



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 3, 2024 – 04:28 pm GMT

PDB ID : 5L61  
Title : Yeast 20S proteasome with human beta5c (1-138) and human beta6 (99-132)  
in complex with epoxyketone inhibitor 14  
Authors : Groll, M.; Huber, E.M.  
Deposited on : 2016-05-28  
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 : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

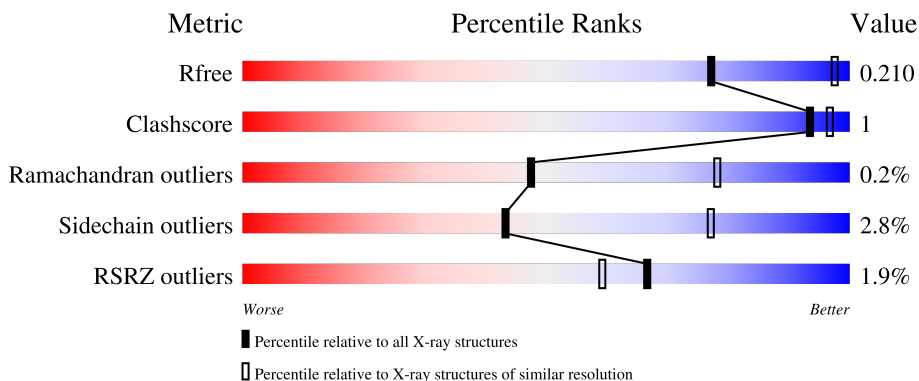
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

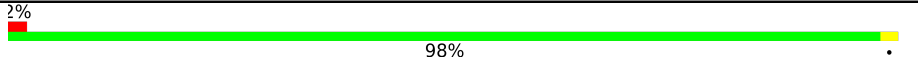
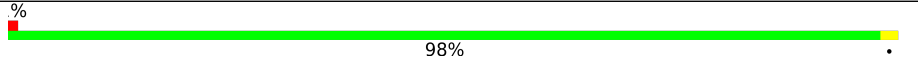



The reported resolution of this entry is 2.80 Å.

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))
$R_{free}$	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (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	 2% 98%
1	O	250	 % 98%
2	B	258	 2% 90% 5%
2	P	258	 2% 90% 5%
3	C	254	 6% 87% 6%

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Mol	Chain	Length	Quality of chain
3	Q	254	 6% 87% 6% • 6%
4	D	260	 87% • 10%
4	R	260	 2% 87% • 10%
5	E	234	 2% 96% ••
5	S	234	 3% 95% ••
6	F	288	 2% 82% • 16%
6	T	288	 2% 82% • 16%
7	G	252	 2% 91% ••
7	U	252	 2% 91% 5% •
8	H	232	 2% 94% ••
8	V	232	 3% 94% ••
9	I	205	 94% 5%
9	W	205	 95% •
10	J	198	 2% 89% 9% ••
10	X	198	 2% 90% 8% ••
11	K	211	 98% 10% •
11	Y	211	 89% 9% •
12	L	222	 95% 5%
12	Z	222	 2% 95% 5%
13	M	246	 91% • 5%
13	a	246	 92% • 5%
14	N	196	 95% ••
14	b	196	 98% •

## 2 Entry composition

There are 19 unique types of molecules in this entry. The entry contains 49776 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	211	1632	1036	282	306	8	0	0	0
11	Y	211	1632	1036	282	306	8	0	0	0

- Molecule 12 is a protein called Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
12	L	222	1764	1119	305	336	4	0	0	0
12	Z	222	1764	1119	305	336	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	233	1824	1154	312	351	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	196	1512	955	250	300	7	0	0	0
14	b	196	1512	955	250	300	7	0	0	0

- Molecule 15 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
15	A	1	Total Mg 1 1	0	0
15	G	1	Total Mg 1 1	0	0
15	I	2	Total Mg 2 2	0	0
15	J	1	Total Mg 1 1	0	0
15	K	2	Total Mg 2 2	0	0
15	L	1	Total Mg 1 1	0	0
15	N	1	Total Mg 1 1	0	0
15	Z	1	Total Mg 1 1	0	0
15	b	1	Total Mg 1 1	0	0

- Molecule 16 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

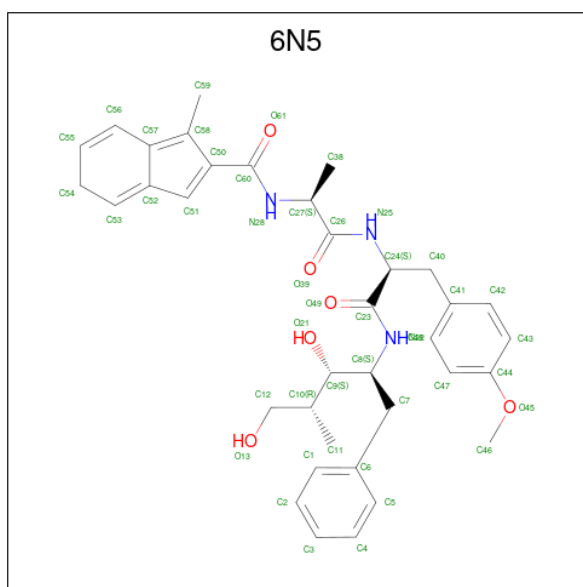
- Molecule 17 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



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

- Molecule 18 is {N}-[(2 {S})-1-[[2 {S})-3-(4-methoxyphenyl)-1-[[2 {S},3 {S},4 {R})-4-methyl-3,5-bis(oxidanyl)-1-phenyl-pentan-2-yl]amino]-1-oxidanylidene-propan-2-yl]amino]-1-oxidanylidene-propan-2-yl]-1-methyl-5 {H}-indene-2-carboxamide (three-letter code: 6N5) (formula: C<sub>36</sub>H<sub>43</sub>N<sub>3</sub>O<sub>6</sub>).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
18	K	1	Total	C	N	O	0	0
			45	36	3	6		
18	Y	1	Total	C	N	O	0	0
			45	36	3	6		

- Molecule 19 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
19	A	6	Total	O	0	0
			6	6		
19	B	7	Total	O	0	0
			7	7		
19	C	6	Total	O	0	0
			6	6		
19	D	4	Total	O	0	0
			4	4		
19	E	5	Total	O	0	0
			5	5		
19	F	12	Total	O	0	0
			12	12		
19	G	11	Total	O	0	0
			11	11		
19	H	15	Total	O	0	0
			15	15		
19	I	11	Total	O	0	0
			11	11		
19	J	9	Total	O	0	0
			9	9		

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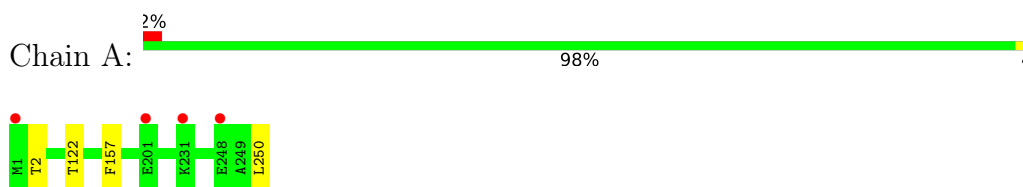
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
19	K	8	Total O 8 8	0	0
19	L	14	Total O 14 14	0	0
19	M	18	Total O 18 18	0	0
19	N	8	Total O 8 8	0	0
19	O	8	Total O 8 8	0	0
19	P	10	Total O 10 10	0	0
19	Q	6	Total O 6 6	0	0
19	R	8	Total O 8 8	0	0
19	S	4	Total O 4 4	0	0
19	T	8	Total O 8 8	0	0
19	U	20	Total O 20 20	0	0
19	V	11	Total O 11 11	0	0
19	W	12	Total O 12 12	0	0
19	X	10	Total O 10 10	0	0
19	Y	10	Total O 10 10	0	0
19	Z	7	Total O 7 7	0	0
19	a	12	Total O 12 12	0	0
19	b	9	Total O 9 9	0	0

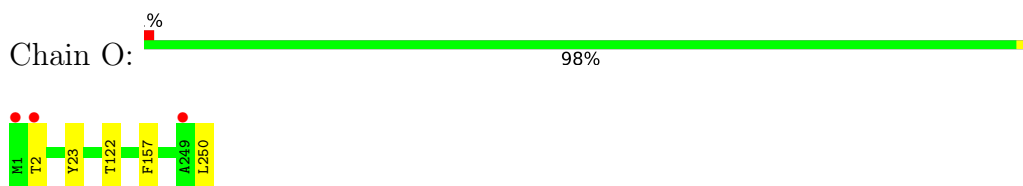
### 3 Residue-property plots [i](#)

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.

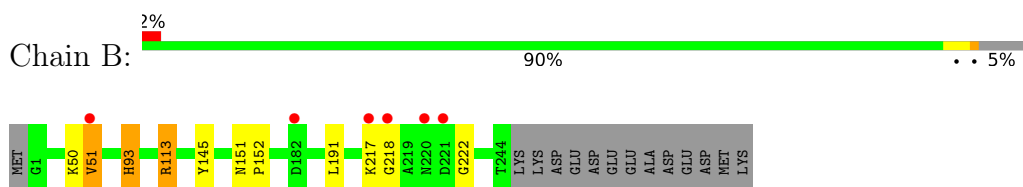
- Molecule 1: Proteasome subunit alpha type-2



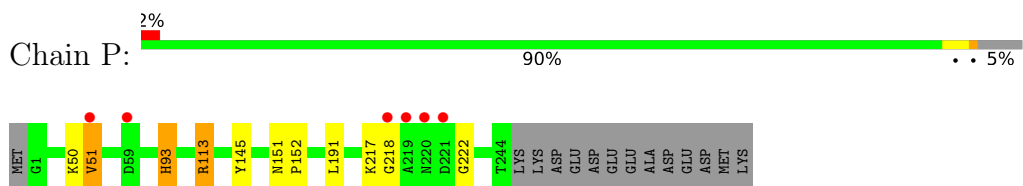
- Molecule 1: Proteasome subunit alpha type-2



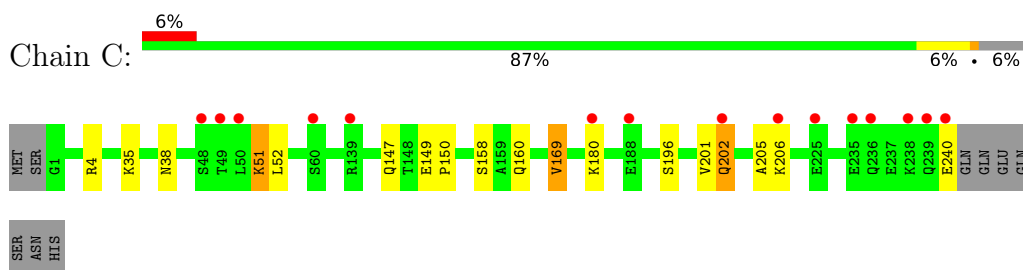
- Molecule 2: Proteasome subunit alpha type-3



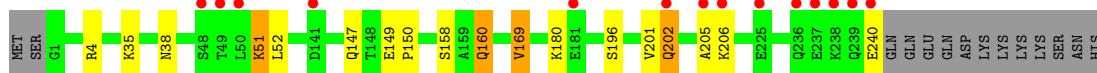
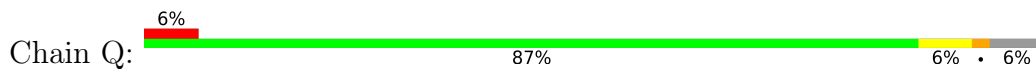
- Molecule 2: Proteasome subunit alpha type-3



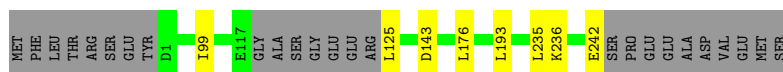
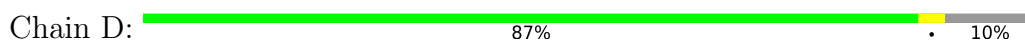
- Molecule 3: Proteasome subunit alpha type-4



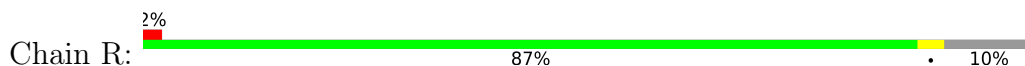
- Molecule 3: Proteasome subunit alpha type-4



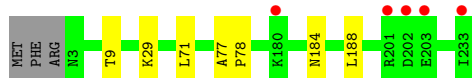
- Molecule 4: Proteasome subunit alpha type-5



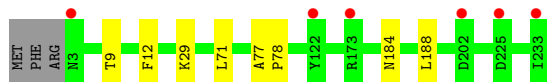
- Molecule 4: Proteasome subunit alpha type-5



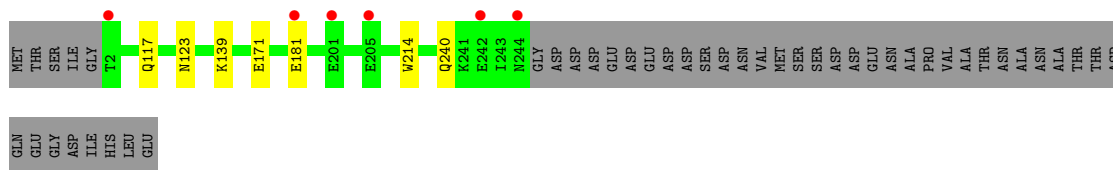
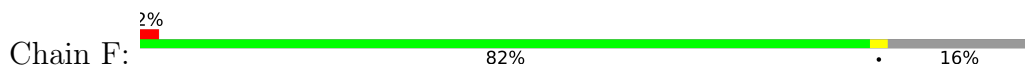
- Molecule 5: Proteasome subunit alpha type-6



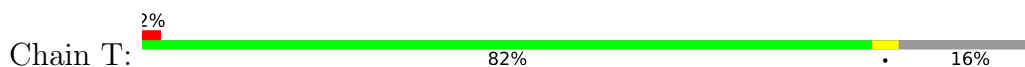
- Molecule 5: Proteasome subunit alpha type-6

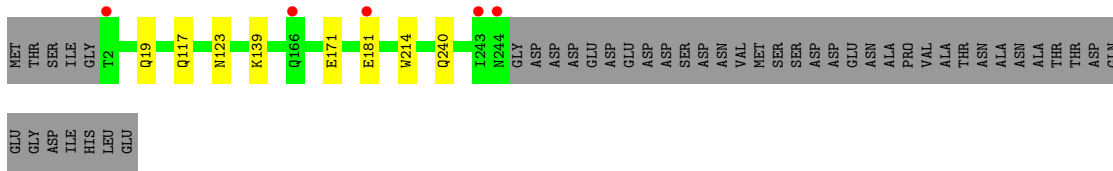


- Molecule 6: Probable proteasome subunit alpha type-7

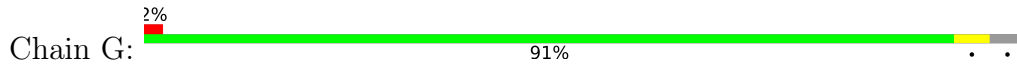


- Molecule 6: Probable proteasome subunit alpha type-7

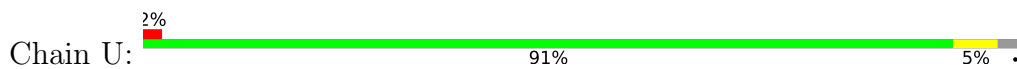




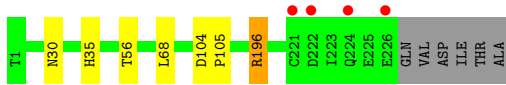
- Molecule 7: Proteasome subunit alpha type-1



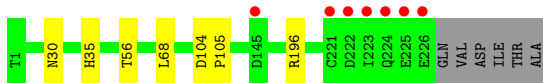
- Molecule 7: Proteasome subunit alpha type-1



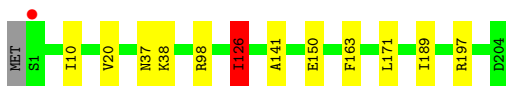
- Molecule 8: Proteasome subunit beta type-2



- Molecule 8: Proteasome subunit beta type-2



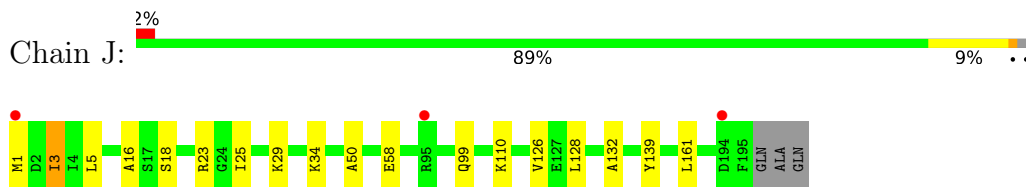
- Molecule 9: Proteasome subunit beta type-3



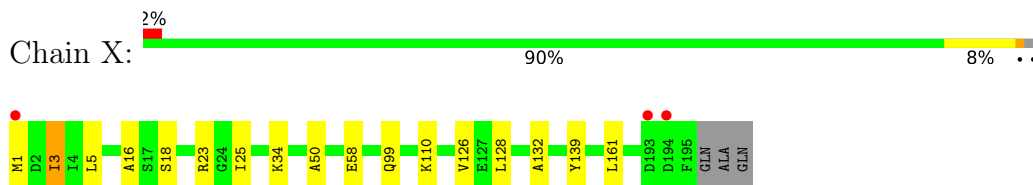
- Molecule 9: Proteasome subunit beta type-3



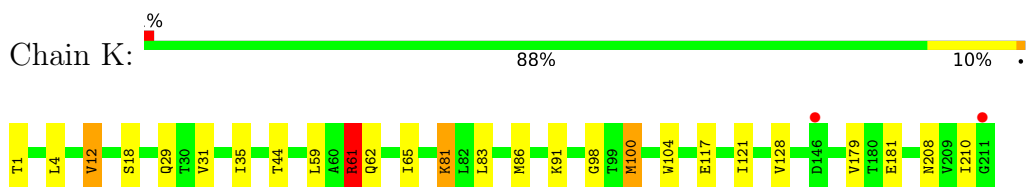
- Molecule 10: Proteasome subunit beta type-4



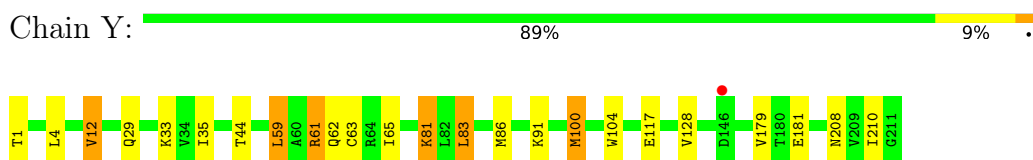
- Molecule 10: Proteasome subunit beta type-4



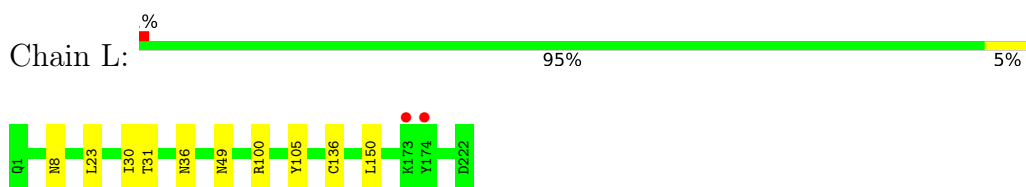
- Molecule 11: Proteasome subunit beta type-5, Proteasome subunit beta type-5



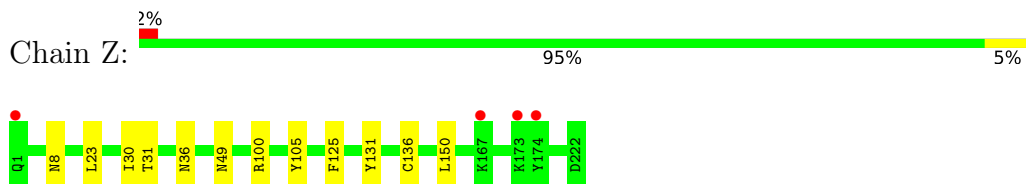
- Molecule 11: Proteasome subunit beta type-5, Proteasome subunit beta type-5



- Molecule 12: Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6

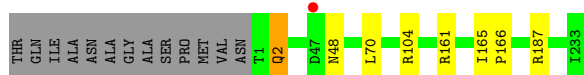


- Molecule 12: Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6

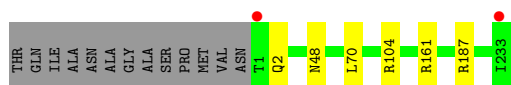


- Molecule 13: Proteasome subunit beta type-7

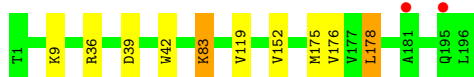




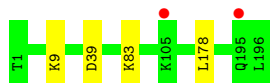
- Molecule 13: Proteasome subunit beta type-7



- Molecule 14: Proteasome subunit beta type-1



- Molecule 14: Proteasome subunit beta type-1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	135.67Å 300.68Å 145.68Å 90.00° 112.84° 90.00°	Depositor
Resolution (Å)	15.00 – 2.80 15.00 – 2.80	Depositor EDS
% Data completeness (in resolution range)	97.5 (15.00-2.80) 97.5 (15.00-2.80)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.49 (at 2.81Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.179 , 0.205 0.185 , 0.210	Depositor DCC
$R_{free}$ test set	12740 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	57.6	Xtrriage
Anisotropy	0.076	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 36.7	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	49776	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.46% 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: 6N5, CL, MG, MES

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	0.27	0/1952	0.46	0/2642
1	O	0.27	0/1952	0.46	0/2642
2	B	0.31	0/1934	0.60	3/2618 (0.1%)
2	P	0.29	0/1934	0.63	2/2618 (0.1%)
3	C	0.27	0/1910	0.49	0/2586
3	Q	0.27	0/1910	0.49	0/2586
4	D	0.26	0/1837	0.46	0/2475
4	R	0.26	0/1837	0.46	0/2475
5	E	0.27	0/1800	0.46	0/2433
5	S	0.26	0/1800	0.46	0/2433
6	F	0.27	0/1932	0.44	0/2609
6	T	0.27	0/1932	0.44	0/2609
7	G	0.27	0/1945	0.46	0/2634
7	U	0.27	0/1945	0.46	0/2634
8	H	0.25	0/1750	0.47	0/2373
8	V	0.24	0/1750	0.47	0/2373
9	I	0.28	0/1611	0.66	2/2174 (0.1%)
9	W	0.27	0/1611	0.69	2/2174 (0.1%)
10	J	0.26	0/1589	0.48	0/2142
10	X	0.26	0/1589	0.48	0/2142
11	K	0.30	0/1668	0.84	7/2253 (0.3%)
11	Y	0.30	0/1668	0.89	9/2253 (0.4%)
12	L	0.28	0/1802	0.49	0/2430
12	Z	0.28	0/1802	0.49	0/2430
13	M	0.26	0/1855	0.50	0/2514
13	a	0.26	0/1855	0.50	0/2514
14	N	0.25	0/1541	0.47	0/2087
14	b	0.25	0/1541	0.47	0/2087
All	All	0.27	0/50252	0.53	25/67940 (0.0%)

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	Y	61	ARG	NE-CZ-NH2	-23.11	108.75	120.30
11	K	61	ARG	NE-CZ-NH1	-20.32	110.14	120.30
9	W	126	ILE	CG1-CB-CG2	-19.35	68.83	111.40
11	Y	61	ARG	NE-CZ-NH1	18.25	129.42	120.30
11	K	61	ARG	NE-CZ-NH2	17.70	129.15	120.30
2	P	113	ARG	NE-CZ-NH2	17.43	129.01	120.30
9	I	126	ILE	CG1-CB-CG2	-16.30	75.54	111.40
2	B	113	ARG	NE-CZ-NH2	12.52	126.56	120.30
11	Y	61	ARG	CD-NE-CZ	10.54	138.36	123.60
2	B	113	ARG	NH1-CZ-NH2	-9.52	108.93	119.40
9	I	126	ILE	CA-CB-CG1	9.28	128.63	111.00
11	K	61	ARG	CD-NE-CZ	9.16	136.42	123.60
2	P	113	ARG	NH1-CZ-NH2	-8.92	109.58	119.40
9	W	126	ILE	CA-CB-CG1	8.89	127.90	111.00
11	Y	61	ARG	CG-CD-NE	-7.57	95.90	111.80
11	Y	59	LEU	CD1-CG-CD2	-7.05	89.35	110.50
11	K	59	LEU	CD1-CG-CD2	-6.70	90.40	110.50
11	K	59	LEU	CB-CG-CD1	5.94	121.10	111.00
2	B	113	ARG	NE-CZ-NH1	5.82	123.21	120.30
11	Y	1	THR	N-CA-C	5.50	125.86	111.00
11	K	1	THR	N-CA-C	5.40	125.58	111.00
11	Y	59	LEU	CB-CG-CD1	5.27	119.96	111.00
11	Y	1	THR	CB-CA-C	-5.16	97.67	111.60
11	Y	1	THR	CA-CB-CG2	5.08	119.51	112.40
11	K	1	THR	CA-CB-CG2	5.03	119.44	112.40

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	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	P	1904	0	1904	16	0
3	C	1881	0	1895	6	0
3	Q	1881	0	1895	7	0
4	D	1813	0	1797	0	0
4	R	1813	0	1797	0	0
5	E	1773	0	1775	1	0
5	S	1773	0	1775	2	0
6	F	1892	0	1883	0	0
6	T	1892	0	1883	1	0
7	G	1907	0	1901	3	0
7	U	1907	0	1901	4	0
8	H	1719	0	1719	4	0
8	V	1719	0	1719	3	0
9	I	1581	0	1574	7	0
9	W	1581	0	1574	9	0
10	J	1561	0	1569	10	0
10	X	1561	0	1569	9	0
11	K	1632	0	1590	10	0
11	Y	1632	0	1590	14	0
12	L	1764	0	1716	3	0
12	Z	1764	0	1716	4	0
13	M	1824	0	1832	2	0
13	a	1824	0	1832	0	0
14	N	1512	0	1481	4	0
14	b	1512	0	1481	0	0
15	A	1	0	0	0	0
15	G	1	0	0	0	0
15	I	2	0	0	0	0
15	J	1	0	0	0	0
15	K	2	0	0	0	0
15	L	1	0	0	0	0
15	N	1	0	0	0	0
15	Z	1	0	0	0	0
15	b	1	0	0	0	0
16	G	1	0	0	0	0
16	U	1	0	0	0	0
17	H	12	0	13	0	0
17	K	12	0	13	1	0
17	V	12	0	13	0	0
17	Y	12	0	13	0	0
18	K	45	0	0	2	0
18	Y	45	0	0	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
19	A	6	0	0	0	0
19	B	7	0	0	0	0
19	C	6	0	0	0	0
19	D	4	0	0	0	0
19	E	5	0	0	0	0
19	F	12	0	0	0	0
19	G	11	0	0	0	0
19	H	15	0	0	0	0
19	I	11	0	0	0	0
19	J	9	0	0	0	0
19	K	8	0	0	0	0
19	L	14	0	0	0	0
19	M	18	0	0	1	0
19	N	8	0	0	0	0
19	O	8	0	0	0	0
19	P	10	0	0	1	0
19	Q	6	0	0	0	0
19	R	8	0	0	0	0
19	S	4	0	0	0	0
19	T	8	0	0	0	0
19	U	20	0	0	0	0
19	V	11	0	0	0	0
19	W	12	0	0	0	0
19	X	10	0	0	0	0
19	Y	10	0	0	1	0
19	Z	7	0	0	0	0
19	a	12	0	0	0	0
19	b	9	0	0	0	0
All	All	49776	0	49182	126	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 (126) 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)
2:B:93:HIS:HE1	2:B:113:ARG:NH1	1.11	1.47
2:B:93:HIS:CE1	2:B:113:ARG:NH1	1.84	1.46
2:P:93:HIS:CE1	2:P:113:ARG:NH1	2.10	1.20
2:P:93:HIS:CE1	2:P:113:ARG:CZ	2.25	1.19
2:P:93:HIS:HE1	2:P:113:ARG:NH1	1.48	1.07

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:93:HIS:CE1	2:B:113:ARG:CZ	2.39	1.04
2:P:93:HIS:HE1	2:P:113:ARG:CZ	1.73	0.94
2:B:93:HIS:HE1	2:B:113:ARG:HH12	1.16	0.91
2:B:93:HIS:CE1	2:B:113:ARG:HH11	1.87	0.91
2:P:93:HIS:NE2	2:P:113:ARG:CZ	2.40	0.84
2:B:93:HIS:NE2	2:B:113:ARG:HD3	1.95	0.81
9:I:98:ARG:HD2	9:I:126:ILE:HD12	1.63	0.81
2:B:93:HIS:NE2	2:B:113:ARG:CZ	2.48	0.77
2:P:93:HIS:CE1	2:P:113:ARG:NH2	2.52	0.76
2:P:93:HIS:NE2	2:P:113:ARG:NE	2.37	0.73
2:P:93:HIS:HE1	2:P:113:ARG:NH2	1.86	0.72
2:B:93:HIS:NE2	2:B:113:ARG:CD	2.54	0.70
9:W:98:ARG:HD2	9:W:126:ILE:HD12	1.75	0.68
2:B:93:HIS:NE2	2:B:113:ARG:NH1	2.40	0.68
9:W:98:ARG:HD2	9:W:126:ILE:CD1	2.25	0.66
2:B:93:HIS:NE2	2:B:113:ARG:NE	2.47	0.63
10:J:139:TYR:OH	10:X:25:ILE:O	2.17	0.63
10:J:25:ILE:O	10:X:139:TYR:OH	2.16	0.62
2:P:93:HIS:NE2	2:P:113:ARG:CD	2.64	0.60
2:P:93:HIS:CE1	19:P:301:HOH:O	2.56	0.58
9:I:38:LYS:NZ	11:Y:208:ASN:O	2.38	0.56
14:N:152:VAL:HA	14:N:175:MET:HE1	1.87	0.56
2:P:93:HIS:NE2	2:P:113:ARG:HD3	2.21	0.56
11:K:208:ASN:O	9:W:38:LYS:NZ	2.39	0.56
11:Y:59:LEU:HD23	11:Y:63:CYS:SG	2.46	0.55
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.90	0.54
11:K:61:ARG:O	11:K:65:ILE:HG13	2.08	0.53
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.90	0.53
11:Y:61:ARG:O	11:Y:65:ILE:HG13	2.08	0.53
10:X:126:VAL:HG12	10:X:128:LEU:HG	1.90	0.53
11:Y:44:THR:HG21	11:Y:100:MET:HE2	1.89	0.53
11:K:44:THR:HG21	11:K:100:MET:HE2	1.90	0.53
11:Y:59:LEU:HD12	11:Y:83:LEU:HG	1.90	0.52
10:X:58:GLU:OE1	11:Y:81:LYS:NZ	2.43	0.52
10:J:126:VAL:HG12	10:J:128:LEU:HG	1.90	0.52
18:K:301:6N5:N28	18:K:301:6N5:C59	2.73	0.52
18:Y:301:6N5:C46	18:Y:301:6N5:C59	2.87	0.52
10:J:58:GLU:OE1	11:K:81:LYS:NZ	2.43	0.52
12:L:31:THR:HG23	12:L:36:ASN:HD21	1.76	0.51
18:Y:301:6N5:N25	18:Y:301:6N5:C48	2.73	0.51
3:C:201:VAL:O	3:C:202:GLN:CB	2.59	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
18:K:301:6N5:C48	18:K:301:6N5:N25	2.72	0.50
7:U:23:PHE:O	7:U:26:THR:HB	2.11	0.50
10:J:50:ALA:O	11:K:91:LYS:NZ	2.43	0.50
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.59	0.50
9:I:98:ARG:CD	9:I:126:ILE:HD12	2.38	0.50
10:J:1:MET:HG2	10:J:34:LYS:HE3	1.93	0.50
7:G:23:PHE:O	7:G:26:THR:HB	2.11	0.50
11:Y:59:LEU:HD12	11:Y:83:LEU:HB2	1.93	0.50
10:X:1:MET:HG2	10:X:34:LYS:HE3	1.93	0.50
12:Z:31:THR:HG23	12:Z:36:ASN:HD21	1.75	0.50
3:C:201:VAL:O	3:C:202:GLN:HB3	2.13	0.49
11:Y:12:VAL:HG13	11:Y:179:VAL:HB	1.94	0.49
9:W:125:LEU:HD23	9:W:126:ILE:HG22	1.94	0.49
3:Q:201:VAL:O	3:Q:202:GLN:HB3	2.13	0.48
11:K:18:SER:O	11:K:31:VAL:HG22	2.14	0.48
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.44	0.48
11:K:12:VAL:HG13	11:K:179:VAL:HB	1.94	0.47
13:M:2:GLN:NE2	19:M:301:HOH:O	2.46	0.47
2:P:93:HIS:HE1	2:P:113:ARG:HH12	1.50	0.47
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.98	0.46
10:J:29:LYS:HD2	11:K:121:ILE:CG2	2.46	0.46
12:L:100:ARG:HD3	12:L:105:TYR:CE2	2.51	0.46
10:X:50:ALA:O	11:Y:91:LYS:NZ	2.49	0.46
12:Z:100:ARG:HD3	12:Z:105:TYR:CE2	2.51	0.45
2:B:50:LYS:O	2:B:51:VAL:C	2.55	0.45
3:C:51:LYS:O	3:C:52:LEU:HB2	2.16	0.45
2:P:50:LYS:O	2:P:51:VAL:C	2.54	0.45
11:Y:33:LYS:HG2	18:Y:301:6N5:C1	2.46	0.45
3:Q:51:LYS:O	3:Q:52:LEU:HB2	2.16	0.45
8:V:104:ASP:HB2	8:V:105:PRO:HD2	1.98	0.45
8:V:35:HIS:HB3	8:V:56:THR:HG21	2.00	0.44
9:I:20:VAL:HG23	9:I:189:ILE:HB	2.00	0.44
11:Y:33:LYS:HE2	18:Y:301:6N5:C6	2.48	0.44
3:C:35:LYS:HG2	3:C:158:SER:O	2.18	0.44
8:H:35:HIS:HB3	8:H:56:THR:HG21	2.00	0.44
11:K:98:GLY:HA3	17:K:304:MES:H62	1.98	0.44
10:X:3:ILE:HG23	10:X:18:SER:HB3	2.00	0.44
14:N:176:VAL:HG12	14:N:178:LEU:HD13	1.99	0.43
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.19	0.43
9:W:20:VAL:HG23	9:W:189:ILE:HB	2.00	0.43
10:J:3:ILE:HG23	10:J:18:SER:HB3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:L:8:ASN:HA	12:L:30:ILE:O	2.19	0.43
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.01	0.43
9:I:10:ILE:HG21	9:I:141:ALA:HB3	2.01	0.42
2:P:145:TYR:OH	2:P:217:LYS:N	2.52	0.42
9:W:98:ARG:CD	9:W:126:ILE:CD1	2.95	0.42
2:B:50:LYS:HD3	2:B:50:LYS:HA	1.96	0.42
11:K:104:TRP:CE2	11:K:181:GLU:HB3	2.54	0.42
2:B:145:TYR:OH	2:B:217:LYS:N	2.53	0.42
3:C:169:VAL:HG23	3:C:196:SER:HB2	2.01	0.42
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.42
11:Y:59:LEU:CD2	11:Y:63:CYS:SG	3.08	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.83	0.42
11:Y:208:ASN:ND2	19:Y:401:HOH:O	2.52	0.42
3:Q:169:VAL:HG23	3:Q:196:SER:HB2	2.01	0.42
14:N:36:ARG:HG3	14:N:42:TRP:CE2	2.54	0.42
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.50	0.42
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.02	0.41
8:H:196:ARG:NH2	9:I:150:GLU:O	2.54	0.41
10:J:5:LEU:HD23	10:J:132:ALA:HB2	2.02	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.84	0.41
8:V:35:HIS:CB	8:V:56:THR:HG21	2.51	0.41
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.55	0.41
5:E:77:ALA:N	5:E:78:PRO:CD	2.84	0.41
8:H:35:HIS:CB	8:H:56:THR:HG21	2.51	0.41
11:Y:104:TRP:CE2	11:Y:181:GLU:HB3	2.54	0.41
13:M:165:ILE:HB	13:M:166:PRO:HD3	2.03	0.41
10:X:5:LEU:HD23	10:X:132:ALA:HB2	2.02	0.41
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.50	0.41
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.02	0.41
9:I:163:PHE:CE1	9:I:197:ARG:HD2	2.56	0.41
12:Z:8:ASN:HA	12:Z:30:ILE:O	2.20	0.41
12:Z:125:PHE:CD2	12:Z:131:TYR:HB3	2.56	0.41
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.52	0.40
5:S:12:PHE:H	6:T:19:GLN:HE22	1.68	0.40
9:W:98:ARG:CD	9:W:126:ILE:HD11	2.50	0.40
9:W:98:ARG:CZ	9:W:126:ILE:HD11	2.52	0.40
2:P:93:HIS:NE2	2:P:113:ARG:NH1	2.59	0.40
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.52	0.40
3:Q:160:GLN:HA	3:Q:160:GLN:HE21	1.86	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%)	240 (97%)	7 (3%)	1 (0%)	34	66
1	O	248/250 (99%)	240 (97%)	7 (3%)	1 (0%)	34	66
2	B	242/258 (94%)	232 (96%)	7 (3%)	3 (1%)	13	39
2	P	242/258 (94%)	232 (96%)	7 (3%)	3 (1%)	13	39
3	C	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	19	49
3	Q	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	19	49
4	D	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
4	R	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
5	E	229/234 (98%)	221 (96%)	8 (4%)	0	100	100
5	S	229/234 (98%)	222 (97%)	7 (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	224/232 (97%)	218 (97%)	6 (3%)	0	100	100
8	V	224/232 (97%)	218 (97%)	6 (3%)	0	100	100
9	I	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
9	W	202/205 (98%)	194 (96%)	8 (4%)	0	100	100
10	J	193/198 (98%)	190 (98%)	3 (2%)	0	100	100
10	X	193/198 (98%)	190 (98%)	3 (2%)	0	100	100
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	231/246 (94%)	221 (96%)	10 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	a	231/246 (94%)	221 (96%)	10 (4%)	0	100	100
14	N	194/196 (99%)	188 (97%)	6 (3%)	0	100	100
14	b	194/196 (99%)	187 (96%)	7 (4%)	0	100	100
All	All	6282/6612 (95%)	6117 (97%)	153 (2%)	12 (0%)	47	78

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
3	C	202	GLN
2	P	51	VAL
3	Q	202	GLN
1	A	2	THR
2	B	218	GLY
2	B	222	GLY
1	O	2	THR
2	P	218	GLY
2	P	222	GLY
3	C	205	ALA
3	Q	205	ALA

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	209/209 (100%)	206 (99%)	3 (1%)	67	90
1	O	209/209 (100%)	206 (99%)	3 (1%)	67	90
2	B	203/216 (94%)	201 (99%)	2 (1%)	76	93
2	P	203/216 (94%)	201 (99%)	2 (1%)	76	93
3	C	212/226 (94%)	203 (96%)	9 (4%)	30	63
3	Q	212/226 (94%)	203 (96%)	9 (4%)	30	63
4	D	194/215 (90%)	186 (96%)	8 (4%)	30	64

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	R	194/215 (90%)	186 (96%)	8 (4%)	30	64
5	E	190/193 (98%)	185 (97%)	5 (3%)	46	79
5	S	190/193 (98%)	185 (97%)	5 (3%)	46	79
6	F	201/239 (84%)	194 (96%)	7 (4%)	36	70
6	T	201/239 (84%)	194 (96%)	7 (4%)	36	70
7	G	206/210 (98%)	201 (98%)	5 (2%)	49	81
7	U	206/210 (98%)	201 (98%)	5 (2%)	49	81
8	H	185/190 (97%)	182 (98%)	3 (2%)	62	88
8	V	185/190 (97%)	182 (98%)	3 (2%)	62	88
9	I	172/173 (99%)	169 (98%)	3 (2%)	60	87
9	W	172/173 (99%)	169 (98%)	3 (2%)	60	87
10	J	173/175 (99%)	169 (98%)	4 (2%)	50	82
10	X	173/175 (99%)	169 (98%)	4 (2%)	50	82
11	K	165/165 (100%)	152 (92%)	13 (8%)	12	34
11	Y	165/165 (100%)	153 (93%)	12 (7%)	14	38
12	L	186/186 (100%)	182 (98%)	4 (2%)	52	83
12	Z	186/186 (100%)	182 (98%)	4 (2%)	52	83
13	M	199/208 (96%)	193 (97%)	6 (3%)	41	75
13	a	199/208 (96%)	193 (97%)	6 (3%)	41	75
14	N	162/162 (100%)	158 (98%)	4 (2%)	47	80
14	b	162/162 (100%)	158 (98%)	4 (2%)	47	80
All	All	5314/5534 (96%)	5163 (97%)	151 (3%)	43	77

All (151) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	THR
1	A	157	PHE
1	A	250	LEU
2	B	93	HIS
2	B	191	LEU
3	C	4	ARG
3	C	38	ASN
3	C	51	LYS
3	C	147	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	C	160	GLN
3	C	169	VAL
3	C	180	LYS
3	C	206	LYS
3	C	240	GLU
4	D	99	ILE
4	D	125	LEU
4	D	143	ASP
4	D	176	LEU
4	D	193	LEU
4	D	235	LEU
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	29	LYS
5	E	71	LEU
5	E	184	ASN
5	E	188	LEU
6	F	117	GLN
6	F	123	ASN
6	F	139	LYS
6	F	171	GLU
6	F	181	GLU
6	F	214	TRP
6	F	240	GLN
7	G	115	LEU
7	G	122	ARG
7	G	125	MET
7	G	208	GLU
7	G	235	ARG
8	H	30	ASN
8	H	68	LEU
8	H	196	ARG
9	I	37	ASN
9	I	126	ILE
9	I	171	LEU
10	J	3	ILE
10	J	23	ARG
10	J	99	GLN
10	J	110	LYS
11	K	4	LEU
11	K	12	VAL

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
11	K	29	GLN
11	K	35	ILE
11	K	61	ARG
11	K	62	GLN
11	K	81	LYS
11	K	83	LEU
11	K	86	MET
11	K	100	MET
11	K	117	GLU
11	K	128	VAL
11	K	210	ILE
12	L	23	LEU
12	L	49	ASN
12	L	136	CYS
12	L	150	LEU
13	M	2	GLN
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	161	ARG
13	M	187	ARG
14	N	9	LYS
14	N	39	ASP
14	N	83	LYS
14	N	178	LEU
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	93	HIS
2	P	191	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	51	LYS
3	Q	147	GLN
3	Q	160	GLN
3	Q	169	VAL
3	Q	180	LYS
3	Q	206	LYS
3	Q	240	GLU
4	R	99	ILE
4	R	125	LEU
4	R	143	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	R	176	LEU
4	R	193	LEU
4	R	235	LEU
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	29	LYS
5	S	71	LEU
5	S	184	ASN
5	S	188	LEU
6	T	117	GLN
6	T	123	ASN
6	T	139	LYS
6	T	171	GLU
6	T	181	GLU
6	T	214	TRP
6	T	240	GLN
7	U	115	LEU
7	U	122	ARG
7	U	125	MET
7	U	208	GLU
7	U	235	ARG
8	V	30	ASN
8	V	68	LEU
8	V	196	ARG
9	W	37	ASN
9	W	126	ILE
9	W	171	LEU
10	X	3	ILE
10	X	23	ARG
10	X	99	GLN
10	X	110	LYS
11	Y	4	LEU
11	Y	12	VAL
11	Y	29	GLN
11	Y	35	ILE
11	Y	62	GLN
11	Y	81	LYS
11	Y	83	LEU
11	Y	86	MET
11	Y	100	MET
11	Y	117	GLU

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Mol	Chain	Res	Type
11	Y	128	VAL
11	Y	210	ILE
12	Z	23	LEU
12	Z	49	ASN
12	Z	136	CYS
12	Z	150	LEU
13	a	2	GLN
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	161	ARG
13	a	187	ARG
14	b	9	LYS
14	b	39	ASP
14	b	83	LYS
14	b	178	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (77) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	58	GLN
2	B	119	GLN
2	B	123	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
4	D	91	HIS
4	D	225	ASN
5	E	68	HIS
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	118	ASN
5	E	120	GLN
5	E	151	ASN
5	E	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	117	GLN
6	F	123	ASN
6	F	191	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	G	83	ASN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	166	GLN
10	J	55	GLN
11	K	85	ASN
11	K	175	ASN
11	K	207	ASN
12	L	3	ASN
12	L	49	ASN
12	L	70	ASN
12	L	79	HIS
12	L	158	ASN
13	M	48	ASN
13	M	102	GLN
13	M	179	ASN
2	P	20	GLN
2	P	58	GLN
2	P	119	GLN
2	P	123	GLN
3	Q	116	GLN
3	Q	120	GLN
3	Q	147	GLN
3	Q	160	GLN
4	R	91	HIS
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN
5	S	118	ASN
5	S	120	GLN
5	S	151	ASN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN
6	T	117	GLN
6	T	123	ASN
6	T	191	GLN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN

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Mol	Chain	Res	Type
7	U	121	GLN
7	U	166	GLN
10	X	55	GLN
11	Y	85	ASN
11	Y	175	ASN
11	Y	207	ASN
12	Z	3	ASN
12	Z	49	ASN
12	Z	70	ASN
12	Z	79	HIS
13	a	48	ASN
13	a	102	GLN
13	a	179	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 13 are monoatomic - leaving 6 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	$\# Z  > 2$
17	MES	K	304	-	12,12,12	2.31	1 (8%)	14,16,16	1.20	2 (14%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
17	MES	V	301	-	12,12,12	2.32	1 (8%)	14,16,16	1.17	2 (14%)
17	MES	H	301	-	12,12,12	2.16	1 (8%)	14,16,16	1.28	3 (21%)
18	6N5	Y	301	11	48,48,48	2.03	11 (22%)	54,66,66	1.72	11 (20%)
18	6N5	K	301	11	48,48,48	2.06	12 (25%)	54,66,66	1.80	9 (16%)
17	MES	Y	302	-	12,12,12	2.26	1 (8%)	14,16,16	1.20	2 (14%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
17	MES	K	304	-	-	0/6/14/14	0/1/1/1
17	MES	V	301	-	-	1/6/14/14	0/1/1/1
17	MES	H	301	-	-	1/6/14/14	0/1/1/1
18	6N5	Y	301	11	-	12/44/67/67	0/4/4/4
18	6N5	K	301	11	-	12/44/67/67	0/4/4/4
17	MES	Y	302	-	-	0/6/14/14	0/1/1/1

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	K	304	MES	C8-S	-7.75	1.66	1.77
17	V	301	MES	C8-S	-7.68	1.66	1.77
17	Y	302	MES	C8-S	-7.56	1.66	1.77
17	H	301	MES	C8-S	-7.15	1.67	1.77
18	K	301	6N5	C40-C41	-6.18	1.36	1.51
18	Y	301	6N5	C7-C6	-5.79	1.37	1.51
18	Y	301	6N5	C40-C41	-5.37	1.38	1.51
18	K	301	6N5	C50-C60	-5.17	1.33	1.49
18	K	301	6N5	C7-C6	-5.11	1.39	1.51
18	Y	301	6N5	C57-C52	-4.98	1.31	1.47
18	K	301	6N5	C57-C52	-4.89	1.32	1.47
18	Y	301	6N5	C50-C60	-4.71	1.34	1.49
18	Y	301	6N5	C10-C9	3.68	1.60	1.53
18	K	301	6N5	C56-C57	-3.49	1.32	1.40
18	Y	301	6N5	C56-C57	-3.46	1.32	1.40
18	K	301	6N5	C54-C53	-3.37	1.38	1.49
18	Y	301	6N5	C54-C53	-3.35	1.38	1.49
18	K	301	6N5	O21-C9	-3.22	1.35	1.43
18	Y	301	6N5	C57-C58	-2.87	1.31	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	K	301	6N5	C57-C58	-2.77	1.31	1.37
18	K	301	6N5	C50-C58	-2.73	1.31	1.41
18	Y	301	6N5	C50-C58	-2.68	1.32	1.41
18	K	301	6N5	C54-C55	-2.40	1.36	1.47
18	Y	301	6N5	O21-C9	-2.37	1.37	1.43
18	K	301	6N5	C10-C9	2.33	1.57	1.53
18	Y	301	6N5	C54-C55	-2.24	1.37	1.47
18	K	301	6N5	C27-C26	-2.16	1.47	1.52

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	K	301	6N5	C7-C8-N22	-8.00	98.41	110.07
18	Y	301	6N5	C7-C8-N22	-5.71	101.74	110.07
18	Y	301	6N5	C46-O45-C44	-4.87	106.95	117.51
18	K	301	6N5	C50-C51-C52	-4.43	104.24	109.47
18	K	301	6N5	C46-O45-C44	-4.10	108.60	117.51
18	Y	301	6N5	C50-C60-N28	3.60	120.83	116.31
18	Y	301	6N5	C50-C51-C52	-3.41	105.45	109.47
18	K	301	6N5	C51-C52-C57	2.86	109.18	106.64
17	H	301	MES	O3S-S-C8	2.72	110.17	105.77
18	Y	301	6N5	O21-C9-C10	2.62	114.74	109.83
18	Y	301	6N5	C51-C52-C57	2.42	108.79	106.64
18	Y	301	6N5	C59-C58-C57	-2.41	122.40	128.30
18	K	301	6N5	C41-C40-C24	-2.39	106.78	113.39
17	Y	302	MES	O3S-S-C8	2.39	109.63	105.77
17	K	304	MES	O3S-S-C8	2.37	109.59	105.77
17	V	301	MES	O2S-S-C8	2.36	109.76	106.92
18	K	301	6N5	C50-C60-N28	2.27	119.16	116.31
17	H	301	MES	O2S-S-C8	2.27	109.65	106.92
17	Y	302	MES	O2S-S-C8	2.27	109.65	106.92
18	Y	301	6N5	C7-C6-C1	-2.25	116.43	120.91
18	Y	301	6N5	C38-C27-C26	-2.21	105.93	110.14
17	H	301	MES	O1S-S-C8	2.20	109.56	106.92
17	K	304	MES	O2S-S-C8	2.19	109.55	106.92
18	K	301	6N5	C59-C58-C57	-2.19	122.94	128.30
17	V	301	MES	O3S-S-C8	2.19	109.30	105.77
18	K	301	6N5	O21-C9-C8	-2.18	103.77	108.98
18	K	301	6N5	C26-C27-N28	-2.17	106.22	111.60
18	Y	301	6N5	C41-C40-C24	-2.13	107.50	113.39
18	Y	301	6N5	C6-C7-C8	2.09	116.96	113.33

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	H	301	MES	N4-C7-C8-S
17	V	301	MES	C8-C7-N4-C5
18	K	301	6N5	C11-C10-C9-O21
18	K	301	6N5	C9-C10-C12-O13
18	K	301	6N5	C11-C10-C12-O13
18	Y	301	6N5	C11-C10-C9-C8
18	Y	301	6N5	C12-C10-C9-C8
18	Y	301	6N5	C9-C10-C12-O13
18	Y	301	6N5	C11-C10-C12-O13
18	Y	301	6N5	C47-C44-O45-C46
18	Y	301	6N5	C43-C44-O45-C46
18	K	301	6N5	C47-C44-O45-C46
18	K	301	6N5	C43-C44-O45-C46
18	Y	301	6N5	C5-C6-C7-C8
18	Y	301	6N5	C1-C6-C7-C8
18	K	301	6N5	C5-C6-C7-C8
18	K	301	6N5	C1-C6-C7-C8
18	K	301	6N5	C11-C10-C9-C8
18	Y	301	6N5	C11-C10-C9-O21
18	Y	301	6N5	C12-C10-C9-O21
18	K	301	6N5	C12-C10-C9-C8
18	K	301	6N5	O49-C23-C24-N25
18	Y	301	6N5	O49-C23-C24-N25
18	K	301	6N5	N22-C23-C24-N25
18	Y	301	6N5	N22-C23-C24-N25
18	K	301	6N5	C12-C10-C9-O21

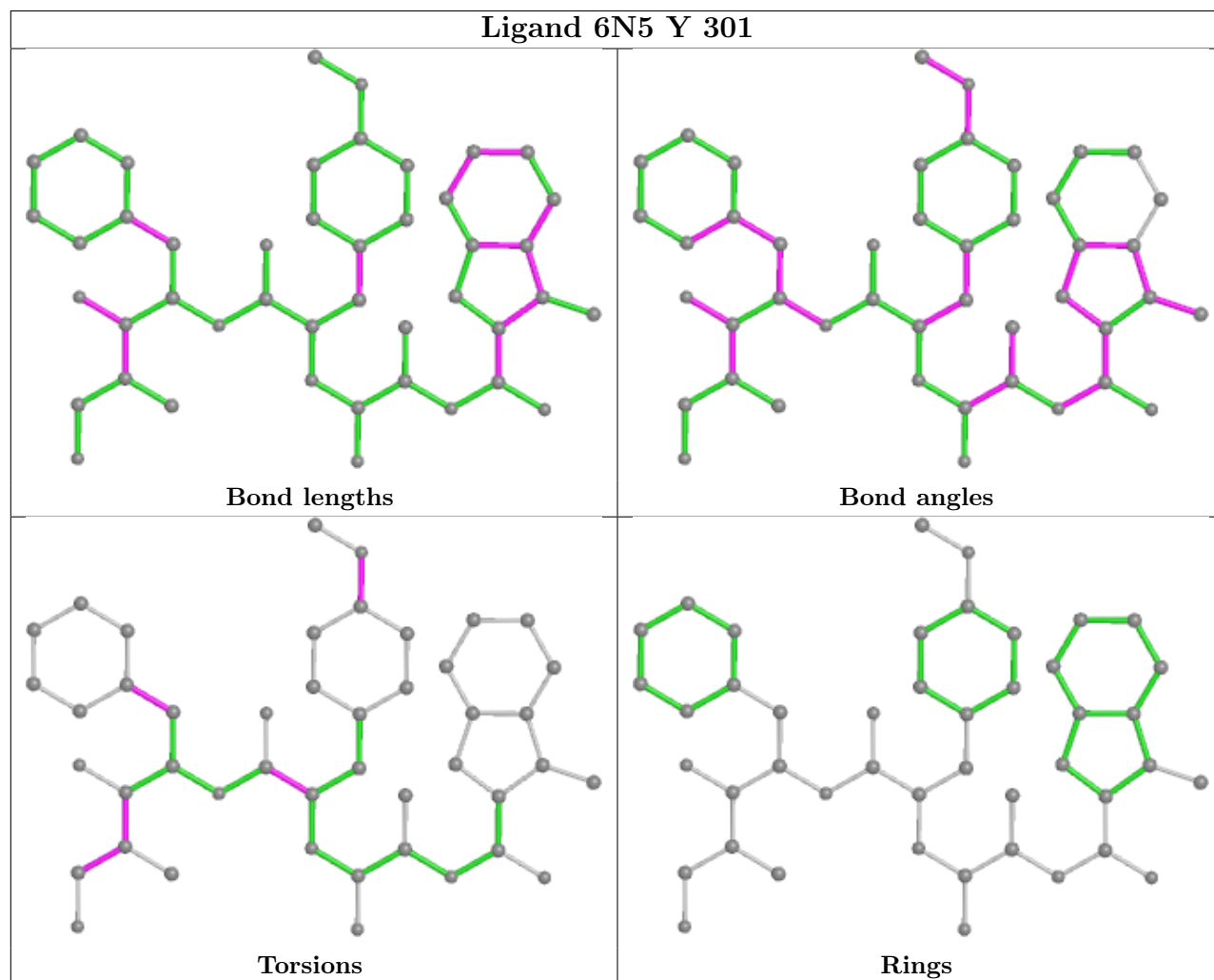
There are no ring outliers.

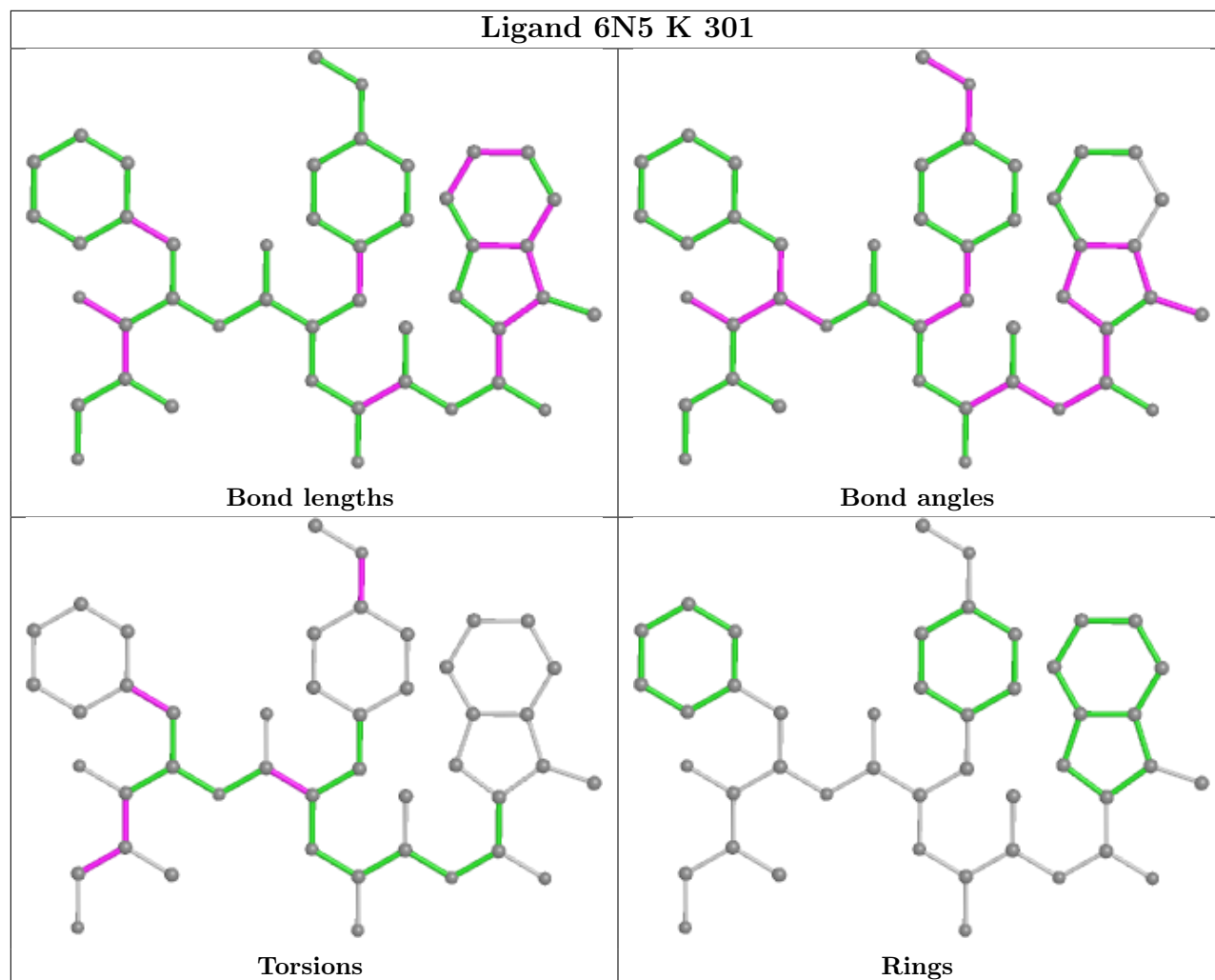
3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	K	304	MES	1	0
18	Y	301	6N5	4	0
18	K	301	6N5	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





## 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%)	-0.45	4 (1%) 72 66	33, 53, 90, 127	0
1	O	250/250 (100%)	-0.45	3 (1%) 79 73	37, 55, 100, 139	0
2	B	244/258 (94%)	-0.36	6 (2%) 57 47	38, 58, 102, 156	0
2	P	244/258 (94%)	-0.38	6 (2%) 57 47	40, 58, 101, 154	0
3	C	240/254 (94%)	-0.18	15 (6%) 20 12	36, 65, 132, 168	0
3	Q	240/254 (94%)	-0.12	14 (5%) 23 15	42, 71, 150, 194	0
4	D	235/260 (90%)	-0.44	0 100 100	40, 61, 93, 126	0
4	R	235/260 (90%)	-0.31	5 (2%) 63 54	51, 69, 110, 136	0
5	E	231/234 (98%)	-0.36	5 (2%) 62 52	43, 65, 103, 150	0
5	S	231/234 (98%)	-0.33	6 (2%) 56 46	48, 70, 110, 146	0
6	F	243/288 (84%)	-0.48	6 (2%) 57 47	38, 60, 109, 137	0
6	T	243/288 (84%)	-0.44	5 (2%) 63 54	37, 65, 121, 157	0
7	G	241/252 (95%)	-0.52	4 (1%) 70 63	37, 56, 98, 154	0
7	U	241/252 (95%)	-0.49	4 (1%) 70 63	31, 54, 91, 130	0
8	H	226/232 (97%)	-0.45	4 (1%) 68 61	37, 53, 90, 147	0
8	V	226/232 (97%)	-0.43	7 (3%) 49 39	37, 53, 87, 155	0
9	I	204/205 (99%)	-0.72	1 (0%) 91 88	33, 50, 83, 105	0
9	W	204/205 (99%)	-0.68	2 (0%) 82 77	35, 51, 83, 106	0
10	J	195/198 (98%)	-0.53	3 (1%) 73 68	34, 55, 85, 125	0
10	X	195/198 (98%)	-0.50	3 (1%) 73 68	37, 56, 86, 133	0
11	K	211/211 (100%)	-0.49	2 (0%) 84 80	35, 59, 91, 118	0
11	Y	211/211 (100%)	-0.50	1 (0%) 91 88	26, 60, 90, 118	0
12	L	222/222 (100%)	-0.51	2 (0%) 84 80	42, 56, 98, 129	0
12	Z	222/222 (100%)	-0.49	4 (1%) 68 61	35, 59, 101, 131	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
13	M	233/246 (94%)	-0.61	1 (0%) 92 91	33, 54, 81, 100	0
13	a	233/246 (94%)	-0.56	2 (0%) 84 80	36, 55, 81, 108	0
14	N	196/196 (100%)	-0.61	2 (1%) 82 77	34, 50, 82, 106	0
14	b	196/196 (100%)	-0.64	2 (1%) 82 77	33, 48, 81, 109	0
All	All	6342/6612 (95%)	-0.46	119 (1%) 66 59	26, 58, 102, 194	0

All (119) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
9	W	1	SER	6.2
2	B	221	ASP	6.2
10	J	1	MET	6.1
10	X	1	MET	6.1
2	B	220	ASN	5.4
8	V	222	ASP	4.7
2	P	219	ALA	4.7
3	Q	206	LYS	4.5
5	E	202	ASP	4.5
3	Q	50	LEU	4.4
2	P	221	ASP	4.4
1	O	249	ALA	4.4
1	O	1	MET	4.3
6	F	181	GLU	4.2
8	H	226	GLU	4.2
8	V	226	GLU	4.1
8	H	221	CYS	4.1
3	C	206	LYS	4.1
3	C	238	LYS	4.0
3	Q	49	THR	3.9
2	P	51	VAL	3.9
8	V	223	ILE	3.9
3	Q	238	LYS	3.9
2	B	51	VAL	3.8
3	C	239	GLN	3.8
8	V	221	CYS	3.8
4	R	1	ASP	3.7
13	a	1	THR	3.7
5	S	202	ASP	3.7
2	P	218	GLY	3.6
3	Q	237	GLU	3.6
2	P	220	ASN	3.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
3	Q	202	GLN	3.6
3	Q	239	GLN	3.6
4	R	241	ALA	3.5
3	C	202	GLN	3.5
2	B	218	GLY	3.4
8	V	224	GLN	3.4
3	C	50	LEU	3.3
1	A	1	MET	3.3
9	I	1	SER	3.3
12	L	174	TYR	3.2
12	Z	174	TYR	3.2
10	X	194	ASP	3.2
7	G	241	GLU	3.1
8	H	222	ASP	3.0
3	Q	240	GLU	3.0
8	H	224	GLN	3.0
10	J	194	ASP	3.0
3	Q	48	SER	2.9
11	K	146	ASP	2.9
3	C	235	GLU	2.9
3	C	49	THR	2.9
3	Q	205	ALA	2.9
3	Q	236	GLN	2.9
10	X	193	ASP	2.9
6	F	205	GLU	2.8
6	F	2	THR	2.8
11	K	211	GLY	2.8
3	C	240	GLU	2.8
7	U	181	LYS	2.8
1	A	248	GLU	2.8
3	C	236	GLN	2.8
3	Q	181	GLU	2.8
5	S	3	ASN	2.7
1	O	2	THR	2.7
11	Y	146	ASP	2.5
3	Q	225	GLU	2.5
6	T	181	GLU	2.5
8	V	225	GLU	2.5
5	E	233	ILE	2.5
8	V	145	ASP	2.4
3	C	225	GLU	2.4
4	R	217	GLN	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
6	T	243	ILE	2.4
14	b	195	GLN	2.4
3	C	48	SER	2.4
6	F	244	ASN	2.4
9	W	133	LYS	2.4
7	G	2	GLY	2.3
4	R	242	GLU	2.3
2	B	217	LYS	2.3
3	C	180	LYS	2.3
14	b	105	LYS	2.3
4	R	230	GLU	2.3
13	M	47	ASP	2.3
7	U	242	GLN	2.3
6	F	242	GLU	2.3
12	Z	167	LYS	2.3
14	N	195	GLN	2.3
6	T	2	THR	2.2
1	A	201	GLU	2.2
5	E	203	GLU	2.2
7	U	2	GLY	2.2
7	U	222	ASP	2.2
3	C	139	ARG	2.2
5	S	233	ILE	2.2
13	a	233	ILE	2.2
3	Q	141	ASP	2.2
5	S	173	ARG	2.2
2	B	182	ASP	2.1
12	Z	173	LYS	2.1
3	C	60	SER	2.1
12	Z	1	GLN	2.1
14	N	181	ALA	2.1
1	A	231	LYS	2.1
5	E	201	ARG	2.1
10	J	95	ARG	2.1
5	S	225	ASP	2.1
6	F	201	GLU	2.1
3	C	188	GLU	2.1
6	T	244	ASN	2.1
5	S	122	TYR	2.1
2	P	59	ASP	2.0
7	G	179	LYS	2.0
12	L	173	LYS	2.0

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Mol	Chain	Res	Type	RSRZ
6	T	166	GLN	2.0
7	G	242	GLN	2.0
5	E	180	LYS	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

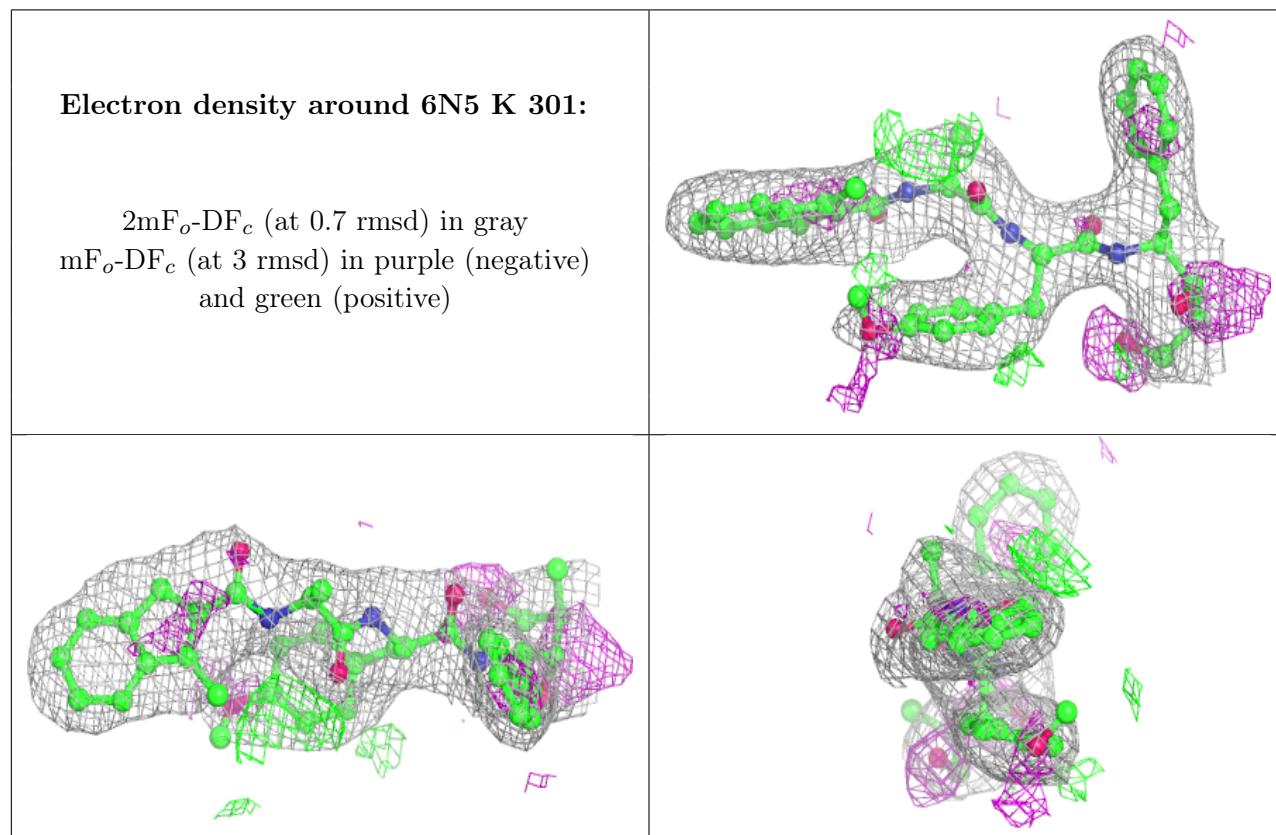
There are no monosaccharides in this entry.

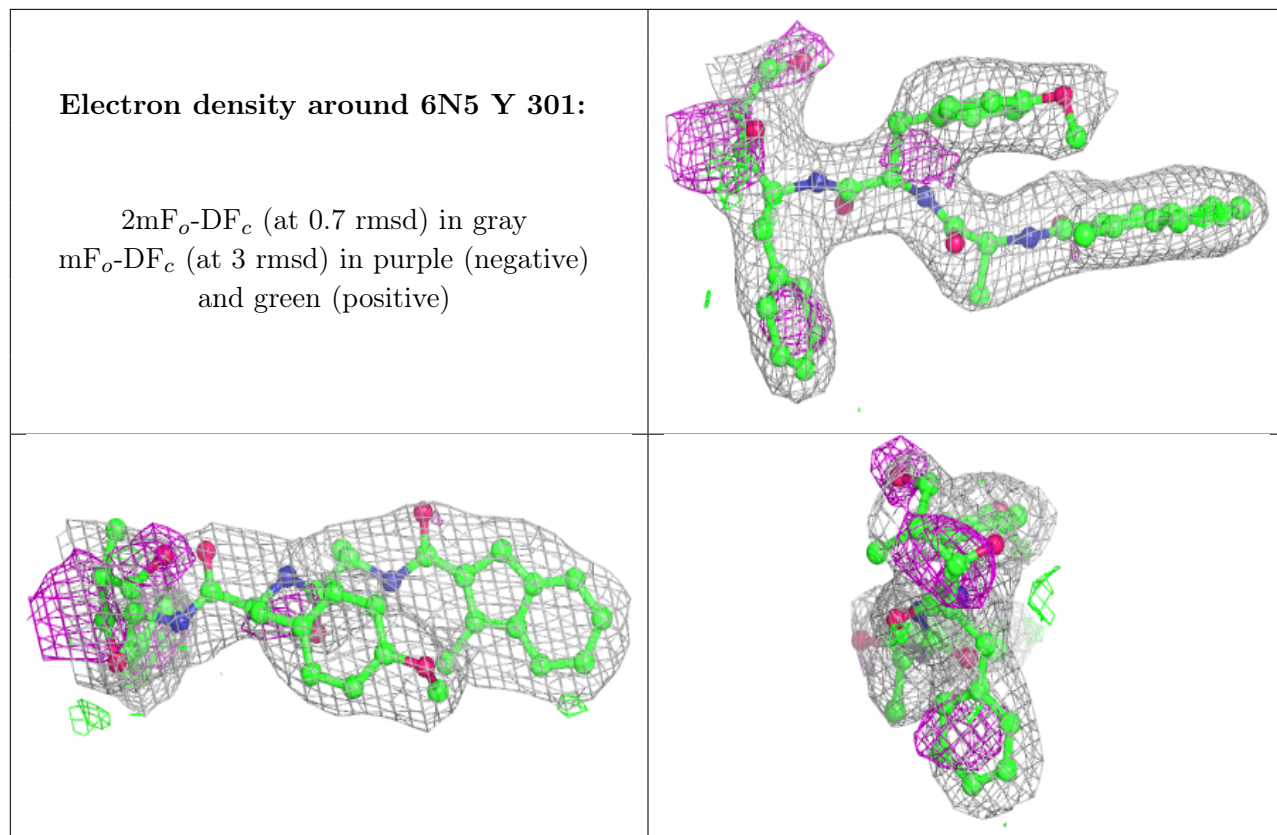
## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
17	MES	V	301	12/12	0.81	0.41	66,73,100,101	0
17	MES	H	301	12/12	0.85	0.34	67,75,90,92	0
17	MES	K	304	12/12	0.91	0.31	53,56,73,80	12
15	MG	N	201	1/1	0.93	0.13	55,55,55,55	0
18	6N5	K	301	45/45	0.93	0.19	33,50,66,71	0
17	MES	Y	302	12/12	0.94	0.26	55,57,67,72	12
15	MG	Z	301	1/1	0.94	0.16	71,71,71,71	0
15	MG	J	201	1/1	0.95	0.17	56,56,56,56	0
18	6N5	Y	301	45/45	0.95	0.18	24,51,65,70	0
15	MG	G	301	1/1	0.97	0.07	57,57,57,57	0
15	MG	A	301	1/1	0.97	0.20	52,52,52,52	0
15	MG	b	201	1/1	0.97	0.08	43,43,43,43	0
15	MG	I	301	1/1	0.98	0.08	46,46,46,46	0
15	MG	I	302	1/1	0.98	0.04	54,54,54,54	0
15	MG	K	303	1/1	0.99	0.45	57,57,57,57	0
15	MG	L	301	1/1	0.99	0.04	71,71,71,71	0
16	CL	G	302	1/1	0.99	0.17	38,38,38,38	0
16	CL	U	301	1/1	0.99	0.18	40,40,40,40	0
15	MG	K	302	1/1	0.99	0.06	54,54,54,54	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.