



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 2, 2024 – 06:09 pm GMT

PDB ID : 5CZ7
Title : Yeast 20S proteasome beta5-T1A beta5-K81R double mutant in complex with Bortezomib, propeptide expressed in cis
Authors : Huber, E.M.; Groll, M.
Deposited on : 2015-07-31
Resolution : 2.50 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-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

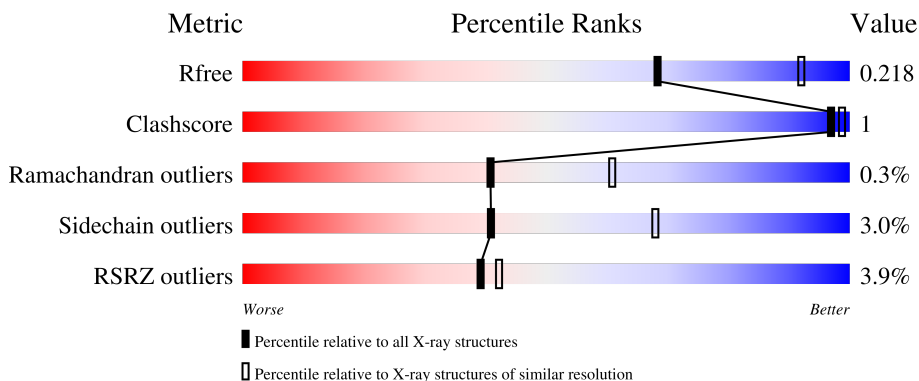
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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

Mol	Chain	Length	Quality of chain
1	A	250	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 95%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">3% 98% .</p>
1	O	250	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 94%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">4% 98% .</p>
2	B	258	<div style="display: flex; align-items: center;"> <div style="width: 6%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 84%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 4%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">6% 90% . . 5%</p>
2	P	258	<div style="display: flex; align-items: center;"> <div style="width: 6%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 85%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 3%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 0%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">6% 91% . . 5%</p>
3	C	254	<div style="display: flex; align-items: center;"> <div style="width: 9%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 78%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">9% 87% 6% . 6%</p>

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Mol	Chain	Length	Quality of chain
3	Q	254	11% 87% 6% • 6%
4	D	260	2% 87% • 10%
4	R	260	5% 87% • 10%
5	E	234	4% 96% • •
5	S	234	6% 96% • •
6	F	288	2% 82% • 16%
6	T	288	4% 82% • 16%
7	G	252	3% 90% 6% •
7	U	252	5% 90% 6% •
8	H	232	3% 92% 5% •
8	V	232	3% 93% • •
9	I	205	% 95% •
9	W	205	% 94% 5%
10	J	198	3% 92% 6% • •
10	X	198	3% 92% 6% • •
11	K	217	2% 92% 6% •
11	Y	217	3% 91% 7% •
12	L	222	% 98% •
12	Z	222	2% 98% •
13	M	246	2% 91% • 5%
13	a	246	% 92% • 5%
14	N	196	% 96% • •
14	b	196	2% 97% •

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
15	MG	N	203	-	-	-	X

2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 50680 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	217	1680	1067	290	316	7	0	0	0
11	Y	217	1680	1067	290	316	7	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	1	ALA	THR	engineered mutation	UNP P30656
K	81	ARG	LYS	engineered mutation	UNP P30656
Y	1	ALA	THR	engineered mutation	UNP P30656
Y	81	ARG	LYS	engineered mutation	UNP P30656

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
12	L	222	1757	1115	303	335	4	0	0	0
12	Z	222	1757	1115	303	335	4	0	0	0

- Molecule 13 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
13	M	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

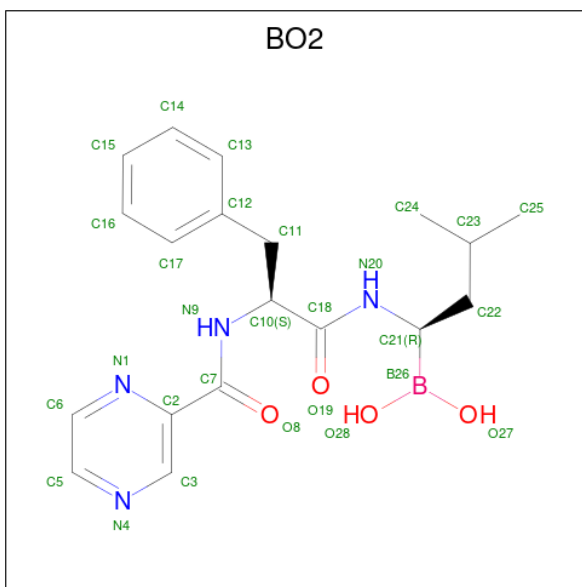
- Molecule 15 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	G	1	Total 1	Mg 1	0	0
15	I	3	Total 3	Mg 3	0	0
15	J	1	Total 1	Mg 1	0	0
15	K	2	Total 2	Mg 2	0	0
15	L	1	Total 1	Mg 1	0	0
15	N	2	Total 2	Mg 2	0	0
15	Z	1	Total 1	Mg 1	0	0

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

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

- Molecule 17 is N-[(1R)-1-(DIHYDROXYBORYL)-3-METHYLBUTYL]-N-(PYRAZIN-2-YLCARBONYL)-L-PHENYLALANINAMIDE (three-letter code: BO2) (formula: C₁₉H₂₅BN₄O₄).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	B	C	N	O		
17	H	1	Total	B	C	N	O	0	0
			28	1	19	4	4		
17	N	1	Total	B	C	N	O	0	0
			28	1	19	4	4		
17	V	1	Total	B	C	N	O	0	0
			28	1	19	4	4		
17	b	1	Total	B	C	N	O	0	0
			28	1	19	4	4		

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	54	Total	O	0	0
			54	54		
18	B	27	Total	O	0	0
			27	27		
18	C	35	Total	O	0	0
			35	35		
18	D	24	Total	O	0	0
			24	24		
18	E	20	Total	O	0	0
			20	20		
18	F	36	Total	O	0	0
			36	36		
18	G	56	Total	O	0	0
			56	56		
18	H	68	Total	O	0	0
			68	68		

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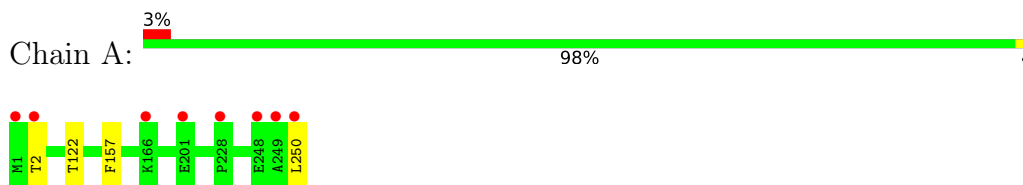
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
18	I	46	Total O 46 46	0	0
18	J	44	Total O 44 44	0	0
18	K	38	Total O 38 38	0	0
18	L	51	Total O 51 51	0	0
18	M	61	Total O 61 61	0	0
18	N	40	Total O 40 40	0	0
18	O	24	Total O 24 24	0	0
18	P	30	Total O 30 30	0	0
18	Q	28	Total O 28 28	0	0
18	R	32	Total O 32 32	0	0
18	S	13	Total O 13 13	0	0
18	T	31	Total O 31 31	0	0
18	U	38	Total O 38 38	0	0
18	V	51	Total O 51 51	0	0
18	W	39	Total O 39 39	0	0
18	X	39	Total O 39 39	0	0
18	Y	38	Total O 38 38	0	0
18	Z	45	Total O 45 45	0	0
18	a	60	Total O 60 60	0	0
18	b	47	Total O 47 47	0	0

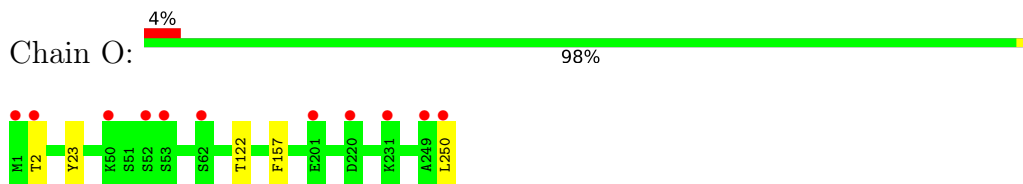
3 Residue-property plots

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

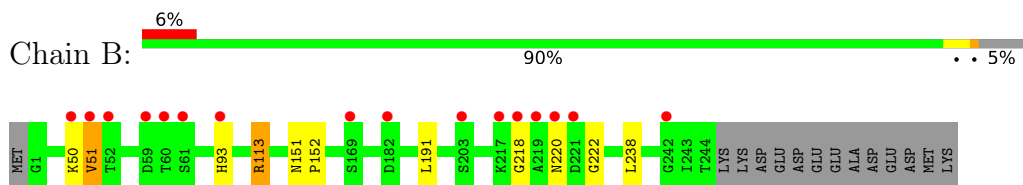
- Molecule 1: Proteasome subunit alpha type-2



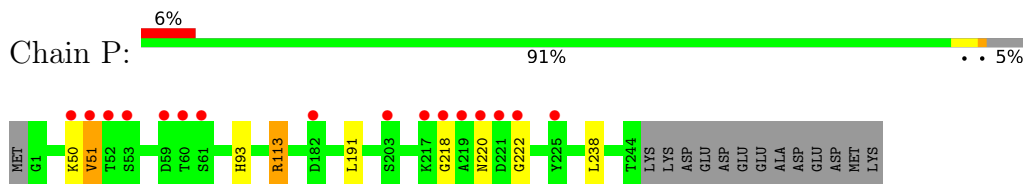
- Molecule 1: Proteasome subunit alpha type-2



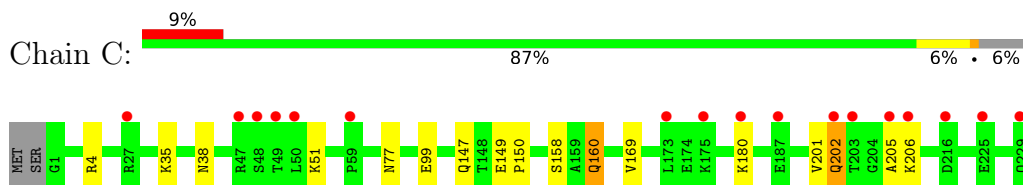
- Molecule 2: Proteasome subunit alpha type-3

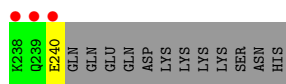


- Molecule 2: Proteasome subunit alpha type-3

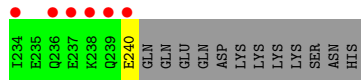
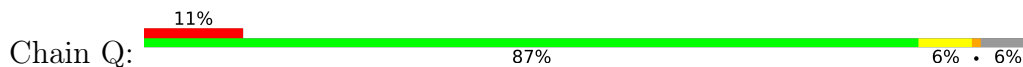


- Molecule 3: Proteasome subunit alpha type-4

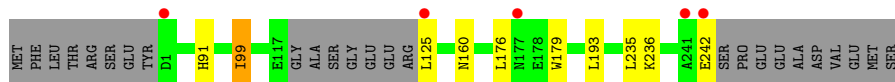
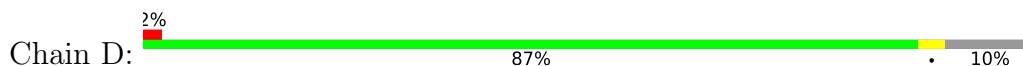




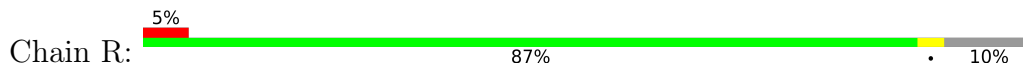
- Molecule 3: Proteasome subunit alpha type-4



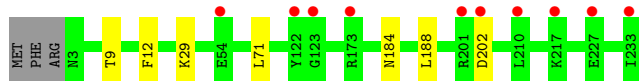
- Molecule 4: Proteasome subunit alpha type-5



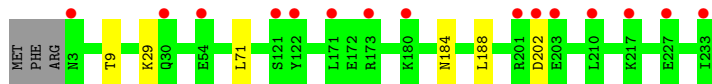
- Molecule 4: Proteasome subunit alpha type-5



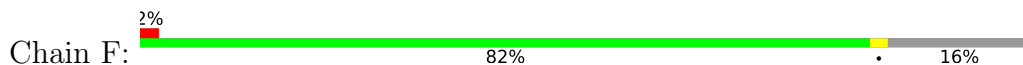
- Molecule 5: Proteasome subunit alpha type-6

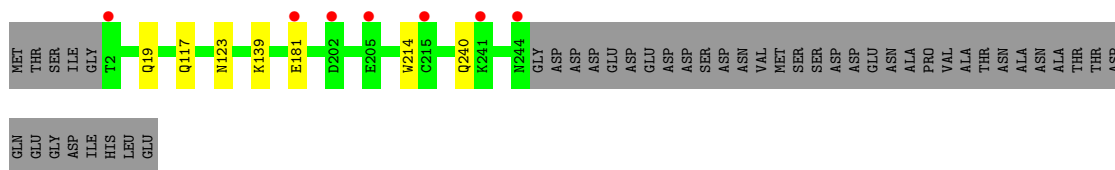


- Molecule 5: Proteasome subunit alpha type-6

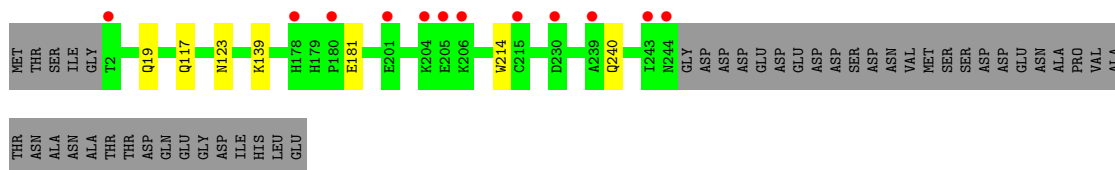
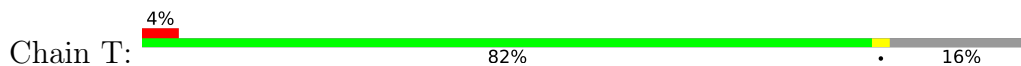


- Molecule 6: Probable proteasome subunit alpha type-7

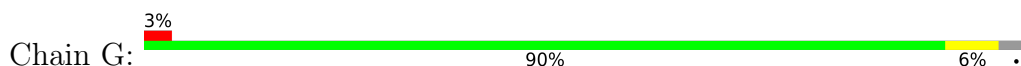




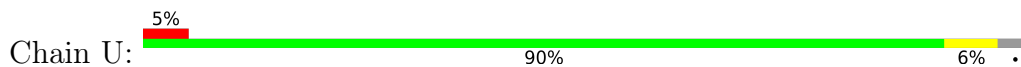
• Molecule 6: Probable proteasome subunit alpha type-7



• Molecule 7: Proteasome subunit alpha type-1



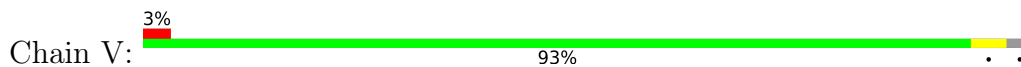
• Molecule 7: Proteasome subunit alpha type-1



• Molecule 8: Proteasome subunit beta type-2



• Molecule 8: Proteasome subunit beta type-2

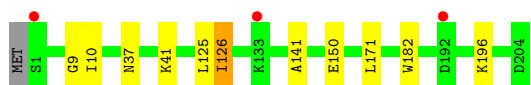


• Molecule 9: Proteasome subunit beta type-3

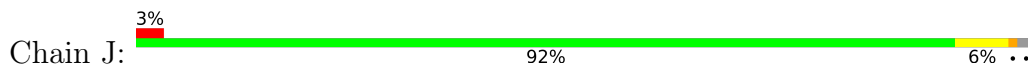




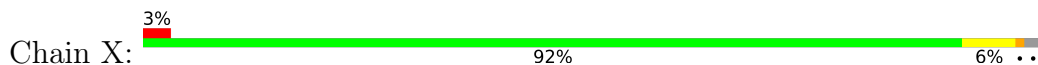
- Molecule 9: Proteasome subunit beta type-3



- Molecule 10: Proteasome subunit beta type-4



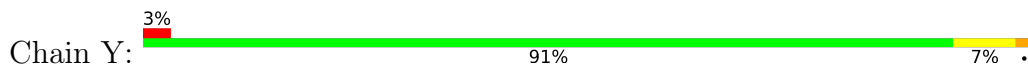
- Molecule 10: Proteasome subunit beta type-4



- Molecule 11: Proteasome subunit beta type-5



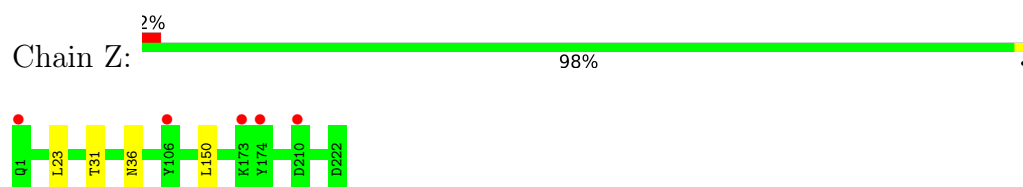
- Molecule 11: Proteasome subunit beta type-5



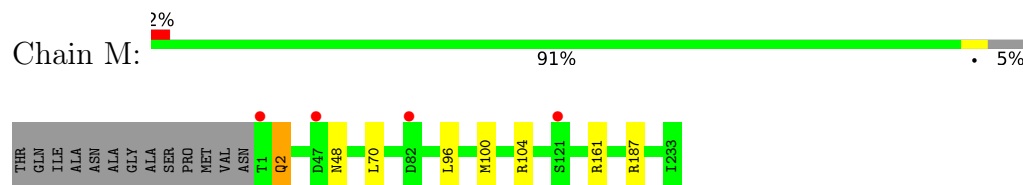
- Molecule 12: Proteasome subunit beta type-6



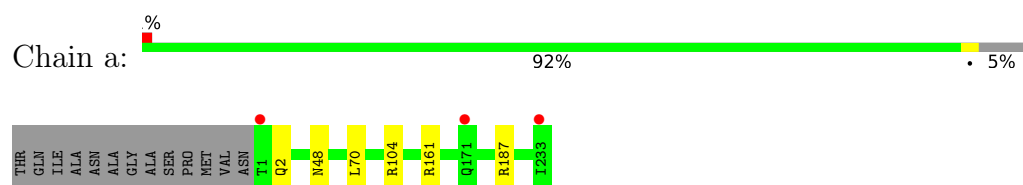
- Molecule 12: Proteasome subunit beta type-6



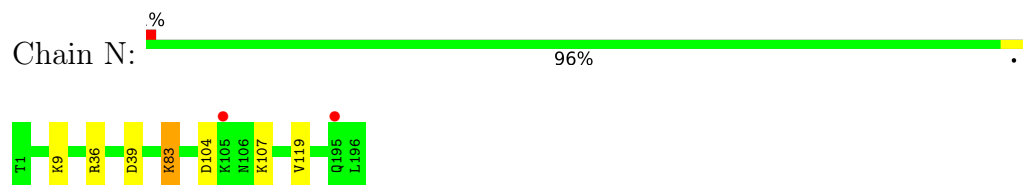
- Molecule 13: Proteasome subunit beta type-7



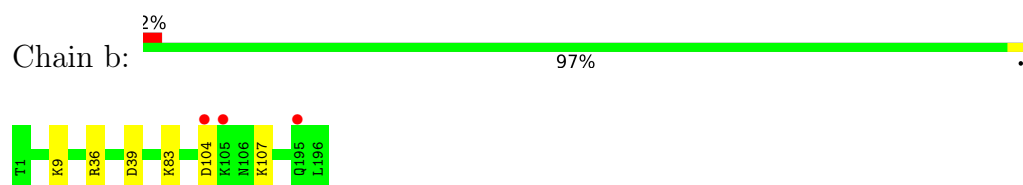
- Molecule 13: Proteasome subunit beta type-7



- Molecule 14: Proteasome subunit beta type-1



- Molecule 14: Proteasome subunit beta type-1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	136.09Å 301.66Å 145.51Å 90.00° 113.44° 90.00°	Depositor
Resolution (Å)	15.00 – 2.50 15.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.7 (15.00-2.50) 99.8 (15.00-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.60 (at 2.51Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.197 , 0.215 0.202 , 0.218	Depositor DCC
R_{free} test set	18347 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	49.1	Xtrriage
Anisotropy	0.056	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 34.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	50680	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.35% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CL, MG, BO2

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	0.28	0/1910	0.50	0/2586
3	Q	0.28	0/1910	0.50	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	0.27	0/1750	0.46	0/2373
8	V	0.28	0/1750	0.46	0/2373
9	I	0.28	0/1611	0.47	0/2174
9	W	0.27	0/1611	0.47	0/2174
10	J	0.27	0/1589	0.47	0/2142
10	X	0.26	0/1589	0.47	0/2142
11	K	0.32	0/1718	0.49	0/2323
11	Y	0.29	0/1718	0.49	0/2323
12	L	0.29	0/1795	0.47	0/2420
12	Z	0.30	0/1795	0.47	0/2420
13	M	0.27	0/1855	0.50	0/2514
13	a	0.27	0/1855	0.50	0/2514
14	N	0.28	0/1541	0.46	0/2087
14	b	0.27	0/1541	0.46	0/2087
All	All	0.28	0/50338	0.47	0/68060

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1915	0	1929	0	0
1	O	1915	0	1929	1	0
2	B	1904	0	1904	4	0
2	P	1904	0	1904	4	0
3	C	1881	0	1895	10	0
3	Q	1881	0	1895	10	0
4	D	1813	0	1797	2	0
4	R	1813	0	1797	2	0
5	E	1773	0	1775	1	0
5	S	1773	0	1775	0	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	1718	7	0
8	V	1719	0	1718	5	0
9	I	1581	0	1574	4	0
9	W	1581	0	1574	5	0
10	J	1561	0	1569	4	0
10	X	1561	0	1569	4	0
11	K	1680	0	1632	12	0
11	Y	1680	0	1632	14	0
12	L	1757	0	1711	1	0
12	Z	1757	0	1711	1	0
13	M	1824	0	1832	2	0
13	a	1824	0	1832	0	0
14	N	1512	0	1480	1	0
14	b	1512	0	1480	0	0
15	G	1	0	0	0	0
15	I	3	0	0	0	0
15	J	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
15	K	2	0	0	0	0
15	L	1	0	0	0	0
15	N	2	0	0	0	0
15	Z	1	0	0	0	0
16	G	1	0	0	0	0
16	N	1	0	0	0	0
16	U	1	0	0	0	0
16	b	1	0	0	0	0
17	H	28	0	25	1	0
17	N	28	0	25	1	0
17	V	28	0	25	0	0
17	b	28	0	25	0	0
18	A	54	0	0	0	0
18	B	27	0	0	2	0
18	C	35	0	0	0	0
18	D	24	0	0	0	0
18	E	20	0	0	0	0
18	F	36	0	0	0	0
18	G	56	0	0	0	0
18	H	68	0	0	0	0
18	I	46	0	0	0	0
18	J	44	0	0	0	0
18	K	38	0	0	0	0
18	L	51	0	0	0	0
18	M	61	0	0	1	0
18	N	40	0	0	0	0
18	O	24	0	0	0	0
18	P	30	0	0	2	0
18	Q	28	0	0	0	0
18	R	32	0	0	0	0
18	S	13	0	0	0	0
18	T	31	0	0	1	0
18	U	38	0	0	0	0
18	V	51	0	0	0	0
18	W	39	0	0	0	0
18	X	39	0	0	0	0
18	Y	38	0	0	1	0
18	Z	45	0	0	0	0
18	a	60	0	0	0	0
18	b	47	0	0	0	0
All	All	50680	0	49300	86	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 (86) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:Y:-2:ALA:O	18:Y:401:HOH:O	1.96	0.81
3:C:99:GLU:HG2	11:K:81:ARG:NH2	2.02	0.75
3:Q:99:GLU:HG2	11:Y:81:ARG:NH2	2.08	0.68
3:C:99:GLU:CG	11:K:81:ARG:HH21	2.16	0.59
8:H:98:LEU:HB2	8:H:113:ILE:HG23	1.85	0.59
3:C:99:GLU:HG2	11:K:81:ARG:HH21	1.69	0.56
8:V:98:LEU:HB2	8:V:113:ILE:HG23	1.87	0.56
11:Y:53:GLN:O	11:Y:57:THR:OG1	2.23	0.55
8:H:49:ALA:HA	17:H:301:BO2:H241	1.87	0.55
3:C:99:GLU:CG	11:K:81:ARG:NH2	2.69	0.54
3:Q:99:GLU:CG	11:Y:81:ARG:HH21	2.21	0.54
8:H:87:LEU:HD12	8:H:113:ILE:HD11	1.90	0.53
3:Q:99:GLU:CG	11:Y:81:ARG:NH2	2.73	0.51
8:H:114:HIS:CD2	17:N:201:BO2:H5	2.45	0.51
3:C:201:VAL:O	3:C:202:GLN:CB	2.59	0.51
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.59	0.51
10:J:1:MET:HG2	10:J:34:LYS:HE3	1.93	0.50
11:K:-2:ALA:HA	11:K:21:THR:O	2.12	0.50
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.94	0.49
6:T:19:GLN:NE2	18:T:301:HOH:O	2.42	0.49
10:X:1:MET:HG2	10:X:34:LYS:HE3	1.93	0.49
7:U:23:PHE:O	7:U:26:THR:HB	2.12	0.49
7:G:23:PHE:O	7:G:26:THR:HB	2.12	0.48
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.94	0.48
2:P:93:HIS:HB3	18:P:301:HOH:O	2.13	0.48
8:H:35:HIS:HB3	8:H:56:THR:HG21	1.96	0.48
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.49	0.47
3:Q:99:GLU:OE1	11:Y:81:ARG:NH2	2.48	0.47
8:V:35:HIS:HB3	8:V:56:THR:HG21	1.95	0.47
11:Y:-3:ILE:HG23	11:Y:-2:ALA:O	2.15	0.47
11:Y:-3:ILE:HD12	11:Y:-3:ILE:HA	1.70	0.46
2:B:93:HIS:HB3	18:B:301:HOH:O	2.15	0.46
8:H:196:ARG:NH2	9:I:150:GLU:O	2.49	0.46
2:P:50:LYS:O	2:P:51:VAL:C	2.54	0.46
3:C:201:VAL:O	3:C:202:GLN:HB3	2.16	0.46
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.81	0.46
3:Q:201:VAL:O	3:Q:202:GLN:HB3	2.16	0.46
2:B:113:ARG:NE	18:B:301:HOH:O	2.39	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:I:9:GLY:HA3	9:I:41:LYS:HE2	1.98	0.45
12:L:31:THR:HG23	12:L:36:ASN:HD21	1.81	0.45
10:X:21:VAL:HG11	11:Y:122:LEU:HD11	1.99	0.45
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.81	0.45
11:K:128:CYS:SG	11:K:136:ALA:HB3	2.57	0.45
2:B:50:LYS:O	2:B:51:VAL:C	2.55	0.45
12:Z:31:THR:HG23	12:Z:36:ASN:HD21	1.81	0.45
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.98	0.44
13:M:96:LEU:O	13:M:100:MET:HG2	2.18	0.44
11:Y:128:CYS:SG	11:Y:136:ALA:HB3	2.57	0.44
10:J:21:VAL:HG11	11:K:122:LEU:HD11	1.99	0.44
10:J:3:ILE:HG23	10:J:18:SER:HB3	2.00	0.44
8:V:104:ASP:HB2	8:V:105:PRO:HD2	2.00	0.44
3:Q:99:GLU:HG2	11:Y:81:ARG:HH21	1.77	0.43
11:K:38:ASN:HB2	11:K:39:PRO:CD	2.48	0.43
13:M:2:GLN:NE2	18:M:301:HOH:O	2.51	0.43
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.18	0.43
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.00	0.43
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.01	0.43
9:I:10:ILE:HG21	9:I:141:ALA:HB3	2.01	0.43
7:G:78:ILE:N	7:G:79:PRO:CD	2.82	0.43
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.99	0.43
11:Y:107:LYS:HG3	11:Y:108:GLU:HG3	2.01	0.43
9:I:125:LEU:HG	9:I:126:ILE:HG22	2.01	0.43
2:P:50:LYS:HD3	2:P:50:LYS:HA	1.92	0.43
10:X:3:ILE:HG23	10:X:18:SER:HB3	2.00	0.43
11:Y:38:ASN:HB2	11:Y:39:PRO:CD	2.48	0.43
3:C:35:LYS:HG2	3:C:158:SER:O	2.18	0.43
8:V:218:VAL:CG2	9:W:196:LYS:HB2	2.49	0.43
11:K:107:LYS:HG3	11:K:108:GLU:HG3	2.00	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.82	0.42
3:C:99:GLU:OE1	11:K:81:ARG:NH2	2.52	0.42
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.00	0.42
2:P:113:ARG:NE	18:P:301:HOH:O	2.39	0.42
9:W:125:LEU:HG	9:W:126:ILE:HG22	2.01	0.42
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.49	0.42
7:G:149:ASP:HB2	7:G:150:PRO:CD	2.50	0.42
4:R:160:ASN:HB3	4:R:179:TRP:CE2	2.55	0.41
7:U:149:ASP:HB2	7:U:150:PRO:CD	2.51	0.41
5:E:12:PHE:H	6:F:19:GLN:HE22	1.67	0.41
11:K:-3:ILE:HD12	11:K:-3:ILE:HA	1.67	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.51	0.41
4:D:160:ASN:HB3	4:D:179:TRP:CE2	2.56	0.40
11:K:145:LYS:HB2	11:K:148:LEU:HD13	2.03	0.40
4:D:91:HIS:HB3	4:D:99:ILE:CG2	2.51	0.40
4:R:91:HIS:CD2	4:R:99:ILE:HG22	2.56	0.40
11:Y:20:ALA:HB2	11:Y:31:VAL:HG21	2.03	0.40
8:V:196:ARG:NH2	9:W:150:GLU:O	2.55	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	34	54
1	O	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	34	54
2	B	242/258 (94%)	235 (97%)	3 (1%)	4 (2%)	9	16
2	P	242/258 (94%)	235 (97%)	3 (1%)	4 (2%)	9	16
3	C	238/254 (94%)	232 (98%)	4 (2%)	2 (1%)	19	35
3	Q	238/254 (94%)	232 (98%)	4 (2%)	2 (1%)	19	35
4	D	231/260 (89%)	228 (99%)	3 (1%)	0	100	100
4	R	231/260 (89%)	228 (99%)	3 (1%)	0	100	100
5	E	229/234 (98%)	224 (98%)	5 (2%)	0	100	100
5	S	229/234 (98%)	222 (97%)	7 (3%)	0	100	100
6	F	241/288 (84%)	237 (98%)	4 (2%)	0	100	100
6	T	241/288 (84%)	237 (98%)	4 (2%)	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

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
8	H	224/232 (97%)	219 (98%)	5 (2%)	0	100	100
8	V	224/232 (97%)	219 (98%)	5 (2%)	0	100	100
9	I	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
9	W	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
10	J	193/198 (98%)	188 (97%)	4 (2%)	1 (0%)	29	48
10	X	193/198 (98%)	188 (97%)	4 (2%)	1 (0%)	29	48
11	K	215/217 (99%)	211 (98%)	4 (2%)	0	100	100
11	Y	215/217 (99%)	211 (98%)	4 (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%)	224 (97%)	7 (3%)	0	100	100
13	a	231/246 (94%)	223 (96%)	8 (4%)	0	100	100
14	N	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
14	b	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
All	All	6294/6624 (95%)	6143 (98%)	135 (2%)	16 (0%)	41	61

All (16) 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
2	B	220	ASN
3	C	205	ALA
2	P	220	ASN
3	Q	205	ALA
10	J	24	GLY
10	X	24	GLY

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	209/209 (100%)	206 (99%)	3 (1%)	67 86
1	O	209/209 (100%)	206 (99%)	3 (1%)	67 86
2	B	203/216 (94%)	200 (98%)	3 (2%)	65 85
2	P	203/216 (94%)	200 (98%)	3 (2%)	65 85
3	C	212/226 (94%)	202 (95%)	10 (5%)	26 49
3	Q	212/226 (94%)	202 (95%)	10 (5%)	26 49
4	D	194/215 (90%)	187 (96%)	7 (4%)	35 61
4	R	194/215 (90%)	187 (96%)	7 (4%)	35 61
5	E	190/193 (98%)	184 (97%)	6 (3%)	39 65
5	S	190/193 (98%)	184 (97%)	6 (3%)	39 65
6	F	201/239 (84%)	195 (97%)	6 (3%)	41 68
6	T	201/239 (84%)	195 (97%)	6 (3%)	41 68
7	G	206/210 (98%)	198 (96%)	8 (4%)	32 57
7	U	206/210 (98%)	198 (96%)	8 (4%)	32 57
8	H	185/190 (97%)	182 (98%)	3 (2%)	62 84
8	V	185/190 (97%)	182 (98%)	3 (2%)	62 84
9	I	172/173 (99%)	168 (98%)	4 (2%)	50 76
9	W	172/173 (99%)	168 (98%)	4 (2%)	50 76
10	J	173/175 (99%)	168 (97%)	5 (3%)	42 69
10	X	173/175 (99%)	167 (96%)	6 (4%)	36 62
11	K	171/171 (100%)	162 (95%)	9 (5%)	22 43
11	Y	171/171 (100%)	162 (95%)	9 (5%)	22 43
12	L	185/185 (100%)	182 (98%)	3 (2%)	62 84
12	Z	185/185 (100%)	183 (99%)	2 (1%)	73 89
13	M	199/208 (96%)	193 (97%)	6 (3%)	41 68
13	a	199/208 (96%)	193 (97%)	6 (3%)	41 68

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
14	N	162/162 (100%)	156 (96%)	6 (4%)	34	60
14	b	162/162 (100%)	156 (96%)	6 (4%)	34	60
All	All	5324/5544 (96%)	5166 (97%)	158 (3%)	41	68

All (158) 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	113	ARG
2	B	191	LEU
2	B	238	LEU
3	C	4	ARG
3	C	38	ASN
3	C	51	LYS
3	C	77	ASN
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	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
5	E	202	ASP
6	F	117	GLN
6	F	123	ASN
6	F	139	LYS
6	F	181	GLU
6	F	214	TRP

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Mol	Chain	Res	Type
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
7	G	236	LEU
8	H	30	ASN
8	H	68	LEU
8	H	196	ARG
9	I	37	ASN
9	I	126	ILE
9	I	171	LEU
9	I	182	TRP
10	J	3	ILE
10	J	23	ARG
10	J	90	LYS
10	J	99	GLN
10	J	149	ARG
11	K	-4	LYS
11	K	-3	ILE
11	K	4	LEU
11	K	9	GLN
11	K	104	TYR
11	K	107	LYS
11	K	128	CYS
11	K	140	LEU
11	K	148	LEU
12	L	23	LEU
12	L	132	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	36	ARG
14	N	39	ASP

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Mol	Chain	Res	Type
14	N	83	LYS
14	N	104	ASP
14	N	107	LYS
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	113	ARG
2	P	191	LEU
2	P	238	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	51	LYS
3	Q	77	ASN
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	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
5	S	202	ASP
6	T	117	GLN
6	T	123	ASN
6	T	139	LYS
6	T	181	GLU
6	T	214	TRP
6	T	240	GLN
7	U	83	ASN
7	U	115	LEU
7	U	117	GLN
7	U	122	ARG

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Mol	Chain	Res	Type
7	U	125	MET
7	U	208	GLU
7	U	235	ARG
7	U	236	LEU
8	V	30	ASN
8	V	68	LEU
8	V	113	ILE
9	W	37	ASN
9	W	126	ILE
9	W	171	LEU
9	W	182	TRP
10	X	3	ILE
10	X	23	ARG
10	X	78	GLN
10	X	90	LYS
10	X	99	GLN
10	X	149	ARG
11	Y	-3	ILE
11	Y	4	LEU
11	Y	9	GLN
11	Y	57	THR
11	Y	104	TYR
11	Y	107	LYS
11	Y	128	CYS
11	Y	140	LEU
11	Y	148	LEU
12	Z	23	LEU
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	36	ARG
14	b	39	ASP
14	b	83	LYS
14	b	104	ASP
14	b	107	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (80) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	HIS
2	B	20	GLN
2	B	58	GLN
2	B	119	GLN
2	B	123	GLN
2	B	155	ASN
3	C	77	ASN
3	C	147	GLN
3	C	160	GLN
4	D	15	GLN
4	D	91	HIS
4	D	100	ASN
4	D	146	GLN
4	D	210	GLN
4	D	225	ASN
5	E	68	HIS
5	E	99	ASN
5	E	116	GLN
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
7	G	83	ASN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	166	GLN
8	H	66	HIS
9	I	37	ASN
10	J	55	GLN
11	K	85	ASN
11	K	176	ASN
12	L	3	ASN
12	L	79	HIS
12	L	158	ASN
13	M	48	ASN
13	M	102	GLN
13	M	179	ASN
1	O	94	HIS
2	P	20	GLN

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Mol	Chain	Res	Type
2	P	58	GLN
2	P	119	GLN
2	P	123	GLN
3	Q	77	ASN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	146	GLN
4	R	225	ASN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN
5	S	120	GLN
5	S	151	ASN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN
6	T	117	GLN
6	T	123	ASN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	166	GLN
9	W	37	ASN
10	X	55	GLN
11	Y	85	ASN
11	Y	176	ASN
12	Z	3	ASN
12	Z	70	ASN
12	Z	158	ASN
13	a	48	ASN
13	a	102	GLN
13	a	179	ASN

5.3.3 RNA

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, 15 are monoatomic - leaving 4 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	BO2	b	201	14	25,29,29	1.84	4 (16%)	32,38,38	1.45	6 (18%)
17	BO2	H	301	8	25,29,29	2.08	4 (16%)	32,38,38	1.45	7 (21%)
17	BO2	N	201	14	25,29,29	1.92	4 (16%)	32,38,38	1.54	8 (25%)
17	BO2	V	301	8	25,29,29	1.99	3 (12%)	32,38,38	1.38	6 (18%)

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	BO2	b	201	14	-	4/22/28/28	0/2/2/2
17	BO2	H	301	8	-	7/22/28/28	0/2/2/2
17	BO2	N	201	14	-	4/22/28/28	0/2/2/2
17	BO2	V	301	8	-	5/22/28/28	0/2/2/2

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	H	301	BO2	C11-C12	-6.82	1.34	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	V	301	BO2	C2-C7	-6.12	1.35	1.50
17	V	301	BO2	C11-C12	-5.96	1.37	1.51
17	N	201	BO2	C2-C7	-5.90	1.36	1.50
17	H	301	BO2	C2-C7	-5.87	1.36	1.50
17	N	201	BO2	C11-C12	-5.65	1.37	1.51
17	b	201	BO2	C2-C7	-5.53	1.37	1.50
17	b	201	BO2	C11-C12	-5.44	1.38	1.51
17	b	201	BO2	C2-N1	-2.40	1.30	1.34
17	V	301	BO2	C7-N9	-2.32	1.29	1.34
17	N	201	BO2	C7-N9	-2.21	1.29	1.34
17	H	301	BO2	C7-N9	-2.11	1.29	1.34
17	N	201	BO2	C2-N1	-2.10	1.31	1.34
17	b	201	BO2	C7-N9	-2.10	1.29	1.34
17	H	301	BO2	C11-C10	-2.03	1.49	1.54

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	H	301	BO2	C6-N1-C2	4.22	122.41	116.93
17	V	301	BO2	C21-C22-C23	-4.16	110.17	115.39
17	b	201	BO2	C3-C2-C7	3.50	123.35	119.62
17	N	201	BO2	C6-N1-C2	3.38	121.31	116.93
17	N	201	BO2	C6-C5-N4	-3.29	117.83	121.95
17	b	201	BO2	C6-N1-C2	3.23	121.12	116.93
17	N	201	BO2	C3-C2-C7	3.17	123.00	119.62
17	V	301	BO2	C6-N1-C2	3.16	121.02	116.93
17	N	201	BO2	C21-C22-C23	-3.08	111.52	115.39
17	H	301	BO2	C5-C6-N1	-2.87	118.04	122.17
17	b	201	BO2	C6-C5-N4	-2.84	118.40	121.95
17	H	301	BO2	C21-C22-C23	-2.67	112.03	115.39
17	b	201	BO2	C3-C2-N1	-2.65	118.45	121.61
17	H	301	BO2	C2-C3-N4	-2.55	118.87	122.05
17	b	201	BO2	C21-C22-C23	-2.34	112.45	115.39
17	b	201	BO2	C18-C10-N9	-2.23	105.09	111.16
17	N	201	BO2	C3-C2-N1	-2.23	118.96	121.61
17	H	301	BO2	C5-N4-C3	2.21	120.67	116.85
17	N	201	BO2	C18-C10-N9	-2.18	105.24	111.16
17	V	301	BO2	C5-C6-N1	-2.16	119.07	122.17
17	N	201	BO2	C5-N4-C3	2.12	120.51	116.85
17	H	301	BO2	C12-C11-C10	-2.12	107.55	113.39
17	H	301	BO2	C18-C10-N9	-2.11	105.42	111.16
17	V	301	BO2	C11-C10-N9	-2.08	106.41	110.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	V	301	BO2	C2-C3-N4	-2.06	119.49	122.05
17	N	201	BO2	C11-C10-N9	-2.03	106.51	110.79
17	V	301	BO2	C6-C5-N4	-2.01	119.44	121.95

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	H	301	BO2	N1-C2-C7-O8
17	H	301	BO2	N1-C2-C7-N9
17	H	301	BO2	C3-C2-C7-O8
17	H	301	BO2	C3-C2-C7-N9
17	H	301	BO2	C21-C22-C23-C25
17	V	301	BO2	C3-C2-C7-O8
17	V	301	BO2	C3-C2-C7-N9
17	V	301	BO2	N1-C2-C7-O8
17	V	301	BO2	N1-C2-C7-N9
17	b	201	BO2	N1-C2-C7-O8
17	b	201	BO2	N1-C2-C7-N9
17	N	201	BO2	N1-C2-C7-O8
17	N	201	BO2	N1-C2-C7-N9
17	b	201	BO2	C3-C2-C7-O8
17	b	201	BO2	C3-C2-C7-N9
17	N	201	BO2	C3-C2-C7-O8
17	N	201	BO2	C3-C2-C7-N9
17	H	301	BO2	N20-C21-C22-C23
17	V	301	BO2	C21-C22-C23-C25
17	H	301	BO2	C21-C22-C23-C24

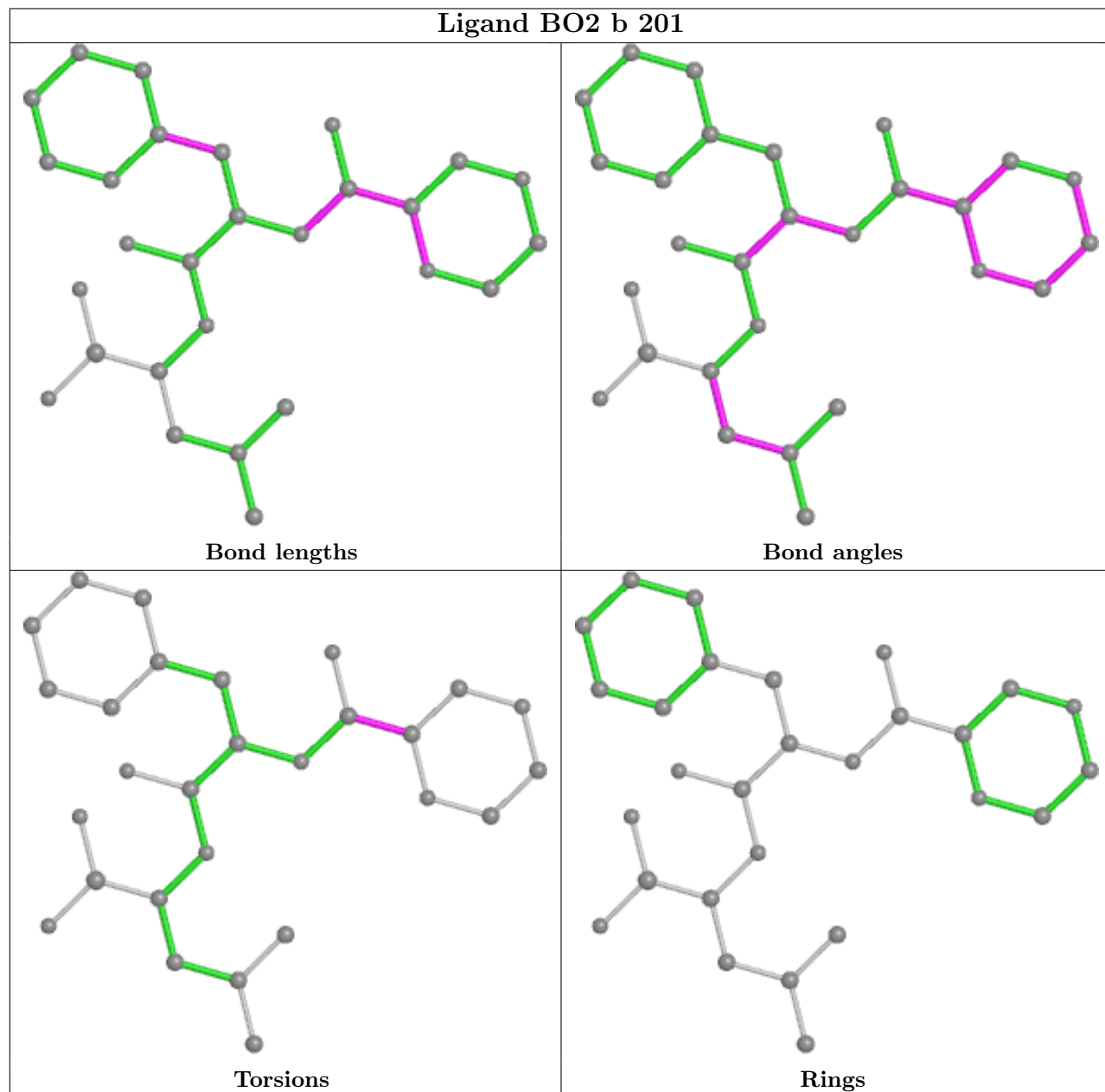
There are no ring outliers.

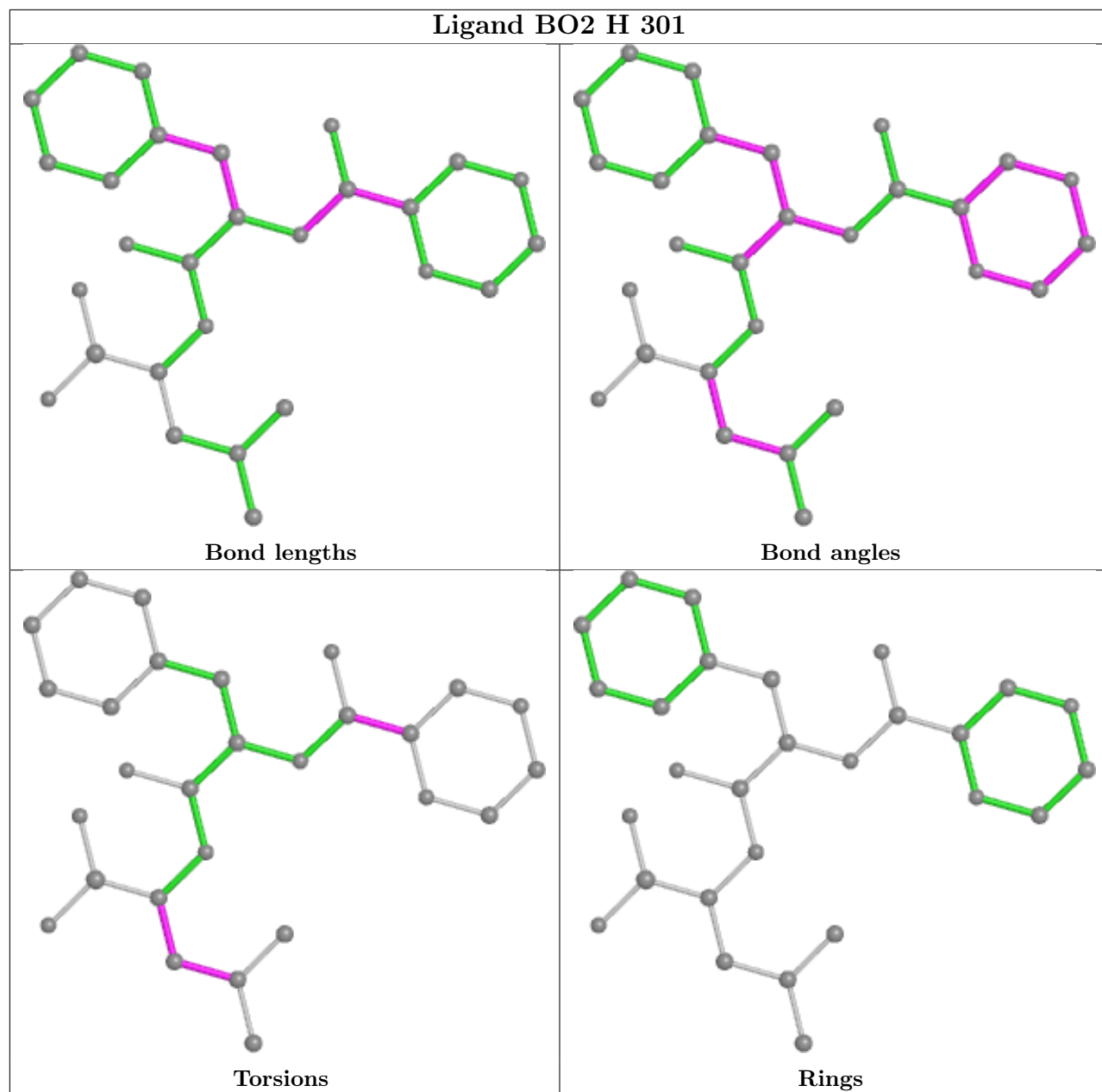
2 monomers are involved in 2 short contacts:

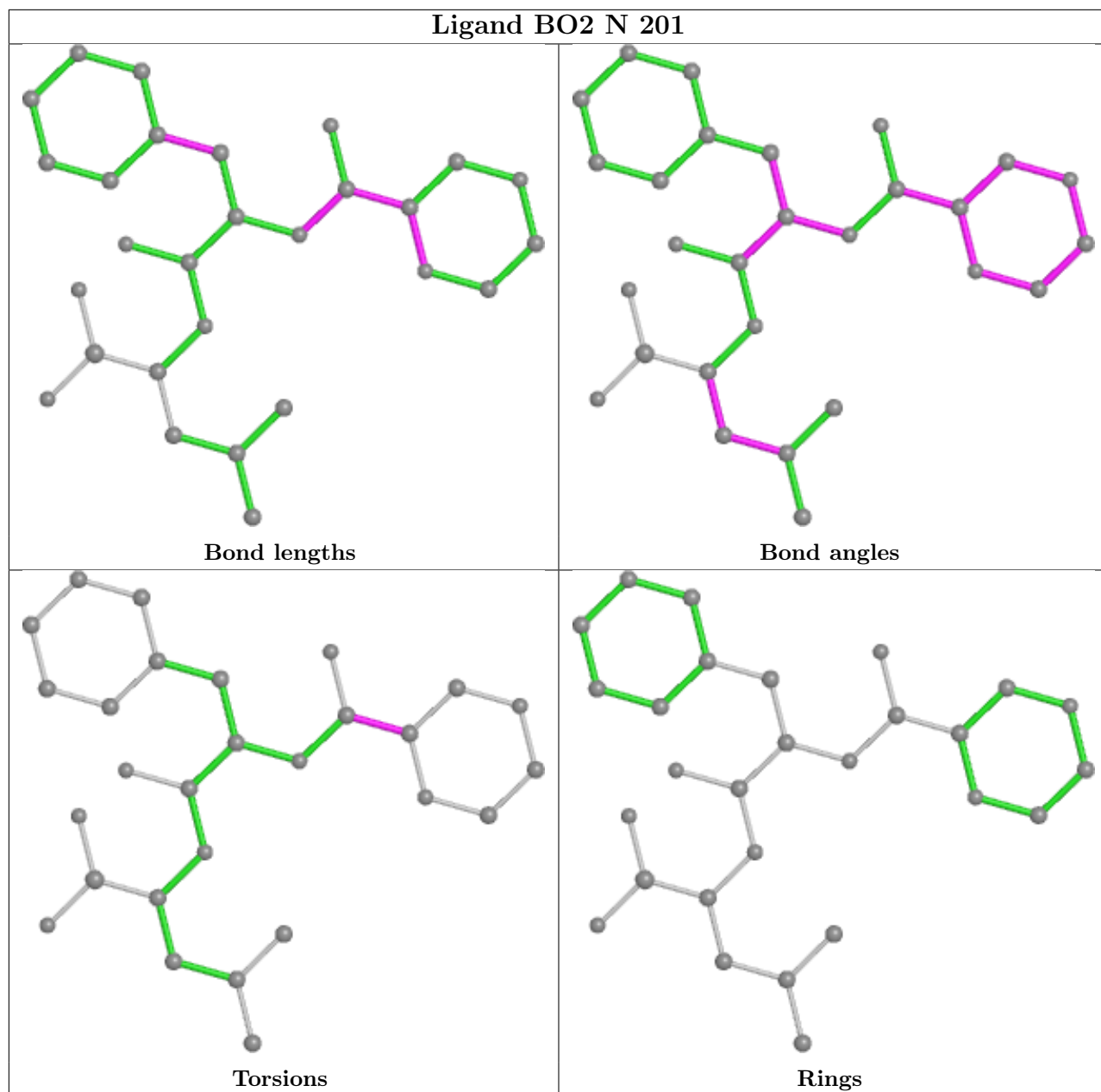
Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	H	301	BO2	1	0
17	N	201	BO2	1	0

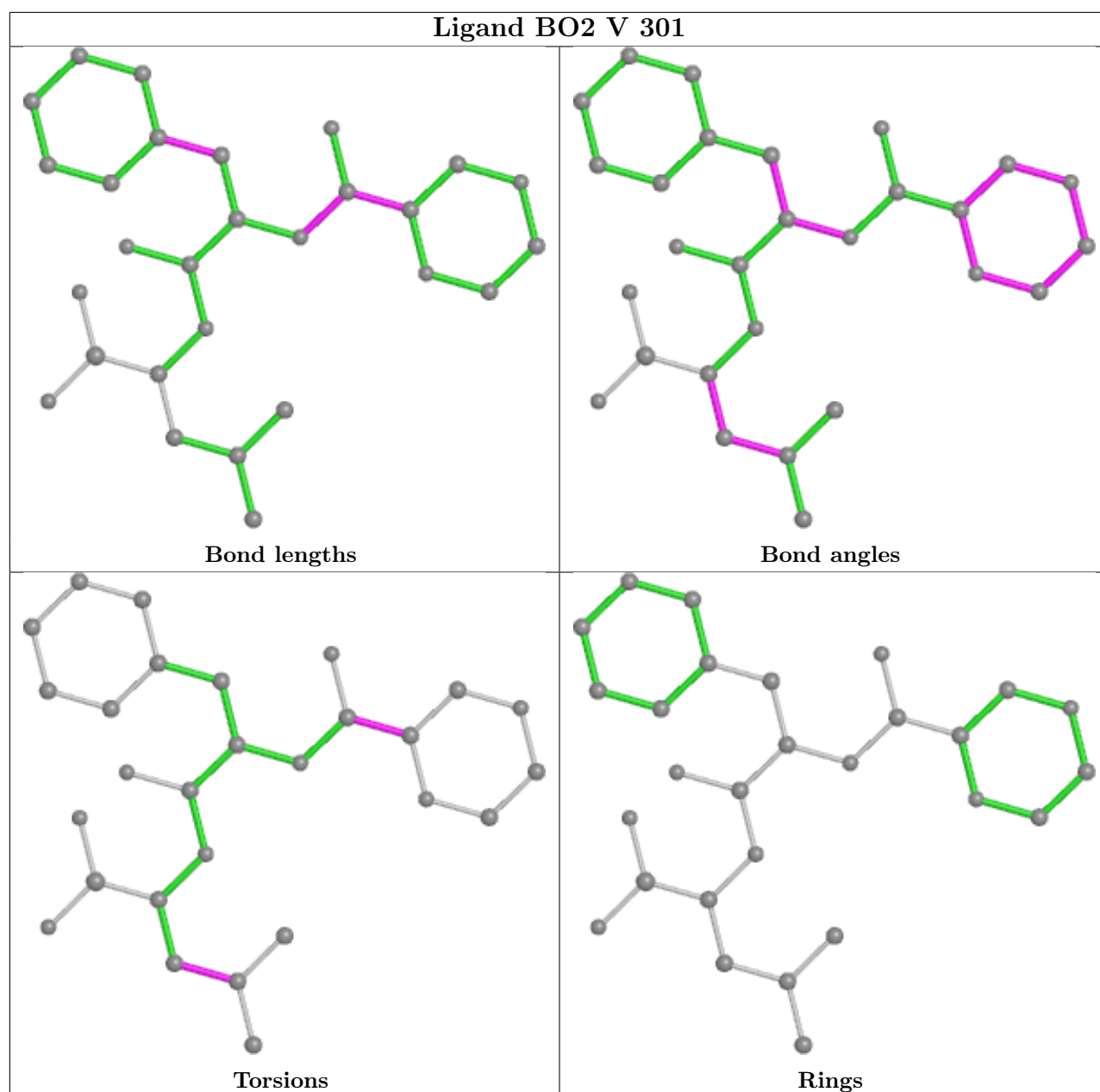
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	250/250 (100%)	-0.16	8 (3%) 47 51	31, 46, 82, 119	0
1	O	250/250 (100%)	-0.03	11 (4%) 34 37	36, 55, 100, 134	0
2	B	244/258 (94%)	0.06	16 (6%) 18 19	33, 52, 95, 154	0
2	P	244/258 (94%)	0.13	16 (6%) 18 19	37, 57, 104, 155	0
3	C	240/254 (94%)	0.34	23 (9%) 8 7	33, 58, 131, 167	0
3	Q	240/254 (94%)	0.39	27 (11%) 5 4	38, 66, 152, 178	0
4	D	235/260 (90%)	-0.02	5 (2%) 63 66	39, 59, 94, 144	0
4	R	235/260 (90%)	0.24	12 (5%) 28 29	48, 65, 106, 140	0
5	E	231/234 (98%)	0.06	10 (4%) 35 38	38, 58, 98, 139	0
5	S	231/234 (98%)	0.26	15 (6%) 18 19	45, 68, 114, 148	0
6	F	243/288 (84%)	-0.13	7 (2%) 51 55	31, 52, 104, 128	0
6	T	243/288 (84%)	0.05	12 (4%) 29 31	36, 62, 123, 154	0
7	G	241/252 (95%)	-0.24	8 (3%) 46 50	31, 47, 83, 133	0
7	U	241/252 (95%)	-0.08	13 (5%) 25 27	37, 52, 87, 131	0
8	H	226/232 (97%)	-0.17	7 (3%) 49 52	28, 42, 79, 143	0
8	V	226/232 (97%)	-0.07	8 (3%) 44 47	30, 47, 81, 167	0
9	I	204/205 (99%)	-0.39	2 (0%) 82 84	28, 43, 72, 95	0
9	W	204/205 (99%)	-0.33	3 (1%) 73 75	31, 46, 77, 99	0
10	J	195/198 (98%)	-0.24	6 (3%) 49 52	29, 46, 73, 112	0
10	X	195/198 (98%)	-0.20	6 (3%) 49 52	31, 48, 74, 129	0
11	K	217/217 (100%)	-0.18	4 (1%) 68 71	33, 47, 72, 94	0
11	Y	217/217 (100%)	-0.16	7 (3%) 47 51	35, 48, 74, 95	0
12	L	222/222 (100%)	-0.24	3 (1%) 75 77	28, 47, 92, 123	0
12	Z	222/222 (100%)	-0.16	5 (2%) 60 63	26, 49, 94, 128	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
13	M	233/246 (94%)	-0.36	4 (1%) 70 72	28, 45, 68, 85	0
13	a	233/246 (94%)	-0.33	3 (1%) 77 79	29, 46, 68, 85	0
14	N	196/196 (100%)	-0.38	2 (1%) 82 84	28, 40, 69, 100	0
14	b	196/196 (100%)	-0.35	3 (1%) 73 75	28, 42, 73, 99	0
All	All	6354/6624 (95%)	-0.09	246 (3%) 39 42	26, 51, 98, 178	0

All (246) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	P	219	ALA	10.2
3	Q	50	LEU	8.6
3	Q	49	THR	7.9
2	B	219	ALA	7.6
10	X	1	MET	7.6
3	C	49	THR	7.5
2	B	221	ASP	7.3
10	J	1	MET	7.3
3	C	50	LEU	6.7
9	W	1	SER	6.7
2	B	51	VAL	6.7
2	P	51	VAL	6.5
2	B	218	GLY	6.5
8	V	224	GLN	6.3
1	A	1	MET	6.2
11	Y	-3	ILE	6.0
3	C	236	GLN	6.0
3	Q	206	LYS	6.0
3	Q	205	ALA	5.9
8	V	221	CYS	5.9
11	Y	-4	LYS	5.9
8	H	221	CYS	5.8
12	Z	174	TYR	5.7
1	O	1	MET	5.6
2	P	59	ASP	5.5
11	K	-2	ALA	5.5
3	C	238	LYS	5.5
10	X	194	ASP	5.5
11	K	-3	ILE	5.4
8	V	226	GLU	5.4
3	C	205	ALA	5.4
5	S	202	ASP	5.3

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Mol	Chain	Res	Type	RSRZ
6	T	243	ILE	5.3
8	H	226	GLU	5.2
2	P	220	ASN	5.1
8	H	224	GLN	5.1
7	U	242	GLN	5.0
12	L	174	TYR	5.0
3	C	202	GLN	4.9
3	Q	239	GLN	4.9
1	A	2	THR	4.9
3	C	206	LYS	4.8
11	Y	-2	ALA	4.8
3	C	240	GLU	4.7
2	P	218	GLY	4.6
1	O	250	LEU	4.6
2	P	221	ASP	4.5
1	O	2	THR	4.5
4	R	241	ALA	4.5
8	V	222	ASP	4.5
9	I	1	SER	4.3
5	E	202	ASP	4.3
14	b	195	GLN	4.2
10	J	194	ASP	4.2
4	D	241	ALA	4.2
11	K	-4	LYS	4.1
4	D	242	GLU	4.1
8	H	222	ASP	4.1
6	F	205	GLU	4.0
2	P	52	THR	4.0
7	G	2	GLY	4.0
3	Q	48	SER	4.0
3	Q	238	LYS	3.9
5	S	233	ILE	3.9
3	Q	240	GLU	3.9
1	A	249	ALA	3.9
10	X	193	ASP	3.8
6	F	202	ASP	3.8
5	S	203	GLU	3.8
11	K	-1	HIS	3.8
8	V	223	ILE	3.8
3	Q	202	GLN	3.8
14	N	195	GLN	3.7
8	V	145	ASP	3.7

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Mol	Chain	Res	Type	RSRZ
2	B	217	LYS	3.7
4	R	217	GLN	3.7
1	O	249	ALA	3.7
3	Q	236	GLN	3.6
5	E	233	ILE	3.6
7	U	2	GLY	3.6
5	E	122	TYR	3.6
3	C	225	GLU	3.5
3	Q	204	GLY	3.4
1	O	231	LYS	3.4
7	U	222	ASP	3.4
6	T	244	ASN	3.4
1	O	52	SER	3.4
11	Y	-1	HIS	3.4
6	T	178	HIS	3.3
14	b	105	LYS	3.3
2	B	59	ASP	3.3
13	M	1	THR	3.3
2	P	222	GLY	3.3
7	G	3	TYR	3.2
2	P	203	SER	3.2
6	F	215	CYS	3.2
3	C	27	ARG	3.2
1	A	250	LEU	3.2
5	E	201	ARG	3.2
2	B	220	ASN	3.2
3	Q	203	THR	3.2
3	C	239	GLN	3.2
6	F	2	THR	3.1
3	C	180	LYS	3.1
3	Q	225	GLU	3.1
11	Y	212	GLY	3.1
3	C	48	SER	3.1
2	B	60	THR	3.0
4	R	116	GLY	3.0
6	F	244	ASN	3.0
5	S	171	LEU	3.0
5	S	210	LEU	3.0
13	a	1	THR	3.0
2	P	225	TYR	3.0
13	M	47	ASP	3.0
5	S	54	GLU	3.0

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Mol	Chain	Res	Type	RSRZ
9	W	192	ASP	2.9
3	Q	234	ILE	2.9
5	E	54	GLU	2.9
6	T	205	GLU	2.9
10	J	193	ASP	2.9
5	E	123	GLY	2.8
5	S	173	ARG	2.8
6	T	215	CYS	2.8
4	D	1	ASP	2.8
5	S	122	TYR	2.8
10	X	149	ARG	2.8
8	H	219	ASN	2.8
3	Q	181	GLU	2.8
9	W	133	LYS	2.8
5	S	227	GLU	2.8
12	Z	1	GLN	2.7
2	B	182	ASP	2.7
7	G	179	LYS	2.7
5	S	3	ASN	2.7
6	T	201	GLU	2.7
2	P	53	SER	2.7
4	R	125	LEU	2.7
3	C	47	ARG	2.7
7	G	242	GLN	2.6
2	P	182	ASP	2.6
14	N	105	LYS	2.6
3	C	235	GLU	2.6
2	P	50	LYS	2.6
8	V	225	GLU	2.6
5	E	173	ARG	2.6
6	T	2	THR	2.6
4	R	1	ASP	2.6
4	R	54	ASP	2.6
4	R	230	GLU	2.6
2	B	52	THR	2.5
1	A	228	PRO	2.5
4	D	125	LEU	2.5
7	U	51	PRO	2.5
10	X	195	PHE	2.5
2	P	217	LYS	2.5
13	a	233	ILE	2.5
8	H	198	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
5	S	30	GLN	2.5
7	G	240	ALA	2.5
4	R	224	ASP	2.5
3	C	234	ILE	2.5
2	B	50	LYS	2.5
3	C	59	PRO	2.5
3	C	216	ASP	2.5
3	Q	60	SER	2.5
6	F	181	GLU	2.5
7	G	241	GLU	2.5
7	G	222	ASP	2.5
13	M	82	ASP	2.5
10	J	24	GLY	2.5
4	R	201	GLU	2.5
3	C	229	GLN	2.4
5	S	180	LYS	2.4
7	G	68	ARG	2.4
3	C	203	THR	2.4
2	B	61	SER	2.4
2	B	242	GLY	2.4
3	Q	51	LYS	2.3
7	U	207	THR	2.3
5	E	210	LEU	2.3
10	J	149	ARG	2.3
8	H	223	ILE	2.3
7	U	3	TYR	2.3
7	U	181	LYS	2.3
10	J	135	TYR	2.3
11	Y	106	ARG	2.3
4	R	242	GLU	2.3
5	E	217	LYS	2.3
1	A	248	GLU	2.3
1	A	201	GLU	2.3
13	M	121	SER	2.3
5	E	227	GLU	2.3
5	S	201	ARG	2.3
2	B	93	HIS	2.3
3	Q	171	GLU	2.3
3	Q	237	GLU	2.3
2	P	61	SER	2.3
6	T	239	ALA	2.2
3	Q	187	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
12	L	172	LEU	2.2
2	B	203	SER	2.2
5	S	217	LYS	2.2
3	Q	27	ARG	2.2
12	Z	106	TYR	2.2
7	U	206	GLY	2.2
1	O	201	GLU	2.2
6	F	241	LYS	2.2
9	I	133	LYS	2.2
7	U	219	ALA	2.2
3	Q	55	THR	2.2
2	B	169	SER	2.2
7	U	68	ARG	2.2
3	Q	47	ARG	2.2
8	V	215	GLU	2.2
12	L	1	GLN	2.2
3	C	175	LYS	2.2
3	C	187	GLU	2.2
7	U	203	ASP	2.1
6	T	230	ASP	2.1
2	P	60	THR	2.1
3	Q	233	GLN	2.1
1	O	220	ASP	2.1
7	U	183	ASP	2.1
4	R	177	ASN	2.1
6	T	206	LYS	2.1
3	Q	229	GLN	2.1
6	T	180	PRO	2.1
1	O	50	LYS	2.1
12	Z	173	LYS	2.1
7	U	188	GLU	2.1
1	O	53	SER	2.0
1	O	62	SER	2.0
4	R	112	ALA	2.0
1	A	166	LYS	2.0
5	S	121	SER	2.0
11	Y	24	ASN	2.0
13	a	171	GLN	2.0
3	C	173	LEU	2.0
10	X	24	GLY	2.0
3	Q	216	ASP	2.0
6	T	204	LYS	2.0

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Mol	Chain	Res	Type	RSRZ
4	D	177	ASN	2.0
3	Q	141	ASP	2.0
12	Z	210	ASP	2.0
14	b	104	ASP	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](#)

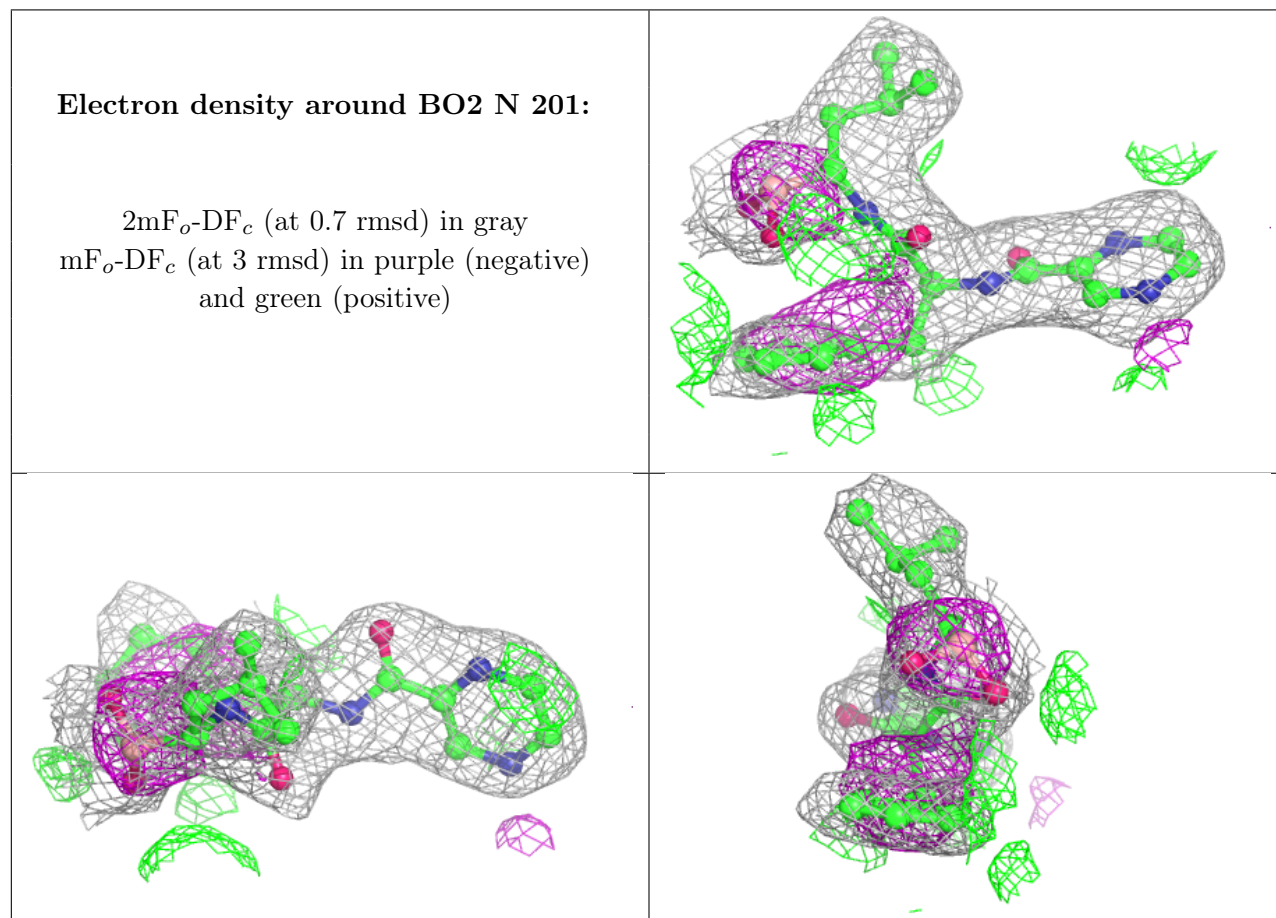
There are no monosaccharides in this entry.

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

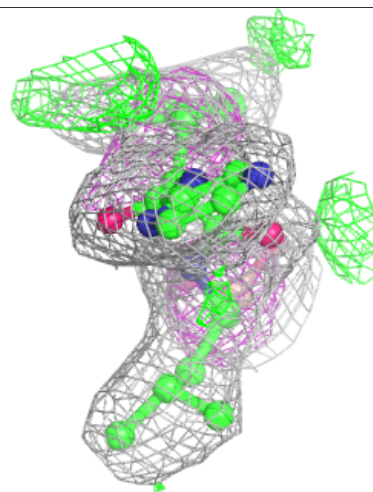
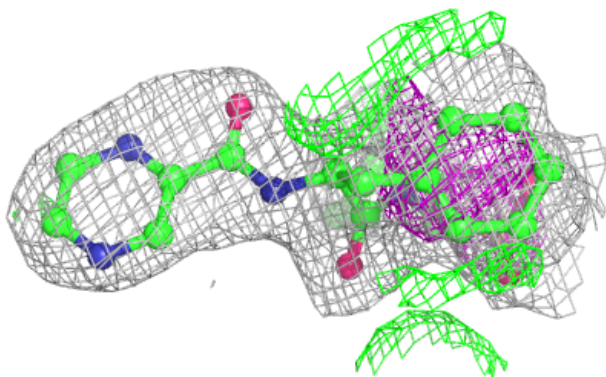
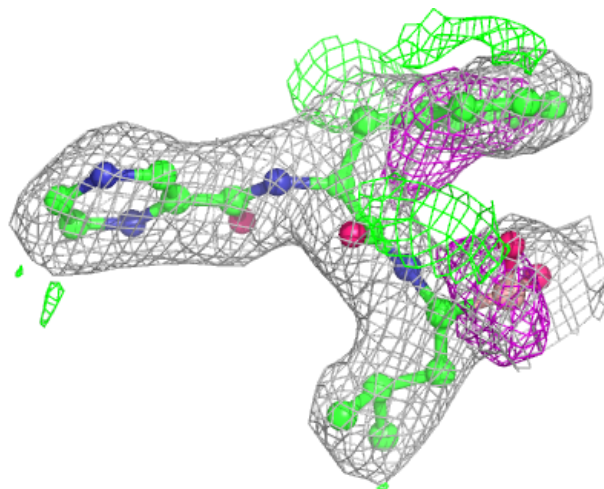
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
15	MG	N	203	1/1	0.21	0.52	70,70,70,70	0
15	MG	I	302	1/1	0.87	0.35	65,65,65,65	0
15	MG	Z	301	1/1	0.89	0.17	57,57,57,57	0
17	BO2	N	201	28/28	0.89	0.19	26,39,51,52	0
17	BO2	b	201	28/28	0.91	0.18	33,41,50,50	0
17	BO2	H	301	28/28	0.93	0.16	40,43,54,57	0
15	MG	J	201	1/1	0.93	0.15	53,53,53,53	0
15	MG	K	301	1/1	0.93	0.07	48,48,48,48	0
17	BO2	V	301	28/28	0.94	0.14	44,46,61,61	0
15	MG	I	301	1/1	0.95	0.21	51,51,51,51	0
15	MG	G	301	1/1	0.95	0.06	40,40,40,40	0
15	MG	K	302	1/1	0.95	0.30	48,48,48,48	0
15	MG	I	303	1/1	0.97	0.06	43,43,43,43	0
15	MG	N	202	1/1	0.98	0.09	38,38,38,38	0
16	CL	b	202	1/1	0.98	0.15	30,30,30,30	0
16	CL	G	302	1/1	0.99	0.04	39,39,39,39	0
16	CL	N	204	1/1	0.99	0.08	30,30,30,30	0
16	CL	U	301	1/1	0.99	0.13	43,43,43,43	0
15	MG	L	301	1/1	0.99	0.08	40,40,40,40	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.



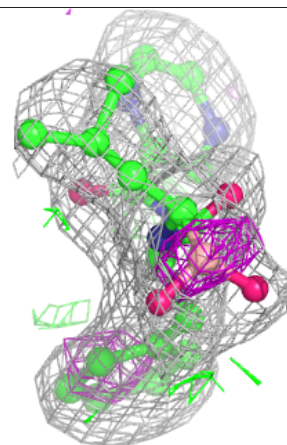
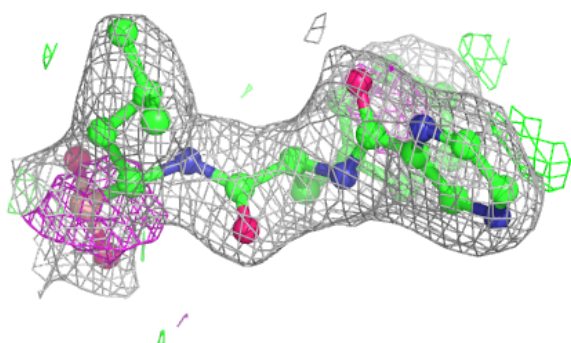
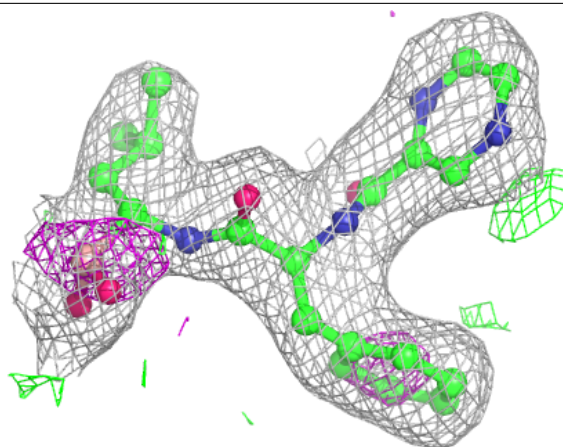
Electron density around BO2 b 201:

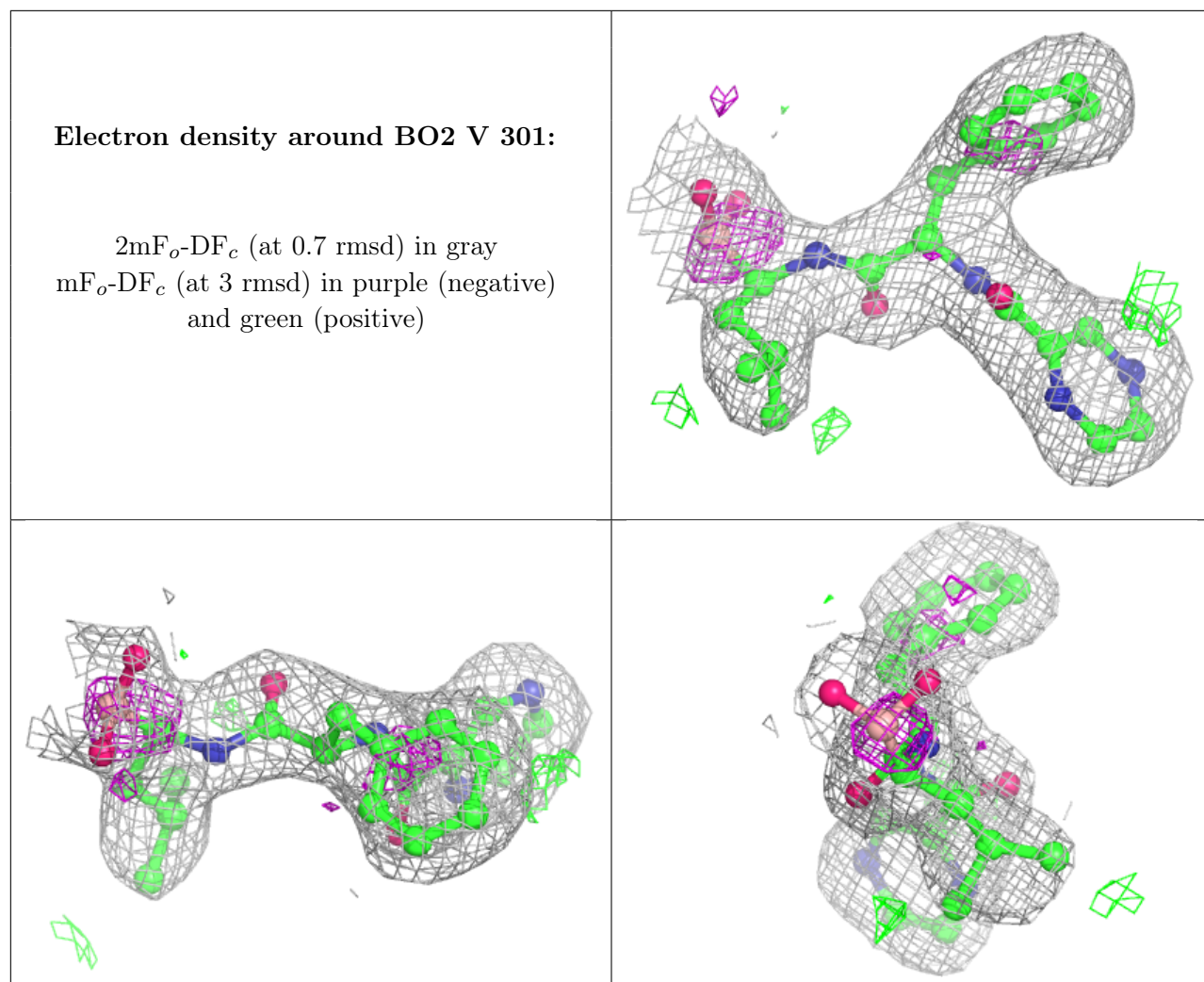
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around BO2 H 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.