



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 11, 2023 – 09:31 am GMT

PDB ID : 4Y6Z  
Title : Yeast 20S proteasome in complex with Ac-PAL-ep  
Authors : Groll, M.; Huber, E.M.  
Deposited on : 2015-02-13  
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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

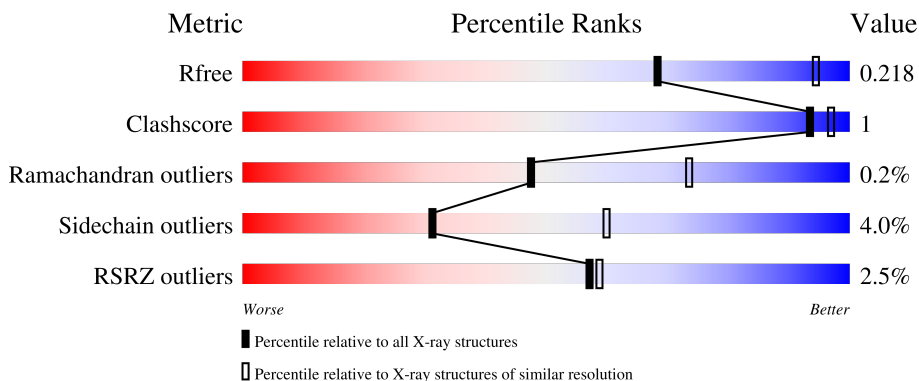
# 1 Overall quality at a glance

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))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	250	 2% 97%
1	O	250	 2% 96%
2	B	258	 5% 88% 7% 5%
2	P	258	 5% 88% 7% 5%
3	C	254	 7% 88% 6% 6%





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Mol	Chain	Length	Quality of chain
3	Q	254	7% 87% 6% • 6%
4	D	260	% 86% • 10%
4	R	260	2% 85% 5% 10%
5	E	234	3% 91% 8% •
5	S	234	5% 91% 7% •
6	F	288	3% 80% 5% 16%
6	T	288	4% 80% • 16%
7	G	252	3% 91% 5% •
7	U	252	2% 90% 6% •
8	H	232	% 89% 6% •
8	V	232	% 90% 5% • •
9	I	205	% 92% 7%
9	W	205	% 92% 8%
10	J	198	% 91% 6% • •
10	X	198	2% 91% 6% • •
11	K	212	95% 5%
11	Y	212	% 95% 5%
12	L	222	95% 5% •
12	Z	222	94% 5% •
13	M	246	% 90% 5% 5%
13	a	246	91% • 5%
14	N	196	% 94% 6%
14	b	196	% 97% •
15	c	5	60% 20% 20%
15	d	5	80% 20%

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Mol	Chain	Length	Quality of chain
15	e	5	 60% 20% 20%
15	f	5	 40% 60% 20% 20%
15	g	5	 60% 20% 20%
15	h	5	 60% 40%

## 2 Entry composition

There are 19 unique types of molecules in this entry. The entry contains 49920 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
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	222	Total	C	N	O	S	0	0	0
			1684	1061	293	323	7			
8	V	222	Total	C	N	O	S	0	0	0
			1684	1061	293	323	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	1045	280	312	7			
11	Y	212	Total	C	N	O	S	0	0	0
			1644	1045	280	312	7			

- 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 a protein called Ac-PAL-ep.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
15	c	5	Total	C	N	O	0	0	0
			27	19	3	5			
15	d	5	Total	C	N	O	0	0	0
			27	19	3	5			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
15	e	5	Total	C	N	O	0	0	0
			27	19	3	5			
15	f	5	Total	C	N	O	0	0	0
			27	19	3	5			
15	g	5	Total	C	N	O	0	0	0
			27	19	3	5			
15	h	5	Total	C	N	O	0	0	0
			27	19	3	5			

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

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

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

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

- Molecule 18 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).





Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
18	K	1	12	6	1	4	1	0	0
18	Y	1	12	6	1	4	1	0	0

- Molecule 19 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
19	A	17	Total	O	0	0
			17	17		
19	B	15	Total	O	0	0
			15	15		
19	C	12	Total	O	0	0
			12	12		
19	D	7	Total	O	0	0
			7	7		
19	E	9	Total	O	0	0
			9	9		
19	F	18	Total	O	0	0
			18	18		
19	G	22	Total	O	0	0
			22	22		
19	H	21	Total	O	0	0
			21	21		
19	I	16	Total	O	0	0
			16	16		
19	J	23	Total	O	0	0
			23	23		

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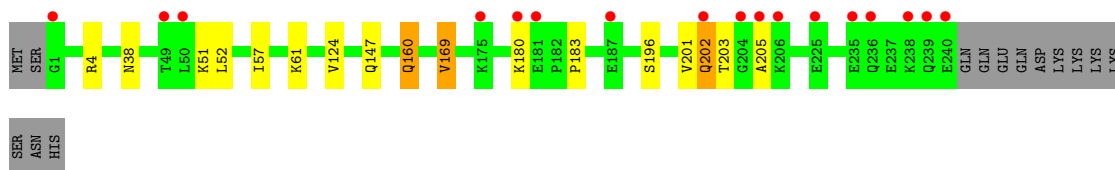
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
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19	L	21	Total O 21 21	0	0
19	M	20	Total O 20 20	0	0
19	N	15	Total O 15 15	0	0
19	O	12	Total O 12 12	0	0
19	P	6	Total O 6 6	0	0
19	Q	9	Total O 9 9	0	0
19	R	9	Total O 9 9	0	0
19	S	3	Total O 3 3	0	0
19	T	8	Total O 8 8	0	0
19	U	18	Total O 18 18	0	0
19	V	12	Total O 12 12	0	0
19	W	16	Total O 16 16	0	0
19	X	22	Total O 22 22	0	0
19	Y	16	Total O 16 16	0	0
19	Z	17	Total O 17 17	0	0
19	a	20	Total O 20 20	0	0
19	b	18	Total O 18 18	0	0
19	c	1	Total O 1 1	0	0
19	d	1	Total O 1 1	0	0
19	e	2	Total O 2 2	0	0

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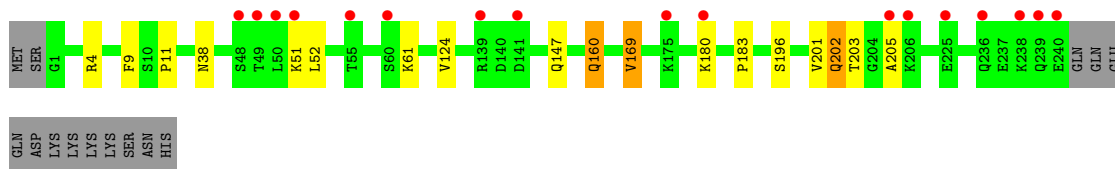
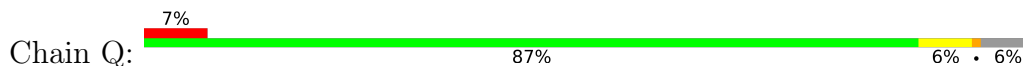
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>	<b>ZeroOcc</b>	<b>AltConf</b>
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19	g	1	Total O 1 1	0	0
19	h	2	Total O 2 2	0	0

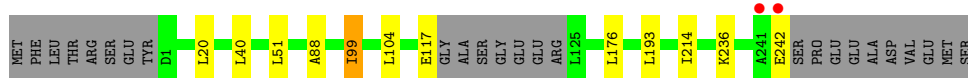
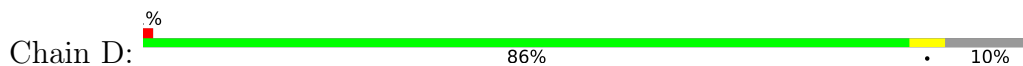




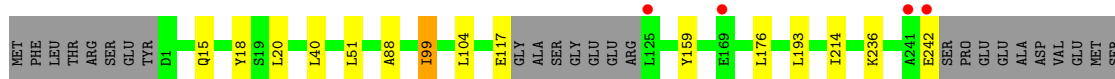
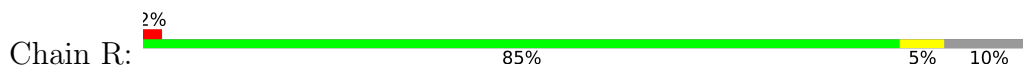
• Molecule 3: Proteasome subunit alpha type-4



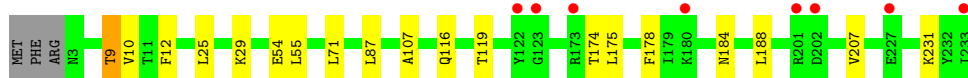
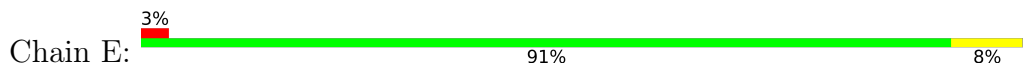
• Molecule 4: Proteasome subunit alpha type-5



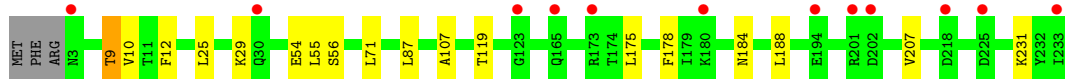
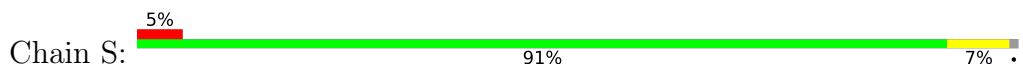
• Molecule 4: Proteasome subunit alpha type-5



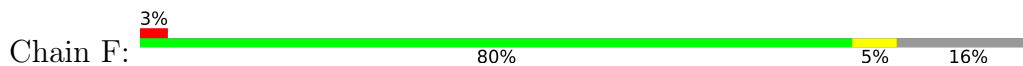
• Molecule 5: Proteasome subunit alpha type-6

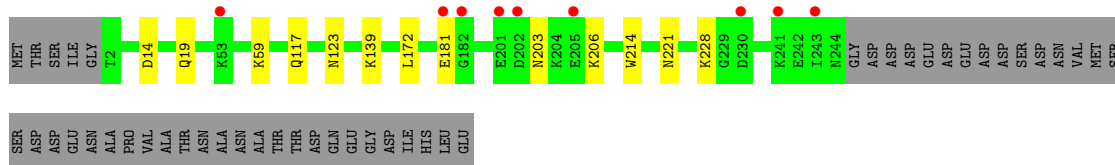


• Molecule 5: Proteasome subunit alpha type-6

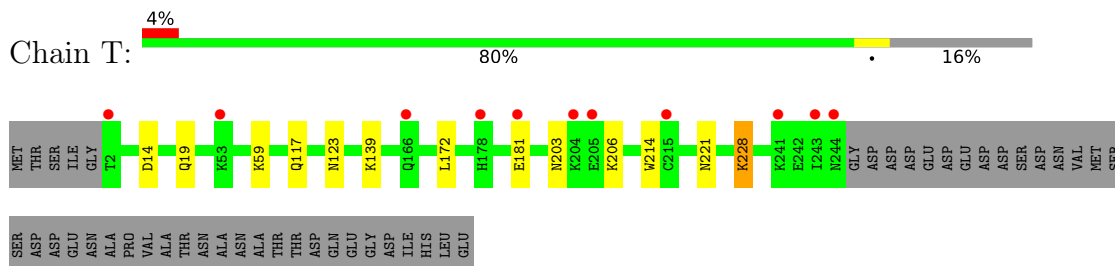


• Molecule 6: Probable proteasome subunit alpha type-7

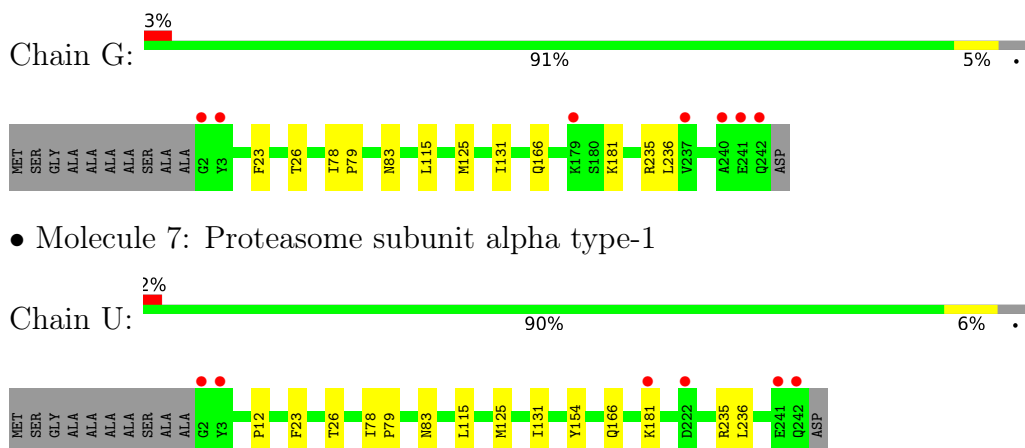




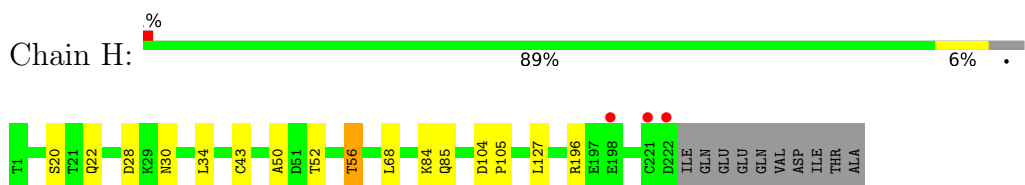
- Molecule 6: Probable proteasome subunit alpha type-7



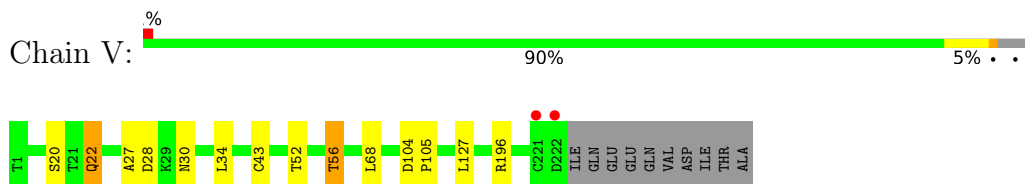
- Molecule 7: Proteasome subunit alpha type-1



- Molecule 8: Proteasome subunit beta type-2



- Molecule 8: Proteasome subunit beta type-2

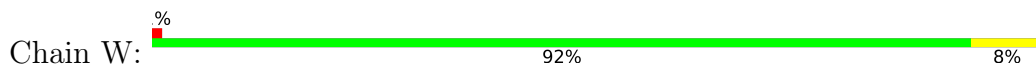


- Molecule 9: Proteasome subunit beta type-3

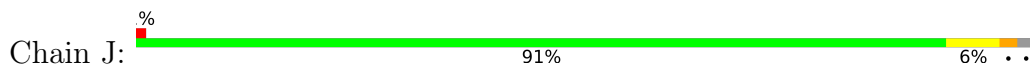




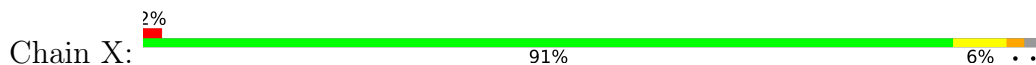
- Molecule 9: Proteasome subunit beta type-3



- 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

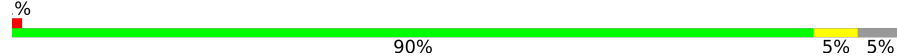


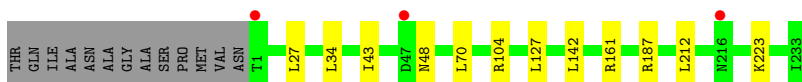
- Molecule 12: Proteasome subunit beta type-6

Chain Z:  94% 5%



- Molecule 13: Proteasome subunit beta type-7

Chain M:  90% 5% 5%



- Molecule 13: Proteasome subunit beta type-7

Chain a:  91% 5%



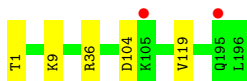
- Molecule 14: Proteasome subunit beta type-1

Chain N:  94% 6%



- Molecule 14: Proteasome subunit beta type-1

Chain b:  97%




- Molecule 15: Ac-PAL-ep

Chain c:  60% 20% 20%



- Molecule 15: Ac-PAL-ep

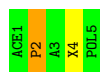
Chain d:  80% 20%




- Molecule 15: Ac-PAL-ep

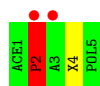


Chain e:  60% 20% 20%



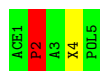
● Molecule 15: Ac-PAL-ep

Chain f:  40% 60% 20% 20%



● Molecule 15: Ac-PAL-ep

Chain g:  60% 20% 20%



● Molecule 15: Ac-PAL-ep

Chain h:  60% 40%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	136.58Å 301.57Å 146.35Å 90.00° 113.25° 90.00°	Depositor
Resolution (Å)	15.00 – 2.70 15.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	98.2 (15.00-2.70) 98.3 (15.00-2.70)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.53 (at 2.69Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.191 , 0.216 0.195 , 0.218	Depositor DCC
$R_{free}$ test set	14487 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	58.6	Xtrriage
Anisotropy	0.090	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 33.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	49920	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.61% 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: ACE, MG, CL, DCL, MES, POL

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	0.49	0/2642
1	O	0.28	0/1952	0.48	0/2642
2	B	0.29	0/1934	0.51	0/2618
2	P	0.28	0/1934	0.51	0/2618
3	C	0.29	0/1910	0.52	0/2586
3	Q	0.29	0/1910	0.51	0/2586
4	D	0.28	0/1837	0.49	0/2475
4	R	0.28	0/1837	0.49	0/2475
5	E	0.29	0/1800	0.49	0/2433
5	S	0.28	0/1800	0.49	0/2433
6	F	0.29	0/1932	0.47	0/2609
6	T	0.29	0/1932	0.47	0/2609
7	G	0.29	0/1945	0.49	0/2634
7	U	0.29	0/1945	0.48	0/2634
8	H	0.30	0/1715	0.50	0/2326
8	V	0.31	0/1715	0.49	0/2326
9	I	0.30	0/1611	0.50	0/2174
9	W	0.29	0/1611	0.49	0/2174
10	J	0.28	0/1589	0.50	0/2142
10	X	0.28	0/1589	0.49	0/2142
11	K	0.29	0/1681	0.50	0/2274
11	Y	0.29	0/1681	0.50	0/2274
12	L	0.34	0/1795	0.49	0/2420
12	Z	0.29	0/1795	0.49	0/2420
13	M	0.29	0/1855	0.53	0/2514
13	a	0.29	0/1855	0.53	0/2514
14	N	0.49	0/1541	0.51	0/2087
14	b	0.34	0/1541	0.50	1/2087 (0.0%)
15	c	2.22	1/13 (7.7%)	1.86	1/18 (5.6%)
15	d	3.15	2/13 (15.4%)	1.56	0/18
15	e	2.98	1/13 (7.7%)	1.51	0/18
15	f	1.95	1/13 (7.7%)	2.06	1/18 (5.6%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
15	g	2.99	1/13 (7.7%)	1.91	0/18
15	h	1.93	1/13 (7.7%)	0.82	0/18
All	All	0.32	7/50272 (0.0%)	0.50	3/67976 (0.0%)

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	g	2	PRO	CA-C	-8.50	1.35	1.52
15	e	2	PRO	CA-C	-8.37	1.36	1.52
15	d	2	PRO	CA-C	-8.35	1.36	1.52
15	c	2	PRO	CA-C	-6.64	1.39	1.52
15	f	2	PRO	CA-C	-6.31	1.40	1.52
15	h	2	PRO	CA-C	-6.04	1.40	1.52
15	d	2	PRO	N-CD	-5.11	1.40	1.47

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	f	2	PRO	CA-N-CD	-6.69	102.13	111.50
15	c	2	PRO	CA-N-CD	-5.73	103.48	111.50
14	b	1	THR	N-CA-C	5.21	125.06	111.00

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	3	0
1	O	1915	0	1929	5	0
2	B	1904	0	1904	7	0
2	P	1904	0	1904	7	0
3	C	1881	0	1895	8	0
3	Q	1881	0	1895	9	0
4	D	1813	0	1797	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	R	1813	0	1797	5	0
5	E	1773	0	1775	5	0
5	S	1773	0	1775	5	0
6	F	1892	0	1883	1	0
6	T	1892	0	1883	2	0
7	G	1907	0	1901	3	0
7	U	1907	0	1901	4	0
8	H	1684	0	1685	8	0
8	V	1684	0	1685	6	0
9	I	1581	0	1574	9	0
9	W	1581	0	1574	7	0
10	J	1561	0	1569	9	0
10	X	1561	0	1569	9	0
11	K	1644	0	1592	4	0
11	Y	1644	0	1592	4	0
12	L	1757	0	1711	3	0
12	Z	1757	0	1711	4	0
13	M	1824	0	1832	2	0
13	a	1824	0	1832	0	0
14	N	1512	0	1479	4	0
14	b	1512	0	1478	0	0
15	c	27	0	31	0	0
15	d	27	0	31	0	0
15	e	27	0	31	0	0
15	f	27	0	32	0	0
15	g	27	0	31	0	0
15	h	27	0	31	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
17	N	1	0	0	0	0
17	U	1	0	0	0	0
17	b	1	0	0	0	0
18	K	12	0	13	0	0
18	Y	12	0	13	0	0
19	A	17	0	0	0	0
19	B	15	0	0	0	0
19	C	12	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
19	D	7	0	0	0	0
19	E	9	0	0	1	0
19	F	18	0	0	0	0
19	G	22	0	0	0	0
19	H	21	0	0	0	0
19	I	16	0	0	0	0
19	J	23	0	0	0	0
19	K	17	0	0	0	0
19	L	21	0	0	0	0
19	M	20	0	0	0	0
19	N	15	0	0	0	0
19	O	12	0	0	0	0
19	P	6	0	0	0	0
19	Q	9	0	0	0	0
19	R	9	0	0	0	0
19	S	3	0	0	0	0
19	T	8	0	0	0	0
19	U	18	0	0	0	0
19	V	12	0	0	0	0
19	W	16	0	0	0	0
19	X	22	0	0	0	0
19	Y	16	0	0	0	0
19	Z	17	0	0	1	0
19	a	20	0	0	0	0
19	b	18	0	0	0	0
19	c	1	0	0	0	0
19	d	1	0	0	0	0
19	e	2	0	0	0	0
19	f	1	0	0	0	0
19	g	1	0	0	0	0
19	h	2	0	0	0	0
All	All	49920	0	49264	116	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 (116) 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:20:SER:OG	8:V:28:ASP:HB3	1.74	0.87
8:H:50:ALA:HB3	9:I:126:ILE:HD12	1.66	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:X:1:MET:O	10:X:2:ASP:HB2	1.87	0.75
10:J:1:MET:O	10:J:2:ASP:HB2	1.86	0.72
12:L:13:LEU:HD13	12:L:150:LEU:HD21	1.74	0.69
12:Z:13:LEU:HD13	12:Z:150:LEU:HD21	1.75	0.69
8:V:20:SER:HG	8:V:28:ASP:HB3	1.58	0.68
4:D:99:ILE:HD11	4:D:104:LEU:HB2	1.77	0.67
11:K:100:MET:HE3	11:K:127:PHE:HB2	1.78	0.66
4:R:99:ILE:HD11	4:R:104:LEU:HB2	1.76	0.66
14:N:8:PHE:HB2	14:N:146:MET:O	1.98	0.63
11:Y:100:MET:HE3	11:Y:127:PHE:HB2	1.83	0.59
3:Q:51:LYS:O	3:Q:52:LEU:HB2	2.04	0.58
3:C:51:LYS:O	3:C:52:LEU:HB2	2.04	0.58
11:Y:5:ALA:HB3	11:Y:100:MET:HE2	1.85	0.58
1:O:122:THR:HG22	2:P:128:ARG:HH21	1.71	0.55
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.71	0.55
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.71	0.55
8:H:50:ALA:CB	9:I:126:ILE:HD12	2.36	0.54
7:G:23:PHE:O	7:G:26:THR:HB	2.07	0.54
11:K:100:MET:CE	11:K:127:PHE:HB2	2.38	0.54
7:U:23:PHE:O	7:U:26:THR:HB	2.08	0.54
9:W:98:ARG:O	9:W:126:ILE:HD11	2.08	0.54
11:Y:100:MET:CE	11:Y:127:PHE:HB2	2.38	0.53
11:K:5:ALA:HB3	11:K:100:MET:HE2	1.91	0.52
14:N:152:VAL:HA	14:N:175:MET:HE1	1.92	0.52
10:J:1:MET:O	10:J:2:ASP:CB	2.58	0.51
10:X:1:MET:O	10:X:2:ASP:CB	2.58	0.51
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.93	0.51
9:W:36:SER:HB2	10:X:126:VAL:HG11	1.93	0.51
8:H:50:ALA:HB3	9:I:126:ILE:CD1	2.38	0.51
10:J:174:MET:HA	10:X:174:MET:HA	1.92	0.51
5:E:12:PHE:H	6:F:19:GLN:HE22	1.57	0.50
8:V:20:SER:OG	8:V:28:ASP:CB	2.54	0.50
1:A:122:THR:HG22	2:B:128:ARG:HH21	1.76	0.50
5:S:12:PHE:H	6:T:19:GLN:HE22	1.58	0.50
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.93	0.50
3:C:201:VAL:HG13	3:C:202:GLN:N	2.27	0.49
2:P:124:HIS:HB3	3:Q:124:VAL:HG12	1.94	0.49
8:H:52:THR:O	8:H:56:THR:HB	2.13	0.49
9:I:20:VAL:HG13	9:I:118:PRO:HB3	1.95	0.49
9:W:20:VAL:HG13	9:W:118:PRO:HB3	1.95	0.49
3:Q:201:VAL:HG13	3:Q:202:GLN:N	2.28	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.61	0.48
3:C:201:VAL:O	3:C:202:GLN:CB	2.61	0.48
8:V:22:GLN:HG2	8:V:27:ALA:HB2	1.94	0.48
9:I:10:ILE:HG21	9:I:141:ALA:HB3	1.96	0.48
2:B:124:HIS:HB3	3:C:124:VAL:HG12	1.94	0.48
3:Q:201:VAL:O	3:Q:202:GLN:HB2	2.13	0.48
3:C:201:VAL:O	3:C:202:GLN:HB2	2.13	0.48
12:L:8:ASN:HA	12:L:30:ILE:O	2.14	0.47
6:T:228:LYS:HE3	6:T:228:LYS:HB2	1.71	0.47
8:V:52:THR:O	8:V:56:THR:HB	2.13	0.47
11:Y:53:GLN:O	11:Y:57:THR:HG23	2.15	0.47
4:D:88:ALA:HA	4:D:99:ILE:HG21	1.96	0.47
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.97	0.47
9:W:10:ILE:HG21	9:W:141:ALA:HB3	1.95	0.47
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.95	0.47
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.97	0.47
5:E:174:THR:HG21	19:E:301:HOH:O	2.15	0.47
11:K:53:GLN:O	11:K:57:THR:HG23	2.16	0.47
4:R:88:ALA:HA	4:R:99:ILE:HG21	1.96	0.46
2:P:151:ASN:HB2	2:P:152:PRO:HD2	1.98	0.46
2:B:146:GLN:HG2	3:C:57:ILE:HG21	1.97	0.46
2:B:151:ASN:HB2	2:B:152:PRO:HD2	1.98	0.46
9:I:9:GLY:HA3	9:I:41:LYS:HE2	1.98	0.46
12:Z:8:ASN:HA	12:Z:30:ILE:O	2.15	0.46
5:S:87:LEU:HD21	5:S:107:ALA:HB1	1.98	0.45
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.99	0.45
4:R:159:TYR:CE2	5:S:56:SER:HB3	2.51	0.45
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.47	0.45
2:B:93:HIS:HB3	2:B:113:ARG:HH21	1.82	0.45
5:E:87:LEU:HD21	5:E:107:ALA:HB1	1.98	0.44
1:O:149:GLN:O	1:O:156:TYR:HA	2.17	0.44
2:P:93:HIS:HB3	2:P:113:ARG:HH21	1.82	0.44
3:Q:11:PRO:HA	4:R:18:TYR:CD1	2.53	0.44
12:Z:147:MET:N	12:Z:148:PRO:HD2	2.32	0.44
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.47	0.44
13:M:127:LEU:HG	13:M:142:LEU:HD12	2.00	0.44
12:L:147:MET:N	12:L:148:PRO:HD2	2.32	0.44
5:E:9:THR:HG21	5:E:119:THR:HA	2.00	0.44
8:H:20:SER:OG	8:H:28:ASP:HB3	2.17	0.44
1:O:119:GLN:O	1:O:122:THR:HB	2.18	0.44
5:S:9:THR:HG21	5:S:119:THR:HA	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:149:GLN:O	1:A:156:TYR:HA	2.18	0.43
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.53	0.43
3:Q:9:PHE:H	4:R:15:GLN:HE22	1.66	0.43
8:H:50:ALA:HB2	9:I:128:CYS:HB2	2.01	0.43
1:A:119:GLN:O	1:A:122:THR:HB	2.18	0.43
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.43
7:G:78:ILE:N	7:G:79:PRO:CD	2.82	0.43
10:J:1:MET:HA	10:J:34:LYS:HE3	2.01	0.42
10:J:67:TYR:CE1	10:J:75:LEU:HD13	2.55	0.42
1:O:14:PRO:HA	2:P:23:TYR:CD1	2.55	0.42
7:U:26:THR:HG21	7:U:131:ILE:HD12	2.02	0.42
10:X:119:ILE:HG12	10:X:125:LYS:HG3	2.01	0.42
10:J:119:ILE:HG12	10:J:125:LYS:HG3	2.01	0.42
9:I:20:VAL:HG23	9:I:189:ILE:HB	2.01	0.42
10:X:67:TYR:CE1	10:X:75:LEU:HD13	2.55	0.41
13:M:27:LEU:HD21	13:M:34:LEU:HD22	2.02	0.41
10:J:1:MET:HA	10:J:34:LYS:CE	2.50	0.41
2:B:180:LYS:O	2:B:183:MET:HB2	2.21	0.41
5:E:175:LEU:HA	5:E:178:PHE:CE2	2.56	0.41
9:W:20:VAL:HG23	9:W:189:ILE:HB	2.02	0.41
5:S:175:LEU:HA	5:S:178:PHE:CE2	2.56	0.41
10:X:1:MET:HA	10:X:34:LYS:CE	2.50	0.41
12:Z:108:HIS:HB3	19:Z:414:HOH:O	2.21	0.41
7:G:26:THR:HG21	7:G:131:ILE:HD12	2.02	0.41
10:X:1:MET:HA	10:X:34:LYS:HE3	2.02	0.41
8:H:84:LYS:HG3	8:H:85:GLN:N	2.36	0.41
9:W:101:PRO:HB3	9:W:126:ILE:HD12	2.03	0.41
14:N:8:PHE:CE2	14:N:10:ASP:HB2	2.56	0.40
3:C:169:VAL:HG23	3:C:196:SER:HB2	2.03	0.40
2:P:180:LYS:O	2:P:183:MET:HB2	2.21	0.40
3:Q:169:VAL:HG23	3:Q:196:SER:HB2	2.03	0.40
14:N:14:LEU:HB3	14:N:34:LEU:HD22	2.03	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%)	241 (97%)	6 (2%)	1 (0%)	34	60
1	O	248/250 (99%)	241 (97%)	6 (2%)	1 (0%)	34	60
2	B	242/258 (94%)	234 (97%)	7 (3%)	1 (0%)	34	60
2	P	242/258 (94%)	234 (97%)	7 (3%)	1 (0%)	34	60
3	C	238/254 (94%)	229 (96%)	6 (2%)	3 (1%)	12	30
3	Q	238/254 (94%)	229 (96%)	6 (2%)	3 (1%)	12	30
4	D	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
4	R	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
5	E	229/234 (98%)	224 (98%)	5 (2%)	0	100	100
5	S	229/234 (98%)	224 (98%)	5 (2%)	0	100	100
6	F	241/288 (84%)	234 (97%)	7 (3%)	0	100	100
6	T	241/288 (84%)	234 (97%)	7 (3%)	0	100	100
7	G	239/252 (95%)	235 (98%)	4 (2%)	0	100	100
7	U	239/252 (95%)	236 (99%)	3 (1%)	0	100	100
8	H	220/232 (95%)	212 (96%)	8 (4%)	0	100	100
8	V	220/232 (95%)	212 (96%)	8 (4%)	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%)	29	54
10	X	193/198 (98%)	188 (97%)	4 (2%)	1 (0%)	29	54
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%)	216 (98%)	4 (2%)	0	100	100
12	Z	220/222 (99%)	216 (98%)	4 (2%)	0	100	100
13	M	231/246 (94%)	224 (97%)	7 (3%)	0	100	100
13	a	231/246 (94%)	224 (97%)	7 (3%)	0	100	100
14	N	194/196 (99%)	185 (95%)	9 (5%)	0	100	100
14	b	194/196 (99%)	188 (97%)	6 (3%)	0	100	100
15	c	2/5 (40%)	1 (50%)	0	1 (50%)	0	0

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
15	d	2/5 (40%)	2 (100%)	0	0	100	100
15	e	2/5 (40%)	2 (100%)	0	0	100	100
15	f	2/5 (40%)	1 (50%)	0	1 (50%)	0	0
15	g	2/5 (40%)	1 (50%)	0	1 (50%)	0	0
15	h	2/5 (40%)	2 (100%)	0	0	100	100
All	All	6288/6644 (95%)	6115 (97%)	158 (2%)	15 (0%)	47	73

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
3	C	202	GLN
10	J	2	ASP
2	P	51	VAL
3	Q	202	GLN
10	X	2	ASP
15	c	2	PRO
15	f	2	PRO
3	C	205	ALA
3	Q	205	ALA
1	A	3	ASP
1	O	3	ASP
15	g	2	PRO
3	Q	183	PRO
3	C	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%)	206 (99%)	3 (1%)	67	86
1	O	209/209 (100%)	206 (99%)	3 (1%)	67	86
2	B	203/216 (94%)	195 (96%)	8 (4%)	32	61

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	P	203/216 (94%)	195 (96%)	8 (4%)	32	61
3	C	212/226 (94%)	204 (96%)	8 (4%)	33	62
3	Q	212/226 (94%)	204 (96%)	8 (4%)	33	62
4	D	194/215 (90%)	184 (95%)	10 (5%)	23	49
4	R	194/215 (90%)	184 (95%)	10 (5%)	23	49
5	E	190/193 (98%)	178 (94%)	12 (6%)	18	40
5	S	190/193 (98%)	179 (94%)	11 (6%)	20	43
6	F	201/239 (84%)	189 (94%)	12 (6%)	19	42
6	T	201/239 (84%)	189 (94%)	12 (6%)	19	42
7	G	206/210 (98%)	199 (97%)	7 (3%)	37	66
7	U	206/210 (98%)	198 (96%)	8 (4%)	32	61
8	H	181/190 (95%)	173 (96%)	8 (4%)	28	56
8	V	181/190 (95%)	173 (96%)	8 (4%)	28	56
9	I	172/173 (99%)	166 (96%)	6 (4%)	36	65
9	W	172/173 (99%)	167 (97%)	5 (3%)	42	71
10	J	173/175 (99%)	167 (96%)	6 (4%)	36	65
10	X	173/175 (99%)	167 (96%)	6 (4%)	36	65
11	K	169/169 (100%)	164 (97%)	5 (3%)	41	70
11	Y	169/169 (100%)	164 (97%)	5 (3%)	41	70
12	L	185/185 (100%)	177 (96%)	8 (4%)	29	57
12	Z	185/185 (100%)	177 (96%)	8 (4%)	29	57
13	M	199/208 (96%)	191 (96%)	8 (4%)	31	60
13	a	199/208 (96%)	191 (96%)	8 (4%)	31	60
14	N	162/162 (100%)	158 (98%)	4 (2%)	47	76
14	b	162/162 (100%)	158 (98%)	4 (2%)	47	76
15	c	1/1 (100%)	1 (100%)	0	100	100
15	d	1/1 (100%)	0	1 (100%)	0	0
15	e	1/1 (100%)	0	1 (100%)	0	0
15	f	1/1 (100%)	0	1 (100%)	0	0
15	g	1/1 (100%)	0	1 (100%)	0	0
15	h	1/1 (100%)	1 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	5318/5546 (96%)	5105 (96%)	213 (4%)	31 60

All (213) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	LYS
1	A	61	LEU
1	A	157	PHE
2	B	50	LYS
2	B	52	THR
2	B	54	THR
2	B	55	LEU
2	B	58	GLN
2	B	79	LEU
2	B	114	LEU
2	B	191	LEU
3	C	4	ARG
3	C	38	ASN
3	C	61	LYS
3	C	147	GLN
3	C	160	GLN
3	C	169	VAL
3	C	180	LYS
3	C	203	THR
4	D	20	LEU
4	D	40	LEU
4	D	51	LEU
4	D	99	ILE
4	D	117	GLU
4	D	176	LEU
4	D	193	LEU
4	D	214	ILE
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	10	VAL
5	E	25	LEU
5	E	29	LYS
5	E	54	GLU
5	E	55	LEU
5	E	71	LEU
5	E	116	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	E	184	ASN
5	E	188	LEU
5	E	207	VAL
5	E	231	LYS
6	F	14	ASP
6	F	59	LYS
6	F	117	GLN
6	F	123	ASN
6	F	139	LYS
6	F	172	LEU
6	F	181	GLU
6	F	203	ASN
6	F	206	LYS
6	F	214	TRP
6	F	221	ASN
6	F	228	LYS
7	G	83	ASN
7	G	115	LEU
7	G	125	MET
7	G	166	GLN
7	G	181	LYS
7	G	235	ARG
7	G	236	LEU
8	H	22	GLN
8	H	30	ASN
8	H	34	LEU
8	H	43	CYS
8	H	56	THR
8	H	68	LEU
8	H	127	LEU
8	H	196	ARG
9	I	37	ASN
9	I	126	ILE
9	I	171	LEU
9	I	182	TRP
9	I	191	LYS
9	I	192	ASP
10	J	23	ARG
10	J	35	THR
10	J	75	LEU
10	J	78	GLN
10	J	144	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	J	174	MET
11	K	4	LEU
11	K	9	GLN
11	K	35	ILE
11	K	106	ARG
11	K	118	ASP
12	L	1	GLN
12	L	13	LEU
12	L	23	LEU
12	L	49	ASN
12	L	106	TYR
12	L	136	CYS
12	L	150	LEU
12	L	167	LYS
13	M	43	ILE
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	161	ARG
13	M	187	ARG
13	M	212	LEU
13	M	223	LYS
14	N	9	LYS
14	N	36	ARG
14	N	104	ASP
14	N	119	VAL
1	O	17	LYS
1	O	61	LEU
1	O	157	PHE
2	P	50	LYS
2	P	52	THR
2	P	54	THR
2	P	55	LEU
2	P	58	GLN
2	P	79	LEU
2	P	114	LEU
2	P	191	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	61	LYS
3	Q	147	GLN
3	Q	160	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	Q	169	VAL
3	Q	180	LYS
3	Q	203	THR
4	R	20	LEU
4	R	40	LEU
4	R	51	LEU
4	R	99	ILE
4	R	117	GLU
4	R	176	LEU
4	R	193	LEU
4	R	214	ILE
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	10	VAL
5	S	25	LEU
5	S	29	LYS
5	S	54	GLU
5	S	55	LEU
5	S	71	LEU
5	S	184	ASN
5	S	188	LEU
5	S	207	VAL
5	S	231	LYS
6	T	14	ASP
6	T	59	LYS
6	T	117	GLN
6	T	123	ASN
6	T	139	LYS
6	T	172	LEU
6	T	181	GLU
6	T	203	ASN
6	T	206	LYS
6	T	214	TRP
6	T	221	ASN
6	T	228	LYS
7	U	83	ASN
7	U	115	LEU
7	U	125	MET
7	U	154	TYR
7	U	166	GLN
7	U	181	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	U	235	ARG
7	U	236	LEU
8	V	22	GLN
8	V	30	ASN
8	V	34	LEU
8	V	43	CYS
8	V	56	THR
8	V	68	LEU
8	V	127	LEU
8	V	196	ARG
9	W	37	ASN
9	W	171	LEU
9	W	182	TRP
9	W	191	LYS
9	W	192	ASP
10	X	23	ARG
10	X	35	THR
10	X	75	LEU
10	X	78	GLN
10	X	144	LEU
10	X	174	MET
11	Y	4	LEU
11	Y	9	GLN
11	Y	35	ILE
11	Y	106	ARG
11	Y	118	ASP
12	Z	1	GLN
12	Z	13	LEU
12	Z	23	LEU
12	Z	49	ASN
12	Z	106	TYR
12	Z	136	CYS
12	Z	150	LEU
12	Z	167	LYS
13	a	43	ILE
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	161	ARG
13	a	187	ARG
13	a	212	LEU
13	a	223	LYS

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Mol	Chain	Res	Type
14	b	9	LYS
14	b	36	ARG
14	b	104	ASP
14	b	119	VAL
15	d	2	PRO
15	e	2	PRO
15	f	2	PRO
15	g	2	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (98) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	HIS
2	B	20	GLN
2	B	95	GLN
2	B	119	GLN
2	B	123	GLN
2	B	155	ASN
2	B	176	GLN
3	C	38	ASN
3	C	77	ASN
3	C	147	GLN
3	C	160	GLN
4	D	15	GLN
4	D	146	GLN
4	D	225	ASN
5	E	59	GLN
5	E	68	HIS
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	120	GLN
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	83	ASN
7	G	114	ASN
7	G	117	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	G	121	GLN
7	G	167	GLN
7	G	175	ASN
8	H	22	GLN
8	H	57	GLN
8	H	66	HIS
10	J	55	GLN
11	K	85	ASN
11	K	176	ASN
12	L	1	GLN
12	L	3	ASN
12	L	49	ASN
12	L	70	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	95	GLN
2	P	119	GLN
2	P	123	GLN
2	P	176	GLN
3	Q	38	ASN
3	Q	77	ASN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	146	GLN
4	R	225	ASN
5	S	59	GLN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN
5	S	120	GLN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN

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Mol	Chain	Res	Type
6	T	117	GLN
6	T	191	GLN
6	T	240	GLN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	167	GLN
7	U	175	ASN
8	V	57	GLN
8	V	66	HIS
10	X	55	GLN
10	X	86	GLN
11	Y	85	ASN
11	Y	176	ASN
12	Z	3	ASN
12	Z	49	ASN
12	Z	70	ASN
12	Z	165	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 [i](#)

There are no RNA molecules in this entry.

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

6 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	DCL	e	4	15,14	7,7,7	0.96	0	6,8,8	1.53	1 (16%)
15	DCL	g	4	15,11	7,7,7	0.78	0	6,8,8	1.24	1 (16%)
15	DCL	h	4	15,14	7,7,7	0.95	1 (14%)	6,8,8	1.12	0
15	DCL	c	4	15,8	7,7,7	0.44	0	6,8,8	1.56	1 (16%)
15	DCL	f	4	15,8	7,7,7	0.29	0	6,8,8	1.20	1 (16%)
15	DCL	d	4	15,11	7,7,7	0.79	0	6,8,8	0.93	0

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	DCL	e	4	15,14	-	4/6/6/6	-
15	DCL	g	4	15,11	-	3/6/6/6	-
15	DCL	h	4	15,14	-	3/6/6/6	-
15	DCL	c	4	15,8	-	4/6/6/6	-
15	DCL	f	4	15,8	-	3/6/6/6	-
15	DCL	d	4	15,11	-	2/6/6/6	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	h	4	DCL	C-CA	2.13	1.55	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	c	4	DCL	CB-CA-C	-3.27	106.43	111.79
15	e	4	DCL	CB-CA-C	-3.15	106.63	111.79
15	f	4	DCL	CB-CA-C	-2.31	108.00	111.79
15	g	4	DCL	CB-CA-C	-2.17	108.22	111.79

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
15	c	4	DCL	N-CA-CB-CG
15	c	4	DCL	C-CA-CB-CG

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Mol	Chain	Res	Type	Atoms
15	d	4	DCL	N-CA-CB-CG
15	d	4	DCL	C-CA-CB-CG
15	e	4	DCL	N-CA-CB-CG
15	e	4	DCL	C-CA-CB-CG
15	f	4	DCL	N-CA-CB-CG
15	f	4	DCL	C-CA-CB-CG
15	g	4	DCL	N-CA-CB-CG
15	g	4	DCL	C-CA-CB-CG
15	h	4	DCL	N-CA-CB-CG
15	h	4	DCL	C-CA-CB-CG
15	e	4	DCL	CA-CB-CG-CD2
15	c	4	DCL	CA-CB-CG-CD2
15	e	4	DCL	CA-CB-CG-CD1
15	h	4	DCL	CA-CB-CG-CD2
15	f	4	DCL	CA-CB-CG-CD2
15	g	4	DCL	CA-CB-CG-CD2
15	c	4	DCL	CA-CB-CG-CD1

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 11 are monoatomic - leaving 2 for Mogul analysis.

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	$\# Z  > 2$
18	MES	K	302	-	12,12,12	2.24	1 (8%)	14,16,16	1.32	2 (14%)
18	MES	Y	301	-	12,12,12	2.22	1 (8%)	14,16,16	1.31	2 (14%)

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
18	MES	K	302	-	-	0/6/14/14	0/1/1/1
18	MES	Y	301	-	-	0/6/14/14	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	K	302	MES	C8-S	-7.49	1.66	1.77
18	Y	301	MES	C8-S	-7.42	1.67	1.77

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	K	302	MES	O3S-S-C8	2.81	110.31	105.77
18	Y	301	MES	O3S-S-C8	2.74	110.19	105.77
18	Y	301	MES	O2S-S-C8	2.67	110.13	106.92
18	K	302	MES	O2S-S-C8	2.43	109.84	106.92

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%)	-0.30	5 (2%) 65 67	41, 54, 86, 127	0
1	O	250/250 (100%)	-0.21	6 (2%) 59 60	46, 61, 100, 131	0
2	B	244/258 (94%)	-0.16	12 (4%) 29 28	41, 58, 107, 163	0
2	P	244/258 (94%)	-0.11	14 (5%) 23 22	45, 62, 111, 165	0
3	C	240/254 (94%)	-0.08	17 (7%) 16 14	42, 61, 124, 153	0
3	Q	240/254 (94%)	0.15	17 (7%) 16 14	49, 74, 150, 189	0
4	D	235/260 (90%)	-0.29	2 (0%) 84 85	45, 64, 97, 139	0
4	R	235/260 (90%)	-0.25	4 (1%) 70 72	48, 66, 101, 141	0
5	E	231/234 (98%)	-0.16	8 (3%) 44 44	49, 69, 99, 140	0
5	S	231/234 (98%)	-0.11	12 (5%) 27 25	48, 72, 108, 143	0
6	F	243/288 (84%)	-0.32	9 (3%) 41 41	44, 62, 108, 134	0
6	T	243/288 (84%)	-0.21	11 (4%) 33 31	42, 67, 113, 148	0
7	G	241/252 (95%)	-0.34	7 (2%) 51 52	39, 54, 94, 146	0
7	U	241/252 (95%)	-0.31	6 (2%) 57 59	44, 56, 88, 132	0
8	H	222/232 (95%)	-0.32	3 (1%) 75 77	41, 53, 79, 114	0
8	V	222/232 (95%)	-0.32	2 (0%) 84 85	43, 57, 80, 120	0
9	I	204/205 (99%)	-0.56	2 (0%) 82 83	38, 50, 76, 101	0
9	W	204/205 (99%)	-0.52	2 (0%) 82 83	40, 53, 79, 104	0
10	J	195/198 (98%)	-0.48	2 (1%) 82 83	40, 51, 76, 122	0
10	X	195/198 (98%)	-0.44	3 (1%) 73 76	43, 53, 77, 130	0
11	K	212/212 (100%)	-0.49	1 (0%) 91 92	39, 52, 76, 92	0
11	Y	212/212 (100%)	-0.49	3 (1%) 75 77	41, 52, 80, 102	0
12	L	222/222 (100%)	-0.46	0 100 100	41, 55, 76, 98	0
12	Z	222/222 (100%)	-0.47	0 100 100	41, 54, 78, 103	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
13	M	233/246 (94%)	-0.50	3 (1%) 77 78	38, 53, 73, 86	0
13	a	233/246 (94%)	-0.50	1 (0%) 92 93	39, 51, 71, 81	0
14	N	196/196 (100%)	-0.58	1 (0%) 91 92	37, 48, 74, 102	0
14	b	196/196 (100%)	-0.53	2 (1%) 82 83	38, 48, 74, 95	0
15	c	2/5 (40%)	1.23	0 100 100	80, 80, 80, 86	0
15	d	2/5 (40%)	-0.42	0 100 100	77, 77, 77, 83	0
15	e	2/5 (40%)	-0.60	0 100 100	61, 61, 61, 71	0
15	f	2/5 (40%)	3.21	2 (100%) 0 0	85, 85, 85, 88	0
15	g	2/5 (40%)	-0.34	0 100 100	74, 74, 74, 81	0
15	h	2/5 (40%)	-0.08	0 100 100	66, 66, 66, 76	0
All	All	6348/6644 (95%)	-0.32	157 (2%) 57 59	37, 57, 98, 189	0

All (157) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	218	GLY	8.7
1	A	1	MET	7.5
3	Q	49	THR	7.3
3	Q	50	LEU	6.6
3	C	206	LYS	6.5
3	Q	206	LYS	6.5
2	P	219	ALA	5.7
1	O	1	MET	5.5
2	B	219	ALA	5.3
2	P	218	GLY	5.3
5	E	202	ASP	5.2
10	X	1	MET	5.2
5	S	202	ASP	5.1
2	P	220	ASN	4.8
10	J	1	MET	4.7
2	B	220	ASN	4.7
3	C	49	THR	4.7
3	Q	48	SER	4.4
2	P	59	ASP	4.4
1	O	249	ALA	4.4
3	Q	238	LYS	4.4
2	P	51	VAL	4.4
3	Q	236	GLN	4.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
3	Q	51	LYS	4.2
15	f	3	ALA	4.2
8	V	222	ASP	4.2
10	X	194	ASP	4.2
13	a	1	THR	3.9
3	C	238	LYS	3.8
4	R	241	ALA	3.8
13	M	1	THR	3.7
6	T	181	GLU	3.7
2	P	221	ASP	3.7
4	D	242	GLU	3.7
10	J	194	ASP	3.7
3	Q	205	ALA	3.7
3	C	180	LYS	3.6
5	S	180	LYS	3.6
13	M	47	ASP	3.5
3	Q	225	GLU	3.5
7	U	222	ASP	3.5
1	A	250	LEU	3.5
2	B	242	GLY	3.5
3	C	50	LEU	3.5
2	B	51	VAL	3.4
3	Q	55	THR	3.4
3	Q	240	GLU	3.4
7	G	3	TYR	3.4
2	P	222	GLY	3.4
3	C	240	GLU	3.4
3	C	205	ALA	3.4
4	D	241	ALA	3.3
4	R	242	GLU	3.3
5	E	180	LYS	3.3
9	I	133	LYS	3.2
6	T	244	ASN	3.2
3	C	202	GLN	3.2
3	C	225	GLU	3.2
2	B	182	ASP	3.1
3	Q	239	GLN	3.1
11	Y	212	GLY	3.1
9	W	1	SER	3.1
9	W	133	LYS	3.1
5	E	233	ILE	3.1
3	C	236	GLN	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	P	52	THR	3.1
3	C	239	GLN	3.1
4	R	125	LEU	3.0
2	B	203	SER	3.0
6	T	243	ILE	3.0
5	S	3	ASN	3.0
1	O	248	GLU	2.9
8	H	221	CYS	2.9
2	B	217	LYS	2.9
3	C	235	GLU	2.9
6	F	181	GLU	2.9
2	B	221	ASP	2.9
7	U	2	GLY	2.9
14	b	105	LYS	2.8
5	S	233	ILE	2.8
1	A	249	ALA	2.8
6	F	201	GLU	2.8
8	H	222	ASP	2.7
5	E	123	GLY	2.7
7	U	242	GLN	2.7
1	O	201	GLU	2.7
6	T	241	LYS	2.7
6	T	215	CYS	2.6
7	U	241	GLU	2.6
8	V	221	CYS	2.6
9	I	1	SER	2.6
10	X	193	ASP	2.6
6	F	241	LYS	2.6
2	B	59	ASP	2.5
1	O	250	LEU	2.5
5	S	165	GLN	2.5
2	P	182	ASP	2.5
5	E	201	ARG	2.5
5	S	218	ASP	2.5
3	C	187	GLU	2.5
14	b	195	GLN	2.5
6	F	53	LYS	2.5
13	M	216	ASN	2.4
6	T	166	GLN	2.4
5	S	173	ARG	2.4
2	P	60	THR	2.4
11	Y	106	ARG	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	B	232	GLN	2.4
3	Q	141	ASP	2.4
7	U	3	TYR	2.4
6	T	2	THR	2.4
1	O	52	SER	2.4
14	N	195	GLN	2.4
1	A	201	GLU	2.4
2	P	225	TYR	2.3
5	E	122	TYR	2.3
11	K	212	GLY	2.3
1	A	248	GLU	2.3
5	S	194	GLU	2.3
6	T	205	GLU	2.3
3	Q	60	SER	2.3
6	F	205	GLU	2.3
8	H	198	GLU	2.3
6	T	204	LYS	2.3
4	R	169	GLU	2.3
5	S	201	ARG	2.3
5	S	30	GLN	2.3
2	P	50	LYS	2.3
6	F	182	GLY	2.3
3	Q	180	LYS	2.3
7	G	240	ALA	2.3
5	S	225	ASP	2.3
2	P	203	SER	2.2
7	G	241	GLU	2.2
3	Q	175	LYS	2.2
7	G	242	GLN	2.2
7	G	2	GLY	2.2
7	G	179	LYS	2.2
15	f	2	PRO	2.2
3	C	204	GLY	2.2
5	S	123	GLY	2.2
6	F	243	ILE	2.2
2	P	93	HIS	2.2
6	T	178	HIS	2.2
2	B	60	THR	2.2
6	F	202	ASP	2.1
3	C	175	LYS	2.1
5	E	173	ARG	2.1
3	C	1	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
3	C	181	GLU	2.1
7	G	237	VAL	2.1
3	Q	139	ARG	2.1
6	F	230	ASP	2.1
7	U	181	LYS	2.0
11	Y	202	GLU	2.0
5	E	227	GLU	2.0
6	T	53	LYS	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
15	DCL	f	4	8/8	0.83	0.30	87,91,96,98	0
15	DCL	c	4	8/8	0.88	0.24	80,87,88,89	0
15	DCL	g	4	8/8	0.90	0.23	71,85,91,94	0
15	DCL	d	4	8/8	0.92	0.23	72,84,87,89	0
15	DCL	e	4	8/8	0.92	0.22	64,71,73,73	0
15	DCL	h	4	8/8	0.92	0.22	65,77,81,81	0

## 6.3 Carbohydrates [i](#)

There are no monosaccharides 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(Å <sup>2</sup> )	Q<0.9
16	MG	G	301	1/1	0.87	0.19	62,62,62,62	0
16	MG	I	301	1/1	0.89	0.10	56,56,56,56	0
18	MES	Y	301	12/12	0.90	0.26	72,96,98,100	0
18	MES	K	302	12/12	0.92	0.22	76,94,100,101	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
16	MG	Z	301	1/1	0.94	0.12	57,57,57,57	0
17	CL	b	201	1/1	0.96	0.23	30,30,30,30	0
17	CL	G	302	1/1	0.96	0.21	30,30,30,30	0
17	CL	N	202	1/1	0.96	0.18	30,30,30,30	0
16	MG	I	302	1/1	0.97	0.05	60,60,60,60	0
16	MG	K	301	1/1	0.97	0.09	66,66,66,66	0
16	MG	N	201	1/1	0.98	0.12	55,55,55,55	0
17	CL	U	301	1/1	0.99	0.24	30,30,30,30	0
16	MG	L	301	1/1	0.99	0.06	67,67,67,67	0

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

There are no such residues in this entry.