



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 07:06 AM UTC

PDB ID : 6HW5 / pdb_00006hw5
Title : Yeast 20S proteasome in complex with 18
Authors : Huber, E.M.; Groll, M.
Deposited on : 2018-10-11
Resolution : 2.90 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

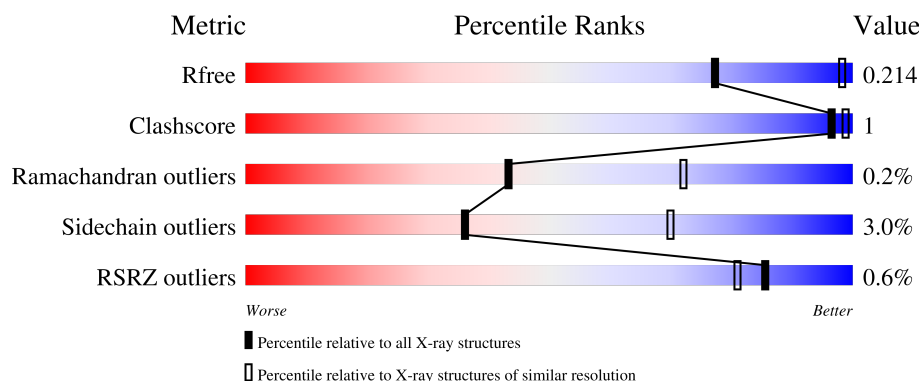
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 Å.

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



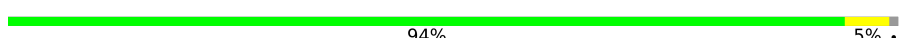
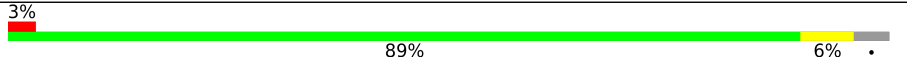
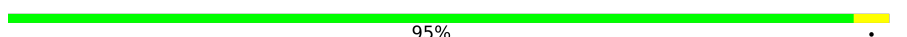
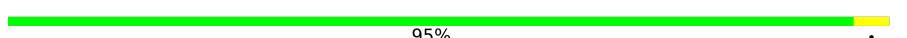
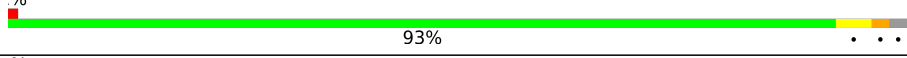
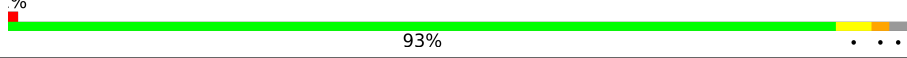
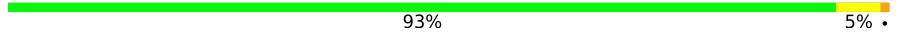
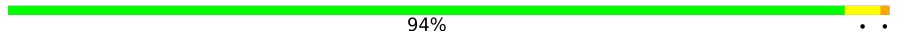
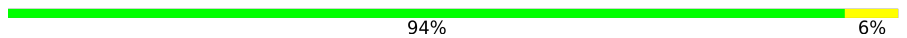
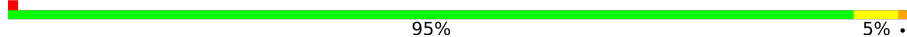
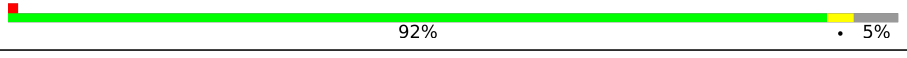
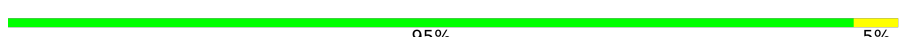
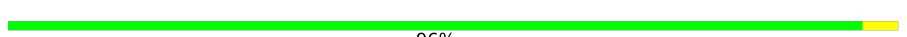
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	% 98% .
1	O	250	% 97% .
2	B	258	% 88% 7% 5%
2	P	258	89% 6% 5%
3	C	254	89% . . 6%

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

2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 49707 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	H	222	Total	C	N	O	S	0	0	0
			1684	1061	293	323	7			
8	V	222	Total	C	N	O	S	0	0	0
			1684	1061	293	323	7			

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

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

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

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

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

- Molecule 11 is a protein called PROTEASOME SUBUNIT BETA TYPE-5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
11	K	212	Total	C	N	O	S	0	0	0
			1644	1045	280	312	7			
11	Y	212	Total	C	N	O	S	0	0	0
			1644	1045	280	312	7			

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

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
13	M	233	Total	C	N	O	S	0	0	0
			1824	1154	312	351	7			
13	a	233	Total	C	N	O	S	0	0	0
			1824	1154	312	351	7			

- Molecule 14 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
14	N	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			
14	b	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			

- Molecule 15 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	G	1	Total	Mg	0	0
			1	1		
15	I	2	Total	Mg	0	0
			2	2		

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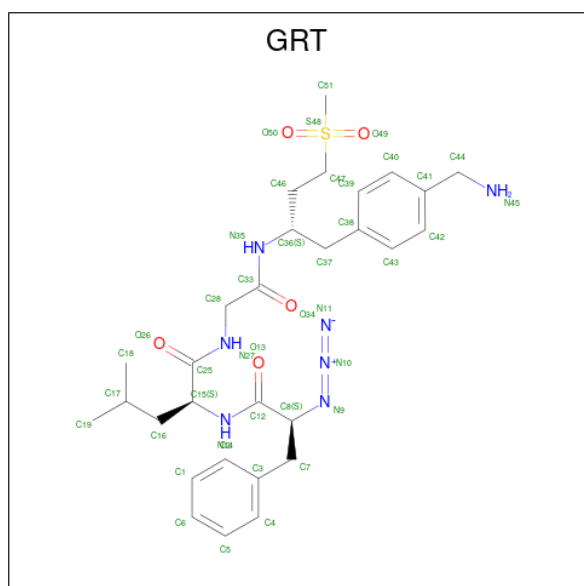
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	K	1	Total	Mg	0	0
			1	1		
15	L	1	Total	Mg	0	0
			1	1		
15	N	1	Total	Mg	0	0
			1	1		
15	X	1	Total	Mg	0	0
			1	1		
15	Z	1	Total	Mg	0	0
			1	1		

- Molecule 16 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 17 is (2 {S})- {N}-[2-[[[(2 {S})-1-[4-(aminomethyl)phenyl]-4-methylsulfonyl-butan-2-yl]amino]-2-oxidanylidene-ethyl]-2-[[[(2 {S})-2-azido-3-phenyl-propanoyl]amino]-4-methyl-pentanamide (CCD ID: GRT) (formula: C₂₉H₄₁N₇O₅S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
17	H	1	Total	C	N	O	S	0	0
			42	29	7	5	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
17	K	1	Total	C	N	O	S	0	0
			42	29	7	5	1		
17	V	1	Total	C	N	O	S	0	0
			42	29	7	5	1		
17	Y	1	Total	C	N	O	S	0	0
			42	29	7	5	1		

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	9	Total	O	0	0
			9	9		
18	B	8	Total	O	0	0
			8	8		
18	C	8	Total	O	0	0
			8	8		
18	D	4	Total	O	0	0
			4	4		
18	E	4	Total	O	0	0
			4	4		
18	F	13	Total	O	0	0
			13	13		
18	G	9	Total	O	0	0
			9	9		
18	H	9	Total	O	0	0
			9	9		
18	I	6	Total	O	0	0
			6	6		
18	J	9	Total	O	0	0
			9	9		
18	K	9	Total	O	0	0
			9	9		
18	L	11	Total	O	0	0
			11	11		
18	M	12	Total	O	0	0
			12	12		
18	N	4	Total	O	0	0
			4	4		
18	O	5	Total	O	0	0
			5	5		
18	P	7	Total	O	0	0
			7	7		

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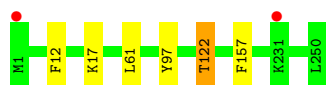
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	Q	10	Total 10	O 10	0	0
18	R	6	Total 6	O 6	0	0
18	S	4	Total 4	O 4	0	0
18	T	9	Total 9	O 9	0	0
18	U	11	Total 11	O 11	0	0
18	V	6	Total 6	O 6	0	0
18	W	2	Total 2	O 2	0	0
18	X	16	Total 16	O 16	0	0
18	Y	13	Total 13	O 13	0	0
18	Z	8	Total 8	O 8	0	0
18	a	12	Total 12	O 12	0	0
18	b	9	Total 9	O 9	0	0

3 Residue-property plots [i](#)

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

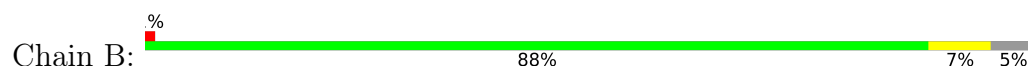
- Molecule 1: Proteasome subunit alpha type-2



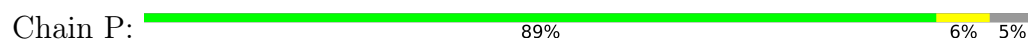
- Molecule 1: Proteasome subunit alpha type-2



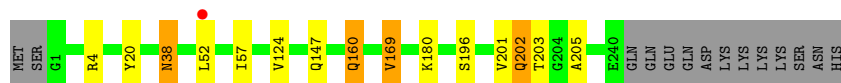
- Molecule 2: Proteasome subunit alpha type-3



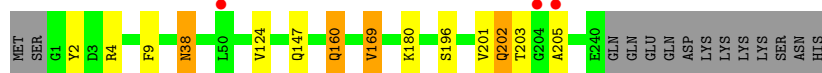
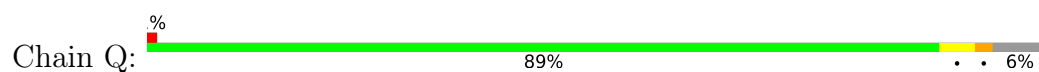
- Molecule 2: Proteasome subunit alpha type-3



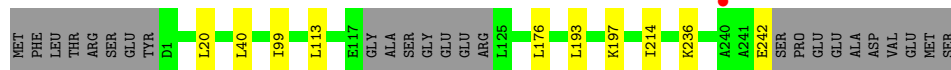
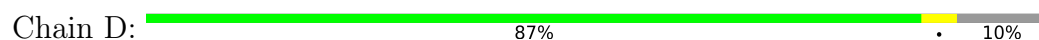
- Molecule 3: Proteasome subunit alpha type-4



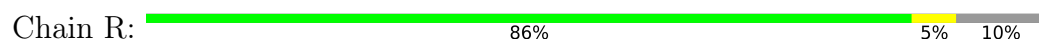
- Molecule 3: Proteasome subunit alpha type-4



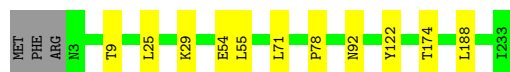
- Molecule 4: Proteasome subunit alpha type-5



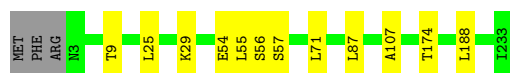
- Molecule 4: Proteasome subunit alpha type-5



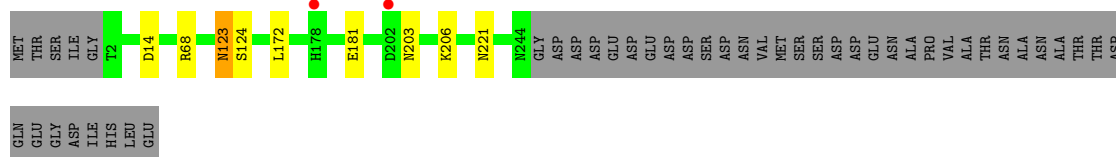
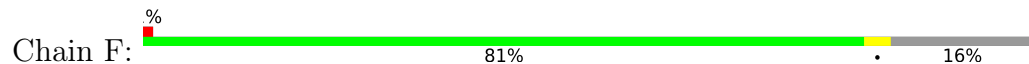
- Molecule 5: Proteasome subunit alpha type-6



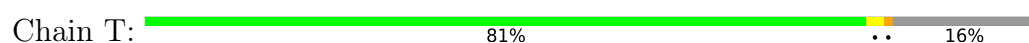
- Molecule 5: Proteasome subunit alpha type-6



- Molecule 6: Probable proteasome subunit alpha type-7



- Molecule 6: Probable proteasome subunit alpha type-7



- Molecule 7: Proteasome subunit alpha type-1

Chain G: 92% . .

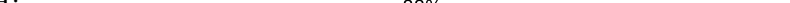


- Molecule 7: Proteasome subunit alpha type-1

Chain U: 92% . .

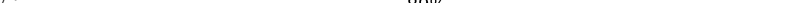


- Molecule 8: Proteasome subunit beta type-2

Chain H:  2% 88% 7%

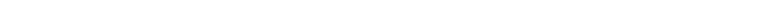


- Molecule 8: Proteasome subunit beta type-2

Chain V:  3% 89% 6%

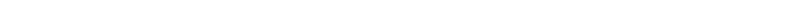


- Molecule 9: Proteasome subunit beta type-3

Chain I: 

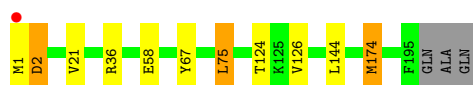


- Molecule 9: Proteasome subunit beta type-3

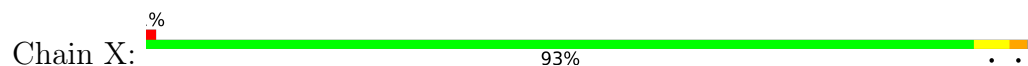
Chain W:  95% .



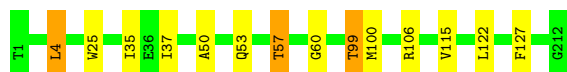
- Molecule 10: Proteasome subunit beta type-4



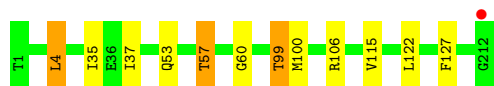
- Molecule 10: Proteasome subunit beta type-4



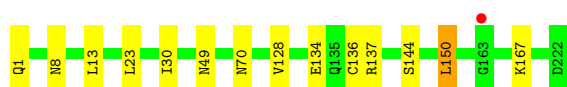
- Molecule 11: PROTEASOME SUBUNIT BETA TYPE-5



- Molecule 11: PROTEASOME SUBUNIT BETA TYPE-5



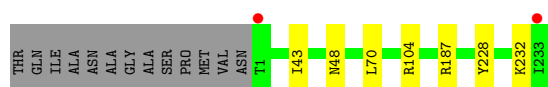
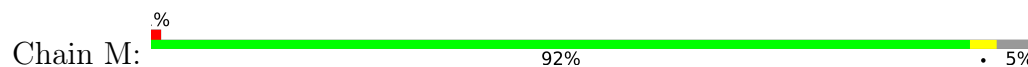
- Molecule 12: Proteasome subunit beta type-6



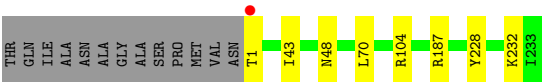
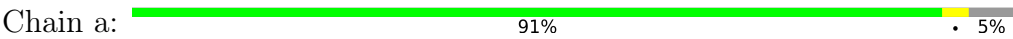
- Molecule 12: Proteasome subunit beta type-6



- Molecule 13: Proteasome subunit beta type-7



- Molecule 13: Proteasome subunit beta type-7



• 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	138.44Å 299.48Å 147.31Å 90.00° 113.25° 90.00°	Depositor
Resolution (Å)	15.00 – 2.90 15.00 – 2.90	Depositor EDS
% Data completeness (in resolution range)	97.8 (15.00-2.90) 97.8 (15.00-2.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.03 (at 2.91Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.180 , 0.211 0.187 , 0.214	Depositor DCC
R_{free} test set	11868 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	77.9	Xtriage
Anisotropy	0.257	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 64.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	49707	wwPDB-VP
Average B, all atoms (Å ²)	89.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.16% 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, GRT, MG

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.61	0/1952	0.81	0/2642
1	O	0.61	0/1952	0.81	0/2642
2	B	0.60	0/1934	0.79	0/2618
2	P	0.60	0/1934	0.79	0/2618
3	C	0.60	0/1910	0.82	0/2586
3	Q	0.61	0/1910	0.82	0/2586
4	D	0.58	0/1837	0.78	0/2475
4	R	0.58	0/1837	0.78	0/2475
5	E	0.59	0/1800	0.78	0/2433
5	S	0.59	0/1800	0.78	0/2433
6	F	0.59	0/1932	0.80	0/2609
6	T	0.59	0/1932	0.81	0/2609
7	G	0.57	0/1945	0.77	0/2634
7	U	0.58	0/1945	0.78	0/2634
8	H	0.55	0/1715	0.78	0/2326
8	V	0.54	0/1715	0.77	0/2326
9	I	0.56	0/1611	0.82	0/2174
9	W	0.56	0/1611	0.81	0/2174
10	J	0.58	0/1589	0.78	0/2142
10	X	0.58	0/1589	0.78	0/2142
11	K	0.54	0/1681	0.81	1/2274 (0.0%)
11	Y	0.54	0/1681	0.82	1/2274 (0.0%)
12	L	0.55	0/1795	0.77	0/2420
12	Z	0.55	0/1795	0.77	1/2420 (0.0%)
13	M	0.57	0/1855	0.81	0/2514
13	a	0.57	0/1855	0.81	0/2514
14	N	0.52	0/1541	0.77	0/2087
14	b	0.53	0/1541	0.78	0/2087
All	All	0.58	0/50194	0.79	3/67868 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	Y	4	LEU	CD1-CG-CD2	-12.08	84.22	110.80
11	K	4	LEU	CD1-CG-CD2	-11.68	85.10	110.80
12	Z	104	PRO	N-CA-C	5.16	118.44	111.22

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1915	0	1929	3	0
1	O	1915	0	1929	5	0
2	B	1904	0	1904	9	0
2	P	1904	0	1904	5	0
3	C	1881	0	1895	9	0
3	Q	1881	0	1895	7	0
4	D	1813	0	1797	1	0
4	R	1813	0	1797	3	0
5	E	1773	0	1775	3	0
5	S	1773	0	1775	3	0
6	F	1892	0	1883	2	0
6	T	1892	0	1883	3	0
7	G	1907	0	1901	1	0
7	U	1907	0	1901	2	0
8	H	1684	0	1687	8	0
8	V	1684	0	1687	7	0
9	I	1581	0	1574	7	0
9	W	1581	0	1574	6	0
10	J	1561	0	1569	7	0
10	X	1561	0	1569	6	0
11	K	1644	0	1594	7	0
11	Y	1644	0	1594	5	0
12	L	1757	0	1711	6	0
12	Z	1757	0	1711	4	0
13	M	1824	0	1832	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
13	a	1824	0	1832	4	0
14	N	1512	0	1481	6	0
14	b	1512	0	1481	5	0
15	G	1	0	0	0	0
15	I	2	0	0	0	0
15	K	1	0	0	0	0
15	L	1	0	0	0	0
15	N	1	0	0	0	0
15	X	1	0	0	0	0
15	Z	1	0	0	0	0
16	G	1	0	0	0	0
16	U	1	0	0	0	0
17	H	42	0	0	1	0
17	K	42	0	0	0	0
17	V	42	0	0	1	0
17	Y	42	0	0	0	0
18	A	9	0	0	0	0
18	B	8	0	0	0	0
18	C	8	0	0	0	0
18	D	4	0	0	0	0
18	E	4	0	0	0	0
18	F	13	0	0	0	0
18	G	9	0	0	0	0
18	H	9	0	0	1	0
18	I	6	0	0	0	0
18	J	9	0	0	0	0
18	K	9	0	0	0	0
18	L	11	0	0	0	0
18	M	12	0	0	0	0
18	N	4	0	0	0	0
18	O	5	0	0	0	0
18	P	7	0	0	1	0
18	Q	10	0	0	0	0
18	R	6	0	0	0	0
18	S	4	0	0	0	0
18	T	9	0	0	0	0
18	U	11	0	0	0	0
18	V	6	0	0	0	0
18	W	2	0	0	0	0
18	X	16	0	0	0	0
18	Y	13	0	0	0	0
18	Z	8	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	a	12	0	0	0	0
18	b	9	0	0	0	0
All	All	49707	0	49064	95	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 (95) 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:100:MET:HE3	11:Y:127:PHE:HB2	1.73	0.71
11:K:100:MET:HE3	11:K:127:PHE:HB2	1.74	0.70
8:H:50:ALA:CB	9:I:126:ILE:HG23	2.24	0.67
8:V:50:ALA:CB	9:W:126:ILE:HG23	2.30	0.62
8:H:139:GLU:OE1	13:a:187:ARG:NH1	2.37	0.58
11:Y:53:GLN:O	11:Y:57:THR:OG1	2.21	0.58
11:K:53:GLN:O	11:K:57:THR:OG1	2.22	0.57
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.70	0.56
1:O:122:THR:HG22	2:P:128:ARG:HH21	1.71	0.56
10:X:1:MET:O	10:X:2:ASP:HB2	2.06	0.56
10:J:1:MET:O	10:J:2:ASP:HB2	2.06	0.55
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.71	0.55
10:J:174:MET:HA	10:X:174:MET:HA	1.88	0.55
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.90	0.54
12:Z:13:LEU:HD13	12:Z:150:LEU:HD21	1.91	0.53
10:X:21:VAL:HG11	11:Y:122:LEU:HD11	1.91	0.53
12:L:13:LEU:HD13	12:L:150:LEU:HD21	1.91	0.52
4:R:159:TYR:CE2	5:S:56:SER:HB3	2.45	0.51
1:A:122:THR:HG22	2:B:128:ARG:HH21	1.74	0.51
2:B:146:GLN:HG2	3:C:57:ILE:HG21	1.91	0.51
10:J:67:TYR:CE1	10:J:75:LEU:HD13	2.46	0.51
14:N:161:GLN:HE21	14:b:136:GLY:HA2	1.76	0.51
10:X:67:TYR:CE1	10:X:75:LEU:HD13	2.45	0.51
14:N:49:ALA:O	14:N:53:GLN:HB2	2.11	0.50
10:J:21:VAL:HG11	11:K:122:LEU:HD11	1.94	0.50
1:A:97:TYR:OH	9:I:77:GLU:OE2	2.27	0.50
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.46	0.50
14:b:49:ALA:O	14:b:53:GLN:HB2	2.12	0.50
8:H:19:ARG:NH1	8:H:167:LEU:O	2.45	0.49
11:K:99:THR:HG22	11:K:115:VAL:HB	1.95	0.49
14:N:152:VAL:HA	14:N:175:MET:HE1	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:b:152:VAL:HA	14:b:175:MET:HE1	1.94	0.48
1:O:14:PRO:HA	2:P:23:TYR:CD1	2.49	0.48
11:Y:99:THR:HG22	11:Y:115:VAL:HB	1.95	0.48
5:E:92:ASN:HD21	12:L:70:ASN:ND2	2.11	0.48
8:H:50:ALA:CB	9:I:126:ILE:CG2	2.92	0.48
7:U:23:PHE:O	7:U:26:THR:HB	2.14	0.48
14:N:35:THR:HG21	13:a:228:TYR:HE2	1.79	0.47
8:V:50:ALA:CB	9:W:126:ILE:CG2	2.92	0.47
8:V:3:ILE:HG22	8:V:99:ILE:HD12	1.97	0.47
8:V:19:ARG:NH1	8:V:167:LEU:O	2.48	0.47
1:O:12:PHE:H	2:P:20:GLN:HE22	1.63	0.46
8:H:3:ILE:HG22	8:H:99:ILE:HD12	1.97	0.46
2:P:113:ARG:NH1	18:P:301:HOH:O	2.49	0.46
8:H:22:GLN:HG3	17:H:301:GRT:C19	2.46	0.46
2:B:161:ALA:HB3	3:C:52:LEU:HD23	1.99	0.46
6:F:123:ASN:HD22	6:F:124:SER:N	2.14	0.45
6:T:123:ASN:HD22	6:T:124:SER:N	2.14	0.45
4:D:113:LEU:HD12	5:E:78:PRO:HB2	1.98	0.45
8:H:144:GLN:NE2	18:H:401:HOH:O	2.49	0.45
10:X:36:ARG:NH1	10:X:58:GLU:OE2	2.48	0.45
14:N:136:GLY:HA2	14:b:161:GLN:HE21	1.82	0.44
8:V:22:GLN:HG3	17:V:301:GRT:C19	2.47	0.44
3:Q:38:ASN:HD22	3:Q:38:ASN:C	2.25	0.44
1:A:12:PHE:H	2:B:20:GLN:HE22	1.66	0.44
3:C:38:ASN:C	3:C:38:ASN:HD22	2.26	0.43
9:I:20:VAL:HG13	9:I:118:PRO:HB3	2.00	0.43
7:G:23:PHE:O	7:G:26:THR:HB	2.18	0.43
9:W:20:VAL:HG13	9:W:118:PRO:HB3	2.00	0.43
8:V:80:LEU:HD12	8:V:113:ILE:HD11	2.00	0.43
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.01	0.43
5:S:87:LEU:HD21	5:S:107:ALA:HB1	2.00	0.43
2:B:124:HIS:HB3	3:C:124:VAL:HG12	2.00	0.43
10:J:36:ARG:NH1	10:J:58:GLU:OE2	2.52	0.43
12:Z:134:GLU:OE1	12:Z:137:ARG:NH2	2.51	0.43
2:P:124:HIS:HB3	3:Q:124:VAL:HG12	2.00	0.43
13:M:187:ARG:NH1	8:V:139:GLU:OE1	2.46	0.42
2:B:95:GLN:HE22	9:I:71:ASN:HD22	1.67	0.42
4:R:158:ARG:HB3	5:S:57:SER:HB3	2.01	0.42
11:K:25:TRP:CH2	12:L:144:SER:HA	2.54	0.42
6:F:123:ASN:HD22	6:F:123:ASN:C	2.27	0.42
11:K:37:ILE:HG23	11:K:60:GLY:HA2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:L:134:GLU:OE1	12:L:137:ARG:NH2	2.53	0.42
9:I:56:ALA:HB3	10:J:124:THR:HG23	2.02	0.41
12:L:8:ASN:HA	12:L:30:ILE:O	2.20	0.41
12:Z:8:ASN:HA	12:Z:30:ILE:O	2.19	0.41
1:O:7:PHE:HB3	3:Q:2:TYR:CE1	2.56	0.41
6:T:123:ASN:HD22	6:T:123:ASN:C	2.28	0.41
11:Y:37:ILE:HG23	11:Y:60:GLY:HA2	2.02	0.41
2:B:14:PRO:HA	3:C:20:TYR:CE1	2.56	0.41
13:M:228:TYR:CE1	14:b:53:GLN:HG2	2.55	0.41
3:Q:9:PHE:H	4:R:15:GLN:HE22	1.67	0.41
3:C:201:VAL:O	3:C:202:GLN:CB	2.69	0.41
14:N:35:THR:HG21	13:a:228:TYR:CE2	2.56	0.41
9:W:98:ARG:O	9:W:126:ILE:HD11	2.20	0.41
12:Z:1:GLN:HE21	13:a:1:THR:CG2	2.34	0.41
2:B:14:PRO:HA	3:C:20:TYR:CD1	2.55	0.41
11:K:50:ALA:CB	12:L:128:VAL:HG23	2.51	0.41
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.69	0.41
8:H:80:LEU:HD12	8:H:113:ILE:HD11	2.02	0.40
9:W:36:SER:HB2	10:X:126:VAL:HG11	2.04	0.40
2:B:1:GLY:HA3	5:E:122:TYR:CD1	2.55	0.40
3:Q:169:VAL:HG23	3:Q:196:SER:HB2	2.04	0.40
6:T:14:ASP:OD2	6:T:14:ASP:N	2.53	0.40
3:C:169:VAL:HG23	3:C:196:SER:HB2	2.03	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%)	242 (98%)	6 (2%)	0	100	100
1	O	248/250 (99%)	242 (98%)	6 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	242/258 (94%)	233 (96%)	7 (3%)	2 (1%)	16	44
2	P	242/258 (94%)	233 (96%)	7 (3%)	2 (1%)	16	44
3	C	238/254 (94%)	231 (97%)	5 (2%)	2 (1%)	16	44
3	Q	238/254 (94%)	231 (97%)	5 (2%)	2 (1%)	16	44
4	D	231/260 (89%)	226 (98%)	5 (2%)	0	100	100
4	R	231/260 (89%)	226 (98%)	5 (2%)	0	100	100
5	E	229/234 (98%)	221 (96%)	8 (4%)	0	100	100
5	S	229/234 (98%)	221 (96%)	8 (4%)	0	100	100
6	F	241/288 (84%)	236 (98%)	5 (2%)	0	100	100
6	T	241/288 (84%)	238 (99%)	3 (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	220/232 (95%)	213 (97%)	6 (3%)	1 (0%)	24	54
8	V	220/232 (95%)	213 (97%)	7 (3%)	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%)	190 (98%)	2 (1%)	1 (0%)	24	54
10	X	193/198 (98%)	190 (98%)	2 (1%)	1 (0%)	24	54
11	K	210/212 (99%)	204 (97%)	6 (3%)	0	100	100
11	Y	210/212 (99%)	205 (98%)	5 (2%)	0	100	100
12	L	220/222 (99%)	217 (99%)	3 (1%)	0	100	100
12	Z	220/222 (99%)	217 (99%)	3 (1%)	0	100	100
13	M	231/246 (94%)	221 (96%)	10 (4%)	0	100	100
13	a	231/246 (94%)	223 (96%)	8 (4%)	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	6276/6614 (95%)	6107 (97%)	158 (2%)	11 (0%)	43	72

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
3	C	202	GLN

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Mol	Chain	Res	Type
10	J	2	ASP
2	P	51	VAL
3	Q	202	GLN
10	X	2	ASP
3	C	205	ALA
3	Q	205	ALA
2	B	221	ASP
2	P	221	ASP
8	H	9	ASN

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	209/209 (100%)	205 (98%)	4 (2%)	50	79
1	O	209/209 (100%)	205 (98%)	4 (2%)	50	79
2	B	203/216 (94%)	195 (96%)	8 (4%)	28	63
2	P	203/216 (94%)	195 (96%)	8 (4%)	28	63
3	C	212/226 (94%)	205 (97%)	7 (3%)	33	67
3	Q	212/226 (94%)	205 (97%)	7 (3%)	33	67
4	D	194/215 (90%)	185 (95%)	9 (5%)	24	57
4	R	194/215 (90%)	185 (95%)	9 (5%)	24	57
5	E	190/193 (98%)	182 (96%)	8 (4%)	26	60
5	S	190/193 (98%)	182 (96%)	8 (4%)	26	60
6	F	201/239 (84%)	193 (96%)	8 (4%)	28	62
6	T	201/239 (84%)	193 (96%)	8 (4%)	28	62
7	G	206/210 (98%)	199 (97%)	7 (3%)	32	66
7	U	206/210 (98%)	199 (97%)	7 (3%)	32	66
8	H	181/190 (95%)	174 (96%)	7 (4%)	28	63
8	V	181/190 (95%)	174 (96%)	7 (4%)	28	63
9	I	172/173 (99%)	170 (99%)	2 (1%)	63	86

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
9	W	172/173 (99%)	170 (99%)	2 (1%)	63	86
10	J	173/175 (99%)	170 (98%)	3 (2%)	53	82
10	X	173/175 (99%)	170 (98%)	3 (2%)	53	82
11	K	169/169 (100%)	164 (97%)	5 (3%)	36	70
11	Y	169/169 (100%)	164 (97%)	5 (3%)	36	70
12	L	185/185 (100%)	179 (97%)	6 (3%)	34	68
12	Z	185/185 (100%)	179 (97%)	6 (3%)	34	68
13	M	199/208 (96%)	194 (98%)	5 (2%)	42	74
13	a	199/208 (96%)	194 (98%)	5 (2%)	42	74
14	N	162/162 (100%)	160 (99%)	2 (1%)	63	86
14	b	162/162 (100%)	160 (99%)	2 (1%)	63	86
All	All	5312/5540 (96%)	5150 (97%)	162 (3%)	36	70

All (162) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	LYS
1	A	61	LEU
1	A	122	THR
1	A	157	PHE
2	B	50	LYS
2	B	52	THR
2	B	55	LEU
2	B	58	GLN
2	B	79	LEU
2	B	114	LEU
2	B	184	LYS
2	B	191	LEU
3	C	4	ARG
3	C	38	ASN
3	C	147	GLN
3	C	160	GLN
3	C	169	VAL
3	C	180	LYS
3	C	203	THR
4	D	20	LEU
4	D	40	LEU
4	D	99	ILE

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Mol	Chain	Res	Type
4	D	176	LEU
4	D	193	LEU
4	D	197	LYS
4	D	214	ILE
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	25	LEU
5	E	29	LYS
5	E	54	GLU
5	E	55	LEU
5	E	71	LEU
5	E	174	THR
5	E	188	LEU
6	F	14	ASP
6	F	68	ARG
6	F	123	ASN
6	F	172	LEU
6	F	181	GLU
6	F	203	ASN
6	F	206	LYS
6	F	221	ASN
7	G	83	ASN
7	G	115	LEU
7	G	125	MET
7	G	166	GLN
7	G	181	LYS
7	G	235	ARG
7	G	236	LEU
8	H	22	GLN
8	H	34	LEU
8	H	38	SER
8	H	68	LEU
8	H	84	LYS
8	H	127	LEU
8	H	196	ARG
9	I	37	ASN
9	I	171	LEU
10	J	75	LEU
10	J	144	LEU
10	J	174	MET
11	K	4	LEU

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Mol	Chain	Res	Type
11	K	35	ILE
11	K	57	THR
11	K	99	THR
11	K	106	ARG
12	L	1	GLN
12	L	23	LEU
12	L	49	ASN
12	L	136	CYS
12	L	150	LEU
12	L	167	LYS
13	M	43	ILE
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	232	LYS
14	N	9	LYS
14	N	119	VAL
1	O	17	LYS
1	O	61	LEU
1	O	122	THR
1	O	157	PHE
2	P	50	LYS
2	P	52	THR
2	P	55	LEU
2	P	58	GLN
2	P	79	LEU
2	P	114	LEU
2	P	184	LYS
2	P	191	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	147	GLN
3	Q	160	GLN
3	Q	169	VAL
3	Q	180	LYS
3	Q	203	THR
4	R	20	LEU
4	R	40	LEU
4	R	99	ILE
4	R	176	LEU
4	R	193	LEU
4	R	197	LYS

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Mol	Chain	Res	Type
4	R	214	ILE
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	25	LEU
5	S	29	LYS
5	S	54	GLU
5	S	55	LEU
5	S	71	LEU
5	S	174	THR
5	S	188	LEU
6	T	14	ASP
6	T	68	ARG
6	T	123	ASN
6	T	172	LEU
6	T	181	GLU
6	T	203	ASN
6	T	206	LYS
6	T	221	ASN
7	U	83	ASN
7	U	115	LEU
7	U	125	MET
7	U	166	GLN
7	U	181	LYS
7	U	235	ARG
7	U	236	LEU
8	V	22	GLN
8	V	34	LEU
8	V	38	SER
8	V	68	LEU
8	V	84	LYS
8	V	127	LEU
8	V	196	ARG
9	W	37	ASN
9	W	171	LEU
10	X	75	LEU
10	X	144	LEU
10	X	174	MET
11	Y	4	LEU
11	Y	35	ILE
11	Y	57	THR
11	Y	99	THR

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Mol	Chain	Res	Type
11	Y	106	ARG
12	Z	1	GLN
12	Z	23	LEU
12	Z	49	ASN
12	Z	136	CYS
12	Z	150	LEU
12	Z	167	LYS
13	a	43	ILE
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	232	LYS
14	b	9	LYS
14	b	119	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (140) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	20	GLN
2	B	95	GLN
2	B	119	GLN
2	B	123	GLN
2	B	155	ASN
2	B	176	GLN
2	B	226	GLN
2	B	232	GLN
3	C	38	ASN
3	C	77	ASN
3	C	115	GLN
3	C	116	GLN
3	C	120	GLN
3	C	147	GLN
3	C	160	GLN
3	C	233	GLN
4	D	15	GLN
4	D	91	HIS
4	D	106	GLN
4	D	146	GLN
4	D	160	ASN
4	D	225	ASN
5	E	68	HIS
5	E	92	ASN

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Mol	Chain	Res	Type
5	E	99	ASN
5	E	116	GLN
5	E	118	ASN
5	E	120	GLN
5	E	147	GLN
5	E	165	GLN
5	E	184	ASN
6	F	86	ASN
6	F	117	GLN
6	F	123	ASN
6	F	143	HIS
7	G	83	ASN
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	166	GLN
7	G	175	ASN
8	H	30	ASN
8	H	165	ASN
8	H	172	ASN
8	H	189	ASN
9	I	63	ASN
10	J	37	GLN
10	J	55	GLN
10	J	63	ASN
10	J	78	GLN
11	K	9	GLN
11	K	24	ASN
11	K	85	ASN
11	K	133	GLN
11	K	143	ASN
11	K	176	ASN
11	K	208	ASN
12	L	1	GLN
12	L	3	ASN
12	L	70	ASN
12	L	79	HIS
12	L	152	ASN
12	L	158	ASN
12	L	197	GLN
13	M	48	ASN
13	M	62	HIS

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Mol	Chain	Res	Type
13	M	102	GLN
14	N	38	HIS
14	N	69	GLN
14	N	141	ASN
14	N	161	GLN
2	P	20	GLN
2	P	95	GLN
2	P	119	GLN
2	P	123	GLN
2	P	176	GLN
2	P	226	GLN
2	P	232	GLN
3	Q	38	ASN
3	Q	77	ASN
3	Q	115	GLN
3	Q	116	GLN
3	Q	120	GLN
3	Q	147	GLN
3	Q	160	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	146	GLN
4	R	225	ASN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	116	GLN
5	S	118	ASN
5	S	120	GLN
5	S	147	GLN
5	S	165	GLN
5	S	184	ASN
6	T	86	ASN
6	T	117	GLN
6	T	123	ASN
6	T	143	HIS
6	T	240	GLN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN

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Mol	Chain	Res	Type
7	U	166	GLN
7	U	175	ASN
8	V	30	ASN
8	V	165	ASN
8	V	172	ASN
8	V	189	ASN
9	W	63	ASN
10	X	37	GLN
10	X	55	GLN
10	X	63	ASN
10	X	78	GLN
10	X	86	GLN
10	X	191	GLN
11	Y	9	GLN
11	Y	85	ASN
11	Y	133	GLN
11	Y	143	ASN
11	Y	176	ASN
11	Y	208	ASN
12	Z	1	GLN
12	Z	3	ASN
12	Z	70	ASN
12	Z	158	ASN
12	Z	197	GLN
13	a	48	ASN
13	a	62	HIS
13	a	102	GLN
13	a	213	GLN
14	b	38	HIS
14	b	69	GLN
14	b	141	ASN
14	b	161	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 10 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	GRT	H	301	8	43,43,43	2.13	9 (20%)	52,57,57	1.44	8 (15%)
17	GRT	K	301	11	43,43,43	2.07	9 (20%)	52,57,57	1.31	8 (15%)
17	GRT	V	301	8	43,43,43	2.18	9 (20%)	52,57,57	1.43	7 (13%)
17	GRT	Y	301	11	43,43,43	2.10	9 (20%)	52,57,57	1.35	8 (15%)

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	GRT	H	301	8	-	6/44/44/44	0/2/2/2
17	GRT	K	301	11	-	2/44/44/44	0/2/2/2
17	GRT	V	301	8	-	5/44/44/44	0/2/2/2
17	GRT	Y	301	11	-	2/44/44/44	0/2/2/2

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	Y	301	GRT	N11-N10	6.43	1.36	1.23
17	K	301	GRT	N11-N10	6.41	1.36	1.23
17	V	301	GRT	N11-N10	6.17	1.35	1.23
17	H	301	GRT	N11-N10	6.04	1.35	1.23
17	Y	301	GRT	N10-N9	5.47	1.36	1.23
17	V	301	GRT	C37-C38	-5.39	1.38	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	Y	301	GRT	C37-C38	-5.39	1.38	1.51
17	K	301	GRT	C37-C38	-5.38	1.38	1.51
17	K	301	GRT	N10-N9	5.34	1.36	1.23
17	H	301	GRT	C37-C38	-5.23	1.39	1.51
17	V	301	GRT	N10-N9	5.17	1.35	1.23
17	H	301	GRT	N10-N9	5.14	1.35	1.23
17	V	301	GRT	C47-S48	4.54	1.84	1.78
17	K	301	GRT	O50-S48	4.46	1.53	1.44
17	H	301	GRT	O49-S48	4.44	1.53	1.44
17	V	301	GRT	O49-S48	4.43	1.53	1.44
17	V	301	GRT	O50-S48	4.37	1.52	1.44
17	K	301	GRT	C7-C3	-4.37	1.41	1.51
17	Y	301	GRT	C7-C3	-4.34	1.41	1.51
17	Y	301	GRT	O50-S48	4.33	1.52	1.44
17	H	301	GRT	C47-S48	4.22	1.83	1.78
17	K	301	GRT	O49-S48	4.20	1.52	1.44
17	H	301	GRT	O50-S48	4.15	1.52	1.44
17	Y	301	GRT	O49-S48	4.07	1.52	1.44
17	V	301	GRT	C7-C3	-3.72	1.42	1.51
17	H	301	GRT	C7-C3	-3.62	1.42	1.51
17	V	301	GRT	C46-C47	3.40	1.55	1.52
17	Y	301	GRT	C47-S48	3.21	1.82	1.78
17	H	301	GRT	C46-C47	3.14	1.55	1.52
17	H	301	GRT	C44-C41	-3.06	1.40	1.51
17	V	301	GRT	C44-C41	-3.02	1.40	1.51
17	K	301	GRT	C44-C41	-2.88	1.41	1.51
17	Y	301	GRT	C44-C41	-2.81	1.41	1.51
17	Y	301	GRT	C46-C47	2.56	1.55	1.52
17	K	301	GRT	C47-S48	2.22	1.81	1.78
17	K	301	GRT	C46-C47	2.13	1.54	1.52

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	H	301	GRT	O50-S48-O49	-4.96	107.92	117.22
17	V	301	GRT	O50-S48-O49	-4.67	108.47	117.22
17	Y	301	GRT	O50-S48-O49	-4.33	109.10	117.22
17	K	301	GRT	O50-S48-O49	-4.25	109.25	117.22
17	Y	301	GRT	O50-S48-C47	3.19	110.62	108.33
17	Y	301	GRT	O50-S48-C51	3.02	111.68	108.87
17	V	301	GRT	C37-C38-C39	2.92	126.33	120.90
17	H	301	GRT	C37-C38-C39	2.90	126.31	120.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	H	301	GRT	O50-S48-C47	2.90	110.42	108.33
17	K	301	GRT	O50-S48-C47	2.86	110.39	108.33
17	K	301	GRT	C37-C38-C39	2.85	126.21	120.90
17	V	301	GRT	C37-C38-C43	-2.80	115.70	120.90
17	Y	301	GRT	C37-C38-C39	2.73	125.97	120.90
17	Y	301	GRT	C33-C28-N27	-2.71	105.13	113.04
17	H	301	GRT	C37-C38-C43	-2.70	115.87	120.90
17	K	301	GRT	C33-C28-N27	-2.69	105.19	113.04
17	Y	301	GRT	C37-C38-C43	-2.65	115.97	120.90
17	K	301	GRT	C37-C38-C43	-2.61	116.05	120.90
17	V	301	GRT	C28-C33-N35	-2.54	110.13	116.16
17	Y	301	GRT	C8-N9-N10	2.45	117.78	115.36
17	K	301	GRT	O50-S48-C51	2.38	111.08	108.87
17	V	301	GRT	C51-S48-C47	2.37	114.10	105.28
17	H	301	GRT	C51-S48-C47	2.30	113.84	105.28
17	H	301	GRT	C28-C33-N35	-2.30	110.70	116.16
17	V	301	GRT	C16-C15-N14	2.25	115.66	110.58
17	K	301	GRT	C8-N9-N10	2.23	117.56	115.36
17	H	301	GRT	C16-C15-N14	2.20	115.54	110.58
17	V	301	GRT	C7-C8-C12	-2.16	106.30	110.61
17	Y	301	GRT	C37-C36-N35	-2.14	106.26	110.34
17	K	301	GRT	C37-C36-N35	-2.06	106.42	110.34
17	H	301	GRT	O34-C33-N35	2.04	126.40	122.95

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	K	301	GRT	C36-C37-C38-C39
17	Y	301	GRT	C36-C37-C38-C39
17	H	301	GRT	C36-C37-C38-C39
17	V	301	GRT	C36-C37-C38-C39
17	K	301	GRT	C36-C37-C38-C43
17	Y	301	GRT	C36-C37-C38-C43
17	H	301	GRT	C36-C37-C38-C43
17	V	301	GRT	C36-C37-C38-C43
17	H	301	GRT	C46-C47-S48-C51
17	V	301	GRT	C46-C47-S48-C51
17	H	301	GRT	C4-C3-C7-C8
17	H	301	GRT	C2-C3-C7-C8
17	V	301	GRT	C2-C3-C7-C8
17	V	301	GRT	C4-C3-C7-C8

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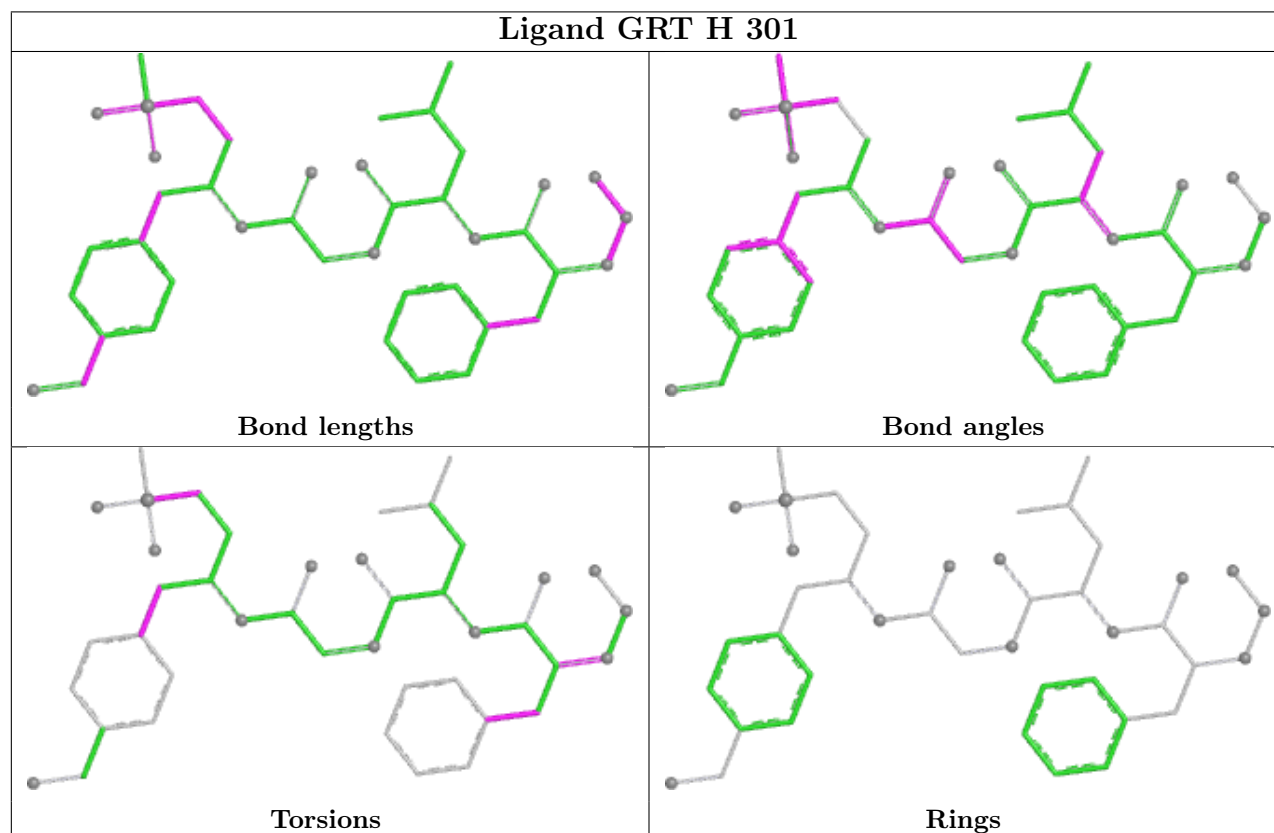
Mol	Chain	Res	Type	Atoms
17	H	301	GRT	C12-C8-N9-N10

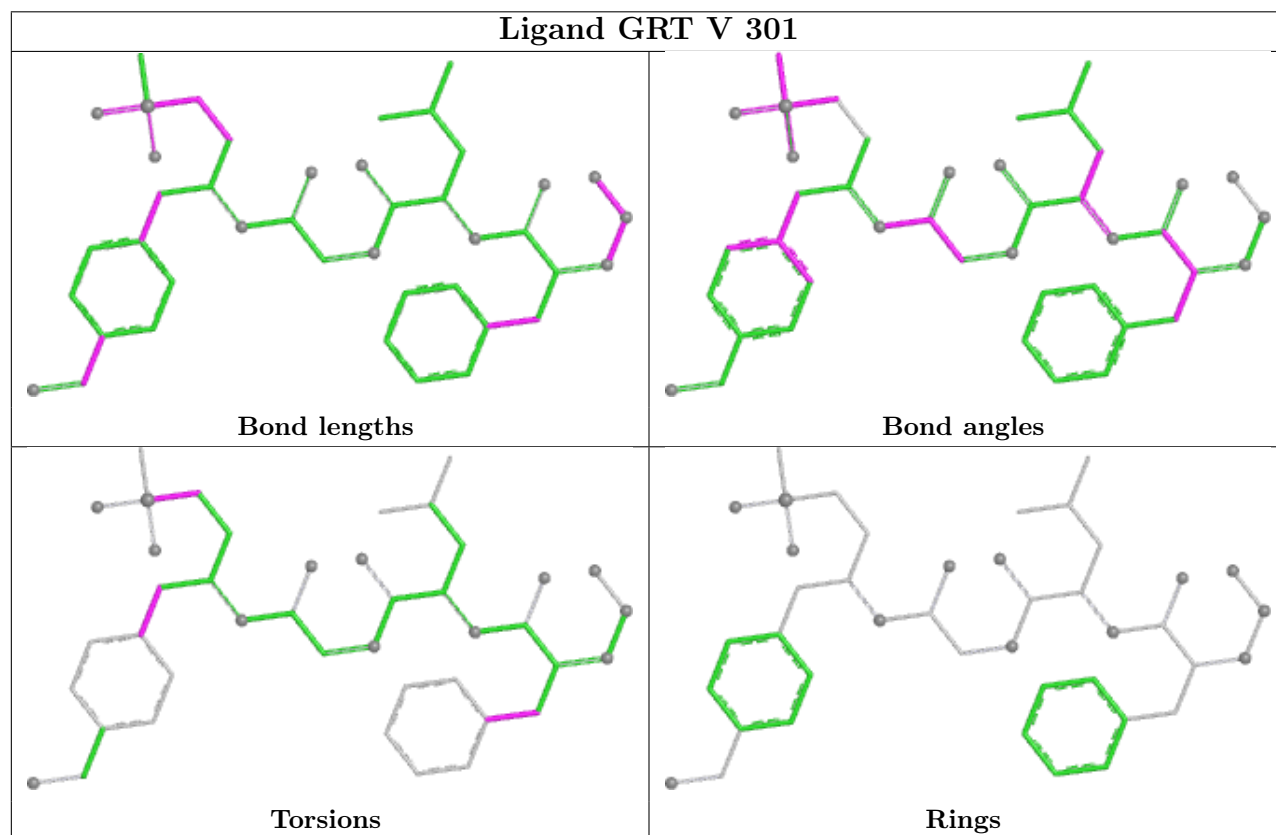
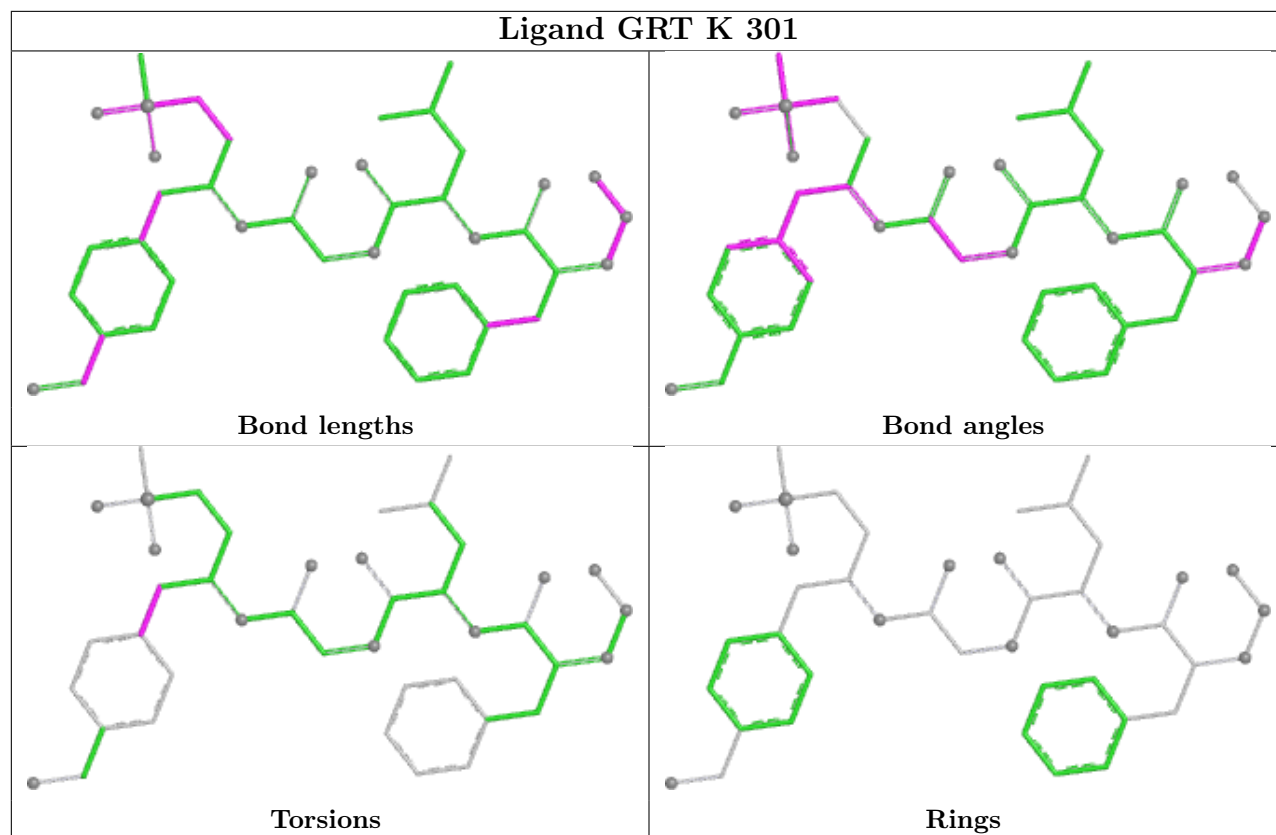
There are no ring outliers.

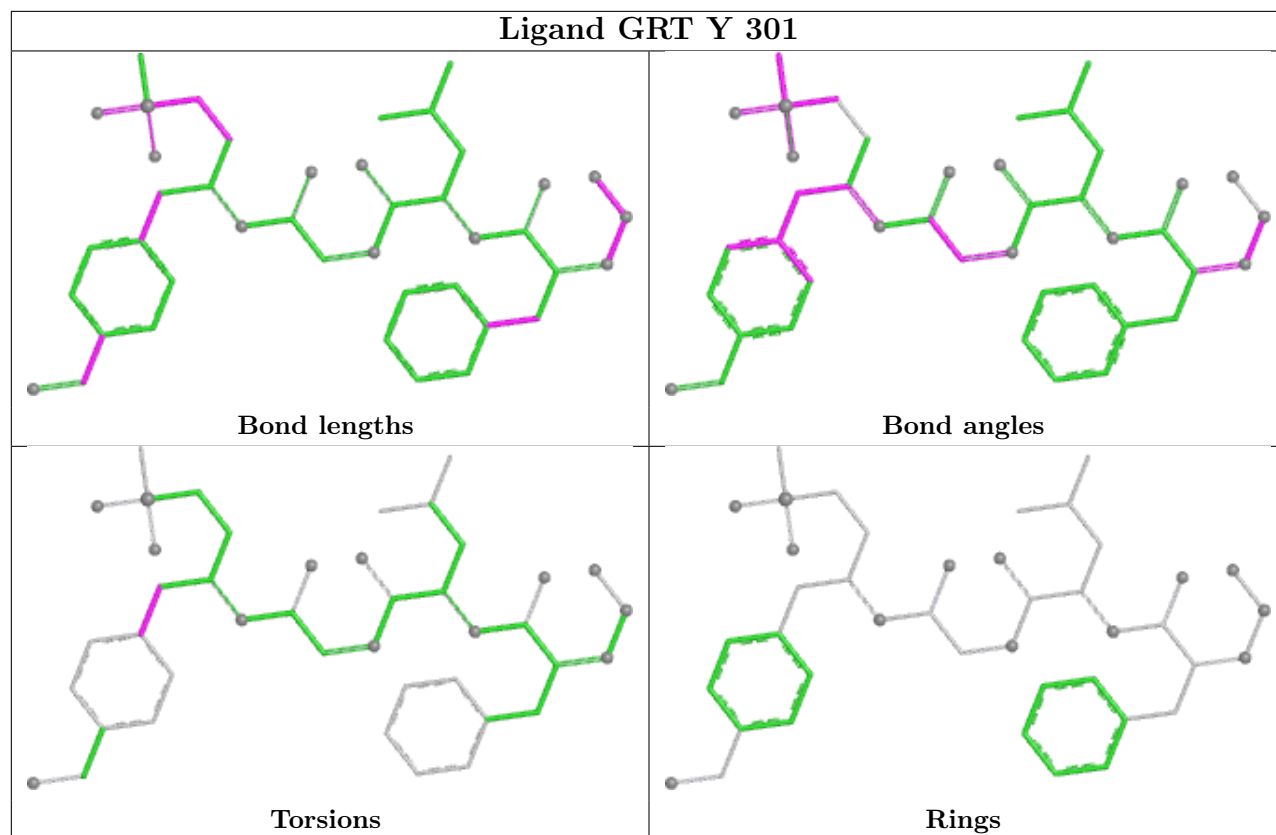
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	H	301	GRT	1	0
17	V	301	GRT	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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	250/250 (100%)	-0.42	2 (0%) 82 77	59, 79, 124, 171	0
1	O	250/250 (100%)	-0.35	3 (1%) 76 69	62, 88, 133, 173	0
2	B	244/258 (94%)	-0.28	2 (0%) 82 77	59, 84, 137, 188	0
2	P	244/258 (94%)	-0.34	1 (0%) 88 85	63, 87, 136, 184	0
3	C	240/254 (94%)	-0.38	1 (0%) 88 85	61, 89, 156, 183	0
3	Q	240/254 (94%)	-0.23	3 (1%) 75 67	68, 102, 184, 218	0
4	D	235/260 (90%)	-0.36	1 (0%) 88 85	68, 92, 127, 173	0
4	R	235/260 (90%)	-0.36	0 100 100	71, 93, 138, 185	0
5	E	231/234 (98%)	-0.32	0 100 100	68, 95, 135, 183	0
5	S	231/234 (98%)	-0.18	0 100 100	68, 96, 149, 183	0
6	F	243/288 (84%)	-0.45	2 (0%) 82 77	61, 86, 139, 168	0
6	T	243/288 (84%)	-0.29	0 100 100	62, 90, 147, 182	0
7	G	241/252 (95%)	-0.44	0 100 100	57, 79, 126, 173	0
7	U	241/252 (95%)	-0.45	0 100 100	61, 79, 119, 149	0
8	H	222/232 (95%)	-0.18	5 (2%) 61 52	61, 79, 128, 163	0
8	V	222/232 (95%)	-0.17	8 (3%) 46 38	66, 85, 129, 170	0
9	I	204/205 (99%)	-0.56	0 100 100	58, 75, 108, 135	0
9	W	204/205 (99%)	-0.54	0 100 100	60, 78, 110, 143	0
10	J	195/198 (98%)	-0.53	1 (0%) 87 83	57, 77, 110, 153	0
10	X	195/198 (98%)	-0.56	1 (0%) 87 83	60, 79, 110, 166	0
11	K	212/212 (100%)	-0.58	0 100 100	58, 76, 109, 137	0
11	Y	212/212 (100%)	-0.54	1 (0%) 87 83	58, 76, 109, 140	0
12	L	222/222 (100%)	-0.38	1 (0%) 87 83	58, 80, 120, 156	0
12	Z	222/222 (100%)	-0.37	2 (0%) 81 75	53, 78, 120, 146	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
13	M	233/246 (94%)	-0.49	2 (0%) 81 75	54, 77, 108, 119	0
13	a	233/246 (94%)	-0.54	1 (0%) 88 85	52, 74, 104, 125	0
14	N	196/196 (100%)	-0.61	0 100 100	45, 70, 105, 134	0
14	b	196/196 (100%)	-0.59	0 100 100	48, 72, 107, 128	0
All	All	6336/6614 (95%)	-0.40	37 (0%) 85 81	45, 82, 134, 218	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
10	X	1	MET	5.1
10	J	1	MET	4.5
1	O	1	MET	4.4
8	V	208	GLY	4.0
1	A	1	MET	3.6
8	H	213	LEU	3.4
8	V	220	ILE	3.2
3	Q	50	LEU	3.1
8	V	212	VAL	3.0
1	O	249	ALA	2.9
8	H	212	VAL	2.9
2	P	219	ALA	2.9
8	V	218	VAL	2.8
8	H	220	ILE	2.8
13	M	233	ILE	2.8
13	a	1	THR	2.8
8	H	218	VAL	2.7
11	Y	212	GLY	2.6
8	V	213	LEU	2.6
8	V	209	THR	2.6
4	D	240	ALA	2.6
8	V	42	TRP	2.5
12	L	163	GLY	2.5
3	Q	205	ALA	2.4
6	F	202	ASP	2.4
2	B	219	ALA	2.3
13	M	1	THR	2.3
1	O	231	LYS	2.2
8	V	206	PRO	2.2
1	A	231	LYS	2.2
2	B	208	ASP	2.2
8	H	208	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
12	Z	163	GLY	2.1
3	C	52	LEU	2.1
6	F	178	HIS	2.0
3	Q	204	GLY	2.0
12	Z	26	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

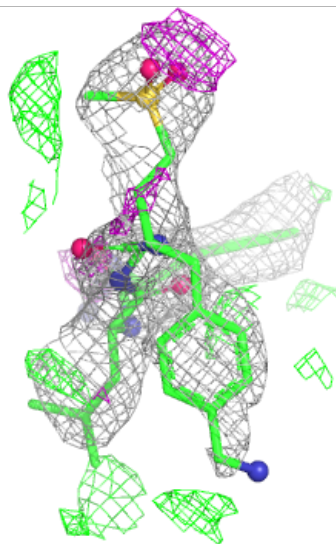
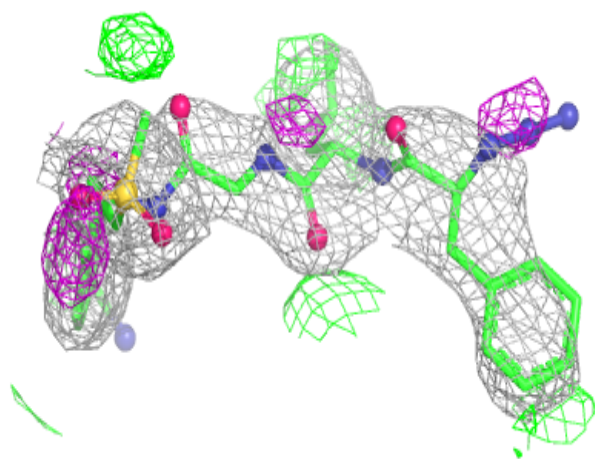
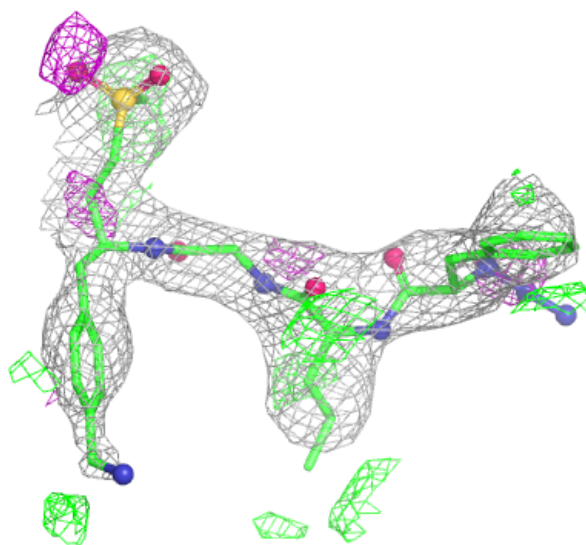
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
17	GRT	V	301	42/42	0.86	0.15	94,107,121,129	0
17	GRT	H	301	42/42	0.90	0.13	96,104,122,128	0
15	MG	I	301	1/1	0.91	0.21	102,102,102,102	0
17	GRT	K	301	42/42	0.94	0.10	77,92,111,120	0
17	GRT	Y	301	42/42	0.94	0.11	81,97,115,117	0
15	MG	K	302	1/1	0.96	0.09	88,88,88,88	0
15	MG	I	302	1/1	0.97	0.05	88,88,88,88	0
16	CL	G	302	1/1	0.97	0.10	68,68,68,68	0
15	MG	Z	301	1/1	0.98	0.06	78,78,78,78	0
15	MG	G	301	1/1	0.98	0.05	74,74,74,74	0
15	MG	X	201	1/1	0.98	0.12	58,58,58,58	0
15	MG	L	301	1/1	0.99	0.11	87,87,87,87	0
16	CL	U	301	1/1	0.99	0.14	64,64,64,64	0
15	MG	N	201	1/1	0.99	0.03	55,55,55,55	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.

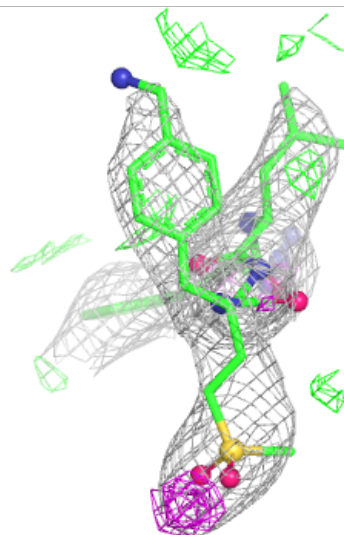
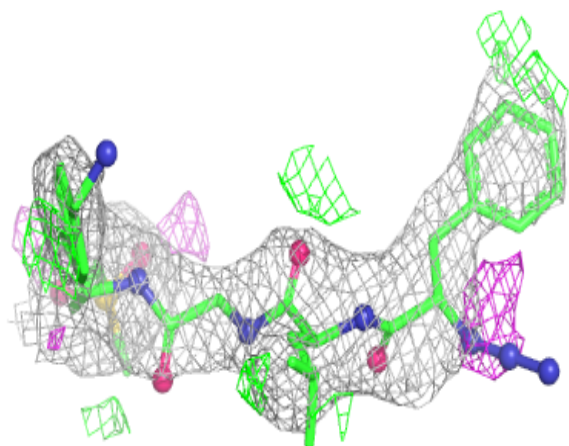
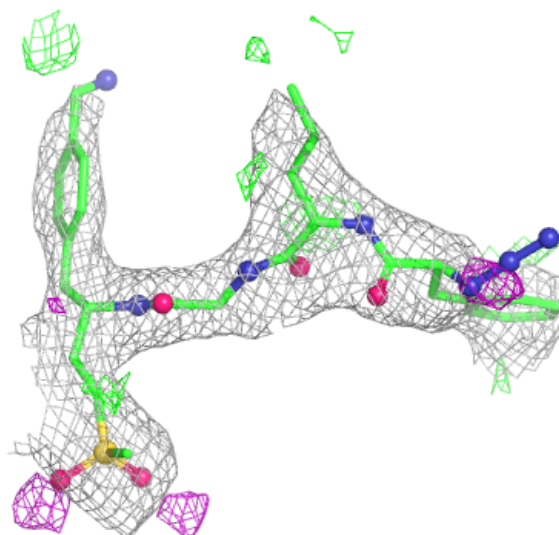
Electron density around GRT V 301:

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



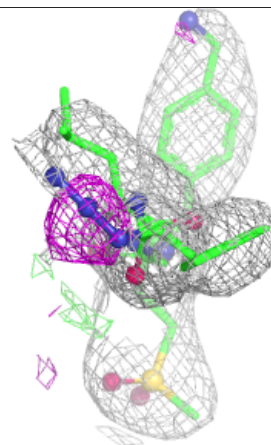
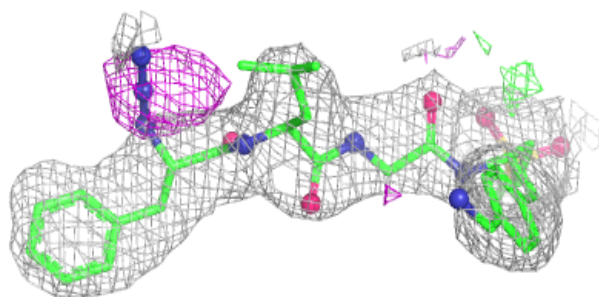
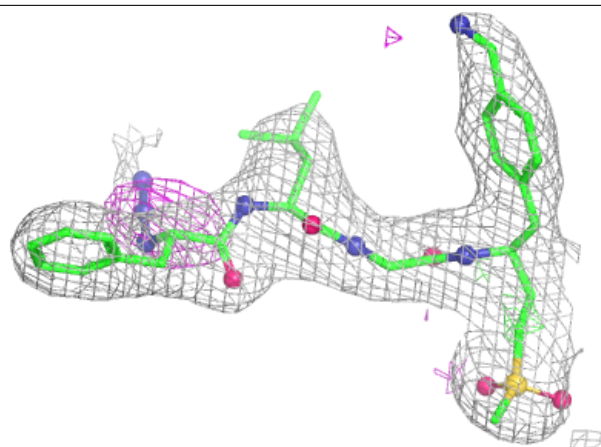
Electron density around GRT H 301:

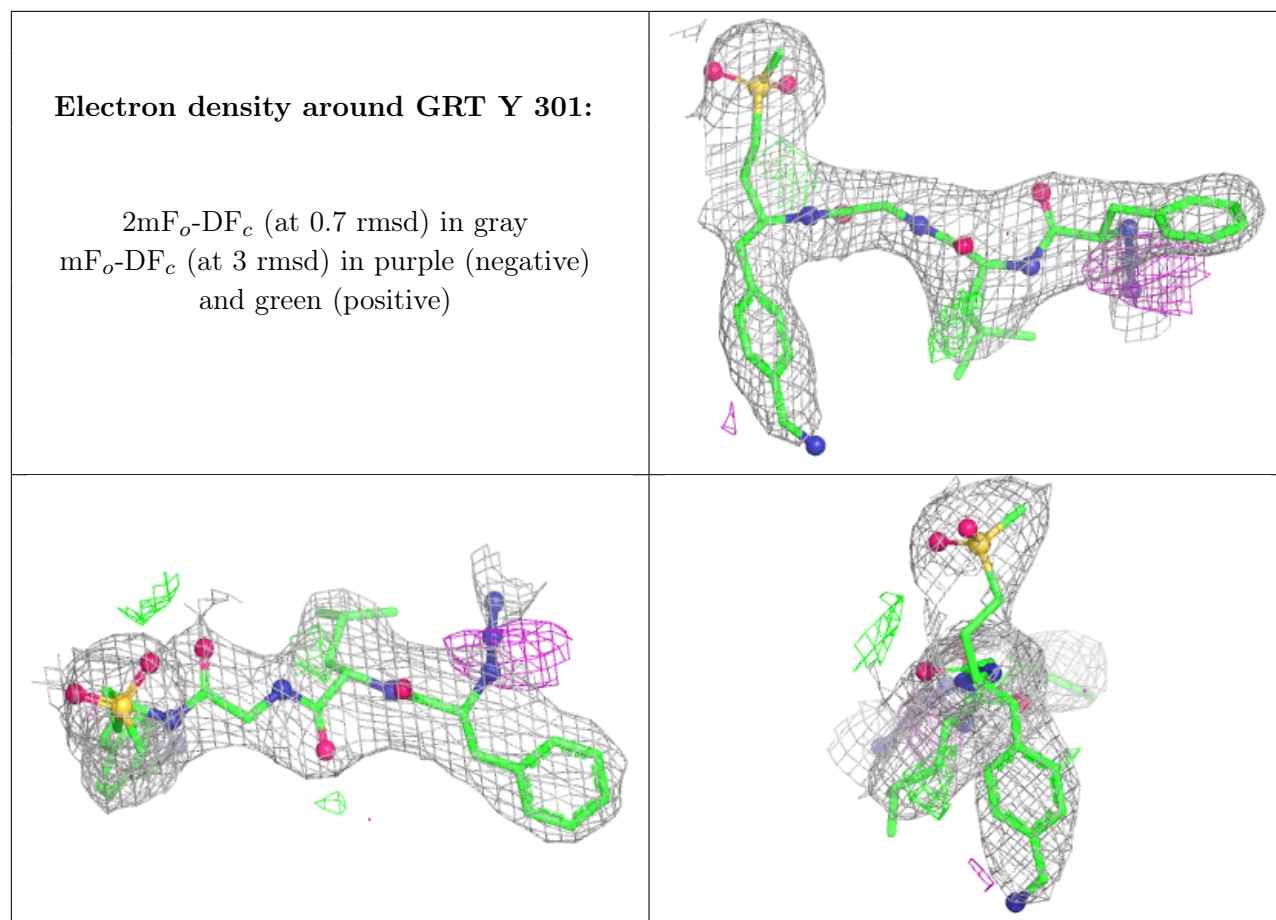
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around GRT 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 ⓘ

There are no such residues in this entry.