



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 14, 2023 – 11:30 PM EDT

PDB ID : 8CXV  
Title : CamA Adenine Methyltransferase Complexed to Cognate Substrate DNA and Compound 3  
Authors : Horton, J.R.; Zhou, J.; Cheng, X.  
Deposited on : 2022-05-22  
Resolution : 2.26 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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

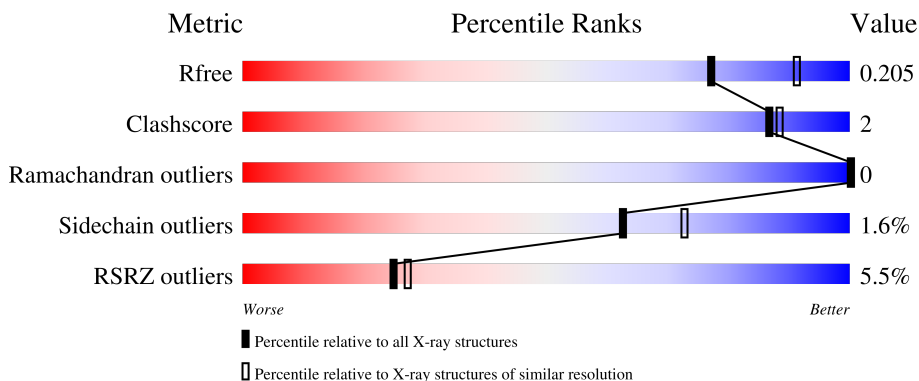
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.26 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.



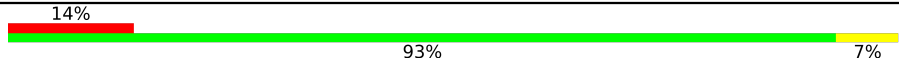

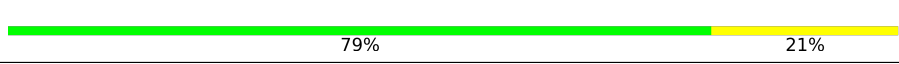
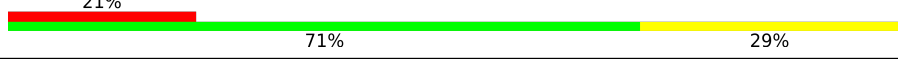
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	578	 89% 5% 6%
1	B	578	 90% 5% 5%
1	C	578	 86% 7% 7%
2	D	14	 86% 14%
2	F	14	 86% 14%

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Mol	Chain	Length	Quality of chain
2	H	14	 14% 93% 7%
3	E	14	 14% 64% 36%
3	G	14	 79% 21%
3	I	14	 21% 71% 29%

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 15942 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 Site-specific DNA-methyltransferase (adenine-specific).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	545	4525	2946	727	835	17	0	1	0
1	B	550	4555	2967	732	839	17	0	0	0
1	C	540	4341	2826	696	802	17	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	HIS	-	expression tag	UNP Q183J3
B	0	HIS	-	expression tag	UNP Q183J3
C	0	HIS	-	expression tag	UNP Q183J3

- Molecule 2 is a DNA chain called DNA Strand 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	D	14	281	136	53	79	13	0	0	0
2	F	14	281	136	53	79	13	0	0	0
2	H	14	281	136	53	79	13	0	0	0

- Molecule 3 is a DNA chain called DNA Strand 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	E	14	287	139	50	85	13	0	0	0
3	G	14	287	139	50	85	13	0	0	0
3	I	14	287	139	50	85	13	0	0	0

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).

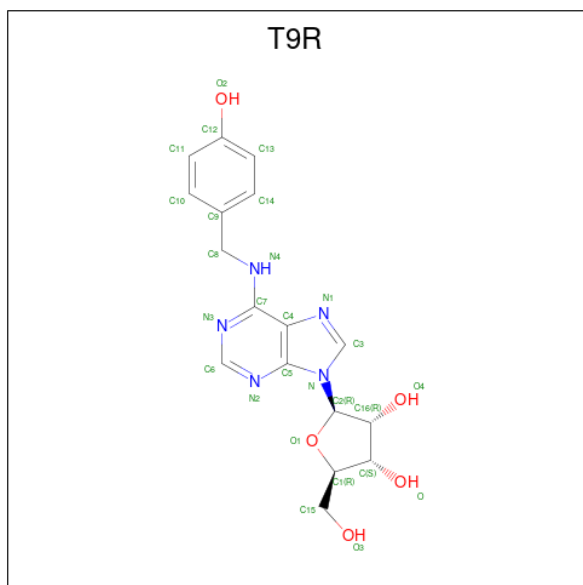


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	F	1	Total C O 4 2 2	0	0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

- Molecule 5 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total K 2 2	0	0
5	B	3	Total K 3 3	0	0
5	C	2	Total K 2 2	0	0

- Molecule 6 is N-[(4-hydroxyphenyl)methyl]adenosine (three-letter code: T9R) (formula: C<sub>17</sub>H<sub>19</sub>N<sub>5</sub>O<sub>5</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C N O 27 17 5 5	0	0
6	B	1	Total C N O 27 17 5 5	0	0
6	C	1	Total C N O 27 17 5 5	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	191	Total O 191 191	0	0
7	B	220	Total O 220 220	0	0
7	C	125	Total O 125 125	0	0

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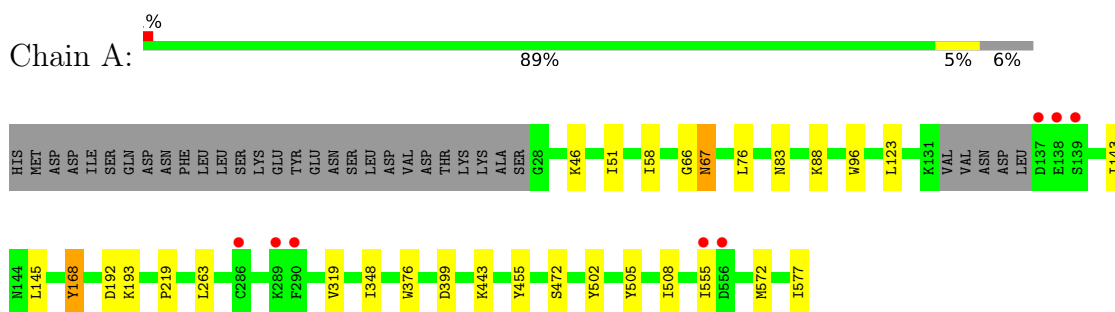
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	27	Total 27	O 27	0	0
7	E	25	Total 25	O 25	0	0
7	F	28	Total 28	O 28	0	0
7	G	28	Total 28	O 28	0	0
7	H	24	Total 24	O 24	0	0
7	I	17	Total 17	O 17	0	0

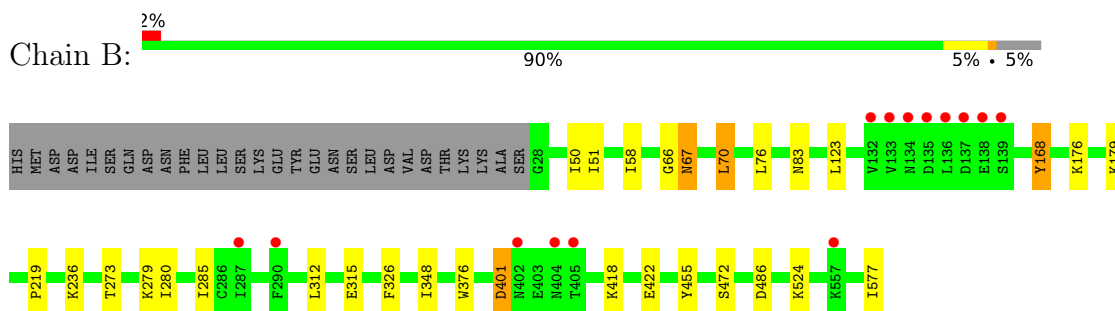
### 3 Residue-property plots [i](#)

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

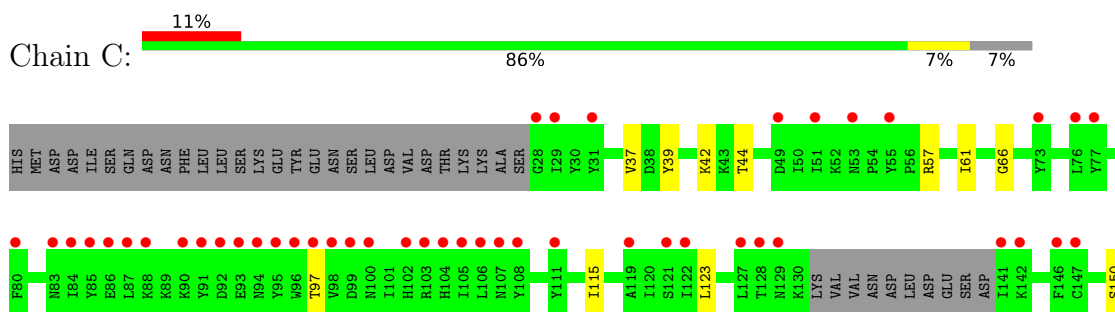
- Molecule 1: Site-specific DNA-methyltransferase (adenine-specific)



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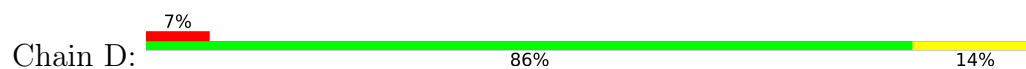
- Molecule 1: Site-specific DNA-methyltransferase (adenine-specific)



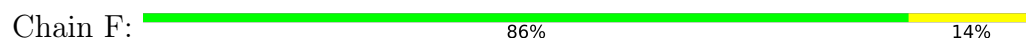




- Molecule 2: DNA Strand 1



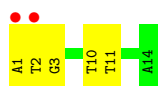
- Molecule 2: DNA Strand 1



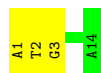
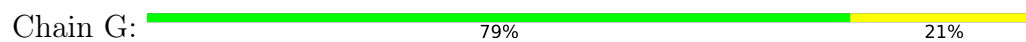
- Molecule 2: DNA Strand 1



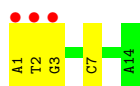
- Molecule 3: DNA Strand 2



- Molecule 3: DNA Strand 2



- Molecule 3: DNA Strand 2



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	81.46Å 161.34Å 229.79Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.88 – 2.26 44.88 – 2.26	Depositor EDS
% Data completeness (in resolution range)	93.6 (44.88-2.26) 93.7 (44.88-2.26)	Depositor EDS
$R_{merge}$	0.24	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.23 (at 2.27Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.181 , 0.208 0.180 , 0.205	Depositor DCC
$R_{free}$ test set	1998 reflections (1.50%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	37.4	Xtrriage
Anisotropy	0.353	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 45.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	15942	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	48.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.57% 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: K, EDO, T9R

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	0.25	0/4621	0.46	0/6217
1	B	0.25	0/4649	0.46	0/6256
1	C	0.24	0/4430	0.45	0/5979
2	D	0.50	0/315	0.86	0/483
2	F	0.49	0/315	0.86	0/483
2	H	0.47	0/315	0.82	0/483
3	E	0.57	0/321	0.99	0/495
3	G	0.58	0/321	1.02	0/495
3	I	0.56	0/321	1.00	0/495
All	All	0.30	0/15608	0.55	0/21386

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	4525	0	4510	15	0
1	B	4555	0	4547	18	0
1	C	4341	0	4213	18	0
2	D	281	0	159	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	281	0	159	1	0
2	H	281	0	159	1	0
3	E	287	0	162	3	0
3	G	287	0	162	3	0
3	I	287	0	162	4	0
4	A	12	0	18	2	0
4	B	24	0	36	1	0
4	F	4	0	6	0	0
4	G	4	0	6	0	0
5	A	2	0	0	0	0
5	B	3	0	0	0	0
5	C	2	0	0	0	0
6	A	27	0	0	0	0
6	B	27	0	0	0	0
6	C	27	0	0	0	0
7	A	191	0	0	0	0
7	B	220	0	0	1	0
7	C	125	0	0	1	0
7	D	27	0	0	0	0
7	E	25	0	0	0	0
7	F	28	0	0	0	0
7	G	28	0	0	0	0
7	H	24	0	0	0	0
7	I	17	0	0	0	0
All	All	15942	0	14299	62	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 2.

All (62) 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:C:61:ILE:HG12	1:C:150:SER:HB3	1.80	0.64
3:E:1:DA:H2''	3:E:2:DT:H5''	1.82	0.61
1:C:66:GLY:HA3	1:C:123:LEU:HD13	1.81	0.61
1:C:280:ILE:HD11	1:C:285:ILE:HG12	1.83	0.61
1:A:66:GLY:HA3	1:A:123:LEU:HD13	1.85	0.59
1:C:57:ARG:NH1	1:C:158:LYS:O	2.37	0.57
1:B:51:ILE:HD11	1:B:83:ASN:HB3	1.85	0.57
1:B:66:GLY:HA3	1:B:123:LEU:HD13	1.86	0.57
1:B:58:ILE:HD13	1:B:76:LEU:HD11	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:280:ILE:HD11	1:B:285:ILE:HG12	1.87	0.56
1:A:319:VAL:HG11	1:A:508:ILE:HG23	1.88	0.55
1:A:168:TYR:CE1	1:A:219:PRO:HD3	2.43	0.54
1:B:418:LYS:NZ	1:B:422:GLU:OE2	2.42	0.53
2:D:13:DC:H2''	2:D:14:DA:C8	2.45	0.52
3:E:2:DT:H2''	3:E:3:DG:C8	2.45	0.52
3:I:1:DA:H2''	3:I:2:DT:H5''	1.91	0.52
1:B:168:TYR:CE1	1:B:219:PRO:HD3	2.46	0.50
1:C:168:TYR:CE1	1:C:219:PRO:HD3	2.47	0.50
1:B:67:ASN:N	1:B:67:ASN:OD1	2.44	0.50
1:A:399:ASP:OD2	1:A:443:LYS:NZ	2.36	0.49
1:A:51:ILE:HD11	1:A:83:ASN:HB3	1.94	0.49
3:G:1:DA:H2''	3:G:2:DT:H5''	1.93	0.48
1:A:143:ILE:HG22	1:A:145:LEU:HG	1.95	0.48
1:B:401:ASP:OD1	1:B:401:ASP:N	2.44	0.47
1:A:502:TYR:HA	1:A:505:TYR:HB3	1.96	0.47
1:B:524:LYS:NZ	7:B:701:HOH:O	2.45	0.47
2:F:13:DC:H2''	2:F:14:DA:C8	2.49	0.47
1:C:348:ILE:O	1:C:472:SER:HA	2.15	0.47
1:C:464:ILE:HG13	1:C:494:VAL:HG11	1.96	0.47
1:B:236:LYS:HE2	1:B:312:LEU:HB2	1.98	0.45
1:C:39:TYR:CG	1:C:293:LEU:HD23	2.52	0.45
1:C:329:LYS:HD2	1:C:577:ILE:HD13	1.98	0.45
3:I:2:DT:H2''	3:I:3:DG:C8	2.52	0.45
1:B:376:TRP:CZ2	1:B:472:SER:HB2	2.52	0.44
1:A:348:ILE:O	1:A:472:SER:HA	2.17	0.44
1:C:403:GLU:O	1:C:407:LYS:HG2	2.17	0.44
1:C:281:LYS:NZ	7:C:708:HOH:O	2.49	0.44
1:A:58:ILE:HD13	1:A:76:LEU:HD11	1.99	0.44
1:B:348:ILE:O	1:B:472:SER:HA	2.17	0.43
1:A:376:TRP:CZ2	1:A:472:SER:HB2	2.54	0.43
1:C:244:ILE:HG12	1:C:263:LEU:HD12	1.99	0.43
3:G:2:DT:H2''	3:G:3:DG:C8	2.54	0.43
2:H:14:DA:H61	3:I:2:DT:H3	1.66	0.43
3:G:1:DA:H1'	3:G:2:DT:H5''	2.00	0.43
1:A:67:ASN:OD1	1:A:67:ASN:N	2.52	0.43
1:C:44:THR:HG22	1:C:213:ILE:HG22	2.00	0.43
1:C:376:TRP:CZ2	1:C:472:SER:HB2	2.55	0.42
1:B:70:LEU:HD12	1:B:70:LEU:HA	1.89	0.42
1:A:572:MET:HG2	1:A:577:ILE:HG13	2.02	0.42
1:B:279:LYS:NZ	4:B:606:EDO:O1	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:486:ASP:OD1	1:B:486:ASP:N	2.52	0.42
1:B:176:LYS:HA	1:B:179:LYS:HE3	2.02	0.42
3:E:10:DT:H2''	3:E:11:DT:H72	2.02	0.42
1:C:380:LYS:HG3	3:I:7:DC:H3'	2.02	0.41
1:B:326:PHE:CE1	1:B:577:ILE:HD12	2.55	0.41
1:A:88:LYS:HE3	1:A:96:TRP:O	2.20	0.41
1:C:502:TYR:HA	1:C:505:TYR:HB3	2.01	0.41
1:B:50:ILE:HD12	1:B:50:ILE:HA	1.95	0.41
1:A:192:ASP:OD2	4:A:903:EDO:H12	2.21	0.41
1:A:193:LYS:HG2	4:A:903:EDO:H22	2.03	0.41
1:C:197:TYR:CZ	1:C:198:PHE:HE1	2.39	0.41
1:C:317:ILE:HD12	1:C:509:THR:HG22	2.02	0.41

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	542/578 (94%)	526 (97%)	16 (3%)	0	100	100
1	B	548/578 (95%)	530 (97%)	18 (3%)	0	100	100
1	C	536/578 (93%)	521 (97%)	15 (3%)	0	100	100
All	All	1626/1734 (94%)	1577 (97%)	49 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	496/548 (90%)	490 (99%)	6 (1%)	71	80
1	B	499/548 (91%)	492 (99%)	7 (1%)	67	76
1	C	458/548 (84%)	448 (98%)	10 (2%)	52	61
All	All	1453/1644 (88%)	1430 (98%)	23 (2%)	62	73

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	LYS
1	A	67	ASN
1	A	168	TYR
1	A	263	LEU
1	A	455	TYR
1	A	555	ILE
1	B	67	ASN
1	B	70	LEU
1	B	168	TYR
1	B	273	THR
1	B	315	GLU
1	B	401	ASP
1	B	455	TYR
1	C	37	VAL
1	C	42	LYS
1	C	97	THR
1	C	115	ILE
1	C	157	TYR
1	C	168	TYR
1	C	274	TYR
1	C	332	GLU
1	C	407	LYS
1	C	455	TYR

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

### 5.3.3 RNA

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 21 ligands modelled in this entry, 7 are monoatomic - leaving 14 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
4	EDO	B	604	-	3,3,3	0.48	0	2,2,2	0.26	0
4	EDO	G	101	-	3,3,3	0.47	0	2,2,2	0.32	0
4	EDO	B	603	-	3,3,3	0.47	0	2,2,2	0.27	0
4	EDO	B	605	-	3,3,3	0.46	0	2,2,2	0.33	0
4	EDO	A	901	-	3,3,3	0.48	0	2,2,2	0.28	0
6	T9R	A	906	-	26,30,30	0.56	0	28,43,43	0.56	1 (3%)
6	T9R	C	603	-	26,30,30	0.55	0	28,43,43	0.56	1 (3%)
4	EDO	B	602	-	3,3,3	0.48	0	2,2,2	0.26	0
6	T9R	B	610	-	26,30,30	0.55	0	28,43,43	0.52	1 (3%)
4	EDO	A	903	-	3,3,3	0.44	0	2,2,2	0.34	0
4	EDO	B	606	-	3,3,3	0.50	0	2,2,2	0.26	0
4	EDO	B	601	-	3,3,3	0.45	0	2,2,2	0.42	0
4	EDO	F	101	-	3,3,3	0.47	0	2,2,2	0.27	0
4	EDO	A	902	-	3,3,3	0.48	0	2,2,2	0.30	0

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	EDO	B	604	-	-	0/1/1/1	-
4	EDO	G	101	-	-	1/1/1/1	-
4	EDO	B	603	-	-	0/1/1/1	-
4	EDO	B	605	-	-	0/1/1/1	-
4	EDO	A	901	-	-	0/1/1/1	-
6	T9R	A	906	-	-	2/7/27/27	0/4/4/4
6	T9R	C	603	-	-	3/7/27/27	0/4/4/4
4	EDO	B	602	-	-	0/1/1/1	-
6	T9R	B	610	-	-	4/7/27/27	0/4/4/4
4	EDO	A	903	-	-	0/1/1/1	-
4	EDO	B	606	-	-	0/1/1/1	-
4	EDO	B	601	-	-	0/1/1/1	-
4	EDO	F	101	-	-	0/1/1/1	-
4	EDO	A	902	-	-	0/1/1/1	-

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	603	T9R	C6-N3-C7	2.22	118.50	116.59
6	B	610	T9R	C6-N3-C7	2.22	118.50	116.59
6	A	906	T9R	C6-N3-C7	2.20	118.47	116.59

There are no chirality outliers.

All (10) torsion outliers are listed below:

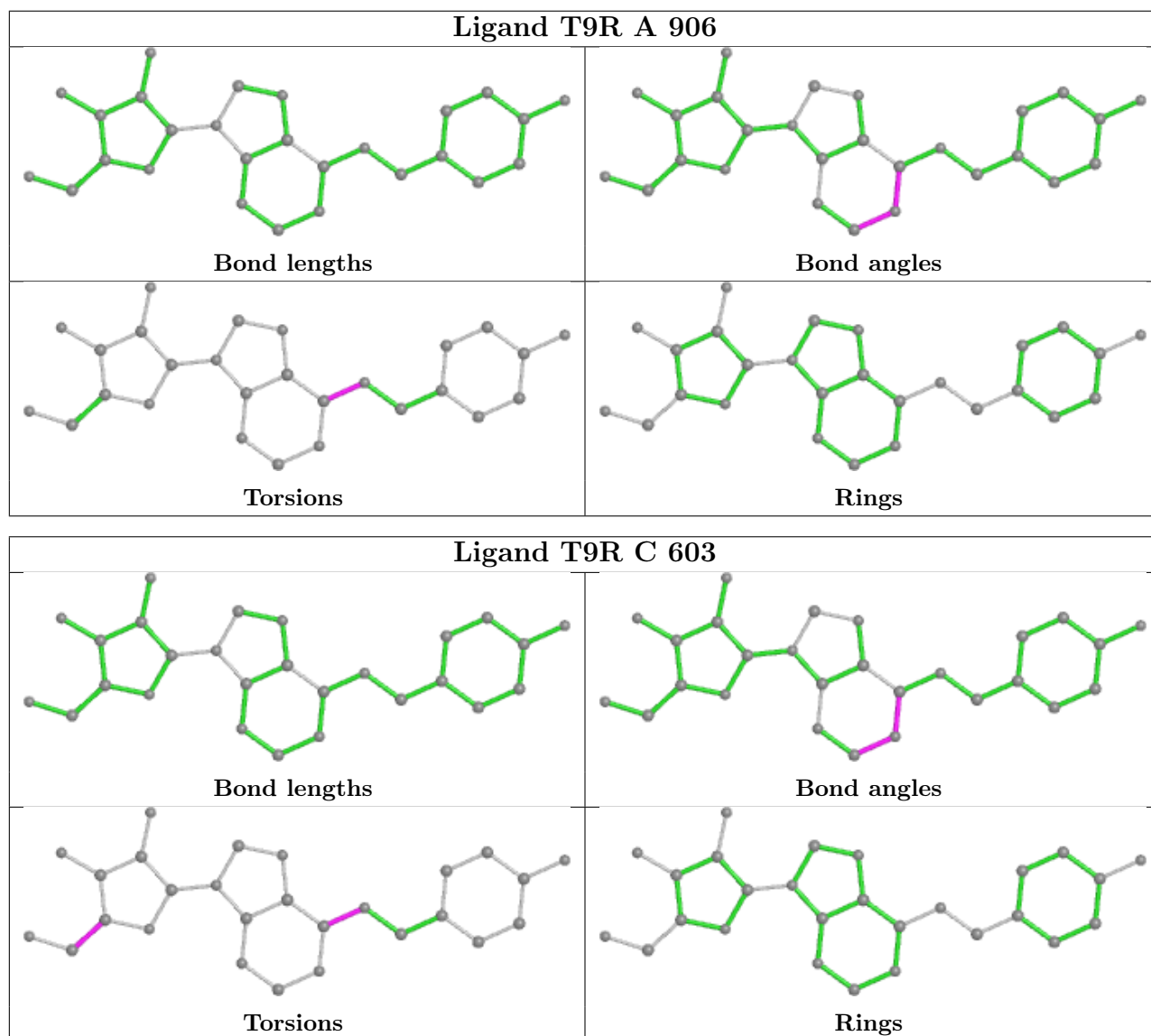
Mol	Chain	Res	Type	Atoms
6	A	906	T9R	C4-C7-N4-C8
6	A	906	T9R	N3-C7-N4-C8
6	B	610	T9R	C4-C7-N4-C8
6	B	610	T9R	N3-C7-N4-C8
6	C	603	T9R	C4-C7-N4-C8
6	C	603	T9R	N3-C7-N4-C8
6	B	610	T9R	O1-C1-C15-O3
6	B	610	T9R	C-C1-C15-O3
4	G	101	EDO	O1-C1-C2-O2
6	C	603	T9R	O1-C1-C15-O3

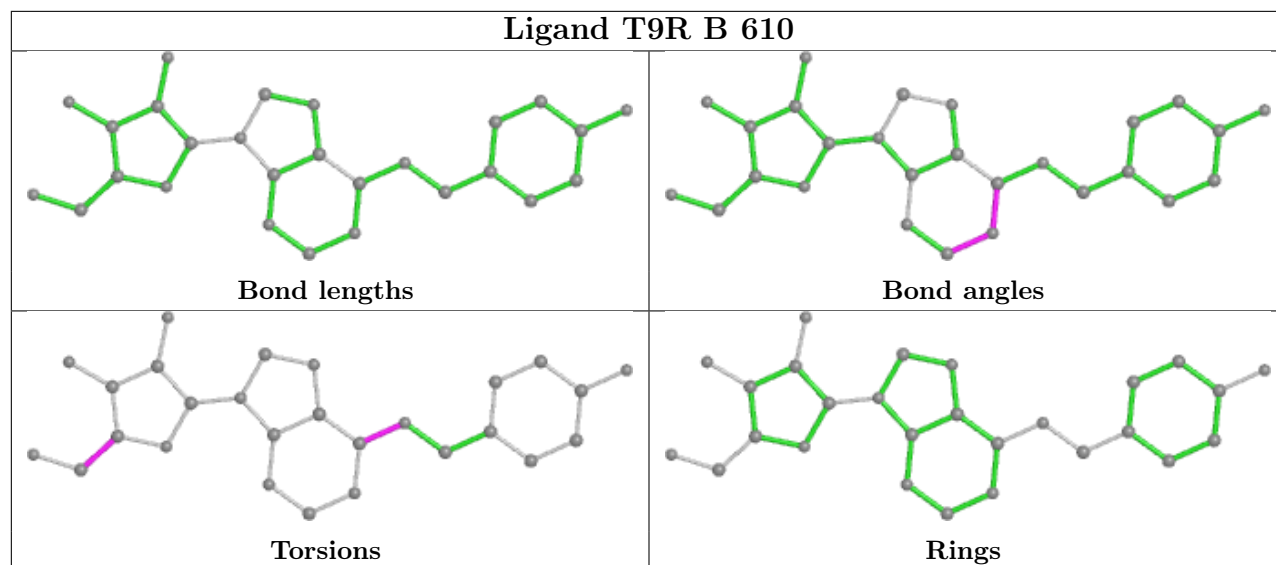
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	903	EDO	2	0
4	B	606	EDO	1	0

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





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [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, 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	545/578 (94%)	-0.31	8 (1%) 73 75	21, 41, 71, 106	0
1	B	550/578 (95%)	-0.15	14 (2%) 57 60	24, 39, 69, 138	0
1	C	540/578 (93%)	0.17	64 (11%) 4 3	32, 53, 100, 131	0
2	D	14/14 (100%)	-0.00	1 (7%) 16 17	26, 31, 107, 125	0
2	F	14/14 (100%)	-0.22	0 100 100	25, 31, 72, 74	0
2	H	14/14 (100%)	0.23	2 (14%) 2 2	37, 49, 120, 144	0
3	E	14/14 (100%)	0.29	2 (14%) 2 2	28, 34, 135, 154	0
3	G	14/14 (100%)	-0.60	0 100 100	28, 33, 59, 60	0
3	I	14/14 (100%)	0.44	3 (21%) 0 0	36, 45, 138, 164	0
All	All	1719/1818 (94%)	-0.09	94 (5%) 25 27	21, 44, 90, 164	0

All (94) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	135	ASP	11.0
1	B	139	SER	7.2
1	C	95	TYR	7.1
1	B	133	VAL	6.9
1	C	55	TYR	6.3
1	C	91	TYR	6.2
3	E	1	DA	6.0
1	B	136	LEU	6.0
1	C	87	LEU	5.8
3	I	1	DA	5.4
1	B	134	ASN	5.2
1	C	273	THR	5.2
2	H	14	DA	5.2
1	C	108	TYR	4.9
1	C	401	ASP	4.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	97	THR	4.7
1	B	132	VAL	4.6
1	C	272	GLU	4.5
1	C	28	GLY	4.5
1	C	271	LYS	4.5
1	C	155	TRP	4.0
1	C	94	ASN	4.0
1	C	128	THR	4.0
1	A	286	CYS	3.9
1	C	88	LYS	3.9
1	C	141	ILE	3.9
3	I	2	DT	3.9
1	B	137	ASP	3.8
1	B	402	ASN	3.8
1	C	404	ASN	3.8
1	C	102	HIS	3.7
1	C	73	TYR	3.6
3	E	2	DT	3.6
1	C	103	ARG	3.5
1	A	137	ASP	3.5
1	C	180	LYS	3.4
1	C	119	ALA	3.3
1	C	51	ILE	3.3
1	C	80	PHE	3.3
1	C	92	ASP	3.3
1	C	274	TYR	3.2
1	C	77	TYR	3.2
1	C	270	THR	3.2
1	B	405	THR	3.2
1	C	106	LEU	3.2
1	B	290	PHE	3.1
1	C	96	TRP	3.1
1	A	556	ASP	3.0
1	C	129	ASN	3.0
1	A	139	SER	3.0
1	C	29	ILE	3.0
2	D	14	DA	3.0
1	B	404	ASN	3.0
1	C	85	TYR	3.0
1	C	76	LEU	2.9
1	C	104	HIS	2.8
1	C	31	TYR	2.8

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Mol	Chain	Res	Type	RSRZ
3	I	3	DG	2.8
1	C	100	ASN	2.8
1	A	289	LYS	2.8
1	B	138	GLU	2.8
1	C	121	SER	2.7
1	C	49	ASP	2.7
1	C	405	THR	2.7
1	C	558	GLY	2.7
1	C	93	GLU	2.7
1	C	99	ASP	2.6
1	C	181	PHE	2.6
1	C	107	ASN	2.6
1	C	90	LYS	2.5
1	C	127	LEU	2.5
1	A	290	PHE	2.5
1	A	138	GLU	2.5
1	C	157	TYR	2.4
1	C	53	ASN	2.4
1	C	146	PHE	2.4
1	C	311	LEU	2.4
2	H	13	DC	2.4
1	C	142	LYS	2.3
1	C	402	ASN	2.3
1	A	555	ILE	2.2
1	C	84	ILE	2.2
1	C	557	LYS	2.2
1	C	83	ASN	2.2
1	C	105	ILE	2.2
1	C	147	CYS	2.1
1	B	287	ILE	2.1
1	C	98	VAL	2.1
1	C	314	ASP	2.1
1	B	557	LYS	2.1
1	C	86	GLU	2.0
1	C	554	SER	2.0
1	C	111	TYR	2.0
1	C	122	ILE	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains

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](#)

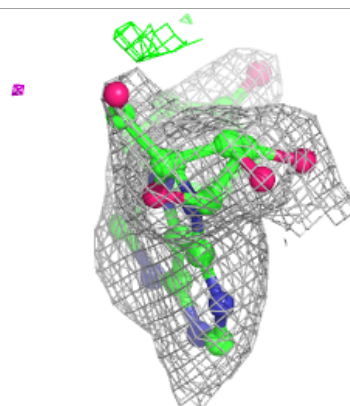
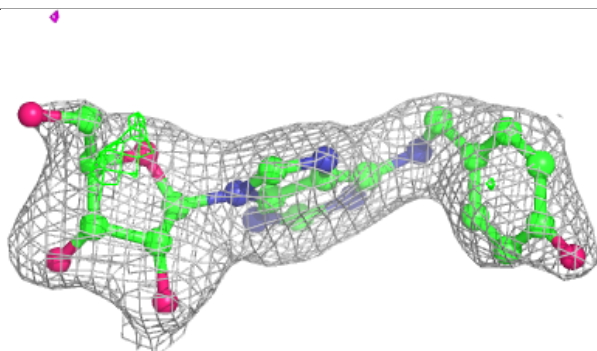
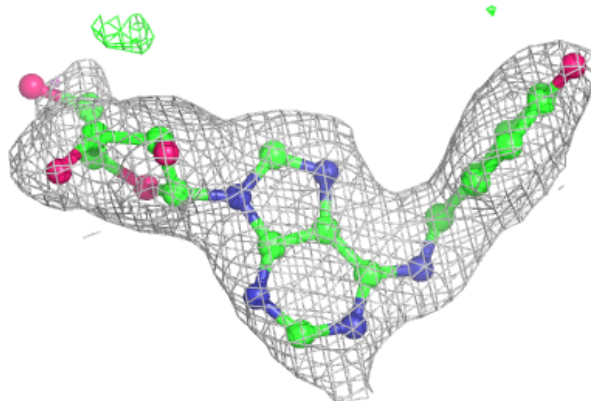
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
4	EDO	A	902	4/4	0.70	0.17	59,61,62,73	0
4	EDO	A	901	4/4	0.82	0.18	54,55,60,61	0
4	EDO	B	603	4/4	0.84	0.44	54,55,71,81	0
4	EDO	F	101	4/4	0.87	0.16	54,54,61,63	0
4	EDO	B	606	4/4	0.90	0.20	48,51,59,64	0
4	EDO	B	602	4/4	0.90	0.24	44,54,56,57	0
4	EDO	A	903	4/4	0.92	0.24	47,48,50,64	0
6	T9R	C	603	27/27	0.92	0.16	59,72,78,82	0
5	K	B	609	1/1	0.94	0.07	73,73,73,73	0
4	EDO	G	101	4/4	0.94	0.16	44,45,46,52	0
5	K	A	905	1/1	0.95	0.10	59,59,59,59	0
5	K	C	602	1/1	0.96	0.08	68,68,68,68	0
6	T9R	A	906	27/27	0.96	0.10	37,47,55,57	0
6	T9R	B	610	27/27	0.96	0.10	29,37,44,60	0
4	EDO	B	604	4/4	0.96	0.18	41,42,42,47	0
5	K	B	608	1/1	0.97	0.05	44,44,44,44	0
4	EDO	B	601	4/4	0.97	0.18	36,38,47,48	0
4	EDO	B	605	4/4	0.97	0.24	52,60,62,66	0
5	K	B	607	1/1	0.98	0.07	47,47,47,47	0
5	K	A	904	1/1	0.99	0.07	43,43,43,43	0
5	K	C	601	1/1	0.99	0.11	53,53,53,53	0

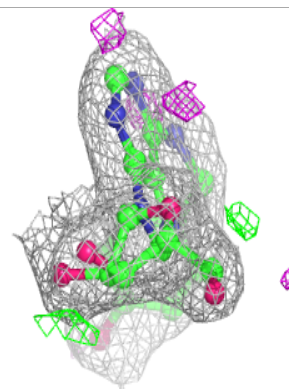
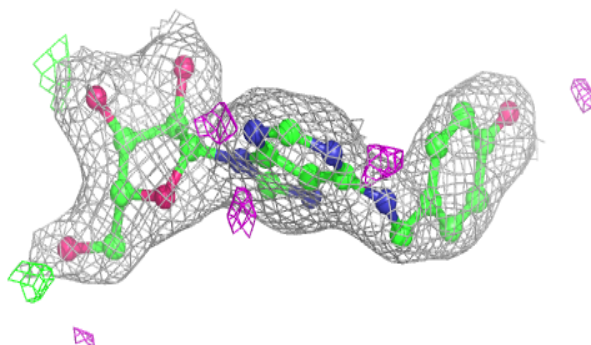
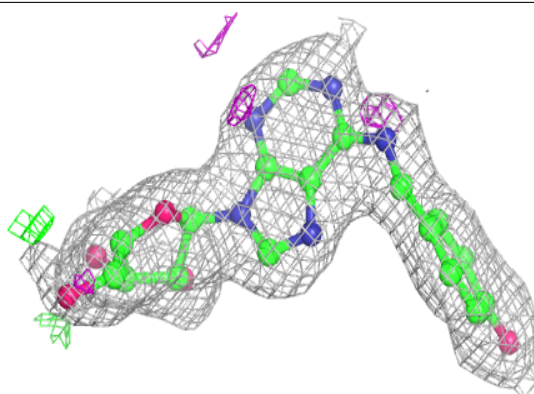
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around T9R C 603:**

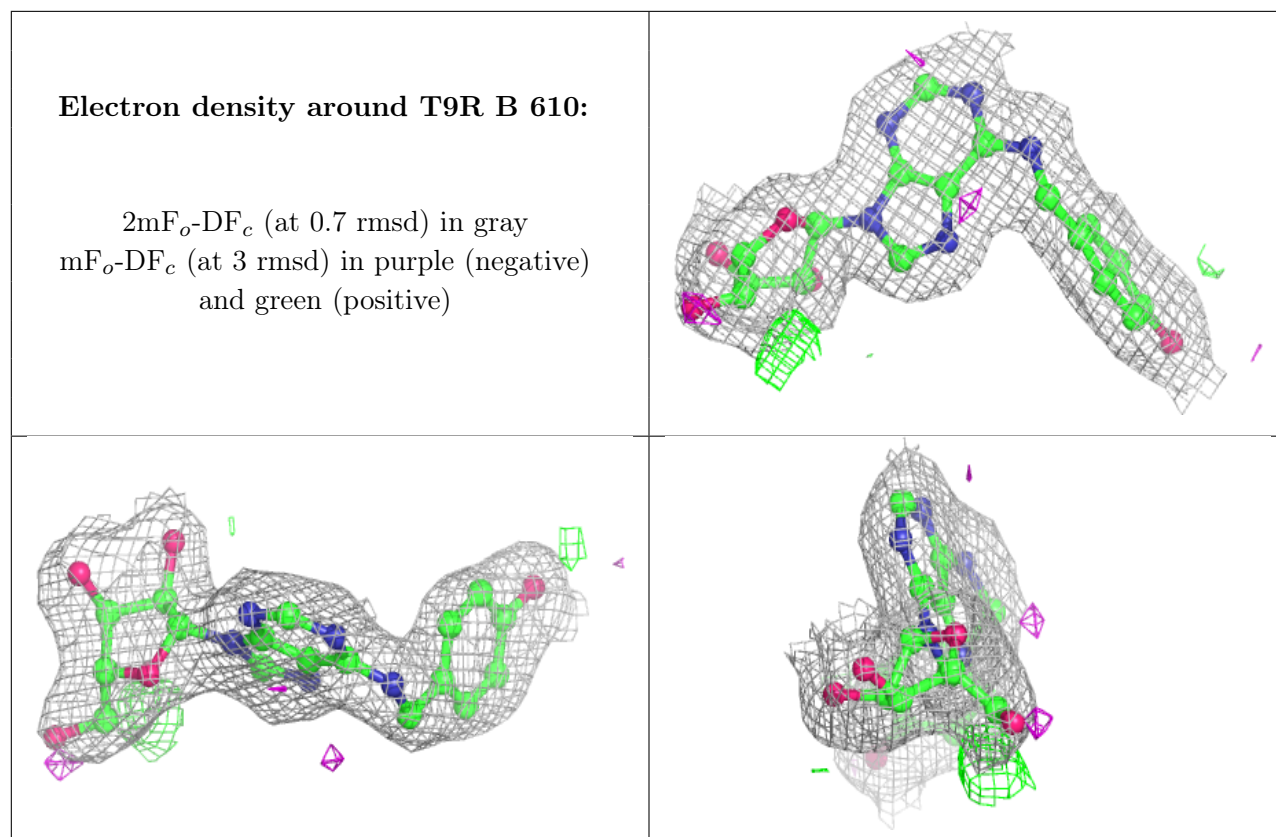
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around T9R A 906:**

$2mF_o-DF_c$  (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.