:LYS:HG2	3:C:158:SER:O	2.17	0.45
12:Z:31:THR:HG23	12:Z:36:ASN:HD21	1.82	0.44
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.98	0.44
2:P:145:TYR:OH	2:P:217:LYS:N	2.50	0.44
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.17	0.44
4:R:159:TYR:CE2	5:S:56:SER:HB3	2.52	0.44
3:C:169:VAL:HG23	3:C:196:SER:HB2	1.99	0.43
10:J:50:ALA:O	11:K:91:LYS:NZ	2.51	0.43
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.01	0.43
2:B:145:TYR:OH	2:B:217:LYS:N	2.50	0.43
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.53	0.42
9:I:10:ILE:HG21	9:I:141:ALA:HB3	2.01	0.42
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:77:ALA:N	5:E:78:PRO:CD	2.83	0.42
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.50	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.42
9:I:98:ARG:O	9:I:126:ILE:HD11	2.20	0.42
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.50	0.41
11:Y:38:ASN:HB2	11:Y:39:PRO:CD	2.50	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.83	0.41
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.50	0.41
4:D:160:ASN:HB3	4:D:179:TRP:CE2	2.56	0.41
11:K:38:ASN:HB2	11:K:39:PRO:CD	2.51	0.41
9:I:141:ALA:HB2	9:I:177:ASP:HB2	2.03	0.41
13:M:96:LEU:O	13:M:100:MET:HG2	2.21	0.41
8:V:104:ASP:HB2	8:V:105:PRO:CD	2.51	0.41
5:S:87:LEU:HD21	5:S:107:ALA:HB1	2.03	0.40
2:B:217:LYS:O	2:B:219:ALA:N	2.44	0.40
4:R:160:ASN:HB3	4:R:179:TRP:CE2	2.56	0.40
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.04	0.40
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.51	0.40
9:W:98:ARG:O	9:W:126:ILE:HD11	2.21	0.40
8:H:50:ALA:CB	9:I:126:ILE:HG23	2.51	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	248/250 (99%)	239 (96%)	8 (3%)	1 (0%)	30 54
1	O	248/250 (99%)	239 (96%)	8 (3%)	1 (0%)	30 54
2	B	242/258 (94%)	234 (97%)	5 (2%)	3 (1%)	10 27
2	P	242/258 (94%)	233 (96%)	6 (2%)	3 (1%)	10 27

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	16	37
3	Q	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	16	37
4	D	231/260 (89%)	228 (99%)	3 (1%)	0	100	100
4	R	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
5	E	229/234 (98%)	221 (96%)	8 (4%)	0	100	100
5	S	229/234 (98%)	221 (96%)	8 (4%)	0	100	100
6	F	241/288 (84%)	237 (98%)	4 (2%)	0	100	100
6	T	241/288 (84%)	236 (98%)	5 (2%)	0	100	100
7	G	239/252 (95%)	236 (99%)	3 (1%)	0	100	100
7	U	239/252 (95%)	236 (99%)	3 (1%)	0	100	100
8	H	224/232 (97%)	219 (98%)	5 (2%)	0	100	100
8	V	224/232 (97%)	218 (97%)	6 (3%)	0	100	100
9	I	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
9	W	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
10	J	193/198 (98%)	188 (97%)	4 (2%)	1 (0%)	24	48
10	X	193/198 (98%)	188 (97%)	5 (3%)	0	100	100
11	K	210/212 (99%)	207 (99%)	3 (1%)	0	100	100
11	Y	210/212 (99%)	207 (99%)	3 (1%)	0	100	100
12	L	220/222 (99%)	214 (97%)	6 (3%)	0	100	100
12	Z	220/222 (99%)	214 (97%)	6 (3%)	0	100	100
13	M	231/246 (94%)	222 (96%)	9 (4%)	0	100	100
13	a	231/246 (94%)	223 (96%)	8 (4%)	0	100	100
14	N	194/196 (99%)	189 (97%)	5 (3%)	0	100	100
14	b	194/196 (99%)	189 (97%)	5 (3%)	0	100	100
All	All	6284/6614 (95%)	6121 (97%)	150 (2%)	13 (0%)	43	68

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
3	C	202	GLN
2	P	51	VAL
3	Q	202	GLN
1	A	2	THR

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Mol	Chain	Res	Type
2	B	218	GLY
2	B	222	GLY
1	O	2	THR
2	P	218	GLY
2	P	222	GLY
3	C	205	ALA
3	Q	205	ALA
10	J	24	GLY

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	209/209 (100%)	206 (99%)	3 (1%)	59	82
1	O	209/209 (100%)	206 (99%)	3 (1%)	59	82
2	B	203/216 (94%)	199 (98%)	4 (2%)	48	76
2	P	203/216 (94%)	199 (98%)	4 (2%)	48	76
3	C	212/226 (94%)	204 (96%)	8 (4%)	29	58
3	Q	212/226 (94%)	204 (96%)	8 (4%)	29	58
4	D	194/215 (90%)	187 (96%)	7 (4%)	31	60
4	R	194/215 (90%)	187 (96%)	7 (4%)	31	60
5	E	190/193 (98%)	186 (98%)	4 (2%)	47	75
5	S	190/193 (98%)	186 (98%)	4 (2%)	47	75
6	F	201/239 (84%)	196 (98%)	5 (2%)	42	71
6	T	201/239 (84%)	196 (98%)	5 (2%)	42	71
7	G	206/210 (98%)	201 (98%)	5 (2%)	43	72
7	U	206/210 (98%)	201 (98%)	5 (2%)	43	72
8	H	185/190 (97%)	183 (99%)	2 (1%)	65	85
8	V	185/190 (97%)	183 (99%)	2 (1%)	65	85
9	I	172/173 (99%)	170 (99%)	2 (1%)	63	84

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
9	W	172/173 (99%)	170 (99%)	2 (1%)	63	84
10	J	173/175 (99%)	168 (97%)	5 (3%)	37	67
10	X	173/175 (99%)	168 (97%)	5 (3%)	37	67
11	K	169/169 (100%)	166 (98%)	3 (2%)	51	78
11	Y	169/169 (100%)	166 (98%)	3 (2%)	51	78
12	L	185/185 (100%)	181 (98%)	4 (2%)	45	74
12	Z	185/185 (100%)	181 (98%)	4 (2%)	45	74
13	M	199/208 (96%)	195 (98%)	4 (2%)	48	76
13	a	199/208 (96%)	195 (98%)	4 (2%)	48	76
14	N	162/162 (100%)	160 (99%)	2 (1%)	63	84
14	b	162/162 (100%)	160 (99%)	2 (1%)	63	84
All	All	5320/5540 (96%)	5204 (98%)	116 (2%)	45	74

All (116) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	THR
1	A	157	PHE
1	A	250	LEU
2	B	55	LEU
2	B	102	ASN
2	B	113	ARG
2	B	191	LEU
3	C	4	ARG
3	C	38	ASN
3	C	51	LYS
3	C	52	LEU
3	C	147	GLN
3	C	169	VAL
3	C	180	LYS
3	C	240	GLU
4	D	99	ILE
4	D	176	LEU
4	D	193	LEU
4	D	214	ILE
4	D	235	LEU
4	D	236	LYS
4	D	242	GLU

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Mol	Chain	Res	Type
5	E	9	THR
5	E	29	LYS
5	E	71	LEU
5	E	188	LEU
6	F	123	ASN
6	F	171	GLU
6	F	172	LEU
6	F	181	GLU
6	F	240	GLN
7	G	26	THR
7	G	115	LEU
7	G	122	ARG
7	G	125	MET
7	G	235	ARG
8	H	68	LEU
8	H	196	ARG
9	I	37	ASN
9	I	171	LEU
10	J	1	MET
10	J	3	ILE
10	J	23	ARG
10	J	90	LYS
10	J	99	GLN
11	K	4	LEU
11	K	140	LEU
11	K	148	LEU
12	L	23	LEU
12	L	49	ASN
12	L	136	CYS
12	L	150	LEU
13	M	2	GLN
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
14	N	9	LYS
14	N	119	VAL
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	55	LEU
2	P	102	ASN
2	P	113	ARG

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Mol	Chain	Res	Type
2	P	191	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	51	LYS
3	Q	52	LEU
3	Q	147	GLN
3	Q	169	VAL
3	Q	180	LYS
3	Q	240	GLU
4	R	99	ILE
4	R	176	LEU
4	R	193	LEU
4	R	214	ILE
4	R	235	LEU
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	29	LYS
5	S	71	LEU
5	S	188	LEU
6	T	123	ASN
6	T	171	GLU
6	T	172	LEU
6	T	181	GLU
6	T	240	GLN
7	U	26	THR
7	U	115	LEU
7	U	122	ARG
7	U	125	MET
7	U	235	ARG
8	V	68	LEU
8	V	196	ARG
9	W	37	ASN
9	W	171	LEU
10	X	1	MET
10	X	3	ILE
10	X	23	ARG
10	X	90	LYS
10	X	99	GLN
11	Y	4	LEU
11	Y	140	LEU
11	Y	148	LEU

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Mol	Chain	Res	Type
12	Z	23	LEU
12	Z	49	ASN
12	Z	136	CYS
12	Z	150	LEU
13	a	2	GLN
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
14	b	9	LYS
14	b	119	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (95) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	93	HIS
2	B	119	GLN
2	B	123	GLN
2	B	232	GLN
3	C	115	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
4	D	15	GLN
4	D	91	HIS
4	D	100	ASN
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	120	GLN
5	E	151	ASN
5	E	165	GLN
5	E	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	123	ASN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	175	ASN
8	H	22	GLN
8	H	86	HIS

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Mol	Chain	Res	Type
8	H	116	HIS
8	H	172	ASN
9	I	63	ASN
9	I	88	GLN
9	I	203	GLN
10	J	55	GLN
10	J	63	ASN
11	K	9	GLN
11	K	85	ASN
11	K	143	ASN
11	K	208	ASN
12	L	3	ASN
12	L	36	ASN
12	L	49	ASN
12	L	70	ASN
12	L	153	GLN
12	L	155	ASN
12	L	158	ASN
12	L	197	GLN
13	M	48	ASN
13	M	149	HIS
14	N	141	ASN
2	P	119	GLN
2	P	123	GLN
2	P	124	HIS
2	P	232	GLN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	160	ASN
4	R	180	HIS
5	S	99	ASN
5	S	116	GLN
5	S	120	GLN
5	S	151	ASN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN
6	T	117	GLN
6	T	123	ASN

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Mol	Chain	Res	Type
7	U	30	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	175	ASN
8	V	22	GLN
8	V	30	ASN
8	V	66	HIS
8	V	86	HIS
8	V	172	ASN
8	V	189	ASN
9	W	63	ASN
9	W	88	GLN
10	X	55	GLN
10	X	63	ASN
11	Y	9	GLN
11	Y	85	ASN
11	Y	143	ASN
11	Y	208	ASN
12	Z	36	ASN
12	Z	49	ASN
12	Z	155	ASN
12	Z	197	GLN
13	a	48	ASN
14	b	141	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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 9 ligands modelled in this entry, 9 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

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, 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	250/250 (100%)	-0.28	3 (1%) 76 75	37, 52, 94, 126	0
1	O	250/250 (100%)	-0.18	6 (2%) 59 56	42, 60, 109, 131	0
2	B	244/258 (94%)	-0.07	7 (2%) 53 50	38, 60, 107, 172	0
2	P	244/258 (94%)	-0.07	8 (3%) 49 45	42, 61, 106, 161	0
3	C	240/254 (94%)	-0.11	6 (2%) 58 55	40, 64, 124, 152	0
3	Q	240/254 (94%)	0.28	11 (4%) 37 34	43, 77, 161, 196	0
4	D	235/260 (90%)	-0.20	2 (0%) 81 80	43, 64, 97, 133	0
4	R	235/260 (90%)	-0.08	2 (0%) 81 80	44, 68, 110, 153	0
5	E	231/234 (98%)	-0.14	1 (0%) 88 87	41, 66, 105, 136	0
5	S	231/234 (98%)	0.19	10 (4%) 40 36	44, 74, 125, 157	0
6	F	243/288 (84%)	-0.28	4 (1%) 70 68	39, 59, 108, 135	0
6	T	243/288 (84%)	0.00	6 (2%) 58 55	43, 73, 126, 165	0
7	G	241/252 (95%)	-0.34	2 (0%) 82 81	35, 53, 88, 136	0
7	U	241/252 (95%)	-0.22	4 (1%) 69 67	41, 58, 92, 137	0
8	H	226/232 (97%)	-0.33	2 (0%) 81 80	33, 50, 82, 161	0
8	V	226/232 (97%)	-0.33	2 (0%) 81 80	34, 53, 84, 177	0
9	I	204/205 (99%)	-0.56	0 100 100	32, 46, 71, 103	0
9	W	204/205 (99%)	-0.50	0 100 100	34, 49, 77, 108	0
10	J	195/198 (98%)	-0.43	1 (0%) 87 86	32, 51, 78, 121	0
10	X	195/198 (98%)	-0.37	1 (0%) 87 86	34, 51, 77, 131	0
11	K	212/212 (100%)	-0.45	0 100 100	30, 49, 76, 91	0
11	Y	212/212 (100%)	-0.46	0 100 100	33, 50, 75, 92	0
12	L	222/222 (100%)	-0.41	2 (0%) 81 80	34, 51, 84, 122	0
12	Z	222/222 (100%)	-0.39	0 100 100	28, 52, 86, 124	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å ²)	Q<0.9
13	M	233/246 (94%)	-0.42	2 (0%)	81 80	30, 50, 73, 93	0
13	a	233/246 (94%)	-0.41	3 (1%)	75 73	30, 50, 73, 93	0
14	N	196/196 (100%)	-0.48	1 (0%)	87 86	33, 46, 73, 101	0
14	b	196/196 (100%)	-0.51	1 (0%)	87 86	32, 47, 77, 106	0
All	All	6344/6614 (95%)	-0.26	87 (1%)	73 72	28, 56, 106, 196	0

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	Q	50	LEU	8.0
10	X	1	MET	5.6
8	V	223	ILE	5.4
3	Q	205	ALA	5.0
2	B	51	VAL	4.5
2	P	218	GLY	4.4
8	H	223	ILE	4.4
3	Q	49	THR	4.1
10	J	1	MET	4.1
3	Q	52	LEU	3.9
2	B	218	GLY	3.7
2	B	50	LYS	3.6
4	D	240	ALA	3.5
2	P	1	GLY	3.5
13	a	1	THR	3.4
5	S	56	SER	3.3
2	P	219	ALA	3.3
14	b	103	ASP	3.1
2	P	51	VAL	3.1
2	P	220	ASN	3.1
1	O	53	SER	3.1
1	A	2	THR	3.1
5	S	209	ASN	3.0
12	L	174	TYR	3.0
5	S	180	LYS	3.0
1	O	1	MET	3.0
6	T	243	ILE	3.0
5	S	52	ALA	2.9
13	a	69	ASP	2.9
3	Q	51	LYS	2.9
8	V	224	GLN	2.9
13	M	1	THR	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	1	MET	2.8
1	O	249	ALA	2.8
2	B	219	ALA	2.8
13	M	69	ASP	2.8
2	P	52	THR	2.7
3	Q	204	GLY	2.7
2	B	220	ASN	2.7
1	O	2	THR	2.6
6	T	14	ASP	2.6
3	Q	234	ILE	2.6
7	U	68	ARG	2.6
5	S	58	TYR	2.6
12	L	166	GLY	2.6
14	N	103	ASP	2.5
5	S	207	VAL	2.5
3	Q	210	ILE	2.4
7	U	242	GLN	2.4
3	C	206	LYS	2.4
6	T	182	GLY	2.4
4	R	113	LEU	2.4
5	S	57	SER	2.4
5	S	55	LEU	2.3
6	F	39	ASN	2.3
6	T	204	LYS	2.3
2	B	222	GLY	2.3
4	D	242	GLU	2.3
5	E	209	ASN	2.3
2	B	1	GLY	2.3
6	T	178	HIS	2.3
3	Q	232	THR	2.3
6	T	244	ASN	2.3
1	O	209	ILE	2.2
6	F	243	ILE	2.2
3	C	50	LEU	2.2
6	F	204	LYS	2.2
3	C	3	ASP	2.2
3	C	205	ALA	2.2
8	H	224	GLN	2.2
2	P	180	LYS	2.2
5	S	54	GLU	2.1
6	F	215	CYS	2.1
5	S	122	TYR	2.1

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Mol	Chain	Res	Type	RSRZ
7	U	24	LYS	2.1
7	U	179	LYS	2.1
1	A	249	ALA	2.1
1	O	231	LYS	2.1
13	a	43	ILE	2.1
3	Q	58	THR	2.1
2	P	225	TYR	2.1
3	C	240	GLU	2.1
3	Q	206	LYS	2.1
3	C	203	THR	2.1
7	G	3	TYR	2.1
7	G	68	ARG	2.0
4	R	238	LYS	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 oligosaccharides in this entry.

6.4 Ligands [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, 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($\text{\AA}^2$)	Q<0.9
15	MG	H	301	1/1	0.93	0.09	56,56,56,56	0
15	MG	K	302	1/1	0.95	0.15	54,54,54,54	0
15	MG	G	301	1/1	0.96	0.04	50,50,50,50	0
15	MG	N	201	1/1	0.97	0.05	50,50,50,50	0
15	MG	Y	301	1/1	0.97	0.06	58,58,58,58	0
15	MG	V	301	1/1	0.99	0.08	55,55,55,55	0
15	MG	K	301	1/1	0.99	0.03	48,48,48,48	0
16	CL	G	302	1/1	0.99	0.03	42,42,42,42	0
16	CL	U	301	1/1	0.99	0.08	42,42,42,42	0

6.5 Other polymers [i](#)

There are no such residues in this entry.