



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 25, 2023 – 08:36 PM EDT

PDB ID : 6AYS
Title : Crystal structure of Campylobacter jejuni 5'-methylthioadenosine/S-adenosyl homocysteine nucleosidase (MTAN) complexed with hexylthio-DADMe-Immucillin-A
Authors : Harijan, R.K.; Ducati, R.G.; Bonanno, J.B.; Almo, S.C.; Schramm, V.L.
Deposited on : 2017-09-08
Resolution : 1.70 Å(reported)

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

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

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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

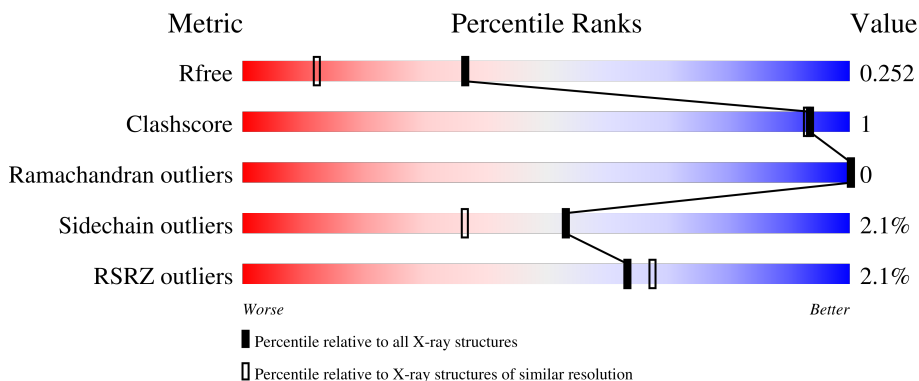
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 Å.

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



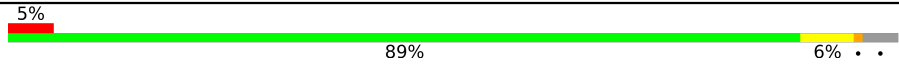
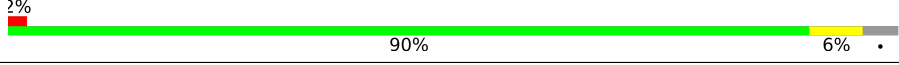
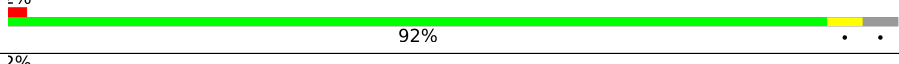
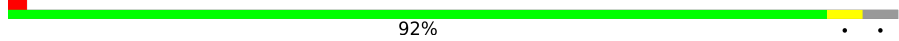
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	238	 94%
1	B	238	 92%
1	C	238	 92%
1	D	238	 92%

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Mol	Chain	Length	Quality of chain
1	E	238	 5% 89% 6% . .
1	F	238	 2% 90% 6% .
1	G	238	 2% 92% . .
1	H	238	 2% 92% . .

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 16036 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 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	229	Total 1764	C 1138	N 276	O 339	S 11	0	2	0
1	B	229	Total 1767	C 1141	N 274	O 341	S 11	0	3	0
1	C	229	Total 1765	C 1140	N 275	O 339	S 11	0	3	0
1	D	229	Total 1759	C 1135	N 274	O 339	S 11	0	2	0
1	E	229	Total 1774	C 1145	N 277	O 341	S 11	0	3	0
1	F	229	Total 1766	C 1141	N 274	O 340	S 11	0	2	0
1	G	229	Total 1768	C 1142	N 276	O 339	S 11	0	2	0
1	H	229	Total 1755	C 1135	N 272	O 337	S 11	0	2	0

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
A	-8	GLY	-	expression tag	UNP A0A1E7P7U4
A	-7	HIS	-	expression tag	UNP A0A1E7P7U4
A	-6	HIS	-	expression tag	UNP A0A1E7P7U4
A	-5	HIS	-	expression tag	UNP A0A1E7P7U4
A	-4	HIS	-	expression tag	UNP A0A1E7P7U4
A	-3	HIS	-	expression tag	UNP A0A1E7P7U4
A	-2	HIS	-	expression tag	UNP A0A1E7P7U4
A	-1	SER	-	expression tag	UNP A0A1E7P7U4
A	0	GLY	-	expression tag	UNP A0A1E7P7U4
A	40	ASP	ASN	conflict	UNP A0A1E7P7U4
B	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
B	-8	GLY	-	expression tag	UNP A0A1E7P7U4

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-7	HIS	-	expression tag	UNP A0A1E7P7U4
B	-6	HIS	-	expression tag	UNP A0A1E7P7U4
B	-5	HIS	-	expression tag	UNP A0A1E7P7U4
B	-4	HIS	-	expression tag	UNP A0A1E7P7U4
B	-3	HIS	-	expression tag	UNP A0A1E7P7U4
B	-2	HIS	-	expression tag	UNP A0A1E7P7U4
B	-1	SER	-	expression tag	UNP A0A1E7P7U4
B	0	GLY	-	expression tag	UNP A0A1E7P7U4
B	40	ASP	ASN	conflict	UNP A0A1E7P7U4
C	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
C	-8	GLY	-	expression tag	UNP A0A1E7P7U4
C	-7	HIS	-	expression tag	UNP A0A1E7P7U4
C	-6	HIS	-	expression tag	UNP A0A1E7P7U4
C	-5	HIS	-	expression tag	UNP A0A1E7P7U4
C	-4	HIS	-	expression tag	UNP A0A1E7P7U4
C	-3	HIS	-	expression tag	UNP A0A1E7P7U4
C	-2	HIS	-	expression tag	UNP A0A1E7P7U4
C	-1	SER	-	expression tag	UNP A0A1E7P7U4
C	0	GLY	-	expression tag	UNP A0A1E7P7U4
C	40	ASP	ASN	conflict	UNP A0A1E7P7U4
D	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
D	-8	GLY	-	expression tag	UNP A0A1E7P7U4
D	-7	HIS	-	expression tag	UNP A0A1E7P7U4
D	-6	HIS	-	expression tag	UNP A0A1E7P7U4
D	-5	HIS	-	expression tag	UNP A0A1E7P7U4
D	-4	HIS	-	expression tag	UNP A0A1E7P7U4
D	-3	HIS	-	expression tag	UNP A0A1E7P7U4
D	-2	HIS	-	expression tag	UNP A0A1E7P7U4
D	-1	SER	-	expression tag	UNP A0A1E7P7U4
D	0	GLY	-	expression tag	UNP A0A1E7P7U4
D	40	ASP	ASN	conflict	UNP A0A1E7P7U4
E	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
E	-8	GLY	-	expression tag	UNP A0A1E7P7U4
E	-7	HIS	-	expression tag	UNP A0A1E7P7U4
E	-6	HIS	-	expression tag	UNP A0A1E7P7U4
E	-5	HIS	-	expression tag	UNP A0A1E7P7U4
E	-4	HIS	-	expression tag	UNP A0A1E7P7U4
E	-3	HIS	-	expression tag	UNP A0A1E7P7U4
E	-2	HIS	-	expression tag	UNP A0A1E7P7U4
E	-1	SER	-	expression tag	UNP A0A1E7P7U4
E	0	GLY	-	expression tag	UNP A0A1E7P7U4
E	40	ASP	ASN	conflict	UNP A0A1E7P7U4

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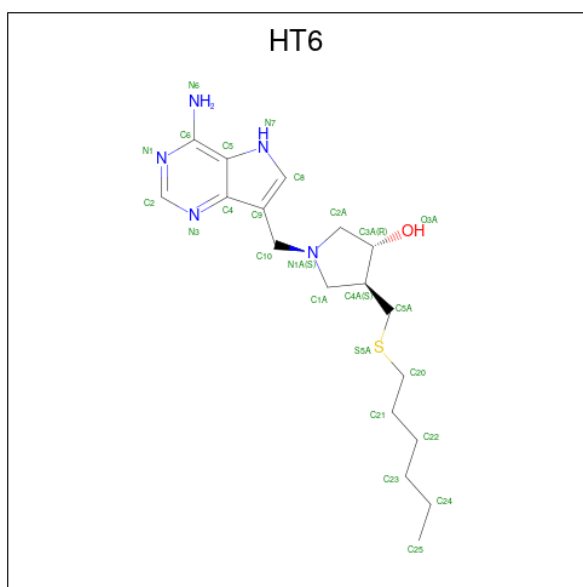
Chain	Residue	Modelled	Actual	Comment	Reference
F	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
F	-8	GLY	-	expression tag	UNP A0A1E7P7U4
F	-7	HIS	-	expression tag	UNP A0A1E7P7U4
F	-6	HIS	-	expression tag	UNP A0A1E7P7U4
F	-5	HIS	-	expression tag	UNP A0A1E7P7U4
F	-4	HIS	-	expression tag	UNP A0A1E7P7U4
F	-3	HIS	-	expression tag	UNP A0A1E7P7U4
F	-2	HIS	-	expression tag	UNP A0A1E7P7U4
F	-1	SER	-	expression tag	UNP A0A1E7P7U4
F	0	GLY	-	expression tag	UNP A0A1E7P7U4
F	40	ASP	ASN	conflict	UNP A0A1E7P7U4
G	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
G	-8	GLY	-	expression tag	UNP A0A1E7P7U4
G	-7	HIS	-	expression tag	UNP A0A1E7P7U4
G	-6	HIS	-	expression tag	UNP A0A1E7P7U4
G	-5	HIS	-	expression tag	UNP A0A1E7P7U4
G	-4	HIS	-	expression tag	UNP A0A1E7P7U4
G	-3	HIS	-	expression tag	UNP A0A1E7P7U4
G	-2	HIS	-	expression tag	UNP A0A1E7P7U4
G	-1	SER	-	expression tag	UNP A0A1E7P7U4
G	0	GLY	-	expression tag	UNP A0A1E7P7U4
G	40	ASP	ASN	conflict	UNP A0A1E7P7U4
H	-9	MET	-	initiating methionine	UNP A0A1E7P7U4
H	-8	GLY	-	expression tag	UNP A0A1E7P7U4
H	-7	HIS	-	expression tag	UNP A0A1E7P7U4
H	-6	HIS	-	expression tag	UNP A0A1E7P7U4
H	-5	HIS	-	expression tag	UNP A0A1E7P7U4
H	-4	HIS	-	expression tag	UNP A0A1E7P7U4
H	-3	HIS	-	expression tag	UNP A0A1E7P7U4
H	-2	HIS	-	expression tag	UNP A0A1E7P7U4
H	-1	SER	-	expression tag	UNP A0A1E7P7U4
H	0	GLY	-	expression tag	UNP A0A1E7P7U4
H	40	ASP	ASN	conflict	UNP A0A1E7P7U4

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 4 2 2	0	0
2	B	1	Total C O 4 2 2	0	0
2	B	1	Total C O 4 2 2	0	0
2	D	1	Total C O 4 2 2	0	0
2	G	1	Total C O 4 2 2	0	0

- Molecule 3 is (3R,4S)-1-[(4-amino-5H-pyrrolo[3,2-d]pyrimidin-7-yl)methyl]-4-[(hexylsulfanyl)methyl]pyrrolidin-3-ol (three-letter code: HT6) (formula: C₁₈H₂₉N₅OS).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
3	A	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	B	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	C	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	D	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	E	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	F	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	G	1	Total	C	N	O	S	0	0
			25	18	5	1	1		
3	H	1	Total	C	N	O	S	0	0
			25	18	5	1	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	249	Total	O	0	0
			249	249		
4	B	241	Total	O	0	0
			241	241		
4	C	240	Total	O	0	0
			240	240		
4	D	216	Total	O	0	0
			216	216		

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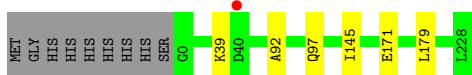
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	208	Total 208	O 208	0	0
4	F	188	Total 188	O 188	0	0
4	G	189	Total 189	O 189	0	0
4	H	167	Total 167	O 167	0	0

3 Residue-property plots [i](#)

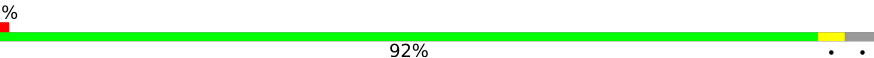
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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.

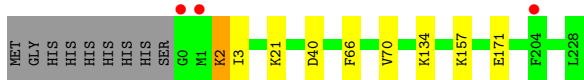
- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase

Chain A:  94%



- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase

Chain B:  92%

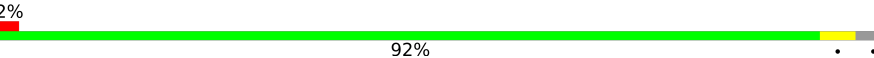


- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase

Chain C:  92%




- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase

Chain D:  92%

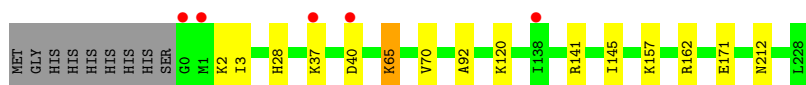
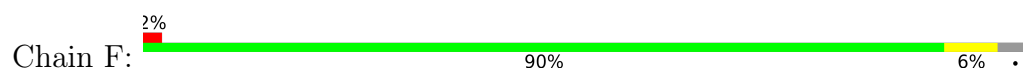


- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase

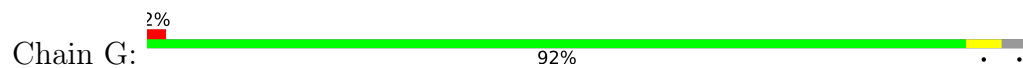
Chain E:  89%



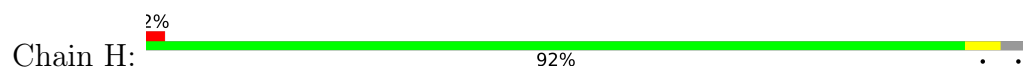
- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase



- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase



- Molecule 1: 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	67.37Å 75.29Å 90.44Å 87.54° 89.05° 71.13°	Depositor
Resolution (Å)	90.35 – 1.70 90.35 – 1.70	Depositor EDS
% Data completeness (in resolution range)	97.3 (90.35-1.70) 97.3 (90.35-1.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.08 (at 1.70Å)	Xtrriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.230 , 0.248 0.237 , 0.252	Depositor DCC
R_{free} test set	8797 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	15.0	Xtrriage
Anisotropy	0.100	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 49.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.035 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	16036	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.35% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, HT6

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	0.39	0/1798	0.60	0/2424
1	B	0.39	0/1804	0.59	0/2433
1	C	0.40	0/1802	0.60	1/2430 (0.0%)
1	D	0.38	0/1793	0.60	0/2419
1	E	0.42	0/1811	0.64	2/2440 (0.1%)
1	F	0.37	0/1800	0.60	1/2427 (0.0%)
1	G	0.38	0/1802	0.60	1/2428 (0.0%)
1	H	0.37	0/1789	0.59	0/2414
All	All	0.39	0/14399	0.60	5/19415 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	2

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	128	LEU	CB-CG-CD1	8.98	126.27	111.00
1	E	40	ASP	CB-CG-OD2	6.07	123.76	118.30
1	E	39	LYS	CB-CA-C	5.95	122.31	110.40
1	G	162	ARG	NE-CZ-NH1	5.63	123.12	120.30
1	F	162	ARG	NE-CZ-NH1	5.34	122.97	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	201	LYS	Peptide,Mainchain

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	1764	0	1781	3	0
1	B	1767	0	1775	3	1
1	C	1765	0	1778	3	1
1	D	1759	0	1765	7	0
1	E	1774	0	1798	14	1
1	F	1766	0	1774	5	1
1	G	1768	0	1789	4	0
1	H	1755	0	1755	8	0
2	A	4	0	6	1	0
2	B	8	0	12	1	0
2	D	4	0	6	0	0
2	G	4	0	6	0	0
3	A	25	0	0	0	0
3	B	25	0	0	0	0
3	C	25	0	0	0	0
3	D	25	0	0	0	0
3	E	25	0	0	0	0
3	F	25	0	0	0	0
3	G	25	0	0	0	0
3	H	25	0	0	0	0
4	A	249	0	0	0	0
4	B	241	0	0	0	0
4	C	240	0	0	0	0
4	D	216	0	0	1	0
4	E	208	0	0	0	0
4	F	188	0	0	1	0
4	G	189	0	0	1	0
4	H	167	0	0	1	0
All	All	16036	0	14245	40	2

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 (40) 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)
1:D:89:LEU:HD12	1:D:138:ILE:HD11	1.58	0.86
1:E:119:ILE:HD12	1:E:178:ALA:C	2.01	0.81
1:E:41:HIS:CE1	1:E:225:CYS:O	2.48	0.67
1:D:133:ALA:HA	1:D:138:ILE:HG23	1.75	0.67
1:D:26:ILE:HG22	1:D:35:PHE:HE1	1.69	0.58
1:A:179:LEU:HD21	2:B:302:EDO:H12	1.87	0.56
1:E:119:ILE:CD1	1:E:178:ALA:O	2.54	0.56
1:E:27:GLU:CG	1:H:27:GLU:HG3	2.37	0.54
1:E:41:HIS:HE1	1:E:225:CYS:O	1.89	0.52
1:D:132:VAL:HG22	1:D:227:LYS:HD3	1.92	0.52
1:E:27:GLU:HG3	1:H:27:GLU:HG3	1.91	0.52
1:E:119:ILE:HD12	1:E:178:ALA:O	2.11	0.50
1:E:119:ILE:CD1	1:E:178:ALA:C	2.79	0.49
1:E:27:GLU:HG3	1:H:27:GLU:CD	2.32	0.49
1:E:119:ILE:HD11	1:E:182:ASP:HB2	1.95	0.48
1:F:120:LYS:CE	1:H:211:ILE:HD11	2.44	0.47
1:G:120:LYS:CE	4:G:571:HOH:O	2.62	0.47
1:E:27:GLU:HG3	1:H:27:GLU:CG	2.45	0.47
1:F:141:ARG:NH2	4:F:401:HOH:O	2.47	0.46
1:D:89:LEU:HD12	1:D:138:ILE:CD1	2.38	0.46
1:E:119:ILE:HD12	1:E:179:LEU:N	2.29	0.46
1:G:2:LYS:HE2	1:G:66:PHE:O	2.16	0.45
1:B:3:ILE:HG12	1:B:70:VAL:CG1	2.50	0.41
1:B:21:LYS:HD3	1:G:123:GLU:OE1	2.20	0.41
1:A:97:GLN:HE21	2:A:301:EDO:C2	2.33	0.41
1:H:141:ARG:NH2	4:H:403:HOH:O	2.52	0.41
1:D:119:ILE:HD11	4:D:406:HOH:O	2.19	0.41
1:F:3:ILE:HG12	1:F:70:VAL:CG1	2.50	0.41
1:B:2:LYS:HE2	1:B:66:PHE:O	2.21	0.41
1:C:3:ILE:HG12	1:C:70:VAL:CG1	2.51	0.41
1:E:92:ALA:HB2	1:E:145:ILE:HD12	2.03	0.41
1:F:28:HIS:NE2	1:F:65:LYS:HD2	2.35	0.41
1:H:3:ILE:HG12	1:H:70:VAL:CG1	2.50	0.41
1:H:92:ALA:HB2	1:H:145:ILE:HD12	2.03	0.41
1:C:156:ALA:HB2	1:D:35:PHE:CD2	2.56	0.40
1:A:92:ALA:HB2	1:A:145:ILE:HD12	2.03	0.40
1:G:3:ILE:HG12	1:G:70:VAL:CG1	2.51	0.40
1:C:92:ALA:HB2	1:C:145:ILE:HD12	2.03	0.40
1:E:3:ILE:HG12	1:E:70:VAL:CG1	2.50	0.40
1:F:92:ALA:HB2	1:F:145:ILE:HD12	2.04	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:134:LYS:CD	1:C:127:ASN:ND2[1_465]	2.13	0.07
1:E:137:ASN:ND2	1:F:212:ASN:OD1[1_455]	2.15	0.05

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	229/238 (96%)	223 (97%)	6 (3%)	0	100	100
1	B	230/238 (97%)	224 (97%)	6 (3%)	0	100	100
1	C	230/238 (97%)	224 (97%)	6 (3%)	0	100	100
1	D	229/238 (96%)	223 (97%)	6 (3%)	0	100	100
1	E	230/238 (97%)	223 (97%)	7 (3%)	0	100	100
1	F	229/238 (96%)	223 (97%)	6 (3%)	0	100	100
1	G	229/238 (96%)	223 (97%)	6 (3%)	0	100	100
1	H	229/238 (96%)	223 (97%)	6 (3%)	0	100	100
All	All	1835/1904 (96%)	1786 (97%)	49 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	186/195 (95%)	184 (99%)	2 (1%)	73	63
1	B	185/195 (95%)	181 (98%)	4 (2%)	52	34
1	C	185/195 (95%)	182 (98%)	3 (2%)	62	48
1	D	184/195 (94%)	180 (98%)	4 (2%)	52	34
1	E	188/195 (96%)	184 (98%)	4 (2%)	53	36
1	F	184/195 (94%)	178 (97%)	6 (3%)	38	19
1	G	186/195 (95%)	181 (97%)	5 (3%)	44	26
1	H	181/195 (93%)	178 (98%)	3 (2%)	60	46
All	All	1479/1560 (95%)	1448 (98%)	31 (2%)	53	36

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	LYS
1	A	171	GLU
1	B	2	LYS
1	B	40	ASP
1	B	157	LYS
1	B	171	GLU
1	C	40	ASP
1	C	128	LEU
1	C	171	GLU
1	D	40	ASP
1	D	138	ILE
1	D	157	LYS
1	D	171	GLU
1	E	40	ASP
1	E	119	ILE
1	E	134	LYS
1	E	171	GLU
1	F	2	LYS
1	F	37	LYS
1	F	40	ASP
1	F	65	LYS
1	F	157	LYS
1	F	171	GLU
1	G	1	MET
1	G	2	LYS
1	G	40	ASP
1	G	157	LYS

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Mol	Chain	Res	Type
1	G	171	GLU
1	H	40	ASP
1	H	157	LYS
1	H	171	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	41	HIS
1	G	107	HIS
1	G	212	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

13 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	HT6	E	301	-	25,27,27	0.88	0	23,36,36	1.98	7 (30%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	EDO	G	301	-	3,3,3	0.44	0	2,2,2	0.45	0
2	EDO	B	302	-	3,3,3	0.41	0	2,2,2	0.57	0
3	HT6	F	301	-	25,27,27	0.81	0	23,36,36	1.90	5 (21%)
3	HT6	D	302	-	25,27,27	0.81	0	23,36,36	2.00	5 (21%)
3	HT6	H	301	-	25,27,27	0.77	0	23,36,36	1.90	6 (26%)
3	HT6	A	302	-	25,27,27	0.77	0	23,36,36	2.01	6 (26%)
3	HT6	C	301	-	25,27,27	0.78	0	23,36,36	2.04	5 (21%)
3	HT6	G	302	-	25,27,27	0.76	0	23,36,36	1.97	5 (21%)
2	EDO	B	301	-	3,3,3	0.40	0	2,2,2	0.30	0
2	EDO	A	301	-	3,3,3	0.41	0	2,2,2	0.76	0
2	EDO	D	301	-	3,3,3	0.37	0	2,2,2	0.91	0
3	HT6	B	303	-	25,27,27	0.80	0	23,36,36	1.94	5 (21%)

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
3	HT6	E	301	-	-	3/11/24/24	0/3/3/3
2	EDO	G	301	-	-	0/1/1/1	-
2	EDO	B	302	-	-	0/1/1/1	-
3	HT6	F	301	-	-	1/11/24/24	0/3/3/3
3	HT6	D	302	-	-	3/11/24/24	0/3/3/3
3	HT6	H	301	-	-	1/11/24/24	0/3/3/3
3	HT6	A	302	-	-	0/11/24/24	0/3/3/3
3	HT6	C	301	-	-	1/11/24/24	0/3/3/3
3	HT6	G	302	-	-	2/11/24/24	0/3/3/3
2	EDO	B	301	-	-	0/1/1/1	-
2	EDO	A	301	-	-	1/1/1/1	-
2	EDO	D	301	-	-	0/1/1/1	-
3	HT6	B	303	-	-	2/11/24/24	0/3/3/3

There are no bond length outliers.

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	302	HT6	C2-N3-C4	6.02	119.49	114.81
3	G	302	HT6	C2-N3-C4	6.00	119.48	114.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	302	HT6	C2-N3-C4	5.93	119.42	114.81
3	C	301	HT6	C2-N3-C4	5.82	119.34	114.81
3	B	303	HT6	C2-N3-C4	5.68	119.23	114.81
3	F	301	HT6	C2-N3-C4	5.35	118.97	114.81
3	H	301	HT6	C2-N3-C4	5.11	118.79	114.81
3	E	301	HT6	C9-C10-N1A	4.41	120.44	114.14
3	C	301	HT6	N3-C2-N1	-4.34	121.90	128.68
3	E	301	HT6	C2-N3-C4	4.23	118.10	114.81
3	C	301	HT6	C9-C10-N1A	4.06	119.93	114.14
3	E	301	HT6	C1A-N1A-C2A	3.97	110.10	104.19
3	A	302	HT6	N3-C2-N1	-3.74	122.83	128.68
3	D	302	HT6	C9-C10-N1A	3.71	119.44	114.14
3	D	302	HT6	N3-C2-N1	-3.63	123.01	128.68
3	B	303	HT6	C9-C10-N1A	3.54	119.20	114.14
3	B	303	HT6	N3-C2-N1	-3.52	123.18	128.68
3	F	301	HT6	N3-C2-N1	-3.49	123.23	128.68
3	G	302	HT6	N3-C2-N1	-3.42	123.33	128.68
3	G	302	HT6	C9-C10-N1A	3.38	118.97	114.14
3	H	301	HT6	N3-C2-N1	-3.36	123.42	128.68
3	H	301	HT6	C1A-N1A-C2A	3.29	109.09	104.19
3	A	302	HT6	C9-C10-N1A	3.26	118.79	114.14
3	H	301	HT6	C9-C10-N1A	3.25	118.78	114.14
3	F	301	HT6	C9-C10-N1A	3.24	118.78	114.14
3	E	301	HT6	N3-C2-N1	-3.15	123.75	128.68
3	A	302	HT6	C1A-N1A-C2A	3.04	108.72	104.19
3	G	302	HT6	C1A-N1A-C2A	3.02	108.69	104.19
3	B	303	HT6	C1A-N1A-C2A	2.96	108.60	104.19
3	C	301	HT6	C1A-N1A-C2A	2.88	108.48	104.19
3	F	301	HT6	C1A-N1A-C2A	2.77	108.31	104.19
3	D	302	HT6	C1A-N1A-C2A	2.75	108.29	104.19
3	A	302	HT6	C5-C4-N3	-2.74	121.73	124.92
3	C	301	HT6	C2-N1-C6	2.53	123.08	118.75
3	G	302	HT6	C5-C4-N3	-2.52	122.00	124.92
3	H	301	HT6	C3A-C2A-N1A	-2.37	99.91	104.44
3	B	303	HT6	C5-C4-N3	-2.37	122.17	124.92
3	F	301	HT6	C5-C4-N3	-2.33	122.22	124.92
3	E	301	HT6	C10-N1A-C1A	2.27	117.12	113.27
3	E	301	HT6	C3A-C2A-N1A	-2.23	100.17	104.44
3	A	302	HT6	C2-N1-C6	2.23	122.56	118.75
3	D	302	HT6	C5-C4-N3	-2.22	122.34	124.92
3	E	301	HT6	C2-N1-C6	2.21	122.54	118.75
3	H	301	HT6	C5-C4-N3	-2.12	122.45	124.92

There are no chirality outliers.

All (14) torsion outliers are listed below:

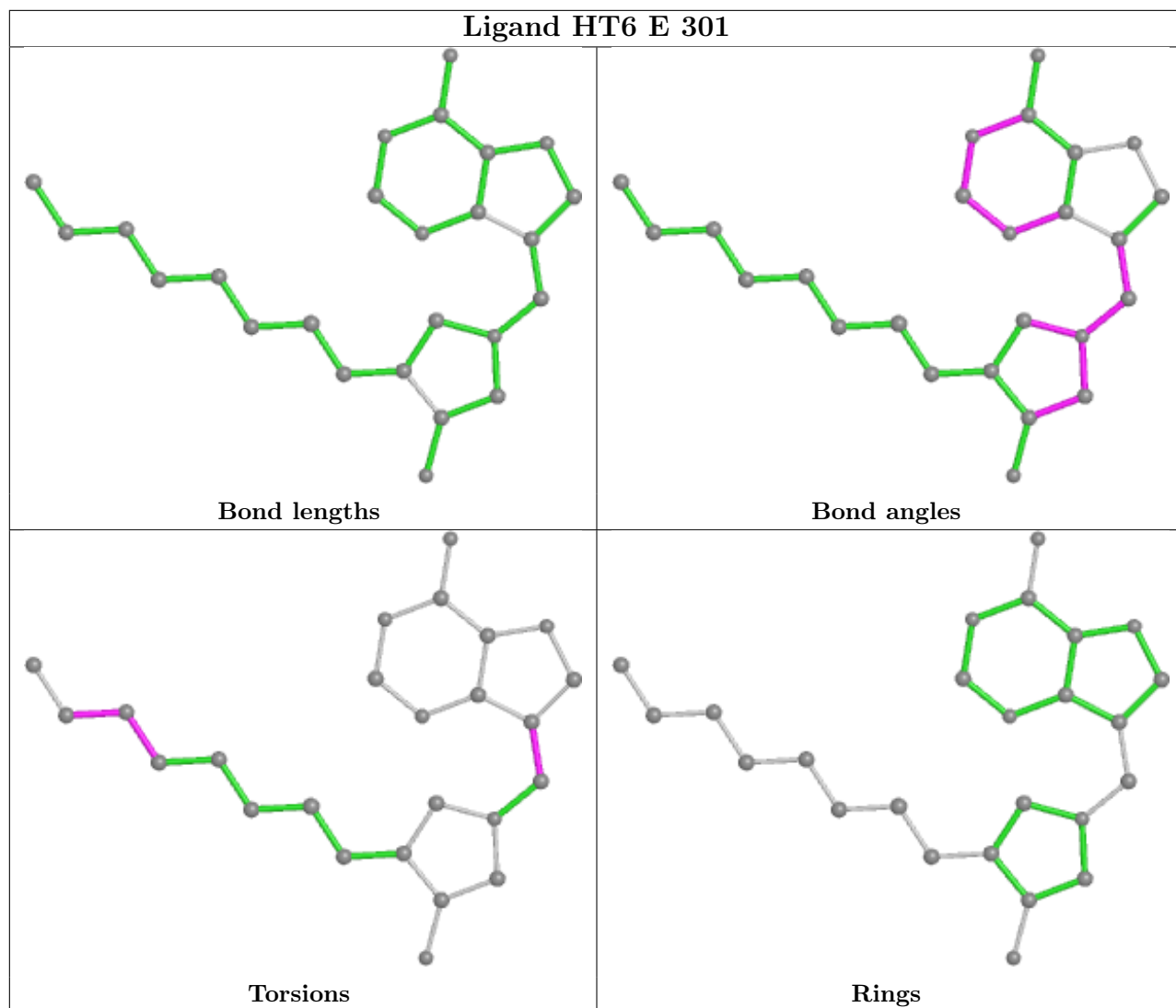
Mol	Chain	Res	Type	Atoms
3	B	303	HT6	C21-C22-C23-C24
3	D	302	HT6	C21-C22-C23-C24
2	A	301	EDO	O1-C1-C2-O2
3	G	302	HT6	C22-C23-C24-C25
3	D	302	HT6	C22-C23-C24-C25
3	B	303	HT6	C22-C23-C24-C25
3	E	301	HT6	C21-C22-C23-C24
3	E	301	HT6	C22-C23-C24-C25
3	C	301	HT6	C9-C10-N1A-C1A
3	F	301	HT6	C9-C10-N1A-C1A
3	E	301	HT6	N1A-C10-C9-C8
3	G	302	HT6	N1A-C10-C9-C8
3	D	302	HT6	C9-C10-N1A-C1A
3	H	301	HT6	C9-C10-N1A-C1A

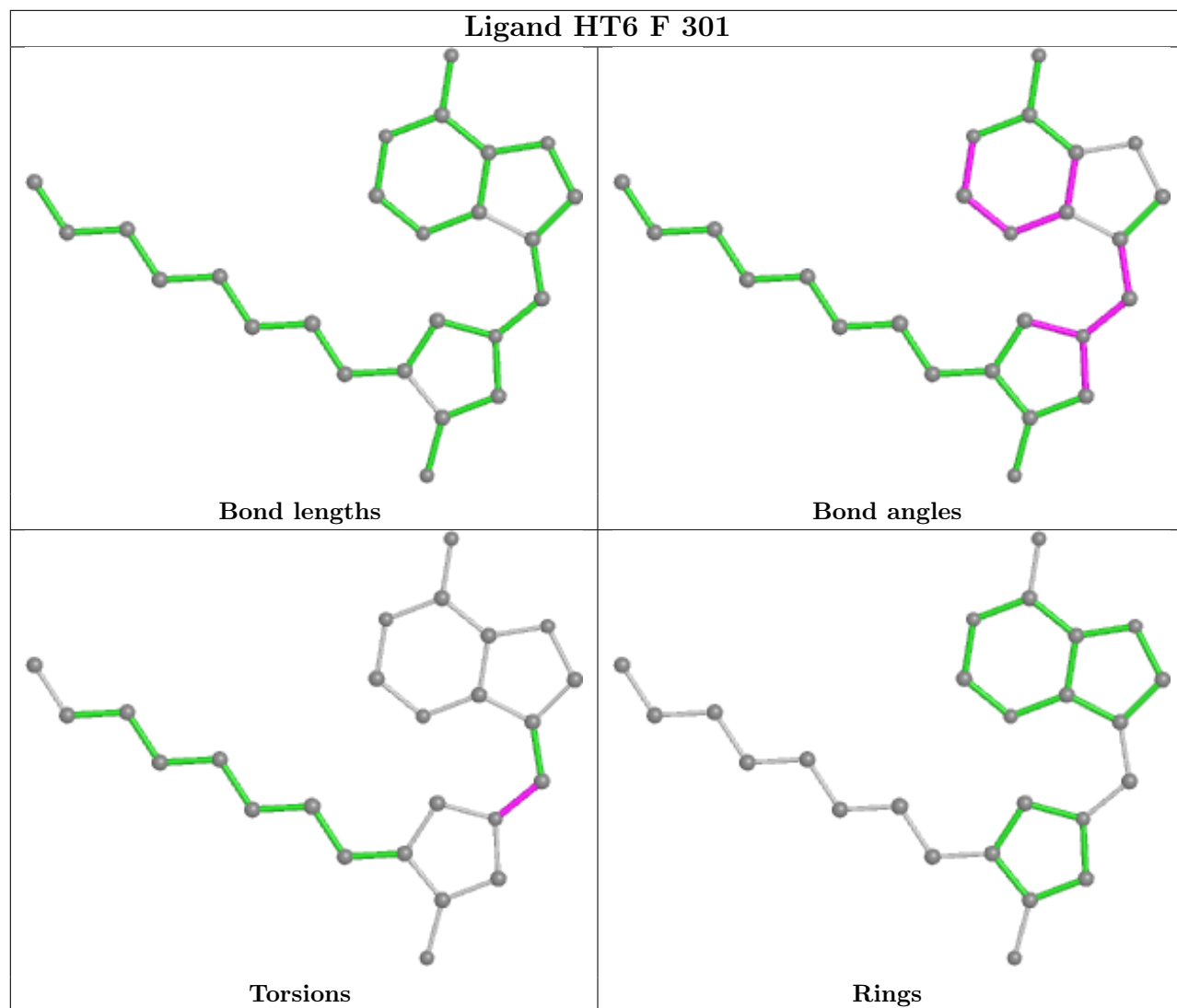
There are no ring outliers.

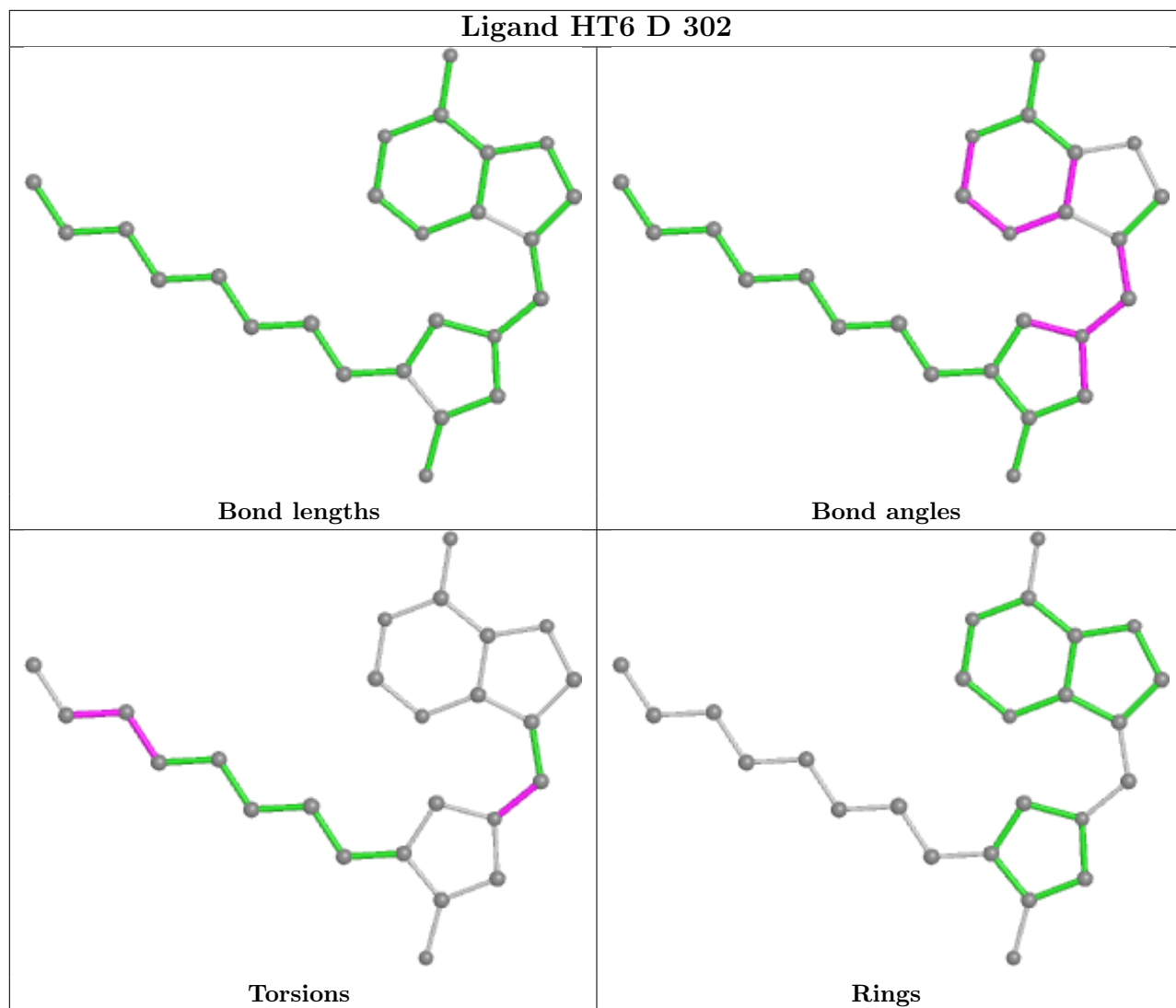
2 monomers are involved in 2 short contacts:

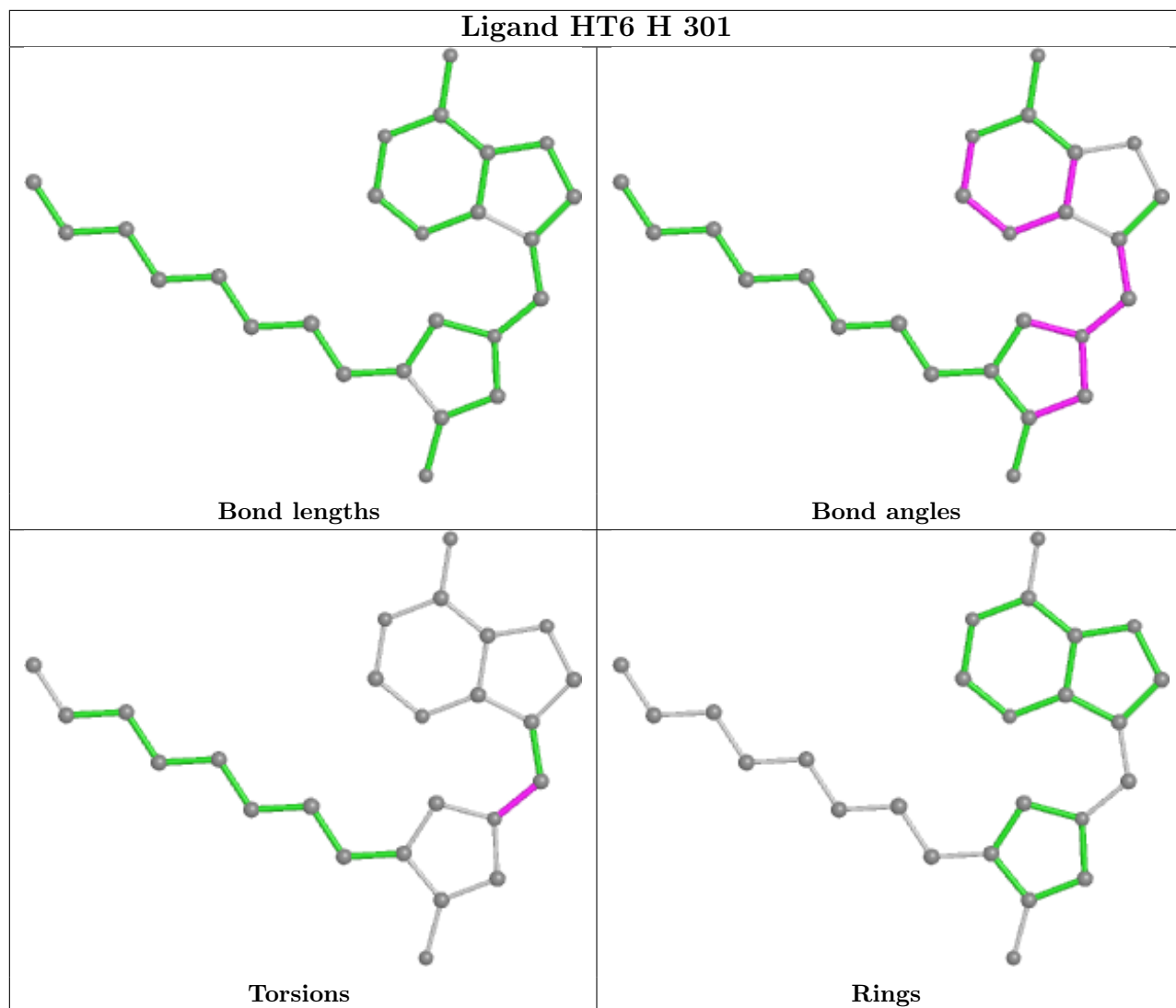
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	302	EDO	1	0
2	A	301	EDO	1	0

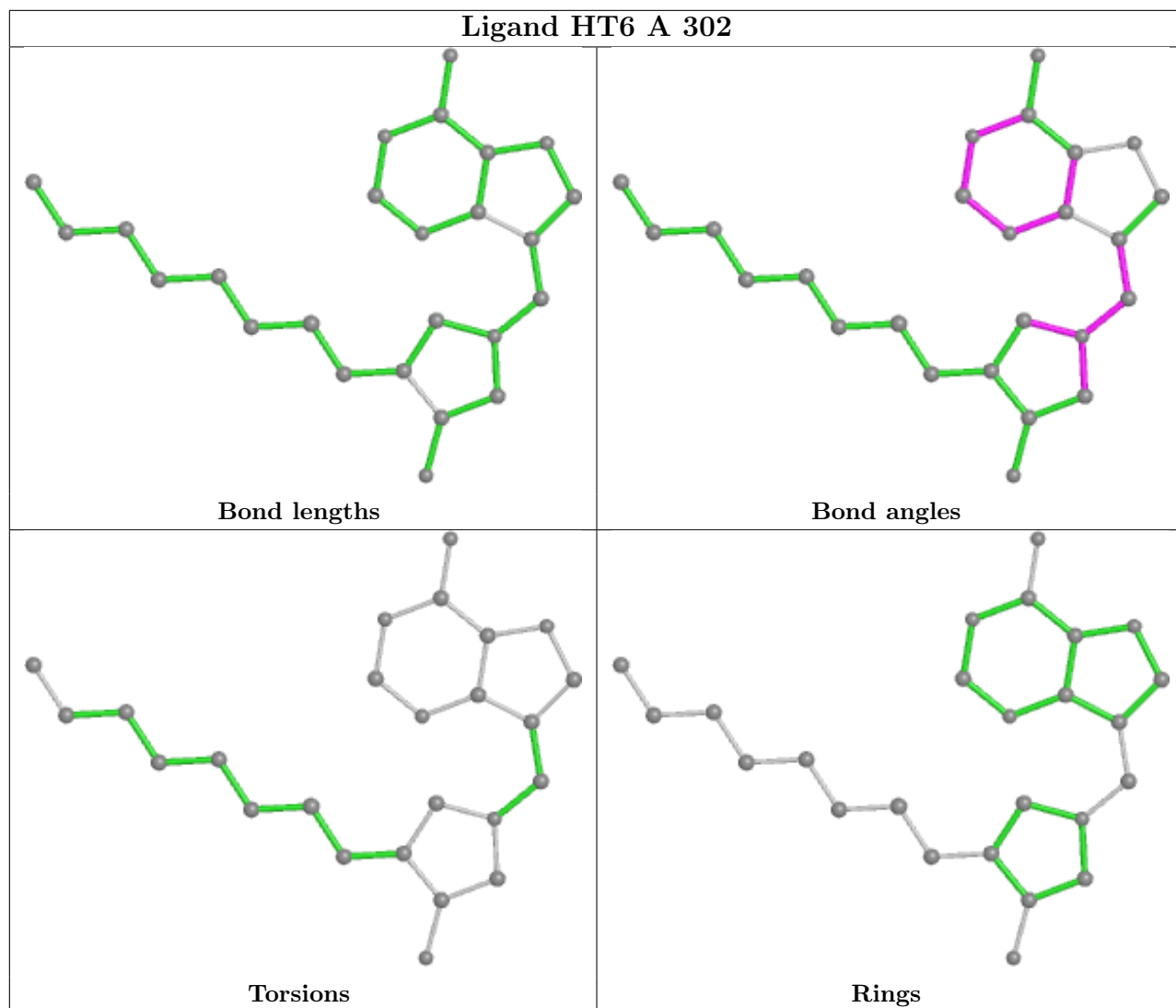
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

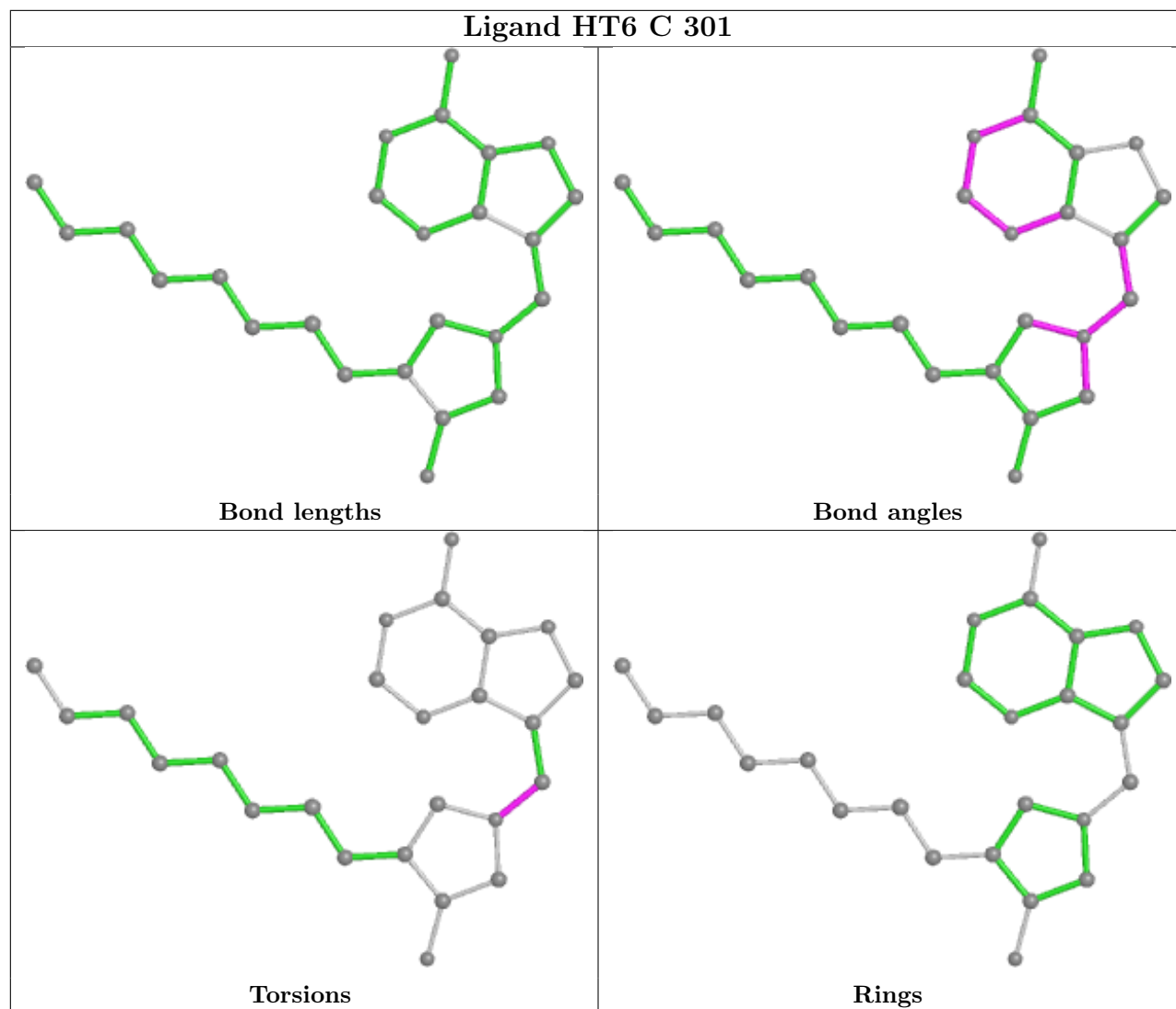


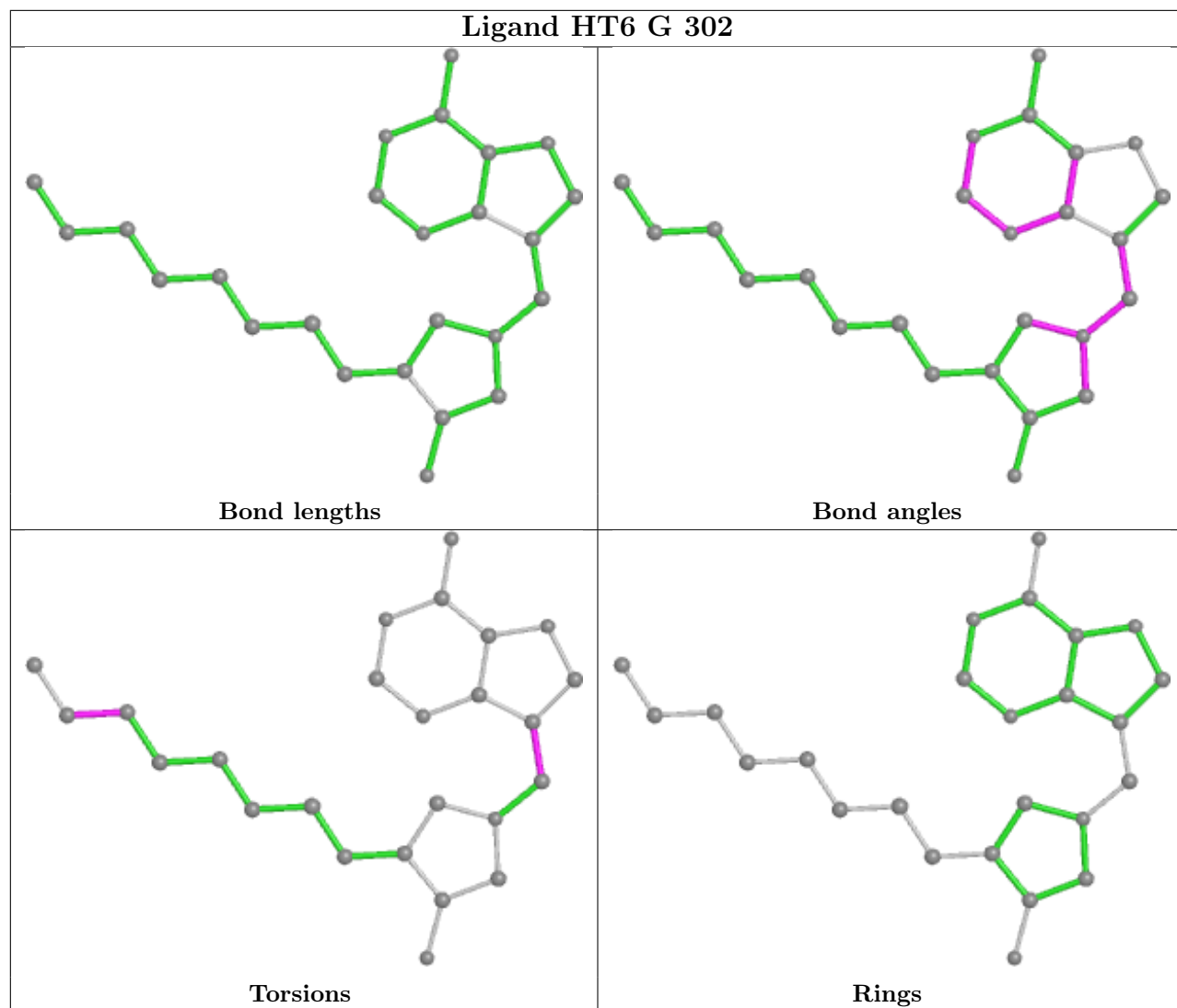


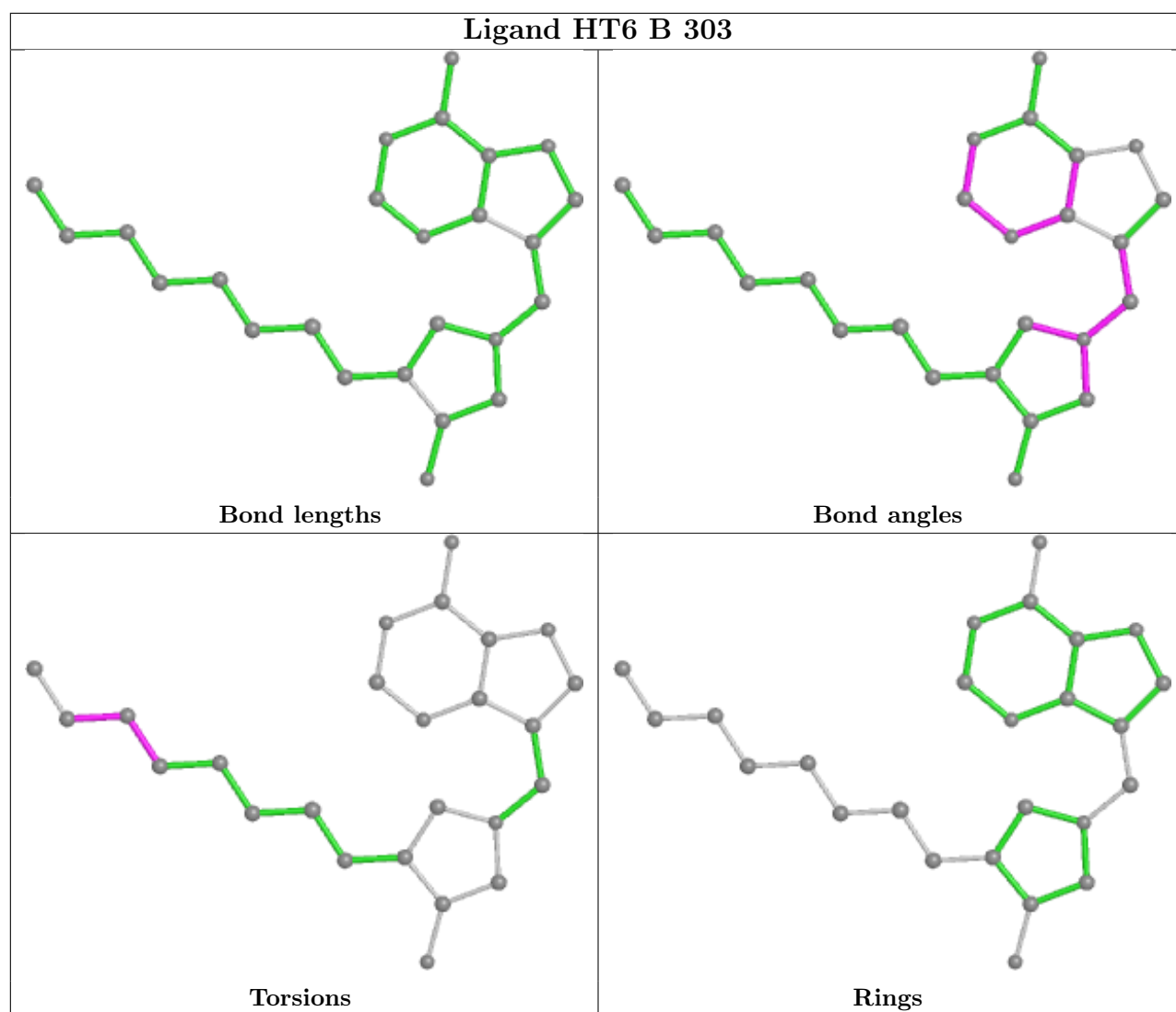












5.7 Other polymers [i](#)

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	229/238 (96%)	-0.12	1 (0%) 92 93	10, 17, 31, 42	1 (0%)
1	B	229/238 (96%)	-0.01	3 (1%) 77 81	10, 18, 34, 47	0
1	C	229/238 (96%)	0.08	7 (3%) 49 53	11, 19, 40, 60	0
1	D	229/238 (96%)	-0.03	4 (1%) 70 74	12, 19, 36, 51	0
1	E	229/238 (96%)	0.12	11 (4%) 30 34	11, 20, 43, 53	0
1	F	229/238 (96%)	0.19	5 (2%) 62 66	13, 23, 44, 61	0
1	G	229/238 (96%)	0.11	4 (1%) 70 74	11, 21, 43, 60	0
1	H	229/238 (96%)	0.18	4 (1%) 70 74	12, 24, 43, 55	0
All	All	1832/1904 (96%)	0.06	39 (2%) 63 67	10, 20, 41, 61	1 (0%)

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	0	GLY	5.8
1	G	0	GLY	4.9
1	H	0	GLY	4.2
1	F	1	MET	4.2
1	F	0	GLY	4.0
1	C	40	ASP	3.9
1	A	40	ASP	3.7
1	D	40	ASP	3.7
1	E	0	GLY	3.4
1	E	40	ASP	3.4
1	H	200	GLU	3.2
1	G	1	MET	3.2
1	C	136	LEU	3.0
1	E	138	ILE	2.7
1	E	22	ASP	2.7
1	E	38	TYR	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	0	GLY	2.7
1	F	138	ILE	2.6
1	E	136	LEU	2.6
1	D	138	ILE	2.4
1	E	1	MET	2.3
1	B	204	PHE	2.3
1	E	21	LYS	2.3
1	B	1	MET	2.3
1	G	201	LYS	2.2
1	F	37	LYS	2.2
1	H	228	LEU	2.2
1	C	135	GLU	2.2
1	C	19	THR	2.2
1	H	40	ASP	2.2
1	E	39	LYS	2.2
1	G	40	ASP	2.2
1	C	228	LEU	2.2
1	F	40	ASP	2.2
1	D	1	MET	2.1
1	E	137	ASN	2.1
1	E	201	LYS	2.1
1	D	119	ILE	2.1
1	C	134	LYS	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

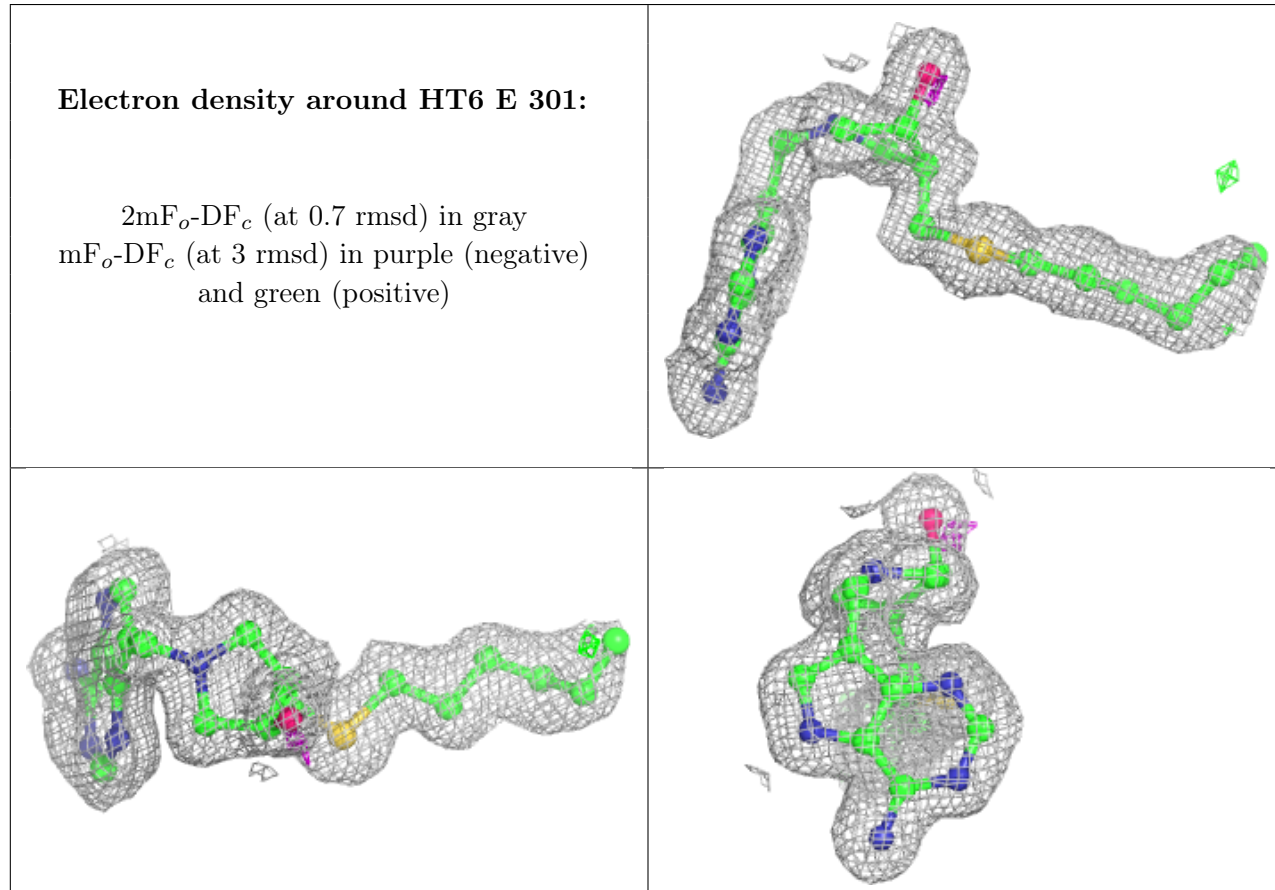
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

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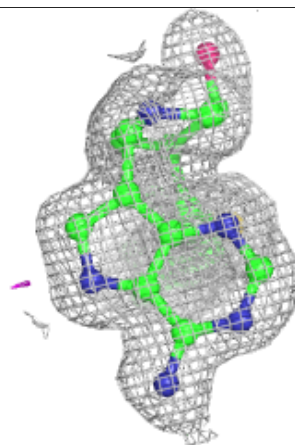
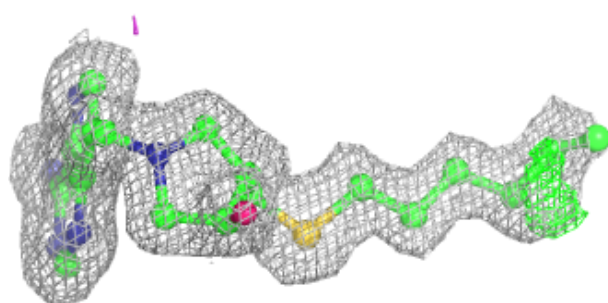
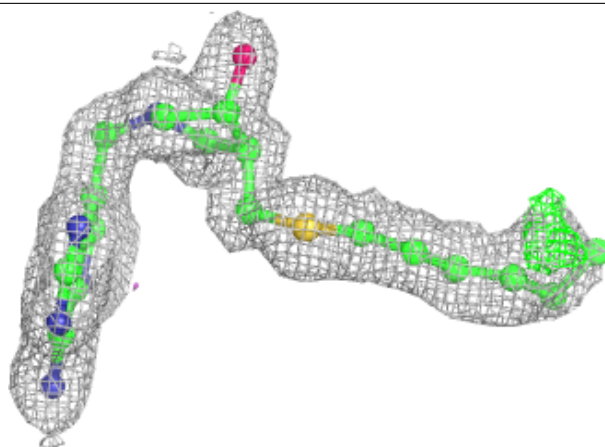
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	EDO	D	301	4/4	0.82	0.26	18,21,22,25	0
2	EDO	A	301	4/4	0.85	0.20	22,23,24,24	0
2	EDO	B	302	4/4	0.89	0.14	28,28,29,29	0
2	EDO	B	301	4/4	0.95	0.07	17,17,17,18	0
2	EDO	G	301	4/4	0.95	0.09	16,16,16,16	0
3	HT6	E	301	25/25	0.95	0.08	12,13,21,23	0
3	HT6	G	302	25/25	0.95	0.08	13,14,24,28	0
3	HT6	H	301	25/25	0.95	0.09	16,17,23,25	0
3	HT6	B	303	25/25	0.96	0.08	12,13,23,27	0
3	HT6	F	301	25/25	0.96	0.08	16,16,26,28	0
3	HT6	C	301	25/25	0.96	0.09	11,12,21,25	0
3	HT6	D	302	25/25	0.96	0.08	13,13,23,26	0
3	HT6	A	302	25/25	0.97	0.07	10,11,17,19	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.

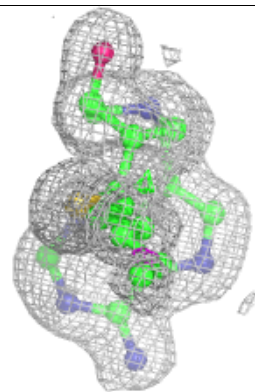
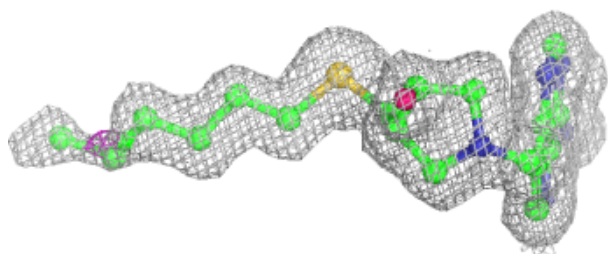
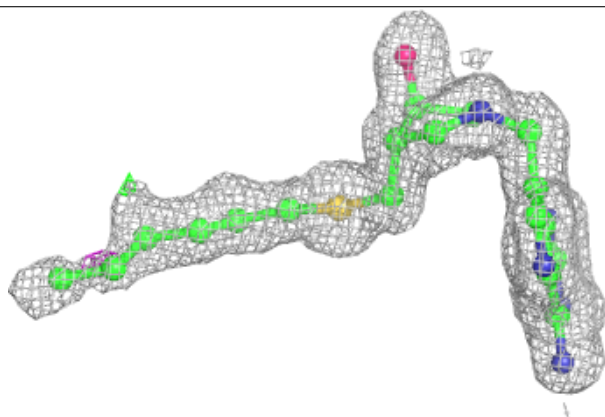


Electron density around HT6 G 302:

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

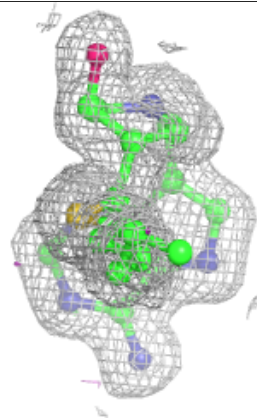
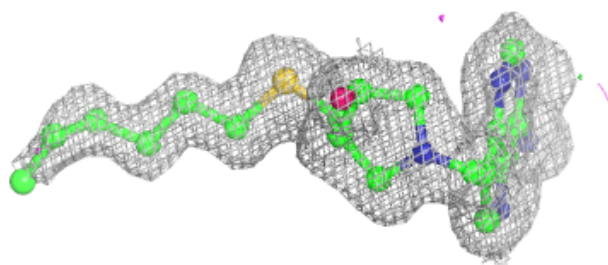
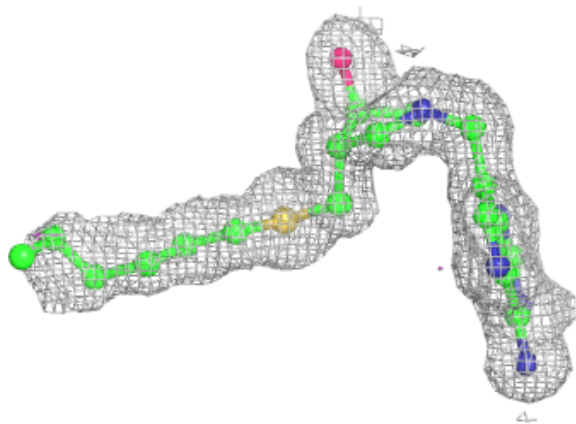
**Electron density around HT6 H 301:**

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



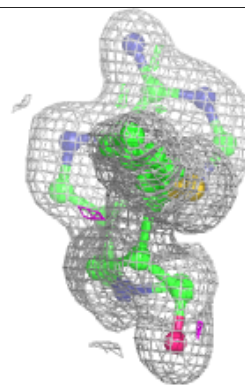
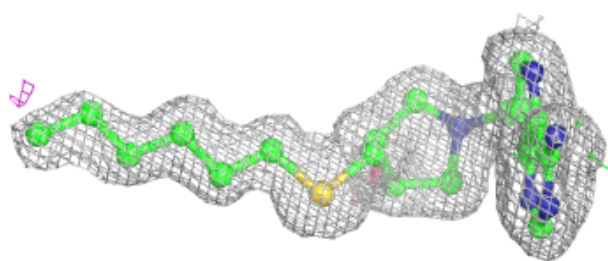
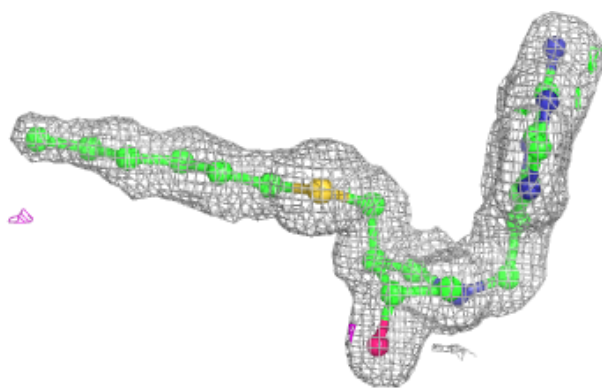
Electron density around HT6 B 303:

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

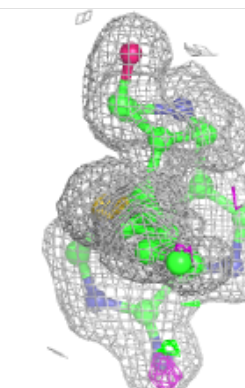
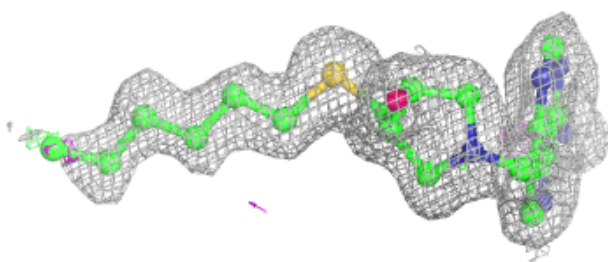
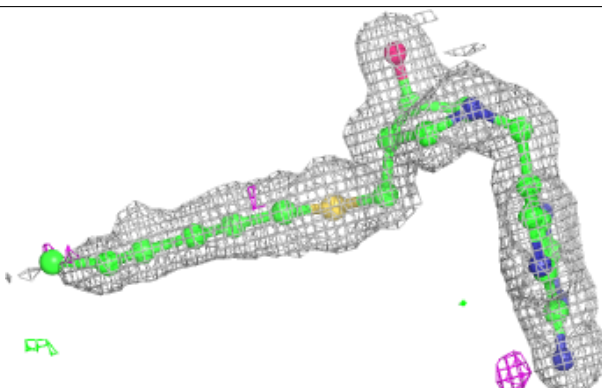


Electron density around HT6 F 301:

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

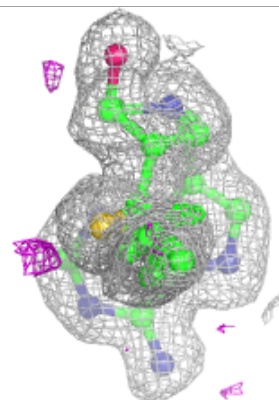
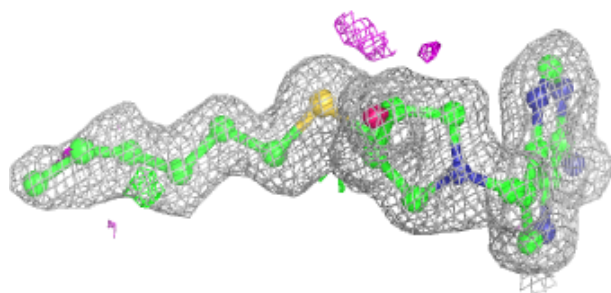
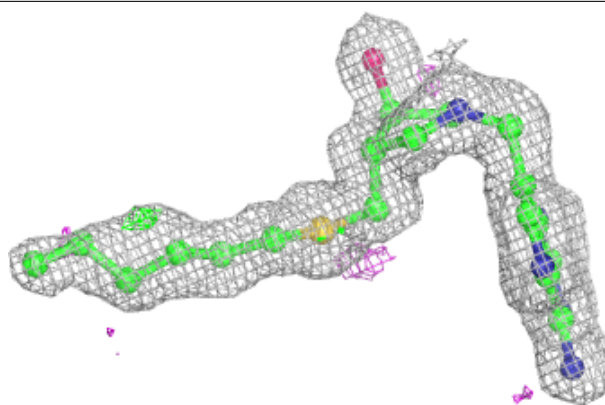
**Electron density around HT6 C 301:**

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

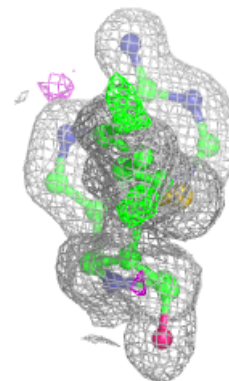
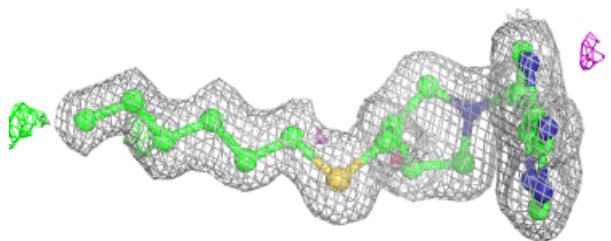
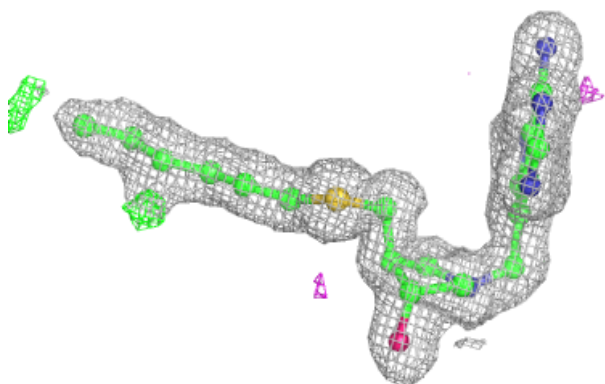


Electron density around HT6 D 302:

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

**Electron density around HT6 A 302:**

$2mF_o-DF_c$ (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.