



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 12, 2026 – 05:49 PM UTC

PDB ID : 5YHW / pdb_00005yhw
Title : Crystal structure of Pig SAMHD1
Authors : Qin, X.H.; Kong, J.
Deposited on : 2017-09-30
Resolution : 2.70 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

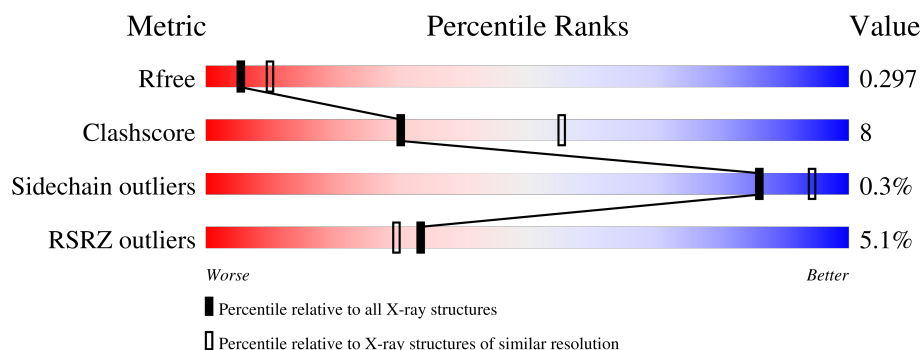
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	524	2% 71% 15% 14%
1	B	524	4% 72% 14% 14%
1	C	524	3% 72% 14% 14%
1	D	524	4% 60% 14% 26%
1	E	524	6% 58% 15% 26%
1	F	524	3% 72% 14% 14%

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Mol	Chain	Length	Quality of chain
1	G	524	
1	H	524	

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
2	DGT	G	706	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 26957 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 Deoxynucleoside triphosphate triphosphohydrolase SAMHD1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	453	Total	C	N	O	S	0	0	0
			3573	2292	623	638	20			
1	B	453	Total	C	N	O	S	0	0	0
			3549	2276	623	630	20			
1	C	453	Total	C	N	O	S	0	0	0
			3553	2279	624	630	20			
1	D	387	Total	C	N	O	S	0	0	0
			3006	1935	528	525	18			
1	E	387	Total	C	N	O	S	0	0	0
			3006	1935	529	524	18			
1	F	453	Total	C	N	O	S	0	0	0
			3578	2296	625	637	20			
1	G	381	Total	C	N	O	S	0	0	0
			2947	1891	520	518	18			
1	H	381	Total	C	N	O	S	0	0	0
			2942	1887	519	518	18			

There are 64 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	104	HIS	-	expression tag	UNP I3LG77
A	105	HIS	-	expression tag	UNP I3LG77
A	106	HIS	-	expression tag	UNP I3LG77
A	107	HIS	-	expression tag	UNP I3LG77
A	108	HIS	-	expression tag	UNP I3LG77
A	109	HIS	-	expression tag	UNP I3LG77
A	206	ARG	HIS	engineered mutation	UNP I3LG77
A	207	ASN	ASP	engineered mutation	UNP I3LG77
B	104	HIS	-	expression tag	UNP I3LG77
B	105	HIS	-	expression tag	UNP I3LG77
B	106	HIS	-	expression tag	UNP I3LG77
B	107	HIS	-	expression tag	UNP I3LG77
B	108	HIS	-	expression tag	UNP I3LG77

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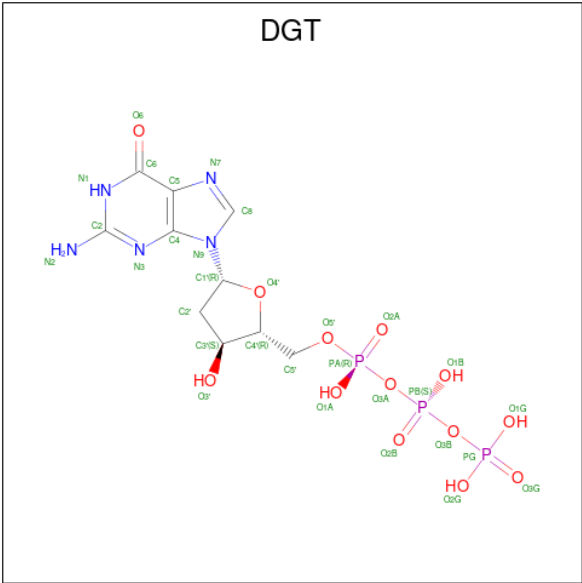
Chain	Residue	Modelled	Actual	Comment	Reference
B	109	HIS	-	expression tag	UNP I3LG77
B	206	ARG	HIS	engineered mutation	UNP I3LG77
B	207	ASN	ASP	engineered mutation	UNP I3LG77
C	104	HIS	-	expression tag	UNP I3LG77
C	105	HIS	-	expression tag	UNP I3LG77
C	106	HIS	-	expression tag	UNP I3LG77
C	107	HIS	-	expression tag	UNP I3LG77
C	108	HIS	-	expression tag	UNP I3LG77
C	109	HIS	-	expression tag	UNP I3LG77
C	206	ARG	HIS	engineered mutation	UNP I3LG77
C	207	ASN	ASP	engineered mutation	UNP I3LG77
D	104	HIS	-	expression tag	UNP I3LG77
D	105	HIS	-	expression tag	UNP I3LG77
D	106	HIS	-	expression tag	UNP I3LG77
D	107	HIS	-	expression tag	UNP I3LG77
D	108	HIS	-	expression tag	UNP I3LG77
D	109	HIS	-	expression tag	UNP I3LG77
D	206	ARG	HIS	engineered mutation	UNP I3LG77
D	207	ASN	ASP	engineered mutation	UNP I3LG77
E	104	HIS	-	expression tag	UNP I3LG77
E	105	HIS	-	expression tag	UNP I3LG77
E	106	HIS	-	expression tag	UNP I3LG77
E	107	HIS	-	expression tag	UNP I3LG77
E	108	HIS	-	expression tag	UNP I3LG77
E	109	HIS	-	expression tag	UNP I3LG77
E	206	ARG	HIS	engineered mutation	UNP I3LG77
E	207	ASN	ASP	engineered mutation	UNP I3LG77
F	104	HIS	-	expression tag	UNP I3LG77
F	105	HIS	-	expression tag	UNP I3LG77
F	106	HIS	-	expression tag	UNP I3LG77
F	107	HIS	-	expression tag	UNP I3LG77
F	108	HIS	-	expression tag	UNP I3LG77
F	109	HIS	-	expression tag	UNP I3LG77
F	206	ARG	HIS	engineered mutation	UNP I3LG77
F	207	ASN	ASP	engineered mutation	UNP I3LG77
G	104	HIS	-	expression tag	UNP I3LG77
G	105	HIS	-	expression tag	UNP I3LG77
G	106	HIS	-	expression tag	UNP I3LG77
G	107	HIS	-	expression tag	UNP I3LG77
G	108	HIS	-	expression tag	UNP I3LG77
G	109	HIS	-	expression tag	UNP I3LG77
G	206	ARG	HIS	engineered mutation	UNP I3LG77

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Chain	Residue	Modelled	Actual	Comment	Reference
G	207	ASN	ASP	engineered mutation	UNP I3LG77
H	104	HIS	-	expression tag	UNP I3LG77
H	105	HIS	-	expression tag	UNP I3LG77
H	106	HIS	-	expression tag	UNP I3LG77
H	107	HIS	-	expression tag	UNP I3LG77
H	108	HIS	-	expression tag	UNP I3LG77
H	109	HIS	-	expression tag	UNP I3LG77
H	206	ARG	HIS	engineered mutation	UNP I3LG77
H	207	ASN	ASP	engineered mutation	UNP I3LG77

- Molecule 2 is 2'-DEOXYGUANOSINE-5'-TRIPHOSPHATE (CCD ID: DGT) (formula: C₁₀H₁₆N₅O₁₃P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	E	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	E	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	E	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	F	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	F	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	G	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	G	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	G	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	H	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	H	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	H	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Mg	0	0
			2	2		

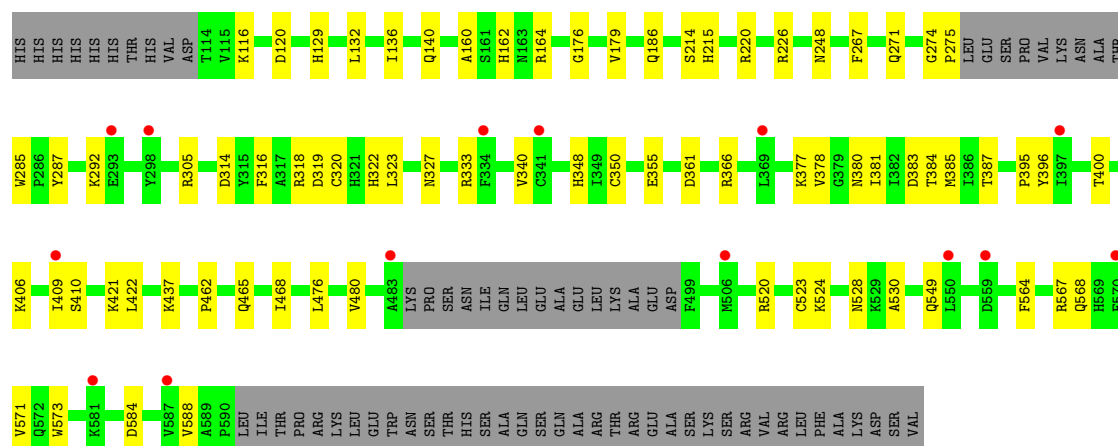
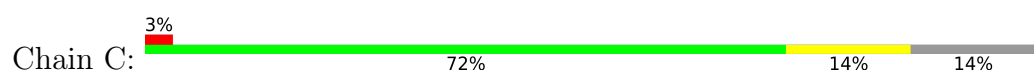
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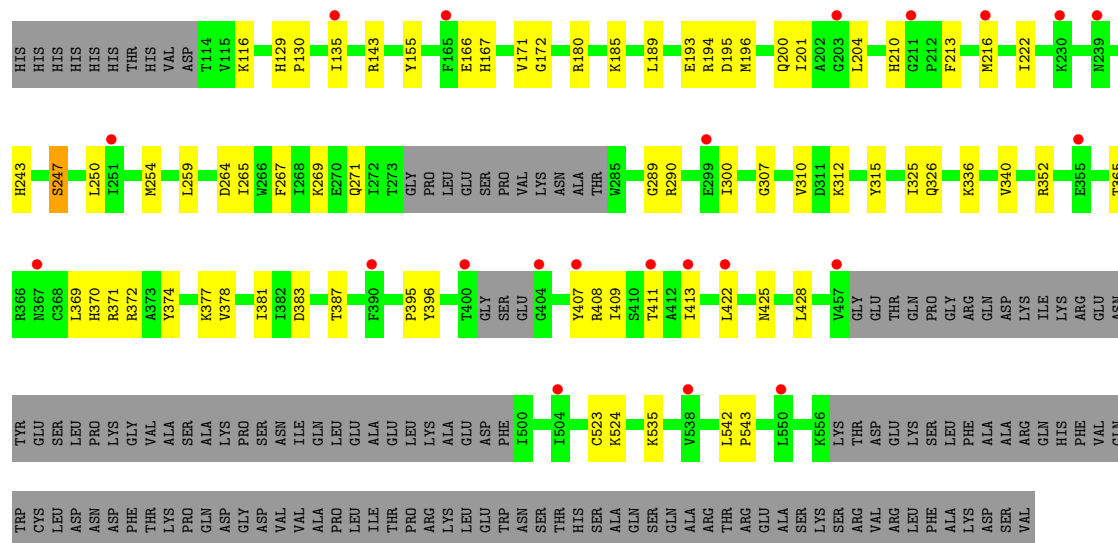
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	2	Total 2	Mg 2	0	0
3	C	2	Total 2	Mg 2	0	0
3	D	2	Total 2	Mg 2	0	0
3	E	2	Total 2	Mg 2	0	0
3	F	1	Total 1	Mg 1	0	0
3	G	3	Total 3	Mg 3	0	0
3	H	2	Total 2	Mg 2	0	0

- Molecule 4 is water.

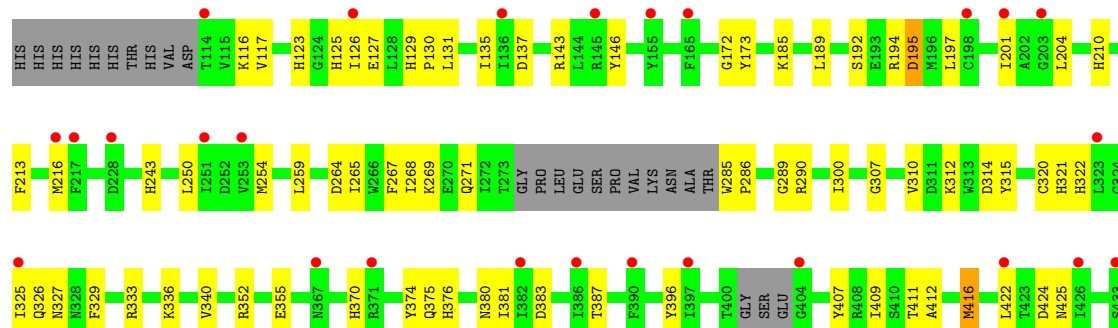
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	9	Total 9	O 9	0	0
4	B	9	Total 9	O 9	0	0
4	C	8	Total 8	O 8	0	0
4	D	6	Total 6	O 6	0	0
4	E	5	Total 5	O 5	0	0
4	F	6	Total 6	O 6	0	0

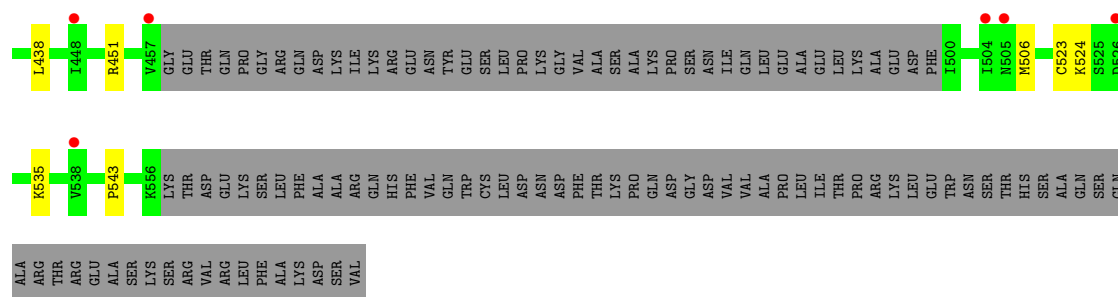


• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

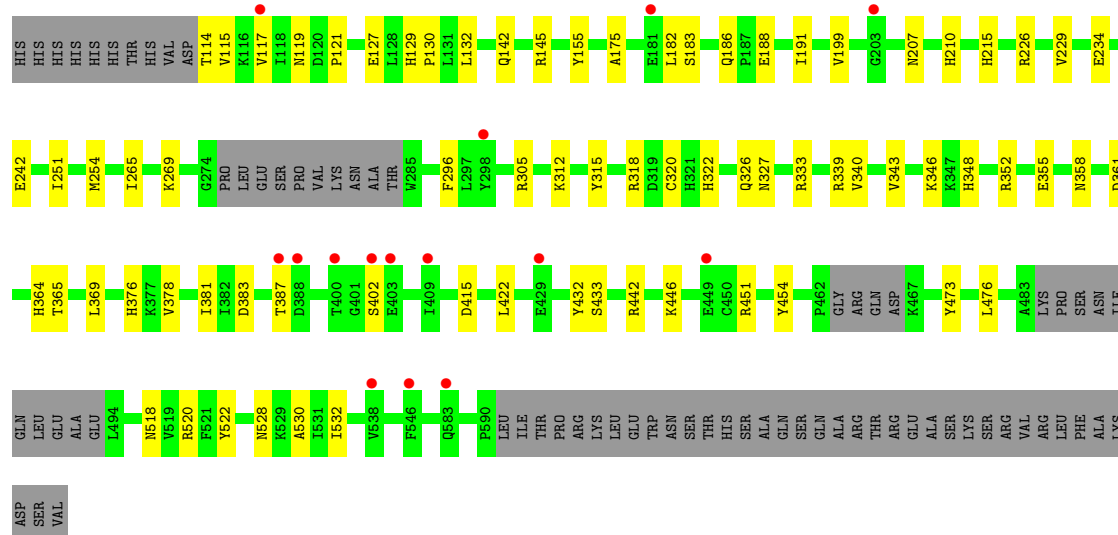


• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

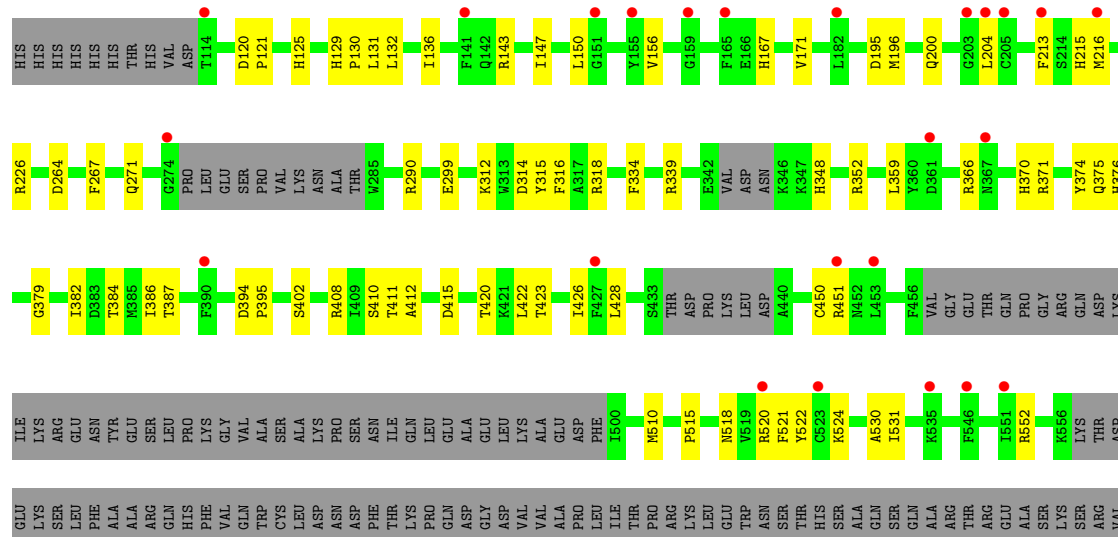




• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

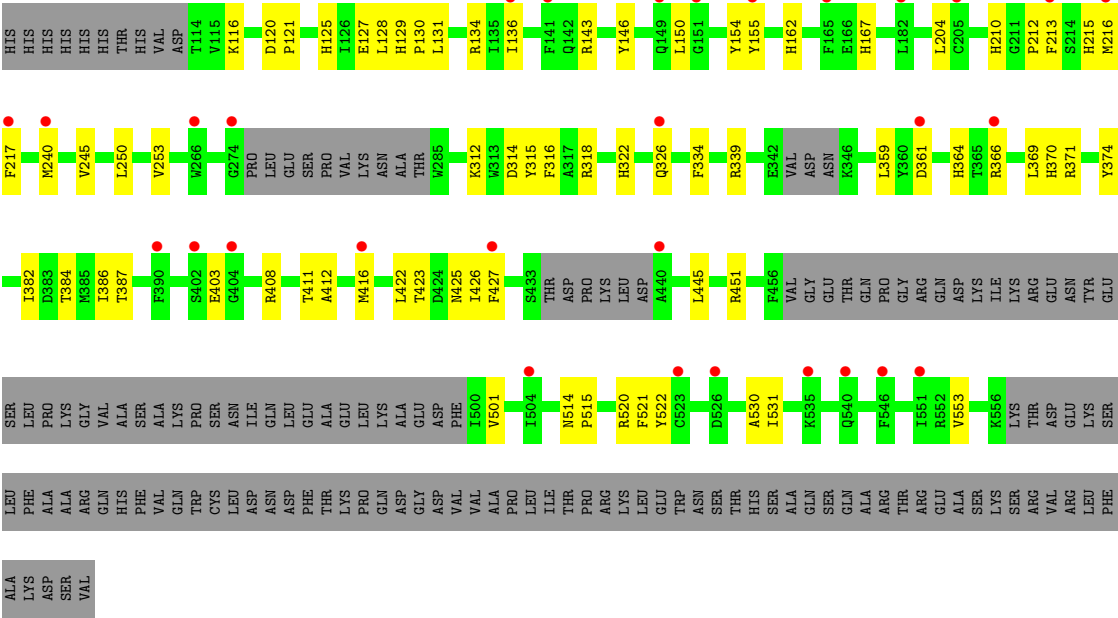


• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1



ARG
LEU
PHE
ALA
LYS
ASP
SER
VAL

● Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	86.54Å 95.91Å 130.75Å 78.66° 88.12° 82.68°	Depositor
Resolution (Å)	29.94 – 2.70 29.94 – 2.70	Depositor EDS
% Data completeness (in resolution range)	96.9 (29.94-2.70) 96.8 (29.94-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.82 (at 2.68Å)	Xtriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.263 , 0.290 (Not available) , 0.297	Depositor DCC
R_{free} test set	2000 reflections (1.31%)	wwPDB-VP
Wilson B-factor (Å ²)	52.0	Xtriage
Anisotropy	0.295	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	26957	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 97.73 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.0370e-10. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: DGT, 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	0.20	0/3659	0.37	0/4959
1	B	0.21	0/3637	0.37	0/4932
1	C	0.20	0/3641	0.37	0/4936
1	D	0.20	0/3077	0.39	0/4173
1	E	0.20	0/3077	0.38	0/4173
1	F	0.20	0/3664	0.36	0/4963
1	G	0.19	0/3015	0.36	0/4086
1	H	0.19	0/3010	0.36	0/4081
All	All	0.20	0/26780	0.37	0/36303

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	3573	0	3430	60	0
1	B	3549	0	3387	47	0
1	C	3553	0	3398	52	0
1	D	3006	0	2852	49	0
1	E	3006	0	2854	55	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3578	0	3451	53	0
1	G	2947	0	2779	57	0
1	H	2942	0	2760	49	0
2	A	93	0	36	12	0
2	B	93	0	36	3	0
2	C	124	0	48	11	0
2	D	93	0	36	9	0
2	E	93	0	36	7	0
2	F	62	0	24	8	0
2	G	93	0	36	16	0
2	H	93	0	36	8	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
3	E	2	0	0	0	0
3	F	1	0	0	0	0
3	G	3	0	0	0	0
3	H	2	0	0	0	0
4	A	9	0	0	0	0
4	B	9	0	0	0	0
4	C	8	0	0	0	0
4	D	6	0	0	0	0
4	E	5	0	0	0	0
4	F	6	0	0	0	0
All	All	26957	0	25199	435	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 8.

The worst 5 of 435 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:703:DGT:O4'	2:A:703:DGT:C4'	1.65	1.28
2:C:705:DGT:O4'	2:C:705:DGT:C4'	1.65	1.27
1:G:451:ARG:NH1	2:G:706:DGT:N1	1.81	1.27
2:D:701:DGT:C4'	2:D:701:DGT:O4'	1.66	1.24
2:H:705:DGT:O4'	2:H:705:DGT:C4'	1.67	1.24

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

There are no protein backbone outliers to report in this entry.

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	346/467 (74%)	346 (100%)	0	100	100
1	B	362/467 (78%)	361 (100%)	1 (0%)	86	94
1	C	363/467 (78%)	363 (100%)	0	100	100
1	D	300/467 (64%)	299 (100%)	1 (0%)	86	94
1	E	300/467 (64%)	297 (99%)	3 (1%)	68	86
1	F	371/467 (79%)	368 (99%)	3 (1%)	73	88
1	G	293/467 (63%)	293 (100%)	0	100	100
1	H	291/467 (62%)	290 (100%)	1 (0%)	86	94
All	All	2626/3736 (70%)	2617 (100%)	9 (0%)	86	94

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	422	LEU
1	H	403	GLU
1	E	416	MET
1	E	425	ASN
1	F	183	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 84 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	186	GLN
1	G	321	HIS
1	F	235	GLN

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Mol	Chain	Res	Type
1	F	376	HIS
1	G	540	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 40 ligands modelled in this entry, 16 are monoatomic - leaving 24 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	$\# Z > 2$
2	DGT	C	706	3	32,33,33	3.49	15 (46%)	48,52,52	2.20	10 (20%)
2	DGT	A	703	3	32,33,33	3.46	15 (46%)	48,52,52	2.02	11 (22%)
2	DGT	D	705	3	32,33,33	3.51	15 (46%)	48,52,52	2.07	12 (25%)
2	DGT	C	703	3	32,33,33	3.50	15 (46%)	48,52,52	2.06	12 (25%)
2	DGT	D	703	3	32,33,33	3.65	15 (46%)	48,52,52	2.14	10 (20%)
2	DGT	A	704	3	32,33,33	3.40	15 (46%)	48,52,52	2.15	11 (22%)
2	DGT	B	703	3	32,33,33	3.58	16 (50%)	48,52,52	2.12	10 (20%)
2	DGT	F	701	3	32,33,33	3.47	16 (50%)	48,52,52	2.14	11 (22%)
2	DGT	B	702	3	32,33,33	3.52	15 (46%)	48,52,52	2.17	10 (20%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	DGT	C	701	3	32,33,33	3.59	16 (50%)	48,52,52	2.11	11 (22%)
2	DGT	F	702	3	32,33,33	3.54	16 (50%)	48,52,52	2.11	10 (20%)
2	DGT	H	703	3	32,33,33	3.49	15 (46%)	48,52,52	2.07	12 (25%)
2	DGT	H	705	3	32,33,33	3.52	16 (50%)	48,52,52	2.16	10 (20%)
2	DGT	A	701	3	32,33,33	3.60	15 (46%)	48,52,52	2.11	10 (20%)
2	DGT	H	701	3	32,33,33	3.59	15 (46%)	48,52,52	2.10	10 (20%)
2	DGT	G	706	3	32,33,33	3.42	15 (46%)	48,52,52	2.21	12 (25%)
2	DGT	E	701	3	32,33,33	3.64	15 (46%)	48,52,52	2.16	10 (20%)
2	DGT	C	705	3	32,33,33	3.44	15 (46%)	48,52,52	2.03	11 (22%)
2	DGT	G	702	3	32,33,33	3.45	16 (50%)	48,52,52	2.17	10 (20%)
2	DGT	G	704	3	32,33,33	3.59	15 (46%)	48,52,52	2.12	10 (20%)
2	DGT	B	705	3	32,33,33	3.50	15 (46%)	48,52,52	2.09	13 (27%)
2	DGT	E	704	3	32,33,33	3.53	15 (46%)	48,52,52	2.16	10 (20%)
2	DGT	E	703	3	32,33,33	3.43	15 (46%)	48,52,52	2.08	12 (25%)
2	DGT	D	701	3	32,33,33	3.51	15 (46%)	48,52,52	2.16	10 (20%)

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
2	DGT	C	706	3	-	4/22/34/34	0/3/3/3
2	DGT	A	703	3	-	4/22/34/34	0/3/3/3
2	DGT	D	705	3	-	5/22/34/34	0/3/3/3
2	DGT	C	703	3	-	2/22/34/34	0/3/3/3
2	DGT	D	703	3	-	9/22/34/34	0/3/3/3
2	DGT	A	704	3	-	6/22/34/34	0/3/3/3
2	DGT	B	703	3	-	5/22/34/34	0/3/3/3
2	DGT	F	701	3	-	5/22/34/34	0/3/3/3
2	DGT	B	702	3	-	3/22/34/34	0/3/3/3
2	DGT	C	701	3	-	6/22/34/34	0/3/3/3
2	DGT	F	702	3	-	6/22/34/34	0/3/3/3
2	DGT	H	703	3	-	4/22/34/34	0/3/3/3
2	DGT	H	705	3	-	2/22/34/34	0/3/3/3
2	DGT	A	701	3	-	4/22/34/34	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	DGT	H	701	3	-	9/22/34/34	0/3/3/3
2	DGT	G	706	3	-	6/22/34/34	0/3/3/3
2	DGT	E	701	3	-	8/22/34/34	0/3/3/3
2	DGT	C	705	3	-	5/22/34/34	0/3/3/3
2	DGT	G	702	3	-	2/22/34/34	0/3/3/3
2	DGT	G	704	3	-	8/22/34/34	0/3/3/3
2	DGT	B	705	3	-	3/22/34/34	0/3/3/3
2	DGT	E	704	3	-	2/22/34/34	0/3/3/3
2	DGT	E	703	3	-	6/22/34/34	0/3/3/3
2	DGT	D	701	3	-	3/22/34/34	0/3/3/3

The worst 5 of 366 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	703	DGT	O4'-C4'	10.09	1.67	1.45
2	F	701	DGT	O4'-C4'	10.03	1.67	1.45
2	G	704	DGT	O4'-C4'	10.00	1.67	1.45
2	H	705	DGT	O4'-C4'	9.99	1.67	1.45
2	B	703	DGT	O4'-C4'	9.98	1.67	1.45

The worst 5 of 258 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	705	DGT	C1'-N9-C8	7.31	144.30	127.91
2	C	706	DGT	C1'-N9-C8	7.25	144.18	127.91
2	G	702	DGT	C1'-N9-C8	7.23	144.14	127.91
2	B	702	DGT	C1'-N9-C8	7.17	143.99	127.91
2	A	704	DGT	C1'-N9-C8	7.11	143.87	127.91

There are no chirality outliers.

5 of 117 torsion outliers are listed below:

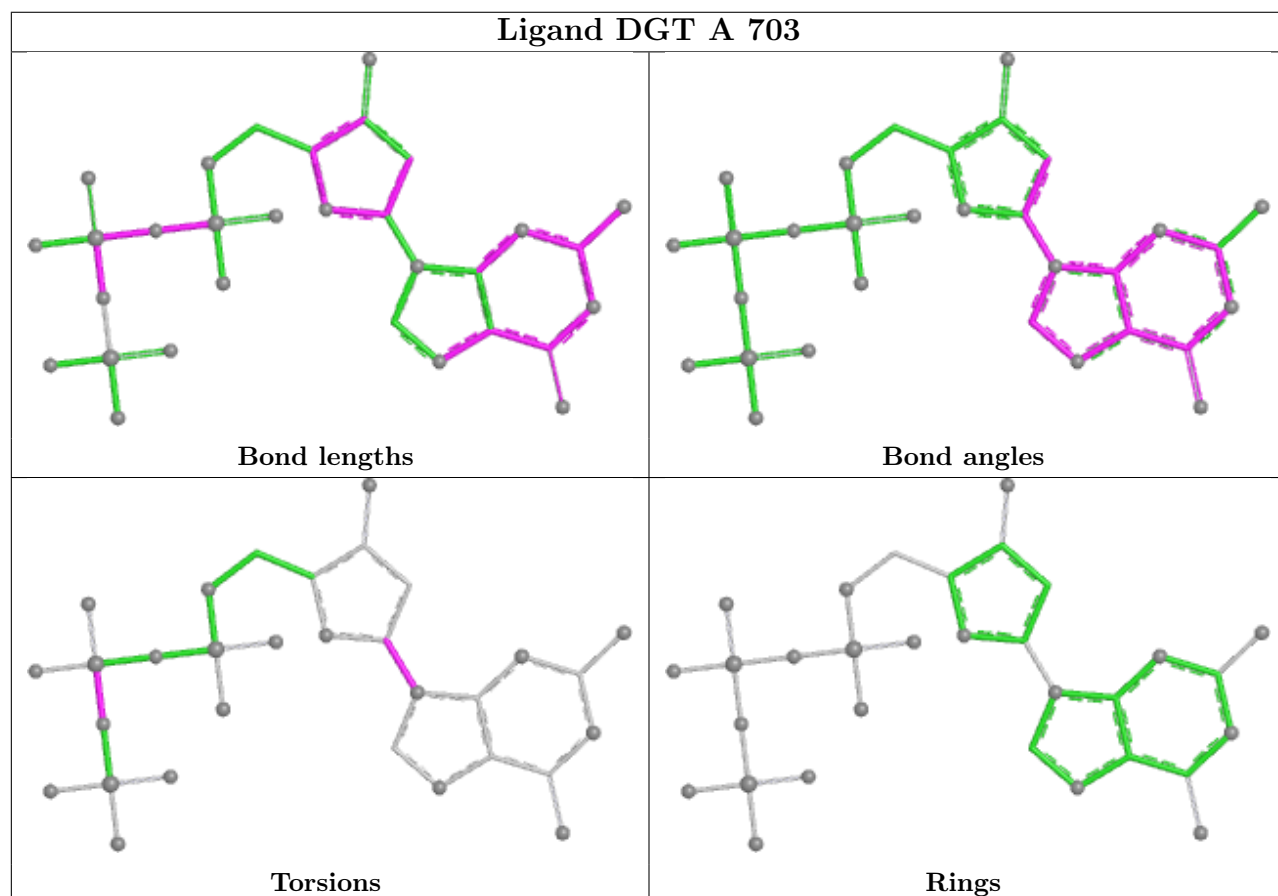
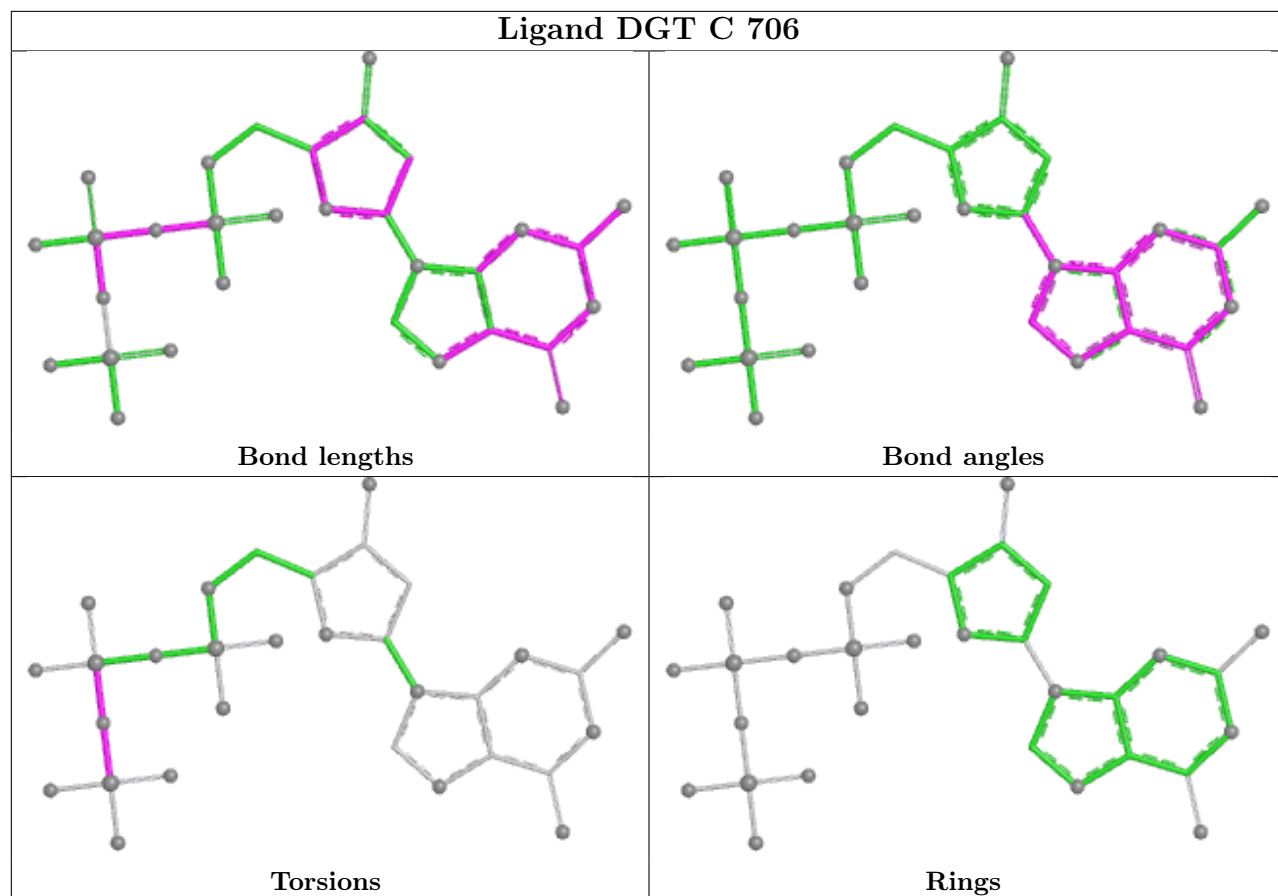
Mol	Chain	Res	Type	Atoms
2	A	704	DGT	C5'-O5'-PA-O2A
2	C	701	DGT	PB-O3A-PA-O5'
2	C	705	DGT	PB-O3B-PG-O2G
2	C	706	DGT	PB-O3B-PG-O2G
2	D	703	DGT	PB-O3A-PA-O5'

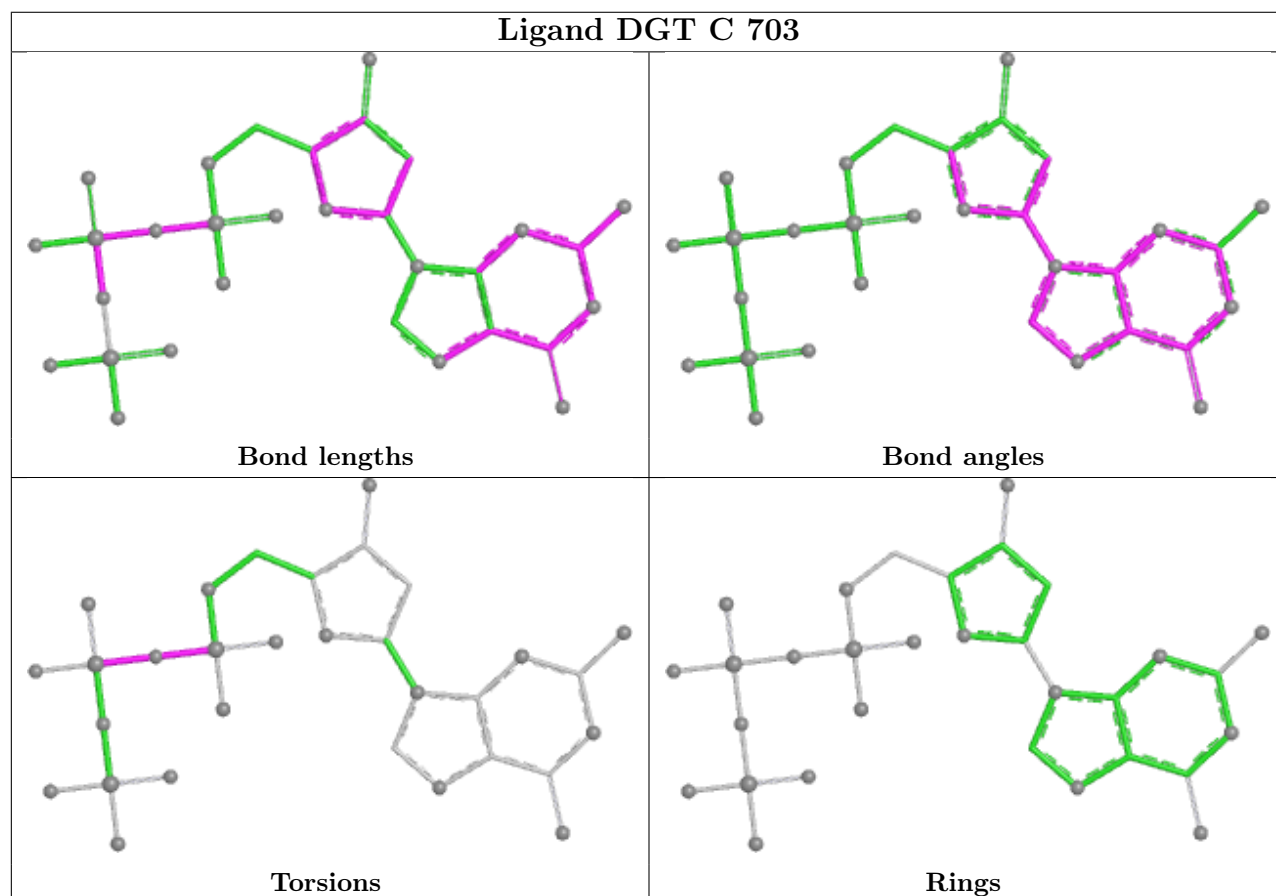
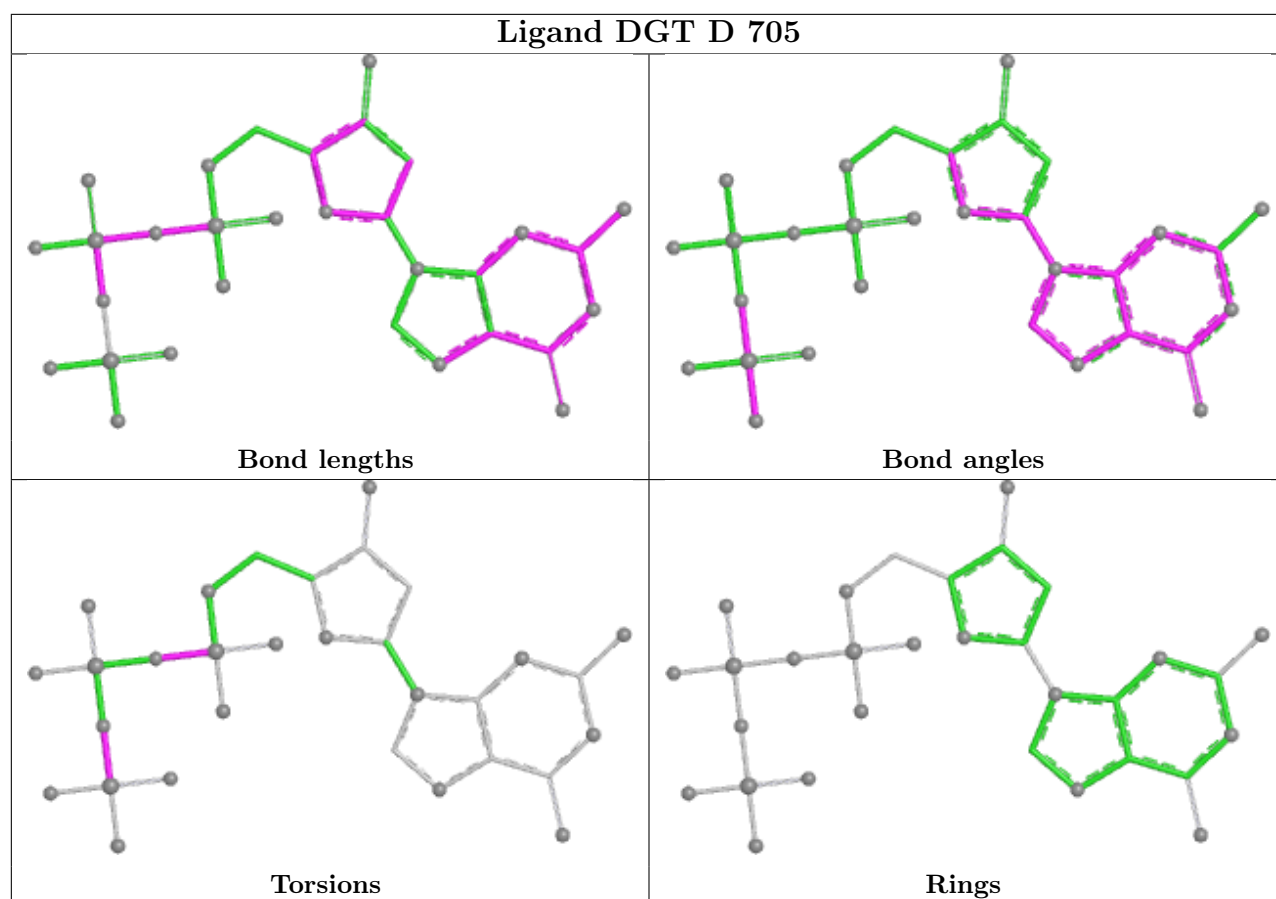
There are no ring outliers.

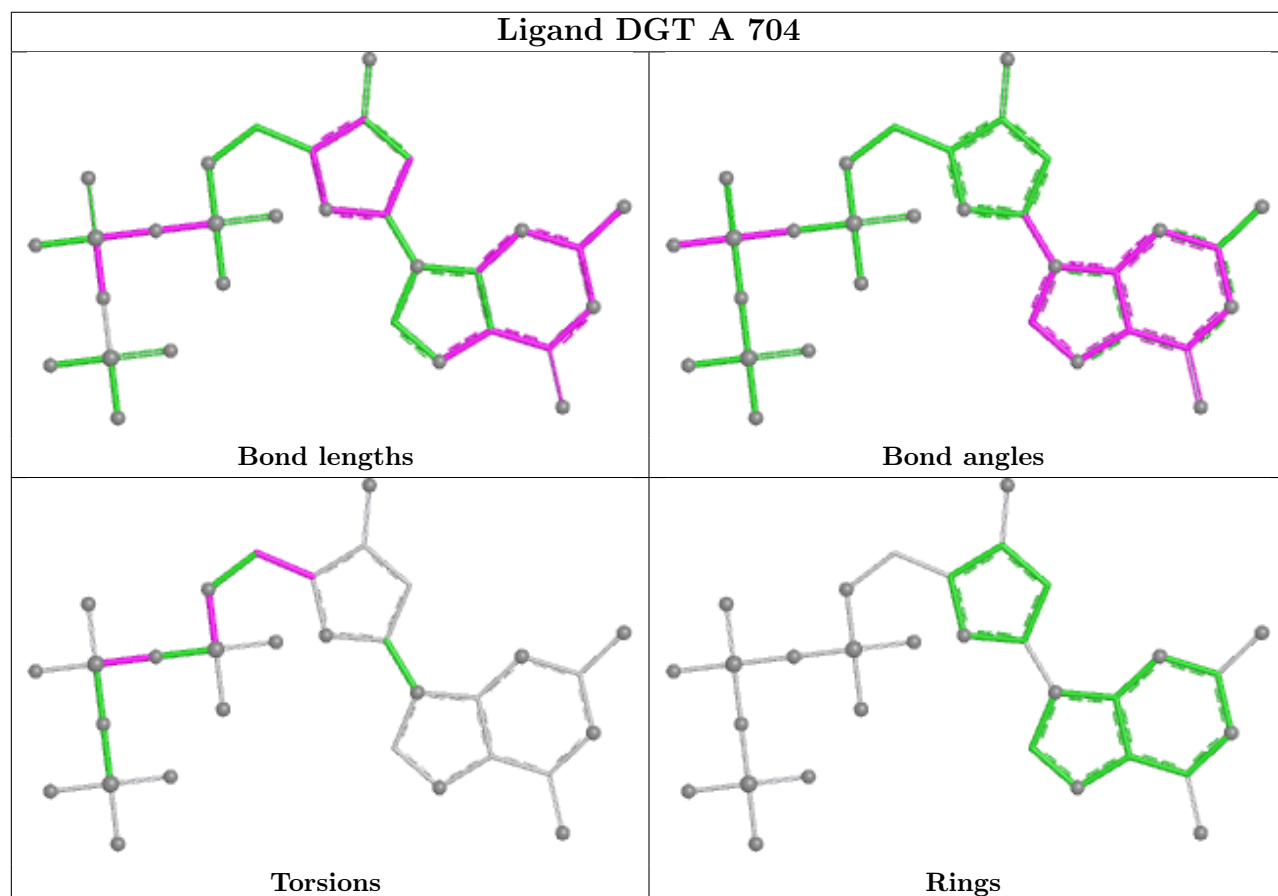
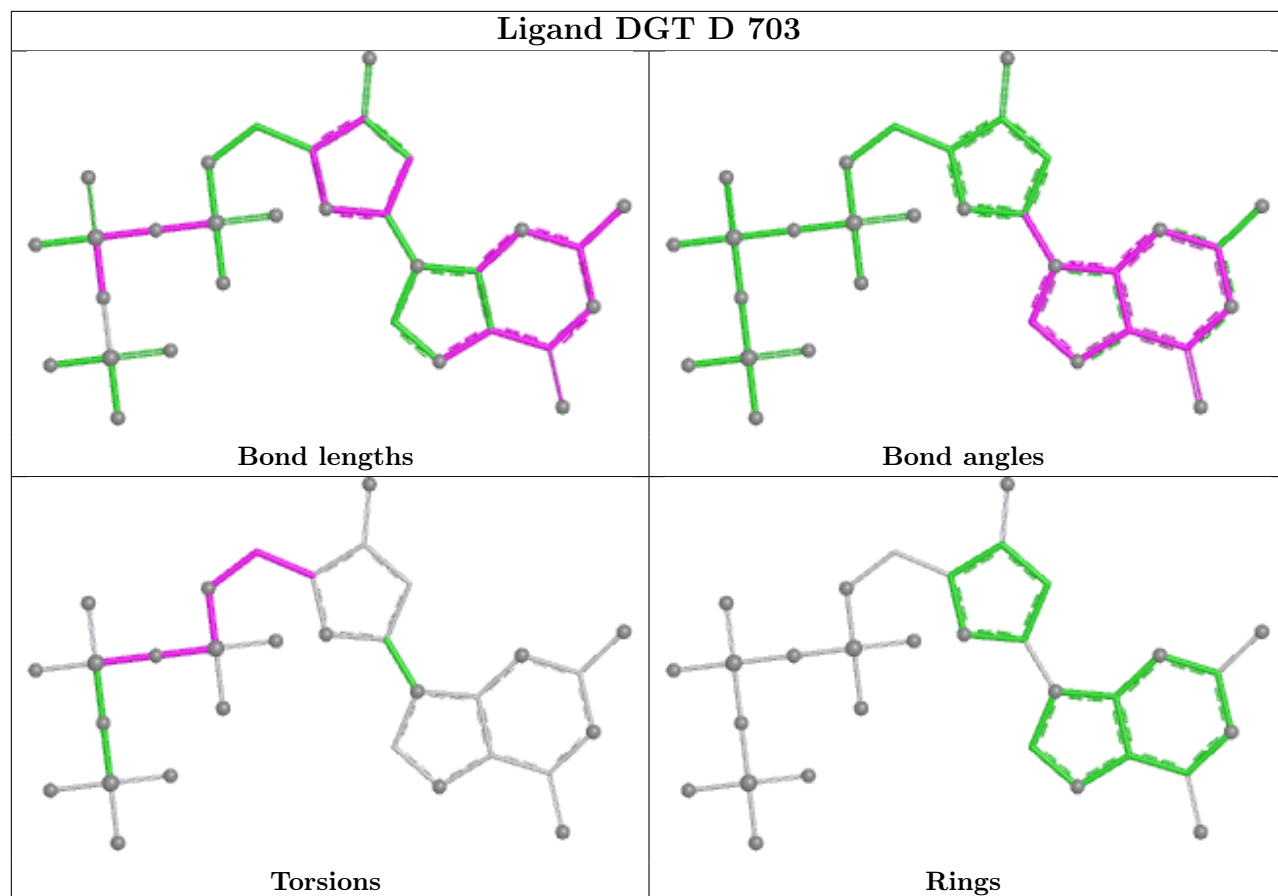
24 monomers are involved in 70 short contacts:

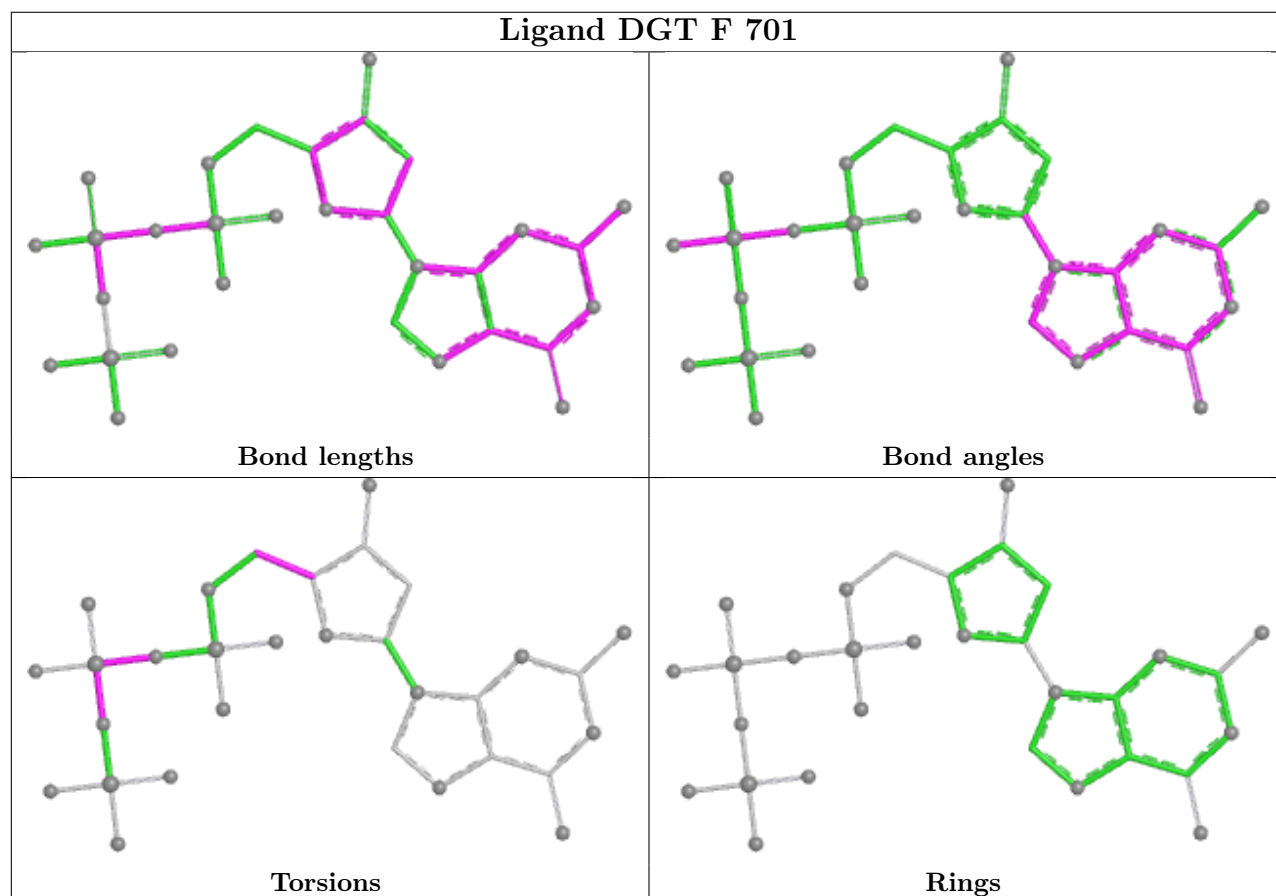
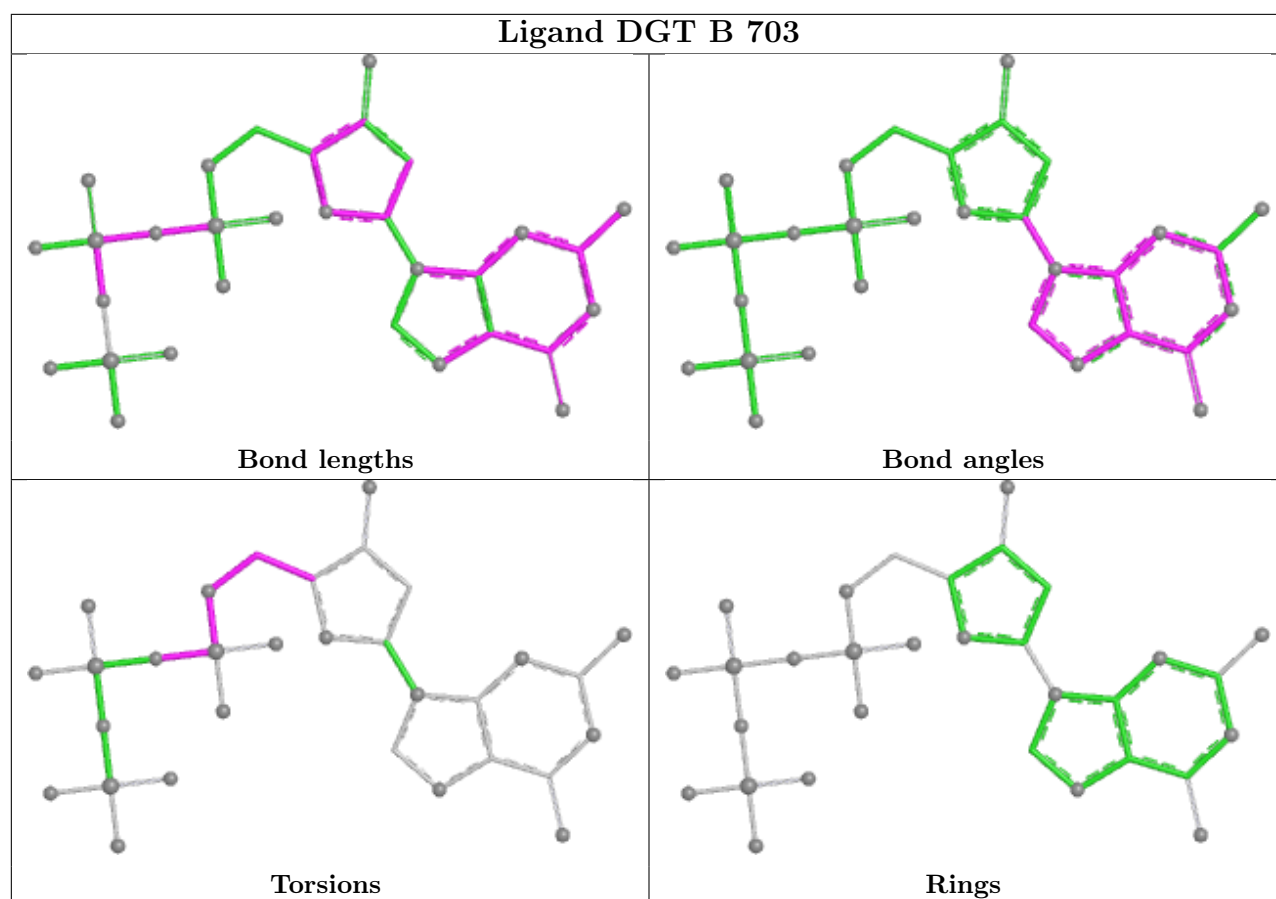
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	706	DGT	1	0
2	A	703	DGT	4	0
2	D	705	DGT	4	0
2	C	703	DGT	3	0
2	D	703	DGT	1	0
2	A	704	DGT	5	0
2	B	703	DGT	1	0
2	F	701	DGT	5	0
2	B	702	DGT	1	0
2	C	701	DGT	3	0
2	F	702	DGT	3	0
2	H	703	DGT	4	0
2	H	705	DGT	1	0
2	A	701	DGT	3	0
2	H	701	DGT	3	0
2	G	706	DGT	11	0
2	E	701	DGT	1	0
2	C	705	DGT	4	0
2	G	702	DGT	2	0
2	G	704	DGT	3	0
2	B	705	DGT	1	0
2	E	704	DGT	3	0
2	E	703	DGT	3	0
2	D	701	DGT	4	0

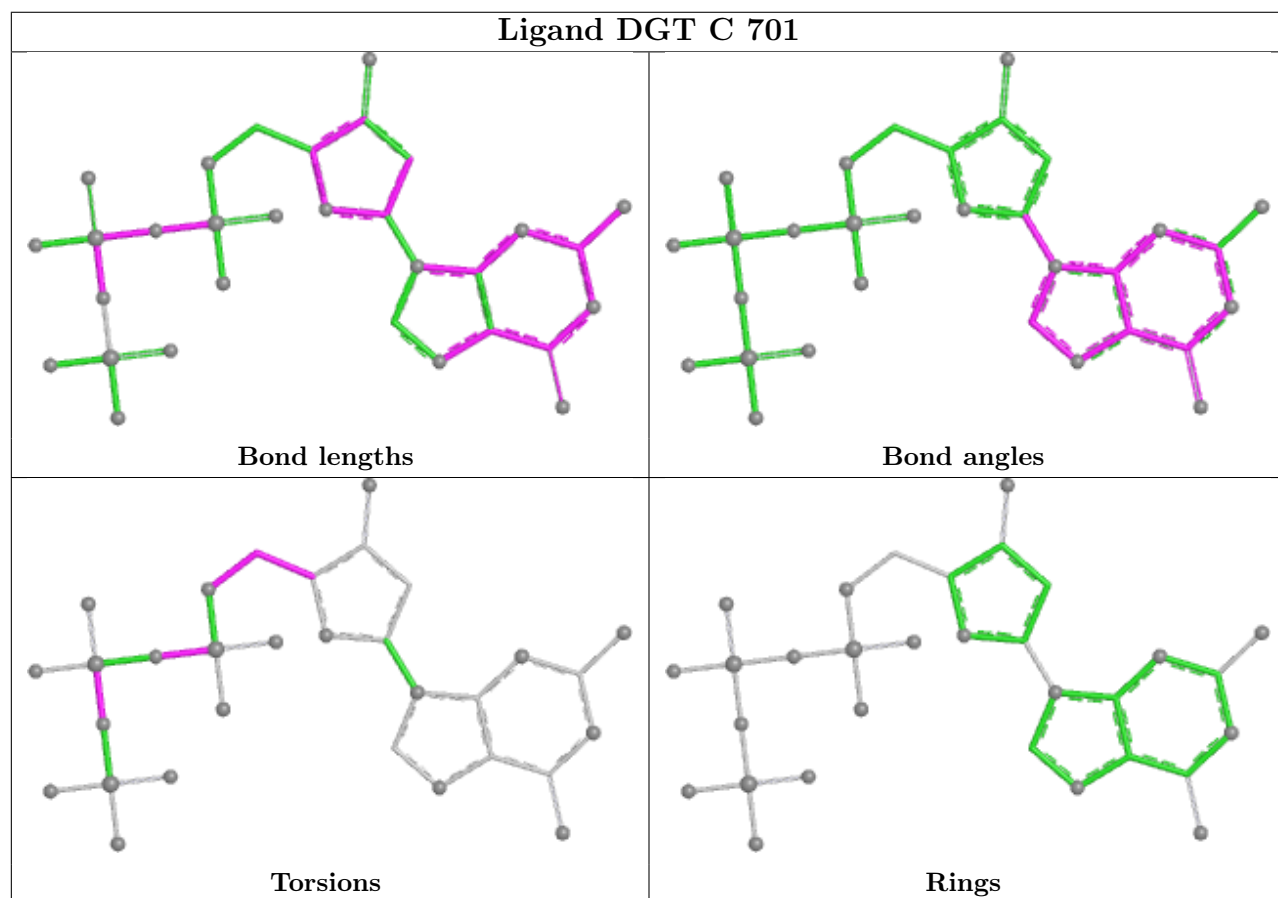
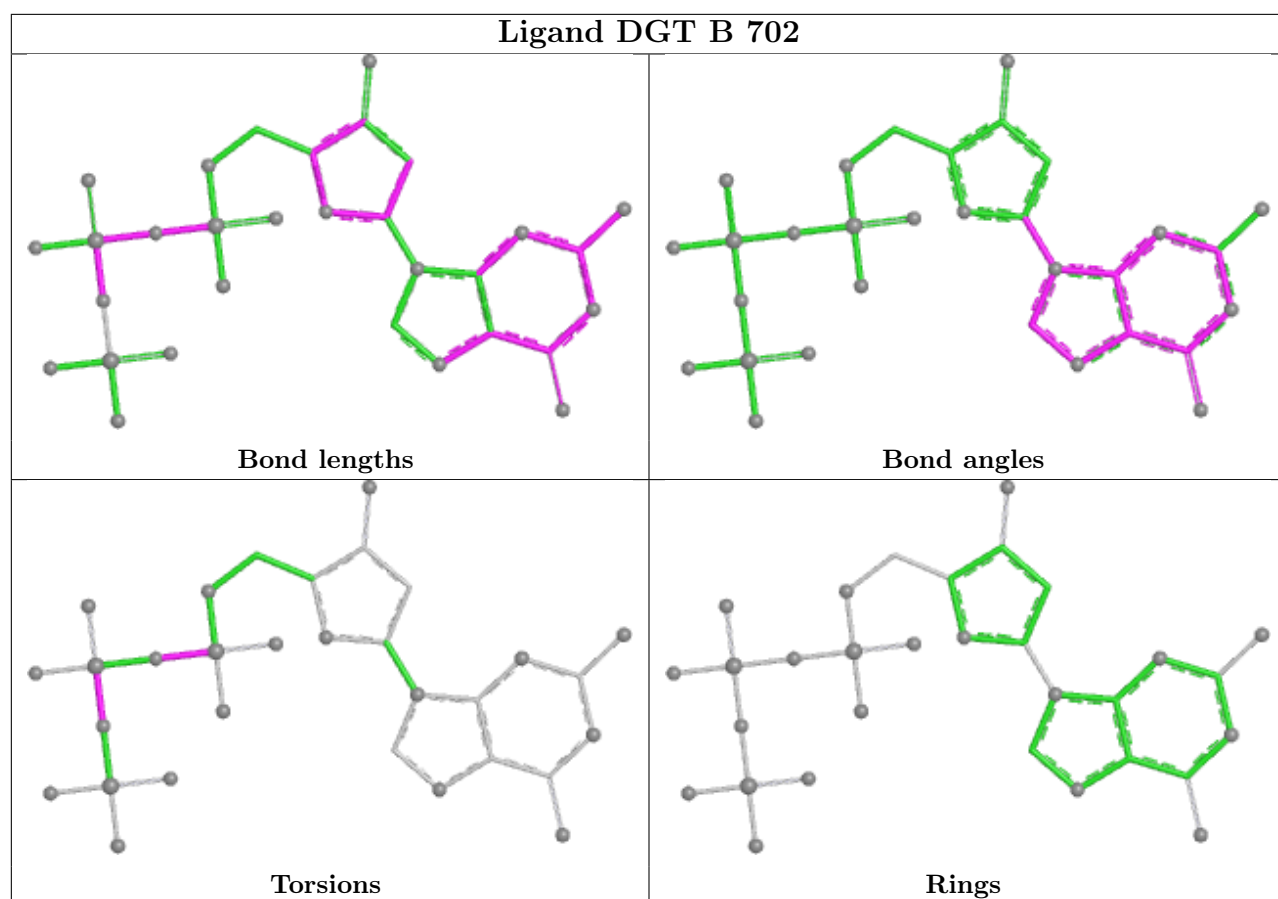
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



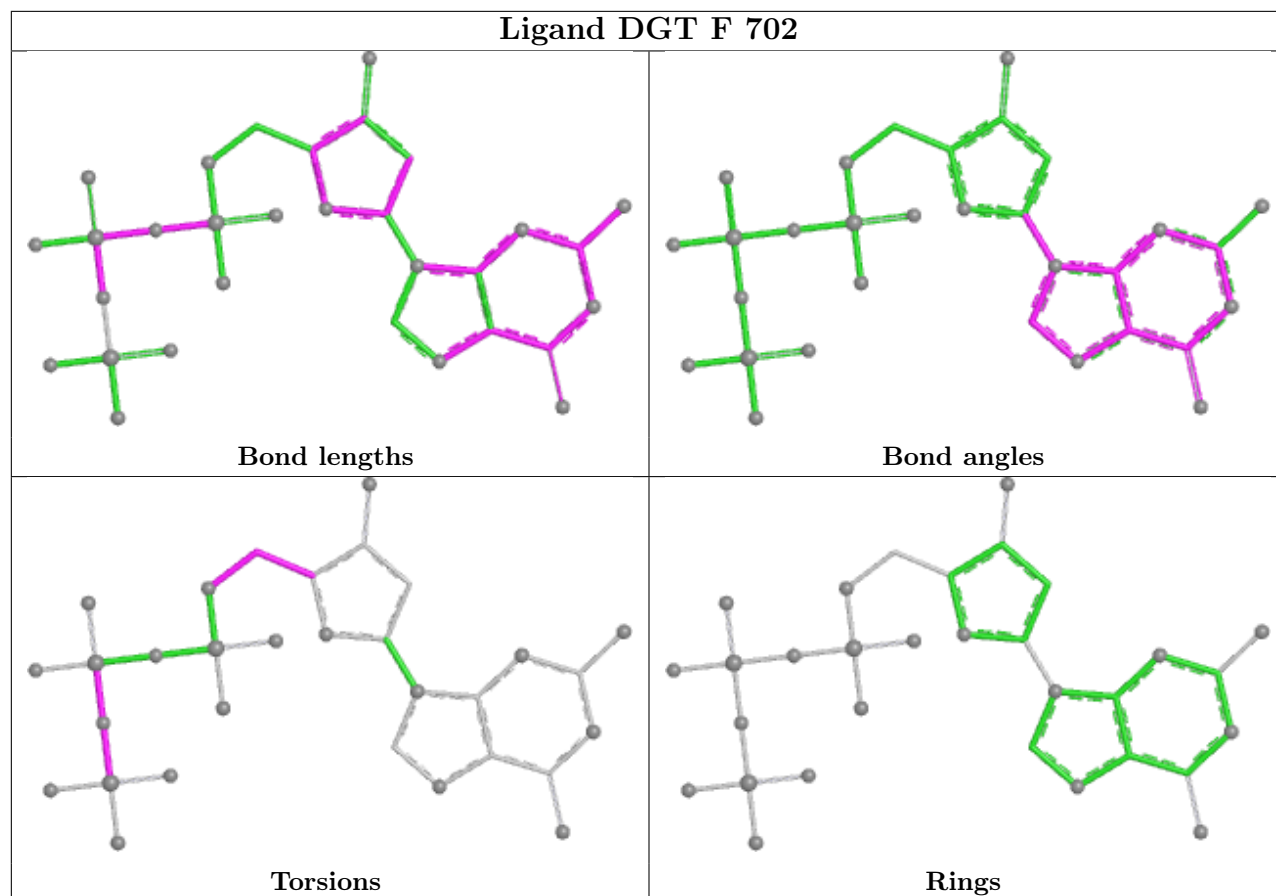




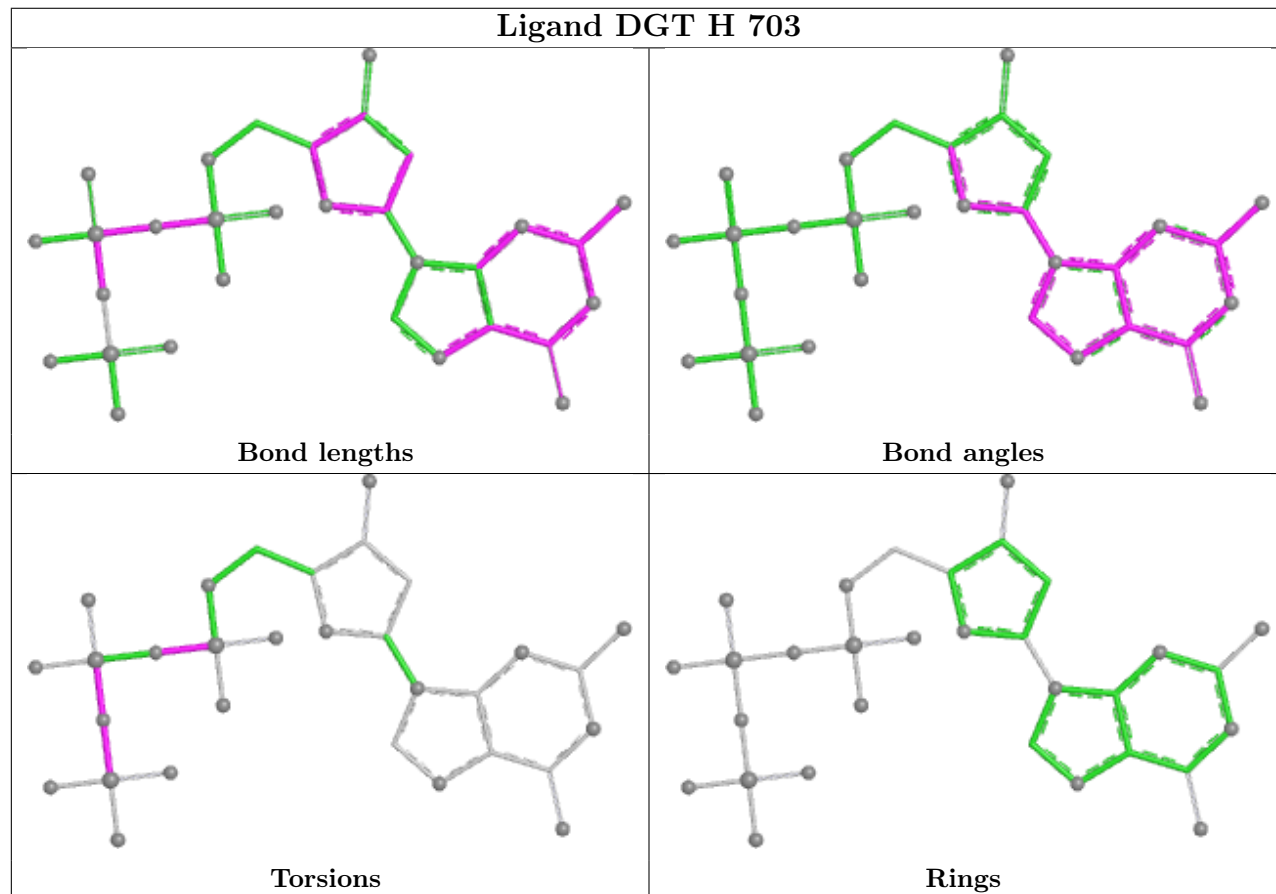


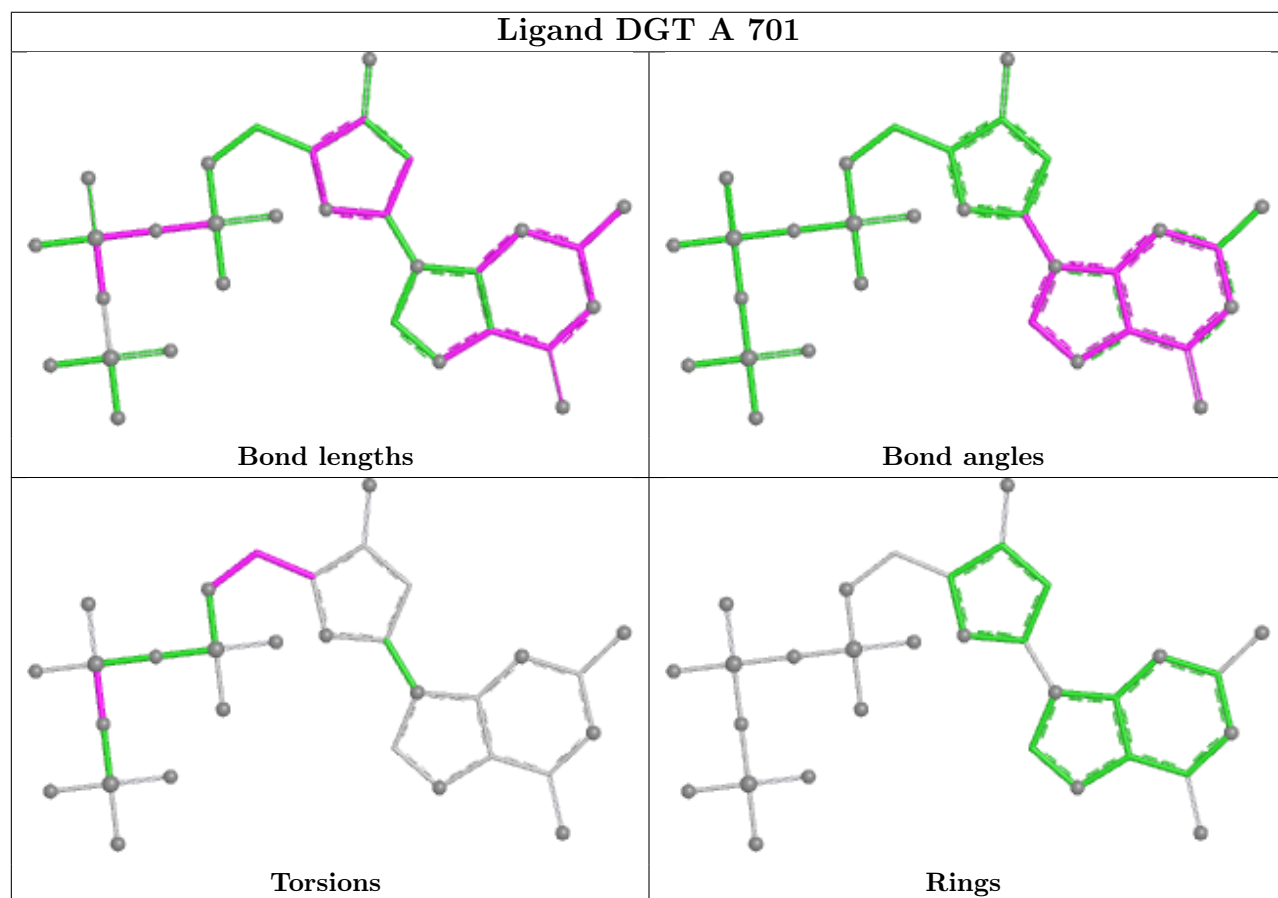
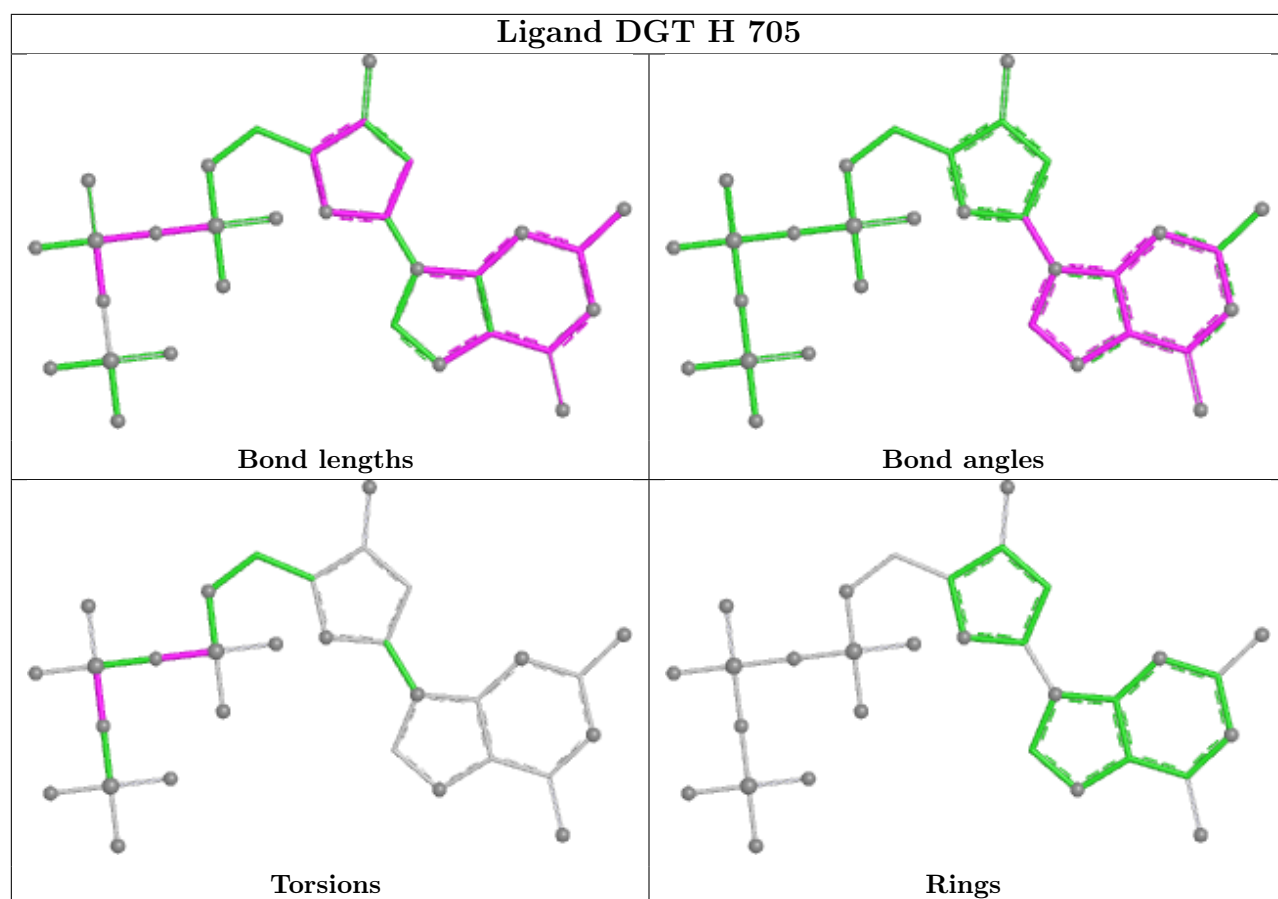


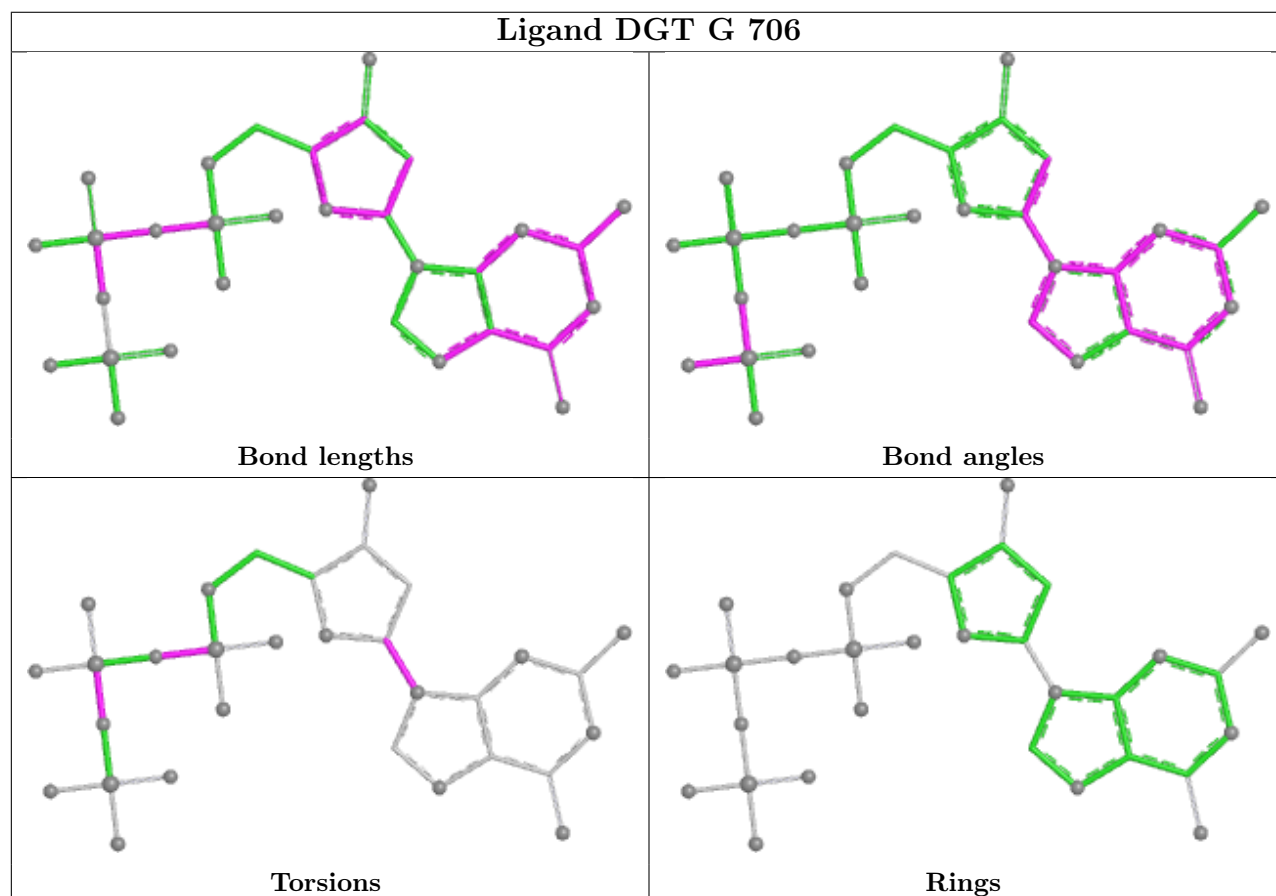
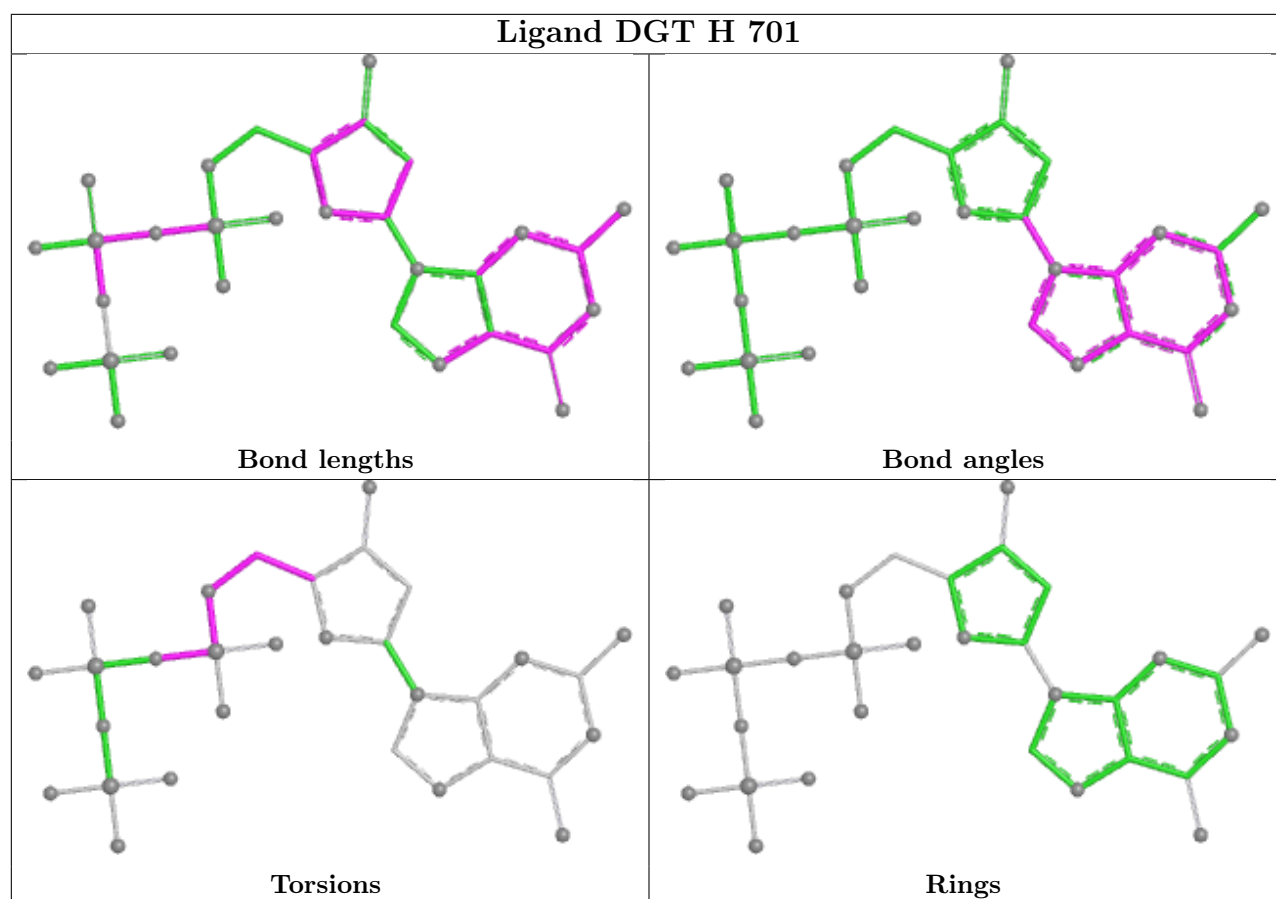
Ligand DGT F 702



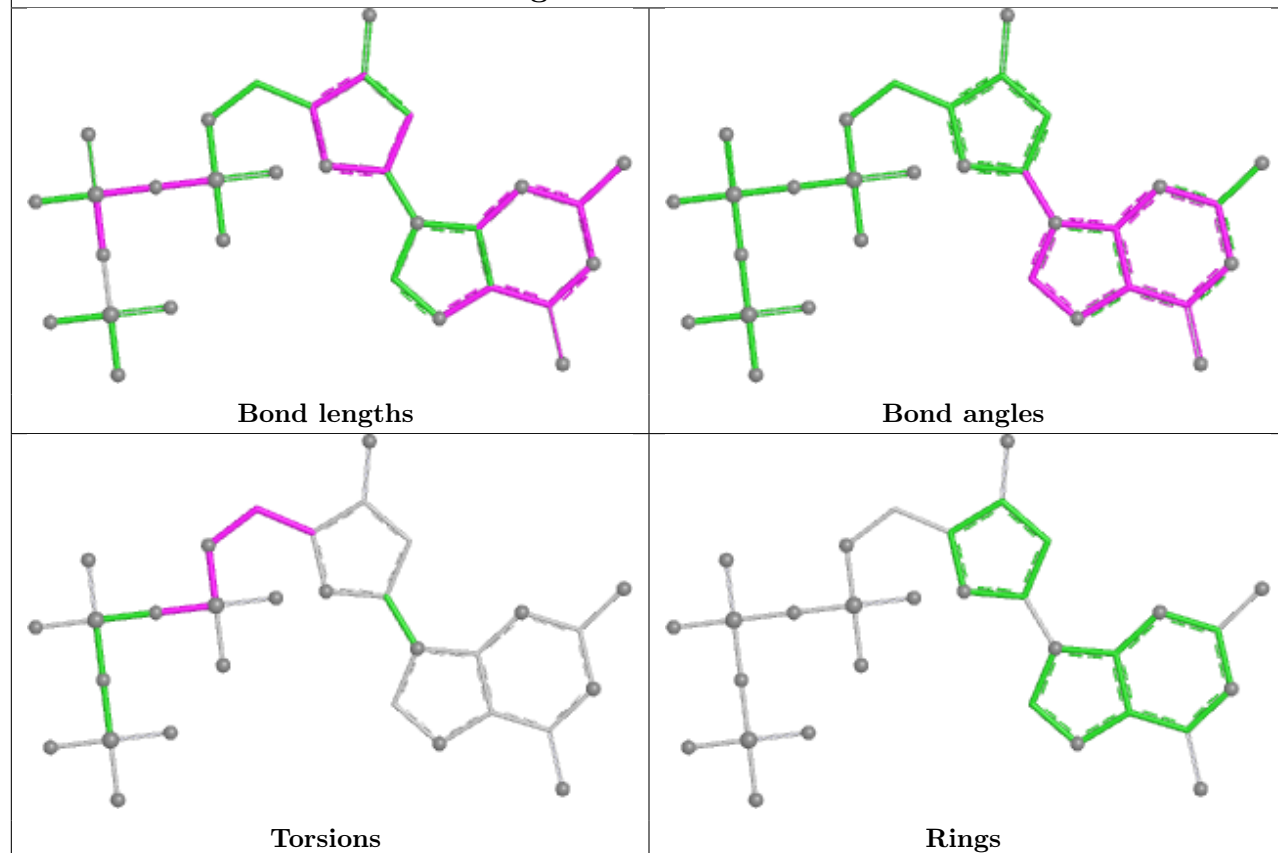
Ligand DGT H 703



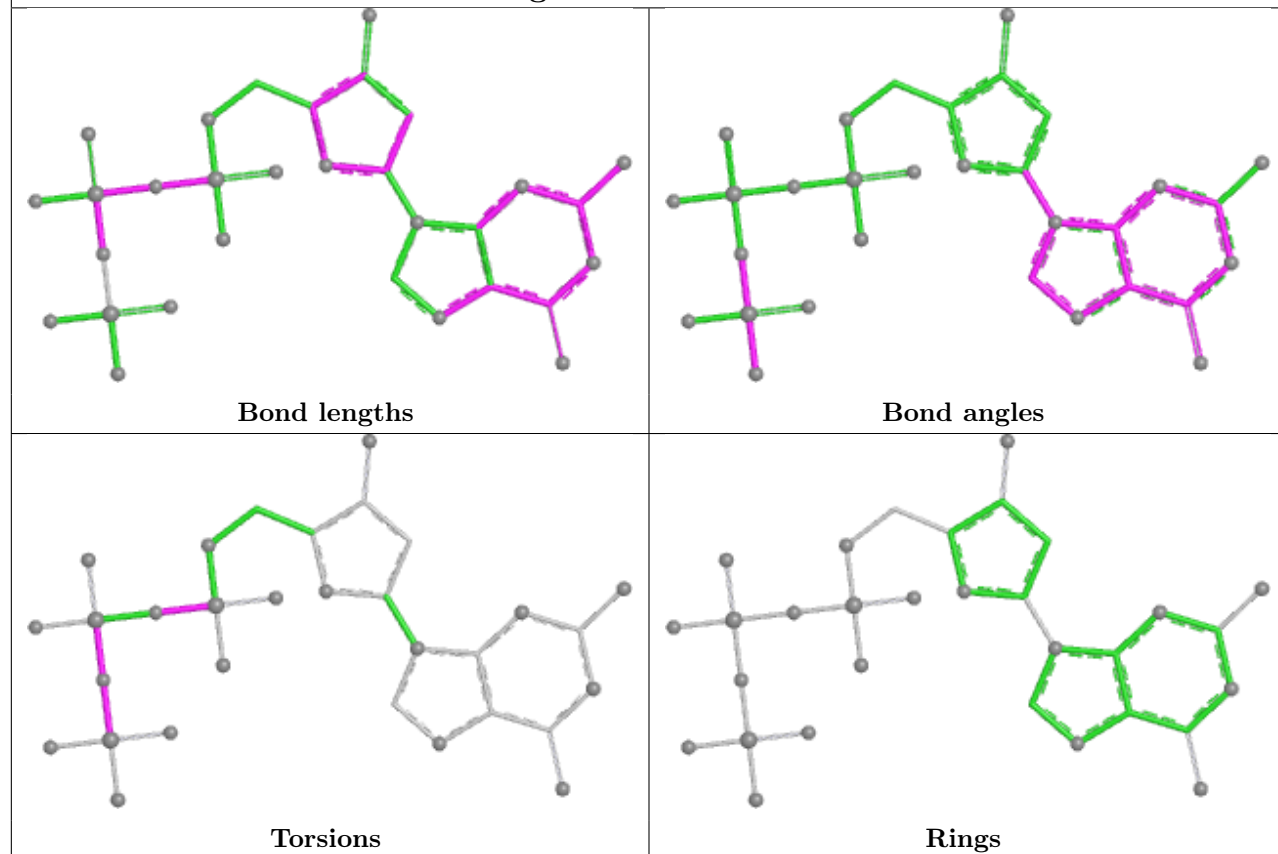


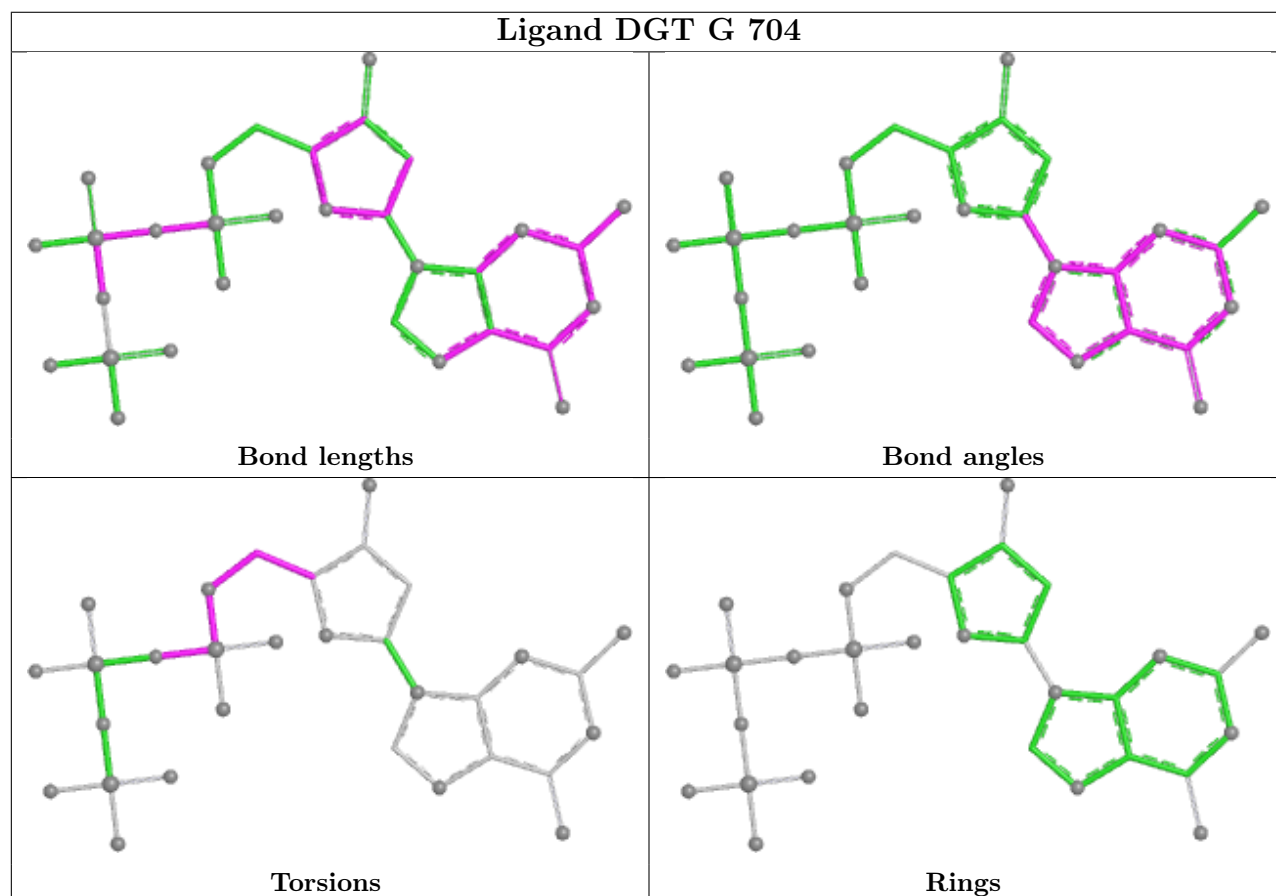
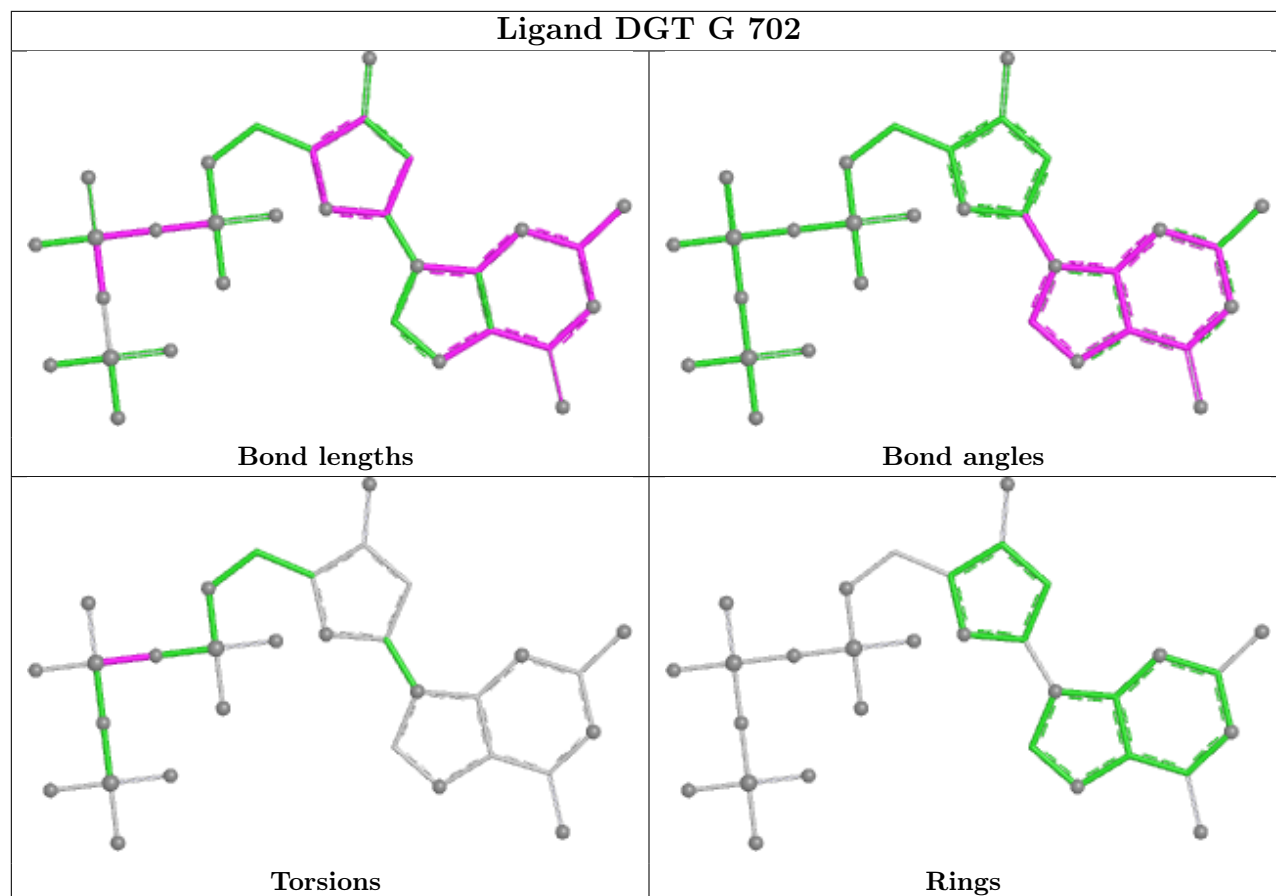


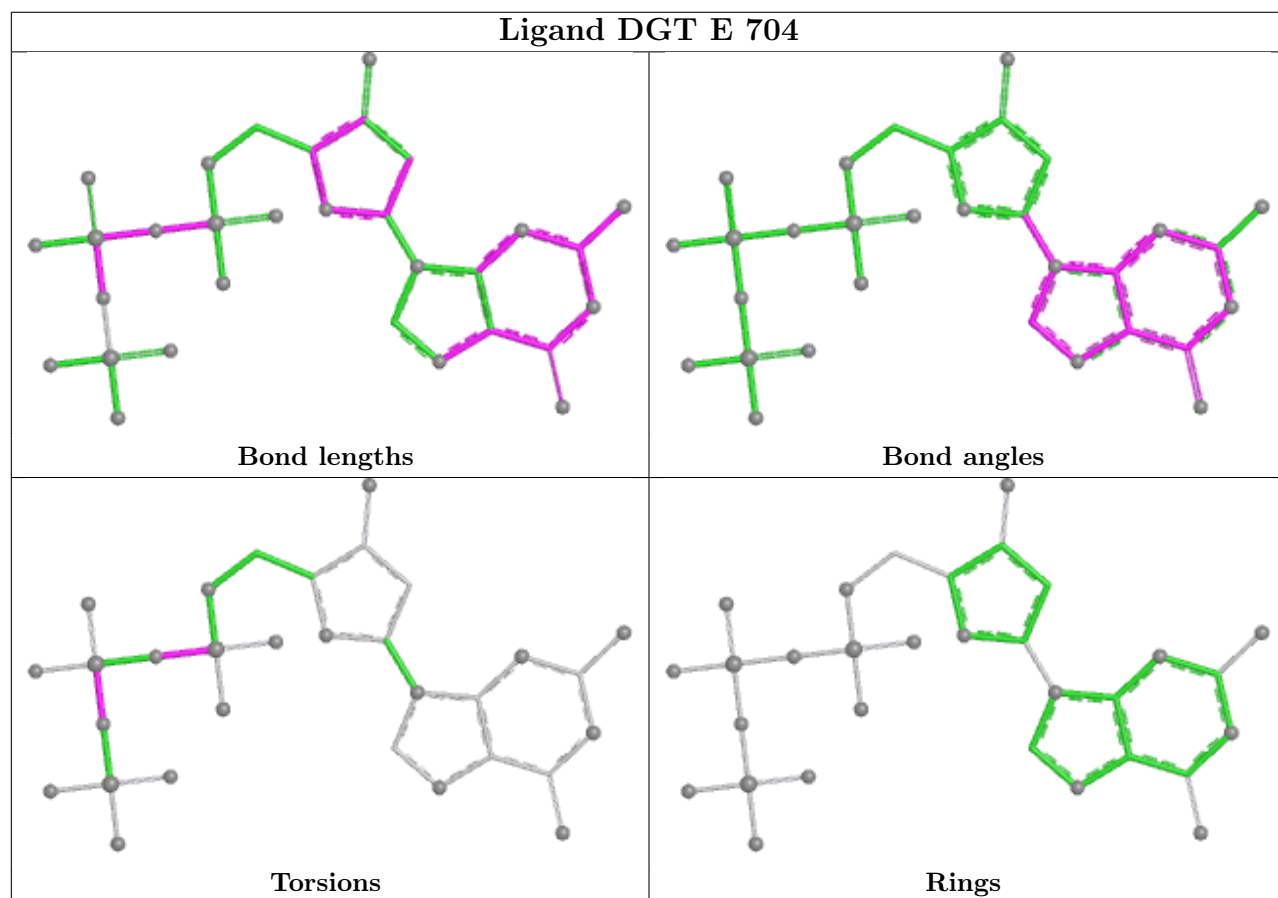
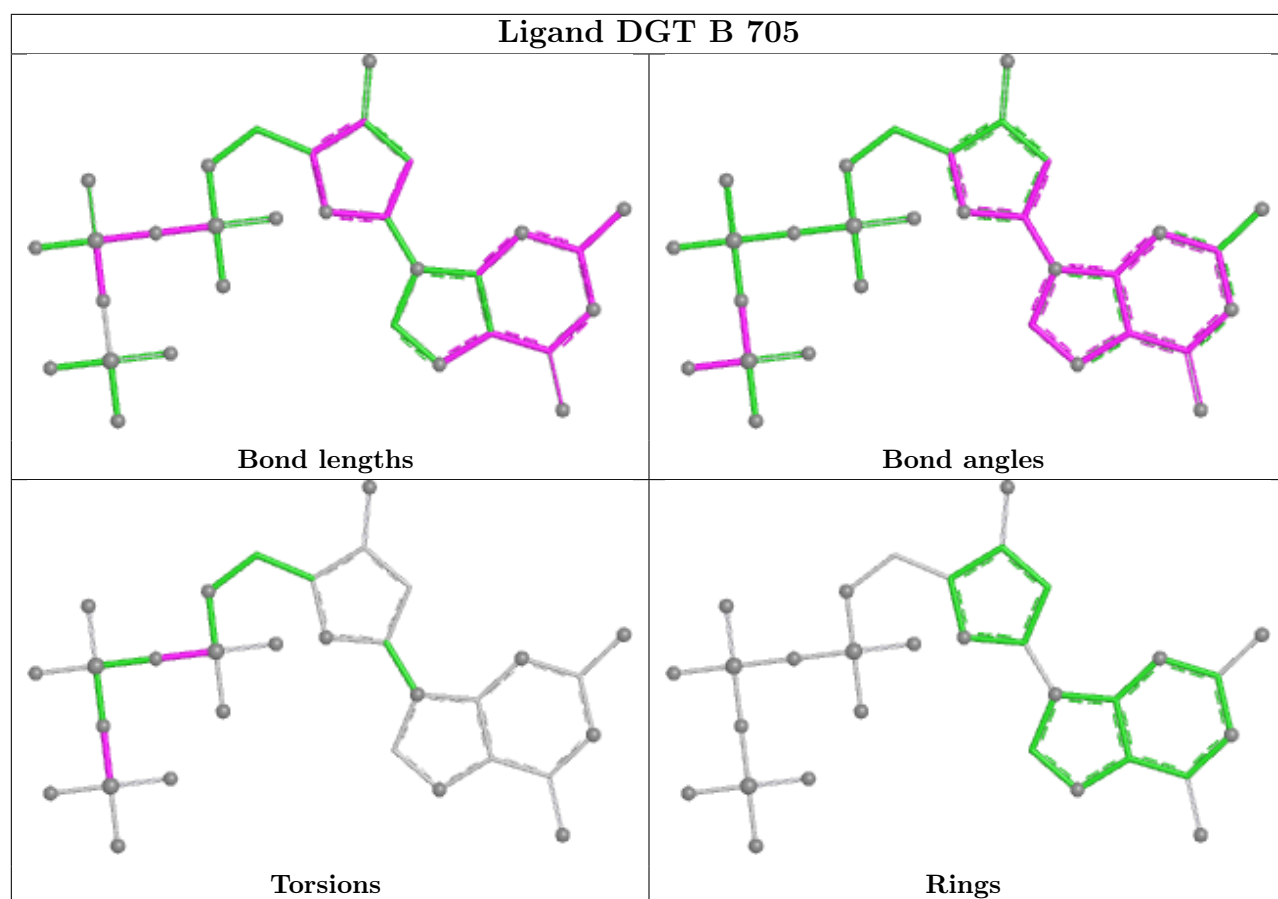
Ligand DGT E 701



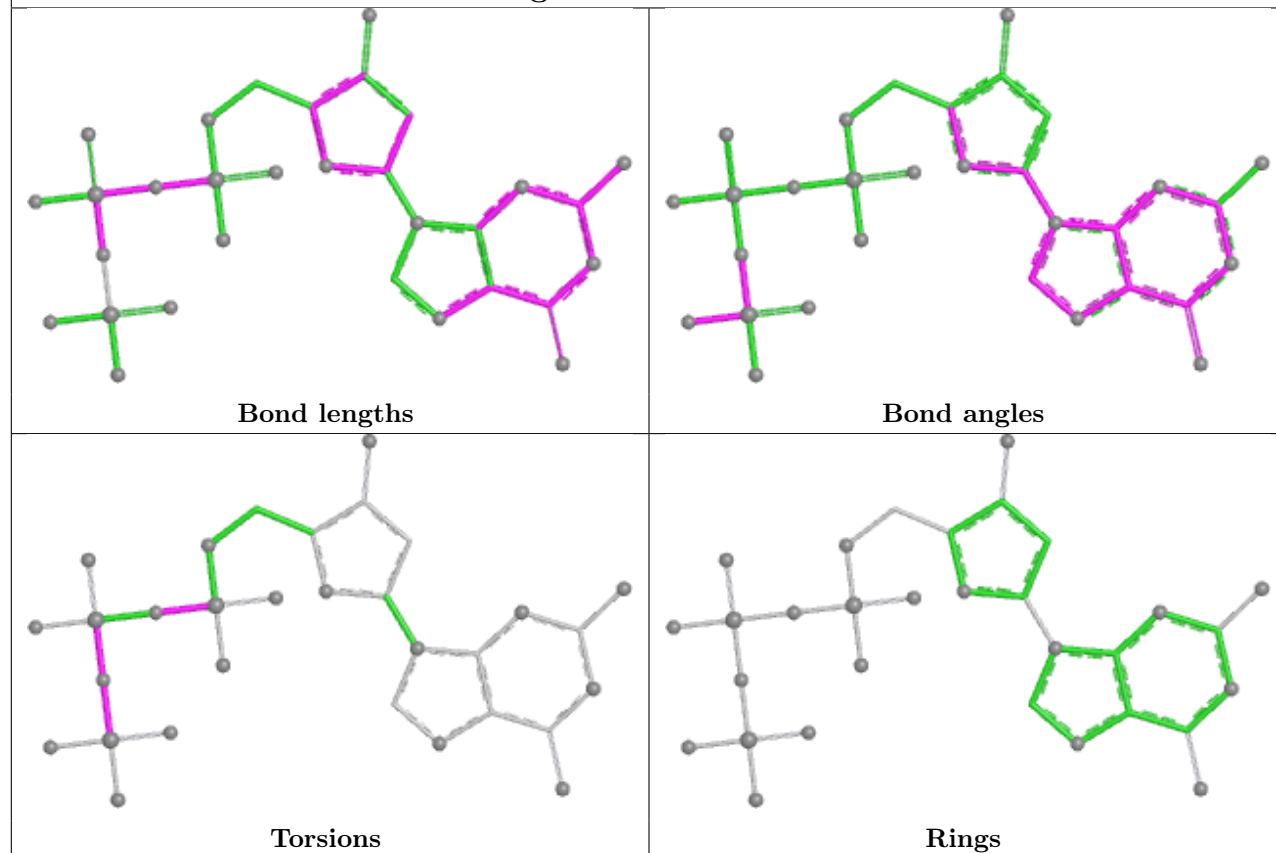
Ligand DGT C 705



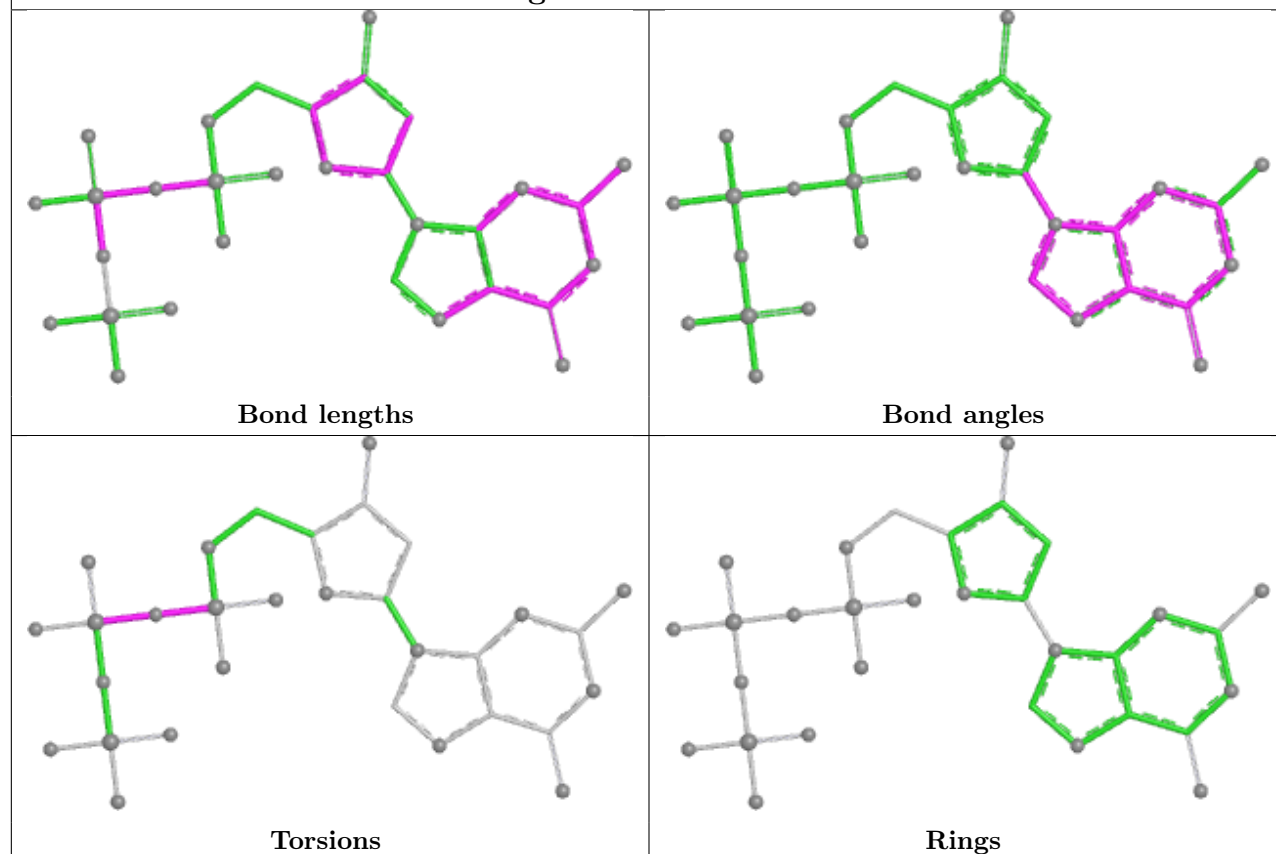




Ligand DGT E 703



Ligand DGT D 701



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	453/524 (86%)	0.47	12 (2%) 57 54	33, 51, 72, 94	0
1	B	453/524 (86%)	0.56	21 (4%) 37 34	38, 54, 79, 92	0
1	C	453/524 (86%)	0.47	14 (3%) 51 48	34, 50, 71, 81	0
1	D	387/524 (73%)	0.79	22 (5%) 29 26	37, 58, 74, 92	0
1	E	387/524 (73%)	0.81	32 (8%) 17 14	40, 60, 80, 93	0
1	F	453/524 (86%)	0.57	15 (3%) 49 45	37, 56, 82, 97	0
1	G	381/524 (72%)	0.72	24 (6%) 26 23	36, 58, 76, 92	0
1	H	381/524 (72%)	0.83	30 (7%) 18 16	43, 62, 83, 94	0
All	All	3348/4192 (79%)	0.64	170 (5%) 33 29	33, 56, 78, 97	0

The worst 5 of 170 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	216	MET	4.5
1	F	403	GLU	4.2
1	D	504	ILE	4.1
1	G	451	ARG	4.1
1	H	404	GLY	4.0

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 ⓘ

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
3	MG	E	702	1/1	0.51	0.28	84,84,84,84	0
3	MG	H	702	1/1	0.56	0.30	88,88,88,88	0
3	MG	G	705	1/1	0.79	0.27	76,76,76,76	0
3	MG	B	704	1/1	0.80	0.28	53,53,53,53	0
3	MG	D	704	1/1	0.81	0.20	61,61,61,61	0
3	MG	A	702	1/1	0.82	0.16	57,57,57,57	0
2	DGT	H	701	31/31	0.83	0.12	59,63,68,68	0
2	DGT	G	704	31/31	0.87	0.12	66,68,69,70	0
2	DGT	D	703	31/31	0.87	0.12	64,70,73,75	0
2	DGT	F	702	31/31	0.88	0.12	61,64,70,71	0
3	MG	F	703	1/1	0.88	0.15	58,58,58,58	0
2	DGT	A	703	31/31	0.88	0.28	88,91,96,98	0
2	DGT	A	701	31/31	0.88	0.12	58,61,63,64	0
2	DGT	E	701	31/31	0.89	0.11	60,63,67,68	0
2	DGT	G	706	31/31	0.89	0.14	51,55,59,59	0
2	DGT	B	703	31/31	0.90	0.11	59,62,70,71	0
2	DGT	D	705	31/31	0.90	0.16	71,73,76,77	0
3	MG	G	703	1/1	0.91	0.22	49,49,49,49	0
2	DGT	B	705	31/31	0.91	0.20	59,64,70,71	0
2	DGT	C	701	31/31	0.91	0.10	52,56,59,60	0
2	DGT	H	703	31/31	0.92	0.13	57,59,63,64	0
3	MG	C	702	1/1	0.92	0.15	56,56,56,56	0
2	DGT	B	702	31/31	0.92	0.14	63,66,68,69	0
3	MG	A	705	1/1	0.92	0.13	60,60,60,60	0
2	DGT	C	705	31/31	0.93	0.16	60,64,70,71	0
2	DGT	E	704	31/31	0.93	0.21	59,62,69,70	0
2	DGT	F	701	31/31	0.93	0.12	46,48,54,55	0
2	DGT	E	703	31/31	0.94	0.12	61,63,67,68	0
2	DGT	C	703	31/31	0.94	0.08	36,38,42,43	0
3	MG	G	701	1/1	0.94	0.10	59,59,59,59	0
2	DGT	C	706	31/31	0.94	0.08	46,49,52,53	0
2	DGT	D	701	31/31	0.94	0.08	35,37,39,41	0
2	DGT	H	705	31/31	0.94	0.21	60,64,69,71	0
3	MG	H	704	1/1	0.94	0.11	54,54,54,54	0
2	DGT	G	702	31/31	0.95	0.08	34,36,38,40	0
3	MG	E	705	1/1	0.95	0.18	57,57,57,57	0
3	MG	B	701	1/1	0.96	0.05	50,50,50,50	0

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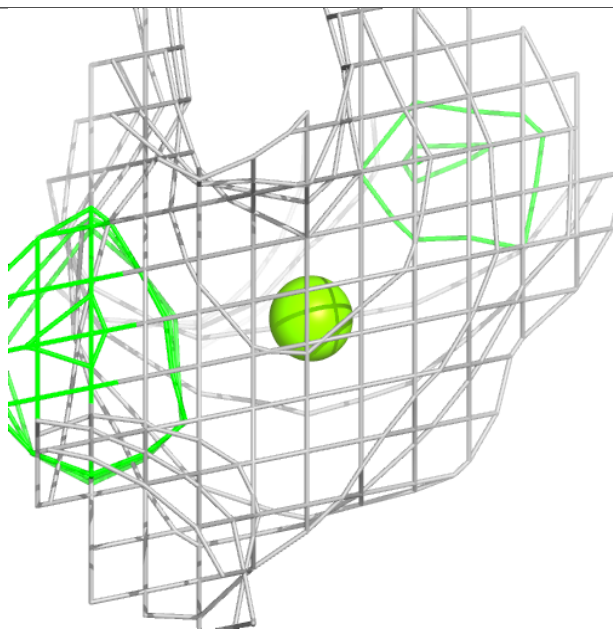
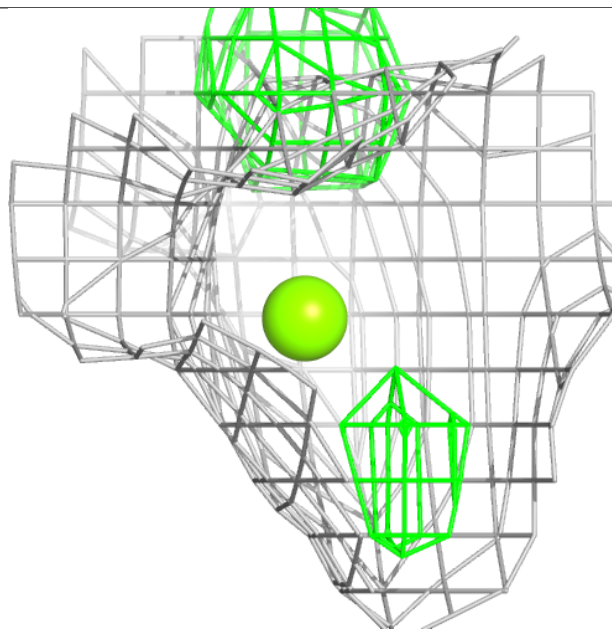
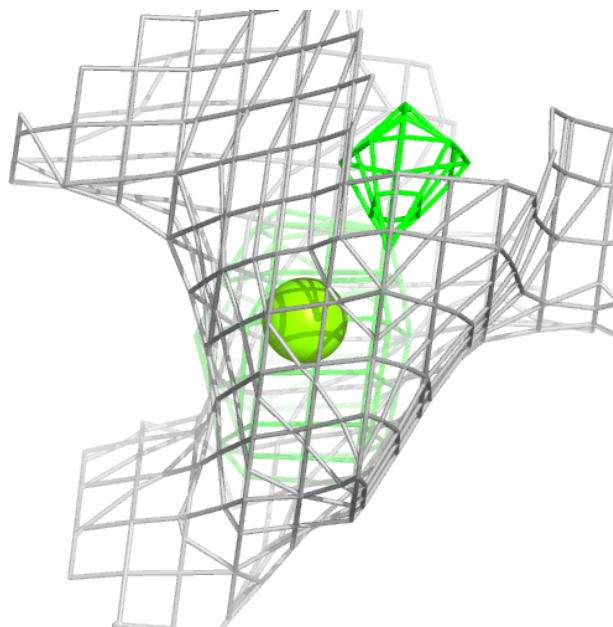
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	DGT	A	704	31/31	0.96	0.07	39,42,44,45	0
3	MG	D	702	1/1	0.97	0.09	59,59,59,59	0
3	MG	C	704	1/1	0.98	0.10	55,55,55,55	0

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.

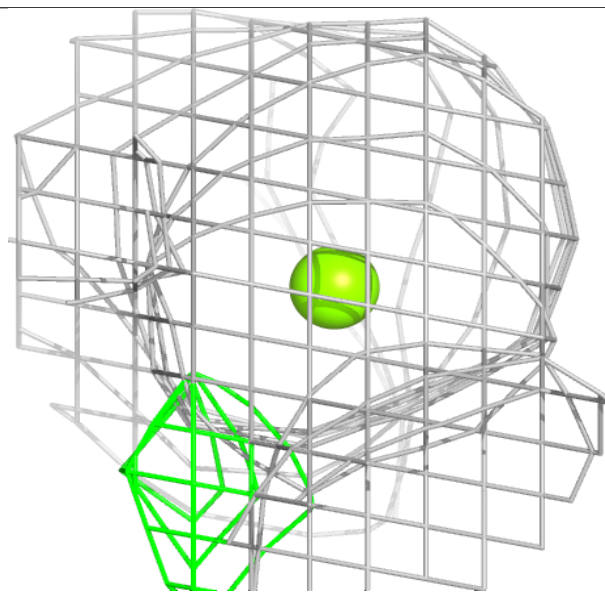
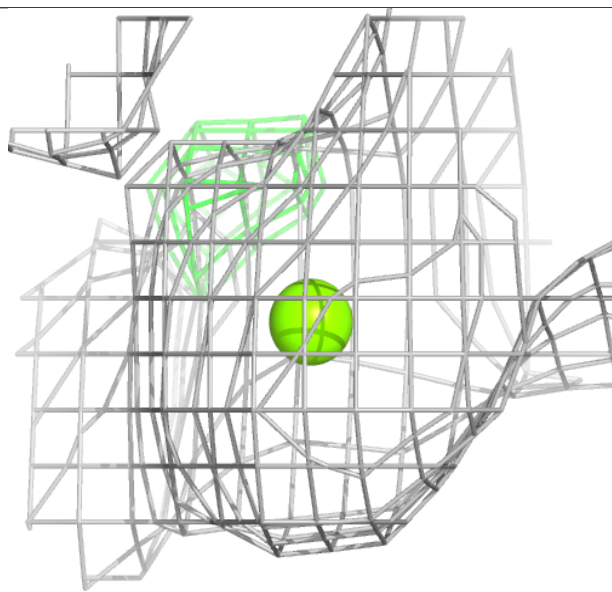
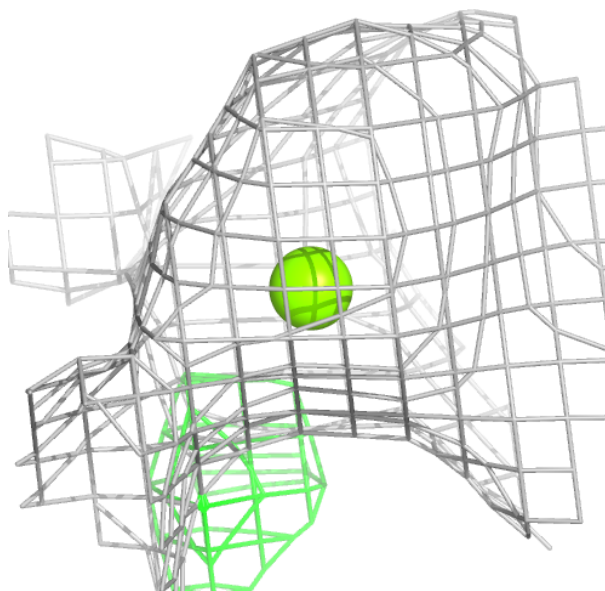
Electron density around MG E 702:

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



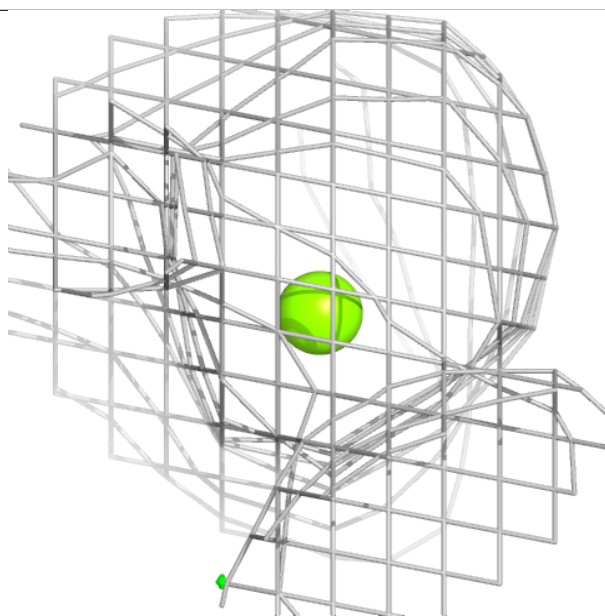
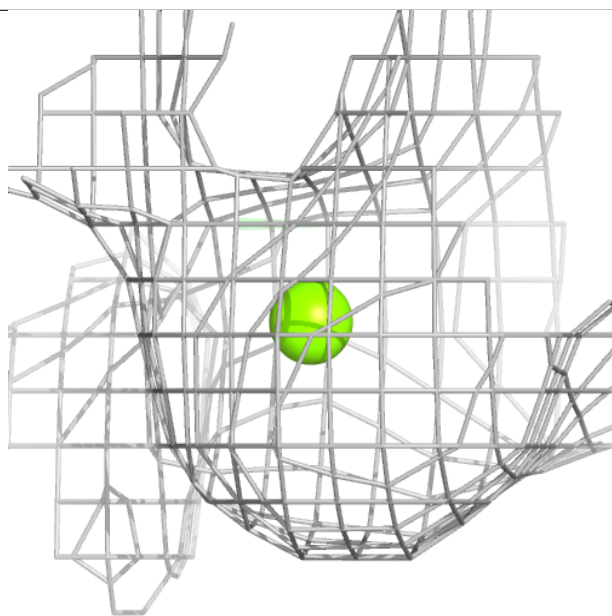
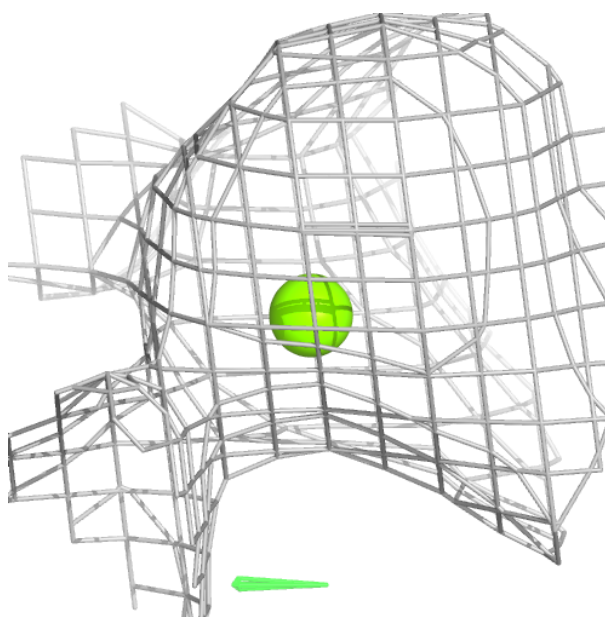
Electron density around MG H 702:

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



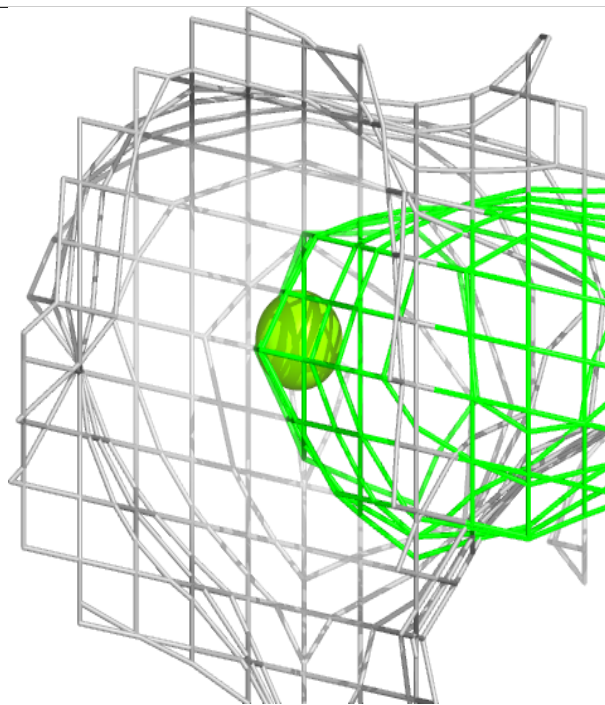
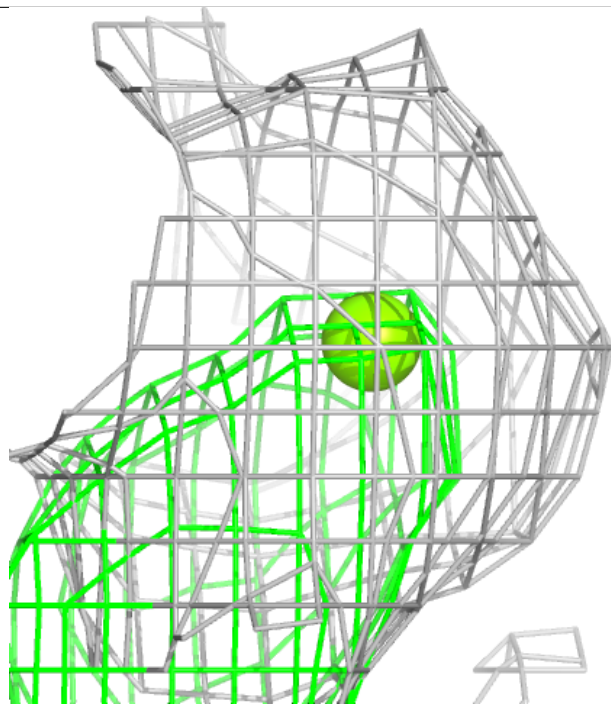
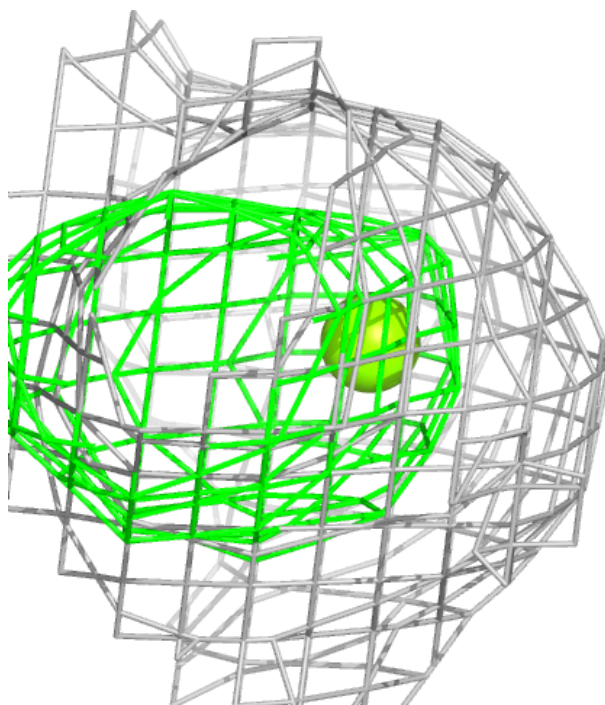
Electron density around MG G 705:

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



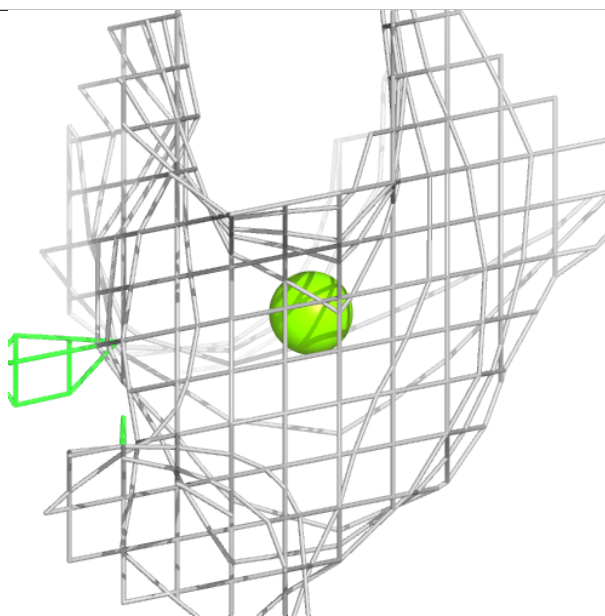
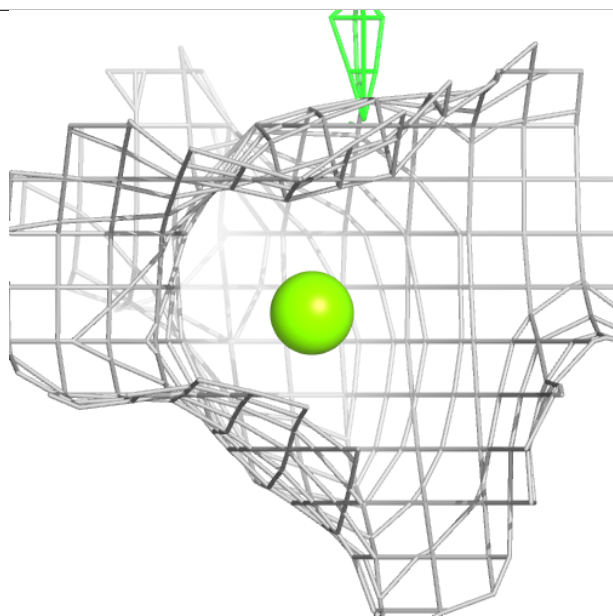
Electron density around MG B 704:

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



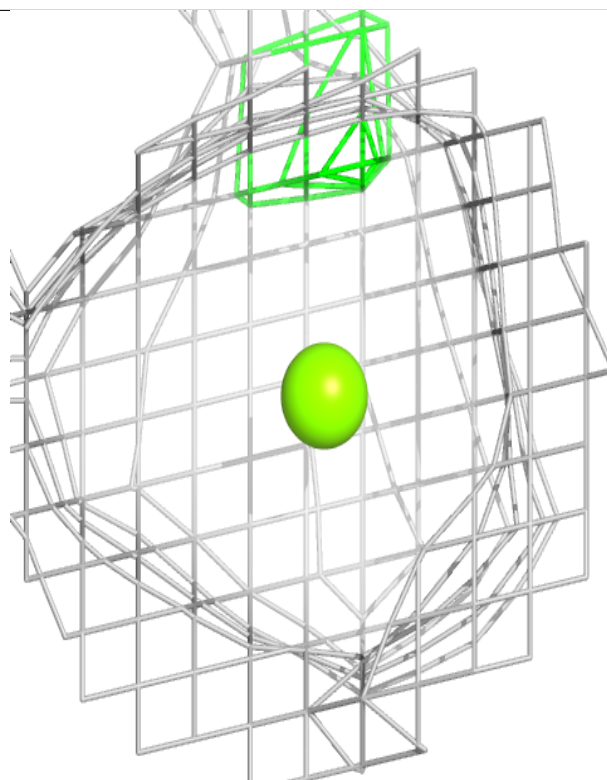
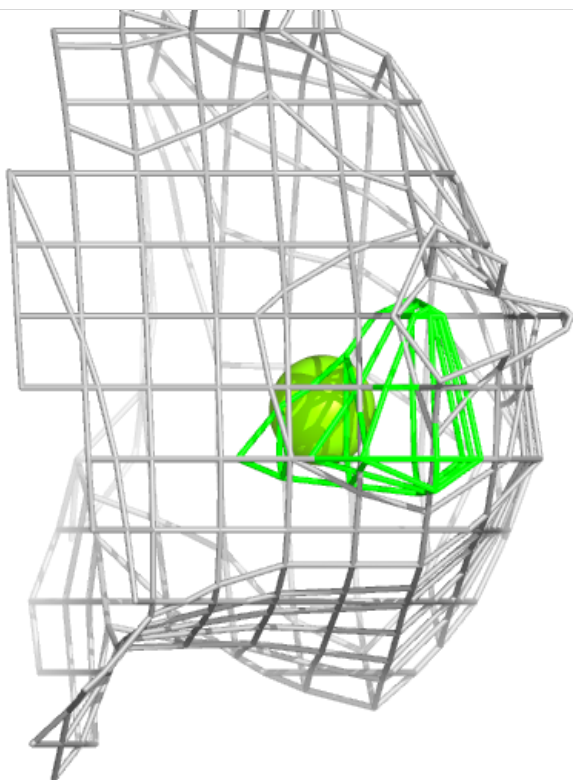
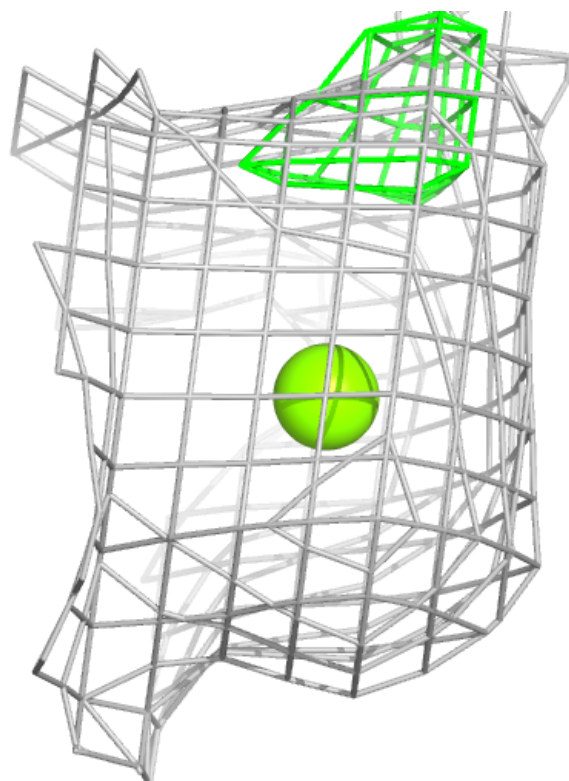
Electron density around MG D 704:

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



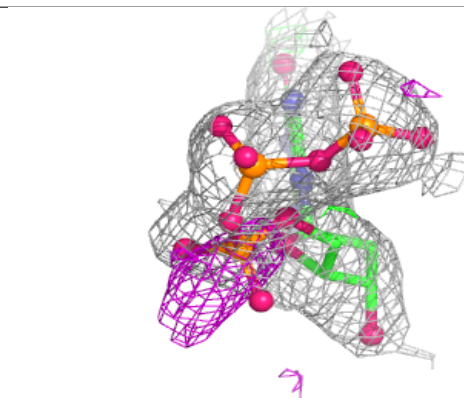
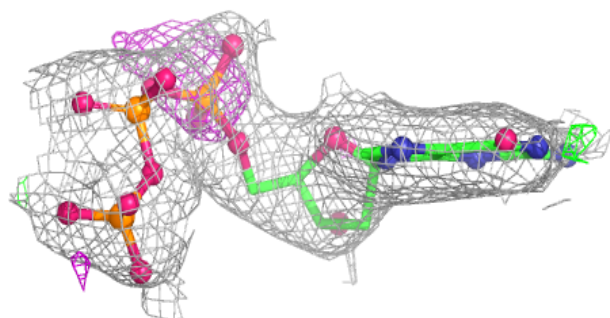
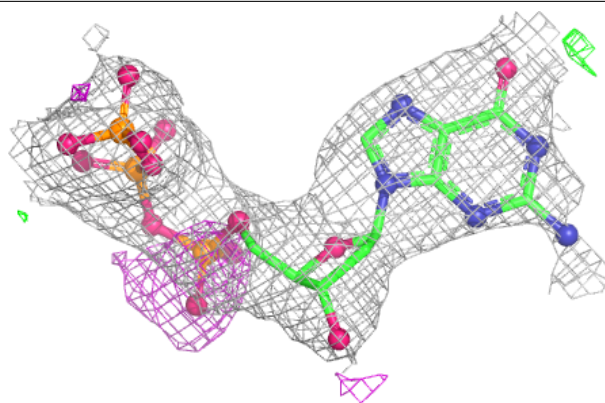
Electron density around MG A 702:

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

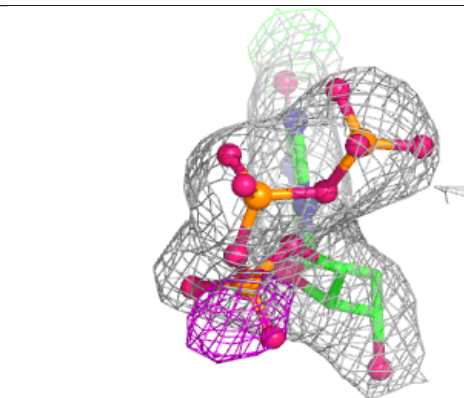
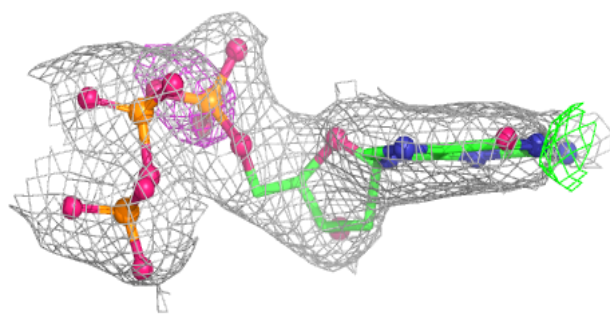
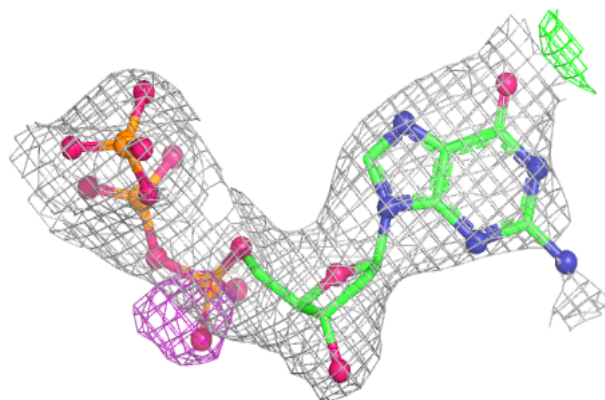


Electron density around DGT H 701:

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

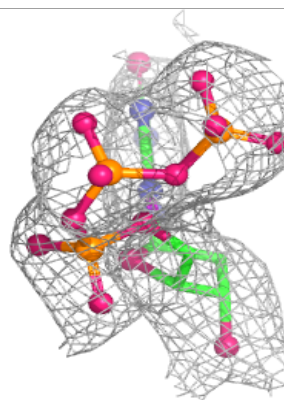
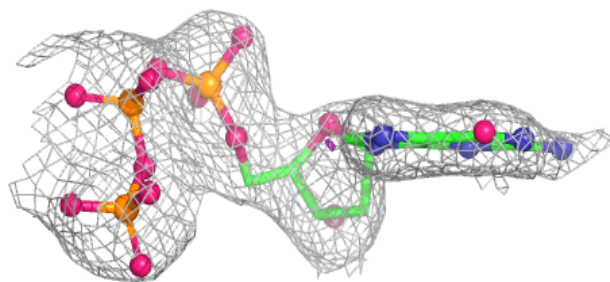
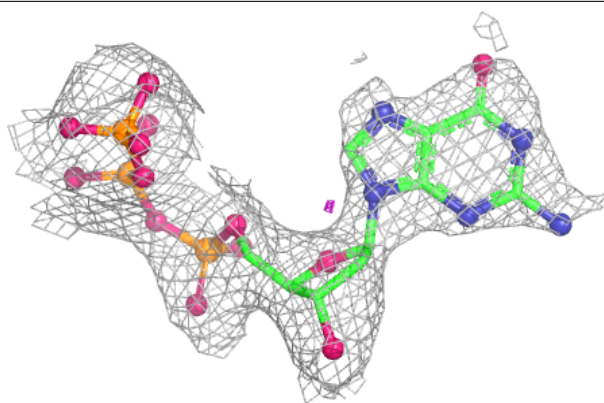
**Electron density around DGT G 704:**

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

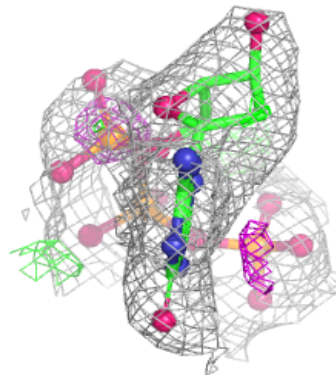
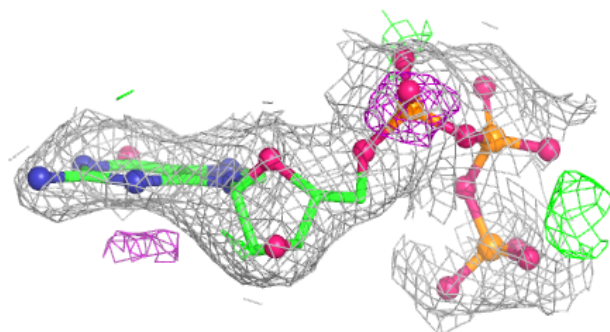
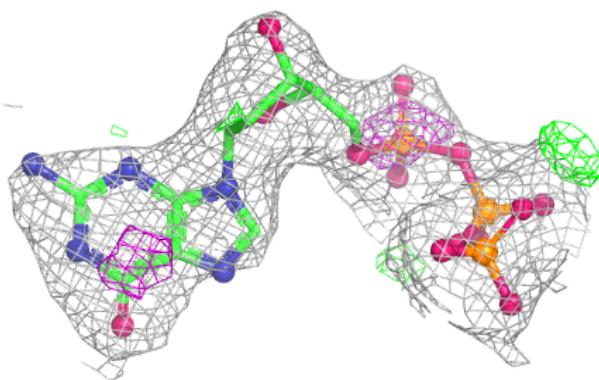


Electron density around DGT D 703:

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

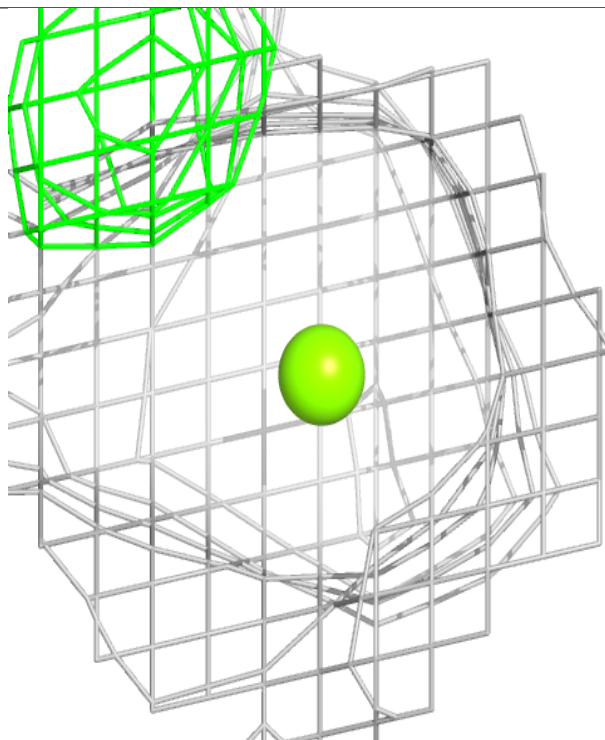
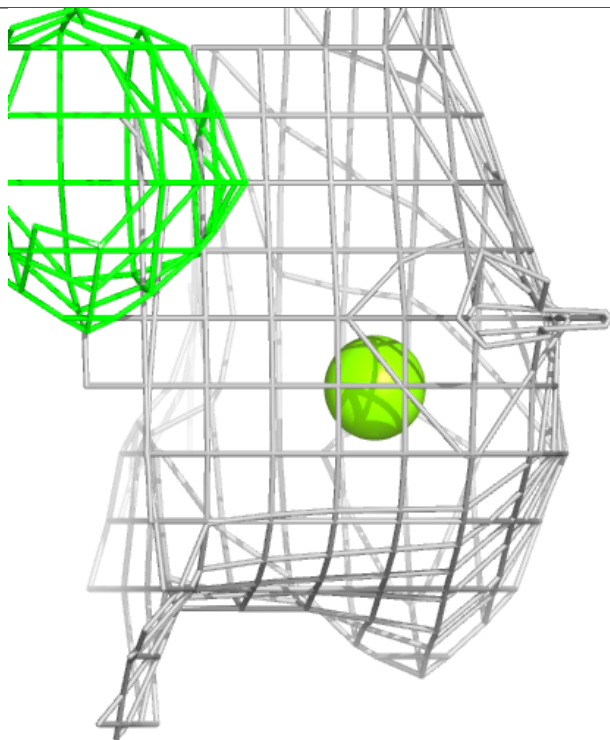
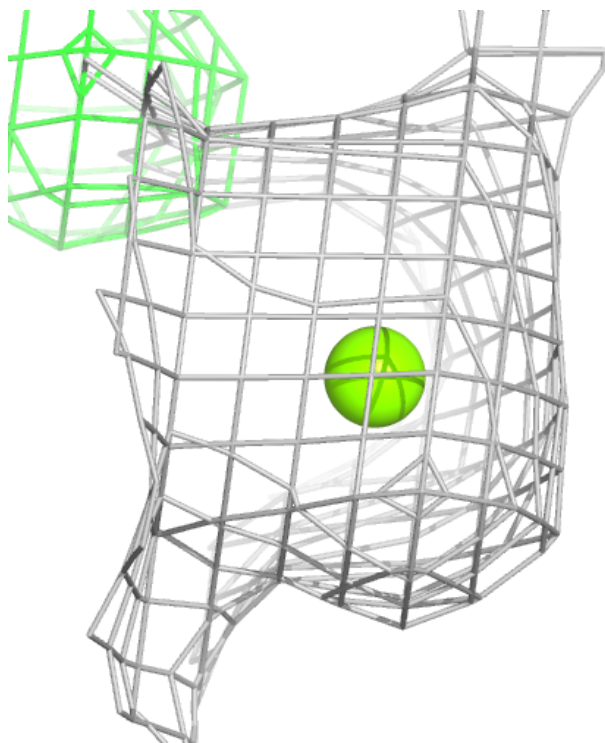
**Electron density around DGT F 702:**

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



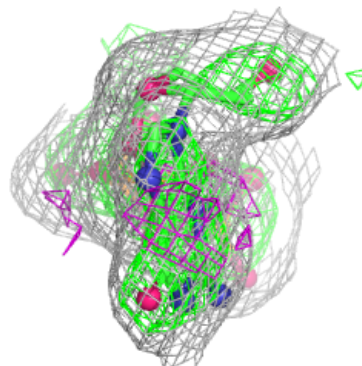
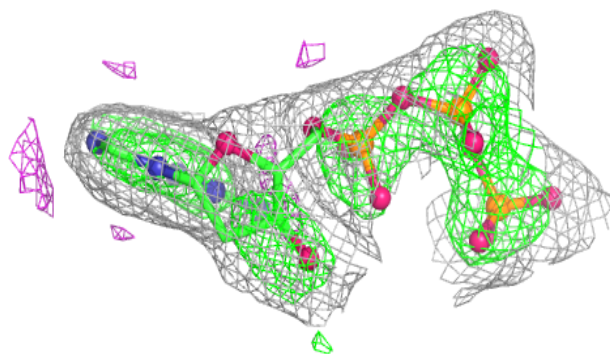
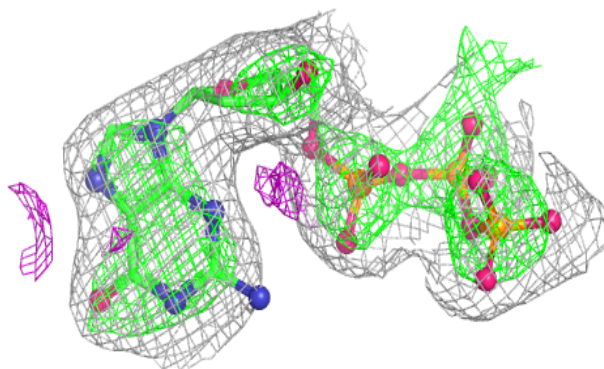
Electron density around MG F 703:

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

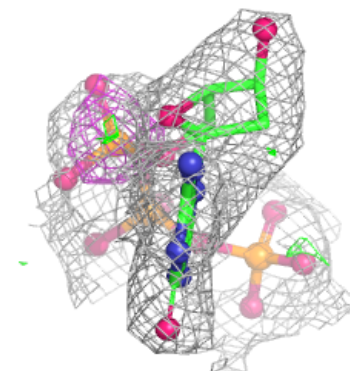
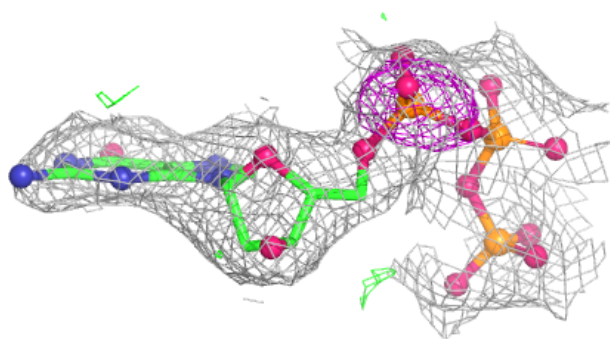
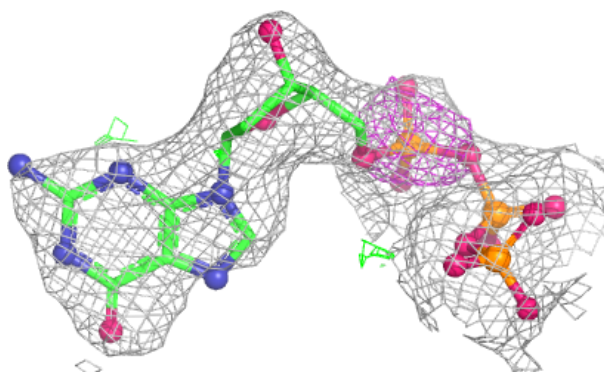


Electron density around DGT A 703:

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

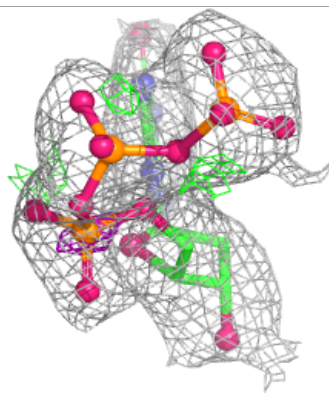
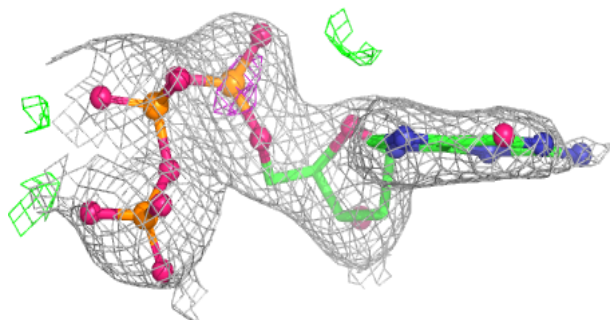
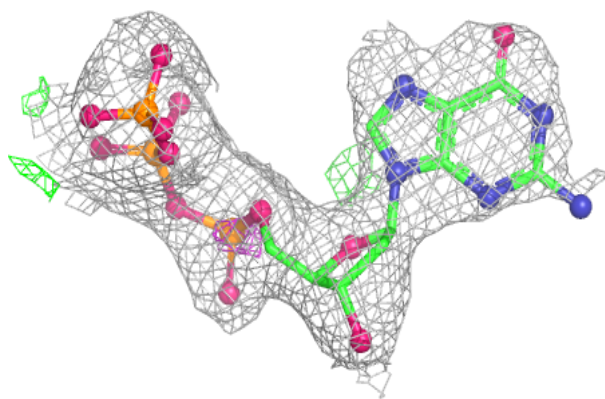
**Electron density around DGT A 701:**

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

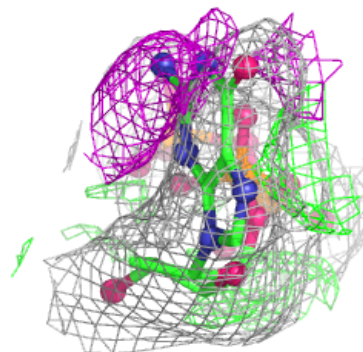
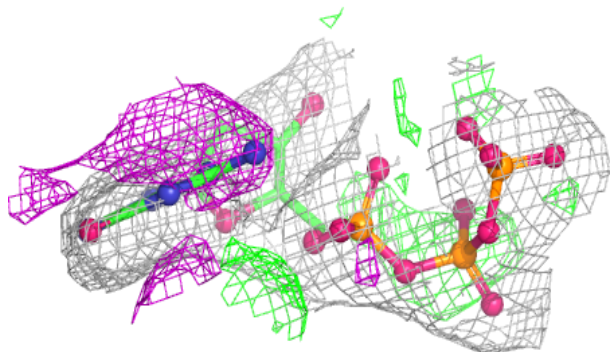
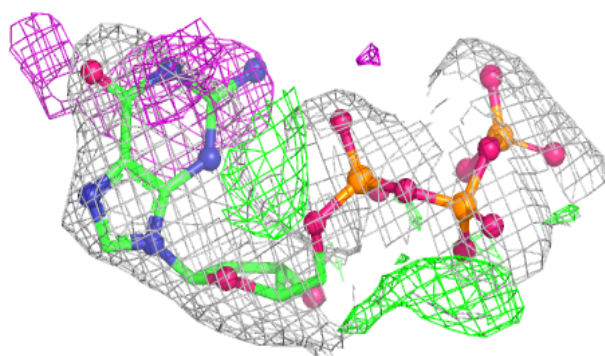


Electron density around DGT E 701:

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

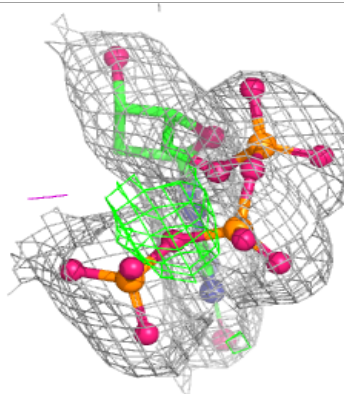
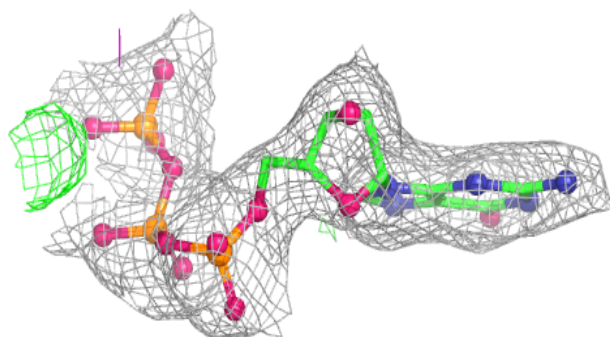
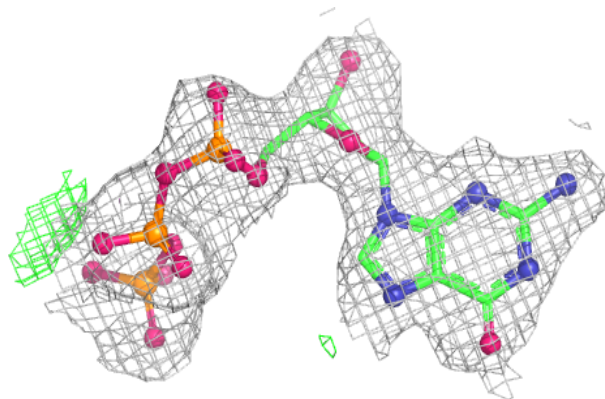
**Electron density around DGT G 706:**

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

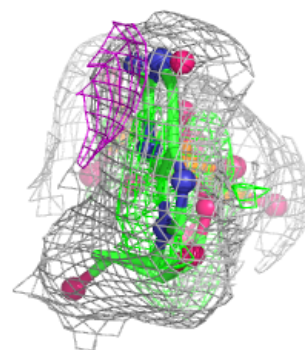
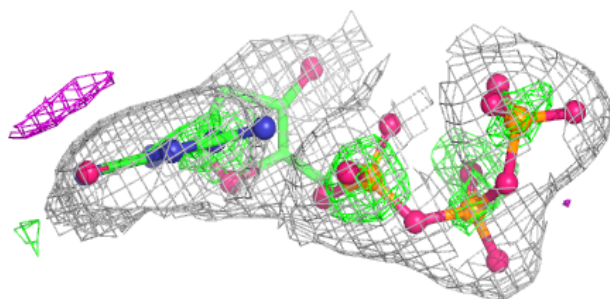
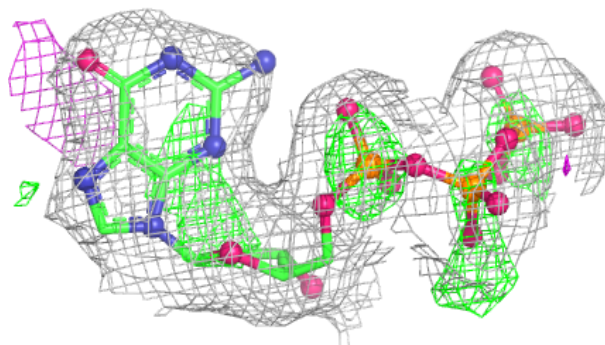


Electron density around DGT B 703:

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

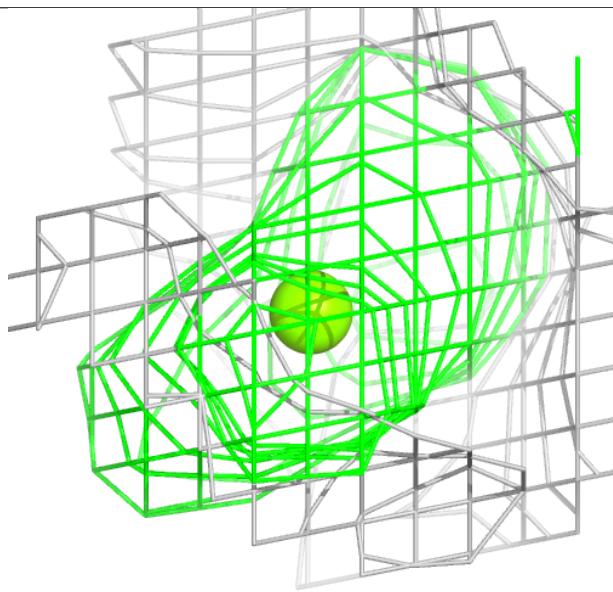
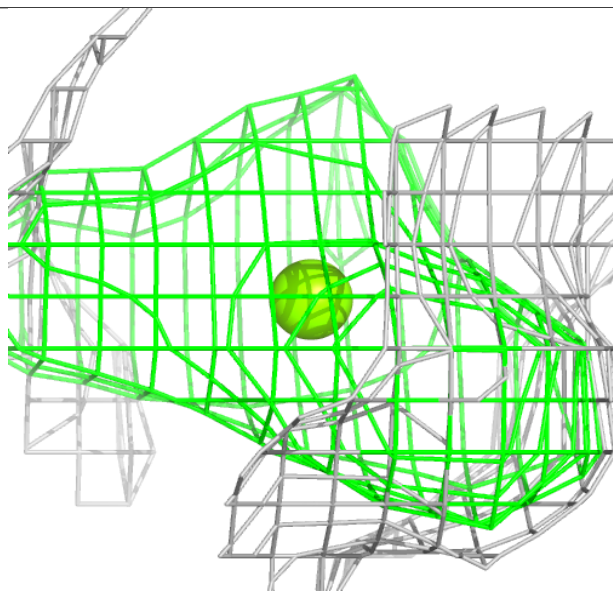
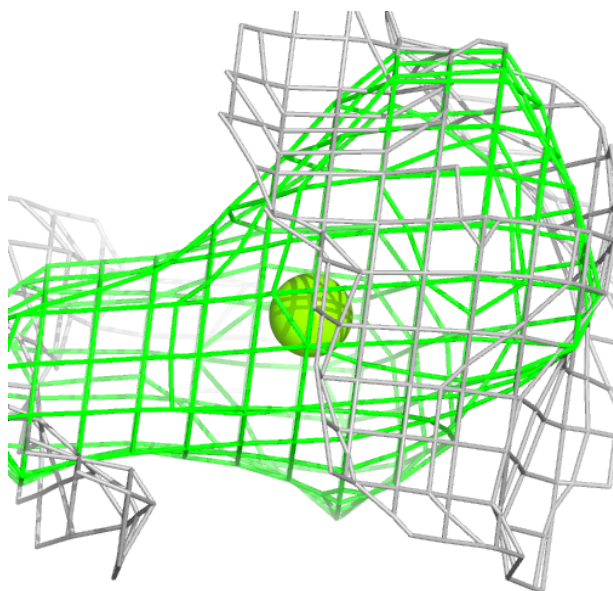
**Electron density around DGT D 705:**

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



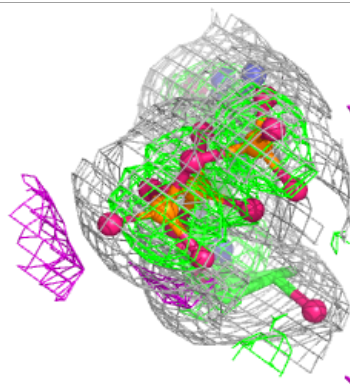
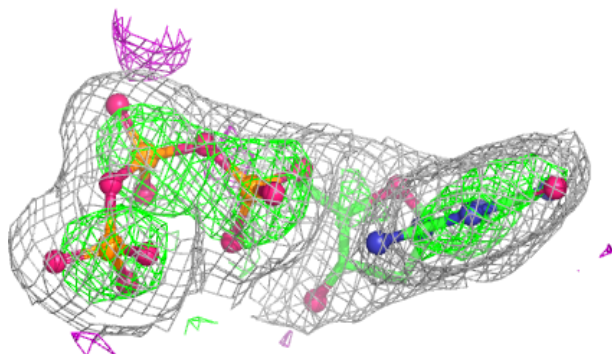
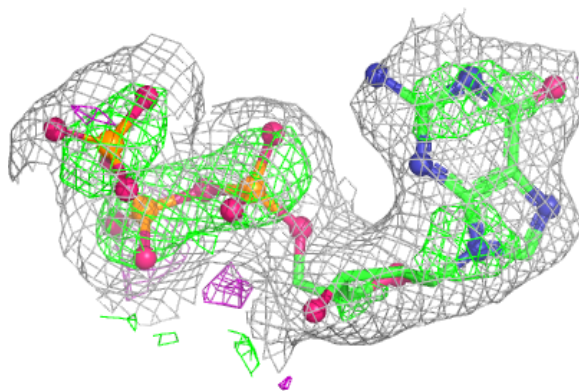
Electron density around MG G 703:

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

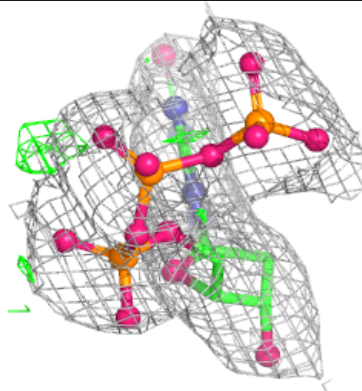
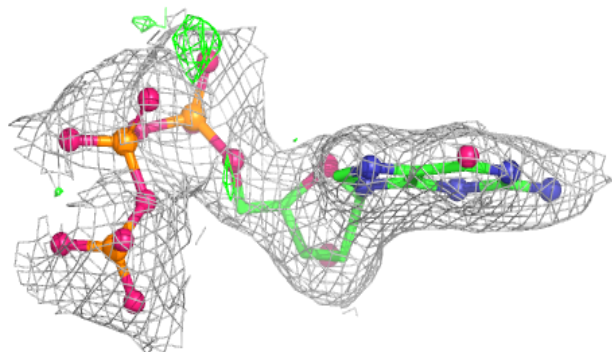
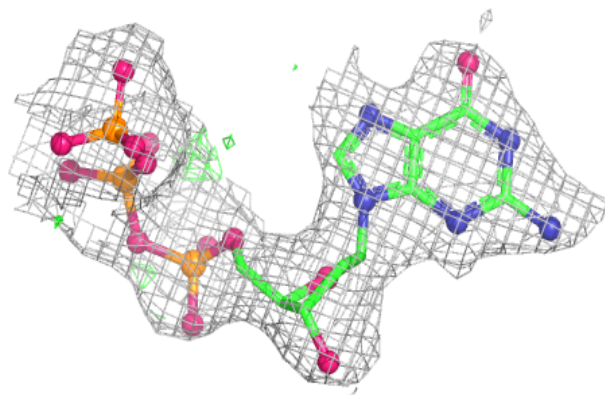


Electron density around DGT B 705:

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

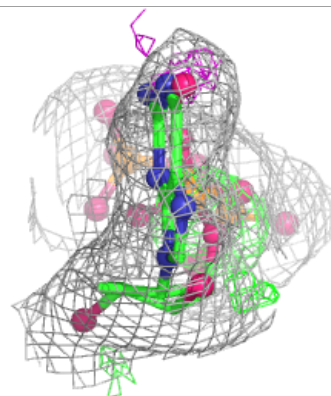
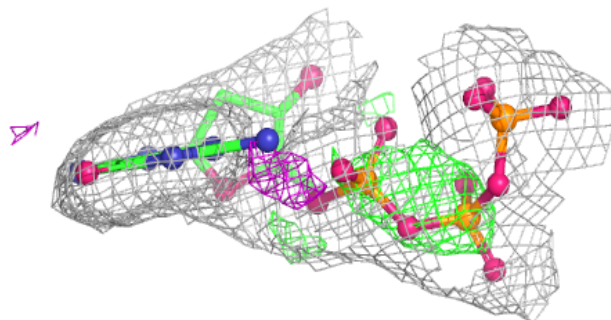
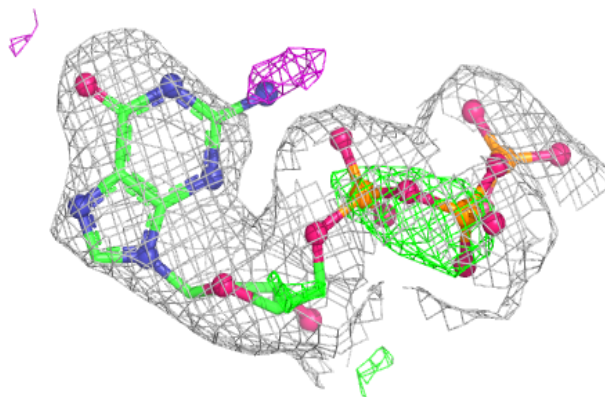
**Electron density around DGT C 701:**

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



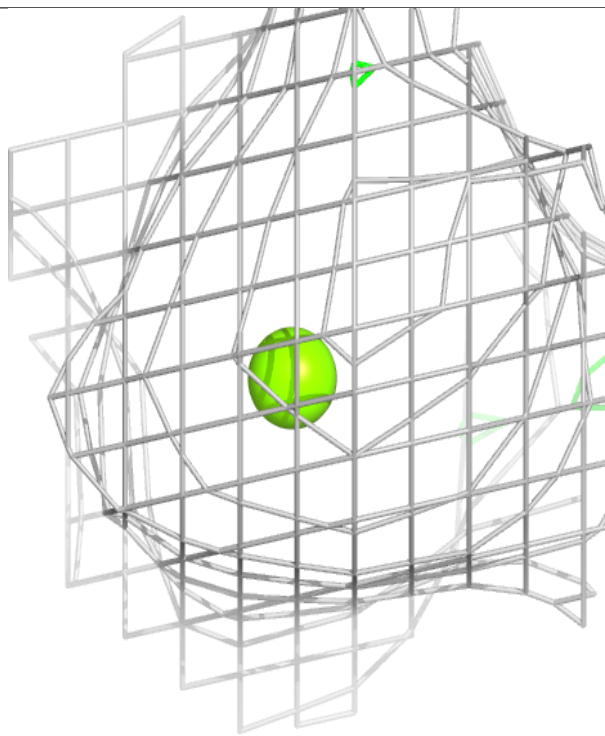
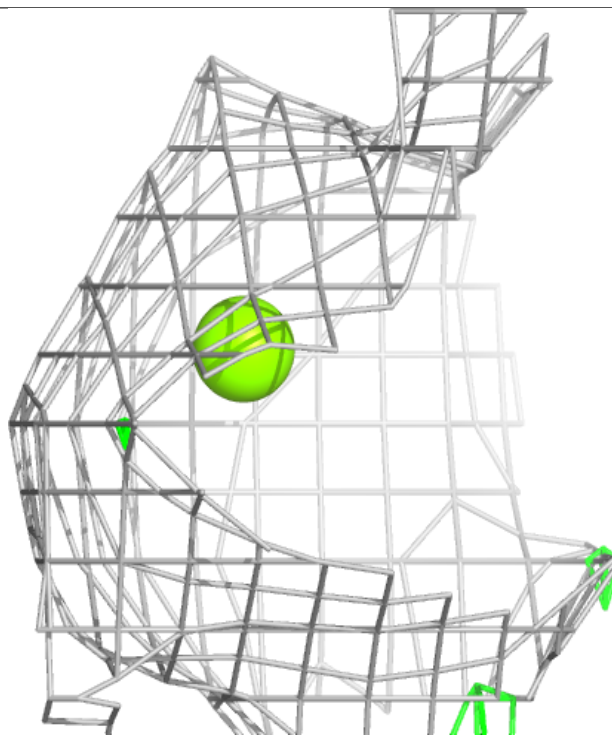
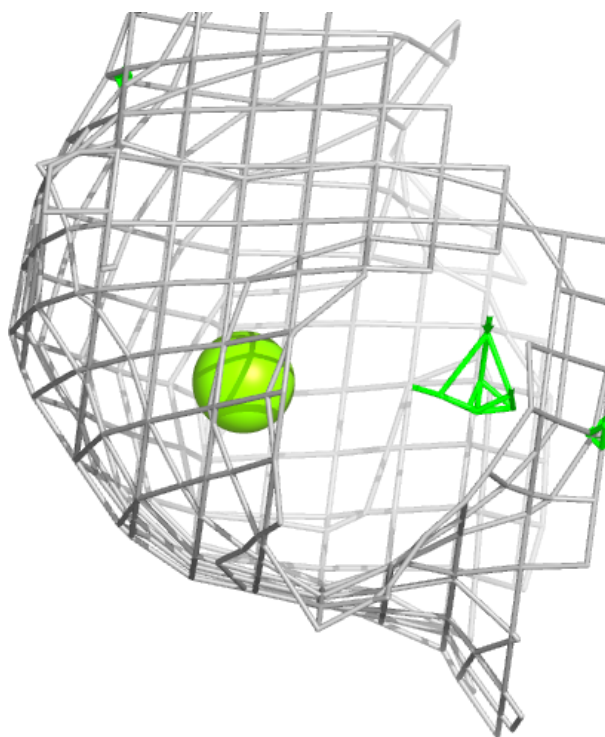
Electron density around DGT H 703:

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



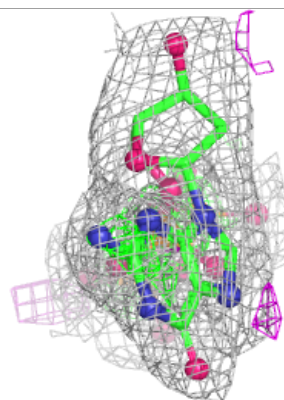
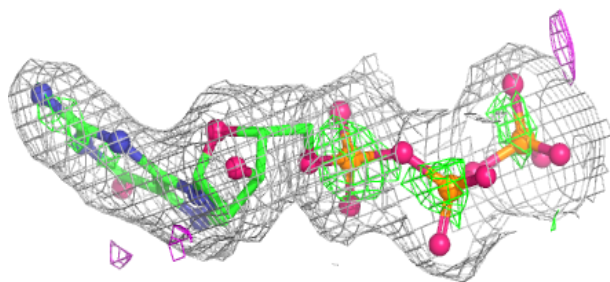
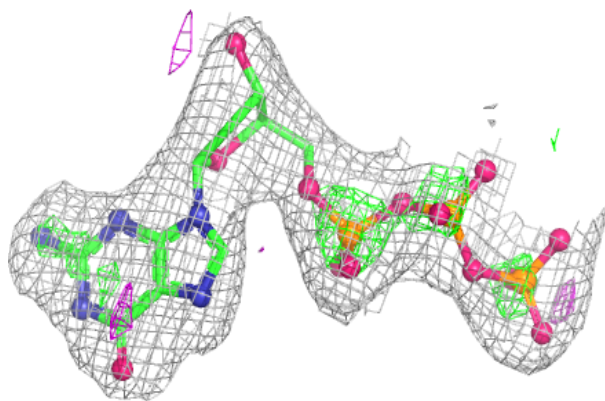
Electron density around MG C 702:

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



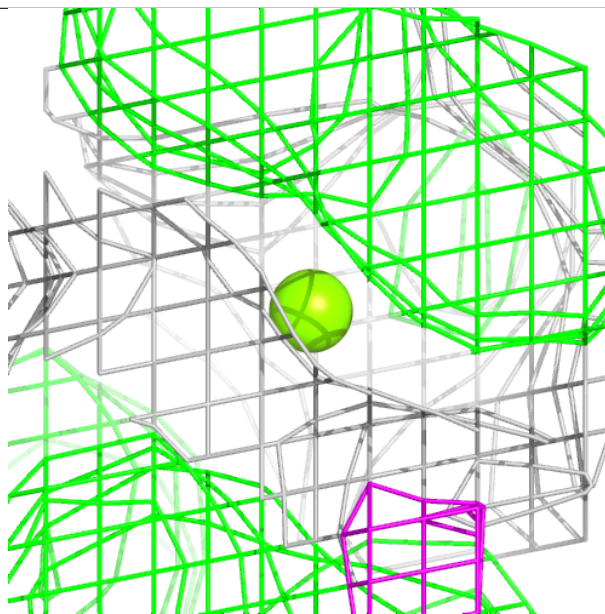
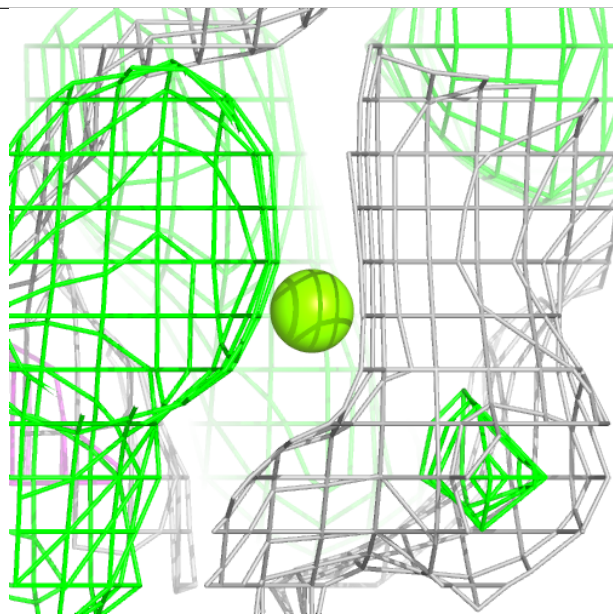
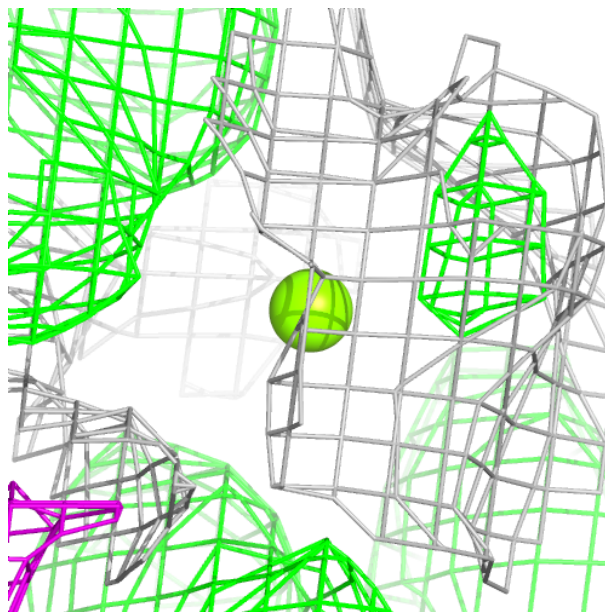
Electron density around DGT B 702:

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



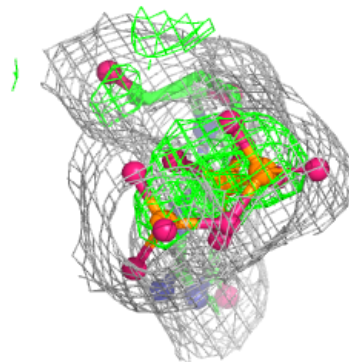
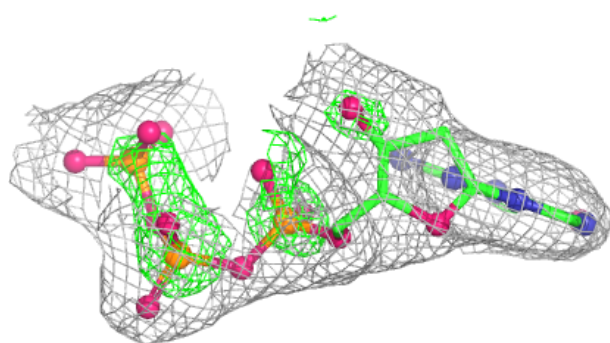
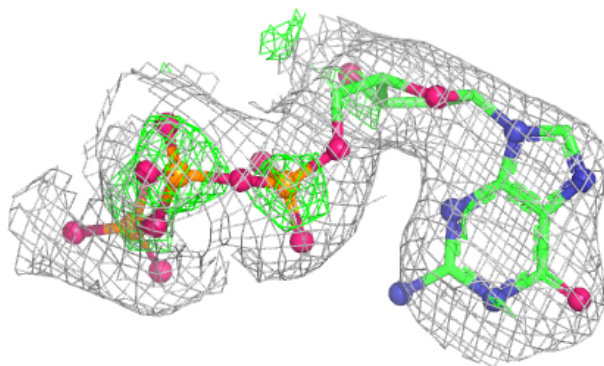
Electron density around MG A 705:

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

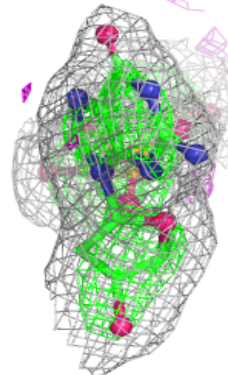
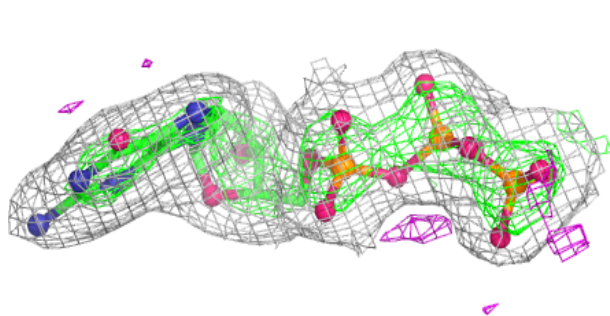
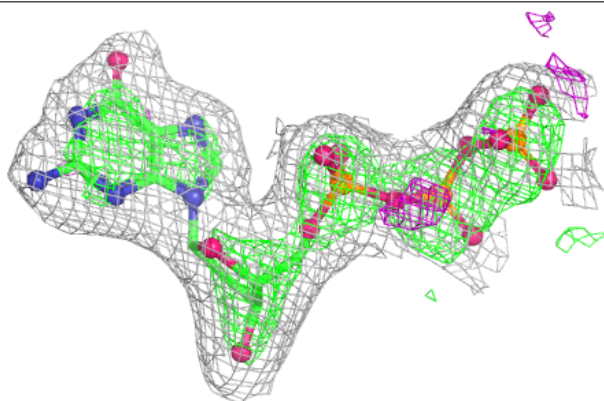


Electron density around DGT C 705:

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

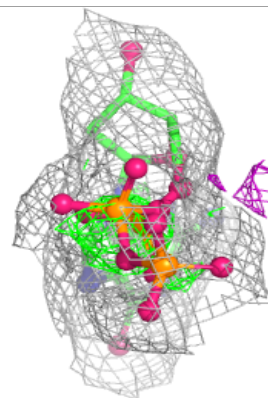
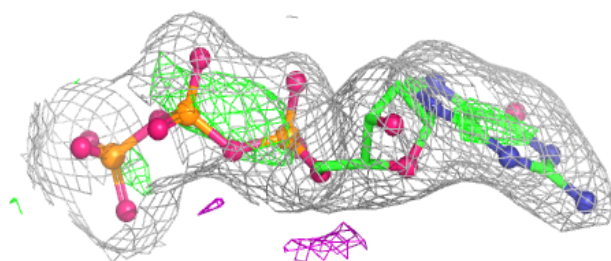
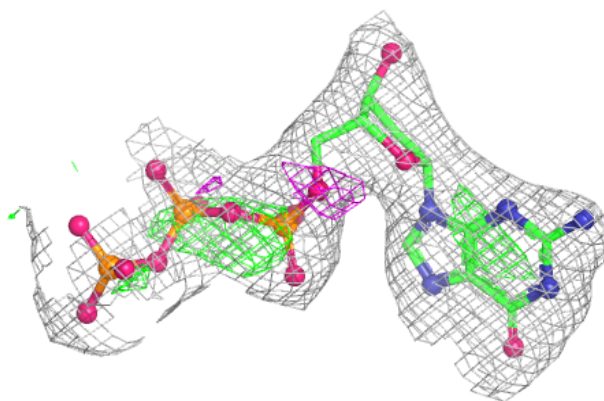
**Electron density around DGT E 704:**

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

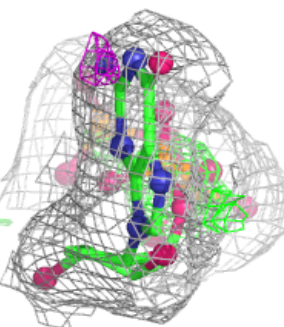
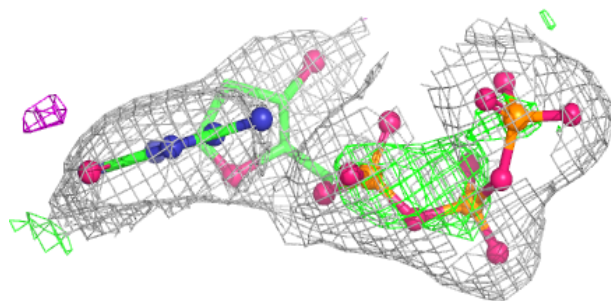
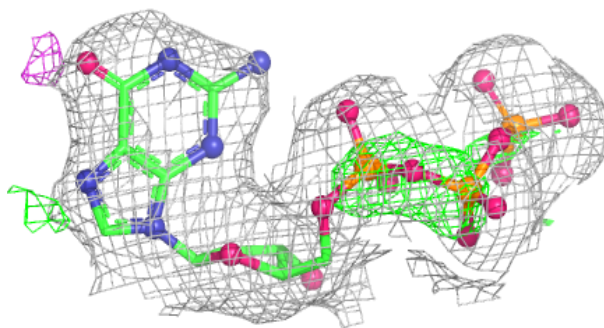


Electron density around DGT F 701:

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

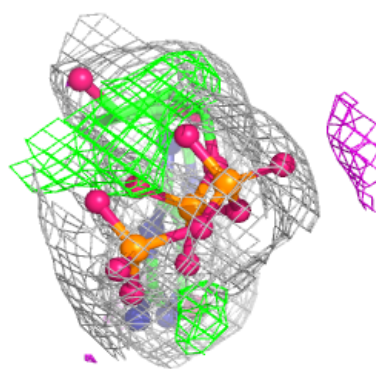
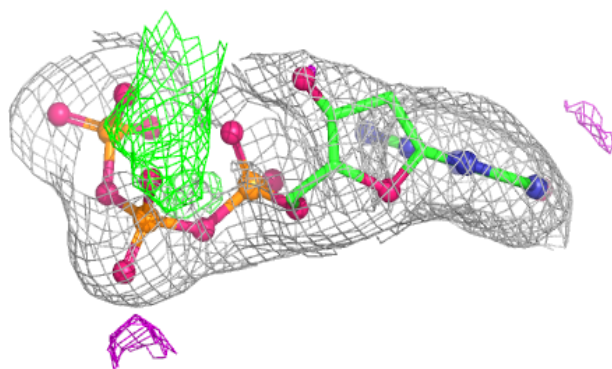
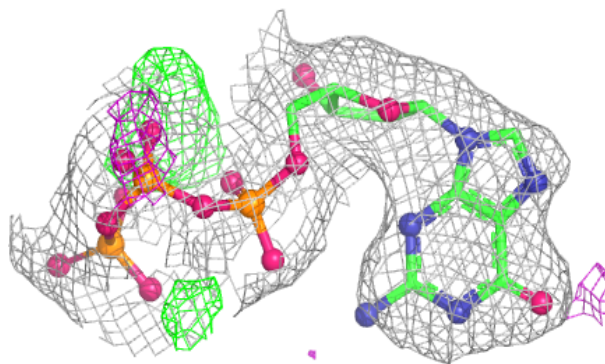
**Electron density around DGT E 703:**

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



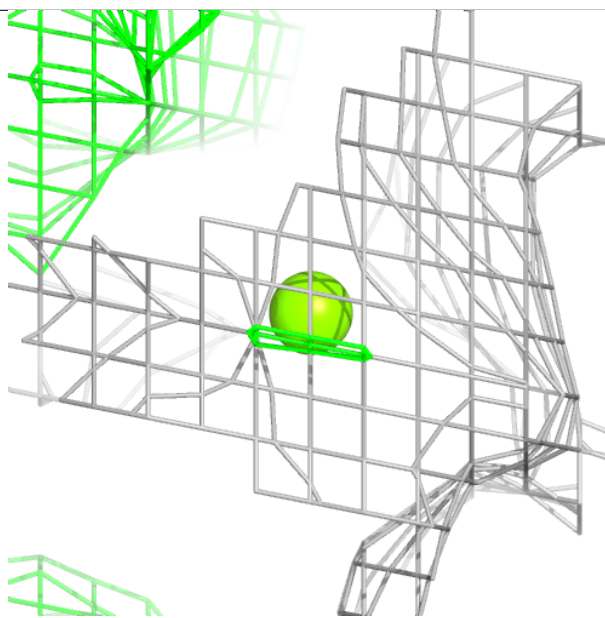
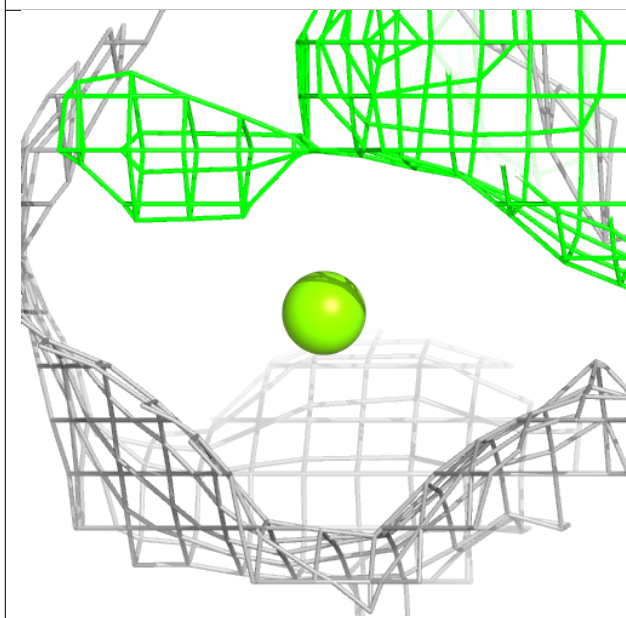
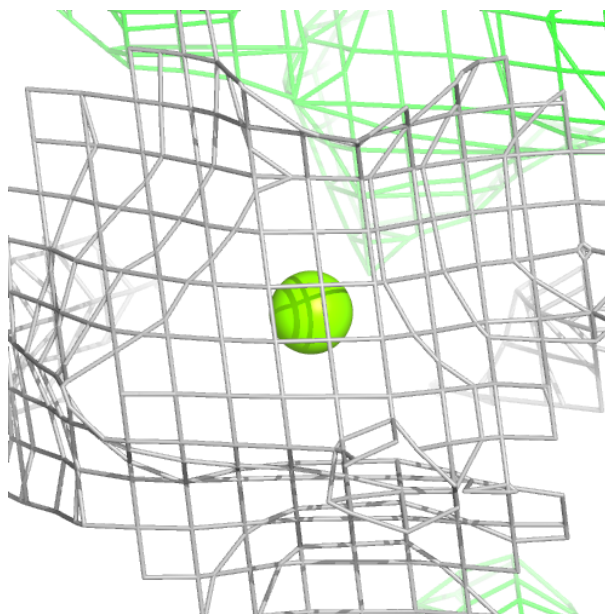
Electron density around DGT C 703:

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



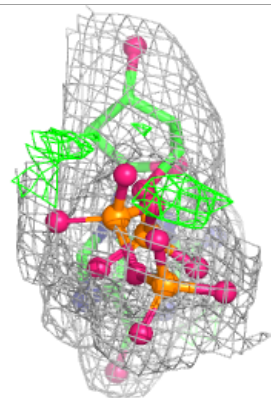
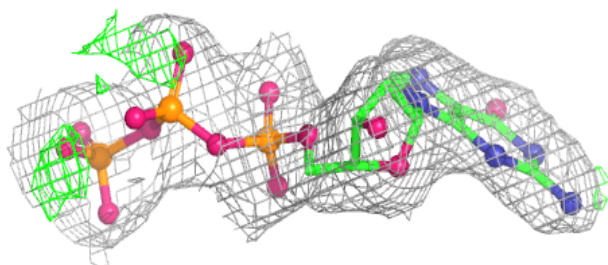
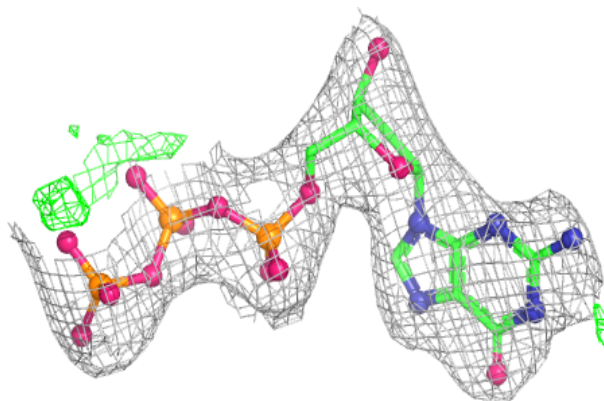
Electron density around MG G 701:

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

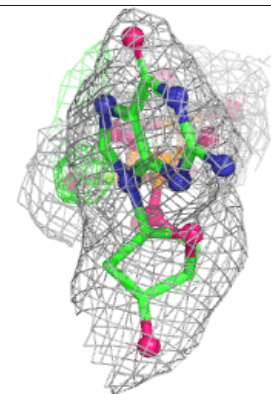
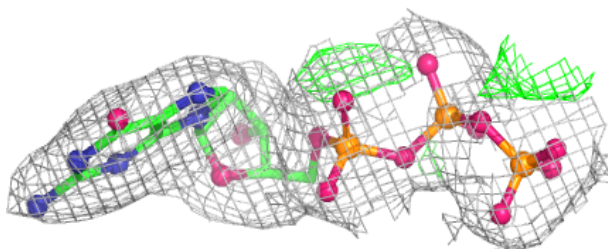
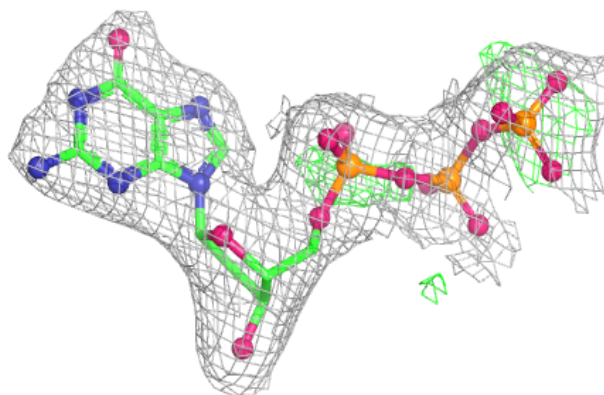


Electron density around DGT C 706:

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

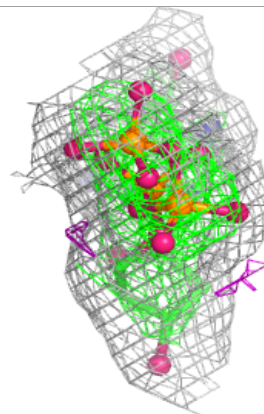
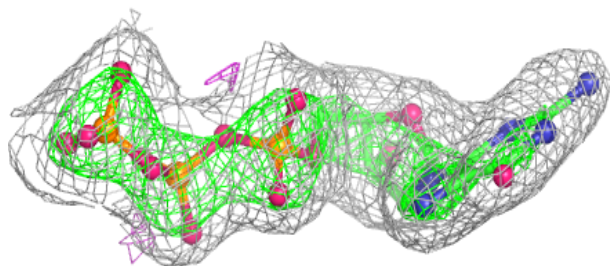
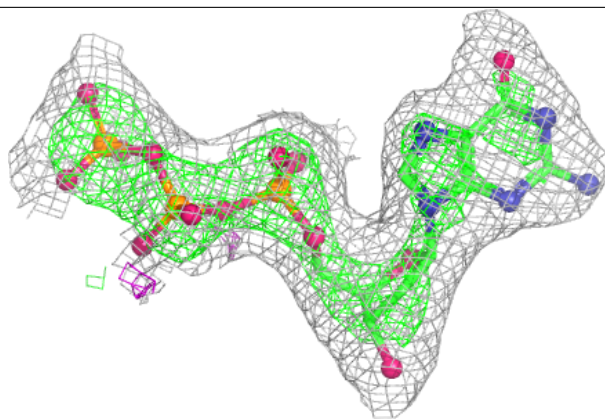
**Electron density around DGT D 701:**

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



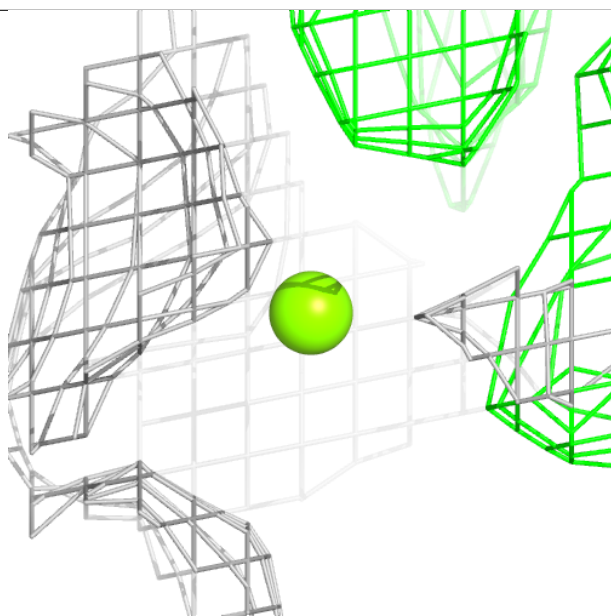
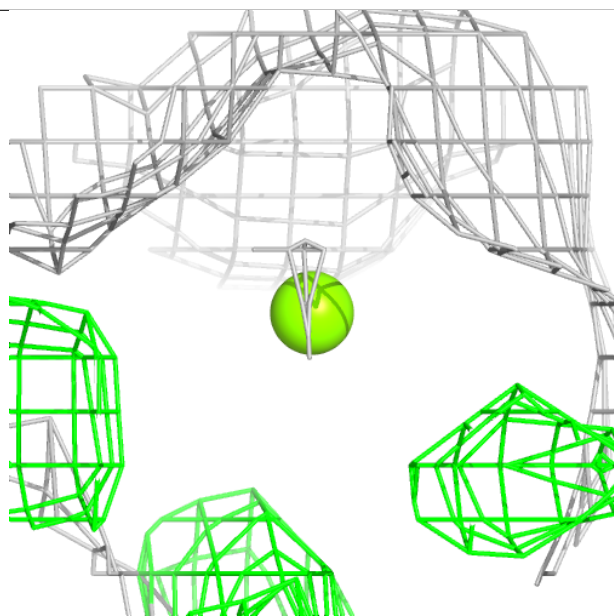
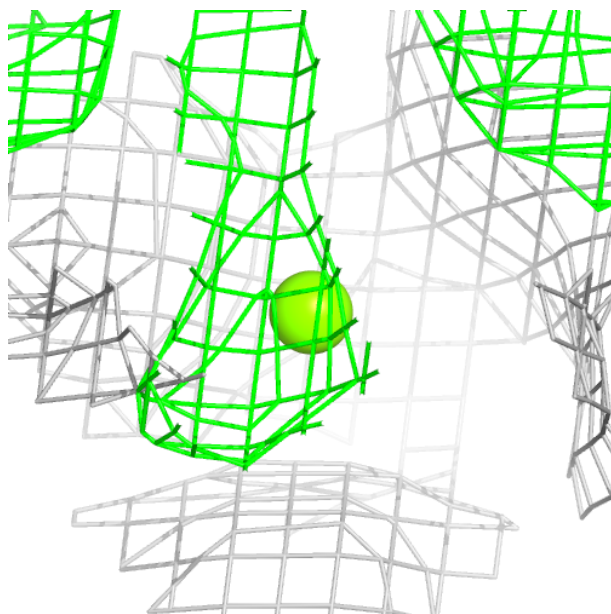
Electron density around DGT H 705:

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



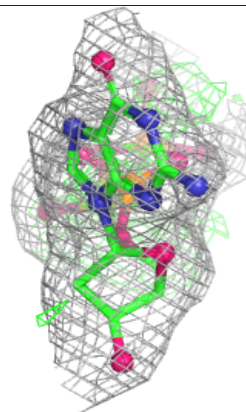
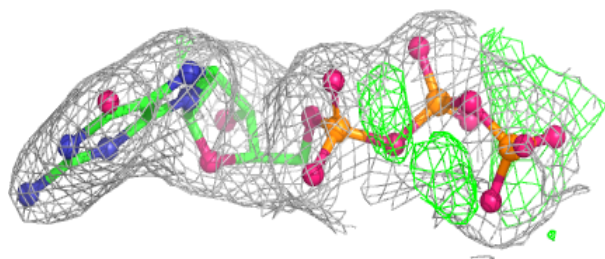
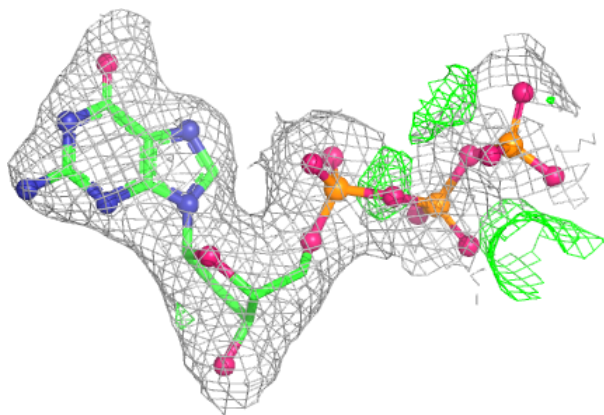
Electron density around MG H 704:

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



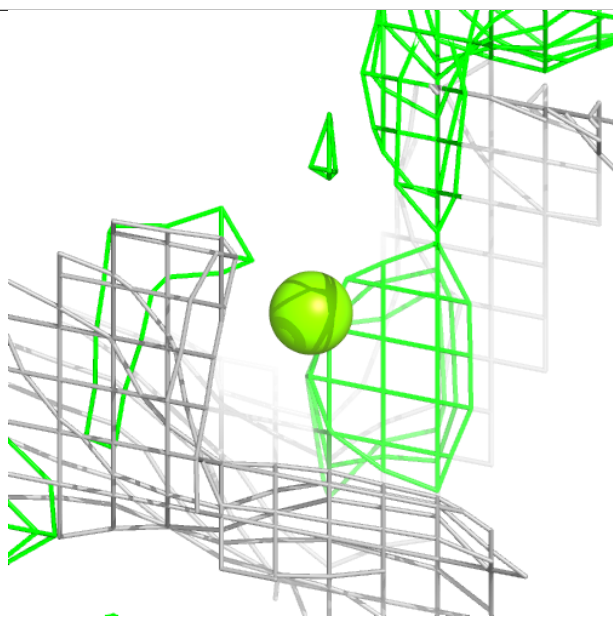
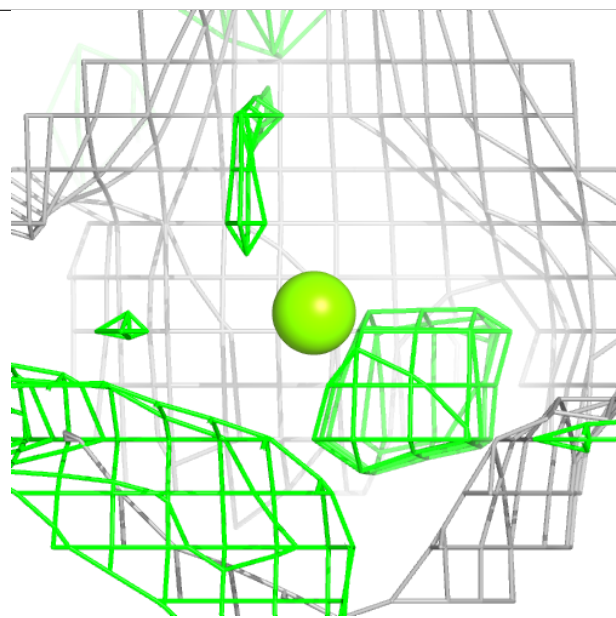
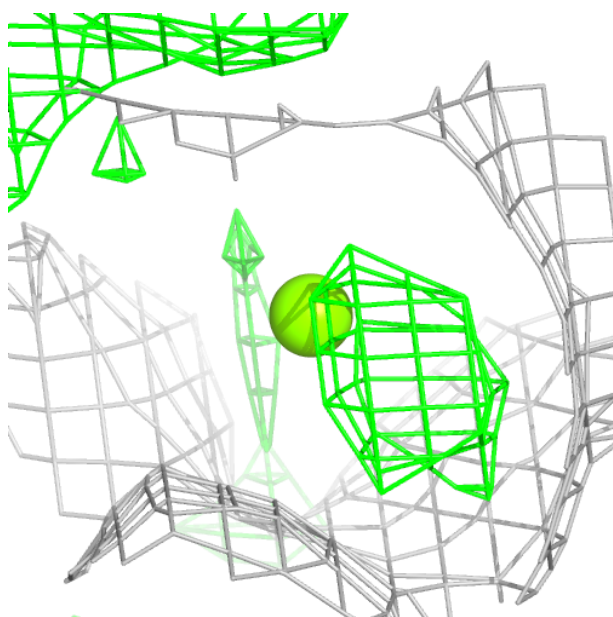
Electron density around DGT G 702:

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



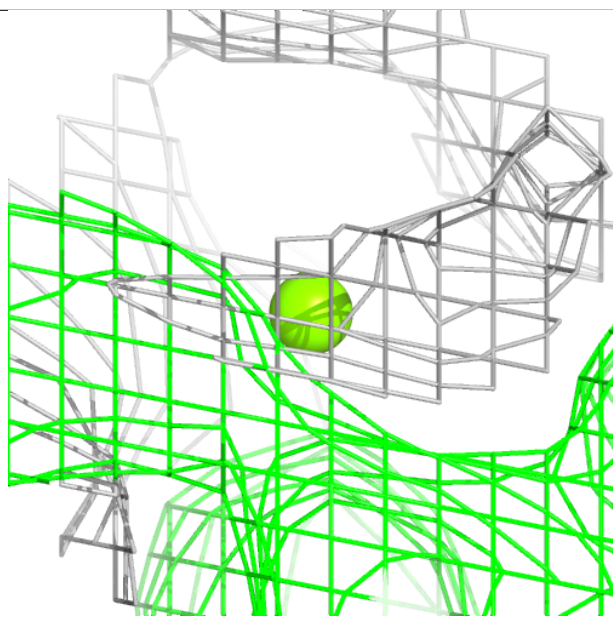
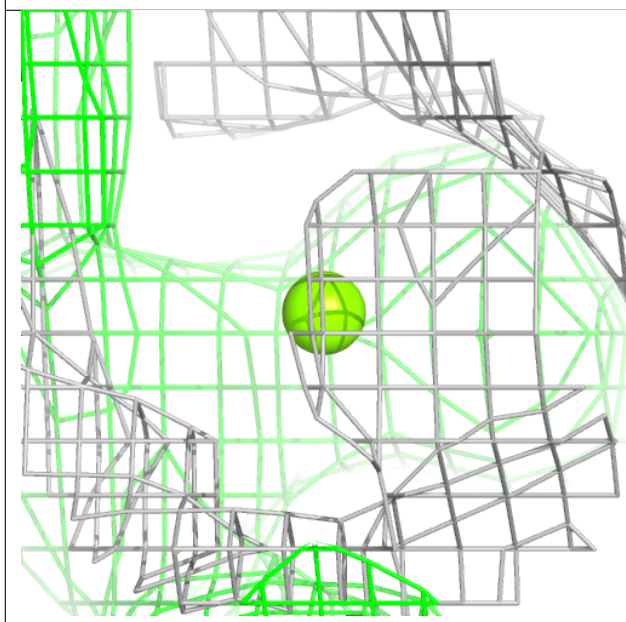
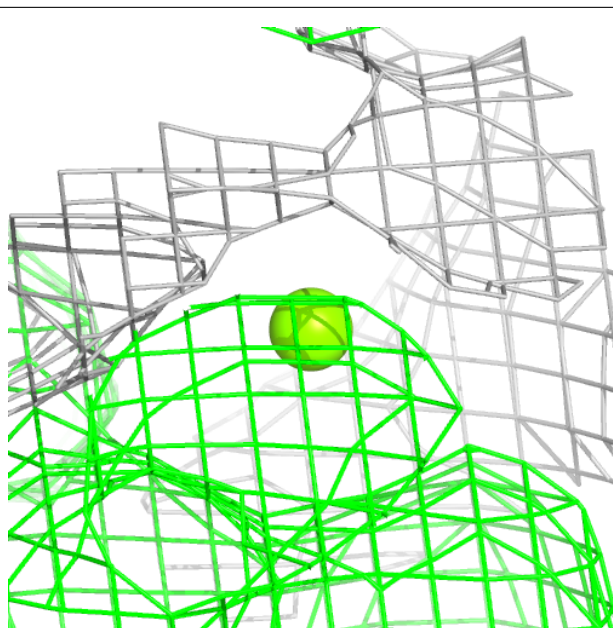
Electron density around MG E 705:

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



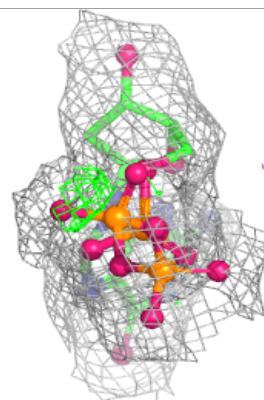
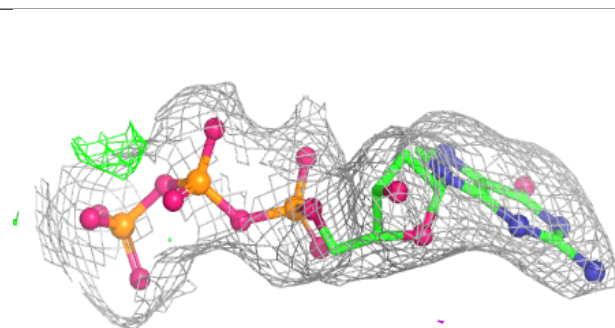
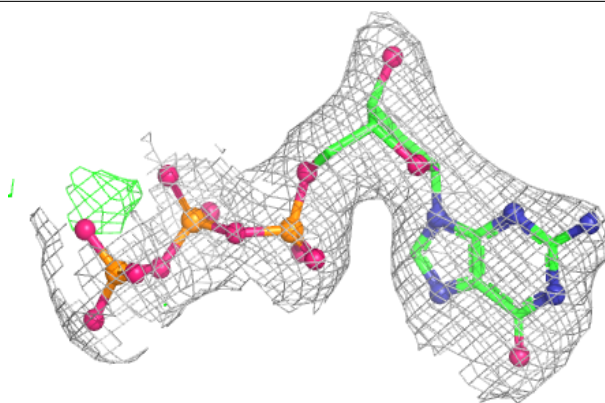
Electron density around MG B 701:

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



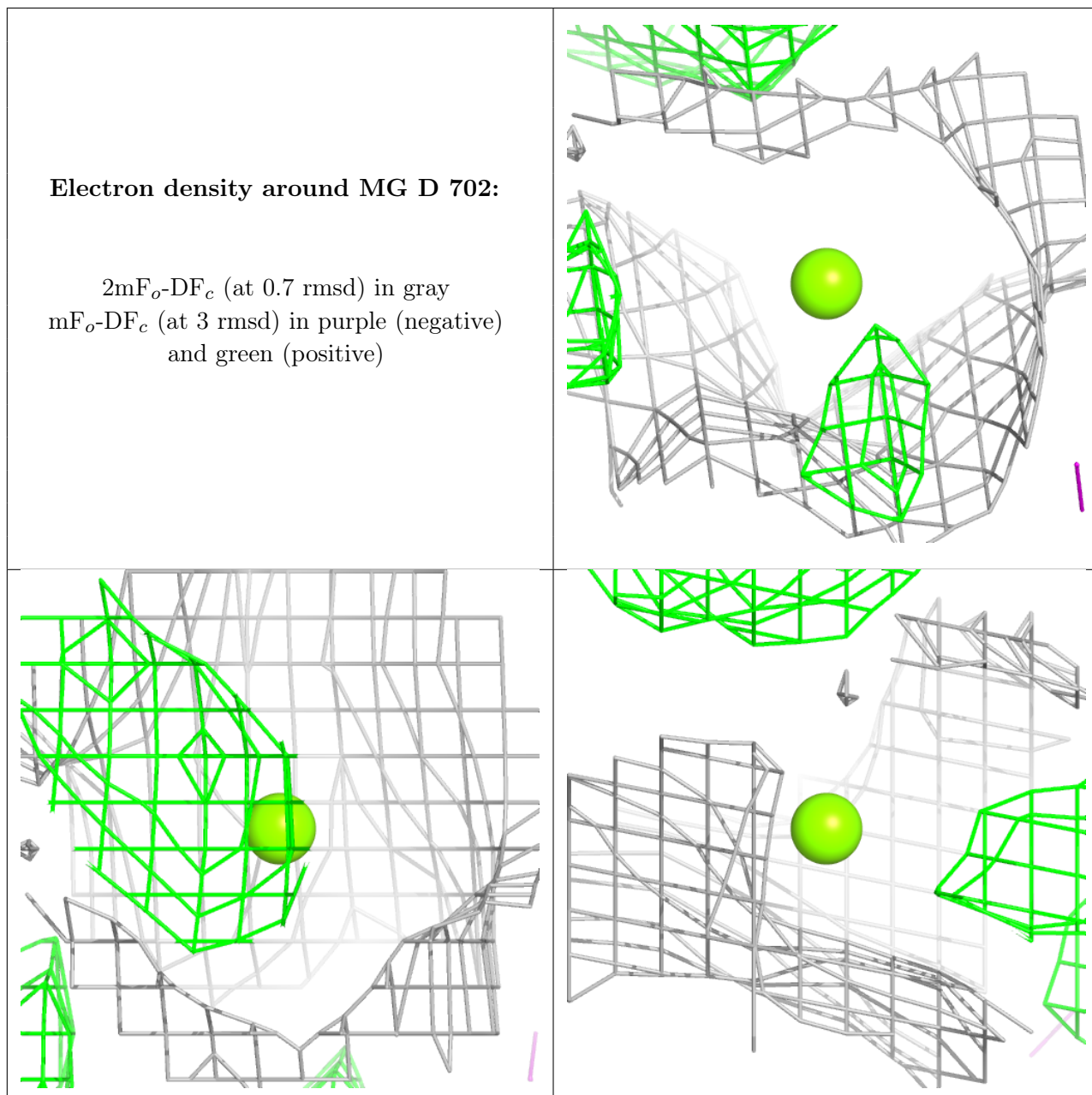
Electron density around DGT A 704:

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



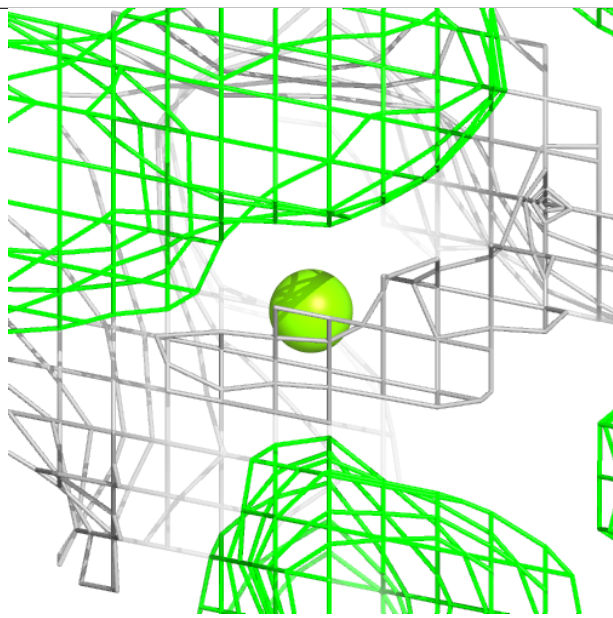
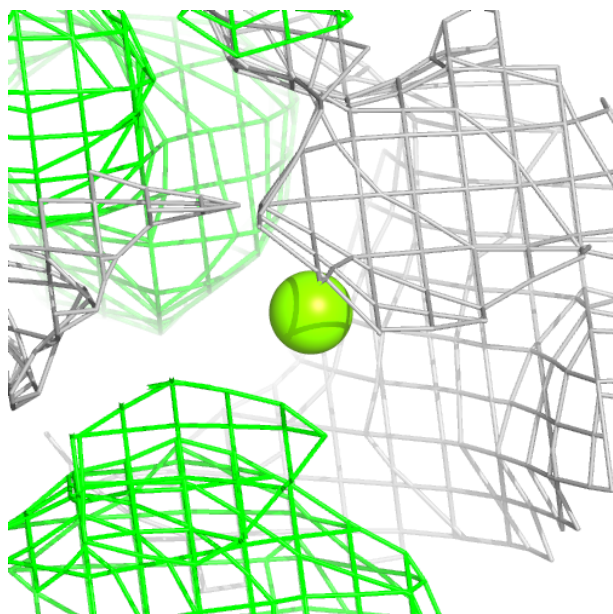
Electron density around MG D 702:

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



Electron density around MG C 704:

$2mF_o-DF_c$ (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.