



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:32 PM UTC

PDB ID : 9QAI / pdb\_00009qai  
Title : Yeast 20S proteasome mutant: beta5\_T3M in complex with MG132  
Authors : Huber, E.M.; Heinemeyer, W.; Groll, M.  
Deposited on : 2025-02-28  
Resolution : 2.80 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 : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

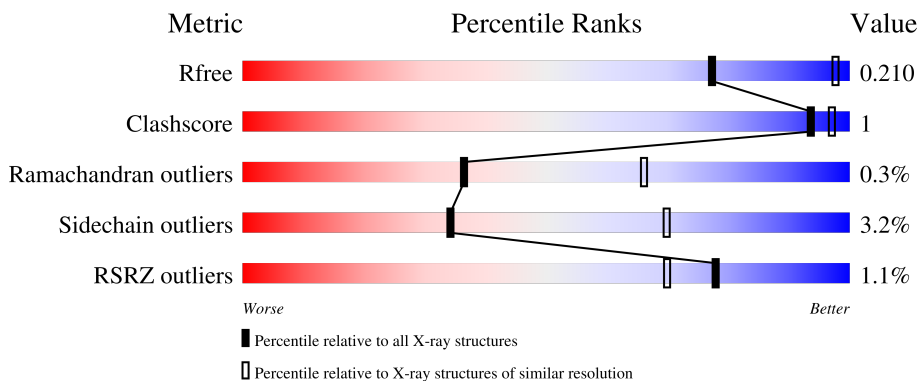
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	180053	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	 98%
1	O	250	 98%
2	B	258	 88% 6% 5%
2	P	258	 89% 5% 5%
3	C	254	 88% 6% 6%





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Mol	Chain	Length	Quality of chain
3	Q	254	4% 88% 6% • 6%
4	D	260	% 86% • 10%
4	R	260	86% • 10%
5	E	234	96% • •
5	S	234	96% • •
6	F	288	% 83% • 16%
6	T	288	% 83% • 16%
7	G	252	91% • •
7	U	252	90% 5% •
8	H	231	92% • • •
8	V	231	% 91% 5% • •
9	I	205	95% •
9	W	205	95% •
10	J	198	2% 90% 7% • •
10	X	198	2% 90% 7% • • •
11	K	211	88% 11% •
11	Y	211	89% 9% •
12	L	222	4% 95% 5%
12	Z	222	5% 95% 5%
13	M	246	% 88% 6% 6%
13	a	246	89% 5% • 5%
14	N	195	95% • •
14	b	195	96% • •
15	e	4	50% 50%
15	f	4	25% 75% 25%

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Mol	Chain	Length	Quality of chain
15	g	4	 75% 25%
15	h	4	 50% 50%
15	i	4	 25% 50% 25% 25%
15	j	4	 75% 25%

## 2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 49851 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 1915	C 1219	N 315	O 377	S 4	0	0	0
1	O	250	Total 1915	C 1219	N 315	O 377	S 4	0	0	0

- 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 1904	C 1201	N 321	O 379	S 3	0	0	0
2	P	244	Total 1904	C 1201	N 321	O 379	S 3	0	0	0

- 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 1881	C 1176	N 329	O 372	S 4	0	0	0
3	Q	240	Total 1881	C 1176	N 329	O 372	S 4	0	0	0

- 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 1813	C 1136	N 304	O 366	S 7	0	0	0
4	R	235	Total 1813	C 1136	N 304	O 366	S 7	0	0	0

- 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	Total 1773	C 1114	N 307	O 348	S 4	0	0	0
5	S	231	Total 1773	C 1114	N 307	O 348	S 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	Total 1892	C 1203	N 329	O 356	S 4	0	0	0
6	T	243	Total 1892	C 1203	N 329	O 356	S 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	Total 1907	C 1214	N 320	O 365	S 8	0	0	0
7	U	241	Total 1907	C 1214	N 320	O 365	S 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	225	Total 1712	C 1078	N 297	O 330	S 7	0	0	0
8	V	225	Total 1712	C 1078	N 297	O 330	S 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	Total 1581	C 1010	N 258	O 305	S 8	0	0	0
9	W	204	Total 1581	C 1010	N 258	O 305	S 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	Total 1561	C 992	N 264	O 299	S 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	211	1638	1042	279	309	8	0	0	0
11	Y	211	1638	1042	279	309	8	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	3	MET	THR	engineered mutation	UNP P30656
Y	3	MET	THR	engineered mutation	UNP P30656

- 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	231	1806	1142	309	348	7	0	0	0
13	a	233	1824	1154	312	351	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	195	1505	951	249	298	7	0	0	0
14	b	195	1505	951	249	298	7	0	0	0

- Molecule 15 is a protein called 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-C]PYRAZ

OLE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
15	e	4	Total 41	C 30	N 4	O 7	0	0	0
15	f	4	Total 41	C 30	N 4	O 7	0	0	0
15	g	4	Total 41	C 30	N 4	O 7	0	0	0
15	h	4	Total 41	C 30	N 4	O 7	0	0	0
15	i	4	Total 41	C 30	N 4	O 7	0	0	0
15	j	4	Total 41	C 30	N 4	O 7	0	0	0

- Molecule 16 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
16	G	1	Total 1	Mg 1	0	0
16	I	1	Total 1	Mg 1	0	0
16	J	1	Total 1	Mg 1	0	0
16	K	1	Total 1	Mg 1	0	0
16	M	1	Total 1	Mg 1	0	0
16	N	1	Total 1	Mg 1	0	0
16	V	1	Total 1	Mg 1	0	0
16	X	1	Total 1	Mg 1	0	0
16	Y	1	Total 1	Mg 1	0	0
16	Z	1	Total 1	Mg 1	0	0
16	b	1	Total 1	Mg 1	0	0

- Molecule 17 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 18 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
18	A	11	Total O 11 11	0	0
18	B	15	Total O 15 15	0	0
18	C	10	Total O 10 10	0	0
18	D	8	Total O 8 8	0	0
18	E	6	Total O 6 6	0	0
18	F	16	Total O 16 16	0	0
18	G	9	Total O 9 9	0	0
18	H	14	Total O 14 14	0	0
18	I	8	Total O 8 8	0	0
18	J	11	Total O 11 11	0	0
18	K	10	Total O 10 10	0	0
18	L	15	Total O 15 15	0	0
18	M	16	Total O 16 16	0	0
18	N	5	Total O 5 5	0	0
18	O	6	Total O 6 6	0	0
18	P	8	Total O 8 8	0	0

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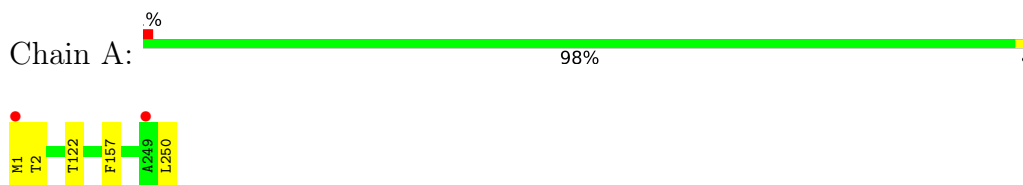
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
18	Q	8	Total O 8 8	0	0
18	R	3	Total O 3 3	0	0
18	S	5	Total O 5 5	0	0
18	T	11	Total O 11 11	0	0
18	U	14	Total O 14 14	0	0
18	V	6	Total O 6 6	0	0
18	W	7	Total O 7 7	0	0
18	X	9	Total O 9 9	0	0
18	Y	10	Total O 10 10	0	0
18	Z	14	Total O 14 14	0	0
18	a	12	Total O 12 12	0	0
18	b	11	Total O 11 11	0	0
18	f	1	Total O 1 1	0	0
18	g	1	Total O 1 1	0	0
18	i	2	Total O 2 2	0	0

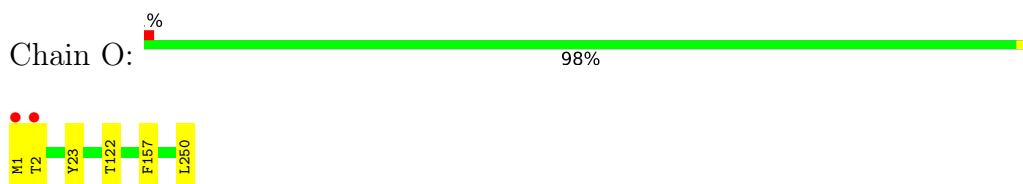
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

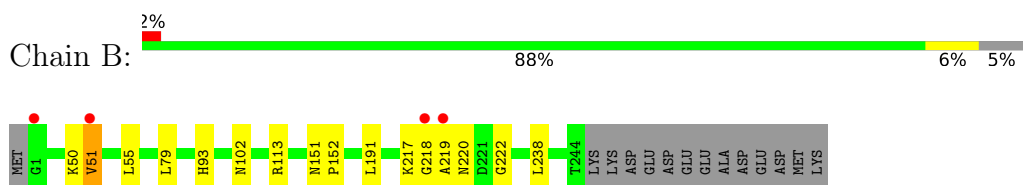
- Molecule 1: Proteasome subunit alpha type-2



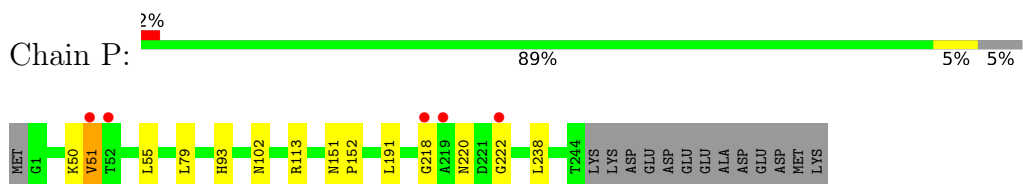
- Molecule 1: Proteasome subunit alpha type-2



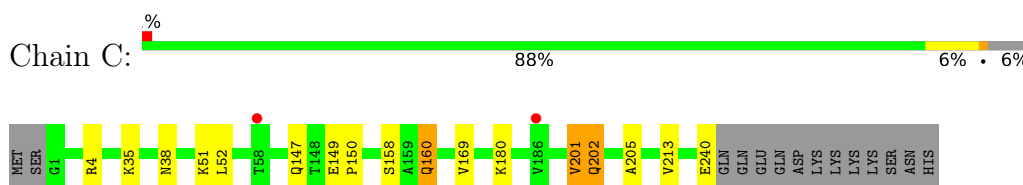
- Molecule 2: Proteasome subunit alpha type-3



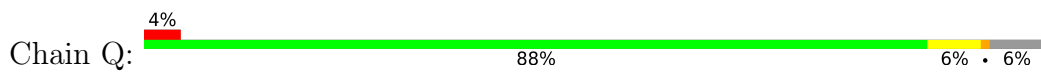
- Molecule 2: Proteasome subunit alpha type-3



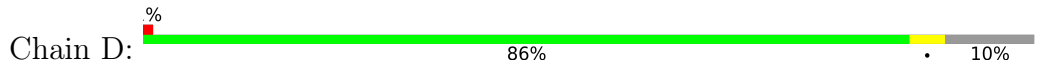
- Molecule 3: Proteasome subunit alpha type-4



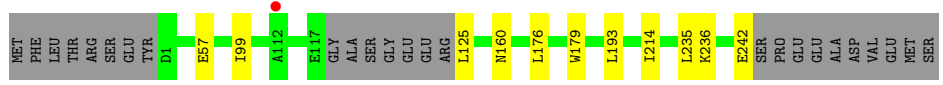
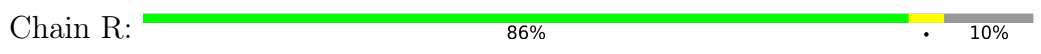
- Molecule 3: Proteasome subunit alpha type-4



• Molecule 4: Proteasome subunit alpha type-5



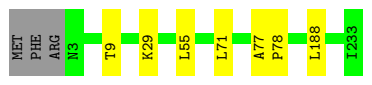
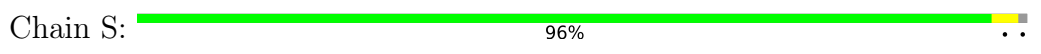
• Molecule 4: Proteasome subunit alpha type-5



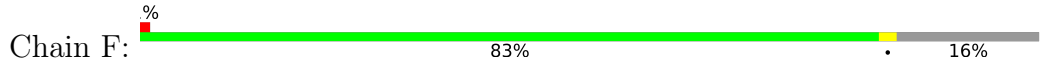
• Molecule 5: Proteasome subunit alpha type-6



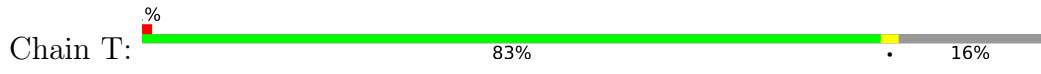
• Molecule 5: Proteasome subunit alpha type-6

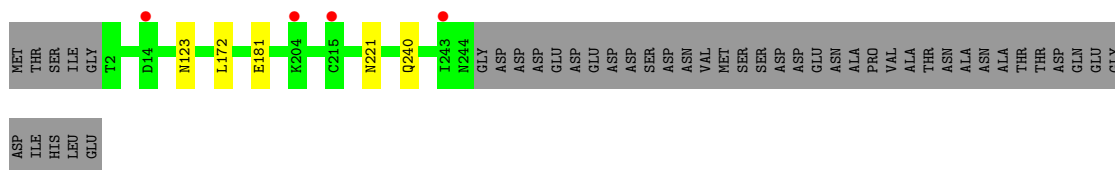


• Molecule 6: Probable proteasome subunit alpha type-7



• Molecule 6: Probable proteasome subunit alpha type-7





- Molecule 7: Proteasome subunit alpha type-1

Chain G: 91%



- Molecule 7: Proteasome subunit alpha type-1

Chain U: 90% 5%



- Molecule 8: Proteasome subunit beta type-2

Chain H: 92%



- Molecule 8: Proteasome subunit beta type-2

Chain V: 91% 5%



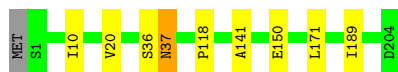
- Molecule 9: Proteasome subunit beta type-3

Chain I: 95%

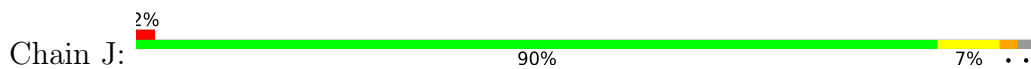


- Molecule 9: Proteasome subunit beta type-3

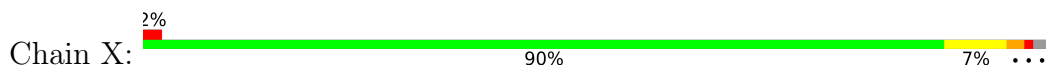
Chain W: 95%



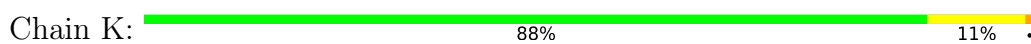
- Molecule 10: Proteasome subunit beta type-4



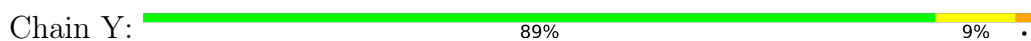
- Molecule 10: Proteasome subunit beta type-4



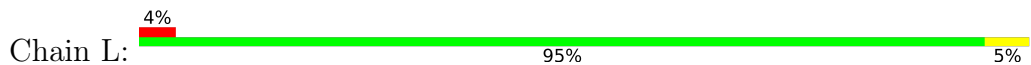
- Molecule 11: Proteasome subunit beta type-5



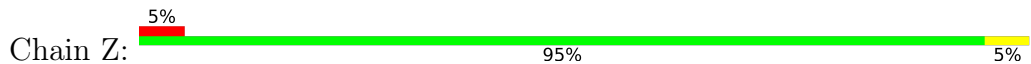
- Molecule 11: Proteasome subunit beta type-5



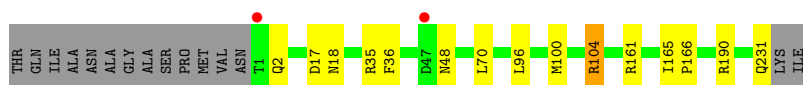
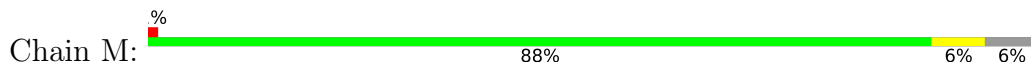
- Molecule 12: Proteasome subunit beta type-6




- Molecule 12: Proteasome subunit beta type-6

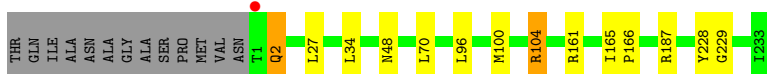


- Molecule 13: Proteasome subunit beta type-7



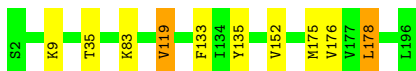
- Molecule 13: Proteasome subunit beta type-7

Chain a:  89% 5% • 5%



- Molecule 14: Proteasome subunit beta type-1

Chain N:  95% ..



- Molecule 14: Proteasome subunit beta type-1

Chain b:  96% ..




- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE

Chain e:  50% 50%



- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE

Chain f:  25% 75% 25%



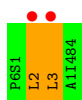
- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE

Chain g:  75% 25%

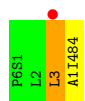


- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE

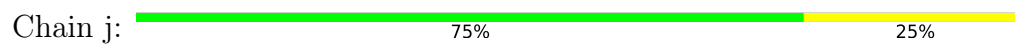
Chain h:  50% 50%



- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE



- Molecule 15: 3-PYRIDIN-4-YL-2,4-DIHYDRO-INDENO[1,2-.C.]PYRAZOLE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	136.13Å 300.28Å 145.70Å 90.00° 113.08° 90.00°	Depositor
Resolution (Å)	15.00 – 2.80 15.00 – 2.80	Depositor EDS
% Data completeness (in resolution range)	97.1 (15.00-2.80) 96.5 (15.00-2.80)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.23 (at 2.81Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.187 , 0.205 0.192 , 0.210	Depositor DCC
$R_{free}$ test set	12695 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	64.4	Xtrriage
Anisotropy	0.014	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 56.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	49851	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.43% 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: P6S, MG, CL, A1I48

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.39	0/1952	0.68	0/2642
1	O	0.39	0/1952	0.68	0/2642
2	B	0.40	0/1934	0.66	0/2618
2	P	0.40	0/1934	0.66	0/2618
3	C	0.40	0/1910	0.68	1/2586 (0.0%)
3	Q	0.40	0/1910	0.68	1/2586 (0.0%)
4	D	0.38	0/1837	0.65	0/2475
4	R	0.38	0/1837	0.65	0/2475
5	E	0.40	0/1800	0.65	0/2433
5	S	0.40	0/1800	0.65	0/2433
6	F	0.39	0/1932	0.68	0/2609
6	T	0.39	0/1932	0.69	0/2609
7	G	0.38	0/1945	0.66	0/2634
7	U	0.38	0/1945	0.66	0/2634
8	H	0.34	0/1743	0.69	0/2363
8	V	0.33	0/1743	0.68	0/2363
9	I	0.33	0/1611	0.71	0/2174
9	W	0.33	0/1611	0.71	0/2174
10	J	0.39	0/1589	0.67	0/2142
10	X	0.39	0/1589	0.67	0/2142
11	K	0.40	0/1675	0.73	0/2264
11	Y	0.41	0/1675	0.75	0/2264
12	L	0.34	0/1795	0.69	2/2420 (0.1%)
12	Z	0.34	0/1795	0.69	2/2420 (0.1%)
13	M	0.37	0/1837	0.71	0/2492
13	a	0.38	0/1855	0.72	0/2514
14	N	0.33	0/1534	0.69	0/2077
14	b	0.33	0/1534	0.69	0/2077
15	e	0.63	0/15	0.84	0/19
15	f	0.64	0/15	0.98	0/19
15	g	0.54	0/15	0.67	0/19
15	h	0.60	0/15	0.85	0/19

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
15	i	1.73	0/15	1.29	0/19
15	j	0.55	0/15	0.66	0/19
All	All	0.38	0/50296	0.68	6/67994 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
15	e	0	1
15	f	0	1
15	g	0	1
15	h	0	1
15	i	0	1
15	j	0	1
All	All	0	6

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	Q	201	VAL	N-CA-C	5.58	116.31	110.62
3	C	201	VAL	N-CA-C	5.52	116.25	110.62
12	L	103	PHE	CA-C-N	5.44	125.39	119.78
12	L	103	PHE	C-N-CA	5.44	125.39	119.78
12	Z	103	PHE	CA-C-N	5.34	125.28	119.78
12	Z	103	PHE	C-N-CA	5.34	125.28	119.78

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
15	e	3	LEU	Peptide
15	f	3	LEU	Peptide
15	g	3	LEU	Peptide
15	h	3	LEU	Peptide
15	i	3	LEU	Peptide
15	j	3	LEU	Peptide

## 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	0	0
1	O	1915	0	1929	1	0
2	B	1904	0	1904	4	0
2	P	1904	0	1904	3	0
3	C	1881	0	1895	5	0
3	Q	1881	0	1895	5	0
4	D	1813	0	1797	1	0
4	R	1813	0	1797	3	0
5	E	1773	0	1775	1	0
5	S	1773	0	1775	1	0
6	F	1892	0	1883	0	0
6	T	1892	0	1883	0	0
7	G	1907	0	1901	4	0
7	U	1907	0	1901	4	0
8	H	1712	0	1709	8	0
8	V	1712	0	1709	8	0
9	I	1581	0	1574	8	0
9	W	1581	0	1574	6	0
10	J	1561	0	1569	11	0
10	X	1561	0	1569	12	0
11	K	1638	0	1587	20	0
11	Y	1638	0	1587	19	0
12	L	1757	0	1711	6	0
12	Z	1757	0	1711	6	0
13	M	1806	0	1808	8	0
13	a	1824	0	1832	7	0
14	N	1505	0	1471	6	0
14	b	1505	0	1471	4	0
15	e	41	0	21	1	0
15	f	41	0	21	0	0
15	g	41	0	21	0	0
15	h	41	0	21	1	0
15	i	41	0	21	0	0
15	j	41	0	21	0	0
16	G	1	0	0	0	0
16	I	1	0	0	0	0
16	J	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
16	K	1	0	0	0	0
16	M	1	0	0	0	0
16	N	1	0	0	0	0
16	V	1	0	0	0	0
16	X	1	0	0	0	0
16	Y	1	0	0	0	0
16	Z	1	0	0	0	0
16	b	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	A	11	0	0	0	0
18	B	15	0	0	1	0
18	C	10	0	0	0	0
18	D	8	0	0	0	0
18	E	6	0	0	0	0
18	F	16	0	0	0	0
18	G	9	0	0	1	0
18	H	14	0	0	0	0
18	I	8	0	0	1	0
18	J	11	0	0	0	0
18	K	10	0	0	0	0
18	L	15	0	0	0	0
18	M	16	0	0	2	0
18	N	5	0	0	0	0
18	O	6	0	0	0	0
18	P	8	0	0	1	0
18	Q	8	0	0	0	0
18	R	3	0	0	0	0
18	S	5	0	0	0	0
18	T	11	0	0	0	0
18	U	14	0	0	0	0
18	V	6	0	0	0	0
18	W	7	0	0	0	0
18	X	9	0	0	1	0
18	Y	10	0	0	0	0
18	Z	14	0	0	0	0
18	a	12	0	0	1	0
18	b	11	0	0	0	0
18	f	1	0	0	0	0
18	g	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	i	2	0	0	0	0
All	All	49851	0	49176	142	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 (142) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:Y:7:ARG:HH11	11:Y:7:ARG:HG2	1.36	0.91
11:Y:7:ARG:HG2	11:Y:7:ARG:NH1	1.98	0.73
11:Y:52:CYS:HA	11:Y:97:MET:HE3	1.74	0.70
11:K:45:MET:HB3	11:K:52:CYS:HB3	1.77	0.66
11:K:4:LEU:HD22	11:K:4:LEU:C	2.21	0.65
13:a:2:GLN:NE2	18:a:301:HOH:O	2.30	0.65
11:K:3:MET:HB2	11:K:16:VAL:HG12	1.80	0.62
9:I:37:ASN:ND2	11:Y:209:ASN:O	2.33	0.61
11:Y:3:MET:HB2	11:Y:16:VAL:HG12	1.81	0.61
11:K:209:ASN:O	9:W:37:ASN:ND2	2.34	0.60
11:Y:4:LEU:C	11:Y:4:LEU:HD22	2.27	0.60
8:V:22:GLN:O	8:V:22:GLN:HG3	2.01	0.60
11:K:4:LEU:HD22	11:K:4:LEU:O	2.02	0.59
10:J:25:ILE:HD11	10:X:135:TYR:HB3	1.86	0.58
11:K:4:LEU:CD1	11:K:161:ILE:HD11	2.34	0.58
11:K:3:MET:HE2	11:K:129:VAL:HB	1.85	0.57
11:K:7:ARG:NH1	11:K:110:PRO:O	2.37	0.57
11:Y:3:MET:HE2	11:Y:129:VAL:HB	1.85	0.56
13:a:27:LEU:HD21	13:a:34:LEU:HD22	1.88	0.55
12:L:31:THR:HG23	12:L:36:ASN:HD21	1.71	0.55
11:K:145:LYS:HB2	11:K:148:LEU:HD13	1.89	0.54
10:J:135:TYR:HB3	10:X:25:ILE:HD11	1.89	0.54
12:Z:31:THR:HG23	12:Z:36:ASN:HD21	1.71	0.54
11:Y:145:LYS:HB2	11:Y:148:LEU:HD13	1.89	0.54
2:B:93:HIS:HB3	18:B:301:HOH:O	2.08	0.53
14:N:152:VAL:HA	14:N:175:MET:HE1	1.92	0.52
14:b:152:VAL:HA	14:b:175:MET:HE1	1.90	0.52
9:I:191:LYS:NZ	18:I:401:HOH:O	2.42	0.52
10:J:25:ILE:HD11	10:X:135:TYR:CG	2.45	0.52
3:C:201:VAL:O	3:C:202:GLN:CB	2.58	0.51
10:J:135:TYR:CG	10:X:25:ILE:HD11	2.45	0.51
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.59	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:P:93:HIS:HB3	18:P:301:HOH:O	2.11	0.50
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.92	0.50
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.92	0.50
13:M:35:ARG:HG3	18:M:408:HOH:O	2.11	0.50
8:V:35:HIS:HB3	8:V:56:THR:HG21	1.94	0.50
11:Y:7:ARG:HH11	11:Y:7:ARG:CG	2.12	0.49
8:H:35:HIS:HB3	8:H:56:THR:HG21	1.94	0.49
11:K:4:LEU:C	11:K:4:LEU:CD2	2.85	0.49
11:Y:4:LEU:C	11:Y:4:LEU:CD2	2.85	0.49
2:B:50:LYS:O	2:B:51:VAL:C	2.55	0.49
10:J:174:MET:N	10:J:174:MET:HE3	2.28	0.49
2:P:50:LYS:O	2:P:51:VAL:C	2.55	0.49
11:Y:145:LYS:HB2	11:Y:148:LEU:CD1	2.43	0.48
7:G:23:PHE:O	7:G:26:THR:HB	2.13	0.48
11:K:145:LYS:HB2	11:K:148:LEU:CD1	2.43	0.48
7:U:23:PHE:O	7:U:26:THR:HB	2.13	0.48
11:K:4:LEU:HD11	11:K:161:ILE:HG12	1.95	0.48
10:X:174:MET:N	10:X:174:MET:HE3	2.28	0.48
3:C:201:VAL:O	3:C:202:GLN:HB3	2.14	0.47
3:Q:201:VAL:O	3:Q:202:GLN:HB3	2.14	0.47
9:W:20:VAL:HG23	9:W:189:ILE:HB	1.97	0.47
4:R:57:GLU:OE1	11:Y:71:LYS:NZ	2.45	0.47
10:J:173:PRO:HB2	10:J:174:MET:HE3	1.97	0.47
8:H:196:ARG:NH2	9:I:150:GLU:O	2.48	0.46
10:X:173:PRO:HB2	10:X:174:MET:HE3	1.97	0.46
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.51	0.46
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.46	0.46
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.96	0.46
9:I:20:VAL:HG23	9:I:189:ILE:HB	1.97	0.46
14:N:176:VAL:HG12	14:N:178:LEU:HD13	1.98	0.46
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.96	0.46
10:J:143:LEU:HD23	10:J:164:CYS:SG	2.56	0.46
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.98	0.46
13:M:35:ARG:HG2	13:M:36:PHE:CZ	2.51	0.46
13:M:35:ARG:HD3	14:N:135:TYR:OH	2.16	0.45
13:M:96:LEU:O	13:M:100:MET:HG2	2.17	0.45
14:b:83:LYS:HG3	14:b:119:VAL:CG2	2.46	0.45
8:V:35:HIS:CB	8:V:56:THR:HG21	2.47	0.45
15:h:2:LEU:N	15:h:2:LEU:HD23	2.31	0.45
11:Y:4:LEU:HD13	11:Y:161:ILE:HD11	1.99	0.45
8:H:35:HIS:CB	8:H:56:THR:HG21	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:4:LEU:CD1	11:K:161:ILE:CD1	2.94	0.45
11:Y:44:THR:HG1	11:Y:100:MET:H	1.65	0.45
11:Y:45:MET:HB3	11:Y:52:CYS:HB3	1.98	0.45
14:b:176:VAL:HG12	14:b:178:LEU:HD13	1.97	0.45
12:L:13:LEU:CD1	12:L:150:LEU:HD21	2.48	0.44
15:e:2:LEU:N	15:e:2:LEU:HD23	2.31	0.44
3:C:35:LYS:HG2	3:C:158:SER:O	2.16	0.44
12:L:13:LEU:HD11	12:L:150:LEU:HD21	2.00	0.44
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.18	0.44
2:B:217:LYS:O	2:B:219:ALA:N	2.44	0.44
12:Z:125:PHE:CD2	12:Z:131:TYR:HB3	2.53	0.44
10:X:174:MET:HG3	18:X:309:HOH:O	2.17	0.43
8:H:196:ARG:NH2	9:I:150:GLU:HG3	2.34	0.43
14:N:35:THR:HG21	13:a:228:TYR:HE2	1.83	0.43
13:a:96:LEU:O	13:a:100:MET:HG2	2.18	0.43
7:G:78:ILE:N	7:G:79:PRO:CD	2.81	0.43
12:L:100:LYS:HD3	12:L:105:TYR:CE2	2.54	0.43
10:X:143:LEU:HD23	10:X:164:CYS:SG	2.58	0.43
12:L:125:PHE:CD2	12:L:131:TYR:HB3	2.53	0.43
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.49	0.43
9:I:10:ILE:HG21	9:I:141:ALA:HB3	2.01	0.43
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.01	0.42
10:J:23:ARG:HA	10:J:23:ARG:HD3	1.83	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.42
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.49	0.42
12:Z:13:LEU:CD1	12:Z:150:LEU:HD21	2.48	0.42
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.01	0.42
4:R:57:GLU:CD	11:Y:71:LYS:HZ2	2.28	0.42
8:V:196:ARG:NH2	9:W:150:GLU:O	2.52	0.42
11:Y:38:ASN:OD1	11:Y:38:ASN:C	2.62	0.42
7:G:122:ARG:HD2	18:G:406:HOH:O	2.19	0.42
12:Z:4:PRO:O	13:a:104:ARG:NH1	2.46	0.42
12:Z:13:LEU:HD11	12:Z:150:LEU:HD21	2.00	0.42
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.01	0.42
11:K:38:ASN:OD1	11:K:38:ASN:C	2.63	0.42
11:K:45:MET:HE1	11:K:53:GLN:HG3	2.02	0.42
8:H:80:LEU:HD12	8:H:113:ILE:HD11	2.02	0.42
13:M:17:ASP:OD1	13:M:18:ASN:N	2.53	0.42
12:Z:100:LYS:HD3	12:Z:105:TYR:CE2	2.54	0.42
8:V:80:LEU:HD12	8:V:113:ILE:HD11	2.02	0.41
10:X:23:ARG:HA	10:X:23:ARG:HD3	1.83	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:130:GLY:O	11:K:133:GLN:HG2	2.20	0.41
11:K:4:LEU:HD12	11:K:161:ILE:CD1	2.50	0.41
12:L:4:PRO:O	13:M:104:ARG:NH1	2.48	0.41
13:M:165:ILE:HB	13:M:166:PRO:HD3	2.03	0.41
9:I:20:VAL:HG13	9:I:118:PRO:HB3	2.02	0.41
4:R:160:ASN:HB3	4:R:179:TRP:CE2	2.55	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.84	0.41
13:a:165:ILE:HB	13:a:166:PRO:HD3	2.02	0.41
4:D:160:ASN:HB3	4:D:179:TRP:CE2	2.56	0.41
8:V:126:SER:O	8:V:127:LEU:HD12	2.21	0.41
13:M:231:GLN:C	18:M:406:HOH:O	2.63	0.41
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.85	0.41
11:K:37:ILE:HG23	11:K:60:GLY:HA2	2.03	0.41
9:W:20:VAL:HG13	9:W:118:PRO:HB3	2.02	0.41
5:E:77:ALA:N	5:E:78:PRO:CD	2.84	0.40
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.51	0.40
3:Q:160:GLN:HA	3:Q:160:GLN:HE21	1.86	0.40
10:J:50:ALA:O	11:K:91:LYS:NZ	2.54	0.40
14:N:133:PHE:HA	14:b:132:THR:O	2.21	0.40
11:Y:130:GLY:O	11:Y:133:GLN:HG2	2.21	0.40
8:H:126:SER:O	8:H:127:LEU:HD12	2.21	0.40
11:Y:4:LEU:CD1	11:Y:161:ILE:HD11	2.51	0.40
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.51	0.40
8:H:139:GLU:OE1	13:a:187:ARG:NH1	2.51	0.40
11:K:4:LEU:HD13	11:K:161:ILE:HD11	2.02	0.40
8:V:173:VAL:HB	8:V:191:LEU:HB2	2.04	0.40
9:W:36:SER:HB2	10:X:126:VAL:HG11	2.03	0.40
10:X:2:ASP:O	10:X:3:ILE:C	2.64	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%)	240 (97%)	7 (3%)	1 (0%)	30	60
1	O	248/250 (99%)	240 (97%)	7 (3%)	1 (0%)	30	60
2	B	242/258 (94%)	233 (96%)	5 (2%)	4 (2%)	7	25
2	P	242/258 (94%)	233 (96%)	5 (2%)	4 (2%)	7	25
3	C	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	16	44
3	Q	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	16	44
4	D	231/260 (89%)	226 (98%)	5 (2%)	0	100	100
4	R	231/260 (89%)	226 (98%)	5 (2%)	0	100	100
5	E	229/234 (98%)	223 (97%)	6 (3%)	0	100	100
5	S	229/234 (98%)	223 (97%)	6 (3%)	0	100	100
6	F	241/288 (84%)	239 (99%)	2 (1%)	0	100	100
6	T	241/288 (84%)	239 (99%)	2 (1%)	0	100	100
7	G	239/252 (95%)	237 (99%)	2 (1%)	0	100	100
7	U	239/252 (95%)	237 (99%)	2 (1%)	0	100	100
8	H	223/231 (96%)	217 (97%)	6 (3%)	0	100	100
8	V	223/231 (96%)	216 (97%)	7 (3%)	0	100	100
9	I	202/205 (98%)	196 (97%)	6 (3%)	0	100	100
9	W	202/205 (98%)	196 (97%)	6 (3%)	0	100	100
10	J	193/198 (98%)	189 (98%)	3 (2%)	1 (0%)	24	55
10	X	193/198 (98%)	189 (98%)	3 (2%)	1 (0%)	24	55
11	K	209/211 (99%)	203 (97%)	6 (3%)	0	100	100
11	Y	209/211 (99%)	203 (97%)	6 (3%)	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	229/246 (93%)	218 (95%)	11 (5%)	0	100	100
13	a	231/246 (94%)	220 (95%)	10 (4%)	1 (0%)	30	60
14	N	193/195 (99%)	187 (97%)	6 (3%)	0	100	100
14	b	193/195 (99%)	187 (97%)	6 (3%)	0	100	100
15	e	1/4 (25%)	1 (100%)	0	0	100	100
15	f	1/4 (25%)	1 (100%)	0	0	100	100
15	g	1/4 (25%)	1 (100%)	0	0	100	100
15	h	1/4 (25%)	1 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
15	i	1/4 (25%)	1 (100%)	0	0	100	100
15	j	1/4 (25%)	1 (100%)	0	0	100	100
All	All	6282/6632 (95%)	6119 (97%)	146 (2%)	17 (0%)	36	66

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
3	C	202	GLN
10	J	3	ILE
2	P	51	VAL
3	Q	202	GLN
10	X	3	ILE
1	A	2	THR
2	B	218	GLY
2	B	222	GLY
1	O	2	THR
2	P	218	GLY
2	P	222	GLY
2	B	220	ASN
3	C	205	ALA
2	P	220	ASN
3	Q	205	ALA
13	a	229	GLY

### 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%)	50	81
1	O	209/209 (100%)	205 (98%)	4 (2%)	50	81
2	B	203/216 (94%)	197 (97%)	6 (3%)	36	72
2	P	203/216 (94%)	197 (97%)	6 (3%)	36	72

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	212/226 (94%)	202 (95%)	10 (5%)	23	57
3	Q	212/226 (94%)	202 (95%)	10 (5%)	23	57
4	D	194/215 (90%)	185 (95%)	9 (5%)	24	58
4	R	194/215 (90%)	186 (96%)	8 (4%)	27	62
5	E	190/193 (98%)	185 (97%)	5 (3%)	40	75
5	S	190/193 (98%)	185 (97%)	5 (3%)	40	75
6	F	201/239 (84%)	196 (98%)	5 (2%)	42	76
6	T	201/239 (84%)	196 (98%)	5 (2%)	42	76
7	G	206/210 (98%)	200 (97%)	6 (3%)	37	73
7	U	206/210 (98%)	199 (97%)	7 (3%)	32	68
8	H	184/189 (97%)	180 (98%)	4 (2%)	45	78
8	V	184/189 (97%)	180 (98%)	4 (2%)	45	78
9	I	172/173 (99%)	170 (99%)	2 (1%)	63	87
9	W	172/173 (99%)	170 (99%)	2 (1%)	63	87
10	J	173/175 (99%)	164 (95%)	9 (5%)	21	53
10	X	173/175 (99%)	164 (95%)	9 (5%)	21	53
11	K	168/168 (100%)	158 (94%)	10 (6%)	17	47
11	Y	168/168 (100%)	158 (94%)	10 (6%)	17	47
12	L	185/185 (100%)	182 (98%)	3 (2%)	55	83
12	Z	185/185 (100%)	182 (98%)	3 (2%)	55	83
13	M	197/208 (95%)	191 (97%)	6 (3%)	36	72
13	a	199/208 (96%)	194 (98%)	5 (2%)	42	76
14	N	161/161 (100%)	158 (98%)	3 (2%)	50	81
14	b	161/161 (100%)	158 (98%)	3 (2%)	50	81
15	e	2/2 (100%)	0	2 (100%)	0	0
15	f	2/2 (100%)	2 (100%)	0	100	100
15	g	2/2 (100%)	2 (100%)	0	100	100
15	h	2/2 (100%)	0	2 (100%)	0	0
15	i	2/2 (100%)	1 (50%)	1 (50%)	0	0
15	j	2/2 (100%)	2 (100%)	0	100	100
All	All	5324/5546 (96%)	5156 (97%)	168 (3%)	34	70

All (168) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	122	THR
1	A	157	PHE
1	A	250	LEU
2	B	55	LEU
2	B	79	LEU
2	B	102	ASN
2	B	113	ARG
2	B	191	LEU
2	B	238	LEU
3	C	4	ARG
3	C	38	ASN
3	C	51	LYS
3	C	52	LEU
3	C	147	GLN
3	C	160	GLN
3	C	169	VAL
3	C	180	LYS
3	C	213	VAL
3	C	240	GLU
4	D	51	LEU
4	D	99	ILE
4	D	125	LEU
4	D	176	LEU
4	D	193	LEU
4	D	214	ILE
4	D	235	LEU
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	29	LYS
5	E	55	LEU
5	E	71	LEU
5	E	188	LEU
6	F	123	ASN
6	F	172	LEU
6	F	181	GLU
6	F	221	ASN
6	F	240	GLN
7	G	75	ASN
7	G	115	LEU
7	G	122	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	G	125	MET
7	G	235	ARG
7	G	236	LEU
8	H	34	LEU
8	H	56	THR
8	H	68	LEU
8	H	196	ARG
9	I	37	ASN
9	I	171	LEU
10	J	1	MET
10	J	3	ILE
10	J	23	ARG
10	J	90	LYS
10	J	99	GLN
10	J	136	SER
10	J	143	LEU
10	J	149	ARG
10	J	174	MET
11	K	4	LEU
11	K	7	ARG
11	K	9	GLN
11	K	31	VAL
11	K	35	ILE
11	K	72	GLU
11	K	73	ARG
11	K	100	MET
11	K	107	LYS
11	K	148	LEU
12	L	23	LEU
12	L	49	ASN
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	190	ARG
14	N	9	LYS
14	N	119	VAL
14	N	178	LEU
1	O	1	MET
1	O	122	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	O	157	PHE
1	O	250	LEU
2	P	55	LEU
2	P	79	LEU
2	P	102	ASN
2	P	113	ARG
2	P	191	LEU
2	P	238	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	51	LYS
3	Q	52	LEU
3	Q	147	GLN
3	Q	160	GLN
3	Q	169	VAL
3	Q	180	LYS
3	Q	213	VAL
3	Q	240	GLU
4	R	99	ILE
4	R	125	LEU
4	R	176	LEU
4	R	193	LEU
4	R	214	ILE
4	R	235	LEU
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	29	LYS
5	S	55	LEU
5	S	71	LEU
5	S	188	LEU
6	T	123	ASN
6	T	172	LEU
6	T	181	GLU
6	T	221	ASN
6	T	240	GLN
7	U	26	THR
7	U	75	ASN
7	U	115	LEU
7	U	122	ARG
7	U	125	MET
7	U	235	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	U	236	LEU
8	V	34	LEU
8	V	56	THR
8	V	68	LEU
8	V	196	ARG
9	W	37	ASN
9	W	171	LEU
10	X	1	MET
10	X	3	ILE
10	X	23	ARG
10	X	90	LYS
10	X	99	GLN
10	X	136	SER
10	X	143	LEU
10	X	149	ARG
10	X	174	MET
11	Y	4	LEU
11	Y	7	ARG
11	Y	9	GLN
11	Y	31	VAL
11	Y	35	ILE
11	Y	73	ARG
11	Y	99	THR
11	Y	100	MET
11	Y	107	LYS
11	Y	148	LEU
12	Z	23	LEU
12	Z	49	ASN
12	Z	150	LEU
13	a	2	GLN
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	161	ARG
14	b	9	LYS
14	b	119	VAL
14	b	178	LEU
15	e	2	LEU
15	e	3	LEU
15	h	2	LEU
15	h	3	LEU
15	i	3	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (101) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	124	HIS
3	C	115	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
4	D	15	GLN
4	D	91	HIS
4	D	225	ASN
5	E	68	HIS
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	123	ASN
6	F	143	HIS
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	175	ASN
7	G	212	ASN
8	H	30	ASN
8	H	116	HIS
8	H	189	ASN
9	I	63	ASN
9	I	88	GLN
9	I	203	GLN
10	J	55	GLN
10	J	63	ASN
11	K	9	GLN
11	K	85	ASN
11	K	176	ASN
12	L	3	ASN
12	L	29	ASN
12	L	36	ASN
12	L	49	ASN
12	L	79	HIS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
12	L	80	ASN
12	L	158	ASN
12	L	159	GLN
12	L	197	GLN
13	M	48	ASN
13	M	102	GLN
13	M	108	ASN
14	N	38	HIS
14	N	141	ASN
14	N	161	GLN
2	P	124	HIS
3	Q	116	GLN
3	Q	120	GLN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	225	ASN
5	S	68	HIS
5	S	99	ASN
5	S	116	GLN
5	S	120	GLN
5	S	151	ASN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN
6	T	123	ASN
6	T	143	HIS
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	175	ASN
8	V	22	GLN
8	V	30	ASN
8	V	116	HIS
8	V	189	ASN
9	W	63	ASN
9	W	88	GLN
9	W	203	GLN
10	X	55	GLN
10	X	63	ASN

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Mol	Chain	Res	Type
11	Y	9	GLN
11	Y	85	ASN
12	Z	3	ASN
12	Z	29	ASN
12	Z	36	ASN
12	Z	49	ASN
12	Z	79	HIS
12	Z	158	ASN
12	Z	159	GLN
12	Z	197	GLN
13	a	26	ASN
13	a	48	ASN
13	a	62	HIS
13	a	102	GLN
13	a	108	ASN
14	b	38	HIS
14	b	141	ASN
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	A1I48	e	4	15,8	12,14,15	0.67	0	10,18,20	0.88	0
15	A1I48	g	4	15,14	12,14,15	0.62	0	10,18,20	0.94	0
15	A1I48	j	4	16,15,14	12,14,15	0.62	0	10,18,20	0.95	0
15	A1I48	i	4	15,11	12,14,15	1.07	1 (8%)	10,18,20	1.50	2 (20%)
15	A1I48	h	4	15,8	12,14,15	0.67	0	10,18,20	0.88	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
15	A1I48	f	4	15,11	12,14,15	0.64	0	10,18,20	0.79	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	A1I48	e	4	15,8	-	3/15/18/20	-
15	A1I48	g	4	15,14	-	3/15/18/20	-
15	A1I48	j	4	16,15,14	-	3/15/18/20	-
15	A1I48	i	4	15,11	-	2/15/18/20	-
15	A1I48	h	4	15,8	-	3/15/18/20	-
15	A1I48	f	4	15,11	-	2/15/18/20	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	i	4	A1I48	OG1-CB	-2.27	1.40	1.44

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	i	4	A1I48	C25-C24-C21	-2.81	109.70	115.76
15	i	4	A1I48	C22-OG1-CB	-2.59	111.64	115.27

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
15	e	4	A1I48	O23-C22-OG1-CB
15	e	4	A1I48	O-C-CA-CB
15	f	4	A1I48	O23-C22-OG1-CB
15	g	4	A1I48	O23-C22-OG1-CB
15	g	4	A1I48	O-C-CA-CB
15	h	4	A1I48	O23-C22-OG1-CB
15	h	4	A1I48	O-C-CA-CB
15	j	4	A1I48	O23-C22-OG1-CB
15	j	4	A1I48	O-C-CA-CB
15	i	4	A1I48	C-CA-CB-CG2

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Mol	Chain	Res	Type	Atoms
15	i	4	A1I48	C-CA-CB-OG1
15	e	4	A1I48	C-CA-CB-CG2
15	f	4	A1I48	O-C-CA-CB
15	g	4	A1I48	C-CA-CB-CG2
15	h	4	A1I48	C-CA-CB-CG2
15	j	4	A1I48	C-CA-CB-CG2

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 15 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%)	-0.39	2 (0%) 82 75	42, 57, 94, 133	0
1	O	250/250 (100%)	-0.37	2 (0%) 82 75	46, 66, 111, 146	0
2	B	244/258 (94%)	-0.22	4 (1%) 70 61	44, 65, 111, 169	0
2	P	244/258 (94%)	-0.21	5 (2%) 65 56	43, 69, 111, 169	0
3	C	240/254 (94%)	-0.20	2 (0%) 82 75	43, 69, 135, 167	0
3	Q	240/254 (94%)	0.05	9 (3%) 44 35	53, 84, 170, 192	0
4	D	235/260 (90%)	-0.21	3 (1%) 75 66	50, 72, 106, 150	0
4	R	235/260 (90%)	-0.09	1 (0%) 88 84	55, 75, 119, 154	0
5	E	231/234 (98%)	-0.22	1 (0%) 88 84	51, 73, 112, 154	0
5	S	231/234 (98%)	-0.07	0 100 100	52, 79, 125, 159	0
6	F	243/288 (84%)	-0.28	2 (0%) 82 75	41, 67, 117, 143	0
6	T	243/288 (84%)	-0.16	4 (1%) 70 61	40, 73, 134, 162	0
7	G	241/252 (95%)	-0.37	0 100 100	41, 61, 102, 158	0
7	U	241/252 (95%)	-0.38	0 100 100	45, 61, 97, 143	0
8	H	225/231 (97%)	-0.41	1 (0%) 88 84	40, 56, 94, 153	0
8	V	225/231 (97%)	-0.34	2 (0%) 81 74	43, 59, 93, 181	0
9	I	204/205 (99%)	-0.52	0 100 100	39, 55, 87, 114	0
9	W	204/205 (99%)	-0.53	0 100 100	40, 58, 90, 110	0
10	J	195/198 (98%)	-0.41	3 (1%) 72 63	40, 59, 89, 125	0
10	X	195/198 (98%)	-0.37	3 (1%) 72 63	40, 62, 89, 138	0
11	K	211/211 (100%)	-0.32	0 100 100	41, 60, 92, 114	0
11	Y	211/211 (100%)	-0.31	0 100 100	45, 60, 94, 113	0
12	L	222/222 (100%)	-0.16	9 (4%) 41 33	43, 61, 109, 139	0
12	Z	222/222 (100%)	-0.19	10 (4%) 38 30	45, 60, 108, 139	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
13	M	231/246 (93%)	-0.42	2 (0%) 81 74	39, 59, 86, 105	0
13	a	233/246 (94%)	-0.47	1 (0%) 88 84	39, 57, 84, 108	0
14	N	195/195 (100%)	-0.50	0 100 100	38, 51, 83, 109	0
14	b	195/195 (100%)	-0.55	0 100 100	37, 52, 82, 112	0
15	e	2/4 (50%)	1.59	0 100 100	98, 98, 98, 99	0
15	f	2/4 (50%)	1.91	1 (50%) 0 0	99, 99, 99, 102	0
15	g	2/4 (50%)	0.80	0 100 100	69, 69, 69, 96	0
15	h	2/4 (50%)	2.50	2 (100%) 0 0	106, 106, 106, 110	0
15	i	2/4 (50%)	1.88	1 (50%) 0 0	105, 105, 105, 110	0
15	j	2/4 (50%)	0.12	0 100 100	71, 71, 71, 86	0
All	All	6348/6632 (95%)	-0.30	70 (1%) 78 70	37, 64, 111, 192	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
12	Z	174	TYR	5.5
12	L	174	TYR	5.5
3	Q	50	LEU	5.2
12	L	165	ASN	3.8
13	a	1	THR	3.8
2	B	51	VAL	3.8
12	Z	168	VAL	3.7
3	Q	205	ALA	3.5
3	Q	49	THR	3.4
13	M	1	THR	3.3
10	X	1	MET	3.1
12	L	168	VAL	3.1
2	B	218	GLY	3.1
8	V	223	ILE	3.1
8	H	223	ILE	3.0
4	D	240	ALA	3.0
3	Q	206	LYS	2.9
15	f	3	LEU	2.9
2	P	51	VAL	2.9
2	P	218	GLY	2.9
12	L	136	CYS	2.9
12	L	170	LYS	2.8
6	F	202	ASP	2.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
10	X	2	ASP	2.8
15	h	3	LEU	2.7
12	Z	163	GLY	2.7
2	B	219	ALA	2.7
12	L	164	THR	2.7
10	J	1	MET	2.6
12	Z	169	LYS	2.6
12	Z	172	LEU	2.6
8	V	224	GLN	2.6
12	Z	165	ASN	2.6
12	L	169	LYS	2.6
12	Z	170	LYS	2.5
2	B	1	GLY	2.5
13	M	47	ASP	2.5
12	Z	173	LYS	2.5
6	F	215	CYS	2.5
3	Q	234	ILE	2.4
5	E	123	GLY	2.4
12	L	172	LEU	2.4
1	A	1	MET	2.4
15	i	3	LEU	2.4
3	Q	48	SER	2.3
6	T	204	LYS	2.3
3	C	58	THR	2.3
3	Q	52	LEU	2.3
15	h	2	LEU	2.3
1	O	2	THR	2.3
2	P	219	ALA	2.3
4	D	241	ALA	2.3
12	Z	166	GLY	2.2
2	P	52	THR	2.2
1	O	1	MET	2.2
6	T	215	CYS	2.2
3	C	186	VAL	2.2
6	T	14	ASP	2.2
10	J	174	MET	2.2
3	Q	175	LYS	2.2
6	T	243	ILE	2.1
3	Q	51	LYS	2.1
4	D	167	GLY	2.1
1	A	249	ALA	2.1
12	L	171	PRO	2.1

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Mol	Chain	Res	Type	RSRZ
10	X	174	MET	2.1
2	P	222	GLY	2.1
10	J	2	ASP	2.1
4	R	112	ALA	2.0
12	Z	164	THR	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	A1I48	h	4	15/16	0.93	0.14	55,78,120,124	0
15	A1I48	i	4	15/16	0.94	0.14	59,79,124,127	0
15	A1I48	e	4	15/16	0.95	0.12	52,78,93,94	0
15	A1I48	g	4	15/16	0.95	0.15	53,93,114,118	0
15	A1I48	j	4	15/16	0.95	0.16	58,95,107,128	0
15	A1I48	f	4	15/16	0.96	0.11	57,79,96,96	0

## 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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	V	301	1/1	0.93	0.15	76,76,76,76	0
16	MG	Y	301	1/1	0.94	0.06	61,61,61,61	0
16	MG	M	301	1/1	0.95	0.09	59,59,59,59	0
16	MG	I	301	1/1	0.96	0.07	65,65,65,65	0
16	MG	Z	301	1/1	0.96	0.07	74,74,74,74	0
16	MG	X	201	1/1	0.97	0.15	43,43,43,43	0
16	MG	G	301	1/1	0.97	0.04	59,59,59,59	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
16	MG	K	301	1/1	0.97	0.12	64,64,64,64	0
16	MG	J	201	1/1	0.98	0.17	47,47,47,47	0
16	MG	N	201	1/1	0.98	0.05	49,49,49,49	0
16	MG	b	201	1/1	0.98	0.03	48,48,48,48	0
17	CL	b	202	1/1	0.98	0.06	67,67,67,67	0
17	CL	N	202	1/1	0.99	0.06	55,55,55,55	0
17	CL	G	302	1/1	0.99	0.08	44,44,44,44	0
17	CL	U	301	1/1	1.00	0.07	45,45,45,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.