



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:39 PM UTC

PDB ID : 4Y8K / pdb_00004y8k
Title : Yeast 20S proteasome in complex with H-APLL-ep
Authors : Huber, E.M.; Groll, M.
Deposited on : 2015-02-16
Resolution : 2.60 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
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

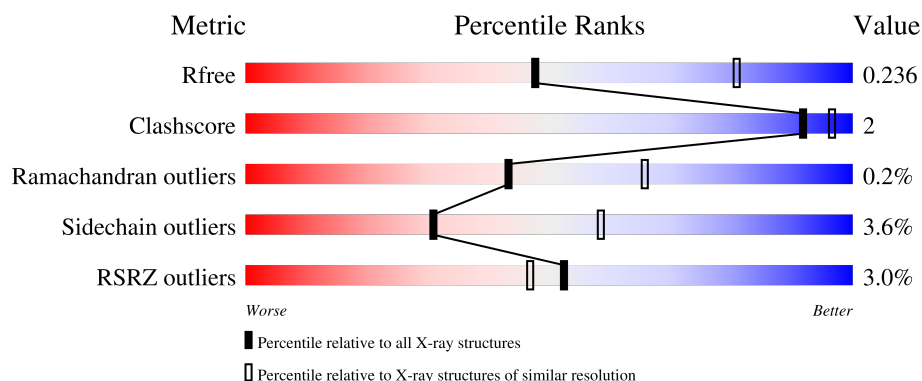
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	250	2% 98% .
1	O	250	2% 98% .
2	B	258	2% 88% 5% • 5%
2	P	258	5% 89% 5% • 5%
3	C	254	4% 89% • • 6%

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

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Mol	Chain	Length	Quality of chain
15	e	5	20%60%80%
15	f	5	20%80%

2 Entry composition

There are 19 unique types of molecules in this entry. The entry contains 49865 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Proteasome subunit alpha type-2.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	H	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	230	Total	C	N	O	S	0	0	0
			1797	1137	307	346	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 H-APLL-ep.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
15	c	5	Total	C	N	O	0	0	0
			32	23	4	5			
15	d	5	Total	C	N	O	0	0	0
			32	23	4	5			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
15	e	5	Total	C	N	O	0	0	0
			32	23	4	5			
15	f	5	Total	C	N	O	0	0	0
			32	23	4	5			

- Molecule 16 is MAGNESIUM ION (CCD ID: 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 (CCD ID: 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 (CCD ID: MES) (formula: C₆H₁₃NO₄S).



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

- Molecule 19 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
19	A	17	Total	O	0	0
			17	17		
19	B	20	Total	O	0	0
			20	20		
19	C	15	Total	O	0	0
			15	15		
19	D	3	Total	O	0	0
			3	3		
19	E	5	Total	O	0	0
			5	5		
19	F	17	Total	O	0	0
			17	17		
19	G	27	Total	O	0	0
			27	27		
19	H	16	Total	O	0	0
			16	16		
19	I	18	Total	O	0	0
			18	18		
19	J	17	Total	O	0	0
			17	17		

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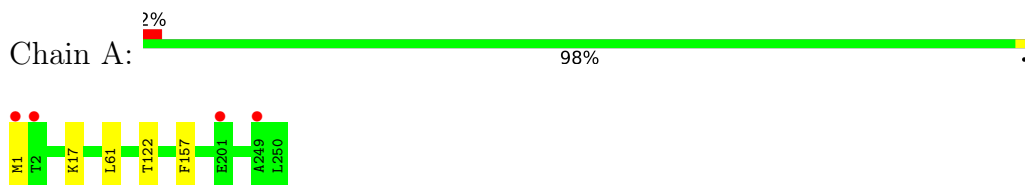
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
19	K	18	Total 18	O 18	0	0
19	L	24	Total 24	O 24	0	0
19	M	20	Total 20	O 20	0	0
19	N	19	Total 19	O 19	0	0
19	O	10	Total 10	O 10	0	0
19	P	10	Total 10	O 10	0	0
19	Q	9	Total 9	O 9	0	0
19	R	8	Total 8	O 8	0	0
19	S	5	Total 5	O 5	0	0
19	T	11	Total 11	O 11	0	0
19	U	18	Total 18	O 18	0	0
19	V	19	Total 19	O 19	0	0
19	W	12	Total 12	O 12	0	0
19	X	16	Total 16	O 16	0	0
19	Y	20	Total 20	O 20	0	0
19	Z	15	Total 15	O 15	0	0
19	a	24	Total 24	O 24	0	0
19	b	15	Total 15	O 15	0	0
19	d	2	Total 2	O 2	0	0
19	f	3	Total 3	O 3	0	0

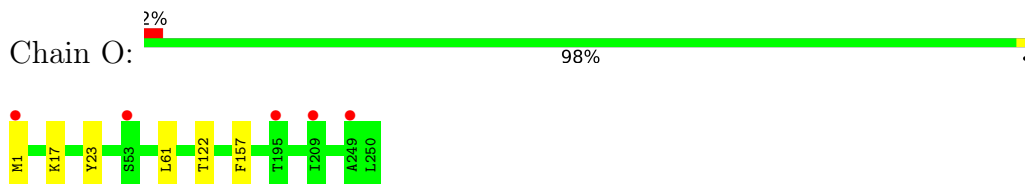
3 Residue-property plots [i](#)

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

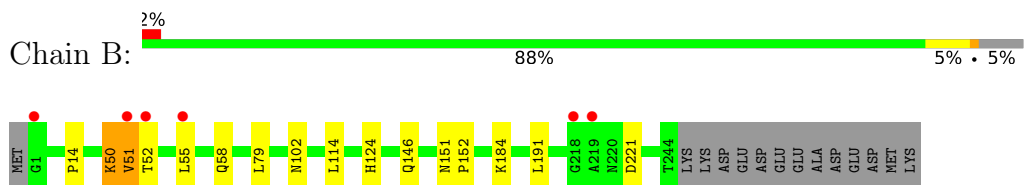
- Molecule 1: Proteasome subunit alpha type-2



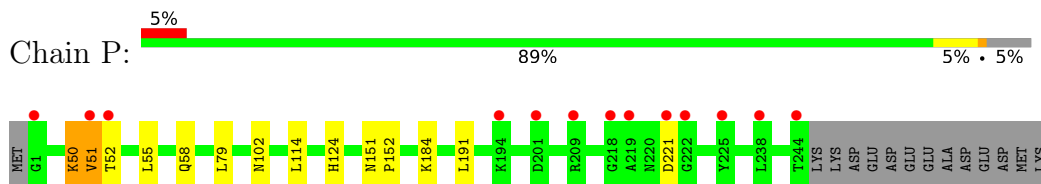
- Molecule 1: Proteasome subunit alpha type-2



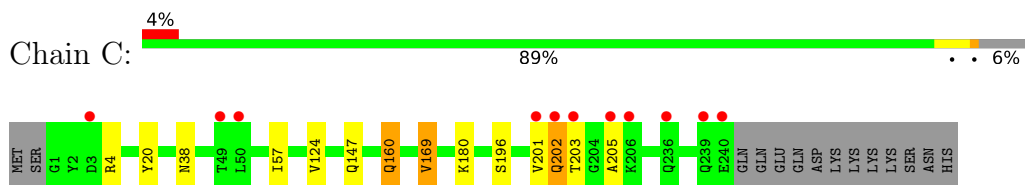
- Molecule 2: Proteasome subunit alpha type-3



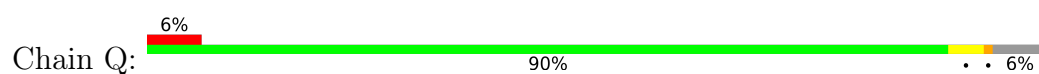
- Molecule 2: Proteasome subunit alpha type-3



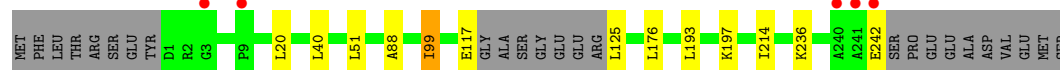
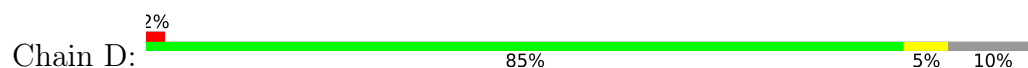
- Molecule 3: Proteasome subunit alpha type-4



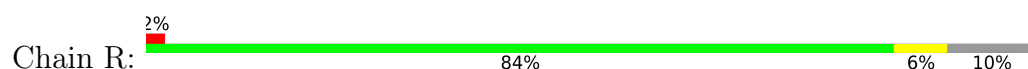
- Molecule 3: Proteasome subunit alpha type-4



- Molecule 4: Proteasome subunit alpha type-5



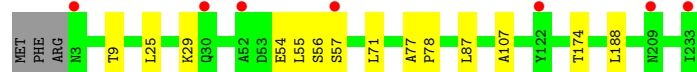
- Molecule 4: Proteasome subunit alpha type-5



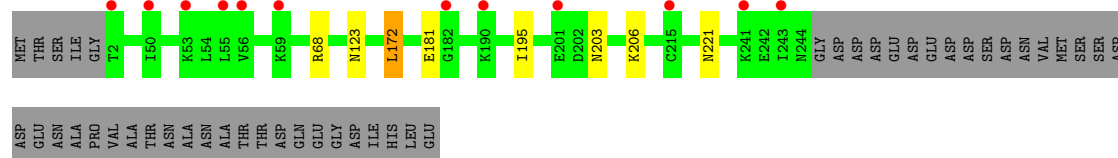
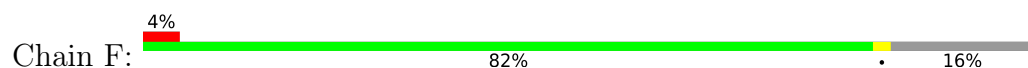
- Molecule 5: Proteasome subunit alpha type-6



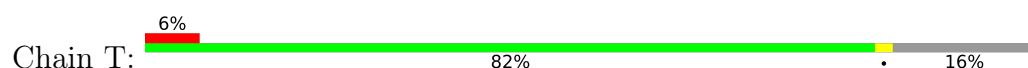
- Molecule 5: Proteasome subunit alpha type-6

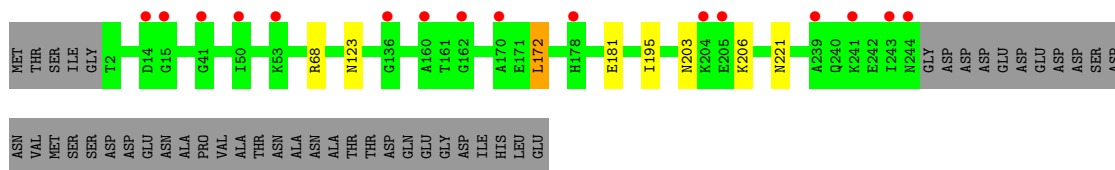


- Molecule 6: Probable proteasome subunit alpha type-7

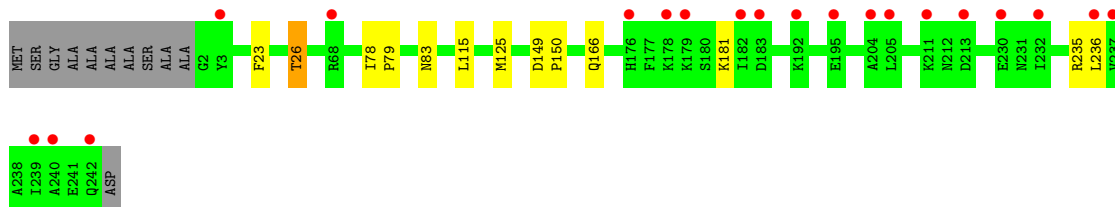
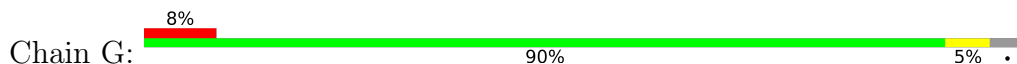


- Molecule 6: Probable proteasome subunit alpha type-7

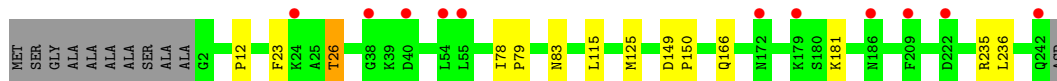
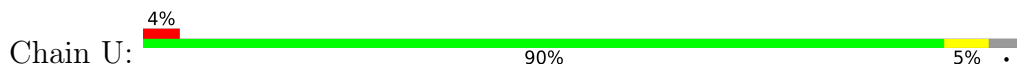




- Molecule 7: Proteasome subunit alpha type-1



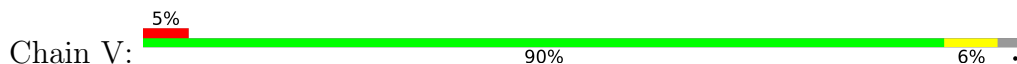
- Molecule 7: Proteasome subunit alpha type-1



- Molecule 8: Proteasome subunit beta type-2



- Molecule 8: Proteasome subunit beta type-2



- Molecule 9: Proteasome subunit beta type-3

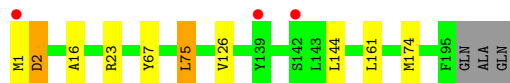


- Molecule 9: Proteasome subunit beta type-3

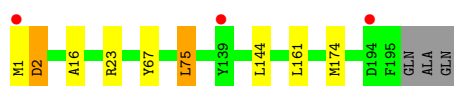
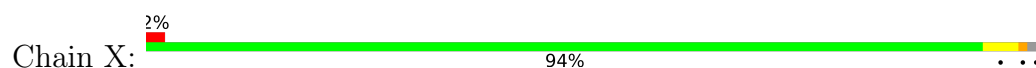




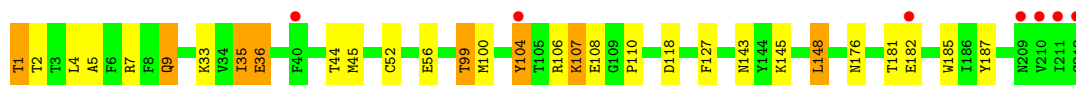
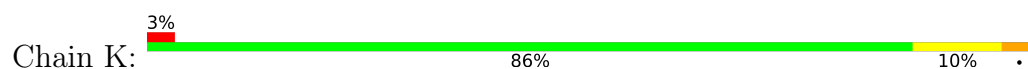
- Molecule 10: Proteasome subunit beta type-4



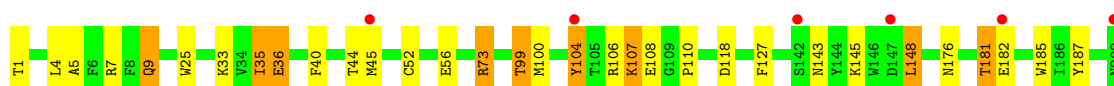
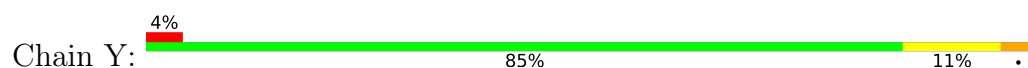
- Molecule 10: Proteasome subunit beta type-4



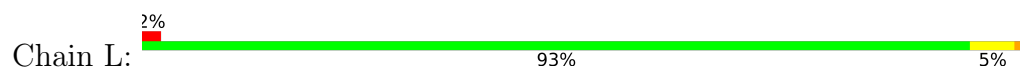
- Molecule 11: Proteasome subunit beta type-5



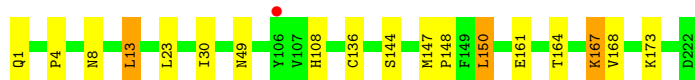
- Molecule 11: Proteasome subunit beta type-5



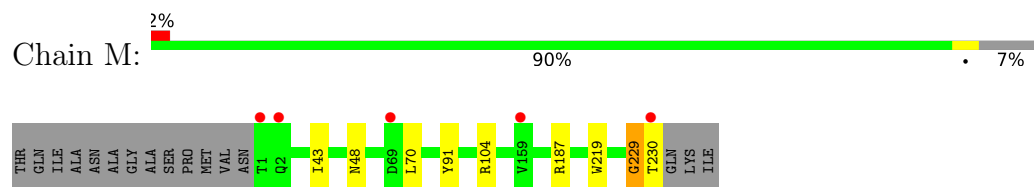
- Molecule 12: Proteasome subunit beta type-6



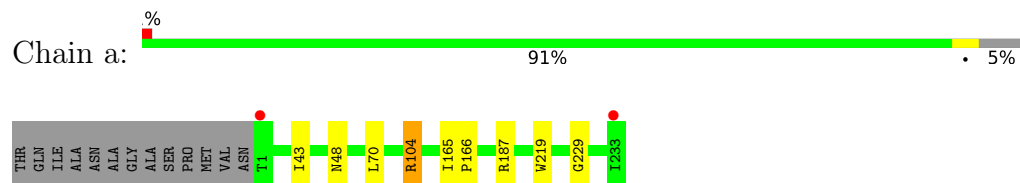
- Molecule 12: Proteasome subunit beta type-6



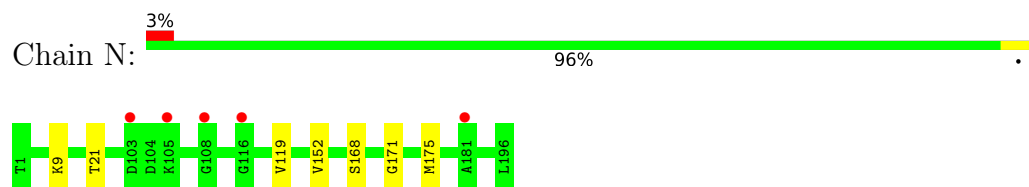
- Molecule 13: Proteasome subunit beta type-7



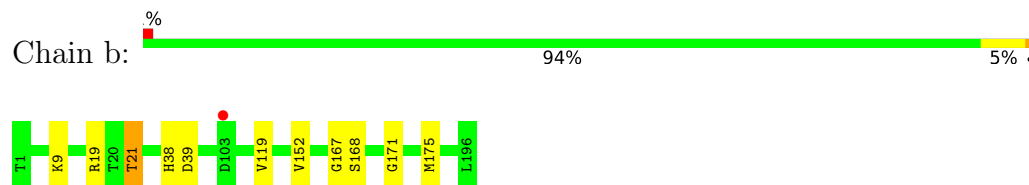
- Molecule 13: Proteasome subunit beta type-7



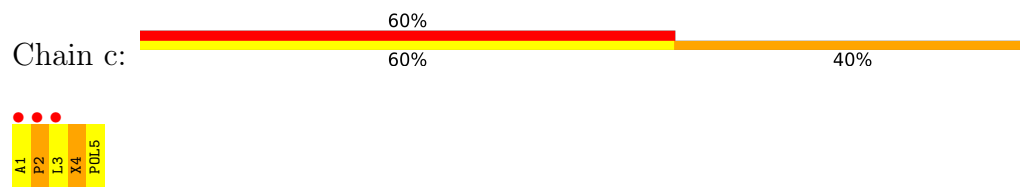
- Molecule 14: Proteasome subunit beta type-1



- Molecule 14: Proteasome subunit beta type-1



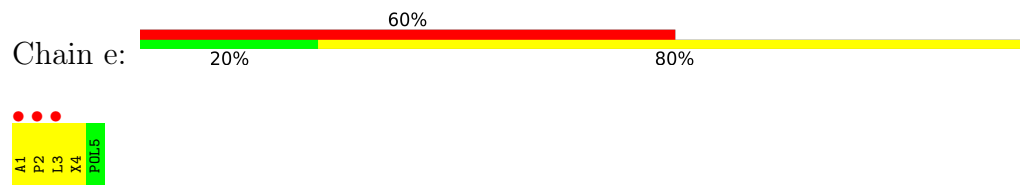
- Molecule 15: H-APLL-ep



- Molecule 15: H-APLL-ep



- Molecule 15: H-APLL-ep



- Molecule 15: H-APLL-ep

Chain f:  20% 80%

A1	P2	L3	X4	POL5
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4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	136.56Å 300.72Å 145.43Å 90.00° 113.33° 90.00°	Depositor
Resolution (Å)	15.00 – 2.60 15.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	98.6 (15.00-2.60) 98.1 (15.00-2.60)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.73 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.209 , 0.236 (Not available) , 0.236	Depositor DCC
R_{free} test set	16129 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	53.7	Xtriage
Anisotropy	0.124	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 52.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	49865	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.24% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.40	0/1952	0.68	0/2642
1	O	0.41	0/1952	0.69	0/2642
2	B	0.42	0/1934	0.68	0/2618
2	P	0.41	0/1934	0.68	0/2618
3	C	0.41	0/1910	0.69	0/2586
3	Q	0.41	0/1910	0.70	0/2586
4	D	0.40	0/1837	0.66	0/2475
4	R	0.40	0/1837	0.66	0/2475
5	E	0.41	0/1800	0.67	0/2433
5	S	0.41	0/1800	0.66	0/2433
6	F	0.41	0/1932	0.70	0/2609
6	T	0.41	0/1932	0.70	0/2609
7	G	0.41	0/1945	0.67	0/2634
7	U	0.40	0/1945	0.67	0/2634
8	H	0.39	0/1715	0.65	0/2326
8	V	0.39	0/1715	0.65	0/2326
9	I	0.39	0/1611	0.68	0/2174
9	W	0.39	0/1611	0.68	0/2174
10	J	0.39	0/1589	0.67	0/2142
10	X	0.39	0/1589	0.66	0/2142
11	K	0.51	4/1681 (0.2%)	0.71	0/2274
11	Y	0.54	4/1681 (0.2%)	0.72	0/2274
12	L	0.39	0/1795	0.69	1/2420 (0.0%)
12	Z	0.39	0/1795	0.70	1/2420 (0.0%)
13	M	0.41	0/1828	0.67	0/2480
13	a	0.41	0/1855	0.67	0/2514
14	N	0.50	0/1541	0.73	0/2087
14	b	0.48	0/1541	0.73	0/2087
15	c	2.46	1/20 (5.0%)	2.64	2/27 (7.4%)
15	d	2.48	1/20 (5.0%)	1.71	2/27 (7.4%)
15	e	2.67	1/20 (5.0%)	2.38	2/27 (7.4%)
15	f	2.52	1/20 (5.0%)	1.69	0/27

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
All	All	0.43	12/50247 (0.0%)	0.69	8/67942 (0.0%)

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	e	2	PRO	CA-C	-11.46	1.38	1.52
15	f	2	PRO	CA-C	-10.42	1.40	1.52
15	d	2	PRO	CA-C	-10.22	1.40	1.52
15	c	2	PRO	CA-C	-9.97	1.38	1.52
11	K	1	THR	CB-OG1	-6.38	1.33	1.43
11	K	104	TYR	CE1-CZ	-6.24	1.23	1.38
11	Y	104	TYR	CG-CD2	-6.14	1.26	1.39
11	Y	1	THR	CB-OG1	-5.96	1.34	1.43
11	K	104	TYR	CG-CD2	-5.86	1.27	1.39
11	Y	104	TYR	CG-CD1	-5.83	1.27	1.39
11	K	104	TYR	CG-CD1	-5.80	1.27	1.39
11	Y	104	TYR	CE1-CZ	-5.66	1.24	1.38

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	c	1	ALA	CA-C-N	8.37	130.30	119.84
15	c	1	ALA	C-N-CA	8.37	130.30	119.84
15	e	1	ALA	CA-C-N	7.34	127.30	120.03
15	e	1	ALA	C-N-CA	7.34	127.30	120.03
12	Z	173	LYS	CD-CE-NZ	6.04	131.24	111.90
12	L	173	LYS	CD-CE-NZ	5.70	130.12	111.90
15	d	1	ALA	CA-C-N	5.05	125.34	119.93
15	d	1	ALA	C-N-CA	5.05	125.34	119.93

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1915	0	1929	0	0
1	O	1915	0	1929	1	0
2	B	1904	0	1904	6	0
2	P	1904	0	1904	3	0
3	C	1881	0	1895	9	0
3	Q	1881	0	1895	6	0
4	D	1813	0	1797	1	0
4	R	1813	0	1797	4	0
5	E	1773	0	1775	3	0
5	S	1773	0	1775	4	0
6	F	1892	0	1883	1	0
6	T	1892	0	1883	1	0
7	G	1907	0	1901	3	0
7	U	1907	0	1901	4	0
8	H	1684	0	1688	4	0
8	V	1684	0	1688	6	0
9	I	1581	0	1574	6	0
9	W	1581	0	1574	6	0
10	J	1561	0	1569	5	0
10	X	1561	0	1569	3	0
11	K	1644	0	1592	29	0
11	Y	1644	0	1592	37	0
12	L	1757	0	1711	5	0
12	Z	1757	0	1711	8	0
13	M	1797	0	1800	4	0
13	a	1824	0	1832	3	0
14	N	1512	0	1478	3	0
14	b	1512	0	1478	7	0
15	c	32	0	41	3	0
15	d	32	0	41	2	0
15	e	32	0	41	2	0
15	f	32	0	41	4	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	1	0
17	N	1	0	0	0	0
17	U	1	0	0	0	0
17	b	1	0	0	0	0
18	Y	12	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	c	12	0	13	1	0
19	A	17	0	0	0	0
19	B	20	0	0	0	0
19	C	15	0	0	0	0
19	D	3	0	0	0	0
19	E	5	0	0	0	0
19	F	17	0	0	0	0
19	G	27	0	0	0	0
19	H	16	0	0	0	0
19	I	18	0	0	0	0
19	J	17	0	0	0	0
19	K	18	0	0	0	0
19	L	24	0	0	0	0
19	M	20	0	0	0	0
19	N	19	0	0	0	0
19	O	10	0	0	0	0
19	P	10	0	0	0	0
19	Q	9	0	0	0	0
19	R	8	0	0	0	0
19	S	5	0	0	0	0
19	T	11	0	0	0	0
19	U	18	0	0	0	0
19	V	19	0	0	0	0
19	W	12	0	0	0	0
19	X	16	0	0	0	0
19	Y	20	0	0	0	0
19	Z	15	0	0	1	0
19	a	24	0	0	0	0
19	b	15	0	0	0	0
19	d	2	0	0	0	0
19	f	3	0	0	0	0
All	All	49865	0	49214	158	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (158) 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:K:104:TYR:CE2	11:K:182:GLU:HG2	1.74	1.22
11:Y:40:PHE:CD1	11:Y:73:ARG:NH2	2.27	1.01

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:104:TYR:HE2	11:K:182:GLU:HG2	1.10	1.01
11:Y:104:TYR:CE1	11:Y:110:PRO:HD3	1.96	1.01
11:K:35:ILE:HB	11:K:45:MET:HE3	1.49	0.94
11:Y:35:ILE:HB	11:Y:45:MET:HE3	1.48	0.94
11:Y:104:TYR:HE1	11:Y:110:PRO:HD3	1.29	0.92
11:K:104:TYR:CD2	11:K:182:GLU:HA	2.10	0.87
11:Y:40:PHE:HD1	11:Y:73:ARG:NH2	1.73	0.87
11:Y:44:THR:O	11:Y:99:THR:HG22	1.74	0.86
11:K:44:THR:O	11:K:99:THR:HG22	1.75	0.85
11:Y:104:TYR:HD2	11:Y:182:GLU:N	1.76	0.83
11:K:104:TYR:HD2	11:K:182:GLU:HA	1.43	0.81
11:Y:104:TYR:CD2	11:Y:182:GLU:N	2.52	0.77
11:Y:104:TYR:HD2	11:Y:181:THR:C	1.94	0.75
11:K:35:ILE:HB	11:K:45:MET:CE	2.18	0.74
11:K:104:TYR:CE1	11:K:110:PRO:HD3	2.23	0.74
11:Y:35:ILE:HB	11:Y:45:MET:CE	2.18	0.72
10:X:1:MET:O	10:X:2:ASP:HB2	1.89	0.72
11:Y:104:TYR:CE1	11:Y:110:PRO:CD	2.74	0.71
10:J:1:MET:O	10:J:2:ASP:HB2	1.89	0.71
11:Y:40:PHE:HD1	11:Y:73:ARG:HH21	1.33	0.70
11:Y:40:PHE:CD1	11:Y:73:ARG:CZ	2.74	0.70
11:K:100:MET:HE3	11:K:127:PHE:HB2	1.75	0.68
11:Y:100:MET:HE3	11:Y:127:PHE:HB2	1.75	0.66
11:Y:33:LYS:HE2	15:e:4:DCL:HG	1.78	0.65
12:L:164:THR:O	12:L:167:LYS:HB2	1.96	0.65
11:Y:104:TYR:CE2	11:Y:182:GLU:HG3	2.32	0.65
12:Z:164:THR:O	12:Z:167:LYS:HB2	1.98	0.64
12:Z:108:HIS:HB2	19:Z:410:HOH:O	1.97	0.63
11:K:104:TYR:CD2	11:K:182:GLU:CA	2.81	0.63
11:Y:73:ARG:NH2	11:Y:104:TYR:O	2.32	0.62
11:Y:7:ARG:NH1	11:Y:110:PRO:O	2.31	0.62
11:K:7:ARG:NH1	11:K:110:PRO:O	2.34	0.61
11:Y:104:TYR:HE1	11:Y:110:PRO:CD	2.09	0.61
15:d:4:DCL:O	15:d:5:POL:O	2.19	0.60
15:c:5:POL:H12	18:c:101:MES:O1S	2.01	0.59
15:f:4:DCL:O	15:f:5:POL:O	2.17	0.58
15:e:3:LEU:O	15:e:4:DCL:HD23	2.03	0.58
11:Y:104:TYR:CD2	11:Y:182:GLU:HA	2.38	0.58
11:Y:104:TYR:CD2	11:Y:182:GLU:CA	2.88	0.56
11:K:104:TYR:CE1	11:K:110:PRO:CD	2.88	0.56
11:Y:56:GLU:OE2	11:Y:99:THR:HG21	2.07	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:Y:104:TYR:CE2	11:Y:182:GLU:CG	2.90	0.54
14:b:21:THR:HG22	15:f:3:LEU:HB2	1.88	0.54
11:Y:145:LYS:HB2	11:Y:148:LEU:HD13	1.90	0.54
8:V:20:SER:OG	8:V:28:ASP:HB3	2.08	0.54
11:K:56:GLU:OE2	11:K:99:THR:HG21	2.08	0.54
8:H:20:SER:OG	8:H:28:ASP:HB3	2.09	0.53
17:G:302:CL:CL	8:H:69:TYR:OH	2.63	0.53
11:K:145:LYS:HB2	11:K:148:LEU:HD13	1.90	0.53
11:K:33:LYS:HE2	15:c:4:DCL:HG	1.91	0.52
11:Y:56:GLU:OE2	11:Y:99:THR:CG2	2.57	0.52
11:K:56:GLU:OE2	11:K:99:THR:CG2	2.57	0.52
7:U:23:PHE:O	7:U:26:THR:HB	2.10	0.52
7:G:23:PHE:O	7:G:26:THR:HB	2.11	0.51
10:J:67:TYR:CE1	10:J:75:LEU:HD13	2.46	0.51
14:b:152:VAL:HA	14:b:175:MET:HE1	1.91	0.51
11:K:104:TYR:HE2	11:K:182:GLU:CG	2.02	0.51
10:X:67:TYR:CE1	10:X:75:LEU:HD13	2.46	0.51
11:Y:5:ALA:HB3	11:Y:100:MET:HE2	1.93	0.51
11:K:5:ALA:HB3	11:K:100:MET:HE2	1.93	0.50
12:L:13:LEU:HD13	12:L:150:LEU:HD21	1.92	0.50
12:Z:13:LEU:HD13	12:Z:150:LEU:HD21	1.93	0.50
11:Y:176:ASN:ND2	11:Y:187:TYR:OH	2.44	0.49
14:N:152:VAL:HA	14:N:175:MET:HE1	1.93	0.49
12:Z:4:PRO:O	13:a:104:ARG:NH1	2.44	0.49
11:K:36:GLU:OE1	11:K:185:TRP:CH2	2.65	0.49
13:M:229:GLY:HA2	8:V:111:PHE:CE1	2.47	0.49
11:Y:36:GLU:OE1	11:Y:185:TRP:CH2	2.65	0.49
11:Y:45:MET:HG2	11:Y:52:CYS:HB3	1.94	0.49
3:C:201:VAL:O	3:C:202:GLN:CB	2.60	0.49
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.60	0.49
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.78	0.48
14:b:19:ARG:NH1	14:b:167:GLY:O	2.46	0.48
3:Q:169:VAL:HG23	3:Q:196:SER:HB2	1.96	0.48
11:Y:107:LYS:HG3	11:Y:108:GLU:HG3	1.96	0.48
11:K:107:LYS:HG3	11:K:108:GLU:HG3	1.96	0.48
13:M:230:THR:HG22	8:V:77:VAL:HB	1.96	0.48
3:C:169:VAL:HG23	3:C:196:SER:HB2	1.96	0.47
11:K:45:MET:HG2	11:K:52:CYS:HB3	1.96	0.47
2:P:50:LYS:O	2:P:51:VAL:C	2.58	0.47
11:Y:35:ILE:HG21	11:Y:56:GLU:HB3	1.97	0.46
11:K:176:ASN:ND2	11:K:187:TYR:OH	2.47	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.79	0.46
5:S:87:LEU:HD21	5:S:107:ALA:HB1	1.97	0.46
2:B:50:LYS:O	2:B:51:VAL:C	2.58	0.46
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.98	0.46
5:E:87:LEU:HD21	5:E:107:ALA:HB1	1.97	0.46
11:K:35:ILE:HG21	11:K:56:GLU:HB3	1.97	0.46
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.98	0.46
4:R:159:TYR:CE2	5:S:56:SER:HB3	2.50	0.46
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.98	0.45
9:I:10:ILE:HG21	9:I:141:ALA:HB3	1.98	0.45
3:C:201:VAL:HG13	3:C:202:GLN:N	2.31	0.45
12:L:8:ASN:HA	12:L:30:ILE:O	2.16	0.45
11:Y:25:TRP:CH2	12:Z:144:SER:HA	2.52	0.45
11:K:5:ALA:HB3	11:K:100:MET:CE	2.46	0.45
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.99	0.45
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.97	0.45
3:Q:201:VAL:HG13	3:Q:202:GLN:N	2.32	0.45
11:Y:5:ALA:HB3	11:Y:100:MET:CE	2.46	0.45
9:W:10:ILE:HG21	9:W:141:ALA:HB3	1.98	0.44
9:W:20:VAL:HG13	9:W:118:PRO:HB3	1.98	0.44
12:Z:8:ASN:HA	12:Z:30:ILE:O	2.16	0.44
2:B:124:HIS:HB3	3:C:124:VAL:HG12	2.00	0.44
2:B:146:GLN:HG2	3:C:57:ILE:HG21	1.99	0.44
9:I:20:VAL:HG13	9:I:118:PRO:HB3	1.98	0.44
14:N:168:SER:O	15:d:5:POL:H33	2.18	0.44
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.52	0.44
8:V:50:ALA:HB2	9:W:128:CYS:HB2	2.00	0.44
2:B:14:PRO:HA	3:C:20:TYR:CD1	2.53	0.44
9:I:9:GLY:HA3	9:I:41:LYS:HE2	2.00	0.44
5:E:98:PHE:O	13:M:91:TYR:HA	2.18	0.43
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.99	0.43
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.43
8:V:218:VAL:CG2	9:W:196:LYS:HB2	2.48	0.43
2:B:14:PRO:HA	3:C:20:TYR:CE1	2.53	0.43
14:b:168:SER:O	15:f:5:POL:H33	2.18	0.43
6:F:172:LEU:CD1	6:F:195:ILE:HD13	2.49	0.42
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.42
8:H:218:VAL:CG2	9:I:196:LYS:HB2	2.49	0.42
2:P:124:HIS:HB3	3:Q:124:VAL:HG12	2.02	0.42
11:K:104:TYR:CD2	11:K:182:GLU:HG2	2.42	0.42
14:N:171:GLY:HA2	13:a:219:TRP:CH2	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:Q:201:VAL:O	3:Q:202:GLN:HB2	2.19	0.42
9:W:20:VAL:HG23	9:W:189:ILE:HB	2.01	0.42
4:D:88:ALA:HA	4:D:99:ILE:HG21	2.01	0.42
9:I:20:VAL:HG23	9:I:189:ILE:HB	2.01	0.42
11:Y:9:GLN:NE2	11:Y:148:LEU:O	2.52	0.42
11:Y:40:PHE:CE1	11:Y:73:ARG:CZ	3.03	0.41
2:P:151:ASN:HB2	2:P:152:PRO:HD2	2.03	0.41
4:R:88:ALA:HA	4:R:99:ILE:HG21	2.01	0.41
12:Z:147:MET:N	12:Z:148:PRO:HD2	2.35	0.41
6:T:172:LEU:CD1	6:T:195:ILE:HD13	2.50	0.41
11:K:1:THR:HG22	11:K:2:THR:N	2.34	0.41
11:K:100:MET:CE	11:K:127:PHE:HB2	2.46	0.41
4:R:158:ARG:HB3	5:S:57:SER:HB3	2.03	0.41
13:M:219:TRP:CH2	14:b:171:GLY:HA2	2.56	0.41
12:L:147:MET:N	12:L:148:PRO:HD2	2.35	0.41
15:c:3:LEU:O	15:c:4:DCL:HD23	2.21	0.41
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.51	0.41
11:K:104:TYR:CZ	11:K:110:PRO:HD3	2.55	0.41
12:Z:161:GLU:HB3	12:Z:164:THR:HG21	2.01	0.41
3:C:201:VAL:O	3:C:202:GLN:HB2	2.20	0.41
10:J:1:MET:O	10:J:2:ASP:CB	2.66	0.41
11:K:9:GLN:NE2	11:K:148:LEU:O	2.54	0.41
12:L:161:GLU:HB3	12:L:164:THR:HG21	2.01	0.41
4:R:99:ILE:HD11	4:R:104:LEU:HB2	2.02	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.84	0.41
11:Y:100:MET:CE	11:Y:127:PHE:HB2	2.46	0.41
14:b:19:ARG:O	15:f:5:POL:H31	2.21	0.41
2:B:151:ASN:HB2	2:B:152:PRO:HD2	2.02	0.40
5:E:77:ALA:N	5:E:78:PRO:CD	2.84	0.40
11:Y:40:PHE:CD1	11:Y:73:ARG:NE	2.89	0.40
13:a:165:ILE:HB	13:a:166:PRO:HD3	2.03	0.40
14:b:38:HIS:O	14:b:39:ASP:C	2.64	0.40
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.51	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	248/250 (99%)	241 (97%)	7 (3%)	0	100	100
1	O	248/250 (99%)	241 (97%)	7 (3%)	0	100	100
2	B	242/258 (94%)	233 (96%)	7 (3%)	2 (1%)	16	34
2	P	242/258 (94%)	233 (96%)	7 (3%)	2 (1%)	16	34
3	C	238/254 (94%)	230 (97%)	6 (2%)	2 (1%)	16	34
3	Q	238/254 (94%)	229 (96%)	7 (3%)	2 (1%)	16	34
4	D	231/260 (89%)	225 (97%)	6 (3%)	0	100	100
4	R	231/260 (89%)	225 (97%)	6 (3%)	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%)	234 (97%)	7 (3%)	0	100	100
6	T	241/288 (84%)	233 (97%)	8 (3%)	0	100	100
7	G	239/252 (95%)	234 (98%)	5 (2%)	0	100	100
7	U	239/252 (95%)	235 (98%)	4 (2%)	0	100	100
8	H	220/232 (95%)	215 (98%)	5 (2%)	0	100	100
8	V	220/232 (95%)	215 (98%)	4 (2%)	1 (0%)	24	46
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%)	189 (98%)	3 (2%)	1 (0%)	24	46
10	X	193/198 (98%)	189 (98%)	3 (2%)	1 (0%)	24	46
11	K	210/212 (99%)	205 (98%)	5 (2%)	0	100	100
11	Y	210/212 (99%)	205 (98%)	5 (2%)	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	228/246 (93%)	222 (97%)	5 (2%)	1 (0%)	30	51

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	a	231/246 (94%)	225 (97%)	5 (2%)	1 (0%)	30	51
14	N	194/196 (99%)	188 (97%)	6 (3%)	0	100	100
14	b	194/196 (99%)	188 (97%)	6 (3%)	0	100	100
15	c	2/5 (40%)	1 (50%)	1 (50%)	0	100	100
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%)	2 (100%)	0	0	100	100
All	All	6281/6634 (95%)	6109 (97%)	159 (2%)	13 (0%)	43	66

All (13) 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
3	C	205	ALA
3	Q	205	ALA
2	B	221	ASP
2	P	221	ASP
8	V	9	ASN
13	M	229	GLY
13	a	229	GLY

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	209/209 (100%)	204 (98%)	5 (2%)	43	70
1	O	209/209 (100%)	204 (98%)	5 (2%)	43	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	203/216 (94%)	194 (96%)	9 (4%)	25	50
2	P	203/216 (94%)	194 (96%)	9 (4%)	25	50
3	C	212/226 (94%)	205 (97%)	7 (3%)	33	61
3	Q	212/226 (94%)	205 (97%)	7 (3%)	33	61
4	D	194/215 (90%)	182 (94%)	12 (6%)	16	36
4	R	194/215 (90%)	182 (94%)	12 (6%)	16	36
5	E	190/193 (98%)	183 (96%)	7 (4%)	30	57
5	S	190/193 (98%)	182 (96%)	8 (4%)	26	52
6	F	201/239 (84%)	194 (96%)	7 (4%)	32	59
6	T	201/239 (84%)	194 (96%)	7 (4%)	32	59
7	G	206/210 (98%)	198 (96%)	8 (4%)	28	55
7	U	206/210 (98%)	198 (96%)	8 (4%)	28	55
8	H	181/190 (95%)	176 (97%)	5 (3%)	38	66
8	V	181/190 (95%)	176 (97%)	5 (3%)	38	66
9	I	172/173 (99%)	168 (98%)	4 (2%)	44	71
9	W	172/173 (99%)	168 (98%)	4 (2%)	44	71
10	J	173/175 (99%)	169 (98%)	4 (2%)	44	71
10	X	173/175 (99%)	169 (98%)	4 (2%)	44	71
11	K	169/169 (100%)	158 (94%)	11 (6%)	15	35
11	Y	169/169 (100%)	157 (93%)	12 (7%)	13	31
12	L	185/185 (100%)	176 (95%)	9 (5%)	22	47
12	Z	185/185 (100%)	177 (96%)	8 (4%)	26	51
13	M	196/208 (94%)	191 (97%)	5 (3%)	40	68
13	a	199/208 (96%)	194 (98%)	5 (2%)	42	69
14	N	162/162 (100%)	159 (98%)	3 (2%)	50	75
14	b	162/162 (100%)	159 (98%)	3 (2%)	50	75
15	c	2/2 (100%)	1 (50%)	1 (50%)	0	0
15	d	2/2 (100%)	2 (100%)	0	100	100
15	e	2/2 (100%)	2 (100%)	0	100	100
15	f	2/2 (100%)	2 (100%)	0	100	100
All	All	5317/5548 (96%)	5123 (96%)	194 (4%)	31	58

All (194) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	17	LYS
1	A	61	LEU
1	A	122	THR
1	A	157	PHE
2	B	50	LYS
2	B	52	THR
2	B	55	LEU
2	B	58	GLN
2	B	79	LEU
2	B	102	ASN
2	B	114	LEU
2	B	184	LYS
2	B	191	LEU
3	C	4	ARG
3	C	38	ASN
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	125	LEU
4	D	176	LEU
4	D	193	LEU
4	D	197	LYS
4	D	214	ILE
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	25	LEU
5	E	29	LYS
5	E	54	GLU
5	E	71	LEU
5	E	174	THR
5	E	188	LEU
6	F	68	ARG
6	F	123	ASN

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Mol	Chain	Res	Type
6	F	172	LEU
6	F	181	GLU
6	F	203	ASN
6	F	206	LYS
6	F	221	ASN
7	G	26	THR
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	56	THR
8	H	68	LEU
8	H	127	LEU
8	H	196	ARG
9	I	37	ASN
9	I	171	LEU
9	I	182	TRP
9	I	192	ASP
10	J	23	ARG
10	J	75	LEU
10	J	144	LEU
10	J	174	MET
11	K	4	LEU
11	K	9	GLN
11	K	35	ILE
11	K	36	GLU
11	K	99	THR
11	K	106	ARG
11	K	107	LYS
11	K	118	ASP
11	K	143	ASN
11	K	148	LEU
11	K	181	THR
12	L	1	GLN
12	L	13	LEU
12	L	23	LEU
12	L	49	ASN
12	L	136	CYS

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Mol	Chain	Res	Type
12	L	150	LEU
12	L	167	LYS
12	L	168	VAL
12	L	173	LYS
13	M	43	ILE
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	187	ARG
14	N	9	LYS
14	N	21	THR
14	N	119	VAL
1	O	1	MET
1	O	17	LYS
1	O	61	LEU
1	O	122	THR
1	O	157	PHE
2	P	50	LYS
2	P	52	THR
2	P	55	LEU
2	P	58	GLN
2	P	79	LEU
2	P	102	ASN
2	P	114	LEU
2	P	184	LYS
2	P	191	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	147	GLN
3	Q	160	GLN
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	125	LEU
4	R	176	LEU
4	R	193	LEU
4	R	197	LYS

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Mol	Chain	Res	Type
4	R	214	ILE
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	25	LEU
5	S	29	LYS
5	S	54	GLU
5	S	55	LEU
5	S	71	LEU
5	S	174	THR
5	S	188	LEU
6	T	68	ARG
6	T	123	ASN
6	T	172	LEU
6	T	181	GLU
6	T	203	ASN
6	T	206	LYS
6	T	221	ASN
7	U	26	THR
7	U	83	ASN
7	U	115	LEU
7	U	125	MET
7	U	166	GLN
7	U	181	LYS
7	U	235	ARG
7	U	236	LEU
8	V	22	GLN
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	192	ASP
10	X	23	ARG
10	X	75	LEU
10	X	144	LEU
10	X	174	MET
11	Y	4	LEU
11	Y	9	GLN
11	Y	35	ILE

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Mol	Chain	Res	Type
11	Y	36	GLU
11	Y	73	ARG
11	Y	99	THR
11	Y	106	ARG
11	Y	107	LYS
11	Y	118	ASP
11	Y	143	ASN
11	Y	148	LEU
11	Y	181	THR
12	Z	1	GLN
12	Z	13	LEU
12	Z	23	LEU
12	Z	49	ASN
12	Z	136	CYS
12	Z	150	LEU
12	Z	167	LYS
12	Z	168	VAL
13	a	43	ILE
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	187	ARG
14	b	9	LYS
14	b	21	THR
14	b	119	VAL
15	c	2	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (115) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	155	ASN
2	B	176	GLN
2	B	226	GLN
2	B	232	GLN
3	C	38	ASN
3	C	53	GLN
3	C	115	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
3	C	233	GLN

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Mol	Chain	Res	Type
4	D	91	HIS
4	D	100	ASN
4	D	106	GLN
4	D	225	ASN
5	E	68	HIS
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	118	ASN
5	E	120	GLN
5	E	147	GLN
5	E	151	ASN
5	E	165	GLN
5	E	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	123	ASN
6	F	240	GLN
7	G	28	GLN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	166	GLN
7	G	175	ASN
8	H	30	ASN
8	H	57	GLN
8	H	116	HIS
8	H	172	ASN
8	H	189	ASN
8	H	194	ASN
9	I	37	ASN
9	I	63	ASN
10	J	55	GLN
10	J	63	ASN
10	J	147	HIS
11	K	9	GLN
11	K	85	ASN
11	K	176	ASN
11	K	208	ASN
12	L	3	ASN
12	L	70	ASN
12	L	79	HIS

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Mol	Chain	Res	Type
12	L	94	GLN
12	L	158	ASN
12	L	165	ASN
13	M	102	GLN
14	N	38	HIS
14	N	69	GLN
14	N	141	ASN
2	P	119	GLN
2	P	123	GLN
2	P	176	GLN
2	P	232	GLN
3	Q	38	ASN
3	Q	116	GLN
3	Q	120	GLN
3	Q	147	GLN
3	Q	160	GLN
3	Q	233	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	225	ASN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	120	GLN
5	S	147	GLN
5	S	165	GLN
5	S	184	ASN
6	T	86	ASN
6	T	117	GLN
6	T	240	GLN
7	U	28	GLN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	166	GLN
8	V	30	ASN
8	V	57	GLN
8	V	114	HIS
8	V	172	ASN
8	V	189	ASN
8	V	194	ASN

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Mol	Chain	Res	Type
9	W	37	ASN
9	W	63	ASN
10	X	37	GLN
10	X	63	ASN
10	X	147	HIS
11	Y	9	GLN
11	Y	85	ASN
11	Y	176	ASN
11	Y	208	ASN
12	Z	3	ASN
12	Z	70	ASN
12	Z	94	GLN
12	Z	158	ASN
12	Z	165	ASN
13	a	48	ASN
13	a	149	HIS
14	b	38	HIS
14	b	69	GLN
14	b	141	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 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	f	4	14,15	7,7,7	0.68	0	6,8,8	1.07	0
15	DCL	d	4	14,15	7,7,7	0.63	0	6,8,8	1.07	0
15	DCL	e	4	11,15	7,7,7	0.47	0	6,8,8	0.91	0
15	DCL	c	4	11,15	7,7,7	0.65	0	6,8,8	0.97	1 (16%)

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

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	c	4	DCL	O-C-CA	-2.15	103.27	111.52

There are no chirality outliers.

All (11) 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
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	f	4	DCL	N-CA-CB-CG
15	f	4	DCL	C-CA-CB-CG
15	f	4	DCL	CA-CB-CG-CD2
15	d	4	DCL	CA-CB-CG-CD2
15	e	4	DCL	C-CA-CB-CG
15	c	4	DCL	CA-CB-CG-CD2

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
15	f	4	DCL	1	0
15	d	4	DCL	1	0
15	e	4	DCL	2	0
15	c	4	DCL	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides 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	Y	301	-	12,12,12	2.26	1 (8%)	15,16,16	1.06	1 (6%)
18	MES	c	101	-	12,12,12	2.27	1 (8%)	15,16,16	1.05	1 (6%)

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	Y	301	-	-	0/6/14/14	0/1/1/1
18	MES	c	101	-	-	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	c	101	MES	C8-S	-7.54	1.67	1.77
18	Y	301	MES	C8-S	-7.49	1.67	1.77

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	Y	301	MES	O2S-S-C8	2.36	110.30	106.73
18	c	101	MES	O2S-S-C8	2.14	109.96	106.73

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
18	c	101	MES	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	250/250 (100%)	0.08	4 (1%) 70 66	36, 50, 88, 129	0
1	O	250/250 (100%)	0.22	5 (2%) 65 60	42, 59, 105, 136	0
2	B	244/258 (94%)	0.05	6 (2%) 58 52	36, 55, 103, 159	0
2	P	244/258 (94%)	0.15	13 (5%) 32 26	41, 60, 109, 159	0
3	C	240/254 (94%)	0.04	11 (4%) 37 32	37, 58, 122, 161	0
3	Q	240/254 (94%)	0.36	16 (6%) 24 19	42, 72, 153, 193	0
4	D	235/260 (90%)	-0.02	5 (2%) 63 58	41, 61, 94, 142	0
4	R	235/260 (90%)	0.01	4 (1%) 69 64	41, 62, 102, 156	0
5	E	231/234 (98%)	0.27	3 (1%) 75 71	43, 63, 99, 141	0
5	S	231/234 (98%)	0.38	7 (3%) 52 47	48, 73, 115, 155	0
6	F	243/288 (84%)	0.49	12 (4%) 35 29	37, 58, 111, 138	0
6	T	243/288 (84%)	0.69	16 (6%) 24 19	36, 68, 126, 161	0
7	G	241/252 (95%)	0.52	20 (8%) 17 13	37, 54, 96, 150	0
7	U	241/252 (95%)	0.49	11 (4%) 37 32	41, 56, 93, 138	0
8	H	222/232 (95%)	0.06	1 (0%) 87 85	35, 48, 81, 118	0
8	V	222/232 (95%)	0.39	11 (4%) 34 28	38, 54, 90, 130	0
9	I	204/205 (99%)	-0.34	1 (0%) 87 85	30, 47, 76, 96	0
9	W	204/205 (99%)	-0.32	0 100 100	32, 50, 82, 103	0
10	J	195/198 (98%)	-0.22	3 (1%) 72 68	32, 49, 75, 114	0
10	X	195/198 (98%)	-0.26	3 (1%) 72 68	36, 51, 77, 129	0
11	K	212/212 (100%)	0.11	7 (3%) 49 43	38, 54, 89, 108	0
11	Y	212/212 (100%)	0.24	9 (4%) 40 35	40, 54, 90, 116	0
12	L	222/222 (100%)	-0.11	4 (1%) 67 63	35, 51, 89, 122	0
12	Z	222/222 (100%)	-0.09	1 (0%) 87 85	33, 52, 89, 120	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
13	M	230/246 (93%)	0.03	5 (2%) 62 57	31, 49, 77, 88	0
13	a	233/246 (94%)	0.02	2 (0%) 81 78	33, 50, 74, 101	0
14	N	196/196 (100%)	0.22	5 (2%) 57 51	32, 45, 75, 104	0
14	b	196/196 (100%)	0.13	1 (0%) 87 85	32, 46, 77, 101	0
15	c	3/5 (60%)	2.99	3 (100%) 0 0	78, 78, 84, 84	0
15	d	3/5 (60%)	0.48	0 100 100	49, 49, 53, 56	0
15	e	3/5 (60%)	3.45	3 (100%) 0 0	80, 80, 88, 90	0
15	f	3/5 (60%)	0.94	0 100 100	52, 52, 56, 56	0
All	All	6345/6634 (95%)	0.14	192 (3%) 52 47	30, 55, 102, 193	0

All (192) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
10	X	1	MET	6.5
3	Q	50	LEU	5.7
10	J	1	MET	5.3
2	B	219	ALA	5.3
11	Y	210	VAL	5.2
2	B	51	VAL	5.1
4	D	240	ALA	4.8
11	K	210	VAL	4.5
6	F	215	CYS	4.5
2	P	219	ALA	4.5
3	Q	49	THR	4.4
1	O	1	MET	4.3
6	T	41	GLY	4.2
11	Y	212	GLY	4.2
13	a	1	THR	4.1
15	c	2	PRO	3.9
6	F	243	ILE	3.9
7	U	24	LYS	3.9
11	Y	209	ASN	3.9
4	D	241	ALA	3.8
1	A	1	MET	3.7
3	Q	51	LYS	3.7
2	B	218	GLY	3.7
6	F	55	LEU	3.7
15	e	2	PRO	3.6
12	L	163	GLY	3.5

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Mol	Chain	Res	Type	RSRZ
6	F	241	LYS	3.5
2	P	218	GLY	3.5
15	e	3	LEU	3.4
3	Q	234	ILE	3.4
8	V	208	GLY	3.4
11	Y	211	ILE	3.4
5	S	122	TYR	3.4
7	G	182	ILE	3.3
15	e	1	ALA	3.3
3	C	206	LYS	3.3
1	A	201	GLU	3.3
11	K	212	GLY	3.3
11	Y	147	ASP	3.3
3	C	205	ALA	3.2
6	T	243	ILE	3.2
3	C	236	GLN	3.2
6	F	2	THR	3.2
8	V	218	VAL	3.2
5	E	233	ILE	3.1
8	V	207	ARG	3.0
11	K	211	ILE	2.9
13	a	233	ILE	2.9
7	U	55	LEU	2.9
4	R	239	GLU	2.9
10	X	194	ASP	2.9
2	P	52	THR	2.9
11	Y	45	MET	2.8
6	T	178	HIS	2.8
11	K	182	GLU	2.8
14	b	103	ASP	2.8
7	G	236	LEU	2.8
2	B	55	LEU	2.8
3	Q	52	LEU	2.8
3	C	240	GLU	2.8
7	G	240	ALA	2.8
13	M	230	THR	2.8
4	R	238	LYS	2.7
10	J	142	SER	2.7
11	Y	182	GLU	2.7
7	G	237	VAL	2.7
12	L	106	TYR	2.7
1	O	209	ILE	2.7

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Mol	Chain	Res	Type	RSRZ
6	T	244	ASN	2.7
8	V	215	GLU	2.7
7	G	204	ALA	2.7
6	T	14	ASP	2.7
4	D	3	GLY	2.7
7	G	230	GLU	2.7
8	V	209	THR	2.7
3	Q	53	GLN	2.6
4	D	242	GLU	2.6
15	c	1	ALA	2.6
7	G	179	LYS	2.6
1	A	249	ALA	2.6
3	Q	46	ARG	2.6
10	J	139	TYR	2.6
5	S	209	ASN	2.6
5	S	57	SER	2.5
7	G	192	LYS	2.5
13	M	159	VAL	2.5
7	U	209	PHE	2.5
14	N	103	ASP	2.5
5	S	30	GLN	2.5
6	T	239	ALA	2.5
7	U	222	ASP	2.5
3	Q	205	ALA	2.5
6	T	160	ALA	2.5
7	U	242	GLN	2.5
15	c	3	LEU	2.5
6	T	170	ALA	2.5
2	P	244	THR	2.4
13	M	1	THR	2.4
7	G	232	ILE	2.4
12	L	166	GLY	2.4
11	Y	104	TYR	2.4
3	Q	201	VAL	2.4
7	G	68	ARG	2.4
11	K	209	ASN	2.4
2	P	222	GLY	2.4
12	L	135	GLN	2.4
8	V	123	TYR	2.4
7	U	186	ASN	2.4
3	Q	59	PRO	2.4
6	T	241	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
4	R	241	ALA	2.4
7	U	40	ASP	2.4
6	T	53	LYS	2.4
7	G	3	TYR	2.3
10	X	139	TYR	2.3
1	O	53	SER	2.3
3	Q	223	SER	2.3
14	N	108	GLY	2.3
14	N	105	LYS	2.3
2	B	1	GLY	2.3
3	Q	232	THR	2.3
7	U	179	LYS	2.3
11	Y	142	SER	2.3
5	E	207	VAL	2.3
3	Q	208	ILE	2.3
3	Q	238	LYS	2.3
6	F	190	LYS	2.3
7	G	211	LYS	2.3
7	U	54	LEU	2.3
8	V	212	VAL	2.3
8	V	196	ARG	2.2
2	P	221	ASP	2.2
3	C	239	GLN	2.2
7	G	213	ASP	2.2
13	M	2	GLN	2.2
8	H	208	GLY	2.2
6	F	201	GLU	2.2
2	P	1	GLY	2.2
2	P	238	LEU	2.2
3	C	50	LEU	2.2
2	P	51	VAL	2.2
7	G	178	LYS	2.2
6	F	50	ILE	2.2
6	T	50	ILE	2.2
2	B	52	THR	2.2
2	P	225	TYR	2.2
5	S	3	ASN	2.2
11	K	104	TYR	2.2
3	Q	233	GLN	2.2
7	G	242	GLN	2.2
6	F	182	GLY	2.2
6	T	162	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
3	C	203	THR	2.2
13	M	69	ASP	2.2
4	D	9	PRO	2.1
6	T	204	LYS	2.1
6	T	136	GLY	2.1
2	P	201	ASP	2.1
6	F	56	VAL	2.1
1	O	249	ALA	2.1
1	A	2	THR	2.1
3	C	49	THR	2.1
6	T	15	GLY	2.1
14	N	116	GLY	2.1
3	C	201	VAL	2.1
4	R	240	ALA	2.1
2	P	209	ARG	2.1
1	O	195	THR	2.1
2	P	194	LYS	2.1
6	F	53	LYS	2.1
8	V	47	GLY	2.1
7	G	239	ILE	2.1
8	V	217	ILE	2.1
9	I	1	SER	2.1
14	N	181	ALA	2.1
6	F	59	LYS	2.1
7	G	176	HIS	2.1
3	C	3	ASP	2.0
7	G	183	ASP	2.0
8	V	222	ASP	2.0
11	K	40	PHE	2.1
5	S	52	ALA	2.0
6	T	205	GLU	2.0
7	G	195	GLU	2.0
3	C	202	GLN	2.0
7	U	172	ASN	2.0
7	G	205	LEU	2.0
5	E	183	GLY	2.0
5	S	233	ILE	2.0
7	U	38	GLY	2.0
3	Q	47	ARG	2.0
12	Z	106	TYR	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
15	DCL	e	4	8/8	0.44	0.30	77,81,82,83	0
15	DCL	c	4	8/8	0.68	0.21	70,78,79,79	0
15	DCL	d	4	8/8	0.90	0.15	51,56,58,58	0
15	DCL	f	4	8/8	0.93	0.13	50,57,62,62	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
16	MG	Z	301	1/1	0.71	0.15	67,67,67,67	0
18	MES	Y	301	12/12	0.77	0.17	76,84,97,106	0
18	MES	c	101	12/12	0.85	0.18	79,86,100,102	0
16	MG	I	302	1/1	0.87	0.06	54,54,54,54	0
16	MG	I	301	1/1	0.93	0.18	63,63,63,63	0
17	CL	b	201	1/1	0.95	0.17	63,63,63,63	0
16	MG	G	301	1/1	0.96	0.09	41,41,41,41	0
17	CL	G	302	1/1	0.97	0.17	30,30,30,30	0
16	MG	K	301	1/1	0.97	0.06	56,56,56,56	0
16	MG	L	301	1/1	0.98	0.08	54,54,54,54	0
16	MG	N	201	1/1	0.98	0.09	46,46,46,46	0
17	CL	U	301	1/1	0.98	0.19	30,30,30,30	0
17	CL	N	202	1/1	0.99	0.06	43,43,43,43	0

6.5 Other polymers [i](#)

There are no such residues in this entry.