



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 2, 2024 – 10:35 am GMT

PDB ID : 5L60  
Title : Yeast 20S proteasome with human beta5c (1-138) and human beta6 (97-111; 118-133) in complex with PR-924  
Authors : Groll, M.; Huber, E.M.  
Deposited on : 2016-05-28  
Resolution : 2.70 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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

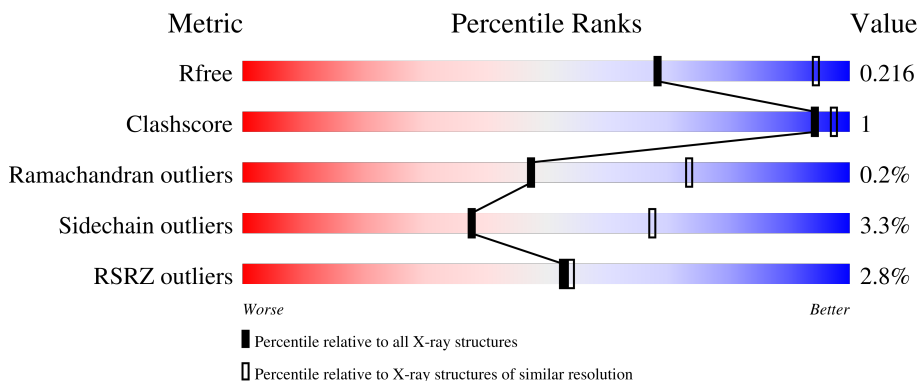
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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

Mol	Chain	Length	Quality of chain
1	A	250	 3% 98%
1	O	250	 4% 98%
2	B	258	 4% 91% 5%
2	P	258	 3% 91% 5%
3	C	254	 7% 87% 6% 6%

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Mol	Chain	Length	Quality of chain
3	Q	254	6% 88% 6% • 6%
4	D	260	2% 86% • 10%
4	R	260	3% 87% • 10%
5	E	234	3% 95% • •
5	S	234	4% 95% • •
6	F	288	3% 82% • 16%
6	T	288	3% 82% • 16%
7	G	252	2% 90% 5% •
7	U	252	2% 90% 5% •
8	H	232	% 92% 5% •
8	V	232	3% 92% 5% •
9	I	205	93% 6%
9	W	205	% 94% 6%
10	J	198	2% 91% 7% • •
10	X	198	2% 91% 7% • •
11	K	211	4% 86% 11% •
11	Y	211	3% 86% 11% •
12	L	222	2% 93% 6%
12	Z	222	3% 94% 6%
13	M	246	2% 91% • 5%
13	a	246	92% • 5%
14	N	196	% 94% 5% •
14	b	196	% 97% •

## 2 Entry composition

There are 19 unique types of molecules in this entry. The entry contains 49909 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	Total 1773	C 1114	N 307	O 348	S 4	0	0	0
5	S	231	Total 1773	C 1114	N 307	O 348	S 4	0	0	0

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

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

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

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

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

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

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

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

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

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

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

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

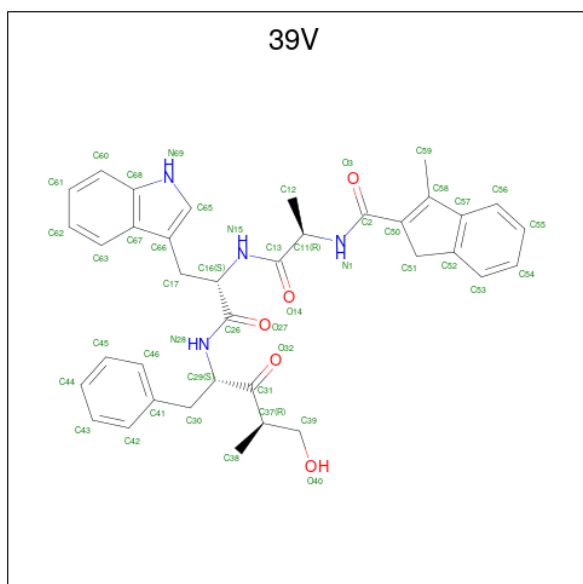
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
16	G	1	Total Cl 1 1	0	0
16	U	1	Total Cl 1 1	0	0

- 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	12	6	1	4	1	0	0
17	K	1	Total	12	6	1	4	1	0	0
17	V	1	Total	12	6	1	4	1	0	0
17	Y	1	Total	12	6	1	4	1	0	0

- Molecule 18 is N-[(3-methyl-1H-inden-2-yl)carbonyl]-D-alanyl-N-[(2S,4R)-5-hydroxy-4-methyl-3-oxo-1-phenylpentan-2-yl]-L-tryptophanamide (three-letter code: 39V) (formula:  $C_{37}H_{40}N_4O_5$ ).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
18	K	1	Total	C	N	O	0	0
			46	37	4	5		
18	Y	1	Total	C	N	O	0	0
			46	37	4	5		

- Molecule 19 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
19	A	18	Total	O	0	0
			18	18		
19	B	17	Total	O	0	0
			17	17		
19	C	15	Total	O	0	0
			15	15		
19	D	14	Total	O	0	0
			14	14		
19	E	7	Total	O	0	0
			7	7		
19	F	17	Total	O	0	0
			17	17		
19	G	17	Total	O	0	0
			17	17		
19	H	17	Total	O	0	0
			17	17		
19	I	12	Total	O	0	0
			12	12		
19	J	20	Total	O	0	0
			20	20		
19	K	11	Total	O	0	0
			11	11		
19	L	14	Total	O	0	0
			14	14		
19	M	25	Total	O	0	0
			25	25		
19	N	11	Total	O	0	0
			11	11		
19	O	10	Total	O	0	0
			10	10		
19	P	9	Total	O	0	0
			9	9		
19	Q	11	Total	O	0	0
			11	11		
19	R	12	Total	O	0	0
			12	12		

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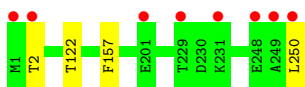
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>	<b>ZeroOcc</b>	<b>AltConf</b>
19	S	8	Total O 8 8	0	0
19	T	12	Total O 12 12	0	0
19	U	20	Total O 20 20	0	0
19	V	17	Total O 17 17	0	0
19	W	15	Total O 15 15	0	0
19	X	12	Total O 12 12	0	0
19	Y	9	Total O 9 9	0	0
19	Z	15	Total O 15 15	0	0
19	a	18	Total O 18 18	0	0
19	b	17	Total O 17 17	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.

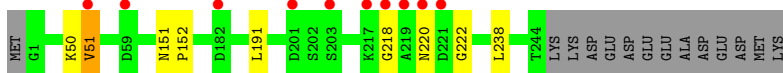
- Molecule 1: Proteasome subunit alpha type-2



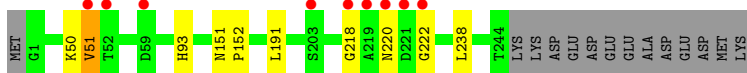
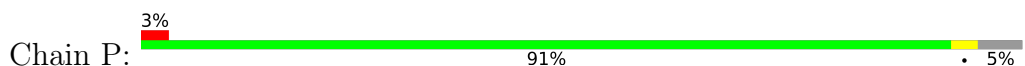
- Molecule 1: Proteasome subunit alpha type-2



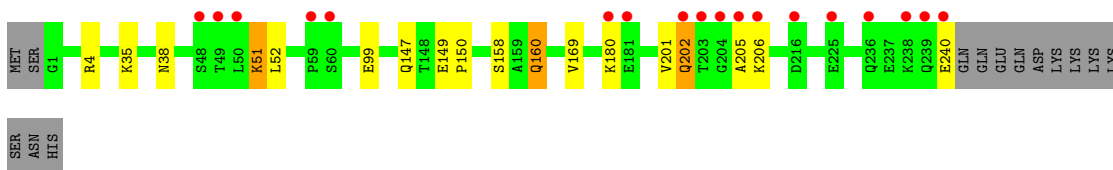
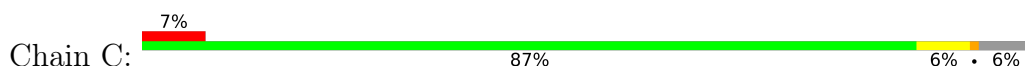
- Molecule 2: Proteasome subunit alpha type-3



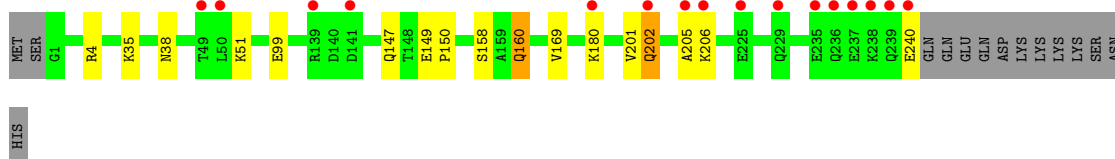
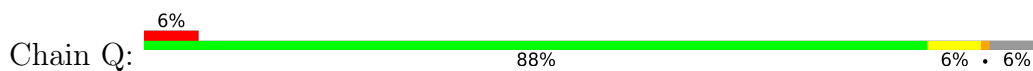
- Molecule 2: Proteasome subunit alpha type-3



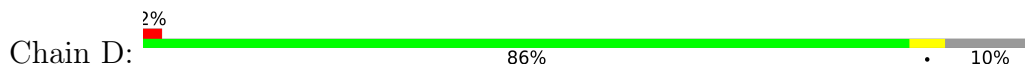
- Molecule 3: Proteasome subunit alpha type-4



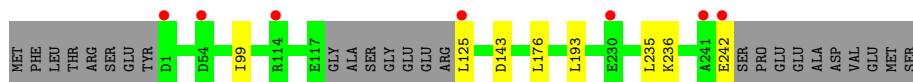
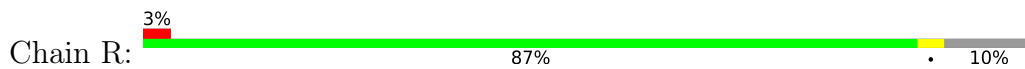
• Molecule 3: Proteasome subunit alpha type-4



• Molecule 4: Proteasome subunit alpha type-5



• Molecule 4: Proteasome subunit alpha type-5



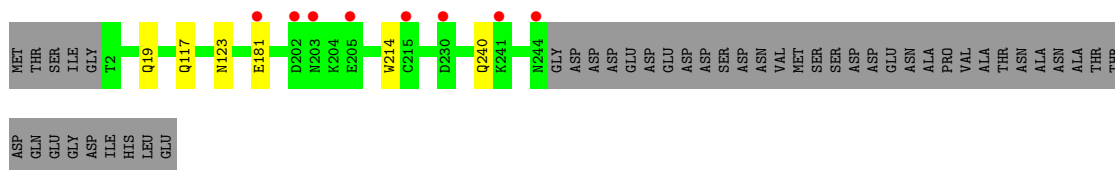
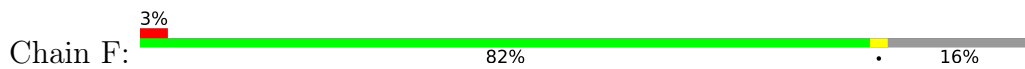
• Molecule 5: Proteasome subunit alpha type-6



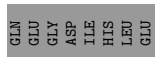
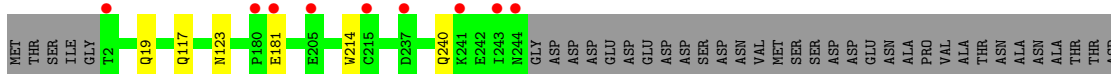
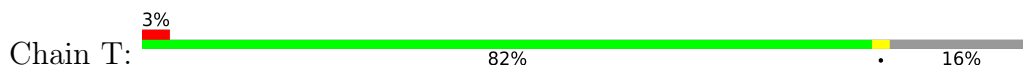
• Molecule 5: Proteasome subunit alpha type-6



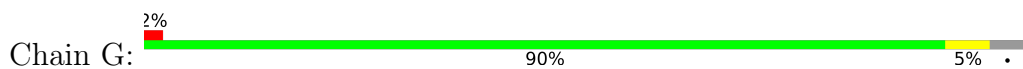
• Molecule 6: Probable proteasome subunit alpha type-7



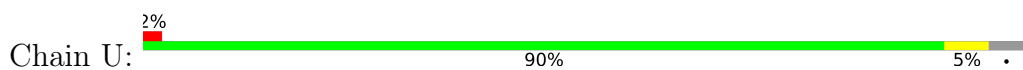
• Molecule 6: Probable proteasome subunit alpha type-7



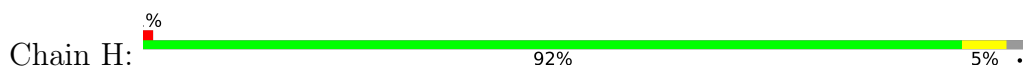
- Molecule 7: Proteasome subunit alpha type-1



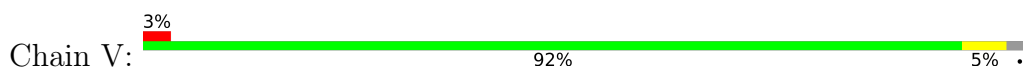
- Molecule 7: Proteasome subunit alpha type-1



- Molecule 8: Proteasome subunit beta type-2



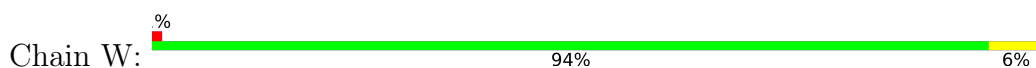
- Molecule 8: Proteasome subunit beta type-2

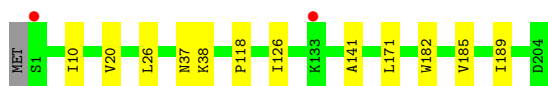


- Molecule 9: Proteasome subunit beta type-3

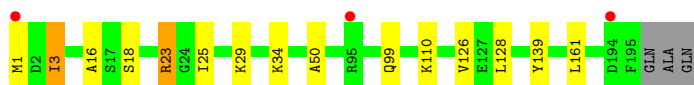
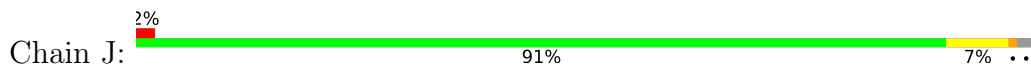


- Molecule 9: Proteasome subunit beta type-3

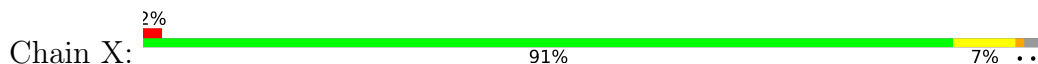




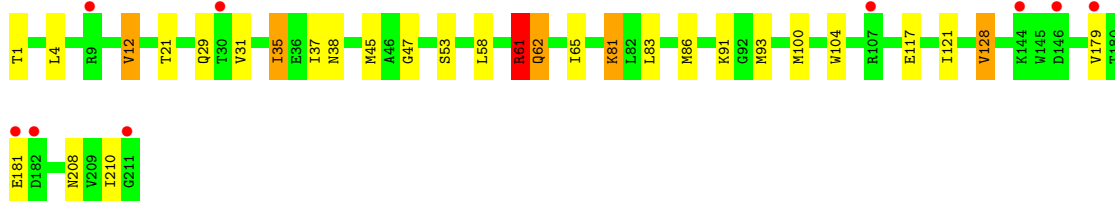
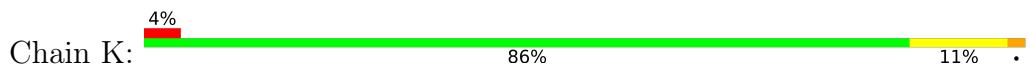
- Molecule 10: Proteasome subunit beta type-4



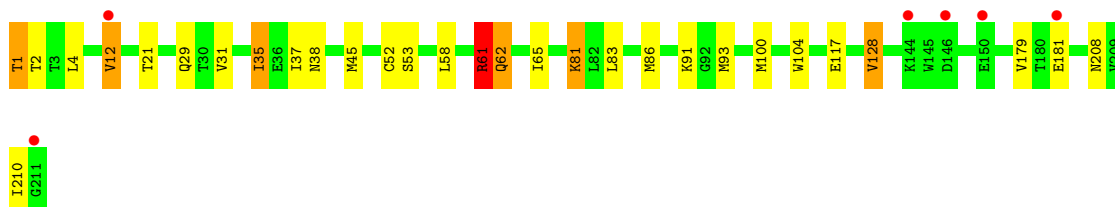
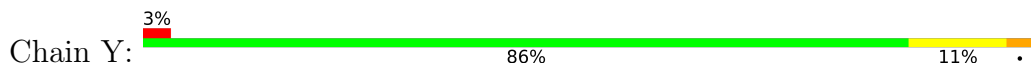
- Molecule 10: Proteasome subunit beta type-4



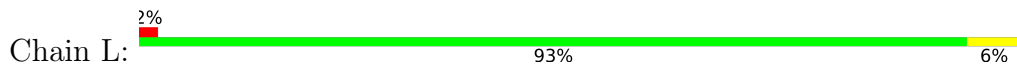
- Molecule 11: Proteasome subunit beta type-5, Proteasome subunit beta type-5



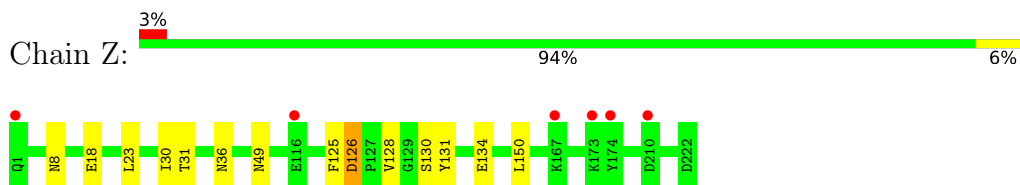
- Molecule 11: Proteasome subunit beta type-5, Proteasome subunit beta type-5



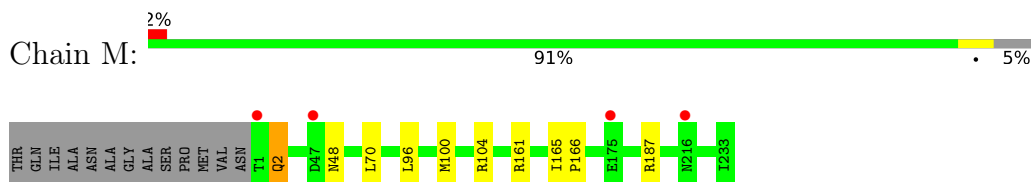
- Molecule 12: Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6



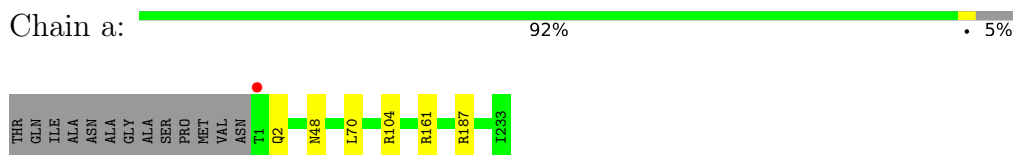
- Molecule 12: Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6, Proteasome subunit beta type-1, Proteasome subunit beta type-6



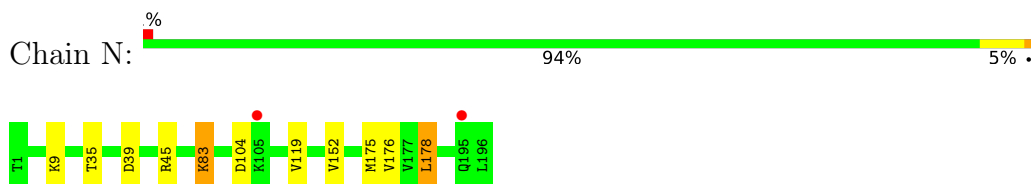
- Molecule 13: Proteasome subunit beta type-7



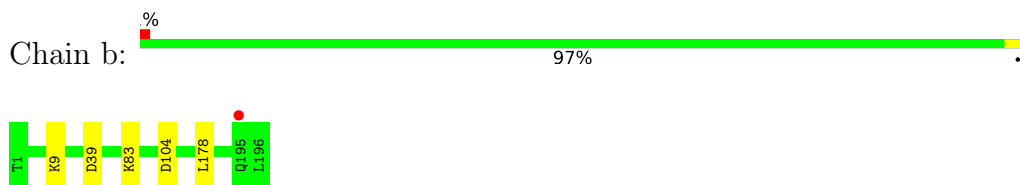
- Molecule 13: Proteasome subunit beta type-7



- 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, $\alpha$ , $\beta$ , $\gamma$	136.54Å 299.51Å 145.85Å 90.00° 112.83° 90.00°	Depositor
Resolution (Å)	15.00 – 2.70 15.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	95.8 (15.00-2.70) 95.9 (15.00-2.70)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.40 (at 2.69Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.188 , 0.212 0.193 , 0.216	Depositor DCC
$R_{free}$ test set	14032 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	55.3	Xtrriage
Anisotropy	0.100	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 33.1	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	49909	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.78% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 39V, MG, CL, 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	0.27	0/1934	0.48	0/2618
2	P	0.27	0/1934	0.48	0/2618
3	C	0.27	0/1910	0.50	0/2586
3	Q	0.27	0/1910	0.50	0/2586
4	D	0.27	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	0.27	0/1800	0.46	0/2433
6	F	0.27	0/1932	0.44	0/2609
6	T	0.27	0/1932	0.45	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	0.25	0/1750	0.48	0/2373
9	I	0.27	0/1611	0.50	0/2174
9	W	0.27	0/1611	0.50	0/2174
10	J	0.26	0/1589	0.48	0/2142
10	X	0.26	0/1589	0.48	0/2142
11	K	0.32	1/1668 (0.1%)	0.76	4/2253 (0.2%)
11	Y	0.32	1/1668 (0.1%)	0.75	6/2253 (0.3%)
12	L	0.30	0/1802	0.50	0/2430
12	Z	0.30	0/1802	0.51	0/2430
13	M	0.27	0/1855	0.51	0/2514
13	a	0.27	0/1855	0.51	0/2514
14	N	0.25	0/1541	0.48	0/2087
14	b	0.25	0/1541	0.47	0/2087
All	All	0.27	2/50252 (0.0%)	0.50	10/67940 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if

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

Mol	Chain	#Chirality outliers	#Planarity outliers
11	K	0	1
11	Y	0	1
All	All	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	K	1	THR	CB-OG1	-5.31	1.32	1.43
11	Y	1	THR	CB-OG1	-5.00	1.33	1.43

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	K	61	ARG	NE-CZ-NH2	-18.71	110.94	120.30
11	Y	61	ARG	NE-CZ-NH1	-16.71	111.94	120.30
11	K	61	ARG	NE-CZ-NH1	15.41	128.01	120.30
11	Y	61	ARG	NE-CZ-NH2	15.30	127.95	120.30
11	K	61	ARG	CD-NE-CZ	8.07	134.89	123.60
11	Y	61	ARG	CD-NE-CZ	7.88	134.63	123.60
11	Y	1	THR	CA-CB-CG2	5.81	120.53	112.40
11	K	1	THR	N-CA-C	5.77	126.58	111.00
11	Y	1	THR	N-CA-C	5.62	126.18	111.00
11	Y	1	THR	CB-CA-C	-5.39	97.04	111.60

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
11	K	61	ARG	Sidechain
11	Y	61	ARG	Sidechain

## 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	2	0
2	P	1904	0	1904	3	0
3	C	1881	0	1895	8	0
3	Q	1881	0	1895	6	0
4	D	1813	0	1797	2	0
4	R	1813	0	1797	0	0
5	E	1773	0	1775	2	0
5	S	1773	0	1775	2	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	1719	0	1719	6	0
8	V	1719	0	1719	5	0
9	I	1581	0	1574	7	0
9	W	1581	0	1574	6	0
10	J	1561	0	1569	10	0
10	X	1561	0	1569	8	0
11	K	1632	0	1590	18	0
11	Y	1632	0	1590	15	0
12	L	1764	0	1716	4	0
12	Z	1764	0	1716	4	0
13	M	1824	0	1832	3	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	4	0
17	V	12	0	13	0	0
17	Y	12	0	13	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	K	46	0	39	9	0
18	Y	46	0	39	6	0
19	A	18	0	0	0	0
19	B	17	0	0	0	0
19	C	15	0	0	0	0
19	D	14	0	0	0	0
19	E	7	0	0	0	0
19	F	17	0	0	0	0
19	G	17	0	0	0	0
19	H	17	0	0	0	0
19	I	12	0	0	0	0
19	J	20	0	0	0	0
19	K	11	0	0	0	0
19	L	14	0	0	0	0
19	M	25	0	0	1	0
19	N	11	0	0	0	0
19	O	10	0	0	0	0
19	P	9	0	0	1	0
19	Q	11	0	0	0	0
19	R	12	0	0	0	0
19	S	8	0	0	0	0
19	T	12	0	0	0	0
19	U	20	0	0	0	0
19	V	17	0	0	0	0
19	W	15	0	0	0	0
19	X	12	0	0	0	0
19	Y	9	0	0	0	0
19	Z	15	0	0	0	0
19	a	18	0	0	0	0
19	b	17	0	0	0	0
All	All	49909	0	49260	123	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 (123) 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)
12:L:124:SER:OG	12:L:134:GLU:OE2	1.77	0.99
18:Y:301:39V:H1	18:Y:301:39V:H4	1.24	0.98
18:K:301:39V:H4	18:K:301:39V:H1	1.29	0.96

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:62:GLN:HA	11:K:62:GLN:OE1	1.73	0.86
18:K:301:39V:O40	17:K:304:MES:O1S	1.99	0.79
18:Y:301:39V:H41	17:Y:302:MES:O1S	1.86	0.75
3:C:99:GLU:HG3	11:K:81:LYS:HE2	1.72	0.71
18:K:301:39V:O40	17:K:304:MES:S	2.50	0.69
18:Y:301:39V:O27	18:Y:301:39V:H33	1.93	0.68
18:Y:301:39V:H1	18:Y:301:39V:C59	2.03	0.67
18:Y:301:39V:H4	18:Y:301:39V:N1	2.02	0.66
18:K:301:39V:H4	18:K:301:39V:N1	2.03	0.62
18:K:301:39V:O40	18:K:301:39V:O32	2.18	0.61
18:K:301:39V:O40	17:K:304:MES:O3S	2.20	0.59
18:K:301:39V:H1	18:K:301:39V:C59	2.07	0.59
10:J:126:VAL:HG12	10:J:128:LEU:HG	1.85	0.58
10:J:139:TYR:OH	10:X:25:ILE:O	2.21	0.58
10:X:126:VAL:HG12	10:X:128:LEU:HG	1.85	0.57
11:K:208:ASN:O	9:W:38:LYS:NZ	2.37	0.57
14:N:152:VAL:HA	14:N:175:MET:HE1	1.85	0.57
18:Y:301:39V:H33	18:Y:301:39V:C26	2.37	0.55
3:C:99:GLU:CG	11:K:81:LYS:HE2	2.38	0.53
9:I:38:LYS:NZ	11:Y:208:ASN:O	2.41	0.53
10:J:25:ILE:O	10:X:139:TYR:OH	2.26	0.53
12:L:31:THR:HG23	12:L:36:ASN:HD21	1.74	0.53
11:K:35:ILE:CD1	11:K:45:MET:CE	2.87	0.52
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.58	0.51
3:C:201:VAL:O	3:C:202:GLN:CB	2.58	0.51
12:Z:31:THR:HG23	12:Z:36:ASN:HD21	1.74	0.50
7:U:23:PHE:O	7:U:26:THR:HB	2.11	0.50
11:Y:35:ILE:CD1	11:Y:45:MET:CE	2.90	0.50
11:Y:62:GLN:OE1	11:Y:62:GLN:CA	2.60	0.50
11:Y:12:VAL:HG13	11:Y:179:VAL:HB	1.94	0.49
7:G:23:PHE:O	7:G:26:THR:HB	2.13	0.49
10:J:50:ALA:O	11:K:91:LYS:NZ	2.45	0.49
18:K:301:39V:O3	18:K:301:39V:H16	2.14	0.48
10:J:23:ARG:NH1	17:K:304:MES:O1	2.46	0.48
11:K:12:VAL:HG13	11:K:179:VAL:HB	1.94	0.48
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.96	0.47
9:W:20:VAL:HG23	9:W:189:ILE:HB	1.97	0.47
8:H:50:ALA:CB	9:I:126:ILE:HG23	2.45	0.47
11:K:45:MET:HE1	11:K:53:SER:HA	1.96	0.47
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.96	0.47
9:I:26:LEU:HD21	9:I:185:VAL:HG23	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:Q:201:VAL:O	3:Q:202:GLN:HB3	2.16	0.46
9:I:20:VAL:HG23	9:I:189:ILE:HB	1.97	0.46
10:J:29:LYS:HD2	11:K:121:ILE:CG2	2.46	0.46
3:C:201:VAL:O	3:C:202:GLN:HB3	2.16	0.46
10:J:1:MET:HG2	10:J:34:LYS:HE3	1.98	0.46
8:H:35:HIS:HB3	8:H:56:THR:HG21	1.98	0.45
9:W:26:LEU:HD21	9:W:185:VAL:HG23	1.99	0.45
14:N:176:VAL:HG12	14:N:178:LEU:HD13	1.97	0.45
8:V:35:HIS:HB3	8:V:56:THR:HG21	1.99	0.45
11:Y:45:MET:HE1	11:Y:53:SER:HA	1.97	0.45
11:K:62:GLN:OE1	11:K:62:GLN:CA	2.56	0.45
12:L:8:ASN:HA	12:L:30:ILE:O	2.17	0.45
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.81	0.45
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.82	0.45
12:Z:126:ASP:OD1	12:Z:126:ASP:C	2.55	0.45
13:M:96:LEU:O	13:M:100:MET:HG2	2.17	0.45
11:K:100:MET:SD	11:K:128:VAL:CG1	3.05	0.45
12:Z:125:PHE:CD2	12:Z:131:TYR:HB3	2.52	0.45
2:B:50:LYS:O	2:B:51:VAL:C	2.56	0.44
3:C:35:LYS:HG2	3:C:158:SER:O	2.17	0.44
3:Q:99:GLU:HG3	11:Y:81:LYS:HE2	1.99	0.44
9:I:10:ILE:HG21	9:I:141:ALA:HB3	1.99	0.44
11:Y:100:MET:SD	11:Y:128:VAL:CG1	3.06	0.44
9:I:20:VAL:HG13	9:I:118:PRO:HB3	1.99	0.44
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.18	0.44
9:W:20:VAL:HG13	9:W:118:PRO:HB3	1.99	0.44
11:K:35:ILE:CD1	11:K:45:MET:HE1	2.48	0.44
10:X:1:MET:HG2	10:X:34:LYS:HE3	1.98	0.44
11:K:35:ILE:HD12	11:K:45:MET:CE	2.47	0.44
2:P:93:HIS:HB3	19:P:301:HOH:O	2.17	0.44
13:M:2:GLN:NE2	19:M:301:HOH:O	2.50	0.44
2:P:50:LYS:O	2:P:51:VAL:C	2.56	0.44
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.48	0.44
10:X:50:ALA:O	11:Y:91:LYS:NZ	2.50	0.44
12:Z:8:ASN:HA	12:Z:30:ILE:O	2.18	0.44
9:W:10:ILE:HG21	9:W:141:ALA:HB3	1.99	0.44
8:V:53:GLU:O	8:V:57:GLN:HG2	2.18	0.43
11:Y:35:ILE:HD12	11:Y:45:MET:HE2	2.00	0.43
11:K:104:TRP:CE2	11:K:181:GLU:HB3	2.53	0.43
12:L:125:PHE:CD2	12:L:131:TYR:HB3	2.53	0.43
5:S:12:PHE:H	6:T:19:GLN:HE22	1.65	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:Y:62:GLN:OE1	11:Y:62:GLN:HA	2.19	0.43
11:Y:1:THR:HG22	11:Y:2:THR:N	2.34	0.43
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.54	0.43
8:H:104:ASP:HB2	8:H:105:PRO:HD2	2.00	0.43
10:X:1:MET:HB3	10:X:34:LYS:HE3	2.01	0.43
11:Y:35:ILE:CD1	11:Y:45:MET:HE2	2.48	0.43
14:N:35:THR:HG21	14:N:45:ARG:HE	1.84	0.42
8:V:104:ASP:HB2	8:V:105:PRO:HD2	2.01	0.42
8:H:53:GLU:O	8:H:57:GLN:HG2	2.20	0.42
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.42
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.50	0.42
11:Y:104:TRP:CE2	11:Y:181:GLU:HB3	2.54	0.42
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.50	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.42
8:H:196:ARG:NH2	9:I:150:GLU:HG3	2.34	0.42
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.02	0.41
11:K:35:ILE:CD1	11:K:45:MET:HE2	2.50	0.41
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.02	0.41
8:V:50:ALA:CB	9:W:126:ILE:HG23	2.51	0.41
11:K:47:GLY:HA2	18:K:301:39V:C62	2.50	0.41
10:J:1:MET:HB3	10:J:34:LYS:HE3	2.01	0.41
5:E:12:PHE:H	6:F:19:GLN:HE22	1.69	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.84	0.41
11:Y:35:ILE:HD12	11:Y:45:MET:CE	2.50	0.41
10:J:3:ILE:HG23	10:J:18:SER:HB3	2.02	0.41
10:X:3:ILE:HG23	10:X:18:SER:HB3	2.02	0.41
4:D:91:HIS:HB3	4:D:99:ILE:CG2	2.51	0.41
5:E:77:ALA:N	5:E:78:PRO:CD	2.84	0.41
11:K:35:ILE:HD12	11:K:45:MET:HE2	2.02	0.41
13:M:165:ILE:HB	13:M:166:PRO:HD3	2.03	0.41
3:C:51:LYS:O	3:C:52:LEU:HB2	2.21	0.41
8:H:112:SER:HB3	8:H:125:LEU:HD13	2.02	0.41
11:K:35:ILE:HG13	11:K:45:MET:HE2	2.03	0.41
4:D:160:ASN:HB3	4:D:179:TRP:CE2	2.56	0.40
8:V:112:SER:HB3	8:V:125:LEU:HD13	2.02	0.40
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.51	0.40
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.51	0.40
11:Y:45:MET:HG2	11:Y:52:CYS:HB3	2.03	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	60
1	O	248/250 (99%)	240 (97%)	7 (3%)	1 (0%)	34	60
2	B	242/258 (94%)	233 (96%)	5 (2%)	4 (2%)	9	23
2	P	242/258 (94%)	233 (96%)	5 (2%)	4 (2%)	9	23
3	C	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	19	43
3	Q	238/254 (94%)	233 (98%)	3 (1%)	2 (1%)	19	43
4	D	231/260 (89%)	227 (98%)	4 (2%)	0	100	100
4	R	231/260 (89%)	226 (98%)	5 (2%)	0	100	100
5	E	229/234 (98%)	222 (97%)	7 (3%)	0	100	100
5	S	229/234 (98%)	223 (97%)	6 (3%)	0	100	100
6	F	241/288 (84%)	239 (99%)	2 (1%)	0	100	100
6	T	241/288 (84%)	239 (99%)	2 (1%)	0	100	100
7	G	239/252 (95%)	236 (99%)	3 (1%)	0	100	100
7	U	239/252 (95%)	236 (99%)	3 (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%)	196 (97%)	6 (3%)	0	100	100
9	W	202/205 (98%)	196 (97%)	6 (3%)	0	100	100
10	J	193/198 (98%)	190 (98%)	3 (2%)	0	100	100
10	X	193/198 (98%)	189 (98%)	4 (2%)	0	100	100
11	K	209/211 (99%)	203 (97%)	6 (3%)	0	100	100
11	Y	209/211 (99%)	204 (98%)	5 (2%)	0	100	100
12	L	220/222 (99%)	215 (98%)	5 (2%)	0	100	100
12	Z	220/222 (99%)	215 (98%)	5 (2%)	0	100	100
13	M	231/246 (94%)	220 (95%)	11 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	a	231/246 (94%)	220 (95%)	11 (5%)	0	100	100
14	N	194/196 (99%)	186 (96%)	8 (4%)	0	100	100
14	b	194/196 (99%)	186 (96%)	8 (4%)	0	100	100
All	All	6282/6612 (95%)	6116 (97%)	152 (2%)	14 (0%)	47	73

All (14) 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
2	B	220	ASN
2	P	220	ASN

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	209/209 (100%)	206 (99%)	3 (1%)	67	86
1	O	209/209 (100%)	206 (99%)	3 (1%)	67	86
2	B	203/216 (94%)	201 (99%)	2 (1%)	76	91
2	P	203/216 (94%)	201 (99%)	2 (1%)	76	91
3	C	212/226 (94%)	203 (96%)	9 (4%)	30	58
3	Q	212/226 (94%)	203 (96%)	9 (4%)	30	58

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	D	194/215 (90%)	186 (96%)	8 (4%)	30	59
4	R	194/215 (90%)	186 (96%)	8 (4%)	30	59
5	E	190/193 (98%)	185 (97%)	5 (3%)	46	75
5	S	190/193 (98%)	185 (97%)	5 (3%)	46	75
6	F	201/239 (84%)	196 (98%)	5 (2%)	47	76
6	T	201/239 (84%)	196 (98%)	5 (2%)	47	76
7	G	206/210 (98%)	199 (97%)	7 (3%)	37	66
7	U	206/210 (98%)	200 (97%)	6 (3%)	42	71
8	H	185/190 (97%)	182 (98%)	3 (2%)	62	85
8	V	185/190 (97%)	182 (98%)	3 (2%)	62	85
9	I	172/173 (99%)	169 (98%)	3 (2%)	60	84
9	W	172/173 (99%)	169 (98%)	3 (2%)	60	84
10	J	173/175 (99%)	169 (98%)	4 (2%)	50	78
10	X	173/175 (99%)	169 (98%)	4 (2%)	50	78
11	K	165/165 (100%)	146 (88%)	19 (12%)	5	13
11	Y	165/165 (100%)	146 (88%)	19 (12%)	5	13
12	L	186/186 (100%)	178 (96%)	8 (4%)	29	57
12	Z	186/186 (100%)	178 (96%)	8 (4%)	29	57
13	M	199/208 (96%)	193 (97%)	6 (3%)	41	70
13	a	199/208 (96%)	193 (97%)	6 (3%)	41	70
14	N	162/162 (100%)	157 (97%)	5 (3%)	40	69
14	b	162/162 (100%)	157 (97%)	5 (3%)	40	69
All	All	5314/5534 (96%)	5141 (97%)	173 (3%)	38	67

All (173) 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	191	LEU
2	B	238	LEU
3	C	4	ARG
3	C	38	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	C	51	LYS
3	C	147	GLN
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	181	GLU
6	F	214	TRP
6	F	240	GLN
7	G	83	ASN
7	G	115	LEU
7	G	117	GLN
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	171	LEU
9	I	182	TRP
10	J	3	ILE
10	J	23	ARG
10	J	99	GLN
10	J	110	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
11	K	4	LEU
11	K	12	VAL
11	K	21	THR
11	K	29	GLN
11	K	31	VAL
11	K	35	ILE
11	K	37	ILE
11	K	38	ASN
11	K	58	LEU
11	K	61	ARG
11	K	62	GLN
11	K	65	ILE
11	K	81	LYS
11	K	83	LEU
11	K	86	MET
11	K	93	MET
11	K	117	GLU
11	K	128	VAL
11	K	210	ILE
12	L	18	GLU
12	L	23	LEU
12	L	49	ASN
12	L	128	VAL
12	L	130	SER
12	L	132	GLN
12	L	134	GLU
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	104	ASP
14	N	178	LEU
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	191	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	P	238	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
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	181	GLU
6	T	214	TRP
6	T	240	GLN
7	U	83	ASN
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	171	LEU
9	W	182	TRP
10	X	3	ILE
10	X	23	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	X	99	GLN
10	X	110	LYS
11	Y	4	LEU
11	Y	12	VAL
11	Y	21	THR
11	Y	29	GLN
11	Y	31	VAL
11	Y	35	ILE
11	Y	37	ILE
11	Y	38	ASN
11	Y	58	LEU
11	Y	61	ARG
11	Y	62	GLN
11	Y	65	ILE
11	Y	81	LYS
11	Y	83	LEU
11	Y	86	MET
11	Y	93	MET
11	Y	117	GLU
11	Y	128	VAL
11	Y	210	ILE
12	Z	18	GLU
12	Z	23	LEU
12	Z	49	ASN
12	Z	126	ASP
12	Z	128	VAL
12	Z	130	SER
12	Z	134	GLU
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	104	ASP
14	b	178	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (75) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	58	GLN
2	B	95	GLN
2	B	119	GLN
2	B	123	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	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	117	GLN
6	F	123	ASN
6	F	191	GLN
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	109	ASN
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	147	GLN
3	Q	160	GLN

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Mol	Chain	Res	Type
4	R	91	HIS
4	R	100	ASN
4	R	225	ASN
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN
5	S	118	ASN
5	S	120	GLN
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
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
12	Z	109	ASN
12	Z	158	ASN
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	H	301	-	12,12,12	2.21	1 (8%)	14,16,16	1.22	2 (14%)
18	39V	Y	301	11	48,50,50	3.57	15 (31%)	56,70,70	1.64	8 (14%)
17	MES	V	301	-	12,12,12	2.21	1 (8%)	14,16,16	1.25	2 (14%)
17	MES	Y	302	-	12,12,12	2.28	1 (8%)	14,16,16	1.22	2 (14%)
18	39V	K	301	11	48,50,50	3.61	17 (35%)	56,70,70	1.71	9 (16%)
17	MES	K	304	-	12,12,12	2.33	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	H	301	-	-	1/6/14/14	0/1/1/1
18	39V	Y	301	11	-	15/41/54/54	0/5/5/5
17	MES	V	301	-	-	0/6/14/14	0/1/1/1
17	MES	Y	302	-	-	0/6/14/14	0/1/1/1
18	39V	K	301	11	-	11/41/54/54	0/5/5/5
17	MES	K	304	-	-	0/6/14/14	0/1/1/1

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	K	301	39V	O32-C31	11.58	1.40	1.21
18	K	301	39V	C2-C50	-11.17	1.34	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	Y	301	39V	O32-C31	11.05	1.39	1.21
18	Y	301	39V	C2-C50	-10.70	1.35	1.49
18	Y	301	39V	C51-C50	-9.56	1.38	1.51
18	K	301	39V	C51-C50	-8.97	1.39	1.51
17	K	304	MES	C8-S	-7.80	1.66	1.77
17	Y	302	MES	C8-S	-7.66	1.66	1.77
17	V	301	MES	C8-S	-7.33	1.67	1.77
17	H	301	MES	C8-S	-7.33	1.67	1.77
18	Y	301	39V	C51-C52	-7.18	1.39	1.50
18	K	301	39V	C51-C52	-6.77	1.39	1.50
18	Y	301	39V	C57-C58	-6.70	1.31	1.44
18	K	301	39V	C57-C58	-6.33	1.32	1.44
18	K	301	39V	C60-C68	-5.52	1.32	1.41
18	K	301	39V	C57-C52	-5.51	1.32	1.39
18	Y	301	39V	C60-C68	-5.28	1.32	1.41
18	K	301	39V	C30-C41	-5.21	1.38	1.51
18	K	301	39V	C63-C67	-5.15	1.31	1.42
18	Y	301	39V	C57-C52	-5.13	1.32	1.39
18	Y	301	39V	C63-C67	-5.07	1.31	1.42
18	Y	301	39V	C30-C41	-4.86	1.39	1.51
18	Y	301	39V	C56-C57	-4.51	1.32	1.39
18	K	301	39V	C56-C57	-4.30	1.33	1.39
18	K	301	39V	C53-C52	-4.10	1.32	1.39
18	Y	301	39V	C53-C52	-4.06	1.32	1.39
18	K	301	39V	C67-C68	-3.81	1.32	1.42
18	Y	301	39V	C67-C68	-3.81	1.32	1.42
18	Y	301	39V	C37-C31	2.77	1.61	1.52
18	K	301	39V	C65-N69	-2.40	1.31	1.36
18	K	301	39V	C50-C58	-2.36	1.31	1.36
18	K	301	39V	C65-C66	-2.36	1.30	1.37
18	K	301	39V	C68-N69	-2.31	1.31	1.38
18	Y	301	39V	C50-C58	-2.14	1.32	1.36
18	Y	301	39V	C65-N69	-2.11	1.32	1.36
18	K	301	39V	C37-C31	2.03	1.58	1.52

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	K	301	39V	C30-C29-N28	-4.97	100.31	110.79
18	K	301	39V	O32-C31-C37	-4.66	112.62	121.26
18	Y	301	39V	C66-C17-C16	-4.33	104.96	113.45
18	Y	301	39V	C11-N1-C2	4.21	128.07	121.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	Y	301	39V	O32-C31-C37	-4.02	113.80	121.26
18	K	301	39V	C66-C17-C16	-4.01	105.60	113.45
18	Y	301	39V	C30-C29-N28	-3.57	103.27	110.79
18	K	301	39V	C57-C58-C50	3.55	111.55	109.15
18	Y	301	39V	C17-C66-C65	-3.43	123.73	127.97
18	K	301	39V	C17-C66-C65	-3.22	123.99	127.97
18	K	301	39V	C11-N1-C2	3.08	126.33	121.57
18	Y	301	39V	C57-C58-C50	2.91	111.11	109.15
18	K	301	39V	C63-C67-C68	2.90	122.02	118.17
18	K	301	39V	C52-C51-C50	2.79	104.80	102.67
18	Y	301	39V	C52-C51-C50	2.69	104.72	102.67
17	V	301	MES	O3S-S-C8	2.66	110.07	105.77
17	H	301	MES	O2S-S-C8	2.59	110.04	106.92
17	K	304	MES	O2S-S-C8	2.50	109.93	106.92
17	K	304	MES	O3S-S-C8	2.43	109.69	105.77
18	Y	301	39V	C63-C67-C68	2.36	121.30	118.17
17	Y	302	MES	O2S-S-C8	2.33	109.73	106.92
17	Y	302	MES	O3S-S-C8	2.26	109.42	105.77
17	V	301	MES	O1S-S-C8	2.20	109.57	106.92
17	H	301	MES	O3S-S-C8	2.20	109.32	105.77
18	K	301	39V	O3-C2-C50	-2.14	118.52	122.03

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	H	301	MES	N4-C7-C8-S
18	K	301	39V	C12-C11-C13-N15
18	K	301	39V	C29-C31-C37-C38
18	K	301	39V	O32-C31-C37-C38
18	Y	301	39V	C12-C11-N1-C2
18	Y	301	39V	C12-C11-C13-O14
18	Y	301	39V	C12-C11-C13-N15
18	Y	301	39V	C29-C31-C37-C38
18	K	301	39V	C12-C11-C13-O14
18	K	301	39V	C12-C11-N1-C2
18	Y	301	39V	C29-C30-C41-C42
18	Y	301	39V	C29-C30-C41-C46
18	K	301	39V	C29-C30-C41-C42
18	K	301	39V	C29-C30-C41-C46
18	K	301	39V	C29-C31-C37-C39
18	Y	301	39V	N15-C16-C17-C66

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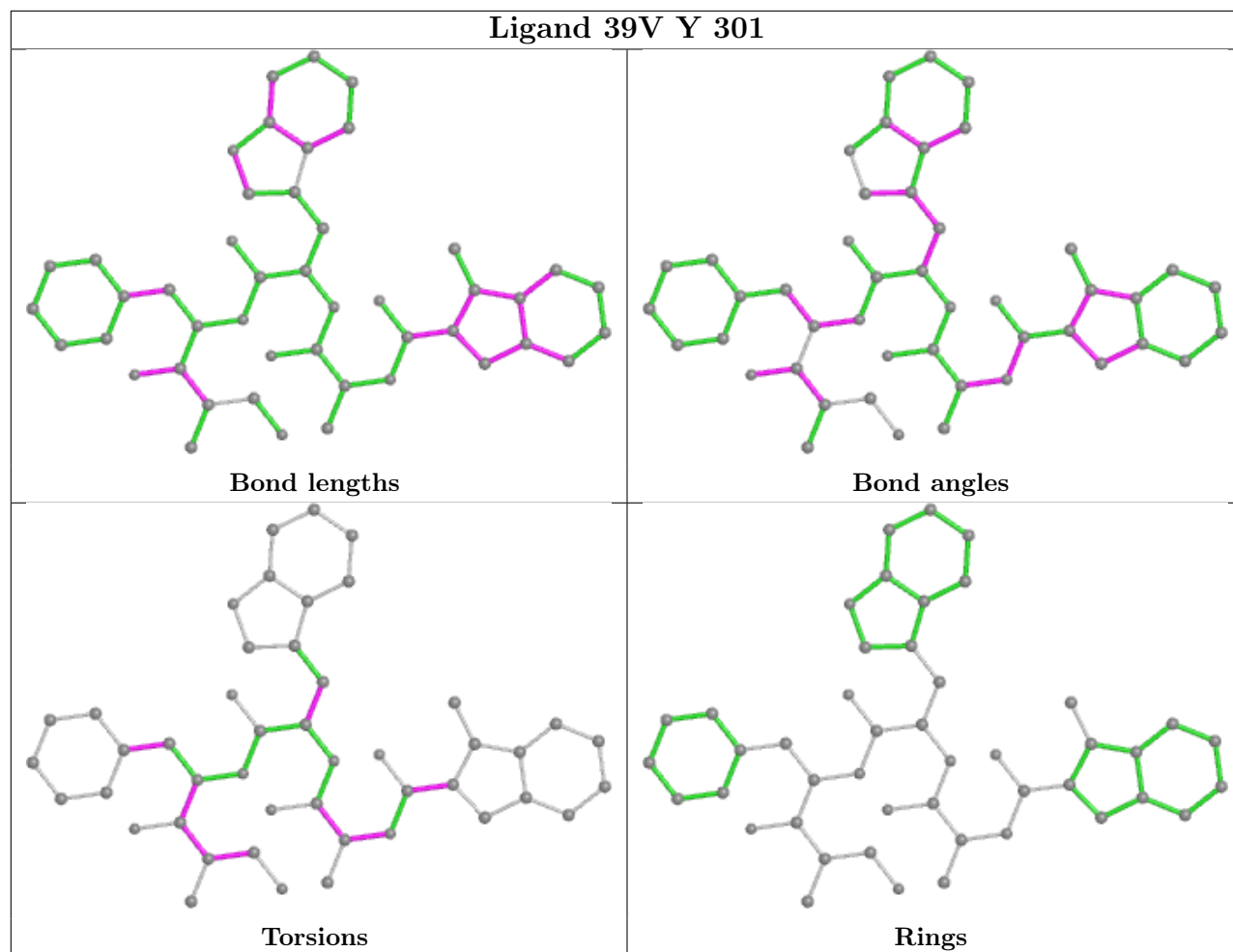
Mol	Chain	Res	Type	Atoms
18	Y	301	39V	C31-C37-C39-O40
18	Y	301	39V	C29-C31-C37-C39
18	Y	301	39V	C13-C11-N1-C2
18	K	301	39V	N1-C2-C50-C58
18	Y	301	39V	N1-C2-C50-C58
18	K	301	39V	C30-C29-C31-O32
18	Y	301	39V	C30-C29-C31-O32
18	K	301	39V	N28-C29-C31-C37
18	Y	301	39V	N28-C29-C31-C37
18	Y	301	39V	C38-C37-C39-O40
18	Y	301	39V	C26-C16-C17-C66

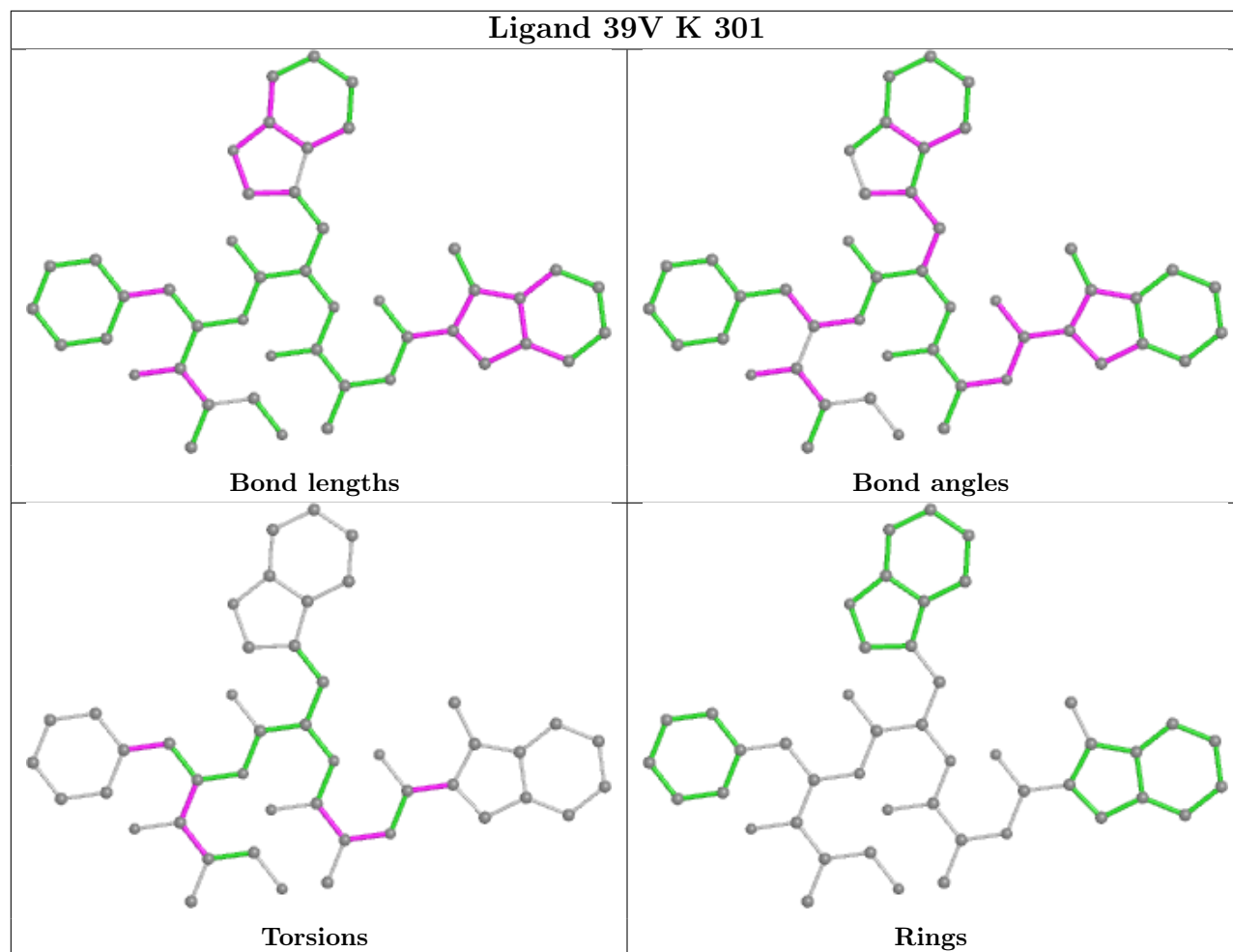
There are no ring outliers.

4 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
18	Y	301	39V	6	0
17	Y	302	MES	1	0
18	K	301	39V	9	0
17	K	304	MES	4	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%)	-0.29	8 (3%) 47 48	34, 51, 88, 126	0
1	O	250/250 (100%)	-0.24	10 (4%) 38 37	37, 54, 100, 136	0
2	B	244/258 (94%)	-0.16	10 (4%) 37 36	36, 56, 99, 153	0
2	P	244/258 (94%)	-0.11	9 (3%) 41 41	39, 57, 101, 153	0
3	C	240/254 (94%)	0.01	18 (7%) 14 12	35, 63, 131, 167	0
3	Q	240/254 (94%)	0.08	16 (6%) 17 16	38, 68, 149, 193	0
4	D	235/260 (90%)	-0.27	4 (1%) 70 72	40, 58, 89, 133	0
4	R	235/260 (90%)	-0.15	7 (2%) 50 51	50, 68, 109, 144	0
5	E	231/234 (98%)	-0.16	7 (3%) 50 51	42, 61, 99, 141	0
5	S	231/234 (98%)	-0.14	9 (3%) 39 38	44, 64, 105, 141	0
6	F	243/288 (84%)	-0.34	8 (3%) 46 46	35, 55, 104, 131	0
6	T	243/288 (84%)	-0.22	9 (3%) 41 41	34, 60, 115, 149	0
7	G	241/252 (95%)	-0.32	6 (2%) 57 59	34, 53, 94, 154	0
7	U	241/252 (95%)	-0.34	6 (2%) 57 59	32, 50, 88, 127	0
8	H	226/232 (97%)	-0.35	3 (1%) 77 78	36, 51, 87, 144	0
8	V	226/232 (97%)	-0.26	6 (2%) 54 55	37, 52, 88, 157	0
9	I	204/205 (99%)	-0.54	1 (0%) 91 92	34, 48, 80, 99	0
9	W	204/205 (99%)	-0.53	2 (0%) 82 83	30, 50, 81, 102	0
10	J	195/198 (98%)	-0.39	3 (1%) 73 76	34, 55, 87, 126	0
10	X	195/198 (98%)	-0.33	4 (2%) 63 65	36, 57, 86, 131	0
11	K	211/211 (100%)	-0.26	9 (4%) 35 33	38, 57, 93, 117	0
11	Y	211/211 (100%)	-0.22	6 (2%) 53 54	39, 59, 92, 119	0
12	L	222/222 (100%)	-0.29	4 (1%) 68 70	42, 56, 98, 128	0
12	Z	222/222 (100%)	-0.24	6 (2%) 54 55	40, 58, 99, 132	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
13	M	233/246 (94%)	-0.46	4 (1%) 70 72	33, 52, 80, 96	0
13	a	233/246 (94%)	-0.43	1 (0%) 92 93	33, 52, 78, 97	0
14	N	196/196 (100%)	-0.53	2 (1%) 82 83	33, 46, 75, 100	0
14	b	196/196 (100%)	-0.51	1 (0%) 91 92	32, 46, 77, 103	0
All	All	6342/6612 (95%)	-0.28	179 (2%) 53 54	30, 56, 100, 193	0

All (179) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
10	X	1	MET	9.3
1	O	249	ALA	7.3
10	J	1	MET	7.0
2	P	218	GLY	6.6
2	P	51	VAL	6.3
3	Q	206	LYS	6.3
2	B	218	GLY	6.2
3	Q	238	LYS	6.1
9	W	1	SER	6.1
1	A	1	MET	6.0
2	B	221	ASP	5.9
3	C	236	GLN	5.8
2	P	219	ALA	5.7
3	Q	240	GLU	5.2
3	Q	239	GLN	5.2
5	E	202	ASP	4.9
9	I	1	SER	4.9
3	C	206	LYS	4.5
1	A	249	ALA	4.5
3	C	50	LEU	4.5
8	V	226	GLU	4.4
5	S	202	ASP	4.3
12	L	174	TYR	4.3
6	F	202	ASP	4.2
1	O	1	MET	4.1
8	H	226	GLU	4.1
8	V	222	ASP	4.1
8	V	224	GLN	4.0
2	P	221	ASP	4.0
3	Q	225	GLU	4.0
10	X	194	ASP	4.0
3	C	49	THR	4.0

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
3	Q	202	GLN	3.9
4	D	242	GLU	3.9
12	L	1	GLN	3.9
3	Q	50	LEU	3.8
2	P	220	ASN	3.8
2	B	51	VAL	3.8
12	Z	174	TYR	3.7
6	T	244	ASN	3.6
3	C	202	GLN	3.6
4	R	241	ALA	3.6
10	X	193	ASP	3.6
3	Q	236	GLN	3.5
3	C	205	ALA	3.5
2	P	59	ASP	3.5
7	U	242	GLN	3.5
3	C	238	LYS	3.5
1	O	2	THR	3.5
10	J	194	ASP	3.5
3	C	203	THR	3.4
11	K	211	GLY	3.4
7	G	242	GLN	3.4
6	T	2	THR	3.3
3	C	225	GLU	3.3
6	F	181	GLU	3.3
2	P	222	GLY	3.3
7	G	2	GLY	3.2
1	O	231	LYS	3.2
6	T	241	LYS	3.2
4	R	230	GLU	3.2
6	F	205	GLU	3.2
1	O	248	GLU	3.2
2	B	219	ALA	3.1
3	C	239	GLN	3.1
4	R	1	ASP	3.1
11	K	146	ASP	3.1
2	B	220	ASN	3.0
8	V	221	CYS	3.0
3	C	180	LYS	2.9
3	Q	180	LYS	2.9
5	E	233	ILE	2.9
11	Y	146	ASP	2.9
1	O	250	LEU	2.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
6	F	203	ASN	2.9
13	M	47	ASP	2.9
11	K	9	ARG	2.9
1	A	2	THR	2.8
1	A	201	GLU	2.8
2	B	201	ASP	2.8
12	Z	210	ASP	2.8
2	P	52	THR	2.8
7	U	181	LYS	2.8
11	Y	211	GLY	2.8
6	T	205	GLU	2.7
14	b	195	GLN	2.7
8	H	221	CYS	2.7
2	P	203	SER	2.7
5	S	122	TYR	2.7
1	O	52	SER	2.7
7	U	203	ASP	2.7
7	U	2	GLY	2.7
13	a	1	THR	2.7
5	S	3	ASN	2.7
3	C	60	SER	2.7
9	W	133	LYS	2.6
14	N	105	LYS	2.6
12	Z	1	GLN	2.6
6	F	241	LYS	2.6
1	A	248	GLU	2.6
14	N	195	GLN	2.6
11	K	181	GLU	2.6
2	B	182	ASP	2.6
5	E	201	ARG	2.6
11	K	182	ASP	2.5
3	C	48	SER	2.5
3	Q	229	GLN	2.5
8	H	224	GLN	2.5
3	C	216	ASP	2.5
7	U	188	GLU	2.5
6	T	181	GLU	2.5
4	R	54	ASP	2.5
10	X	195	PHE	2.5
12	Z	173	LYS	2.5
3	Q	139	ARG	2.5
6	F	215	CYS	2.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
10	J	95	ARG	2.5
12	L	165	ASN	2.5
3	C	181	GLU	2.4
1	A	250	LEU	2.4
11	K	30	THR	2.4
5	E	180	LYS	2.4
5	S	233	ILE	2.4
7	U	222	ASP	2.4
5	E	54	GLU	2.4
2	B	203	SER	2.4
5	S	203	GLU	2.4
8	V	145	ASP	2.4
6	F	244	ASN	2.4
6	T	180	PRO	2.4
5	S	225	ASP	2.4
13	M	1	THR	2.4
12	Z	116	GLU	2.4
13	M	216	ASN	2.3
3	C	240	GLU	2.3
4	R	125	LEU	2.3
11	K	179	VAL	2.3
3	C	59	PRO	2.3
2	B	217	LYS	2.3
12	Z	167	LYS	2.3
1	O	4	ARG	2.3
4	R	114	ARG	2.3
3	Q	205	ALA	2.3
2	B	59	ASP	2.3
4	D	224	ASP	2.3
11	Y	181	GLU	2.2
1	O	182	GLU	2.2
3	Q	235	GLU	2.2
5	E	173	ARG	2.2
11	Y	150	GLU	2.2
6	T	237	ASP	2.2
7	G	3	TYR	2.2
5	S	54	GLU	2.2
3	C	204	GLY	2.2
6	T	243	ILE	2.2
1	A	229	THR	2.2
5	S	207	VAL	2.1
7	G	188	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
6	F	230	ASP	2.1
4	R	242	GLU	2.1
1	A	231	LYS	2.1
3	Q	141	ASP	2.1
1	O	201	GLU	2.1
12	L	173	LYS	2.1
11	K	107	ARG	2.1
4	D	117	GLU	2.1
5	S	201	ARG	2.1
11	Y	12	VAL	2.1
11	Y	144	LYS	2.1
5	E	203	GLU	2.1
6	T	215	CYS	2.1
7	G	241	GLU	2.0
3	Q	49	THR	2.0
7	G	181	LYS	2.0
4	D	1	ASP	2.0
3	Q	237	GLU	2.0
8	V	225	GLU	2.0
13	M	175	GLU	2.0
11	K	144	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	H	301	12/12	0.86	0.41	67,74,90,93	0
17	MES	V	301	12/12	0.86	0.43	65,73,84,87	0

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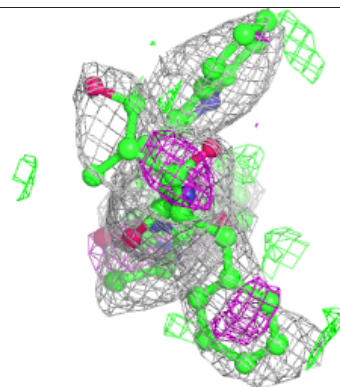
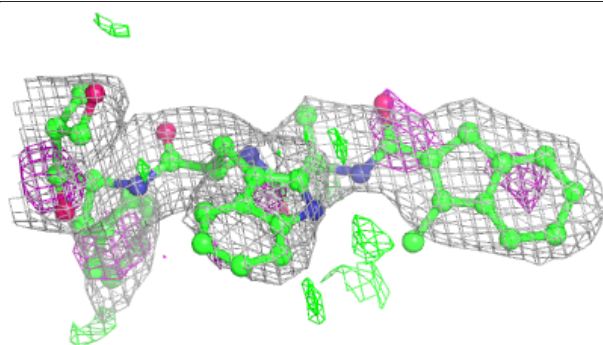
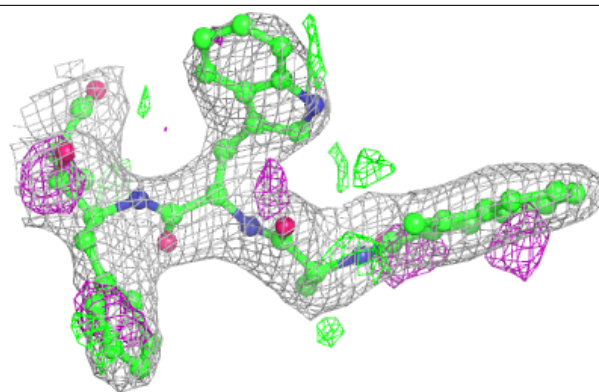
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
17	MES	K	304	12/12	0.88	0.34	47,49,66,69	12
18	39V	Y	301	46/46	0.88	0.27	52,60,78,80	0
17	MES	Y	302	12/12	0.89	0.27	49,51,61,62	12
18	39V	K	301	46/46	0.90	0.23	48,58,69,73	0
15	MG	A	301	1/1	0.91	0.25	46,46,46,46	0
15	MG	K	303	1/1	0.91	0.29	61,61,61,61	0
15	MG	J	201	1/1	0.95	0.19	57,57,57,57	0
15	MG	Z	301	1/1	0.95	0.25	68,68,68,68	0
15	MG	I	301	1/1	0.96	0.14	61,61,61,61	0
15	MG	G	301	1/1	0.97	0.05	47,47,47,47	0
15	MG	N	201	1/1	0.98	0.08	50,50,50,50	0
15	MG	L	301	1/1	0.98	0.06	61,61,61,61	0
15	MG	b	201	1/1	0.98	0.09	36,36,36,36	0
15	MG	K	302	1/1	0.99	0.06	59,59,59,59	0
16	CL	G	302	1/1	0.99	0.10	42,42,42,42	0
16	CL	U	301	1/1	0.99	0.13	42,42,42,42	0
15	MG	I	302	1/1	1.00	0.12	62,62,62,62	0

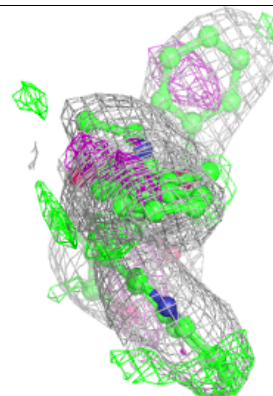
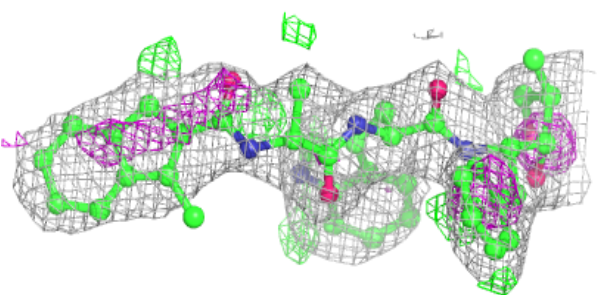
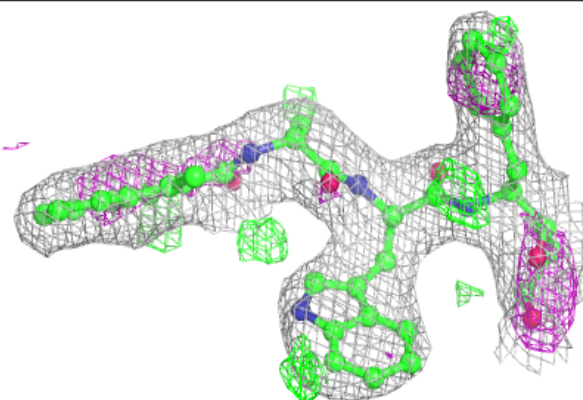
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 39V Y 301:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around 39V K 301:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.