



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2018 – 01:18 pm GMT

PDB ID : 4Y8N  
Title : Yeast 20S proteasome beta7-delta7\_Cter mutant in complex with Ac-PAE-ep  
Authors : Huber, E.M.; Groll, M.  
Deposited on : 2015-02-16  
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.

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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

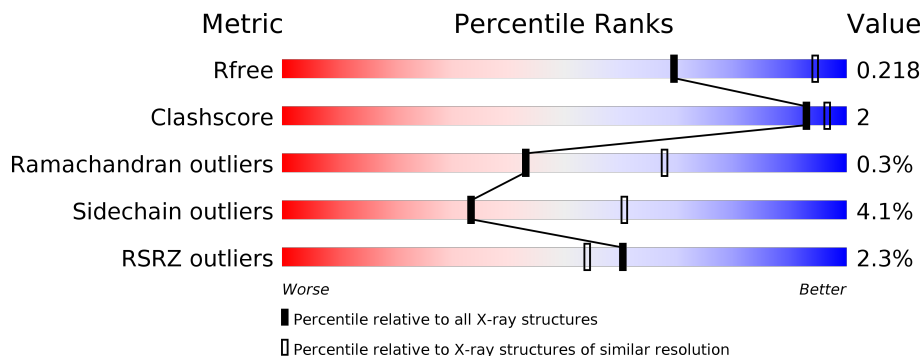
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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.





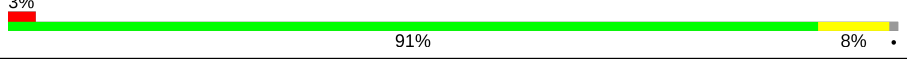
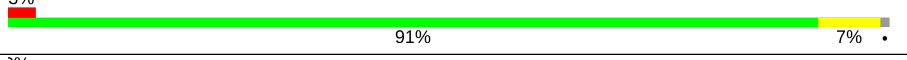
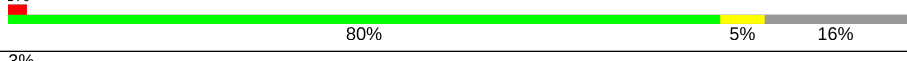

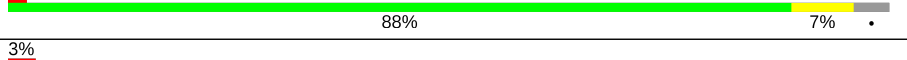
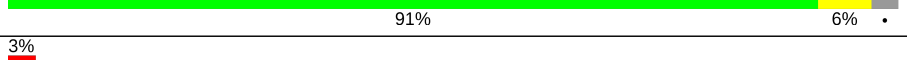
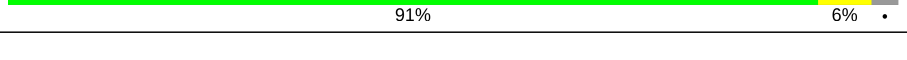
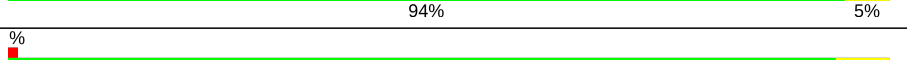
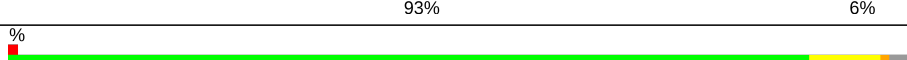
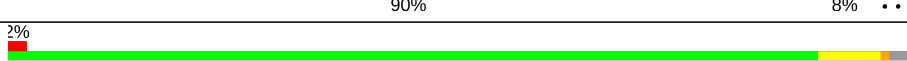
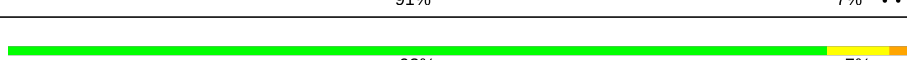
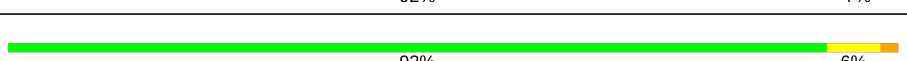
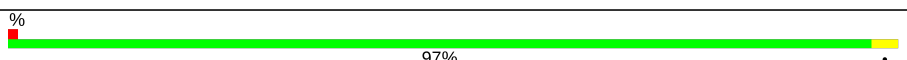
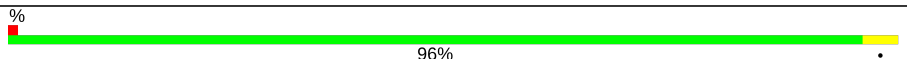
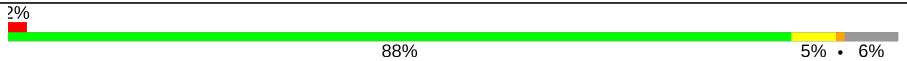
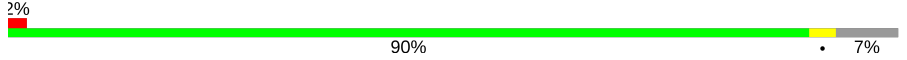
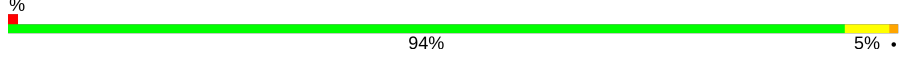
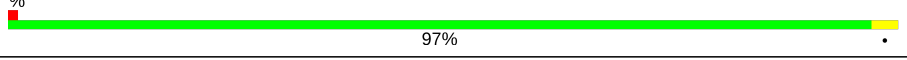
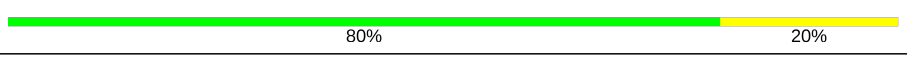
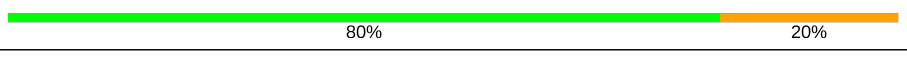

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	111664	2767 (2.60-2.60)
Clashscore	122126	3110 (2.60-2.60)
Ramachandran outliers	120053	3062 (2.60-2.60)
Sidechain outliers	120020	3062 (2.60-2.60)
RSRZ outliers	108989	2706 (2.60-2.60)

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 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	250	<p>2% 98%</p>
1	O	250	<p>3% 97%</p>
2	B	258	<p>3% 85% 10% 5%</p>
2	P	258	<p>4% 86% 9% 5%</p>
3	C	254	<p>6% 84% 9% 6%</p>
3	Q	254	<p>7% 86% 7% 6%</p>

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Mol	Chain	Length	Quality of chain
4	D	260	 85% 5% 10%
4	R	260	 85% 5% 10%
5	E	234	 91% 8%
5	S	234	 91% 7%
6	F	288	 80% 5% 16%
6	T	288	 81% 16%
7	G	252	 87% 8%
7	U	252	 88% 7%
8	H	232	 91% 6%
8	V	232	 91% 6%
9	I	205	 94% 5%
9	W	205	 93% 6%
10	J	198	 90% 8%
10	X	198	 91% 7%
11	K	212	 92% 7%
11	Y	212	 92% 6%
12	L	222	 97%
12	Z	222	 96%
13	M	239	 88% 5% 6%
13	a	239	 90% 7%
14	N	196	 94% 5%
14	b	196	 97%
15	c	5	 80% 20%
15	d	5	 80% 20%

## 2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 49891 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
			Total	C	N	O	S			
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
			Total	C	N	O	S			
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
			Total	C	N	O	S			
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
			Total	C	N	O	S			
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
			Total	C	N	O	S			
5	E	231	1773	1114	307	348	4	0	0	0
5	S	231	1773	1114	307	348	4	0	0	0

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

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

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	212	1644	1045	280	312	7	0	0	0
11	Y	212	1644	1045	280	312	7	0	0	0

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
13	M	224	1753	1108	300	338	7	0	0	0
13	a	223	1745	1104	299	335	7	0	0	0

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

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

- Molecule 15 is a protein called Ac-PAE-ep.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
15	c	5	28	18	3	7	0	0	0
15	d	5	28	18	3	7	0	0	0

- Molecule 16 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
16	G	1	Total 1	Mg 1	0	0
16	K	1	Total 1	Mg 1	0	0
16	I	2	Total 2	Mg 2	0	0
16	Z	1	Total 1	Mg 1	0	0
16	N	1	Total 1	Mg 1	0	0
16	L	1	Total 1	Mg 1	0	0

- Molecule 17 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
17	G	1	Total 1	Cl 1	0	0

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	28	Total 28	O 28	0	0
18	B	23	Total 23	O 23	0	0
18	C	19	Total 19	O 19	0	0
18	D	16	Total 16	O 16	0	0
18	E	9	Total 9	O 9	0	0
18	F	26	Total 26	O 26	0	0
18	G	30	Total 30	O 30	0	0
18	H	25	Total 25	O 25	0	0
18	I	24	Total 24	O 24	0	0
18	J	22	Total 22	O 22	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
18	K	20	Total O 20 20	0	0
18	L	31	Total O 31 31	0	0
18	M	27	Total O 27 27	0	0
18	N	19	Total O 19 19	0	0
18	O	15	Total O 15 15	0	0
18	P	18	Total O 18 18	0	0
18	Q	15	Total O 15 15	0	0
18	R	21	Total O 21 21	0	0
18	S	9	Total O 9 9	0	0
18	T	19	Total O 19 19	0	0
18	U	26	Total O 26 26	0	0
18	V	20	Total O 20 20	0	0
18	W	16	Total O 16 16	0	0
18	X	19	Total O 19 19	0	0
18	Y	31	Total O 31 31	0	0
18	Z	27	Total O 27 27	0	0
18	a	27	Total O 27 27	0	0
18	b	24	Total O 24 24	0	0
18	c	3	Total O 3 3	0	0
18	d	2	Total O 2 2	0	0



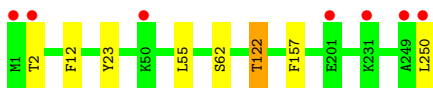
### 3 Residue-property plots [i](#)

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.

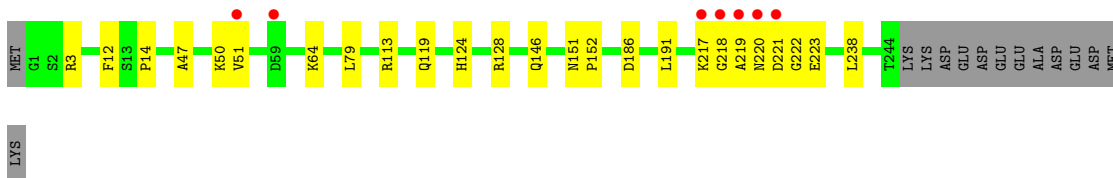
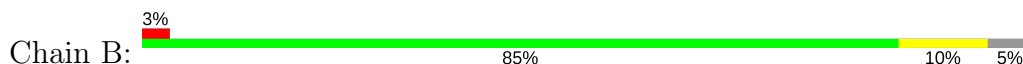
- Molecule 1: Proteasome subunit alpha type-2



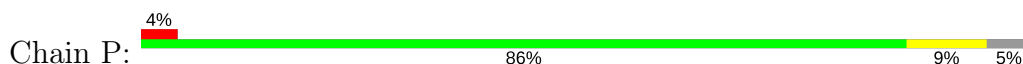
- Molecule 1: Proteasome subunit alpha type-2



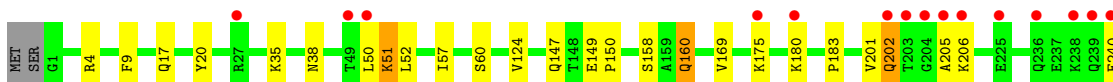
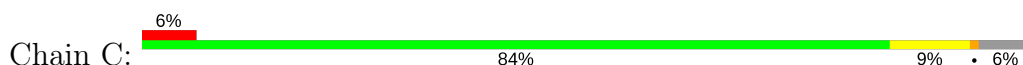
- Molecule 2: Proteasome subunit alpha type-3



- Molecule 2: Proteasome subunit alpha type-3

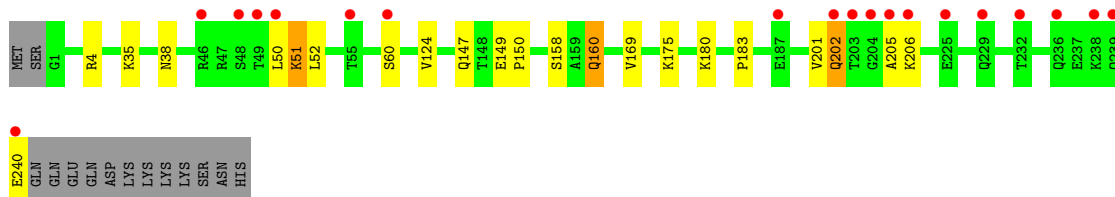
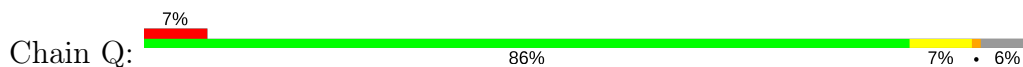


- Molecule 3: Proteasome subunit alpha type-4

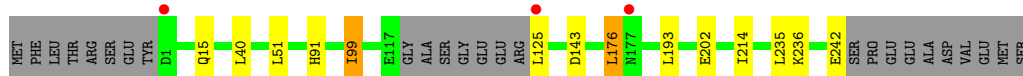
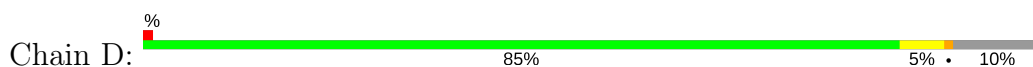


GLN  
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GLU  
GLN  
ASP  
LYS  
LYS  
LYS  
LYS  
SER  
ASN  
HIS

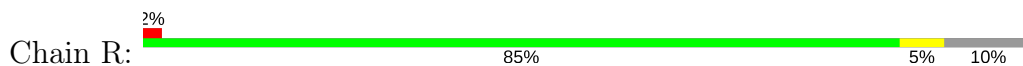
● Molecule 3: Proteasome subunit alpha type-4



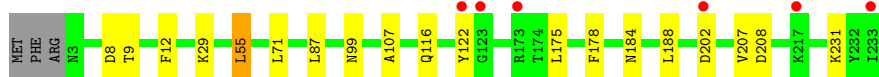
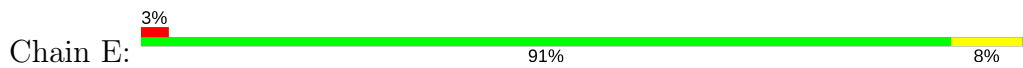
● Molecule 4: Proteasome subunit alpha type-5



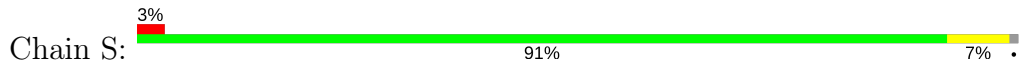
● Molecule 4: Proteasome subunit alpha type-5



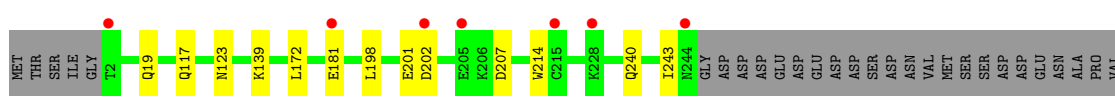
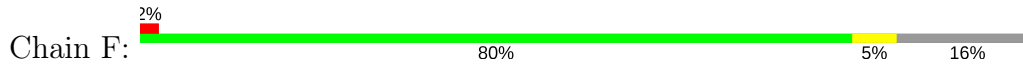
● Molecule 5: Proteasome subunit alpha type-6



● Molecule 5: Proteasome subunit alpha type-6



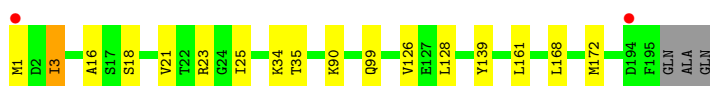
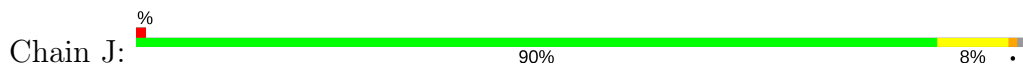
● Molecule 6: Probable proteasome subunit alpha type-7



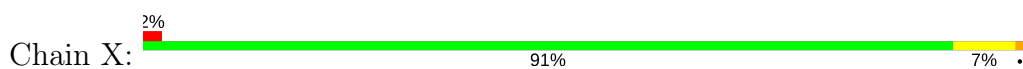




- Molecule 10: Proteasome subunit beta type-4



- Molecule 10: Proteasome subunit beta type-4



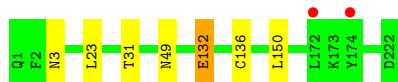
- Molecule 11: Proteasome subunit beta type-5



- Molecule 11: Proteasome subunit beta type-5



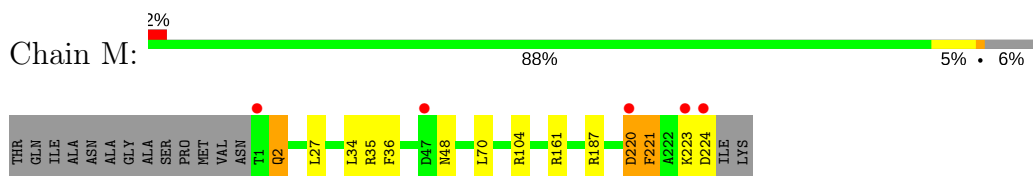
- Molecule 12: Proteasome subunit beta type-6



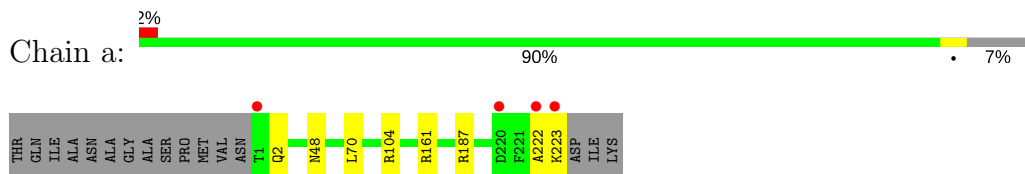
- Molecule 12: Proteasome subunit beta type-6



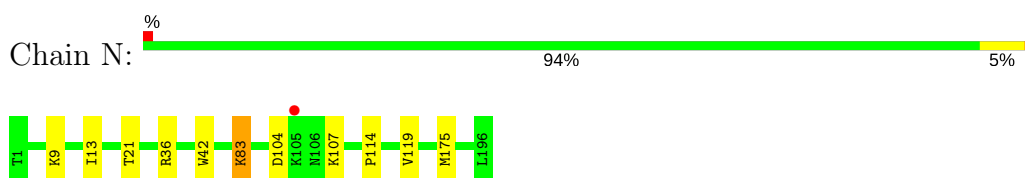
- Molecule 13: Proteasome subunit beta type-7



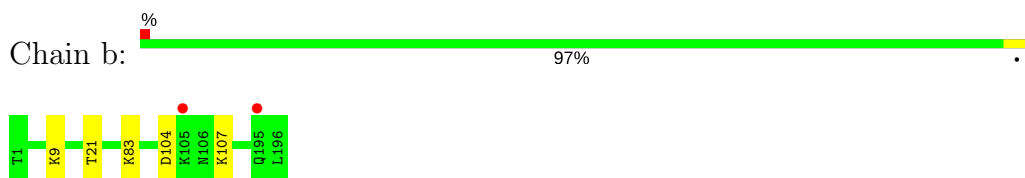
• Molecule 13: Proteasome subunit beta type-7



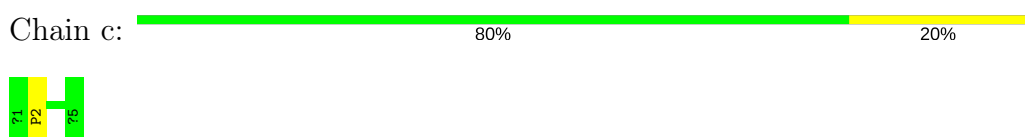
• Molecule 14: Proteasome subunit beta type-1



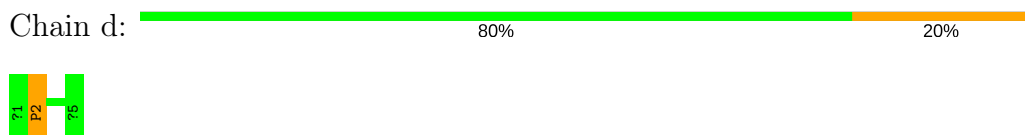
• Molecule 14: Proteasome subunit beta type-1



• Molecule 15: Ac-PAE-ep



• Molecule 15: Ac-PAE-ep



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	136.41Å 301.59Å 145.62Å 90.00° 112.89° 90.00°	Depositor
Resolution (Å)	15.00 – 2.60 15.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	95.5 (15.00-2.60) 95.5 (15.00-2.60)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.48 (at 2.61Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.197 , 0.215 0.199 , 0.218	Depositor DCC
$R_{free}$ test set	15717 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	56.8	Xtrriage
Anisotropy	0.047	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 39.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	49891	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	64.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.39% 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

Bond lengths and bond angles in the following residue types are not validated in this section: MG, POL, GAU, ACE, 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	0.28	0/1952	0.47	0/2642
1	O	0.28	0/1952	0.47	0/2642
2	B	0.28	0/1934	0.50	0/2618
2	P	0.28	0/1934	0.50	0/2618
3	C	0.28	0/1910	0.51	0/2586
3	Q	0.28	0/1910	0.51	0/2586
4	D	0.27	0/1837	0.48	0/2475
4	R	0.27	0/1837	0.48	0/2475
5	E	0.28	0/1800	0.48	0/2433
5	S	0.28	0/1800	0.48	0/2433
6	F	0.28	0/1932	0.45	0/2609
6	T	0.28	0/1932	0.45	0/2609
7	G	0.28	0/1945	0.47	0/2634
7	U	0.28	0/1945	0.47	0/2634
8	H	0.29	0/1750	0.48	0/2373
8	V	0.26	0/1750	0.48	0/2373
9	I	0.32	0/1611	0.49	0/2174
9	W	0.28	0/1611	0.48	0/2174
10	J	0.28	0/1589	0.49	0/2142
10	X	0.27	0/1589	0.48	0/2142
11	K	0.29	0/1681	0.51	1/2274 (0.0%)
11	Y	0.27	0/1681	0.50	1/2274 (0.0%)
12	L	0.28	0/1795	0.50	1/2420 (0.0%)
12	Z	0.29	0/1795	0.50	0/2420
13	M	0.33	0/1783	0.52	0/2420
13	a	0.34	0/1775	0.52	0/2409
14	N	0.37	0/1541	0.51	0/2087
14	b	0.34	0/1541	0.49	0/2087
15	c	2.43	1/13 (7.7%)	1.11	0/18
15	d	2.67	1/13 (7.7%)	1.24	0/18
All	All	0.29	2/50138 (0.0%)	0.49	3/67799 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	d	2	PRO	CA-C	-7.62	1.37	1.52
15	c	2	PRO	CA-C	-7.24	1.38	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
12	L	132	GLU	CA-CB-CG	5.21	124.87	113.40
11	Y	4	LEU	CA-CB-CG	5.13	127.09	115.30
11	K	4	LEU	CA-CB-CG	5.12	127.07	115.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1915	0	1929	1	0
1	O	1915	0	1929	4	0
2	B	1904	0	1904	12	0
2	P	1904	0	1904	10	0
3	C	1881	0	1895	10	0
3	Q	1881	0	1895	6	0
4	D	1813	0	1797	5	0
4	R	1813	0	1797	4	0
5	E	1773	0	1775	6	0
5	S	1773	0	1775	3	0
6	F	1892	0	1883	3	0
6	T	1892	0	1883	1	0
7	G	1907	0	1901	6	0
7	U	1907	0	1901	5	0
8	H	1719	0	1719	9	0
8	V	1719	0	1719	9	0
9	I	1581	0	1574	6	0
9	W	1581	0	1574	7	0
10	J	1561	0	1569	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
10	X	1561	0	1569	9	0
11	K	1644	0	1595	7	0
11	Y	1644	0	1595	6	0
12	L	1757	0	1711	0	0
12	Z	1757	0	1711	1	0
13	M	1753	0	1754	10	0
13	a	1745	0	1750	0	0
14	N	1512	0	1478	7	0
14	b	1512	0	1478	0	0
15	c	28	0	27	0	0
15	d	28	0	26	0	0
16	G	1	0	0	0	0
16	I	2	0	0	0	0
16	K	1	0	0	0	0
16	L	1	0	0	0	0
16	N	1	0	0	0	0
16	Z	1	0	0	0	0
17	G	1	0	0	0	0
18	A	28	0	0	0	0
18	B	23	0	0	0	0
18	C	19	0	0	0	0
18	D	16	0	0	0	0
18	E	9	0	0	0	0
18	F	26	0	0	1	0
18	G	30	0	0	0	0
18	H	25	0	0	0	0
18	I	24	0	0	0	0
18	J	22	0	0	0	0
18	K	20	0	0	0	0
18	L	31	0	0	0	0
18	M	27	0	0	1	0
18	N	19	0	0	0	0
18	O	15	0	0	0	0
18	P	18	0	0	2	0
18	Q	15	0	0	0	0
18	R	21	0	0	0	0
18	S	9	0	0	0	0
18	T	19	0	0	0	0
18	U	26	0	0	0	0
18	V	20	0	0	0	0
18	W	16	0	0	0	0
18	X	19	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	Y	31	0	0	0	0
18	Z	27	0	0	0	0
18	a	27	0	0	0	0
18	b	24	0	0	0	0
18	c	3	0	0	0	0
18	d	2	0	0	0	0
All	All	49891	0	49017	132	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 2.

All (132) 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)
8:V:53:GLU:OE1	8:V:57:GLN:NE2	2.21	0.73
8:H:53:GLU:OE1	8:H:57:GLN:NE2	2.21	0.72
7:G:68:ARG:HH12	14:N:36:ARG:HH22	1.46	0.63
13:M:220:ASP:O	13:M:223:LYS:HG2	2.00	0.61
13:M:224:ASP:OD2	8:V:123:TYR:OH	2.17	0.61
14:N:13:ILE:HG21	14:N:175:MET:CE	2.31	0.61
13:M:35:ARG:HH12	14:N:114:PRO:HB3	1.67	0.60
5:S:12:PHE:H	6:T:19:GLN:HE22	1.50	0.59
2:B:12:PHE:H	3:C:17:GLN:HE22	1.51	0.59
8:H:113:ILE:HG13	8:H:119:THR:HG22	1.86	0.58
8:V:113:ILE:HG13	8:V:119:THR:HG22	1.85	0.58
2:P:93:HIS:HB3	18:P:302:HOH:O	2.04	0.57
2:B:221:ASP:O	2:B:223:GLU:N	2.38	0.56
2:P:221:ASP:O	2:P:223:GLU:N	2.39	0.56
14:N:13:ILE:HG21	14:N:175:MET:HE2	1.86	0.56
13:M:223:LYS:O	13:M:224:ASP:HB3	2.06	0.56
2:B:3:ARG:HB3	5:E:122:TYR:OH	2.05	0.55
5:E:12:PHE:H	6:F:19:GLN:HE22	1.56	0.54
10:J:21:VAL:HG11	11:K:122:LEU:HD11	1.91	0.53
3:Q:51:LYS:O	3:Q:52:LEU:HB2	2.08	0.53
10:X:21:VAL:HG11	11:Y:122:LEU:HD11	1.91	0.53
3:C:51:LYS:O	3:C:52:LEU:HB2	2.08	0.52
3:C:201:VAL:O	3:C:202:GLN:CB	2.57	0.52
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.57	0.52
11:K:53:GLN:O	11:K:57:THR:HG23	2.11	0.51
3:C:160:GLN:HA	3:C:160:GLN:HE21	1.76	0.51
7:G:23:PHE:O	7:G:26:THR:HB	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:O:122:THR:HG22	2:P:128:ARG:HH21	1.77	0.50
2:P:217:LYS:C	2:P:219:ALA:H	2.15	0.50
11:Y:53:GLN:O	11:Y:57:THR:HG23	2.11	0.50
8:H:113:ILE:CG1	8:H:119:THR:HG22	2.41	0.50
13:M:224:ASP:O	13:M:224:ASP:OD1	2.28	0.50
8:H:35:HIS:CE1	8:H:53:GLU:OE2	2.65	0.50
13:M:35:ARG:NH1	14:N:114:PRO:HB3	2.26	0.50
8:V:113:ILE:CG1	8:V:119:THR:HG22	2.41	0.50
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.94	0.49
7:U:23:PHE:O	7:U:26:THR:HB	2.12	0.49
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.77	0.49
2:B:217:LYS:C	2:B:219:ALA:H	2.14	0.49
9:I:9:GLY:HA3	9:I:41:LYS:HE2	1.95	0.49
2:P:47:ALA:HB1	2:P:64:LYS:HD2	1.95	0.49
8:H:112:SER:HB3	8:H:125:LEU:HD13	1.95	0.49
1:O:12:PHE:H	2:P:20:GLN:HE22	1.61	0.49
13:M:35:ARG:HD3	13:M:36:PHE:CZ	2.48	0.48
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.95	0.48
2:B:47:ALA:HB1	2:B:64:LYS:HD2	1.95	0.48
8:H:35:HIS:HB3	8:H:56:THR:HG21	1.95	0.48
9:I:10:ILE:HG21	9:I:141:ALA:HB3	1.96	0.48
4:R:91:HIS:HB3	4:R:99:ILE:HG22	1.96	0.48
4:D:91:HIS:HB3	4:D:99:ILE:HG22	1.96	0.48
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.95	0.48
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.49	0.47
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.95	0.47
10:X:1:MET:HG2	10:X:34:LYS:HE3	1.96	0.47
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.44	0.47
9:W:10:ILE:HG21	9:W:141:ALA:HB3	1.96	0.46
11:K:107:LYS:HG3	11:K:108:GLU:HG3	1.97	0.46
11:Y:107:LYS:HG3	11:Y:108:GLU:HG3	1.97	0.46
1:A:122:THR:HG22	2:B:128:ARG:HH21	1.81	0.46
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.16	0.46
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.98	0.46
9:W:36:SER:HB2	10:X:126:VAL:HG11	1.97	0.46
2:P:124:HIS:HB3	3:Q:124:VAL:HG12	1.98	0.46
4:R:91:HIS:HB3	4:R:99:ILE:CG2	2.46	0.46
3:C:9:PHE:H	4:D:15:GLN:HE22	1.64	0.45
10:J:1:MET:HG2	10:J:34:LYS:HE3	1.96	0.45
11:K:116:ASP:HB2	11:K:120:THR:HB	1.99	0.45
3:C:35:LYS:HG2	3:C:158:SER:O	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.97	0.45
13:M:221:PHE:O	13:M:224:ASP:OD1	2.35	0.45
1:O:55:LEU:HB3	7:U:159:ALA:O	2.17	0.45
8:H:22:GLN:NE2	8:H:27:ALA:HB2	2.32	0.45
13:M:27:LEU:HD21	13:M:34:LEU:HD22	1.99	0.44
2:B:124:HIS:HB3	3:C:124:VAL:HG12	2.00	0.44
4:D:91:HIS:HB3	4:D:99:ILE:CG2	2.47	0.44
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.47	0.44
2:B:146:GLN:HG2	3:C:57:ILE:HG21	1.98	0.44
10:J:23:ARG:HA	10:J:23:ARG:HD3	1.76	0.44
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.47	0.44
14:N:36:ARG:HG3	14:N:42:TRP:CE2	2.52	0.44
4:R:91:HIS:CD2	4:R:99:ILE:HG22	2.54	0.43
10:J:3:ILE:HG23	10:J:18:SER:HB3	2.00	0.43
11:K:145:LYS:HB2	11:K:148:LEU:HD13	2.00	0.43
10:X:3:ILE:HG23	10:X:18:SER:HB3	2.00	0.43
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.01	0.43
9:W:98:ARG:O	9:W:126:ILE:HD11	2.19	0.43
12:Z:137:ARG:HD3	12:Z:138:ALA:O	2.19	0.43
9:I:98:ARG:O	9:I:126:ILE:HD11	2.18	0.43
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.01	0.43
11:K:38:ASN:HB2	11:K:39:PRO:CD	2.49	0.43
10:X:1:MET:HB3	10:X:34:LYS:HE3	2.01	0.43
5:S:87:LEU:HD21	5:S:107:ALA:HB1	2.00	0.43
6:F:19:GLN:NE2	18:F:309:HOH:O	2.49	0.42
9:I:20:VAL:HG13	9:I:118:PRO:HB3	2.01	0.42
11:Y:145:LYS:HB2	11:Y:148:LEU:HD13	1.99	0.42
4:D:91:HIS:CD2	4:D:99:ILE:HG22	2.54	0.42
2:P:113:ARG:NE	18:P:302:HOH:O	2.45	0.42
9:W:101:PRO:HB3	9:W:126:ILE:HD12	2.01	0.42
11:Y:38:ASN:HB2	11:Y:39:PRO:CD	2.49	0.42
5:E:87:LEU:HD21	5:E:107:ALA:HB1	2.00	0.42
9:I:101:PRO:HB3	9:I:126:ILE:HD12	2.02	0.42
2:P:151:ASN:HB2	2:P:152:PRO:HD2	2.02	0.42
8:V:104:ASP:HB2	8:V:105:PRO:CD	2.50	0.42
2:B:3:ARG:CB	5:E:122:TYR:OH	2.68	0.42
9:W:20:VAL:HG13	9:W:118:PRO:HB3	2.01	0.42
2:B:151:ASN:HB2	2:B:152:PRO:HD2	2.01	0.41
5:E:175:LEU:HA	5:E:178:PHE:CE2	2.55	0.41
8:V:112:SER:HB3	8:V:125:LEU:HD13	2.02	0.41
7:U:78:ILE:N	7:U:79:PRO:CD	2.83	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:X:1:MET:CB	10:X:34:LYS:HE3	2.50	0.41
8:H:104:ASP:HB2	8:H:105:PRO:CD	2.50	0.41
5:S:175:LEU:HA	5:S:178:PHE:CE2	2.55	0.41
10:J:1:MET:HB3	10:J:34:LYS:HE3	2.02	0.41
11:Y:128:CYS:SG	11:Y:136:ALA:HB3	2.61	0.41
4:D:176:LEU:HD22	5:E:55:LEU:CD2	2.51	0.41
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.41
10:J:25:ILE:O	10:X:139:TYR:OH	2.39	0.41
2:B:14:PRO:HA	3:C:20:TYR:CD1	2.56	0.41
10:J:1:MET:CB	10:J:34:LYS:HE3	2.51	0.41
7:G:73:VAL:HG12	7:G:133:THR:HB	2.01	0.41
4:R:160:ASN:HB3	4:R:179:TRP:CE2	2.56	0.41
11:K:128:CYS:SG	11:K:136:ALA:HB3	2.61	0.41
10:J:126:VAL:HG12	10:J:128:LEU:HG	2.03	0.40
13:M:2:GLN:NE2	18:M:326:HOH:O	2.54	0.40
6:F:198:LEU:HD12	6:F:243:ILE:HG22	2.03	0.40
7:G:63:ILE:HD12	7:G:215:GLU:HG2	2.04	0.40
10:J:139:TYR:OH	10:X:25:ILE:O	2.40	0.40
7:G:165:LYS:HD2	7:G:205:LEU:HD22	2.04	0.40
10:J:168:LEU:O	10:J:172:MET:HB2	2.21	0.40
7:U:73:VAL:HG12	7:U:133:THR:HB	2.02	0.40
8:V:35:HIS:HB3	8:V:56:THR:HG21	2.04	0.40
8:V:218:VAL:CG2	9:W:196:LYS:HB2	2.52	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	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	36 60
1	O	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	36 60

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	242/258 (94%)	234 (97%)	4 (2%)	4 (2%)	10	20
2	P	242/258 (94%)	234 (97%)	4 (2%)	4 (2%)	10	20
3	C	238/254 (94%)	233 (98%)	2 (1%)	3 (1%)	13	27
3	Q	238/254 (94%)	233 (98%)	2 (1%)	3 (1%)	13	27
4	D	231/260 (89%)	229 (99%)	2 (1%)	0	100	100
4	R	231/260 (89%)	229 (99%)	2 (1%)	0	100	100
5	E	229/234 (98%)	223 (97%)	6 (3%)	0	100	100
5	S	229/234 (98%)	222 (97%)	7 (3%)	0	100	100
6	F	241/288 (84%)	238 (99%)	3 (1%)	0	100	100
6	T	241/288 (84%)	238 (99%)	3 (1%)	0	100	100
7	G	239/252 (95%)	238 (100%)	1 (0%)	0	100	100
7	U	239/252 (95%)	238 (100%)	1 (0%)	0	100	100
8	H	224/232 (97%)	217 (97%)	7 (3%)	0	100	100
8	V	224/232 (97%)	217 (97%)	7 (3%)	0	100	100
9	I	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
9	W	202/205 (98%)	196 (97%)	6 (3%)	0	100	100
10	J	193/198 (98%)	188 (97%)	5 (3%)	0	100	100
10	X	193/198 (98%)	189 (98%)	3 (2%)	1 (0%)	31	56
11	K	210/212 (99%)	206 (98%)	4 (2%)	0	100	100
11	Y	210/212 (99%)	206 (98%)	4 (2%)	0	100	100
12	L	220/222 (99%)	215 (98%)	5 (2%)	0	100	100
12	Z	220/222 (99%)	215 (98%)	5 (2%)	0	100	100
13	M	222/239 (93%)	212 (96%)	9 (4%)	1 (0%)	31	56
13	a	221/239 (92%)	211 (96%)	9 (4%)	1 (0%)	31	56
14	N	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
14	b	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
15	c	2/5 (40%)	2 (100%)	0	0	100	100
15	d	2/5 (40%)	2 (100%)	0	0	100	100
All	All	6269/6610 (95%)	6116 (98%)	134 (2%)	19 (0%)	43	68

All (19) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
2	B	222	GLY
3	C	202	GLN
2	P	51	VAL
2	P	222	GLY
3	Q	202	GLN
13	a	222	ALA
1	A	2	THR
2	B	218	GLY
1	O	2	THR
2	P	218	GLY
2	B	220	ASN
3	C	205	ALA
13	M	221	PHE
2	P	220	ASN
3	Q	205	ALA
10	X	24	GLY
3	C	183	PRO
3	Q	183	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	209/209 (100%)	205 (98%)	4 (2%)	60	82
1	O	209/209 (100%)	205 (98%)	4 (2%)	60	82
2	B	203/216 (94%)	196 (97%)	7 (3%)	40	67
2	P	203/216 (94%)	196 (97%)	7 (3%)	40	67
3	C	212/226 (94%)	200 (94%)	12 (6%)	23	45
3	Q	212/226 (94%)	200 (94%)	12 (6%)	23	45
4	D	194/215 (90%)	182 (94%)	12 (6%)	20	40
4	R	194/215 (90%)	182 (94%)	12 (6%)	20	40
5	E	190/193 (98%)	177 (93%)	13 (7%)	17	35
5	S	190/193 (98%)	178 (94%)	12 (6%)	20	40

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
6	F	201/239 (84%)	191 (95%)	10 (5%)	27	51
6	T	201/239 (84%)	191 (95%)	10 (5%)	27	51
7	G	206/210 (98%)	195 (95%)	11 (5%)	25	48
7	U	206/210 (98%)	195 (95%)	11 (5%)	25	48
8	H	185/190 (97%)	181 (98%)	4 (2%)	55	79
8	V	185/190 (97%)	181 (98%)	4 (2%)	55	79
9	I	172/173 (99%)	169 (98%)	3 (2%)	63	83
9	W	172/173 (99%)	169 (98%)	3 (2%)	63	83
10	J	173/175 (99%)	169 (98%)	4 (2%)	53	78
10	X	173/175 (99%)	168 (97%)	5 (3%)	45	72
11	K	169/169 (100%)	161 (95%)	8 (5%)	29	54
11	Y	169/169 (100%)	161 (95%)	8 (5%)	29	54
12	L	185/185 (100%)	178 (96%)	7 (4%)	36	63
12	Z	185/185 (100%)	177 (96%)	8 (4%)	32	58
13	M	192/203 (95%)	185 (96%)	7 (4%)	38	65
13	a	191/203 (94%)	184 (96%)	7 (4%)	37	64
14	N	162/162 (100%)	157 (97%)	5 (3%)	43	70
14	b	162/162 (100%)	157 (97%)	5 (3%)	43	70
15	c	1/1 (100%)	1 (100%)	0	100	100
15	d	1/1 (100%)	0	1 (100%)	0	0
All	All	5307/5532 (96%)	5091 (96%)	216 (4%)	33	60

All (216) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	62	SER
1	A	122	THR
1	A	157	PHE
1	A	250	LEU
2	B	50	LYS
2	B	79	LEU
2	B	113	ARG
2	B	119	GLN
2	B	186	ASP
2	B	191	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	B	238	LEU
3	C	4	ARG
3	C	38	ASN
3	C	50	LEU
3	C	51	LYS
3	C	60	SER
3	C	147	GLN
3	C	160	GLN
3	C	169	VAL
3	C	175	LYS
3	C	180	LYS
3	C	206	LYS
3	C	240	GLU
4	D	40	LEU
4	D	51	LEU
4	D	99	ILE
4	D	125	LEU
4	D	143	ASP
4	D	176	LEU
4	D	193	LEU
4	D	202	GLU
4	D	214	ILE
4	D	235	LEU
4	D	236	LYS
4	D	242	GLU
5	E	8	ASP
5	E	9	THR
5	E	29	LYS
5	E	55	LEU
5	E	71	LEU
5	E	99	ASN
5	E	116	GLN
5	E	184	ASN
5	E	188	LEU
5	E	202	ASP
5	E	207	VAL
5	E	208	ASP
5	E	231	LYS
6	F	117	GLN
6	F	123	ASN
6	F	139	LYS
6	F	172	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
6	F	181	GLU
6	F	201	GLU
6	F	202	ASP
6	F	207	ASP
6	F	214	TRP
6	F	240	GLN
7	G	26	THR
7	G	75	ASN
7	G	83	ASN
7	G	115	LEU
7	G	117	GLN
7	G	122	ARG
7	G	125	MET
7	G	178	LYS
7	G	208	GLU
7	G	235	ARG
7	G	236	LEU
8	H	30	ASN
8	H	68	LEU
8	H	113	ILE
8	H	196	ARG
9	I	37	ASN
9	I	126	ILE
9	I	171	LEU
10	J	3	ILE
10	J	35	THR
10	J	90	LYS
10	J	99	GLN
11	K	4	LEU
11	K	9	GLN
11	K	69	ARG
11	K	104	TYR
11	K	107	LYS
11	K	128	CYS
11	K	140	LEU
11	K	148	LEU
12	L	3	ASN
12	L	23	LEU
12	L	31	THR
12	L	49	ASN
12	L	132	GLU
12	L	136	CYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
12	L	150	LEU
13	M	2	GLN
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	161	ARG
13	M	187	ARG
13	M	220	ASP
14	N	9	LYS
14	N	21	THR
14	N	83	LYS
14	N	104	ASP
14	N	107	LYS
1	O	62	SER
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	50	LYS
2	P	79	LEU
2	P	113	ARG
2	P	119	GLN
2	P	186	ASP
2	P	191	LEU
2	P	238	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	50	LEU
3	Q	51	LYS
3	Q	60	SER
3	Q	147	GLN
3	Q	160	GLN
3	Q	169	VAL
3	Q	175	LYS
3	Q	180	LYS
3	Q	206	LYS
3	Q	240	GLU
4	R	40	LEU
4	R	51	LEU
4	R	99	ILE
4	R	125	LEU
4	R	143	ASP
4	R	176	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	R	193	LEU
4	R	202	GLU
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	55	LEU
5	S	71	LEU
5	S	99	ASN
5	S	116	GLN
5	S	184	ASN
5	S	188	LEU
5	S	202	ASP
5	S	207	VAL
5	S	208	ASP
5	S	231	LYS
6	T	117	GLN
6	T	123	ASN
6	T	139	LYS
6	T	172	LEU
6	T	181	GLU
6	T	201	GLU
6	T	202	ASP
6	T	207	ASP
6	T	214	TRP
6	T	240	GLN
7	U	26	THR
7	U	75	ASN
7	U	83	ASN
7	U	115	LEU
7	U	117	GLN
7	U	122	ARG
7	U	125	MET
7	U	178	LYS
7	U	208	GLU
7	U	235	ARG
7	U	236	LEU
8	V	30	ASN
8	V	68	LEU
8	V	113	ILE

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
8	V	196	ARG
9	W	37	ASN
9	W	126	ILE
9	W	171	LEU
10	X	3	ILE
10	X	23	ARG
10	X	35	THR
10	X	90	LYS
10	X	99	GLN
11	Y	4	LEU
11	Y	9	GLN
11	Y	69	ARG
11	Y	104	TYR
11	Y	107	LYS
11	Y	128	CYS
11	Y	140	LEU
11	Y	148	LEU
12	Z	3	ASN
12	Z	23	LEU
12	Z	31	THR
12	Z	49	ASN
12	Z	132	GLU
12	Z	136	CYS
12	Z	137	ARG
12	Z	150	LEU
13	a	2	GLN
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	161	ARG
13	a	187	ARG
13	a	223	LYS
14	b	9	LYS
14	b	21	THR
14	b	83	LYS
14	b	104	ASP
14	b	107	LYS
15	d	2	PRO

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (121) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	HIS
2	B	20	GLN
2	B	58	GLN
2	B	95	GLN
2	B	119	GLN
2	B	123	GLN
2	B	155	ASN
2	B	176	GLN
3	C	17	GLN
3	C	38	ASN
3	C	77	ASN
3	C	92	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
4	D	15	GLN
4	D	100	ASN
4	D	146	GLN
4	D	225	ASN
5	E	68	HIS
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	118	ASN
5	E	120	GLN
5	E	151	ASN
5	E	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	117	GLN
6	F	191	GLN
6	F	240	GLN
7	G	6	HIS
7	G	30	ASN
7	G	83	ASN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	166	GLN
7	G	167	GLN
8	H	22	GLN
8	H	35	HIS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
8	H	66	HIS
8	H	165	ASN
9	I	37	ASN
10	J	55	GLN
10	J	146	HIS
11	K	85	ASN
11	K	176	ASN
11	K	190	ASN
11	K	208	ASN
12	L	3	ASN
12	L	49	ASN
12	L	70	ASN
12	L	158	ASN
13	M	18	ASN
13	M	48	ASN
13	M	102	GLN
13	M	179	ASN
13	M	194	ASN
13	M	213	GLN
14	N	161	GLN
1	O	94	HIS
2	P	20	GLN
2	P	58	GLN
2	P	95	GLN
2	P	119	GLN
2	P	123	GLN
2	P	176	GLN
3	Q	17	GLN
3	Q	38	ASN
3	Q	77	ASN
3	Q	116	GLN
3	Q	120	GLN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	100	ASN
4	R	146	GLN
4	R	225	ASN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN

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Mol	Chain	Res	Type
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
6	T	191	GLN
6	T	240	GLN
7	U	30	ASN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	166	GLN
7	U	167	GLN
8	V	35	HIS
8	V	165	ASN
9	W	37	ASN
10	X	55	GLN
10	X	86	GLN
10	X	146	HIS
11	Y	85	ASN
11	Y	176	ASN
11	Y	208	ASN
12	Z	3	ASN
12	Z	49	ASN
12	Z	70	ASN
12	Z	158	ASN
13	a	18	ASN
13	a	48	ASN
13	a	102	GLN
13	a	179	ASN
13	a	194	ASN
13	a	213	GLN
14	b	161	GLN

### 5.3.3 RNA

There are no RNA molecules in this entry.



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

2 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
15	GAU	c	4	15,14	5,8,8	1.90	1 (20%)	2,9,9	1.71	0
15	GAU	d	4	15,14	5,8,8	1.60	1 (20%)	2,9,9	1.94	1 (50%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
15	GAU	c	4	15,14	-	0/5/7/7	0/0/0/0
15	GAU	d	4	15,14	-	0/5/7/7	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	d	4	GAU	C-CA	3.05	1.57	1.52
15	c	4	GAU	C-CA	4.06	1.58	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	d	4	GAU	CB-CA-N	-2.27	102.29	109.00

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 8 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 [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	250/250 (100%)	-0.44	4 (1%) 72 67	41, 53, 85, 125	0
1	O	250/250 (100%)	-0.30	7 (2%) 53 46	46, 63, 105, 133	0
2	B	244/258 (94%)	-0.29	7 (2%) 51 44	42, 60, 101, 150	0
2	P	244/258 (94%)	-0.20	10 (4%) 37 29	47, 64, 110, 155	0
3	C	240/254 (94%)	-0.13	15 (6%) 20 15	42, 65, 125, 150	0
3	Q	240/254 (94%)	0.06	19 (7%) 12 9	47, 75, 151, 175	0
4	D	235/260 (90%)	-0.35	3 (1%) 77 73	47, 66, 99, 138	0
4	R	235/260 (90%)	-0.24	5 (2%) 63 58	48, 69, 109, 144	0
5	E	231/234 (98%)	-0.20	6 (2%) 56 49	50, 69, 106, 150	0
5	S	231/234 (98%)	-0.12	6 (2%) 56 49	52, 75, 118, 164	0
6	F	243/288 (84%)	-0.37	7 (2%) 51 44	44, 61, 109, 139	0
6	T	243/288 (84%)	-0.23	8 (3%) 46 39	46, 72, 126, 156	0
7	G	241/252 (95%)	-0.46	4 (1%) 70 65	37, 55, 89, 136	0
7	U	241/252 (95%)	-0.39	6 (2%) 57 50	45, 60, 91, 135	0
8	H	226/232 (97%)	-0.31	6 (2%) 54 48	38, 54, 87, 148	0
8	V	226/232 (97%)	-0.28	7 (3%) 49 41	45, 58, 90, 163	0
9	I	204/205 (99%)	-0.64	1 (0%) 90 89	39, 51, 78, 100	0
9	W	204/205 (99%)	-0.62	3 (1%) 73 69	42, 54, 84, 107	0
10	J	195/198 (98%)	-0.48	2 (1%) 82 79	40, 55, 81, 134	0
10	X	195/198 (98%)	-0.45	3 (1%) 73 69	41, 56, 80, 143	0
11	K	212/212 (100%)	-0.52	1 (0%) 90 89	38, 56, 78, 99	0
11	Y	212/212 (100%)	-0.54	0 100 100	42, 56, 79, 100	0
12	L	222/222 (100%)	-0.51	2 (0%) 84 81	40, 56, 87, 121	0
12	Z	222/222 (100%)	-0.53	2 (0%) 84 81	38, 55, 86, 120	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
13	M	224/239 (93%)	-0.53	5 (2%) 62 56	25, 55, 79, 98	0
13	a	223/239 (93%)	-0.51	4 (1%) 68 63	24, 53, 75, 93	0
14	N	196/196 (100%)	-0.54	1 (0%) 90 89	40, 51, 79, 107	0
14	b	196/196 (100%)	-0.51	2 (1%) 82 79	40, 53, 79, 113	0
15	c	2/5 (40%)	-0.87	0 100 100	66, 66, 66, 67	0
15	d	2/5 (40%)	-0.80	0 100 100	57, 57, 57, 63	0
All	All	6329/6610 (95%)	-0.37	146 (2%) 60 54	24, 59, 103, 175	0

All (146) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	Q	49	THR	6.8
3	C	206	LYS	6.6
3	Q	50	LEU	6.3
2	P	220	ASN	6.0
10	J	1	MET	5.9
10	X	1	MET	5.9
3	C	205	ALA	5.8
2	B	218	GLY	5.4
8	V	224	GLN	5.2
13	M	224	ASP	5.1
3	C	49	THR	5.1
2	B	221	ASP	5.0
2	B	51	VAL	5.0
3	Q	206	LYS	5.0
5	S	202	ASP	5.0
8	V	226	GLU	4.9
10	X	194	ASP	4.7
2	B	219	ALA	4.6
2	P	221	ASP	4.6
3	Q	236	GLN	4.6
12	L	174	TYR	4.6
2	P	51	VAL	4.5
9	W	1	SER	4.4
1	A	1	MET	4.3
2	P	218	GLY	4.2
7	U	242	GLN	4.0
8	H	221	CYS	3.8
6	F	244	ASN	3.8
3	C	50	LEU	3.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
3	Q	239	GLN	3.8
10	J	194	ASP	3.8
1	O	1	MET	3.7
5	E	202	ASP	3.7
8	V	221	CYS	3.7
2	P	219	ALA	3.7
6	T	178	HIS	3.6
4	R	1	ASP	3.6
12	Z	174	TYR	3.6
4	R	241	ALA	3.5
3	Q	240	GLU	3.5
13	a	220	ASP	3.5
2	P	59	ASP	3.5
8	H	224	GLN	3.4
8	H	226	GLU	3.4
3	C	236	GLN	3.4
1	O	250	LEU	3.4
9	W	133	LYS	3.4
1	O	2	THR	3.3
3	C	238	LYS	3.3
3	C	239	GLN	3.3
8	H	222	ASP	3.3
3	Q	205	ALA	3.3
4	R	125	LEU	3.2
6	F	205	GLU	3.2
1	A	249	ALA	3.2
5	E	122	TYR	3.2
14	b	195	GLN	3.1
3	Q	229	GLN	3.1
13	a	223	LYS	3.1
13	M	223	LYS	3.1
3	C	225	GLU	3.0
3	Q	204	GLY	3.0
7	G	222	ASP	3.0
1	A	2	THR	3.0
3	C	240	GLU	3.0
8	H	198	GLU	3.0
8	V	222	ASP	2.9
8	V	225	GLU	2.9
13	M	220	ASP	2.9
2	B	217	LYS	2.9
6	T	244	ASN	2.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
6	T	243	ILE	2.9
4	R	242	GLU	2.8
5	E	233	ILE	2.8
3	C	202	GLN	2.8
13	M	47	ASP	2.7
3	Q	202	GLN	2.7
5	S	201	ARG	2.7
9	I	1	SER	2.7
5	S	180	LYS	2.7
13	a	1	THR	2.7
3	Q	187	GLU	2.6
1	O	50	LYS	2.6
7	G	68	ARG	2.6
5	E	217	LYS	2.6
6	F	202	ASP	2.6
3	C	180	LYS	2.5
5	S	227	GLU	2.5
6	T	239	ALA	2.5
9	W	192	ASP	2.5
1	O	231	LYS	2.5
14	b	105	LYS	2.5
2	P	60	THR	2.5
7	G	3	TYR	2.5
2	P	230	LYS	2.5
2	P	222	GLY	2.5
3	C	204	GLY	2.5
14	N	105	LYS	2.5
3	Q	203	THR	2.4
6	T	241	LYS	2.4
6	F	215	CYS	2.4
5	S	210	LEU	2.4
8	H	223	ILE	2.4
1	A	201	GLU	2.4
3	C	203	THR	2.4
6	F	181	GLU	2.4
6	T	204	LYS	2.3
3	Q	46	ARG	2.3
13	M	1	THR	2.3
4	R	217	GLN	2.3
2	P	50	LYS	2.3
4	D	125	LEU	2.3
1	O	249	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
2	B	59	ASP	2.2
5	S	54	GLU	2.2
11	K	147	ASP	2.2
6	F	2	THR	2.2
3	Q	238	LYS	2.2
13	a	222	ALA	2.2
8	V	223	ILE	2.2
3	Q	48	SER	2.1
10	X	193	ASP	2.1
3	C	27	ARG	2.1
3	C	175	LYS	2.1
6	T	181	GLU	2.1
7	U	2	GLY	2.1
6	F	228	LYS	2.1
7	U	222	ASP	2.1
6	T	205	GLU	2.1
4	D	177	ASN	2.1
3	Q	60	SER	2.1
5	E	123	GLY	2.1
3	Q	225	GLU	2.1
7	U	3	TYR	2.1
8	V	219	ASN	2.1
3	Q	55	THR	2.1
7	U	181	LYS	2.0
7	G	240	ALA	2.0
12	Z	173	LYS	2.0
5	E	173	ARG	2.0
3	Q	232	THR	2.0
4	D	1	ASP	2.0
2	B	220	ASN	2.0
7	U	206	GLY	2.0
1	O	201	GLU	2.0
12	L	172	LEU	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( $\text{\AA}^2$ )	Q<0.9
15	GAU	c	4	9/9	0.92	0.16	68,72,75,76	0
15	GAU	d	4	9/9	0.95	0.13	61,66,66,72	0

### 6.3 Carbohydrates [i](#)

There are no carbohydrates 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, 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( $\text{\AA}^2$ )	Q<0.9
16	MG	N	201	1/1	0.94	0.14	52,52,52,52	0
16	MG	Z	301	1/1	0.96	0.30	62,62,62,62	0
16	MG	G	301	1/1	0.97	0.05	48,48,48,48	0
16	MG	I	301	1/1	0.97	0.33	64,64,64,64	0
17	CL	G	302	1/1	0.97	0.22	30,30,30,30	0
16	MG	K	301	1/1	0.99	0.04	54,54,54,54	0
16	MG	L	301	1/1	0.99	0.05	56,56,56,56	0
16	MG	I	302	1/1	0.99	0.07	49,49,49,49	0

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

There are no such residues in this entry.