



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 19, 2024 – 03:02 PM EDT

PDB ID : 4MZ7  
Title : Structural insight into dGTP-dependent activation of tetrameric SAMHD1 deoxynucleoside triphosphate triphosphohydrolase  
Authors : Zhu, C.; Gao, W.; Zhao, K.; Qin, X.; Zhang, Y.; Peng, X.; Zhang, L.; Dong, Y.; Zhang, W.; Li, P.; Wei, W.; Gong, Y.; Yu, X.F.  
Deposited on : 2013-09-29  
Resolution : 1.80 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 2.37.1  
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) : 2.37.1

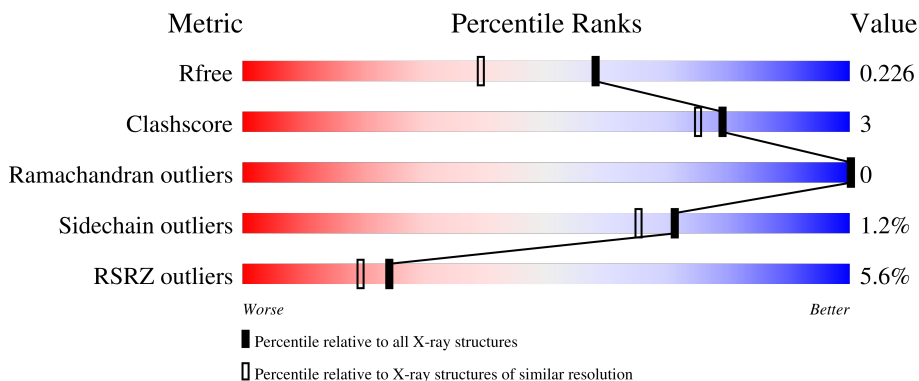
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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

Mol	Chain	Length	Quality of chain
1	A	539	
1	B	539	

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 9013 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
			Total	C	N	O	S			
1	A	481	3955	2534	688	714	19	0	2	0
1	B	493	4050	2596	704	731	19	0	2	0

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	88	MET	-	expression tag	UNP Q9Y3Z3
A	89	GLY	-	expression tag	UNP Q9Y3Z3
A	90	SER	-	expression tag	UNP Q9Y3Z3
A	91	SER	-	expression tag	UNP Q9Y3Z3
A	92	HIS	-	expression tag	UNP Q9Y3Z3
A	93	HIS	-	expression tag	UNP Q9Y3Z3
A	94	HIS	-	expression tag	UNP Q9Y3Z3
A	95	HIS	-	expression tag	UNP Q9Y3Z3
A	96	HIS	-	expression tag	UNP Q9Y3Z3
A	97	HIS	-	expression tag	UNP Q9Y3Z3
A	98	SER	-	expression tag	UNP Q9Y3Z3
A	99	SER	-	expression tag	UNP Q9Y3Z3
A	100	GLY	-	expression tag	UNP Q9Y3Z3
A	101	GLU	-	expression tag	UNP Q9Y3Z3
A	102	ASN	-	expression tag	UNP Q9Y3Z3
A	103	LEU	-	expression tag	UNP Q9Y3Z3
A	104	TYR	-	expression tag	UNP Q9Y3Z3
A	105	PHE	-	expression tag	UNP Q9Y3Z3
A	106	GLN	-	expression tag	UNP Q9Y3Z3
A	107	GLY	-	expression tag	UNP Q9Y3Z3
A	108	SER	-	expression tag	UNP Q9Y3Z3
A	266	TYR	CYS	engineered mutation	UNP Q9Y3Z3
B	88	MET	-	expression tag	UNP Q9Y3Z3
B	89	GLY	-	expression tag	UNP Q9Y3Z3
B	90	SER	-	expression tag	UNP Q9Y3Z3

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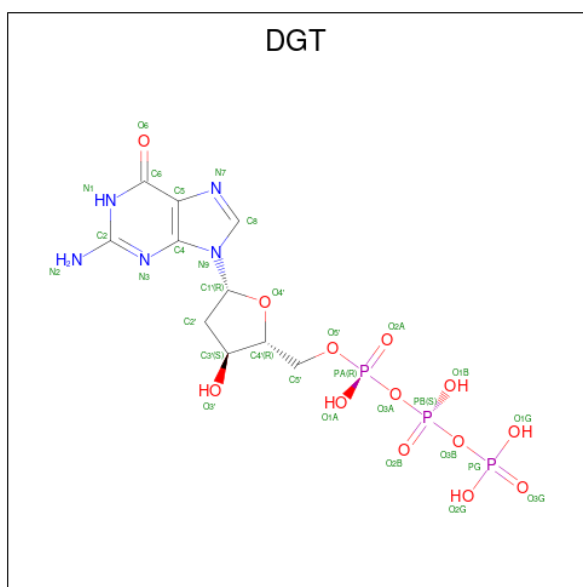
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Chain	Residue	Modelled	Actual	Comment	Reference
B	91	SER	-	expression tag	UNP Q9Y3Z3
B	92	HIS	-	expression tag	UNP Q9Y3Z3
B	93	HIS	-	expression tag	UNP Q9Y3Z3
B	94	HIS	-	expression tag	UNP Q9Y3Z3
B	95	HIS	-	expression tag	UNP Q9Y3Z3
B	96	HIS	-	expression tag	UNP Q9Y3Z3
B	97	HIS	-	expression tag	UNP Q9Y3Z3
B	98	SER	-	expression tag	UNP Q9Y3Z3
B	99	SER	-	expression tag	UNP Q9Y3Z3
B	100	GLY	-	expression tag	UNP Q9Y3Z3
B	101	GLU	-	expression tag	UNP Q9Y3Z3
B	102	ASN	-	expression tag	UNP Q9Y3Z3
B	103	LEU	-	expression tag	UNP Q9Y3Z3
B	104	TYR	-	expression tag	UNP Q9Y3Z3
B	105	PHE	-	expression tag	UNP Q9Y3Z3
B	106	GLN	-	expression tag	UNP Q9Y3Z3
B	107	GLY	-	expression tag	UNP Q9Y3Z3
B	108	SER	-	expression tag	UNP Q9Y3Z3
B	266	TYR	CYS	engineered mutation	UNP Q9Y3Z3

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Zn 1 1	0	0
2	B	1	Total Zn 1 1	0	0

- Molecule 3 is 2'-DEOXYGUANOSINE-5'-TRIPHOSPHATE (three-letter code: DGT) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>).

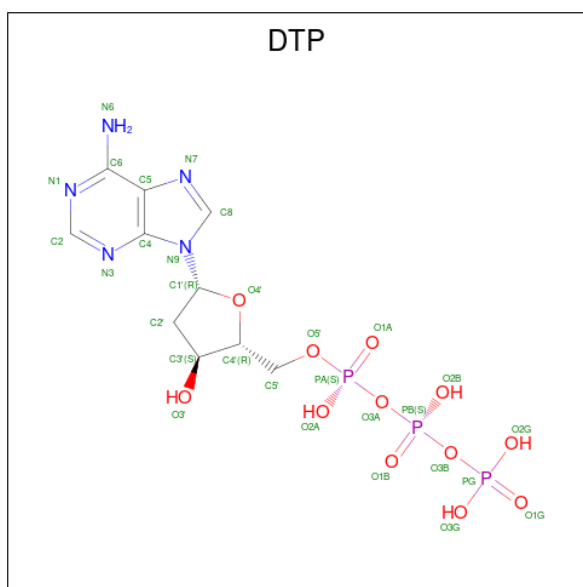


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		
4	B	1	Total	Mg	0	0
			1	1		

- Molecule 5 is 2'-DEOXYADENOSINE 5'-TRIPHOSPHATE (three-letter code: DTP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>12</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	B	1	30	10	5	12	3	0	0

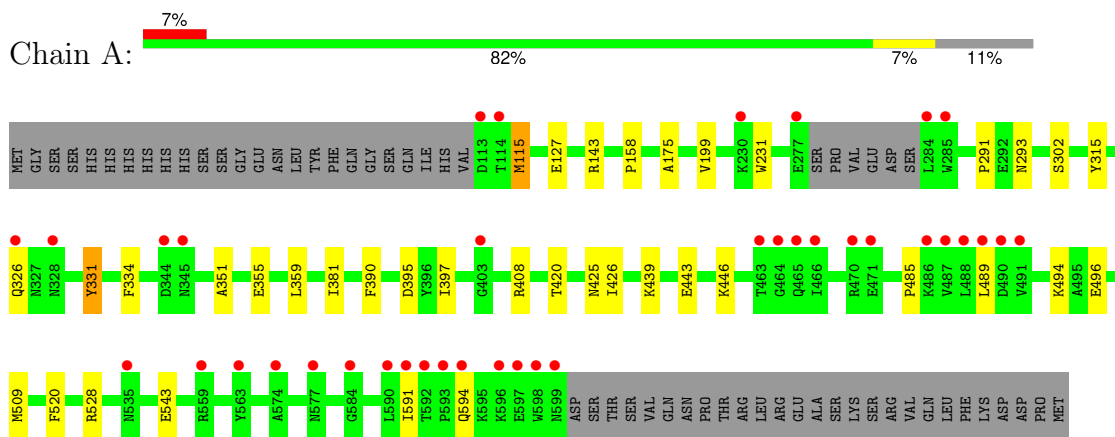
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	347	Total	O	0	0
			347	347		
6	B	472	Total	O	0	0
			472	472		

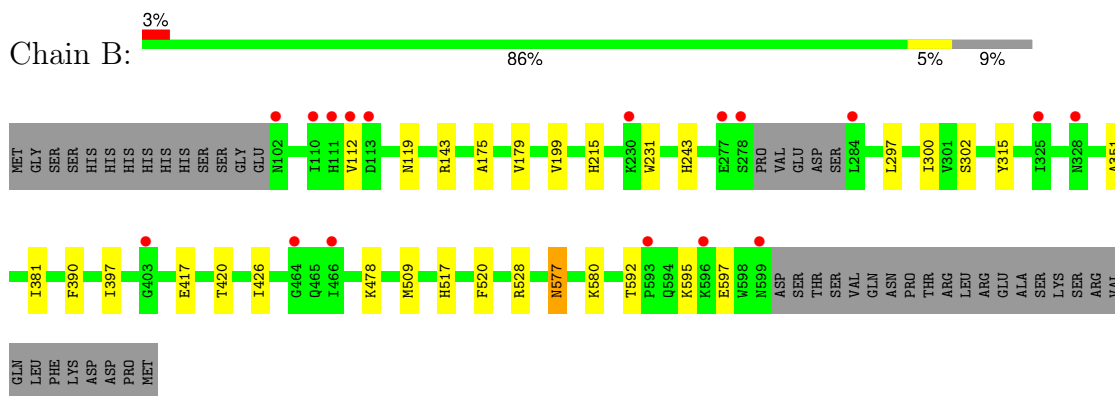
### 3 Residue-property plots [i](#)

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: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1



- Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	147.40Å 103.61Å 92.13Å 90.00° 121.98° 90.00°	Depositor
Resolution (Å)	50.00 – 1.80 48.27 – 1.80	Depositor EDS
% Data completeness (in resolution range)	97.2 (50.00-1.80) 97.2 (48.27-1.80)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.03 (at 1.79Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.194 , 0.226 0.194 , 0.226	Depositor DCC
$R_{free}$ test set	5284 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	16.5	Xtrriage
Anisotropy	0.025	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 49.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	9013	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.33% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DTP, MG, DGT, ZN

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	0.54	1/4054 (0.0%)	0.56	0/5474
1	B	0.52	1/4155 (0.0%)	0.58	0/5611
All	All	0.53	2/8209 (0.0%)	0.57	0/11085

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	231	TRP	CD2-CE2	5.13	1.47	1.41
1	B	231	TRP	CD2-CE2	5.07	1.47	1.41

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	3955	0	3928	21	0
1	B	4050	0	4020	24	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	93	0	36	2	0
3	B	62	0	24	0	0
4	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
5	B	30	0	12	0	0
6	A	347	0	0	6	0
6	B	472	0	0	6	0
All	All	9013	0	8020	46	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 3.

All (46) 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:A:355:GLU:HG3	6:A:1062:HOH:O	1.82	0.80
1:A:591:ILE:O	1:A:594:GLN:HG2	1.83	0.78
1:B:243:HIS:HE1	6:B:1370:HOH:O	1.66	0.77
1:B:179:VAL:HG22	1:B:300:ILE:HD13	1.70	0.72
1:A:158:PRO:HG3	6:A:1059:HOH:O	1.94	0.67
1:B:397:ILE:HG21	1:B:426:ILE:HD11	1.77	0.64
1:A:326:GLN:NE2	6:A:1093:HOH:O	2.32	0.61
1:A:485:PRO:HG2	1:A:489:LEU:HD11	1.83	0.59
1:B:397:ILE:HB	6:B:1054:HOH:O	2.03	0.58
1:B:175:ALA:HB1	1:B:199:VAL:HG12	1.86	0.57
1:A:115:MET:HE1	1:A:127:GLU:HB3	1.87	0.57
1:A:395:ASP:OD1	1:A:408:ARG:NH2	2.39	0.56
1:B:179:VAL:CG2	1:B:300:ILE:HD13	2.35	0.56
1:A:494:LYS:HG3	1:A:496:GLU:HG2	1.90	0.53
3:A:703:DGT:N2	6:A:859:HOH:O	2.34	0.52
1:A:397:ILE:HG21	1:A:426:ILE:HD11	1.90	0.52
1:A:143:ARG:HD2	1:A:420:THR:HA	1.91	0.51
1:A:446:LYS:HE2	6:A:1147:HOH:O	2.09	0.51
1:A:439:LYS:O	1:A:443:GLU:HG2	2.10	0.51
1:B:297:LEU:HA	1:B:300:ILE:HD12	1.93	0.49
3:A:703:DGT:HN2A	1:B:119:ASN:ND2	2.11	0.49
1:B:509:MET:HE1	1:B:517:HIS:CD2	2.48	0.49
1:A:175:ALA:HB1	1:A:199:VAL:HG12	1.95	0.48
1:B:302:SER:O	6:B:905:HOH:O	2.20	0.48
1:A:302:SER:O	6:A:805:HOH:O	2.21	0.46
1:B:478:LYS:HD3	6:B:980:HOH:O	2.16	0.45
1:B:595:LYS:HE3	1:B:597:GLU:HG2	1.97	0.45
1:A:381:ILE:HD12	1:A:381:ILE:HA	1.84	0.45
1:A:390:PHE:CZ	1:A:426:ILE:HG23	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:351:ALA:O	1:B:520:PHE:HA	2.17	0.45
1:B:577:ASN:HD21	1:B:597:GLU:HG3	1.81	0.45
1:B:143:ARG:HD2	1:B:420:THR:HA	1.98	0.44
1:A:351:ALA:O	1:A:520:PHE:HA	2.17	0.44
1:B:179:VAL:HG22	1:B:300:ILE:CD1	2.45	0.44
1:B:215[A]:HIS:CD2	6:B:1252:HOH:O	2.70	0.44
1:B:179:VAL:HG21	1:B:199:VAL:HG11	2.00	0.43
1:B:580:LYS:HE3	1:B:592:THR:HG21	2.00	0.43
1:B:381:ILE:HD12	1:B:381:ILE:HA	1.91	0.43
1:B:390:PHE:CZ	1:B:426:ILE:HG23	2.54	0.42
1:A:331:TYR:CD1	1:A:331:TYR:C	2.92	0.42
1:B:509:MET:HB2	1:B:509:MET:HE2	1.79	0.42
1:A:291:PRO:HG2	1:A:293:ASN:OD1	2.20	0.41
1:B:179:VAL:CG2	1:B:199:VAL:HG11	2.50	0.41
1:B:417:GLU:OE2	6:B:1272:HOH:O	2.22	0.40
1:A:334:PHE:CE2	1:A:359:LEU:HD21	2.56	0.40
1:A:509:MET:HB2	1:A:509:MET:HE2	1.80	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	479/539 (89%)	471 (98%)	8 (2%)	0	100	100
1	B	491/539 (91%)	483 (98%)	8 (2%)	0	100	100
All	All	970/1078 (90%)	954 (98%)	16 (2%)	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	429/481 (89%)	423 (99%)	6 (1%)	67	59
1	B	440/481 (92%)	436 (99%)	4 (1%)	78	75
All	All	869/962 (90%)	859 (99%)	10 (1%)	71	65

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	MET
1	A	315	TYR
1	A	331	TYR
1	A	425	ASN
1	A	528	ARG
1	A	543	GLU
1	B	112	VAL
1	B	315	TYR
1	B	528	ARG
1	B	577	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	326	GLN
1	A	328	ASN
1	B	119	ASN
1	B	243	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 4 are monoatomic - leaving 6 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	DGT	A	703	4	29,33,33	1.02	1 (3%)	37,52,52	1.36	5 (13%)
5	DTP	B	805	4	28,32,32	0.98	1 (3%)	35,50,50	1.53	6 (17%)
3	DGT	B	804	-	29,33,33	1.24	3 (10%)	37,52,52	1.35	4 (10%)
3	DGT	B	801	4	29,33,33	1.05	1 (3%)	37,52,52	1.23	5 (13%)
3	DGT	A	704	4	29,33,33	0.98	1 (3%)	37,52,52	1.27	4 (10%)
3	DGT	A	702	-	29,33,33	1.25	2 (6%)	37,52,52	1.27	4 (10%)

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	DGT	A	703	4	-	4/18/34/34	0/3/3/3
5	DTP	B	805	4	-	3/18/34/34	0/3/3/3
3	DGT	B	804	-	-	2/18/34/34	0/3/3/3
3	DGT	B	801	4	-	6/18/34/34	0/3/3/3
3	DGT	A	704	4	-	7/18/34/34	0/3/3/3
3	DGT	A	702	-	-	4/18/34/34	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	702	DGT	PB-O3A	4.11	1.63	1.59
3	B	804	DGT	PB-O3A	3.30	1.63	1.59
3	B	804	DGT	PA-O3A	3.09	1.62	1.59
3	A	702	DGT	PA-O3A	3.04	1.62	1.59
3	A	703	DGT	PB-O3A	2.64	1.62	1.59
3	B	801	DGT	PB-O3A	2.07	1.61	1.59
5	B	805	DTP	C2-N3	2.04	1.35	1.32
3	A	704	DGT	PB-O3A	2.03	1.61	1.59
3	B	804	DGT	PB-O3B	2.00	1.61	1.59

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	805	DTP	N3-C2-N1	-5.32	121.45	128.67
3	B	804	DGT	O6-C6-C5	-3.70	116.99	124.32
3	A	703	DGT	C8-N7-C5	3.32	108.19	102.55
3	A	702	DGT	O6-C6-C5	-3.27	117.83	124.32
3	B	804	DGT	O6-C6-N1	3.14	124.34	120.62
3	B	804	DGT	C8-N7-C5	3.13	107.89	102.55
3	A	704	DGT	C8-N7-C5	3.01	107.67	102.55
3	A	703	DGT	O6-C6-C5	-3.01	118.36	124.32
3	A	703	DGT	O6-C6-N1	2.96	124.13	120.62
5	B	805	DTP	O2B-PB-O3A	-2.91	99.41	107.27
3	B	801	DGT	C8-N7-C5	2.87	107.44	102.55
5	B	805	DTP	O2B-PB-O3B	2.82	114.89	107.27
3	A	704	DGT	O2G-PG-O3B	2.81	114.07	104.64
5	B	805	DTP	N6-C6-N1	2.81	124.33	118.33
3	A	703	DGT	O4'-C1'-N9	-2.71	105.15	108.75
3	A	702	DGT	O6-C6-N1	2.70	123.83	120.62
5	B	805	DTP	O4'-C1'-N9	-2.66	105.22	108.75
3	A	702	DGT	C8-N7-C5	2.63	107.02	102.55
3	B	801	DGT	O1A-PA-O3A	2.42	113.82	107.27
3	B	804	DGT	C5-C6-N1	2.40	118.65	114.07
3	A	704	DGT	O6-C6-C5	-2.37	119.62	124.32
3	A	703	DGT	O3A-PB-O2B	-2.37	103.57	110.70
3	A	704	DGT	O6-C6-N1	2.28	123.33	120.62
3	B	801	DGT	O2G-PG-O3B	2.28	112.27	104.64
3	A	702	DGT	C5-C6-N1	2.23	118.32	114.07
3	B	801	DGT	O6-C6-C5	-2.12	120.11	124.32
5	B	805	DTP	C4-C5-N7	-2.06	107.16	109.34
3	B	801	DGT	O6-C6-N1	2.00	123.00	120.62

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	702	DGT	PB-O3B-PG-O2G
3	B	804	DGT	PB-O3B-PG-O2G
3	A	704	DGT	PB-O3B-PG-O3G
3	B	801	DGT	PB-O3B-PG-O3G
3	B	804	DGT	PB-O3B-PG-O3G
5	B	805	DTP	PG-O3B-PB-O1B
3	A	704	DGT	PB-O3B-PG-O2G
3	B	801	DGT	PG-O3B-PB-O1B
3	A	704	DGT	PG-O3B-PB-O1B
5	B	805	DTP	PG-O3B-PB-O2B
3	B	801	DGT	C4'-C5'-O5'-PA
3	A	702	DGT	PG-O3B-PB-O2B
3	A	703	DGT	PG-O3B-PB-O2B
3	A	704	DGT	PB-O3A-PA-O1A
3	B	801	DGT	PB-O3A-PA-O1A
3	A	702	DGT	PB-O3B-PG-O1G
3	A	703	DGT	PG-O3B-PB-O1B
3	A	703	DGT	PB-O3A-PA-O2A
3	A	704	DGT	PB-O3A-PA-O2A
3	B	801	DGT	PG-O3B-PB-O2B
3	B	801	DGT	PB-O3A-PA-O2A
3	A	702	DGT	PB-O3B-PG-O3G
3	A	704	DGT	C4'-C5'-O5'-PA
3	A	703	DGT	PB-O3A-PA-O1A
3	A	704	DGT	PG-O3B-PB-O2B
5	B	805	DTP	PB-O3A-PA-O2A

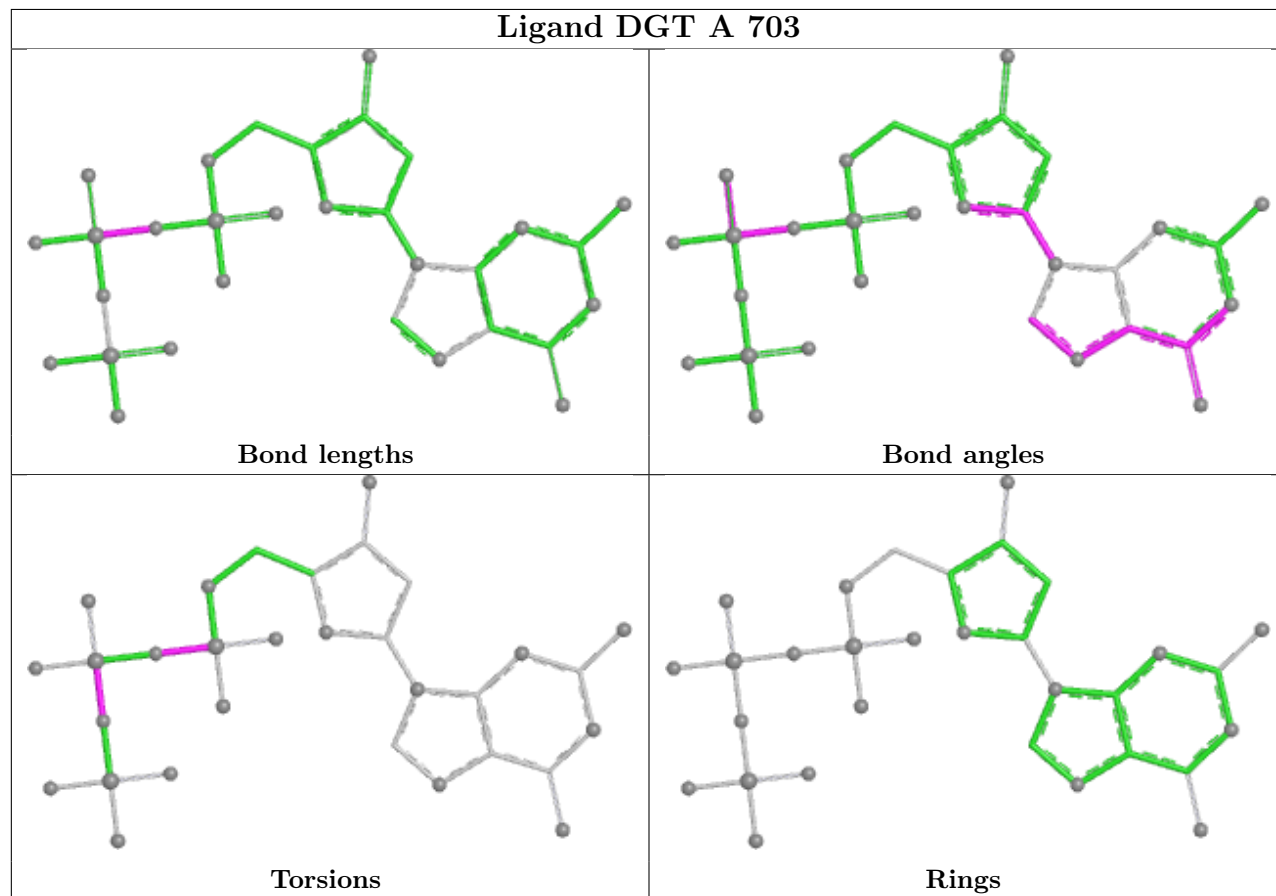
There are no ring outliers.

1 monomer is involved in 2 short contacts:

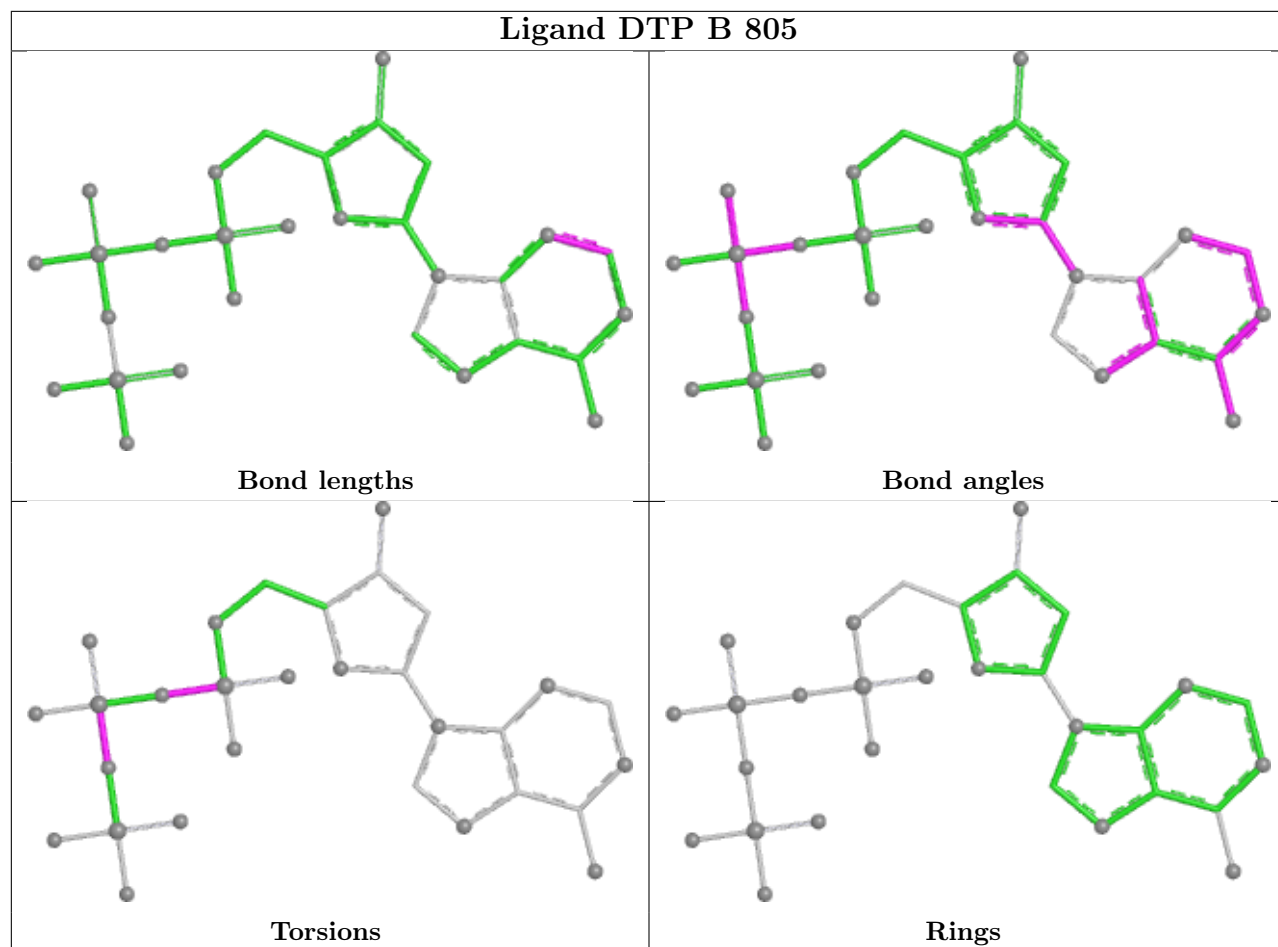
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	703	DGT	2	0

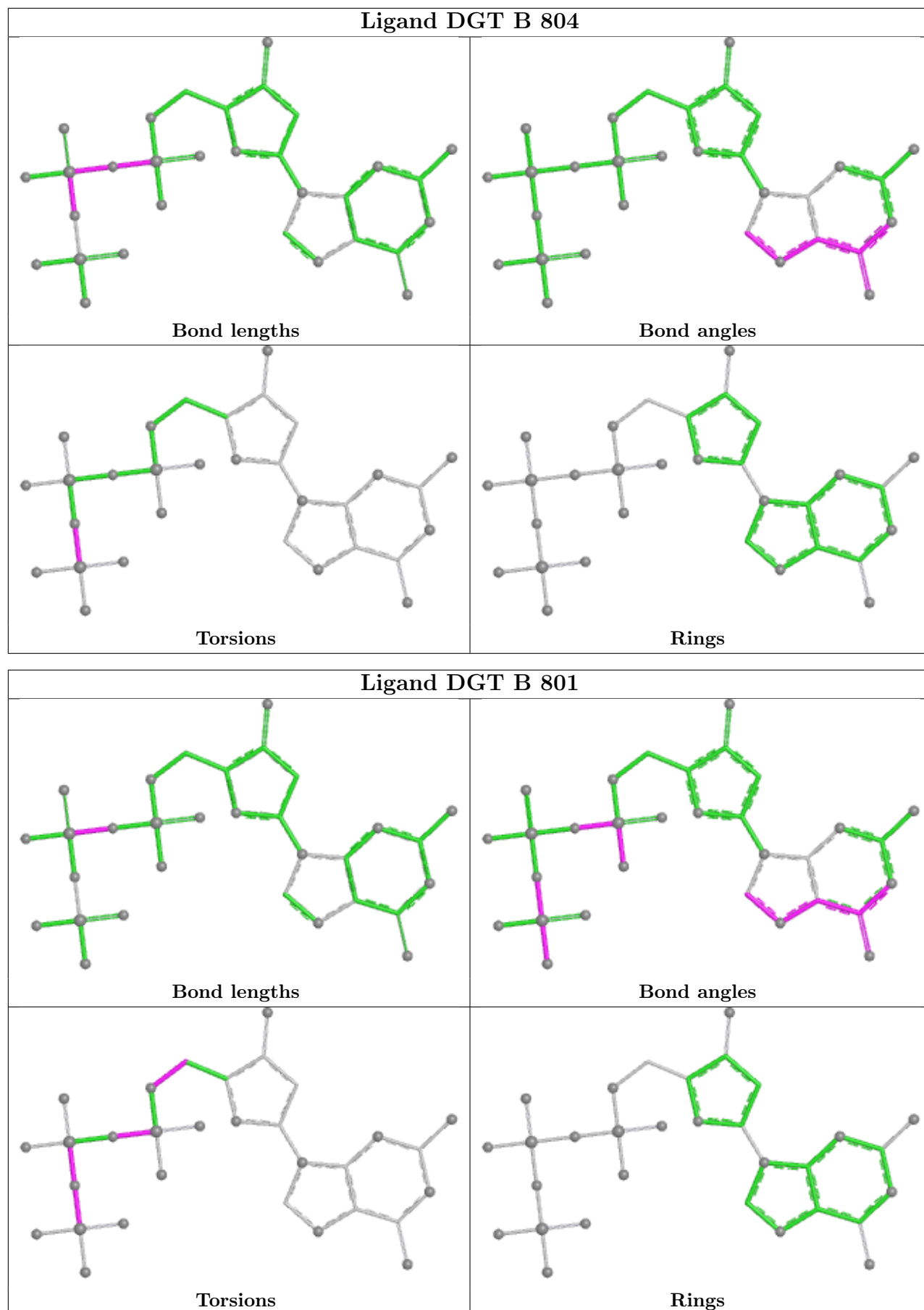
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

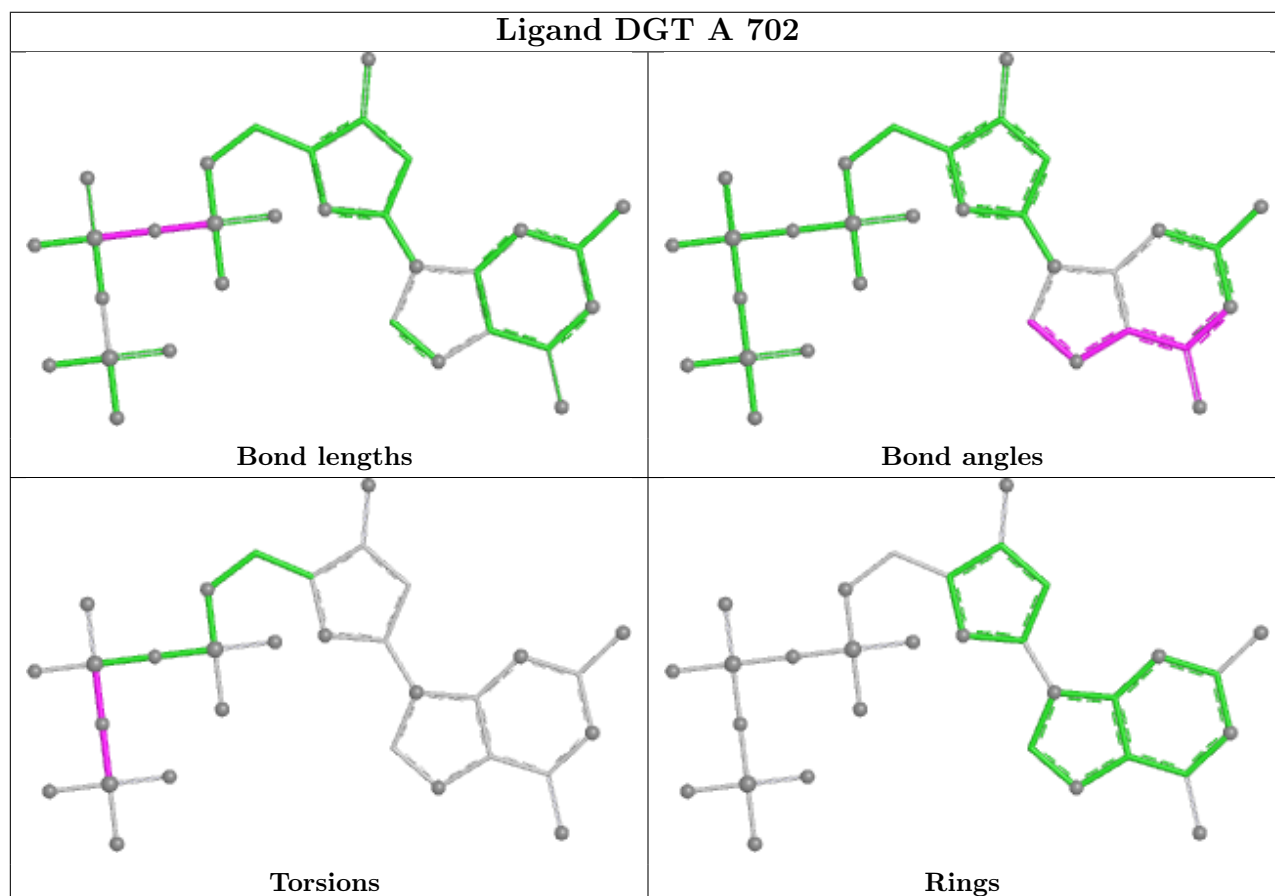
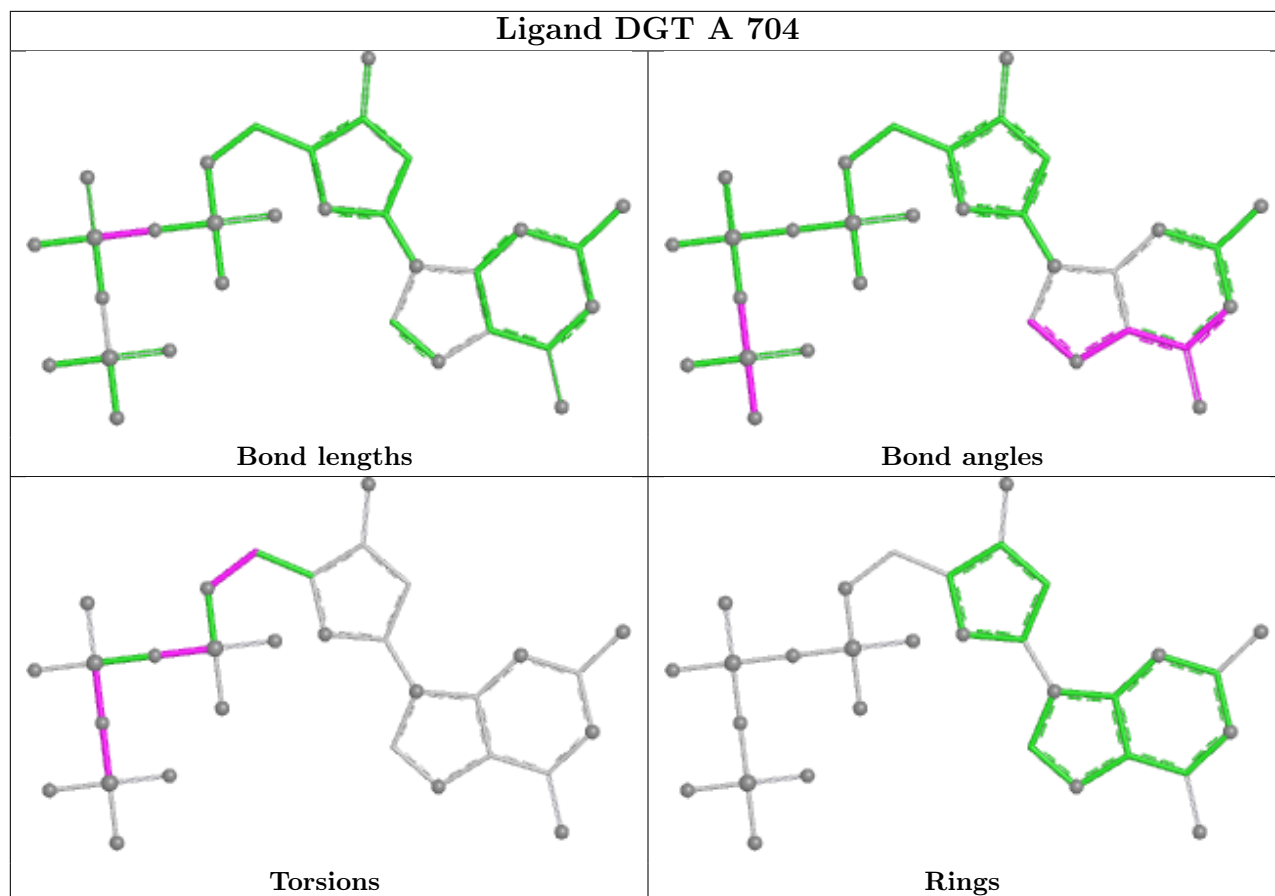
in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers 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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	481/539 (89%)	0.35	38 (7%) 12 9	6, 22, 52, 77	0
1	B	493/539 (91%)	0.04	17 (3%) 45 39	4, 17, 40, 81	0
All	All	974/1078 (90%)	0.19	55 (5%) 24 19	4, 19, 46, 81	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	111	HIS	7.8
1	A	488	LEU	7.3
1	A	491	VAL	6.0
1	A	489	LEU	5.6
1	A	593	PRO	5.0
1	A	596	LYS	5.0
1	A	277	GLU	5.0
1	A	594	GLN	4.9
1	A	284	LEU	4.9
1	A	590	LEU	4.8
1	B	284	LEU	4.6
1	A	487	VAL	4.4
1	A	599	ASN	4.2
1	A	403	GLY	4.1
1	A	486	LYS	4.1
1	A	490	ASP	3.9
1	A	591	ILE	3.8
1	A	465	GLN	3.8
1	B	593	PRO	3.8
1	B	277	GLU	3.7
1	A	285	TRP	3.6
1	B	110	ILE	3.6
1	B	403	GLY	3.5
1	A	577	ASN	3.5

*Continued on next page...*

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Mol	Chain	Res	Type	RSRZ
1	A	535	ASN	3.5
1	A	464	GLY	3.4
1	A	592	THR	3.3
1	B	596	LYS	3.3
1	A	463	THR	3.1
1	A	597	GLU	3.1
1	A	559	ARG	3.1
1	A	598	TRP	3.0
1	A	471	GLU	3.0
1	A	345	ASN	3.0
1	A	466	ILE	2.9
1	A	230	LYS	2.9
1	B	278	SER	2.8
1	B	112	VAL	2.8
1	A	344	ASP	2.8
1	B	328	ASN	2.6
1	B	230	LYS	2.6
1	B	113	ASP	2.5
1	B	466	ILE	2.5
1	A	114	THR	2.5
1	B	599	ASN	2.5
1	A	563	TYR	2.4
1	A	113	ASP	2.3
1	B	102	ASN	2.3
1	A	328	ASN	2.3
1	B	464	GLY	2.3
1	A	574	ALA	2.2
1	A	470	ARG	2.1
1	A	326	GLN	2.1
1	B	325	ILE	2.1
1	A	584	GLY	2.1

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

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

## 6.3 Carbohydrates [i](#)

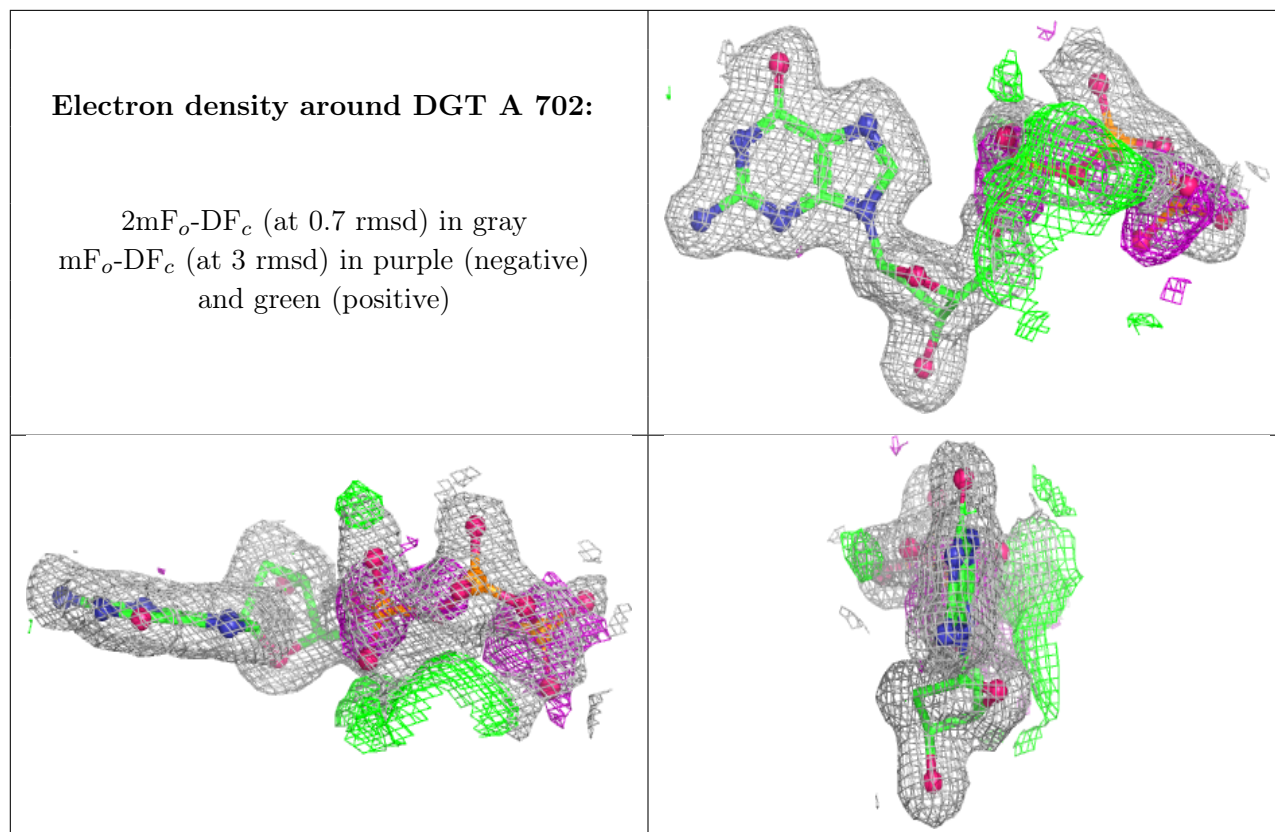
There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

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

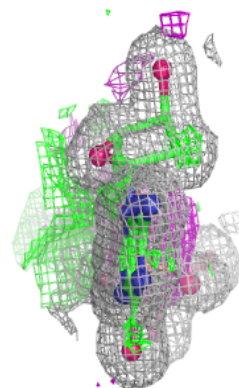
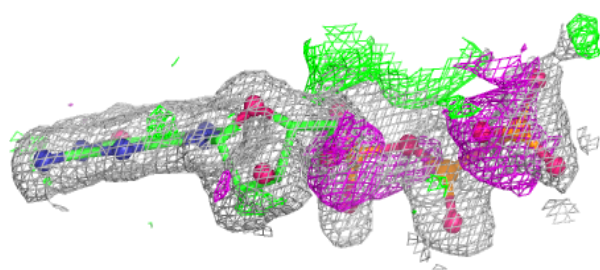
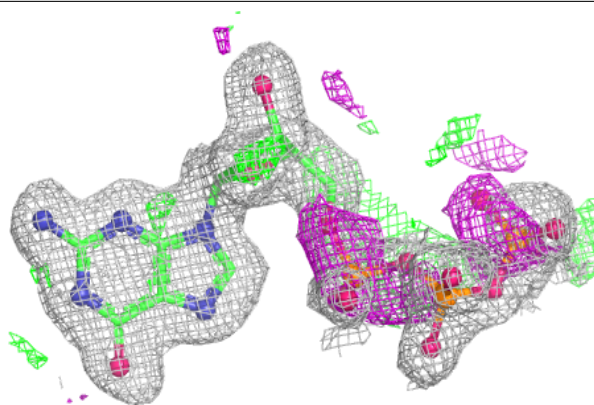
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	DGT	A	702	31/31	0.83	0.15	10,17,43,47	0
3	DGT	B	804	31/31	0.86	0.15	7,13,38,39	0
4	MG	A	705	1/1	0.95	0.14	16,16,16,16	0
4	MG	B	802	1/1	0.95	0.12	19,19,19,19	0
3	DGT	B	801	31/31	0.97	0.09	9,11,20,22	0
3	DGT	A	703	31/31	0.98	0.10	8,11,15,17	0
3	DGT	A	704	31/31	0.98	0.09	8,9,15,16	0
5	DTP	B	805	30/30	0.98	0.12	6,8,11,12	0
2	ZN	A	701	1/1	0.99	0.10	14,14,14,14	0
2	ZN	B	803	1/1	0.99	0.08	11,11,11,11	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.

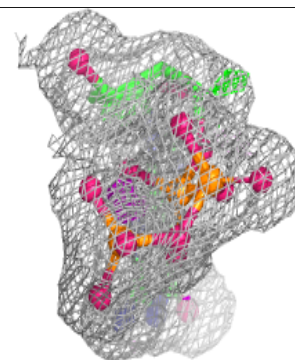
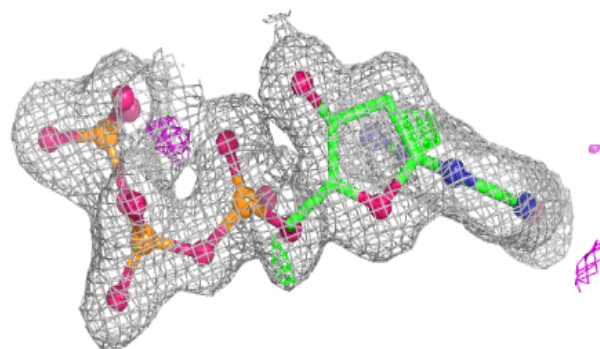
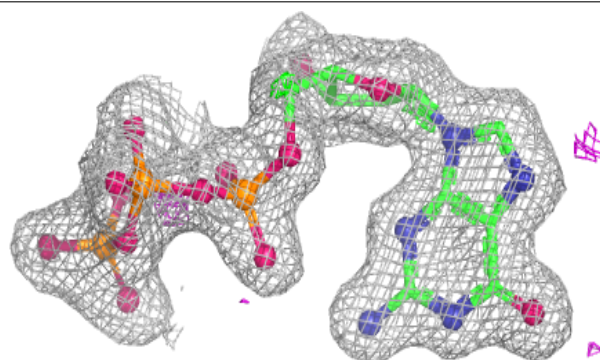


**Electron density around DGT B 804:**

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

**Electron density around DGT B 801:**

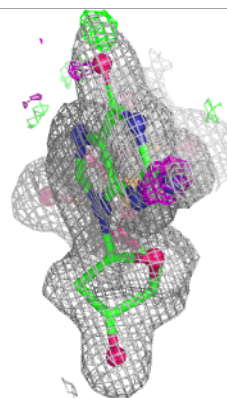
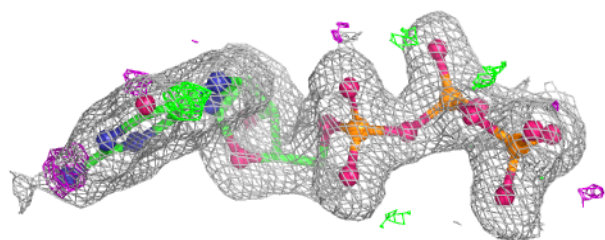
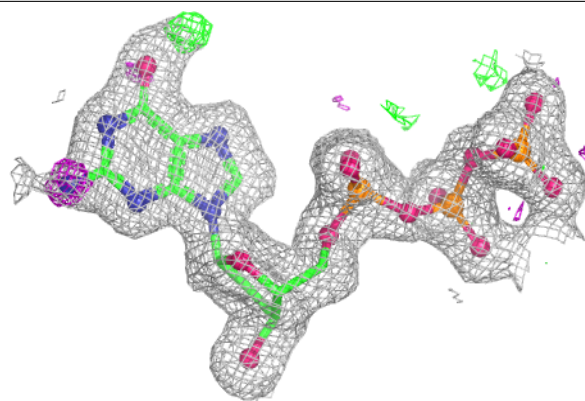
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



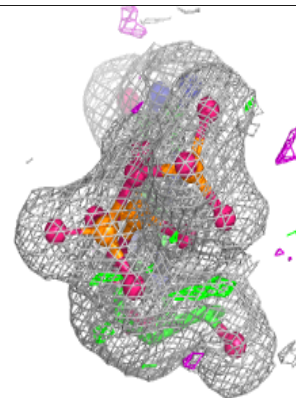
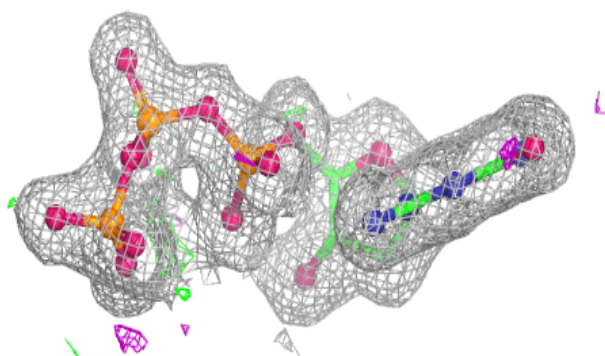
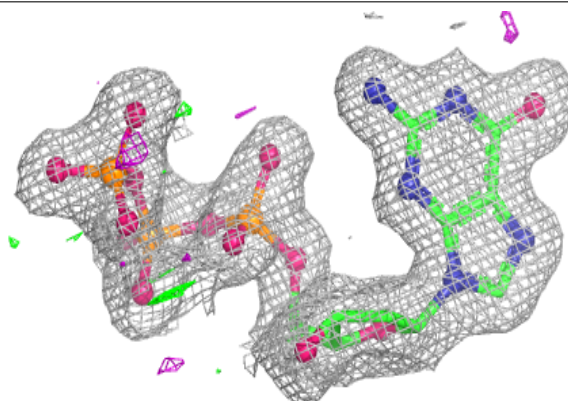


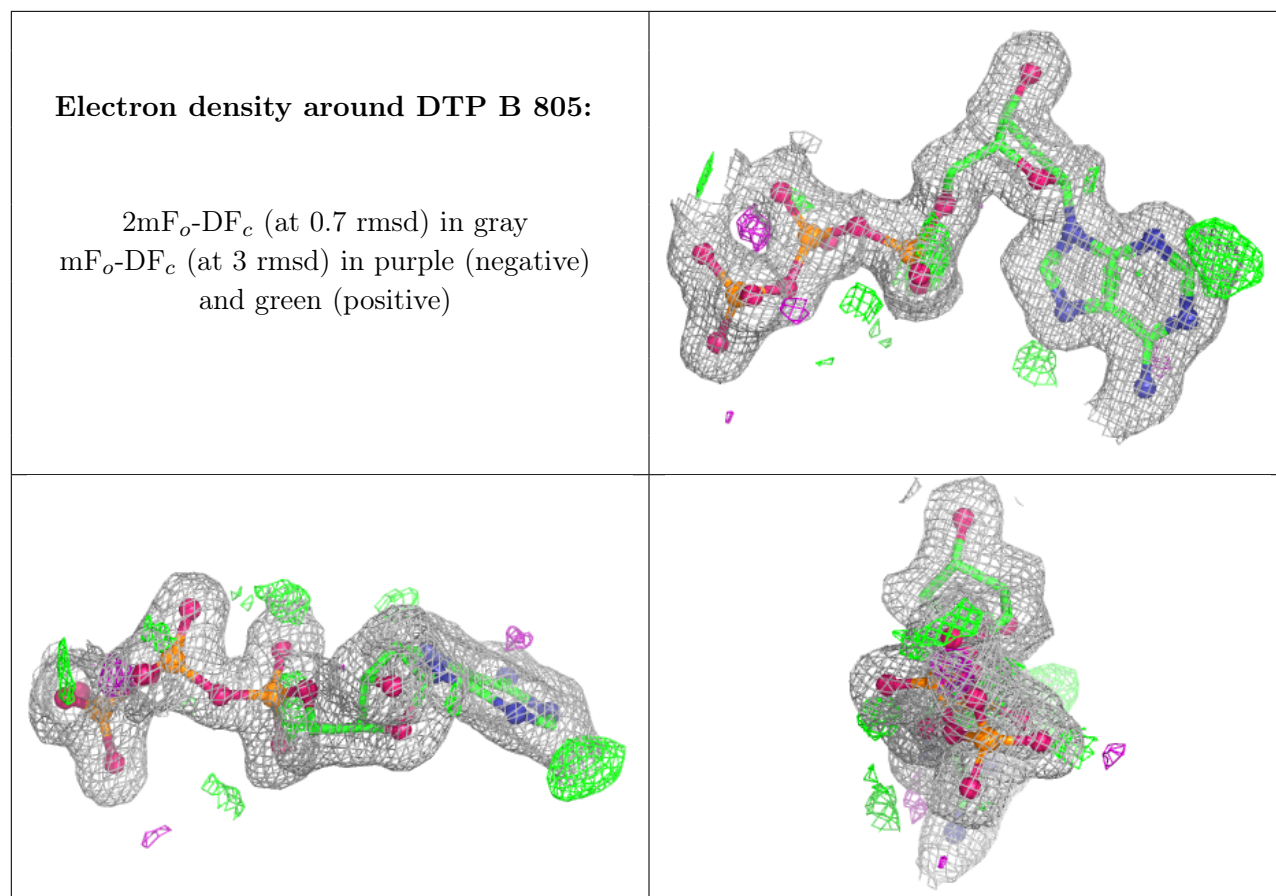
**Electron density around DGT A 703:**

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

**Electron density around DGT A 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 [i](#)

There are no such residues in this entry.