



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 12, 2024 – 05:27 PM EDT

PDB ID : 7L4M  
Title : Crystal structure of the DRM2-CCT DNA complex  
Authors : Fang, J.; Song, J.  
Deposited on : 2020-12-19  
Resolution : 2.81 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)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

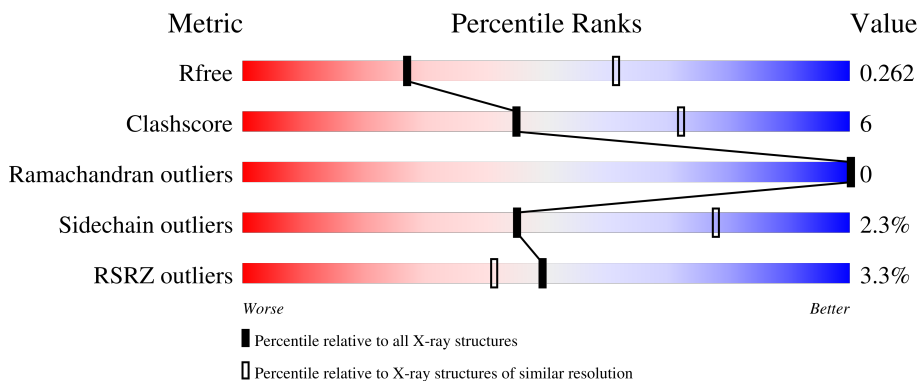
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.81 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))
$R_{free}$	164625	3657 (2.80-2.80)
Clashscore	180529	4123 (2.80-2.80)
Ramachandran outliers	177936	4071 (2.80-2.80)
Sidechain outliers	177891	4073 (2.80-2.80)
RSRZ outliers	164620	3659 (2.80-2.80)

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	357	 6% 86% 12%
1	B	357	 0% 84% 13%
2	C	18	 67% 33%
2	E	18	 6% 50% 50%
3	D	18	 72% 22% 6%

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Mol	Chain	Length	Quality of chain
3	G	18	 33% 50% 6% 11%

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 6912 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 DNA (cytosine-5)-methyltransferase DRM2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	350	2746	1769	482	483	12	0	0	0
1	A	350	2653	1702	460	479	12	0	0	0

- Molecule 2 is a DNA chain called DNA (5'-D(\*TP\*AP\*AP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*AP\*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	C	18	380	180	84	99	17	0	0	0
2	E	18	381	180	84	100	17	0	0	0

- Molecule 3 is a DNA chain called DNA (5'-D(P\*AP\*TP\*TP\*CP\*CP\*TP\*CP\*CP\*TP\*(C49)P\*CP\*TP\*CP\*CP\*TP\*TP\*TP\*A)-3').

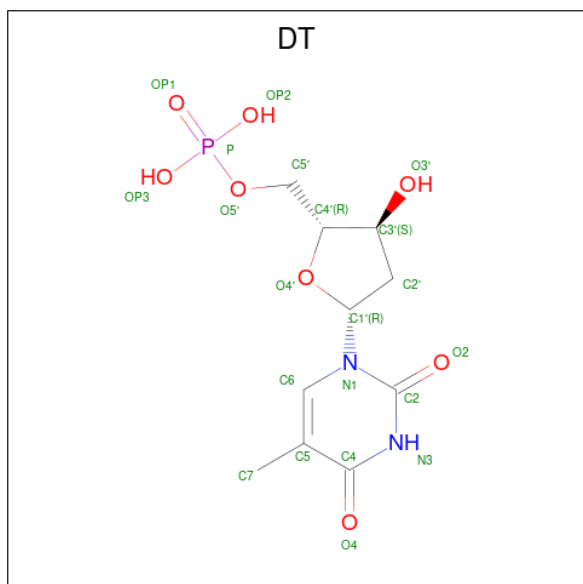
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	F	N	O	P			
3	D	18	356	173	1	50	114	18	0	0	0
3	G	16	312	153	1	43	100	15	0	0	0

- Molecule 4 is S-ADENOSYL-L-HOMOCYSTEINE (three-letter code: SAH) (formula: C<sub>14</sub>H<sub>20</sub>N<sub>6</sub>O<sub>5</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
4	A	1	Total	C	N	O	S	0	0
			26	14	6	5	1		

- Molecule 5 is THYMIDINE-5'-MONOPHOSPHATE (three-letter code: DT) (formula:  $C_{10}H_{15}N_2O_8P$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	E	1	Total	C	N	O	P	0	0
			20	10	2	7	1		

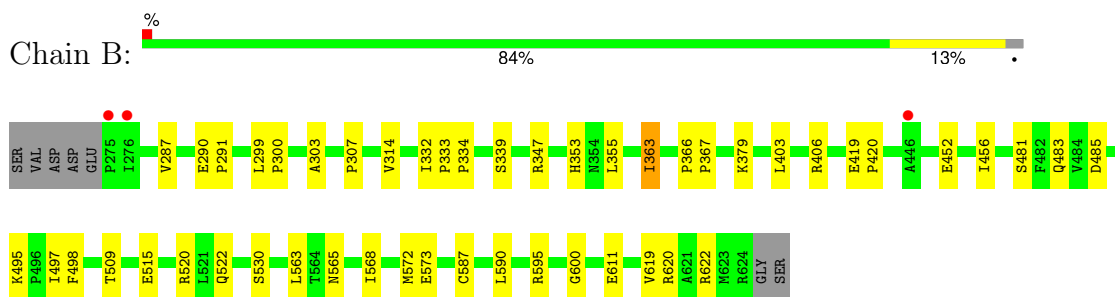
- Molecule 6 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	B	12	Total	O	0	0
			12	12		

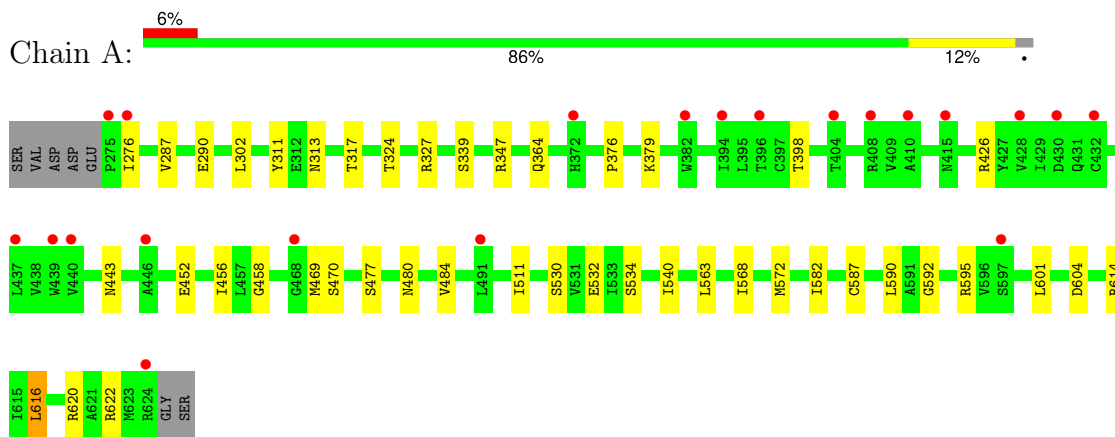
### 3 Residue-property plots [i](#)

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.

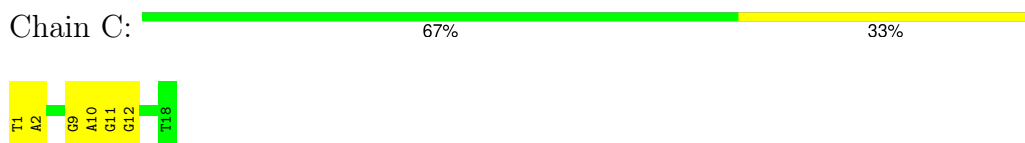
- Molecule 1: DNA (cytosine-5)-methyltransferase DRM2



- Molecule 1: DNA (cytosine-5)-methyltransferase DRM2

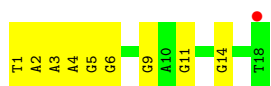


- Molecule 2: DNA (5'-D(\*TP\*AP\*AP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*AP\*T)-3')

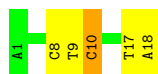


- Molecule 2: DNA (5'-D(\*TP\*AP\*AP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*GP\*GP\*AP\*AP\*T)-3')

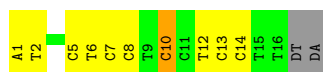




- Molecule 3: DNA (5'-D(P\*AP\*TP\*TP\*CP\*CP\*TP\*CP\*CP\*TP\*(C49)P\*CP\*TP\*CP\*CP\*TP\*TP\*TP\*A)-3')



- Molecule 3: DNA (5'-D(P\*AP\*TP\*TP\*CP\*CP\*TP\*CP\*CP\*TP\*(C49)P\*CP\*TP\*CP\*CP\*TP\*TP\*TP\*A)-3')





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	171.92Å 70.98Å 104.09Å 90.00° 97.90° 90.00°	Depositor
Resolution (Å)	47.06 – 2.81 47.06 – 2.81	Depositor EDS
% Data completeness (in resolution range)	99.0 (47.06-2.81) 99.2 (47.06-2.81)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.32 (at 2.81Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.213 , 0.263 0.215 , 0.262	Depositor DCC
$R_{free}$ test set	28746 reflections (6.56%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	67.8	Xtrriage
Anisotropy	0.607	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 68.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6912	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	105.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.60% 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: SAH, C49

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	0/2727	0.36	0/3728
1	B	0.21	0/2824	0.36	0/3844
2	C	0.47	0/431	0.78	0/667
2	E	0.50	0/432	0.80	0/668
3	D	0.53	0/369	1.05	0/562
3	G	0.68	0/320	1.21	2/487 (0.4%)
All	All	0.31	0/7103	0.56	2/9956 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	7	DC	C1'-O4'-C4'	-6.92	103.18	110.10
3	G	7	DC	O4'-C1'-N1	6.56	112.59	108.00

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	2653	0	2489	24	0
1	B	2746	0	2692	30	0
2	C	380	0	199	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	381	0	202	12	0
3	D	356	0	207	4	0
3	G	312	0	185	13	0
4	A	26	0	19	1	0
4	B	26	0	19	1	0
5	E	20	0	13	0	0
6	B	12	0	0	0	0
All	All	6912	0	6025	74	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 6.

All (74) 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:477:SER:HB2	1:A:511:ILE:HD11	1.64	0.80
3:G:5:DC:H2''	3:G:6:DT:H5'	1.68	0.76
1:B:572:MET:HG2	1:B:622:ARG:HD3	1.69	0.75
2:E:11:DG:N2	3:G:8:DC:O2	2.20	0.70
2:C:11:DG:H2''	2:C:12:DG:H5''	1.79	0.64
1:B:481:SER:HA	4:B:701:SAH:HA	1.79	0.63
3:D:8:DC:H2''	3:D:9:DT:H5''	1.81	0.62
1:B:403:LEU:HD23	1:B:406:ARG:HH11	1.63	0.62
1:B:587:CYS:HB3	3:D:10:C49:F	1.90	0.62
1:B:287:VAL:HG23	1:B:290:GLU:HB2	1.82	0.61
1:A:572:MET:HG2	1:A:622:ARG:HD3	1.84	0.60
1:A:592:GLY:O	2:E:9:DG:N2	2.28	0.60
1:A:595:ARG:HG2	2:E:9:DG:N3	2.17	0.60
1:A:287:VAL:HG23	1:A:290:GLU:HB2	1.86	0.57
1:A:480:ASN:O	4:A:701:SAH:N	2.38	0.57
1:B:587:CYS:CB	3:D:10:C49:F	2.40	0.56
2:E:14:DG:H1	3:G:5:DC:H42	1.54	0.56
1:B:509:THR:HG21	1:B:530:SER:HB2	1.88	0.54
1:A:587:CYS:CB	3:G:10:C49:F	2.46	0.53
3:G:1:DA:H2''	3:G:2:DT:H5''	1.92	0.52
2:C:9:DG:H2''	2:C:10:DA:C8	2.45	0.51
3:G:12:DT:C6	3:G:12:DT:H5'	2.46	0.50
1:A:587:CYS:HB3	3:G:10:C49:F	2.02	0.50
2:E:5:DG:H2'	2:E:6:DG:C8	2.47	0.49
1:B:483:GLN:HE21	1:B:485:ASP:HB2	1.76	0.49
1:A:563:LEU:O	1:A:614:ARG:NH1	2.45	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:G:5:DC:C2'	3:G:6:DT:H5'	2.41	0.49
1:B:339:SER:HB2	1:B:347:ARG:HB3	1.93	0.49
2:C:1:DT:H2''	2:C:2:DA:C8	2.48	0.49
1:B:303:ALA:HB1	1:B:332:ILE:HD11	1.95	0.49
1:A:458:GLY:HA3	1:A:484:VAL:HB	1.95	0.48
1:B:363:ILE:HD11	1:B:520:ARG:HB2	1.95	0.48
1:A:311:TYR:OH	1:A:313:ASN:ND2	2.41	0.48
1:A:616:LEU:HD22	1:A:620:ARG:HD2	1.94	0.48
1:B:307:PRO:HD2	1:B:620:ARG:HG2	1.96	0.48
2:E:3:DA:H2'	2:E:4:DA:C8	2.49	0.47
1:B:495:LYS:HE2	1:B:522:GLN:HB2	1.96	0.47
1:A:469:MET:SD	1:A:540:ILE:HD11	2.55	0.47
1:A:595:ARG:HG2	2:E:9:DG:C2	2.49	0.47
3:G:12:DT:H5'	3:G:12:DT:H6	1.80	0.47
1:B:452:GLU:O	1:B:456:ILE:HG12	2.16	0.46
1:B:515:GLU:OE1	1:B:515:GLU:N	2.49	0.46
2:E:3:DA:H4'	2:E:4:DA:OP1	2.16	0.46
2:E:4:DA:H2'	2:E:5:DG:C8	2.50	0.46
3:G:13:DC:H2''	3:G:14:DC:O5'	2.15	0.46
1:B:366:PRO:HA	1:B:367:PRO:HD3	1.80	0.46
1:A:339:SER:HB2	1:A:347:ARG:HB3	1.98	0.45
3:D:17:DT:H2''	3:D:18:DA:C8	2.52	0.45
1:A:563:LEU:HD21	1:A:568:ILE:HD11	1.99	0.45
1:B:497:ILE:HG23	1:B:498:PHE:HD1	1.83	0.44
1:A:317:THR:HG22	1:A:590:LEU:HB3	2.00	0.44
1:B:299:LEU:HD12	1:B:300:PRO:HD2	1.99	0.44
1:B:595:ARG:HG2	2:C:9:DG:C2	2.52	0.44
1:B:353:HIS:HB2	1:B:355:LEU:HD13	2.00	0.43
1:B:563:LEU:HD21	1:B:568:ILE:HD11	2.01	0.43
3:G:13:DC:H4'	3:G:14:DC:OP1	2.18	0.43
1:B:333:PRO:HA	1:B:334:PRO:HD3	1.84	0.43
1:B:611:GLU:OE2	1:A:327:ARG:NH2	2.41	0.43
1:A:376:PRO:HA	1:A:379:LYS:HE3	2.00	0.43
1:A:470:SER:HB3	2:E:4:DA:H5'	2.01	0.42
1:B:307:PRO:HG3	1:B:619:VAL:HG22	2.02	0.42
2:E:1:DT:H2''	2:E:2:DA:OP2	2.19	0.42
1:B:290:GLU:HA	1:B:291:PRO:HD3	1.86	0.42
1:B:497:ILE:HG23	1:B:498:PHE:CD1	2.54	0.41
1:B:379:LYS:HD3	1:B:379:LYS:HA	1.89	0.41
1:A:532:GLU:HG3	1:A:534:SER:H	1.86	0.41
1:B:573:GLU:HG2	1:B:622:ARG:NH2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:419:GLU:HA	1:B:420:PRO:HD3	1.80	0.41
1:A:452:GLU:O	1:A:456:ILE:HG12	2.19	0.41
2:E:4:DA:H4'	2:E:5:DG:OP1	2.21	0.41
1:A:324:THR:HG22	1:A:327:ARG:NH1	2.36	0.40
1:B:590:LEU:HD23	1:B:600:GLY:HA2	2.03	0.40
1:A:426:ARG:NH2	3:G:6:DT:OP2	2.55	0.40
3:G:5:DC:H2''	3:G:6:DT:C5'	2.46	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	348/357 (98%)	330 (95%)	18 (5%)	0	100	100
1	B	348/357 (98%)	335 (96%)	13 (4%)	0	100	100
All	All	696/714 (98%)	665 (96%)	31 (4%)	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	271/315 (86%)	261 (96%)	10 (4%)	29	63

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	292/315 (93%)	289 (99%)	3 (1%)	73	91
All	All	563/630 (89%)	550 (98%)	13 (2%)	45	78

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	314	VAL
1	B	363	ILE
1	B	565	ASN
1	A	276	ILE
1	A	302	LEU
1	A	364	GLN
1	A	398	THR
1	A	443	ASN
1	A	530	SER
1	A	582	ILE
1	A	601	LEU
1	A	604	ASP
1	A	616	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	C49	D	10	3,1	17,22,24	4.93	10 (58%)	17,33,38	2.18	6 (35%)
3	C49	G	10	3,1	17,22,24	4.96	10 (58%)	17,33,38	1.99	4 (23%)

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	C49	D	10	3,1	-	2/7/40/46	0/2/2/2
3	C49	G	10	3,1	-	7/7/40/46	0/2/2/2

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	10	C49	C2-N1	10.25	1.49	1.35
3	D	10	C49	C2-N1	10.11	1.49	1.35
3	D	10	C49	C3'-C4'	-8.90	1.29	1.53
3	G	10	C49	C3'-C4'	-8.75	1.30	1.53
3	G	10	C49	O4'-C4'	7.99	1.62	1.45
3	D	10	C49	O4'-C4'	7.92	1.62	1.45
3	G	10	C49	C2-N3	6.78	1.49	1.38
3	D	10	C49	C2-N3	6.66	1.49	1.38
3	G	10	C49	CM5-C5	6.40	1.65	1.51
3	D	10	C49	CM5-C5	6.38	1.64	1.51
3	D	10	C49	O4'-C1'	-5.17	1.30	1.42
3	G	10	C49	O4'-C1'	-5.11	1.31	1.42
3	D	10	C49	C6-N1	-4.43	1.42	1.46
3	D	10	C49	F-C5	-4.36	1.34	1.42
3	G	10	C49	F-C5	-4.36	1.34	1.42
3	G	10	C49	C6-N1	-4.35	1.42	1.46
3	G	10	C49	O3'-C3'	3.08	1.49	1.43
3	D	10	C49	O3'-C3'	2.81	1.49	1.43
3	G	10	C49	C4-N3	2.09	1.42	1.36
3	D	10	C49	C4-N3	2.08	1.42	1.36

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	10	C49	F-C5-CM5	-4.63	100.14	106.49
3	D	10	C49	F-C5-CM5	-4.57	100.22	106.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	10	C49	N3-C2-N1	4.06	120.72	116.65
3	G	10	C49	N3-C2-N1	3.93	120.60	116.65
3	G	10	C49	C2'-C1'-N1	-3.64	111.26	115.59
3	D	10	C49	O4'-C1'-N1	3.27	112.45	108.39
3	D	10	C49	C2'-C1'-N1	-3.13	111.87	115.59
3	D	10	C49	C4'-O4'-C1'	-2.98	102.43	109.51
3	D	10	C49	O2-C2-N1	-2.95	119.55	123.10
3	G	10	C49	O2-C2-N1	-2.70	119.85	123.10

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	10	C49	O4'-C4'-C5'-O5'
3	G	10	C49	C3'-C4'-C5'-O5'
3	G	10	C49	C2'-C1'-N1-C6
3	D	10	C49	C2'-C1'-N1-C6
3	G	10	C49	C2'-C1'-N1-C2
3	G	10	C49	O4'-C1'-N1-C2
3	D	10	C49	C2'-C1'-N1-C2
3	G	10	C49	O4'-C1'-N1-C6
3	G	10	C49	C4'-C5'-O5'-P

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	10	C49	2	0
3	G	10	C49	2	0

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

3 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
4	SAH	B	701	-	23,28,28	1.27	3 (13%)	22,40,40	1.94	4 (18%)
5	DT	E	101	-	18,21,22	0.40	0	25,30,33	0.69	1 (4%)
4	SAH	A	701	-	23,28,28	1.27	3 (13%)	22,40,40	1.88	4 (18%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SAH	B	701	-	-	7/11/31/31	0/3/3/3
5	DT	E	101	-	-	0/7/21/22	0/2/2/2
4	SAH	A	701	-	-	6/11/31/31	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	701	SAH	C2-N3	4.24	1.38	1.32
4	A	701	SAH	C2-N3	4.20	1.38	1.32
4	B	701	SAH	C2-N1	2.55	1.38	1.33
4	A	701	SAH	C2-N1	2.54	1.38	1.33
4	A	701	SAH	OXT-C	-2.27	1.23	1.30
4	B	701	SAH	OXT-C	-2.22	1.23	1.30

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	701	SAH	N3-C2-N1	-6.24	120.20	128.67
4	B	701	SAH	N3-C2-N1	-6.22	120.22	128.67
4	A	701	SAH	C5'-SD-CG	-4.24	89.68	102.26
4	B	701	SAH	C5'-SD-CG	-4.14	89.97	102.26
4	B	701	SAH	O4'-C1'-N9	2.92	112.62	108.75
4	A	701	SAH	OXT-C-O	-2.63	118.12	124.08
4	B	701	SAH	OXT-C-O	-2.58	118.23	124.08
4	A	701	SAH	O4'-C1'-N9	2.22	111.69	108.75

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	101	DT	O4-C4-C5	-2.21	122.39	124.92

There are no chirality outliers.

All (13) torsion outliers are listed below:

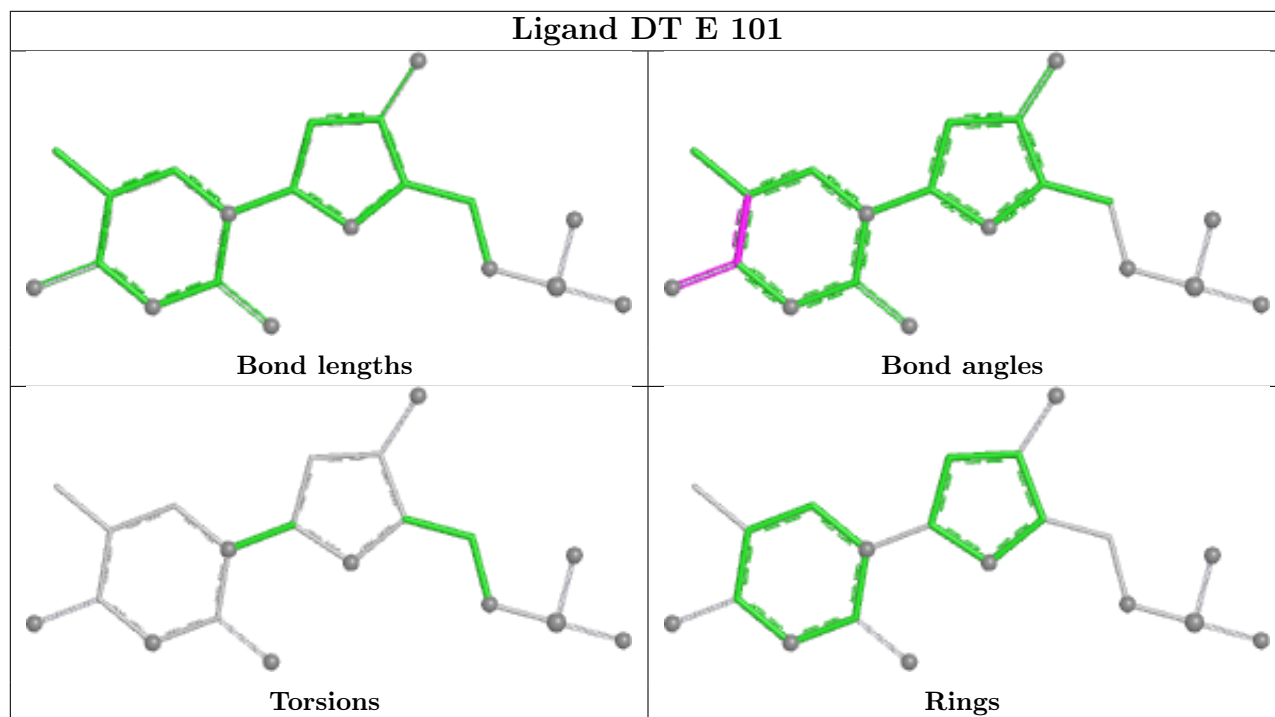
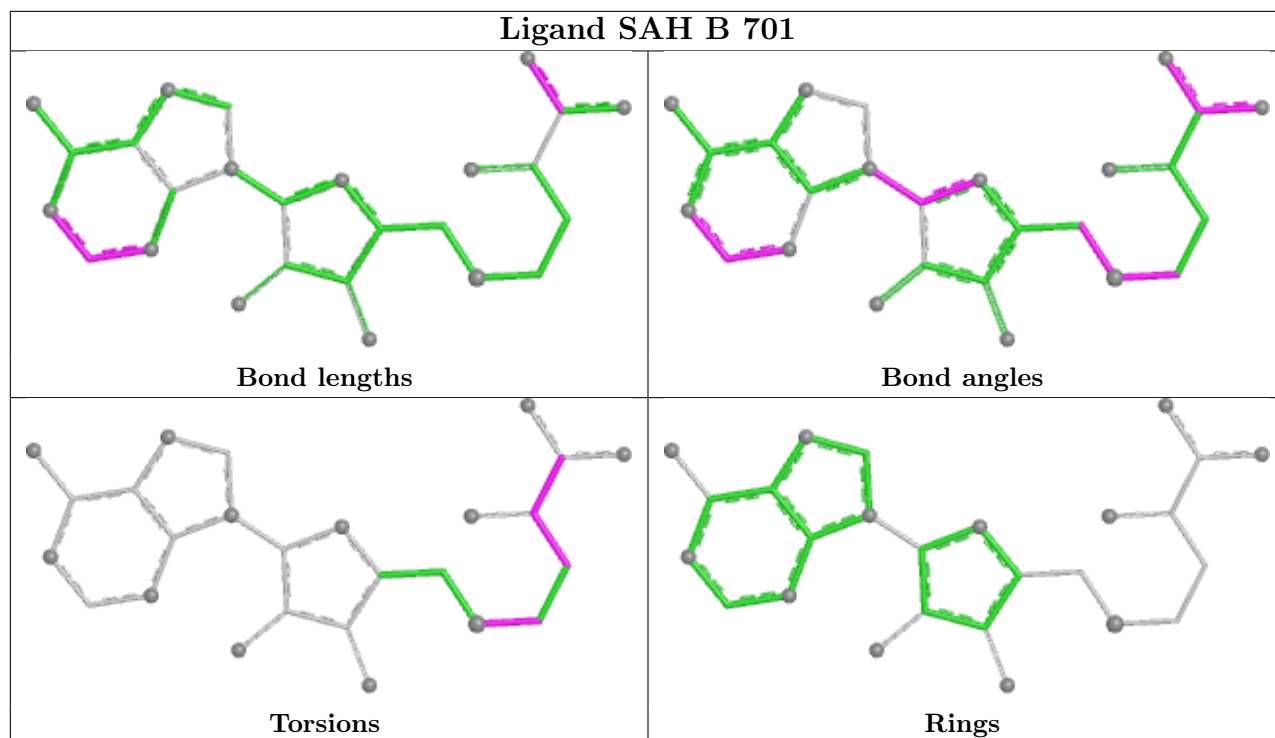
Mol	Chain	Res	Type	Atoms
4	B	701	SAH	C-CA-CB-CG
4	B	701	SAH	OXT-C-CA-CB
4	A	701	SAH	OXT-C-CA-CB
4	B	701	SAH	O-C-CA-CB
4	A	701	SAH	O-C-CA-CB
4	B	701	SAH	OXT-C-CA-N
4	A	701	SAH	OXT-C-CA-N
4	B	701	SAH	N-CA-CB-CG
4	B	701	SAH	CB-CG-SD-C5'
4	A	701	SAH	CB-CG-SD-C5'
4	A	701	SAH	C-CA-CB-CG
4	B	701	SAH	O-C-CA-N
4	A	701	SAH	O-C-CA-N

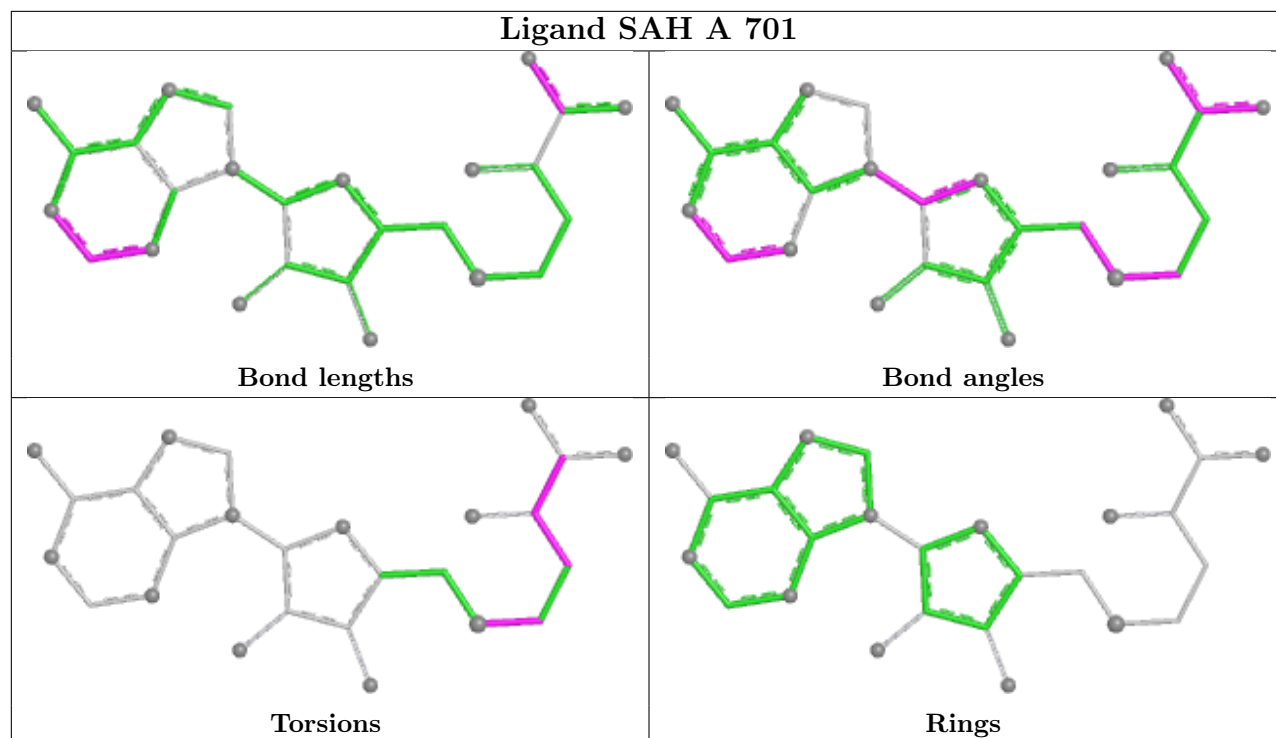
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	701	SAH	1	0
4	A	701	SAH	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, 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	350/357 (98%)	0.60	21 (6%) 29 22	63, 120, 172, 213	0
1	B	350/357 (98%)	-0.02	3 (0%) 81 75	46, 69, 100, 129	0
2	C	18/18 (100%)	-0.04	0 100 100	73, 100, 154, 180	0
2	E	18/18 (100%)	0.38	1 (5%) 31 24	147, 175, 282, 310	0
3	D	17/18 (94%)	-0.44	0 100 100	61, 83, 147, 157	0
3	G	15/18 (83%)	0.67	0 100 100	104, 171, 290, 292	0
All	All	768/786 (97%)	0.28	25 (3%) 49 41	46, 90, 172, 310	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	432	CYS	4.7
1	A	446	ALA	4.6
1	A	437	LEU	4.6
1	B	275	PRO	4.0
1	A	430	ASP	3.1
1	A	275	PRO	3.0
1	A	276	ILE	3.0
1	A	372	HIS	2.8
1	A	440	VAL	2.7
1	A	410	ALA	2.6
1	B	276	ILE	2.5
1	A	404	THR	2.4
1	A	428	VAL	2.4
1	A	396	THR	2.3
1	A	408	ARG	2.3
1	A	439	TRP	2.3
1	A	491	LEU	2.2
1	A	415	ASN	2.2
1	A	468	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	446	ALA	2.1
1	A	624	ARG	2.1
1	A	597	SER	2.1
1	A	394	ILE	2.0
2	E	18	DT	2.0
1	A	382	TRP	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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	C49	G	10	21/23	0.90	0.13	74,94,128,222	0
3	C49	D	10	21/23	0.95	0.10	43,62,83,98	0

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

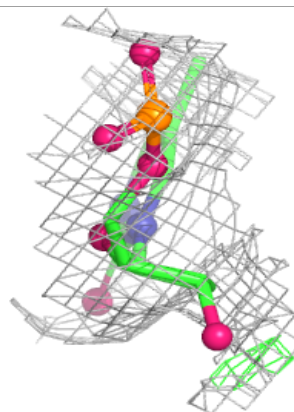
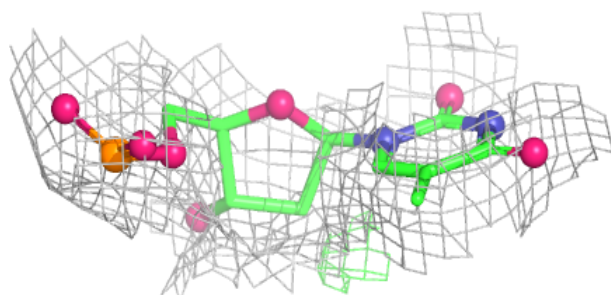
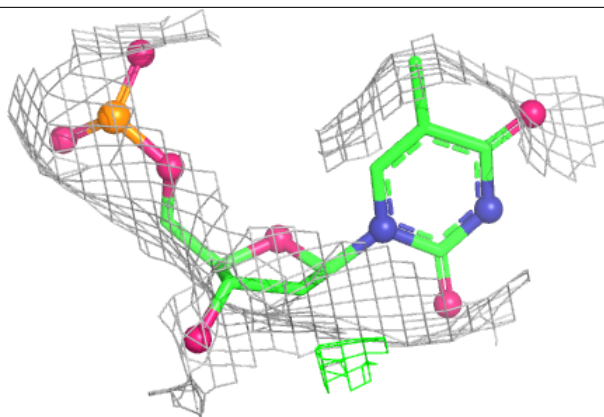
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
5	DT	E	101	20/21	0.46	0.14	155,173,180,184	0
4	SAH	A	701	26/26	0.86	0.13	48,85,119,141	0
4	SAH	B	701	26/26	0.91	0.12	36,62,91,94	0

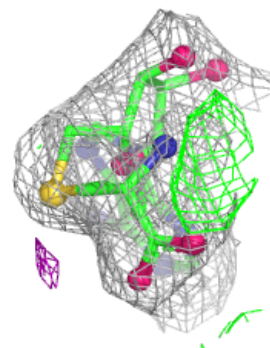
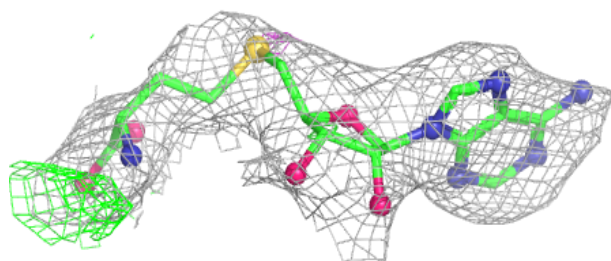
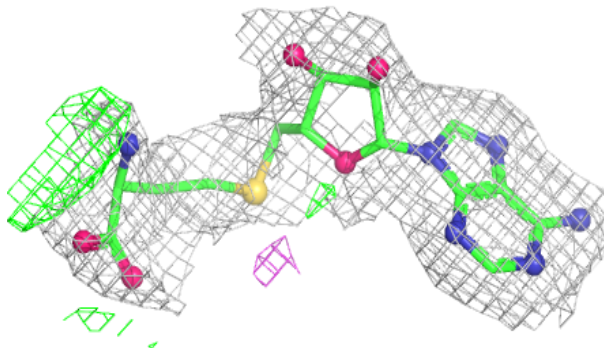
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

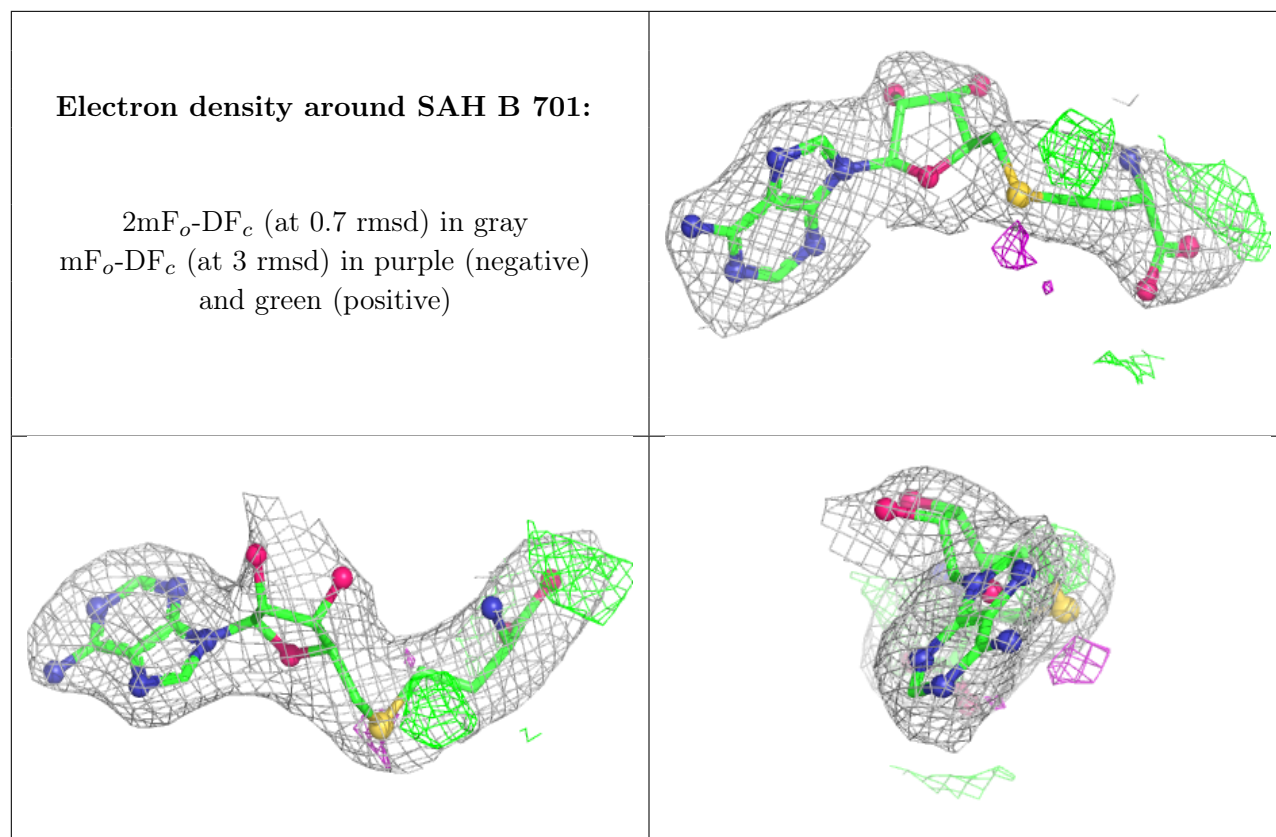
**Electron density around DT E 101:**

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

**Electron density around SAH 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)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.