WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 23, 2025 – 10:05 AM EST

PDB ID	:	9CH3
Title	:	Structure of the alpha-N-methyltransferase (SonM) and RiPP precursor (SonA-L63D) heteromeric complex (bound to SAH)
Authors	:	Crone, K.K.; Labonte, J.W.; Elias, M.; Freeman, M.F.
Deposited on	:	2024-07-01
Resolution	:	2.30 Å(reported)

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

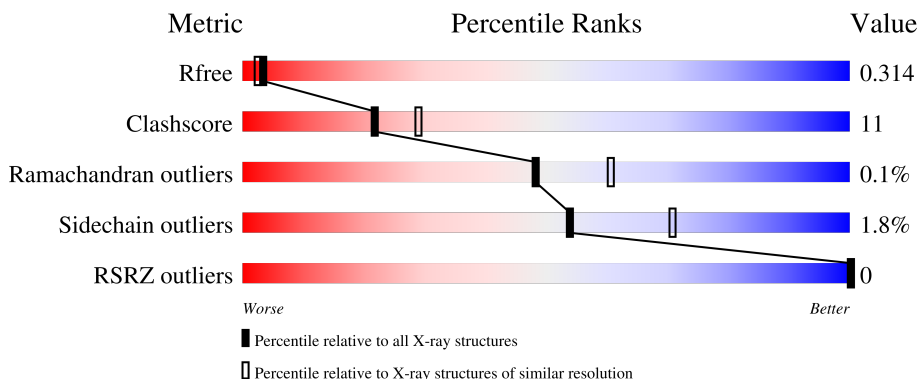|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 2.30 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	Percentile Ranks	Value
Rfree		0.314
Clashscore		11
Ramachandran outliers		0.1%
Sidechain outliers		1.8%
RSRZ outliers		0

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)

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 <=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	263	78% 20% ·
1	C	263	81% 18% ·
1	H	263	82% 17% ·
1	J	263	79% 20%
2	B	78	58% 17% · 24%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	D	78	54% 15% • 29%
3	I	78	60% 12% • 27%
3	K	78	54% 14% • 31%

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 10190 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 TP-methylase family protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	262	Total	C	N	O	S	0	0	0
			2038	1307	350	372	9			
1	C	262	Total	C	N	O	S	0	0	0
			2038	1307	350	372	9			
1	H	262	Total	C	N	O	S	0	0	0
			2038	1307	350	372	9			
1	J	262	Total	C	N	O	S	0	0	0
			2038	1307	350	372	9			

- Molecule 2 is a protein called Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	59	Total	C	N	O	S	0	0	0
			454	279	77	94	4			

There are 8 discrepancies between the modelled and reference sequences:

| Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	MET	-	initiating methionine	UNP Q8EGW2
B	-5	HIS	-	expression tag	UNP Q8EGW2
B	-4	HIS	-	expression tag	UNP Q8EGW2
B	-3	HIS	-	expression tag	UNP Q8EGW2
B	-2	HIS	-	expression tag	UNP Q8EGW2
B	-1	HIS	-	expression tag	UNP Q8EGW2
B	0	HIS	-	expression tag	UNP Q8EGW2
B	63	ASP	LEU	engineered mutation	UNP Q8EGW2

- Molecule 3 is a protein called Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	55	Total	C	N	O	S	0	0	0
			429	264	72	89	4			
3	I	57	Total	C	N	O	S	0	0	0
			441	272	74	91	4			
3	K	54	Total	C	N	O	S	0	0	0
			425	262	71	88	4			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-6	MET	-	initiating methionine	UNP Q8EGW2
D	-5	HIS	-	expression tag	UNP Q8EGW2
D	-4	HIS	-	expression tag	UNP Q8EGW2
D	-3	HIS	-	expression tag	UNP Q8EGW2
D	-2	HIS	-	expression tag	UNP Q8EGW2
D	-1	HIS	-	expression tag	UNP Q8EGW2
D	0	HIS	-	expression tag	UNP Q8EGW2
D	63	ASP	LEU	engineered mutation	UNP Q8EGW2
I	-6	MET	-	initiating methionine	UNP Q8EGW2
I	-5	HIS	-	expression tag	UNP Q8EGW2
I	-4	HIS	-	expression tag	UNP Q8EGW2
I	-3	HIS	-	expression tag	UNP Q8EGW2
I	-2	HIS	-	expression tag	UNP Q8EGW2
I	-1	HIS	-	expression tag	UNP Q8EGW2
I	0	HIS	-	expression tag	UNP Q8EGW2
I	63	ASP	LEU	engineered mutation	UNP Q8EGW2
K	-6	MET	-	initiating methionine	UNP Q8EGW2
K	-5	HIS	-	expression tag	UNP Q8EGW2
K	-4	HIS	-	expression tag	UNP Q8EGW2
K	-3	HIS	-	expression tag	UNP Q8EGW2
K	-2	HIS	-	expression tag	UNP Q8EGW2
K	-1	HIS	-	expression tag	UNP Q8EGW2
K	0	HIS	-	expression tag	UNP Q8EGW2
K	63	ASP	LEU	engineered mutation	UNP Q8EGW2

- Molecule 4 is S-ADENOSYL-L-HOMOCYSTEINE (three-letter code: SAH) (formula: $C_{14}H_{20}N_6O_5S$) (labeled as "Ligand of Interest" by depositor).

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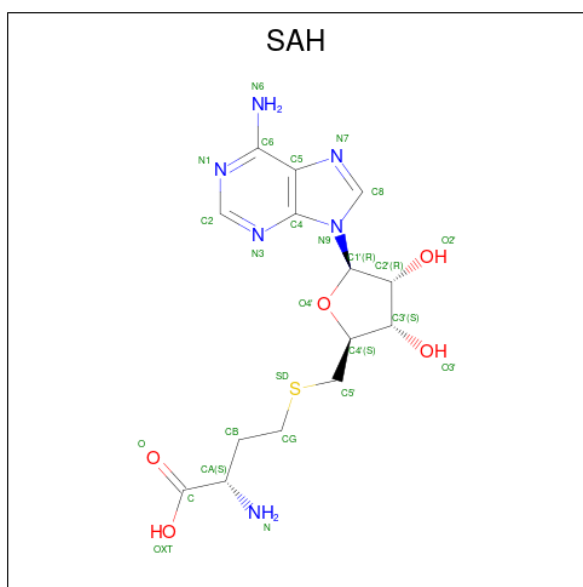
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
4	C	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
4	H	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
4	J	1	Total	C	N	O	S	0	0
			26	14	6	5	1		

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Zn	0	0
			1	1		
5	H	1	Total	Zn	0	0
			1	1		

- Molecule 6 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	28	Total	O	0	0
			28	28		
6	B	7	Total	O	0	0
			7	7		
6	C	35	Total	O	0	0
			35	35		

Continued on next page...

W O R L D W I D E
PDB
PROTEIN DATA BANK

Continued from previous page...

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	15	Total 15	O 15	0	0
6	H	42	Total 42	O 42	0	0
6	I	9	Total 9	O 9	0	0
6	J	41	Total 41	O 41	0	0
6	K	6	Total 6	O 6	0	0

3 Residue-property plots ⓘ

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.
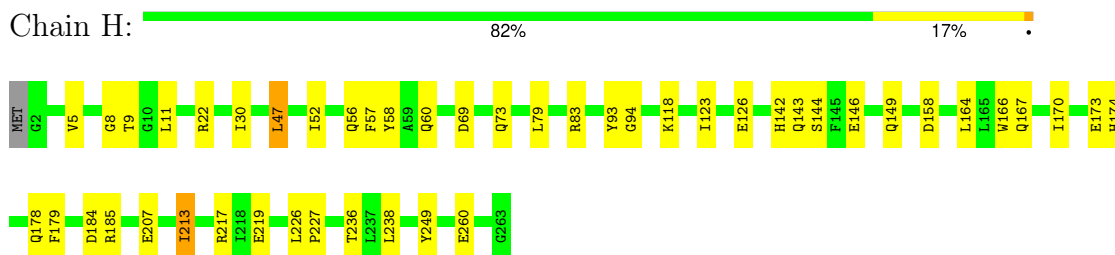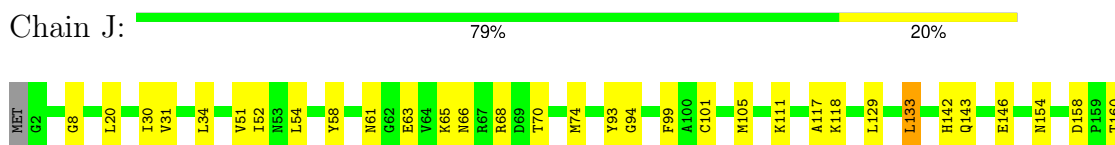
• Molecule 1: TP-methylase family protein
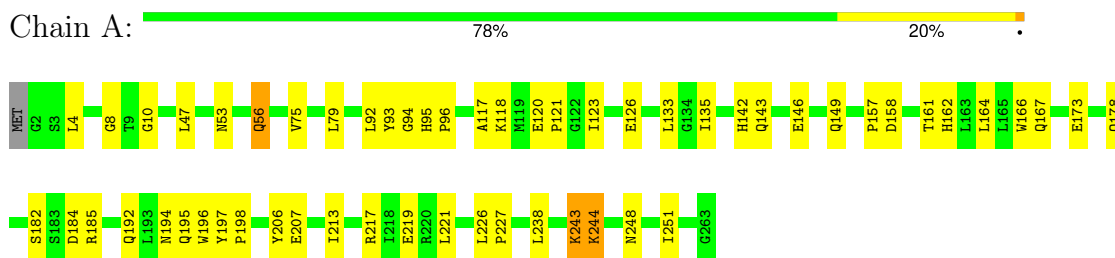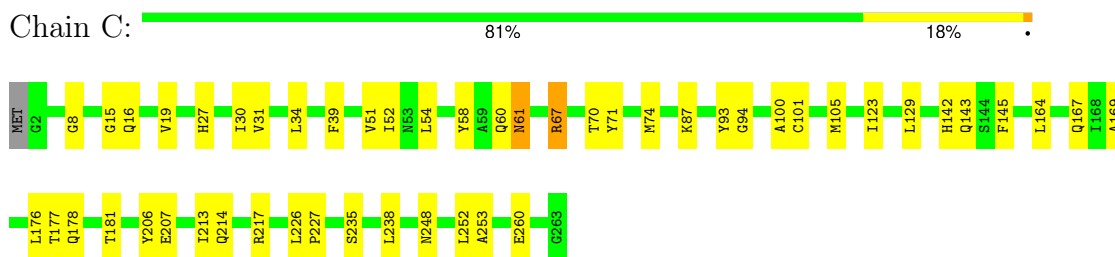
Chain A:

• Molecule 1: TP-methylase family protein

Chain C:

• Molecule 1: TP-methylase family protein

Chain H:

• Molecule 1: TP-methylase family protein

Chain J:

L164 Q167 T175 L176 T177 Q178 V204 I205 Y206 E207 P212 I213 Q214 R217 R220 L226 P227 S235 L238 L245 N248 L252 L262 G263

• Molecule 2: Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein

Chain B:

| 58% | 17% | • | 24% |

MET HIS HIS HIS HIS HIS MET SER G3 Q13 Y21 V28 T35 D36 E37 Q38 I39 M43 K49 T52 L53 SER GLY ASP SER SER TYR GLN SER TYR D63 V64 I65 G68 N69 G70 ASP

• Molecule 3: Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein

Chain D:

| 54% | 15% | • | 29% |

MET HIS HIS HIS HIS HIS MET SER GLY L4 G12 Q16 Y21 K22 Q23 A27 A31 H32 G33 K51 T52 LEU SER GLY ASP SER SER TYR GLN SER TYR D63 V64 I65 S66 H67 G68 ASN GLY ASP

• Molecule 3: Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein

Chain I:

| 60% | 12% | • | 27% |

MET HIS HIS HIS HIS HIS MET SER G3 G12 Y21 V28 T35 D36 E37 Q38 I39 K49 L53 SER GLY ASP SER SER TYR GLN SER TYR D63 H67 G68 ASN GLY ASP

• Molecule 3: Extradiol ring-cleavage dioxygenase LigAB LigA subunit domain-containing protein

Chain K:

| 54% | 14% | • | 31% |

MET HIS HIS HIS HIS HIS MET SER GLY L4 L11 Q16 L17 M18 Y21 K22 Q23 V28 I39 M43 T52 LEU SER GLY ASP SER SER TYR GLN SER TYR D63 V64 I65 S66 H67 GLY ASN GLY ASP
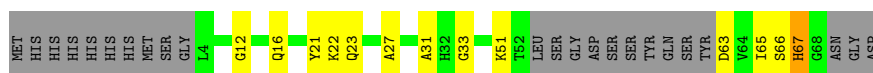
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	52.00Å 108.40Å 59.00Å 90.00° 93.70° 90.20°	Depositor
Resolution (Å)	19.94 – 2.30 19.94 – 2.30	Depositor EDS
% Data completeness (in resolution range)	84.4 (19.94-2.30) 93.4 (19.94-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.40 (at 2.30Å)	Xtriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.276 , 0.299 0.294 , 0.314	Depositor DCC
R_{free} test set	2663 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	25.7	Xtriage
Anisotropy	0.125	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 12.3	EDS
L-test for twinning[2]	$< |L| > = 0.62, < L^2 > = 0.48$	Xtriage
Estimated twinning fraction	0.110 for -h,k,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	10190	wwPDB-VP
Average B, all atoms (Å^2)	32.0	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 62.05 % 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 1.1943e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, IML, SAH

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	0.27	0/2089	0.47	0/2846
1	C	0.27	0/2089	0.48	0/2846
1	H	0.28	0/2089	0.51	0/2846
1	J	0.27	0/2089	0.47	0/2846
2	B	0.29	0/448	0.48	0/598
3	D	0.29	0/433	0.53	0/580
3	I	0.30	0/445	0.48	0/596
3	K	0.29	0/429	0.48	0/575
All	All	0.28	0/10111	0.48	0/13733

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 ⓘ

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	2038	0	2027	56	0
1	C	2038	0	2027	50	0
1	H	2038	0	2027	43	0
1	J	2038	0	2027	43	0
2	B	454	0	433	15	0

Continued on next page...

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	429	0	408	17	0
3	I	441	0	422	9	0
3	K	425	0	405	8	0
4	A	26	0	19	4	0
4	C	26	0	19	2	0
4	H	26	0	19	3	0
4	J	26	0	19	1	0
5	A	1	0	0	0	0
5	H	1	0	0	0	0
6	A	28	0	0	7	0
6	B	7	0	0	2	0
6	C	35	0	0	2	0
6	D	15	0	0	2	0
6	H	42	0	0	9	0
6	I	9	0	0	1	0
6	J	41	0	0	4	0
6	K	6	0	0	0	0
All	All	10190	0	9852	211	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 11.

The worst 5 of 211 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:118:LYS:HD2	6:D:104:HOH:O	1.51	1.09
1:C:67:ARG:HH11	1:C:67:ARG:HG3	1.20	1.04
1:H:69:ASP:HB3	6:H:415:HOH:O	1.58	1.01
1:C:67:ARG:HH11	1:C:67:ARG:CG	1.81	0.92
1:H:166:TRP:CD1	6:H:402:HOH:O	2.24	0.90

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	260/263 (99%)	250 (96%)	10 (4%)	0	100	100
1	C	260/263 (99%)	249 (96%)	10 (4%)	1 (0%)	30	39
1	H	260/263 (99%)	252 (97%)	8 (3%)	0	100	100
1	J	260/263 (99%)	249 (96%)	11 (4%)	0	100	100
2	B	54/78 (69%)	52 (96%)	2 (4%)	0	100	100
3	D	51/78 (65%)	50 (98%)	1 (2%)	0	100	100
3	I	53/78 (68%)	53 (100%)	0	0	100	100
3	K	50/78 (64%)	50 (100%)	0	0	100	100
All	All	1248/1364 (92%)	1205 (97%)	42 (3%)	1 (0%)	48	60

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	61	ASN

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	218/219 (100%)	214 (98%)	4 (2%)	54	71
1	C	218/219 (100%)	217 (100%)	1 (0%)	86	93
1	H	218/219 (100%)	214 (98%)	4 (2%)	54	71
1	J	218/219 (100%)	216 (99%)	2 (1%)	75	87
2	B	48/66 (73%)	47 (98%)	1 (2%)	48	66
3	D	47/67 (70%)	44 (94%)	3 (6%)	14	20
3	I	48/67 (72%)	47 (98%)	1 (2%)	48	66
3	K	47/67 (70%)	44 (94%)	3 (6%)	14	20
All	All	1062/1143 (93%)	1043 (98%)	19 (2%)	54	71

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	65	LYS
3	K	65	ILE
3	K	66	SER
3	K	63	ASP
3	D	67	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	174	HIS
3	I	13	GLN
1	J	149	GLN
3	I	40	ASN
1	H	142	HIS

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

5.4   Non-standard residues in protein, DNA, RNA chains ⓘ

1 non-standard protein/DNA/RNA residue is 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	$\#|Z| > 2$
2	IML	B	65	2	7,8,9	0.48	0	6,9,11	0.74	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
2	IML	B	65	2	-	3/8/10/12	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	65	IML	CA-CB-CG1-CD1
2	B	65	IML	N-CA-CB-CG1
2	B	65	IML	CG2-CB-CG1-CD1

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	65	IML	4	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	SAH	C	301	-	23,28,28	0.72	0	22,40,40	0.67	1 (4%)
4	SAH	A	301	-	23,28,28	0.72	0	22,40,40	0.66	1 (4%)
4	SAH	H	301	-	23,28,28	0.71	0	22,40,40	0.67	1 (4%)
4	SAH	J	301	-	23,28,28	0.72	0	22,40,40	0.67	1 (4%)

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	C	301	-	-	2/11/31/31	0/3/3/3
4	SAH	A	301	-	-	0/11/31/31	0/3/3/3
4	SAH	H	301	-	-	0/11/31/31	0/3/3/3
4	SAH	J	301	-	-	2/11/31/31	0/3/3/3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	J	301	SAH	C5-C6-N6	2.30	123.81	120.31
4	H	301	SAH	C5-C6-N6	2.25	123.74	120.31
4	A	301	SAH	C5-C6-N6	2.23	123.70	120.31
4	C	301	SAH	C5-C6-N6	2.22	123.70	120.31

There are no chirality outliers.

All (4) torsion outliers are listed below:

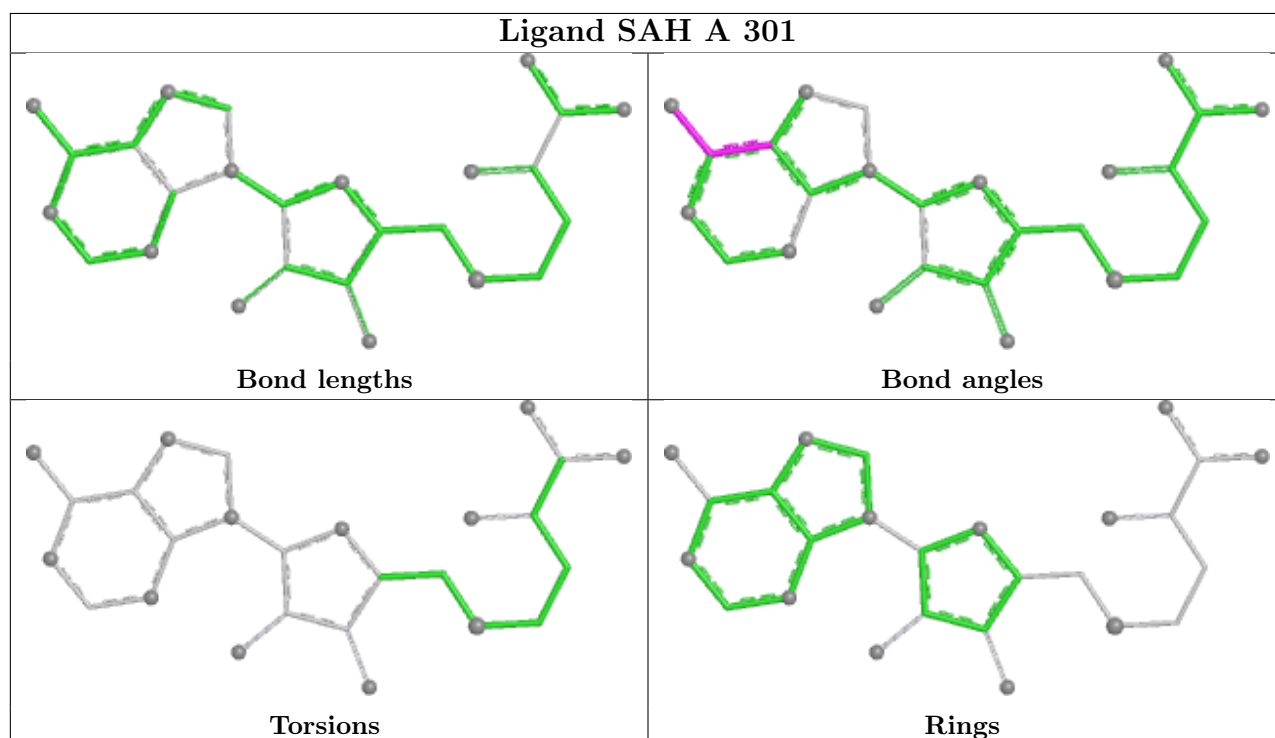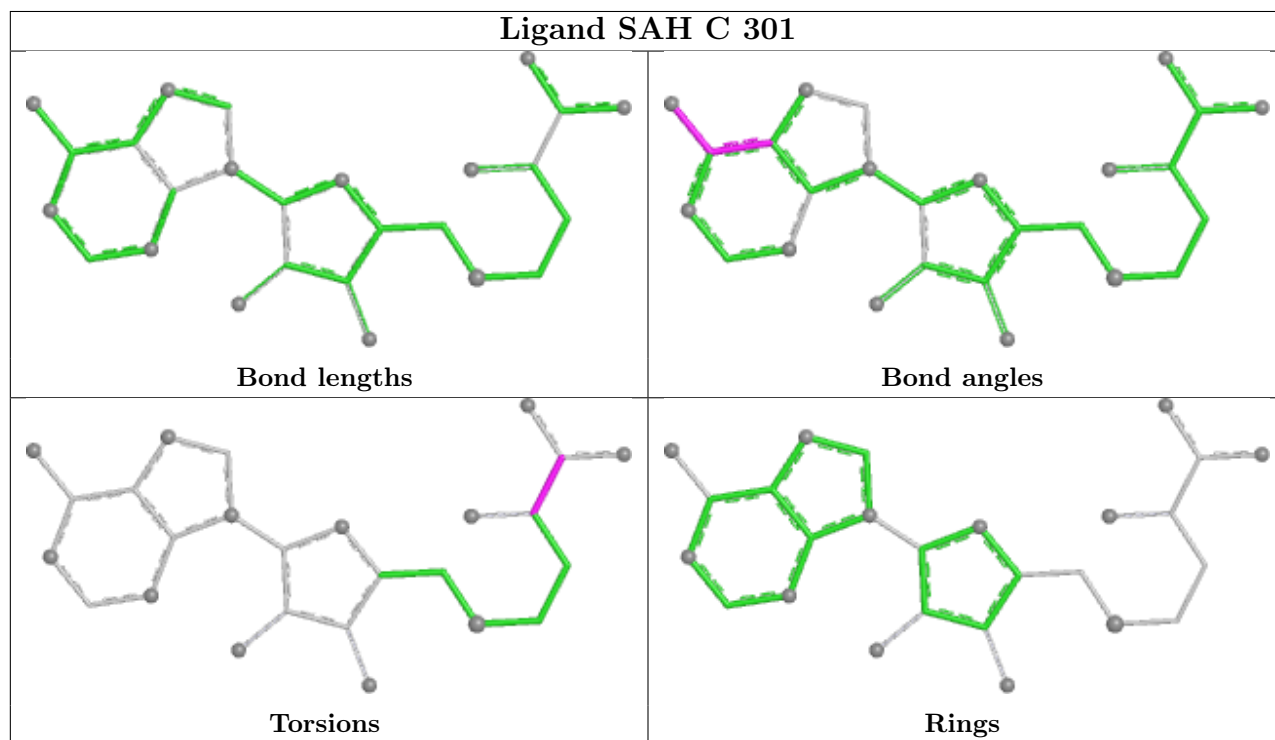| Mol	Chain	Res	Type	Atoms
4	C	301	SAH	O-C-CA-CB
4	C	301	SAH	OXT-C-CA-CB
4	J	301	SAH	OXT-C-CA-CB
4	J	301	SAH	O-C-CA-CB

There are no ring outliers.
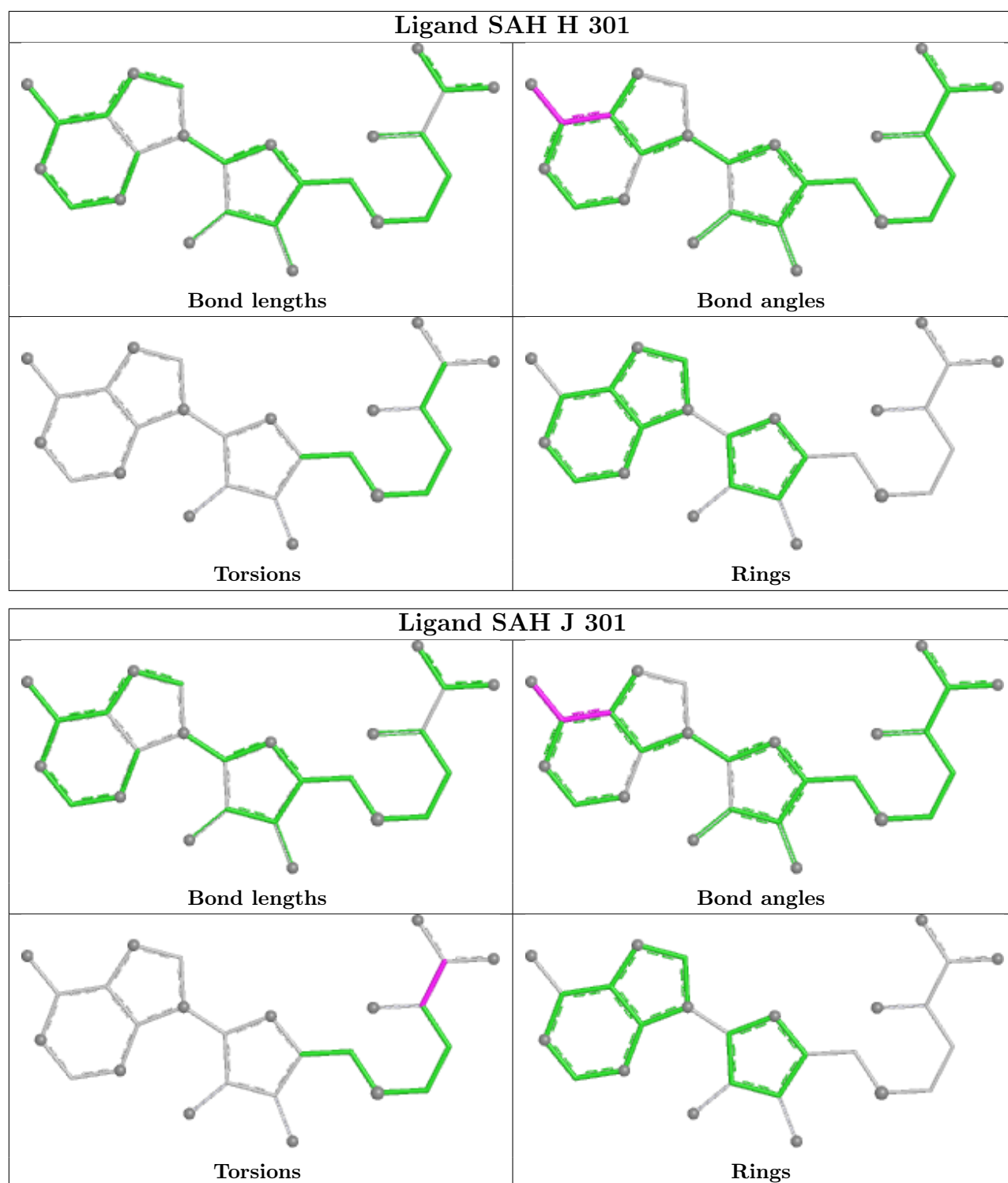
4 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	301	SAH	2	0
4	A	301	SAH	4	0
4	H	301	SAH	3	0
4	J	301	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 then 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 SAH C 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SAH A 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SAH H 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SAH J 301

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	262/263 (99%)	-0.96	0	100	100	16, 28, 46, 62	0
1	C	262/263 (99%)	-0.86	0	100	100	15, 31, 53, 78	0
1	H	262/263 (99%)	-0.90	0	100	100	15, 28, 52, 93	0
1	J	262/263 (99%)	-0.84	0	100	100	15, 31, 49, 69	0
2	B	58/78 (74%)	-0.88	0	100	100	22, 34, 53, 59	0
3	D	55/78 (70%)	-0.76	0	100	100	19, 33, 60, 70	0
3	I	57/78 (73%)	-0.92	0	100	100	19, 32, 50, 61	0
3	K	54/78 (69%)	-0.83	0	100	100	17, 36, 66, 81	0
All	All	1272/1364 (93%)	-0.88	0	100	100	15, 30, 53, 93	0

There are no RSRZ outliers to report.

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

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
2	IML	B	65	9/10	0.98	0.07	36,39,40,41	0

6.3 Carbohydrates ⓘ

There are no monosaccharides 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
4	SAH	A	301	26/26	0.97	0.05	22,28,33,36	0
4	SAH	H	301	26/26	0.97	0.06	23,31,43,52	0
4	SAH	J	301	26/26	0.97	0.06	30,37,44,47	0
4	SAH	C	301	26/26	0.98	0.05	31,36,44,46	0
5	ZN	H	302	1/1	0.98	0.05	73,73,73,73	0
5	ZN	A	302	1/1	0.99	0.04	69,69,69,69	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.
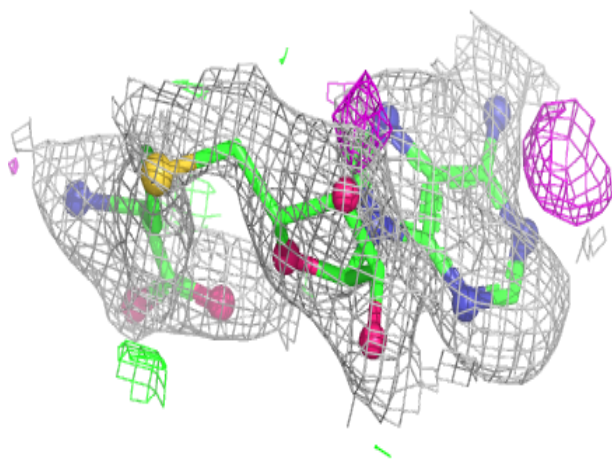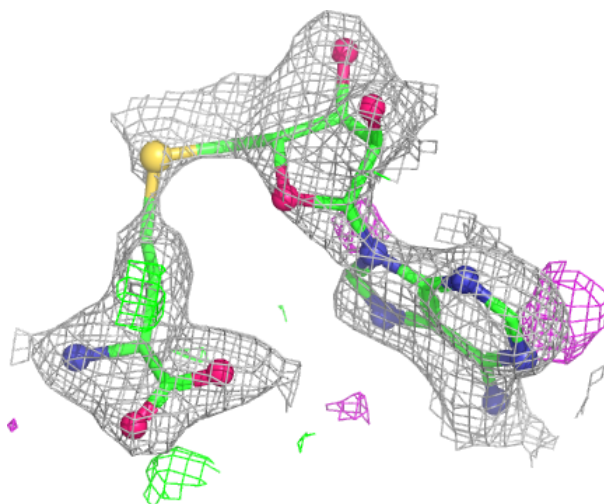
Electron density around SAH A 301:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
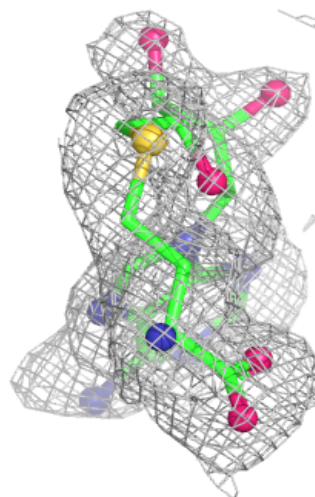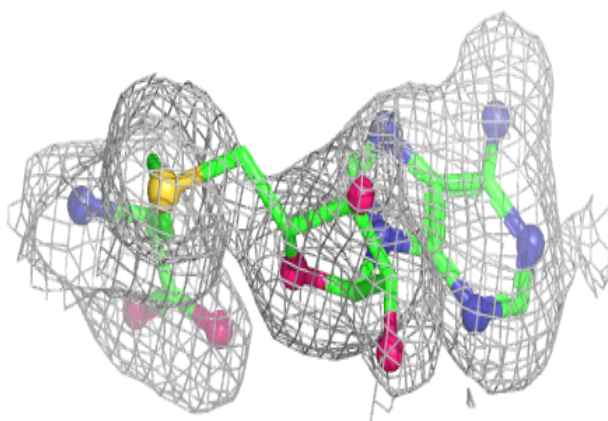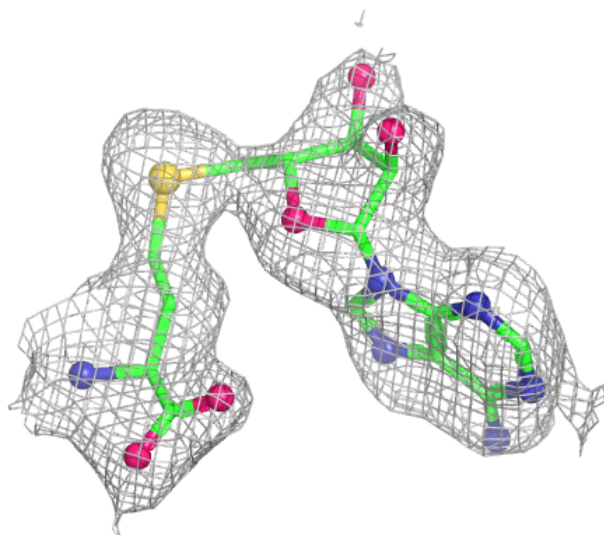and green (positive)
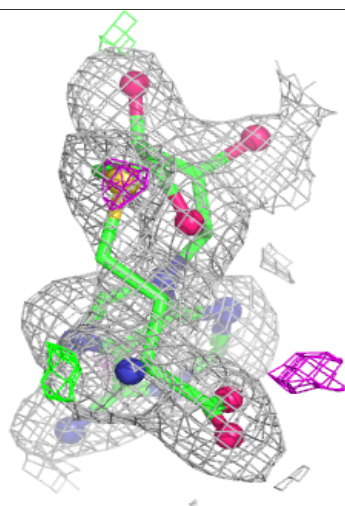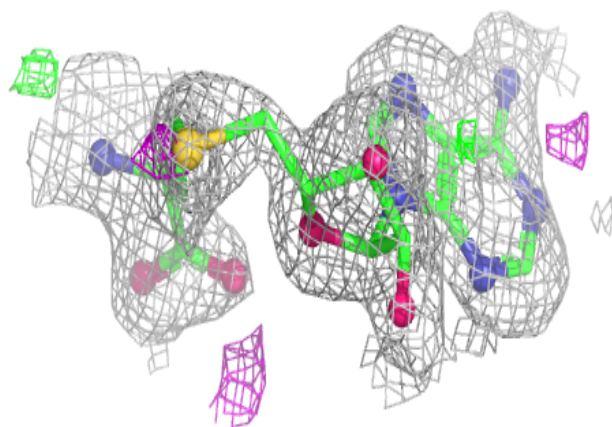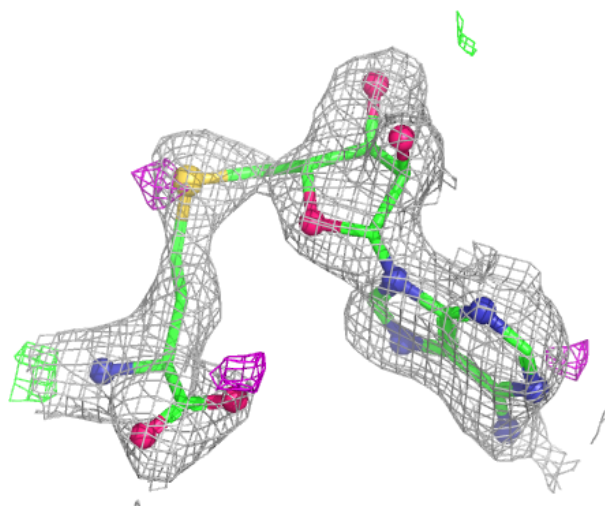
Electron density around SAH H 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
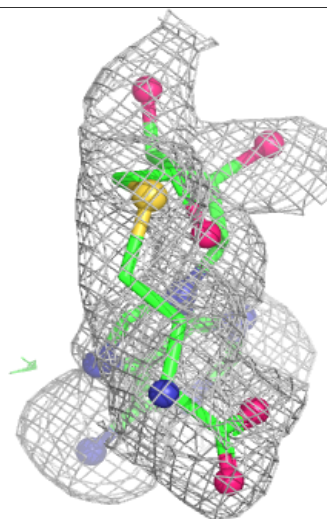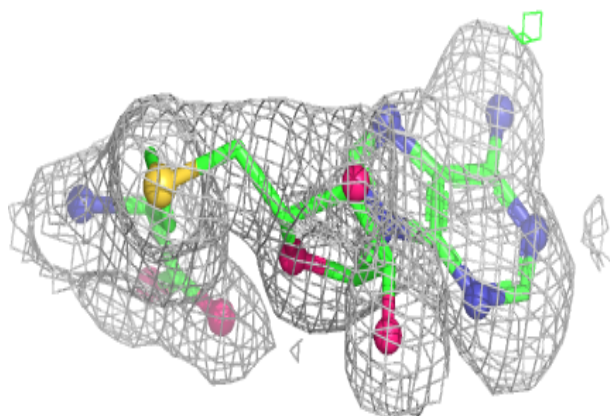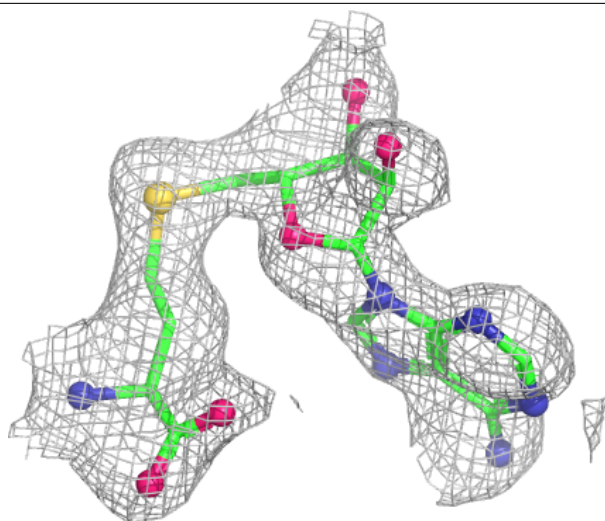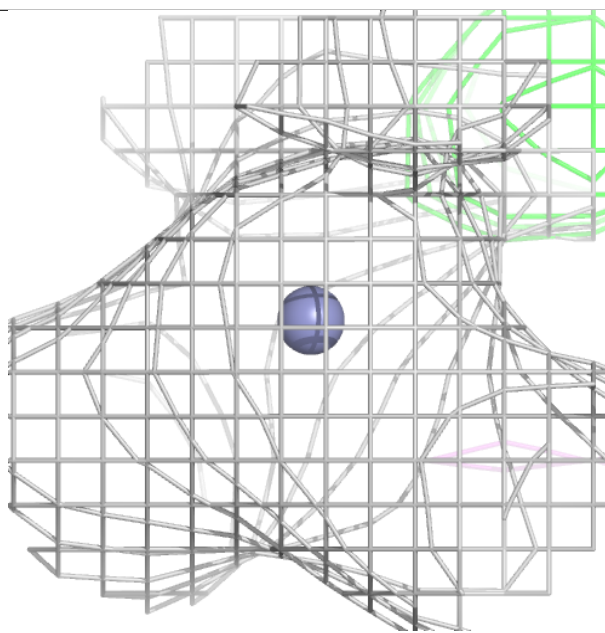and green (positive)
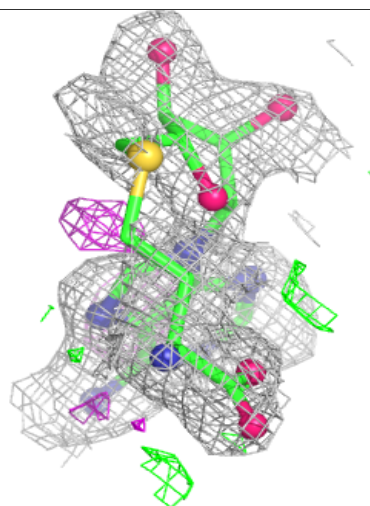
Electron density around SAH J 301:

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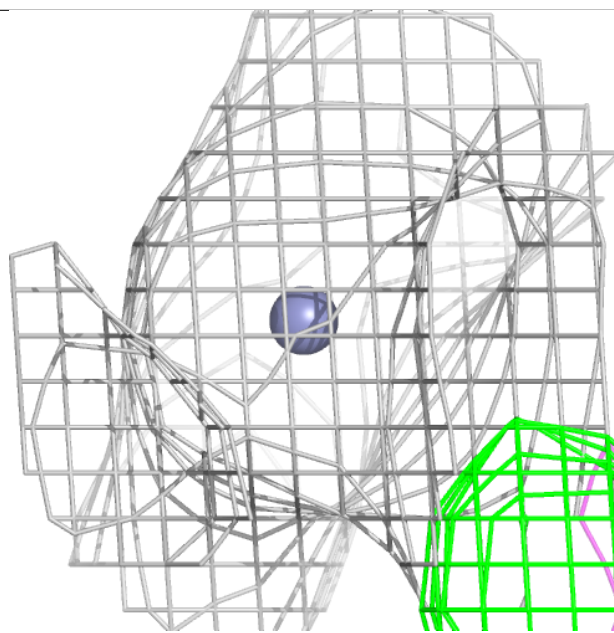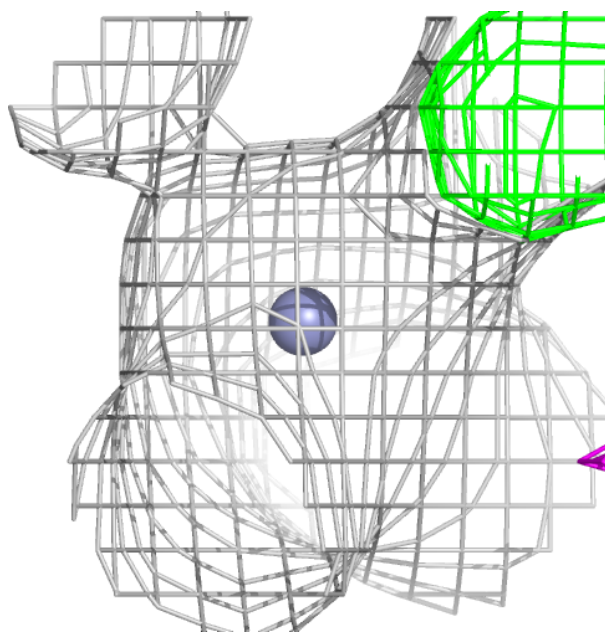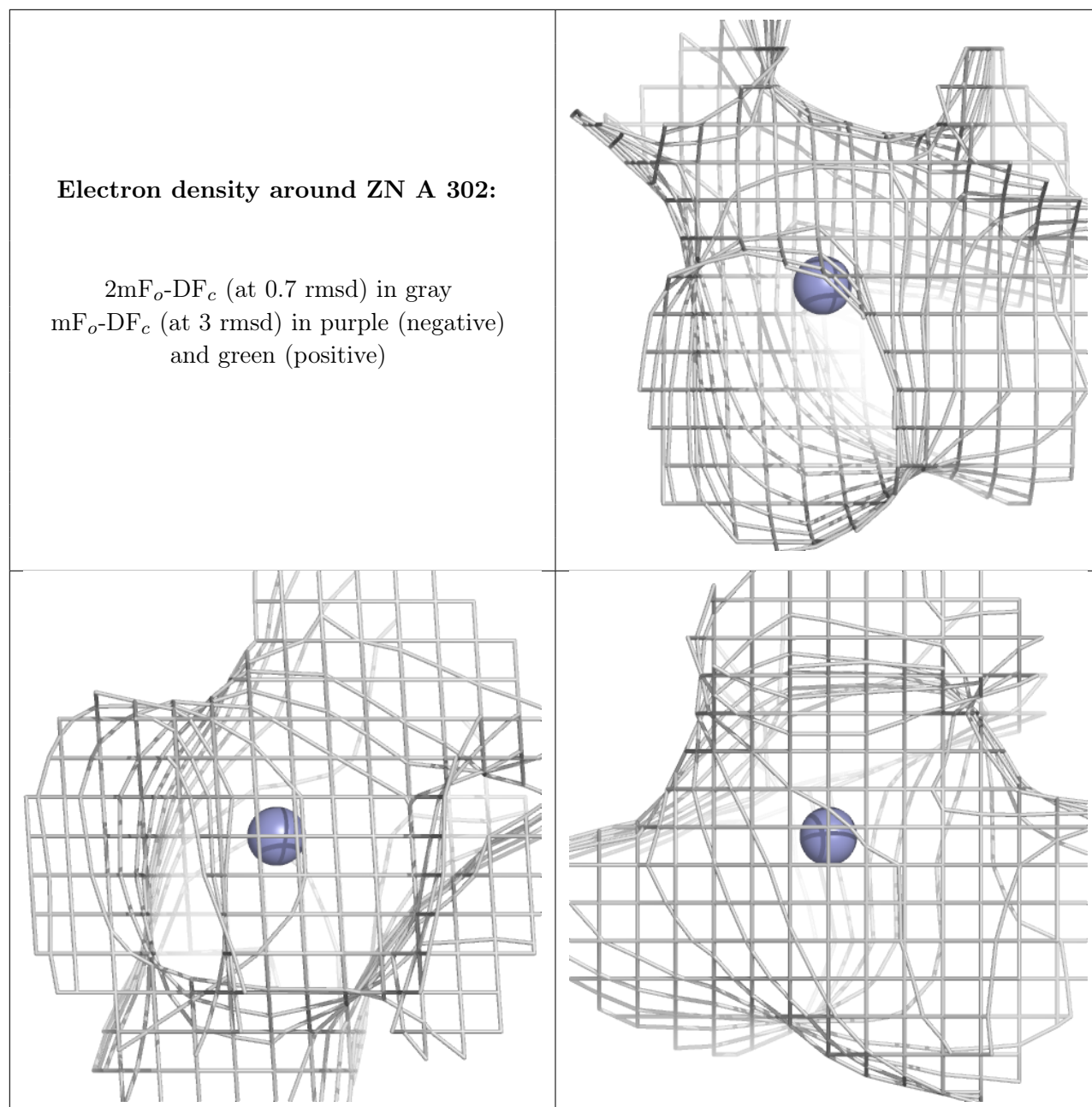and green (positive)

Electron density around SAH C 301:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around ZN H 302:

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

Electron density around ZN A 302:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.