



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:10 PM UTC

PDB ID : 3SSN / pdb_00003ssn
Title : MycE Methyltransferase from the Mycinamycin Biosynthetic Pathway in Complex with Mg, SAH, and Mycinamycin VI
Authors : Akey, D.L.; Smith, J.L.
Deposited on : 2011-07-08
Resolution : 2.39 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

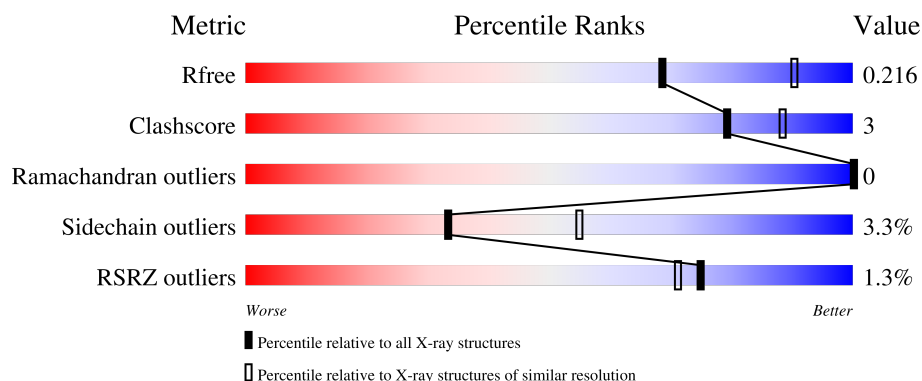
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.39 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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

Mol	Chain	Length	Quality of chain
1	A	419	% 80% 11% • 8%
1	B	419	2% 78% 5% 16%
1	C	419	% 81% 5% • 13%
1	D	419	% 85% 8% • 6%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12616 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 Methyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	386	Total	C	N	O	S	0	0	0
			3077	1955	543	571	8			
1	B	350	Total	C	N	O	S	0	0	0
			2774	1748	496	524	6			
1	C	366	Total	C	N	O	S	0	0	0
			2924	1860	518	538	8			
1	D	393	Total	C	N	O	S	0	0	0
			3126	1982	554	582	8			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP Q83WF2
A	-18	GLY	-	expression tag	UNP Q83WF2
A	-17	SER	-	expression tag	UNP Q83WF2
A	-16	SER	-	expression tag	UNP Q83WF2
A	-15	HIS	-	expression tag	UNP Q83WF2
A	-14	HIS	-	expression tag	UNP Q83WF2
A	-13	HIS	-	expression tag	UNP Q83WF2
A	-12	HIS	-	expression tag	UNP Q83WF2
A	-11	HIS	-	expression tag	UNP Q83WF2
A	-10	HIS	-	expression tag	UNP Q83WF2
A	-9	SER	-	expression tag	UNP Q83WF2
A	-8	SER	-	expression tag	UNP Q83WF2
A	-7	GLY	-	expression tag	UNP Q83WF2
A	-6	LEU	-	expression tag	UNP Q83WF2
A	-5	VAL	-	expression tag	UNP Q83WF2
A	-4	PRO	-	expression tag	UNP Q83WF2
A	-3	ARG	-	expression tag	UNP Q83WF2
A	-2	GLY	-	expression tag	UNP Q83WF2
A	-1	SER	-	expression tag	UNP Q83WF2
A	0	HIS	-	expression tag	UNP Q83WF2
B	-19	MET	-	expression tag	UNP Q83WF2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP Q83WF2
B	-17	SER	-	expression tag	UNP Q83WF2
B	-16	SER	-	expression tag	UNP Q83WF2
B	-15	HIS	-	expression tag	UNP Q83WF2
B	-14	HIS	-	expression tag	UNP Q83WF2
B	-13	HIS	-	expression tag	UNP Q83WF2
B	-12	HIS	-	expression tag	UNP Q83WF2
B	-11	HIS	-	expression tag	UNP Q83WF2
B	-10	HIS	-	expression tag	UNP Q83WF2
B	-9	SER	-	expression tag	UNP Q83WF2
B	-8	SER	-	expression tag	UNP Q83WF2
B	-7	GLY	-	expression tag	UNP Q83WF2
B	-6	LEU	-	expression tag	UNP Q83WF2
B	-5	VAL	-	expression tag	UNP Q83WF2
B	-4	PRO	-	expression tag	UNP Q83WF2
B	-3	ARG	-	expression tag	UNP Q83WF2
B	-2	GLY	-	expression tag	UNP Q83WF2
B	-1	SER	-	expression tag	UNP Q83WF2
B	0	HIS	-	expression tag	UNP Q83WF2
C	-19	MET	-	expression tag	UNP Q83WF2
C	-18	GLY	-	expression tag	UNP Q83WF2
C	-17	SER	-	expression tag	UNP Q83WF2
C	-16	SER	-	expression tag	UNP Q83WF2
C	-15	HIS	-	expression tag	UNP Q83WF2
C	-14	HIS	-	expression tag	UNP Q83WF2
C	-13	HIS	-	expression tag	UNP Q83WF2
C	-12	HIS	-	expression tag	UNP Q83WF2
C	-11	HIS	-	expression tag	UNP Q83WF2
C	-10	HIS	-	expression tag	UNP Q83WF2
C	-9	SER	-	expression tag	UNP Q83WF2
C	-8	SER	-	expression tag	UNP Q83WF2
C	-7	GLY	-	expression tag	UNP Q83WF2
C	-6	LEU	-	expression tag	UNP Q83WF2
C	-5	VAL	-	expression tag	UNP Q83WF2
C	-4	PRO	-	expression tag	UNP Q83WF2
C	-3	ARG	-	expression tag	UNP Q83WF2
C	-2	GLY	-	expression tag	UNP Q83WF2
C	-1	SER	-	expression tag	UNP Q83WF2
C	0	HIS	-	expression tag	UNP Q83WF2
D	-19	MET	-	expression tag	UNP Q83WF2
D	-18	GLY	-	expression tag	UNP Q83WF2
D	-17	SER	-	expression tag	UNP Q83WF2

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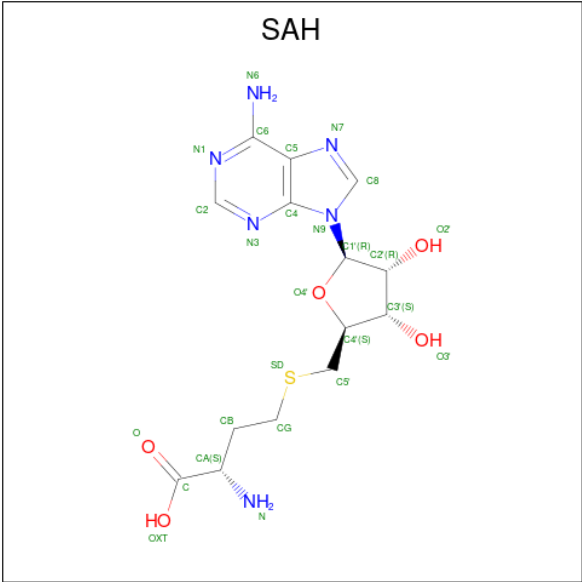
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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	expression tag	UNP Q83WF2
D	-15	HIS	-	expression tag	UNP Q83WF2
D	-14	HIS	-	expression tag	UNP Q83WF2
D	-13	HIS	-	expression tag	UNP Q83WF2
D	-12	HIS	-	expression tag	UNP Q83WF2
D	-11	HIS	-	expression tag	UNP Q83WF2
D	-10	HIS	-	expression tag	UNP Q83WF2
D	-9	SER	-	expression tag	UNP Q83WF2
D	-8	SER	-	expression tag	UNP Q83WF2
D	-7	GLY	-	expression tag	UNP Q83WF2
D	-6	LEU	-	expression tag	UNP Q83WF2
D	-5	VAL	-	expression tag	UNP Q83WF2
D	-4	PRO	-	expression tag	UNP Q83WF2
D	-3	ARG	-	expression tag	UNP Q83WF2
D	-2	GLY	-	expression tag	UNP Q83WF2
D	-1	SER	-	expression tag	UNP Q83WF2
D	0	HIS	-	expression tag	UNP Q83WF2

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

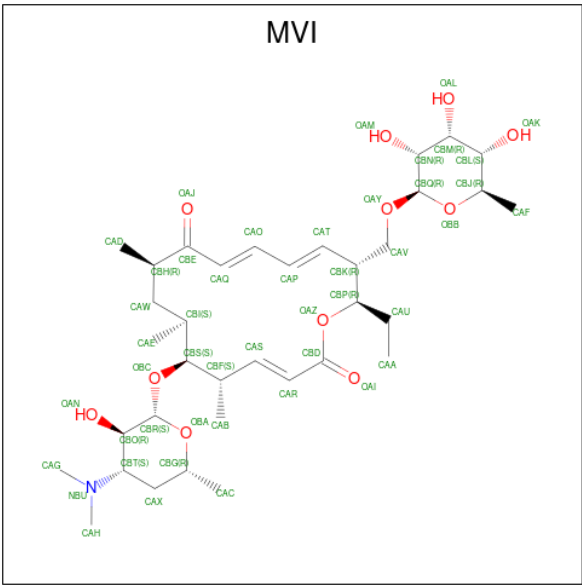
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Mg 1 1	0	0
2	C	1	Total Mg 1 1	0	0
2	D	1	Total Mg 1 1	0	0

- Molecule 3 is S-ADENOSYL-L-HOMOCYSTEINE (CCD ID: SAH) (formula: C₁₄H₂₀N₆O₅S).



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

- Molecule 4 is Mycinamicin VI (CCD ID: MVI) (formula: C₃₅H₅₇NO₁₁).



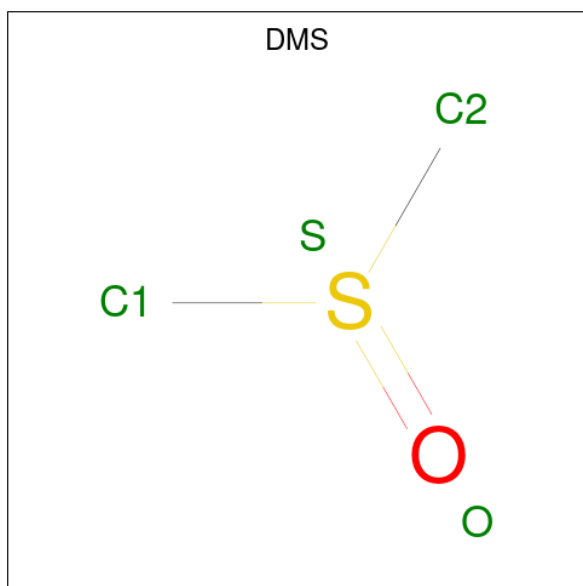
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			47	35	1	11		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	C	1	Total	C	N	O	0	0
			47	35	1	11		

- Molecule 5 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	S	0	0
			4	2	1	1		
5	A	1	Total	C	O	S	0	0
			4	2	1	1		
5	C	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	D	1	Total	C	O	0	0
			6	3	3		

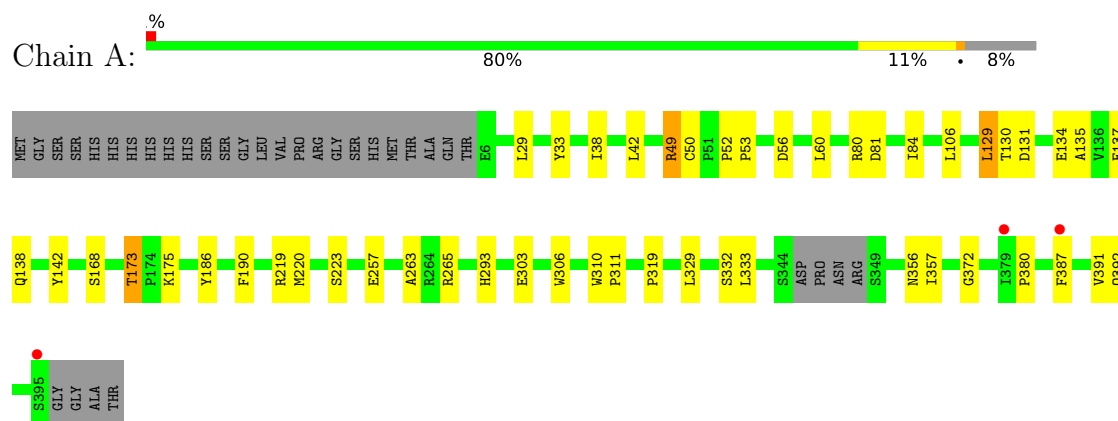
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	166	Total	O	0	0
			166	166		
7	B	109	Total	O	0	0
			109	109		
7	C	130	Total	O	0	0
			130	130		
7	D	117	Total	O	0	0
			117	117		

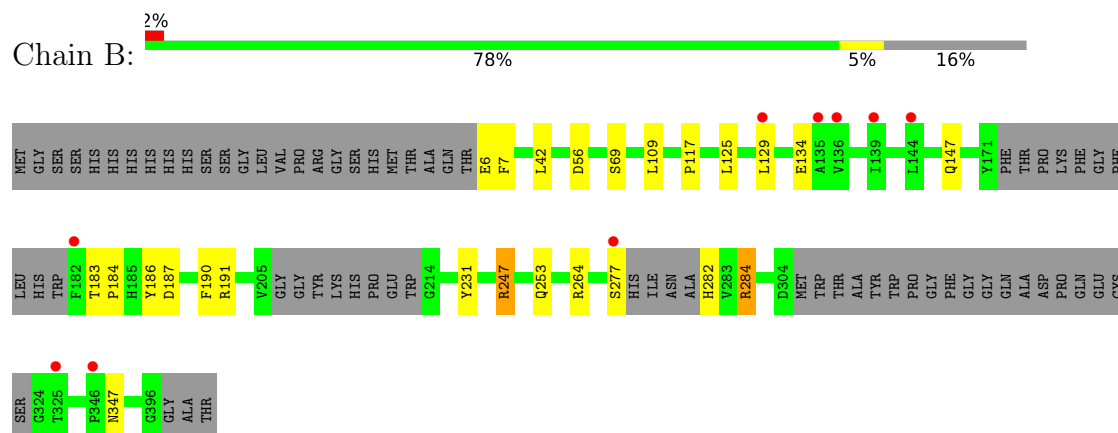
3 Residue-property plots [i](#)

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.

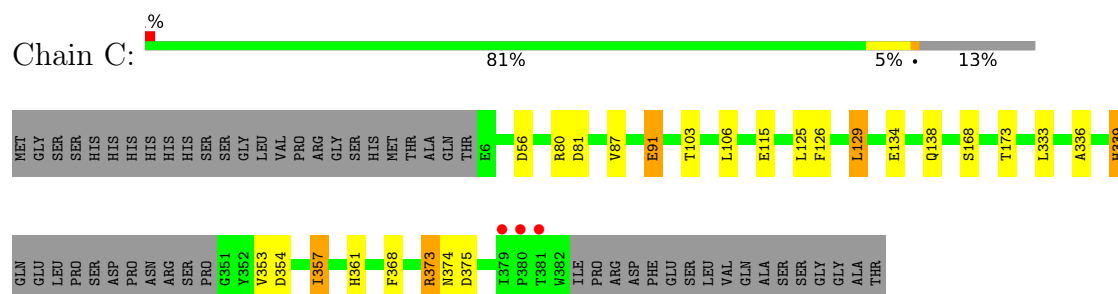
• Molecule 1: Methyltransferase



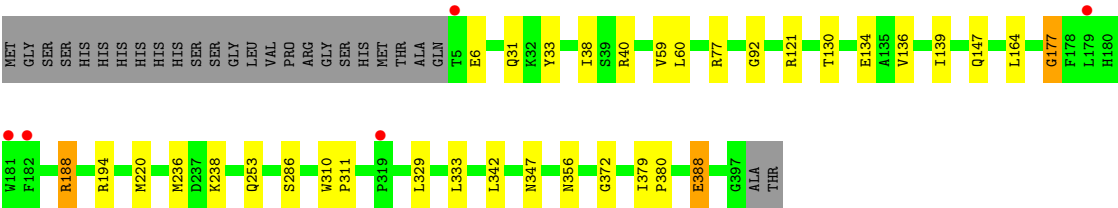
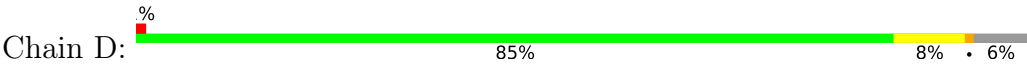
• Molecule 1: Methyltransferase



• Molecule 1: Methyltransferase



● Molecule 1: Methyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.11Å 142.11Å 83.86Å 90.00° 105.61° 90.00°	Depositor
Resolution (Å)	46.70 – 2.39 46.70 – 2.39	Depositor EDS
% Data completeness (in resolution range)	98.7 (46.70-2.39) 98.6 (46.70-2.39)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 2.39Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.165 , 0.218 0.164 , 0.216	Depositor DCC
R_{free} test set	3265 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	42.1	Xtriage
Anisotropy	0.219	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 47.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	12616	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.19% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MVI, MG, DMS, GOL, 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	0.55	0/3159	0.82	0/4287
1	B	0.53	0/2833	0.82	0/3835
1	C	0.52	0/3002	0.79	0/4072
1	D	0.52	0/3210	0.79	1/4358 (0.0%)
All	All	0.53	0/12204	0.80	1/16552 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	177	GLY	N-CA-C	5.03	118.96	113.58

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	3077	0	2969	28	0
1	B	2774	0	2704	12	0
1	C	2924	0	2822	13	0
1	D	3126	0	3013	19	0
2	A	1	0	0	0	0
2	C	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	1	0	0	0	0
3	A	26	0	19	0	0
3	C	26	0	19	0	0
3	D	26	0	19	0	0
4	A	47	0	56	1	0
4	C	47	0	56	0	0
5	A	8	0	12	1	0
5	C	4	0	6	0	0
6	D	6	0	8	1	0
7	A	166	0	0	2	0
7	B	109	0	0	1	0
7	C	130	0	0	0	0
7	D	117	0	0	2	0
All	All	12616	0	11703	65	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 (65) 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:173:THR:HG21	1:A:220:MET:HE3	1.61	0.83
1:A:319:PRO:HG3	1:D:342:LEU:HD21	1.80	0.64
1:A:219:ARG:HD2	7:A:462:HOH:O	1.97	0.64
1:B:231:TYR:HD2	1:B:247:ARG:HG2	1.65	0.61
1:A:173:THR:HG21	1:A:220:MET:CE	2.31	0.60
1:D:33:TYR:HB2	1:D:38:ILE:HD11	1.84	0.60
1:C:125:LEU:HD11	1:D:380:PRO:HG3	1.84	0.60
1:A:49:ARG:HG2	5:A:401:DMS:S	2.44	0.56
1:A:129:LEU:HD23	1:A:135:ALA:HA	1.87	0.56
1:B:147:GLN:HG3	1:D:177:GLY:HA3	1.88	0.54
1:D:6:GLU:HB2	7:D:481:HOH:O	2.09	0.52
1:A:50:CYS:HB3	1:A:84:ILE:HD12	1.91	0.52
1:D:77:ARG:HD2	6:D:400:GOL:H31	1.93	0.51
1:C:333:LEU:HD22	1:C:357:ILE:HD12	1.93	0.51
1:B:264:ARG:NH2	7:B:459:HOH:O	2.44	0.50
1:C:353:VAL:HG13	1:C:357:ILE:HD11	1.94	0.50
1:A:265:ARG:HD2	7:A:521:HOH:O	2.12	0.50
1:C:361:HIS:HB2	1:C:368:PHE:HB2	1.93	0.50
1:D:388:GLU:H	1:D:388:GLU:CD	2.20	0.49
1:D:164:LEU:HD22	1:D:220:MET:HE3	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:33:TYR:HB2	1:A:38:ILE:HD11	1.94	0.49
1:C:103:THR:HA	1:C:106:LEU:HD12	1.95	0.48
1:B:186:TYR:O	1:B:190:PHE:HB2	2.14	0.47
1:A:173:THR:CG2	1:A:220:MET:CE	2.92	0.47
1:A:173:THR:OG1	1:A:175:LYS:HG2	2.14	0.47
1:C:373:ARG:NH2	1:C:375:ASP:OD1	2.47	0.47
1:A:29:LEU:C	1:A:29:LEU:HD23	2.40	0.47
1:B:117:PRO:HG3	1:D:188:ARG:CZ	2.45	0.46
1:A:80:ARG:O	1:A:81:ASP:HB2	2.15	0.46
1:B:183:THR:N	1:B:184:PRO:CD	2.77	0.46
1:D:253:GLN:HG3	1:D:286:SER:OG	2.16	0.46
1:D:236:MET:HB2	1:D:238:LYS:HE2	1.98	0.46
1:C:126:PHE:HB3	1:C:129:LEU:HD22	1.98	0.45
1:C:87:VAL:HB	1:C:91:GLU:HG3	1.98	0.45
1:C:56:ASP:CG	1:C:80:ARG:HH11	2.24	0.45
1:A:387:PHE:O	1:A:391:VAL:HG23	2.16	0.45
1:A:310:TRP:HA	1:A:311:PRO:HD3	1.86	0.45
1:D:329:LEU:O	1:D:333:LEU:HG	2.16	0.44
1:C:336:ALA:HB1	1:C:354:ASP:HA	1.99	0.44
1:A:134:GLU:O	1:A:137:GLU:HG2	2.18	0.44
1:D:136:VAL:HA	1:D:139:ILE:HD12	2.00	0.44
1:A:186:TYR:OH	1:A:303:GLU:OE2	2.36	0.43
1:D:60:LEU:HD13	1:D:92:GLY:HA3	2.01	0.43
1:C:373:ARG:HD2	1:D:121:ARG:C	2.44	0.42
1:A:306:TRP:CD2	1:D:379:ILE:HG13	2.55	0.42
1:D:310:TRP:HA	1:D:311:PRO:HD3	1.84	0.42
1:A:80:ARG:NH1	1:C:81:ASP:OD2	2.50	0.42
1:D:194:ARG:HD3	7:D:439:HOH:O	2.19	0.42
1:B:6:GLU:HG3	1:B:7:PHE:CD1	2.55	0.42
1:A:50:CYS:CB	1:A:84:ILE:HD12	2.49	0.41
1:A:138:GLN:HG3	1:A:142:TYR:HD2	1.84	0.41
1:A:186:TYR:O	1:A:190:PHE:HB2	2.20	0.41
4:A:701:MVI:CAP	4:A:701:MVI:CBD	2.99	0.41
1:D:356:ASN:HA	1:D:372:GLY:O	2.20	0.41
1:A:329:LEU:O	1:A:333:LEU:HG	2.21	0.41
1:A:42:LEU:HD21	1:A:106:LEU:HD23	2.02	0.41
1:B:231:TYR:CD2	1:B:247:ARG:HG2	2.50	0.41
1:B:284:ARG:H	1:B:284:ARG:HG2	1.73	0.41
1:A:52:PRO:HA	1:A:53:PRO:HD3	1.77	0.41
1:A:380:PRO:HB3	1:B:125:LEU:HD11	2.03	0.41
1:C:339:HIS:CE1	1:C:374:ASN:ND2	2.89	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:187:ASP:OD1	1:B:191:ARG:HD3	2.21	0.40
1:A:263:ALA:HB1	1:A:293:HIS:CG	2.57	0.40
1:A:356:ASN:HA	1:A:372:GLY:O	2.22	0.40
1:B:42:LEU:HD22	1:B:109:LEU:HD12	2.04	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	382/419 (91%)	372 (97%)	10 (3%)	0	100	100
1	B	340/419 (81%)	330 (97%)	10 (3%)	0	100	100
1	C	362/419 (86%)	353 (98%)	9 (2%)	0	100	100
1	D	391/419 (93%)	378 (97%)	13 (3%)	0	100	100
All	All	1475/1676 (88%)	1433 (97%)	42 (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	327/353 (93%)	314 (96%)	13 (4%)	28	47
1	B	299/353 (85%)	289 (97%)	10 (3%)	33	55

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	308/353 (87%)	298 (97%)	10 (3%)	34	56
1	D	332/353 (94%)	323 (97%)	9 (3%)	39	62
All	All	1266/1412 (90%)	1224 (97%)	42 (3%)	33	55

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	ARG
1	A	56	ASP
1	A	60	LEU
1	A	129	LEU
1	A	130	THR
1	A	131	ASP
1	A	168	SER
1	A	173	THR
1	A	223	SER
1	A	257	GLU
1	A	332	SER
1	A	357	ILE
1	A	392	GLN
1	B	56	ASP
1	B	69	SER
1	B	129	LEU
1	B	134	GLU
1	B	247	ARG
1	B	253	GLN
1	B	277	SER
1	B	282	HIS
1	B	284	ARG
1	B	347	ASN
1	C	91	GLU
1	C	115	GLU
1	C	129	LEU
1	C	134	GLU
1	C	138	GLN
1	C	168	SER
1	C	173	THR
1	C	339	HIS
1	C	357	ILE
1	C	373	ARG
1	D	31	GLN

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Mol	Chain	Res	Type
1	D	40	ARG
1	D	59	VAL
1	D	130	THR
1	D	134	GLU
1	D	147	GLN
1	D	188	ARG
1	D	347	ASN
1	D	388	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	67	HIS
1	A	147	GLN
1	A	197	GLN
1	A	254	ASN
1	B	148	GLN
1	B	282	HIS
1	C	374	ASN
1	D	67	HIS
1	D	74	HIS
1	D	138	GLN
1	D	185	HIS
1	D	240	HIS
1	D	250	GLN
1	D	347	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 12 ligands modelled in this entry, 3 are monoatomic - leaving 9 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	MVI	C	701	2	49,49,49	1.39	4 (8%)	62,69,69	1.33	9 (14%)
3	SAH	D	601	-	27,28,28	1.52	4 (14%)	36,40,40	1.94	10 (27%)
5	DMS	A	400	-	3,3,3	2.72	1 (33%)	3,3,3	0.47	0
3	SAH	C	601	-	27,28,28	1.49	5 (18%)	36,40,40	1.93	10 (27%)
5	DMS	A	401	-	3,3,3	2.73	1 (33%)	3,3,3	0.66	0
4	MVI	A	701	2	49,49,49	1.36	4 (8%)	62,69,69	1.33	9 (14%)
3	SAH	A	601	-	27,28,28	1.41	4 (14%)	36,40,40	2.09	11 (30%)
6	GOL	D	400	-	5,5,5	0.41	0	5,5,5	0.19	0
5	DMS	C	400	-	3,3,3	2.70	1 (33%)	3,3,3	0.58	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	MVI	C	701	2	-	4/51/87/87	0/2/3/3
3	SAH	D	601	-	-	3/15/31/31	0/3/3/3
3	SAH	C	601	-	-	1/15/31/31	0/3/3/3
4	MVI	A	701	2	-	3/51/87/87	0/2/3/3
3	SAH	A	601	-	-	1/15/31/31	0/3/3/3
6	GOL	D	400	-	-	0/4/4/4	-

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	601	SAH	C5-C4	5.19	1.48	1.39
3	C	601	SAH	C5-C4	4.81	1.47	1.39
5	A	401	DMS	O-S	4.58	1.80	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	400	DMS	O-S	4.58	1.80	1.50
5	C	400	DMS	O-S	4.53	1.80	1.50
3	A	601	SAH	C5-C4	4.48	1.47	1.39
4	A	701	MVI	CAR-CBD	-3.54	1.40	1.48
4	C	701	MVI	CAR-CBD	-3.53	1.40	1.48
4	C	701	MVI	CAR-CAS	3.49	1.40	1.32
4	A	701	MVI	CAR-CAS	3.24	1.39	1.32
3	D	601	SAH	C5-C6	2.95	1.49	1.41
3	A	601	SAH	C5-C6	2.95	1.49	1.41
3	C	601	SAH	C5-C6	2.77	1.48	1.41
4	C	701	MVI	OAY-CBQ	2.61	1.44	1.40
3	C	601	SAH	C5-N7	-2.54	1.34	1.39
3	D	601	SAH	C8-N7	2.53	1.36	1.31
3	A	601	SAH	C8-N7	2.32	1.36	1.31
4	C	701	MVI	CBH-CBE	2.28	1.54	1.51
3	C	601	SAH	C8-N7	2.21	1.35	1.31
4	A	701	MVI	CBH-CBE	2.18	1.54	1.51
4	A	701	MVI	CAX-CBG	2.16	1.55	1.52
3	A	601	SAH	OXT-C	-2.09	1.24	1.30
3	C	601	SAH	OXT-C	-2.08	1.24	1.30
3	D	601	SAH	C5-N7	-2.05	1.35	1.39

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	601	SAH	C5-C4-N3	-5.69	118.88	126.72
3	D	601	SAH	C5-C4-N3	-5.55	119.07	126.72
3	A	601	SAH	C5-C4-N3	-5.47	119.19	126.72
3	A	601	SAH	N3-C4-N9	4.43	134.71	127.17
3	D	601	SAH	N3-C4-N9	4.43	134.70	127.17
3	C	601	SAH	N3-C4-N9	4.40	134.65	127.17
3	A	601	SAH	C2-N3-C4	3.95	121.47	111.83
4	A	701	MVI	OBB-CBJ-CAF	3.85	115.28	106.74
3	D	601	SAH	C2-N3-C4	3.71	120.89	111.83
3	A	601	SAH	C4-C5-N7	-3.70	106.35	110.58
3	A	601	SAH	N3-C2-N1	-3.68	123.01	128.58
4	C	701	MVI	OBB-CBJ-CBL	3.67	116.17	109.55
3	C	601	SAH	C4-C5-N7	-3.64	106.42	110.58
4	A	701	MVI	CAP-CAO-CAQ	-3.57	116.19	124.65
3	C	601	SAH	C2-N3-C4	3.57	120.55	111.83
3	A	601	SAH	C4-N9-C8	3.43	109.34	105.74
3	D	601	SAH	N3-C2-N1	-3.40	123.44	128.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	601	SAH	C4-C5-N7	-3.33	106.78	110.58
4	A	701	MVI	OAZ-CBD-CAR	3.28	118.53	111.39
3	A	601	SAH	C5-N7-C8	3.16	108.42	103.45
4	C	701	MVI	OBB-CBJ-CAF	3.16	113.76	106.74
4	C	701	MVI	CAP-CAO-CAQ	-3.16	117.18	124.65
3	C	601	SAH	N3-C2-N1	-3.08	123.91	128.58
4	C	701	MVI	CBQ-OBB-CBJ	3.02	118.79	113.63
3	A	601	SAH	N9-C8-N7	-2.93	109.78	113.94
3	C	601	SAH	OXT-C-O	-2.81	117.70	124.08
4	C	701	MVI	OAZ-CBD-CAR	2.79	117.45	111.39
3	C	601	SAH	C5-N7-C8	2.73	107.74	103.45
4	C	701	MVI	CBF-CAS-CAR	-2.71	119.14	126.30
4	C	701	MVI	OAZ-CBP-CBK	2.69	113.42	107.60
4	C	701	MVI	CBM-CBL-CBJ	2.67	113.87	109.81
4	A	701	MVI	OAZ-CBP-CBK	2.60	113.24	107.60
4	C	701	MVI	CBK-CAT-CAP	-2.57	119.36	125.40
3	D	601	SAH	C4-N9-C8	2.53	108.40	105.74
3	A	601	SAH	C6-C5-N7	2.53	136.97	132.09
3	A	601	SAH	OXT-C-O	-2.47	118.47	124.08
3	D	601	SAH	OXT-C-O	-2.47	118.47	124.08
3	C	601	SAH	C4-N9-C8	2.46	108.32	105.74
3	D	601	SAH	C5-N7-C8	2.40	107.22	103.45
3	A	601	SAH	CB-CG-SD	-2.36	108.18	113.45
4	A	701	MVI	OBA-CBG-CAC	2.34	111.25	106.88
4	A	701	MVI	CBQ-OBB-CBJ	2.30	117.55	113.63
3	D	601	SAH	C6-C5-N7	2.28	136.48	132.09
4	A	701	MVI	CBF-CAS-CAR	-2.21	120.45	126.30
3	C	601	SAH	C6-C5-N7	2.21	136.34	132.09
4	A	701	MVI	OAY-CBQ-CBN	-2.13	105.04	108.27
4	A	701	MVI	CBM-CBL-CBJ	2.07	112.97	109.81
3	D	601	SAH	C2-N1-C6	2.05	122.10	118.73
3	C	601	SAH	N9-C8-N7	-2.04	111.05	113.94

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	701	MVI	CAA-CAU-CBP-OAZ
4	A	701	MVI	CBI-CAW-CBH-CBE
4	C	701	MVI	CBI-CAW-CBH-CBE
3	D	601	SAH	O4'-C4'-C5'-SD
3	C	601	SAH	C2'-C1'-N9-C8

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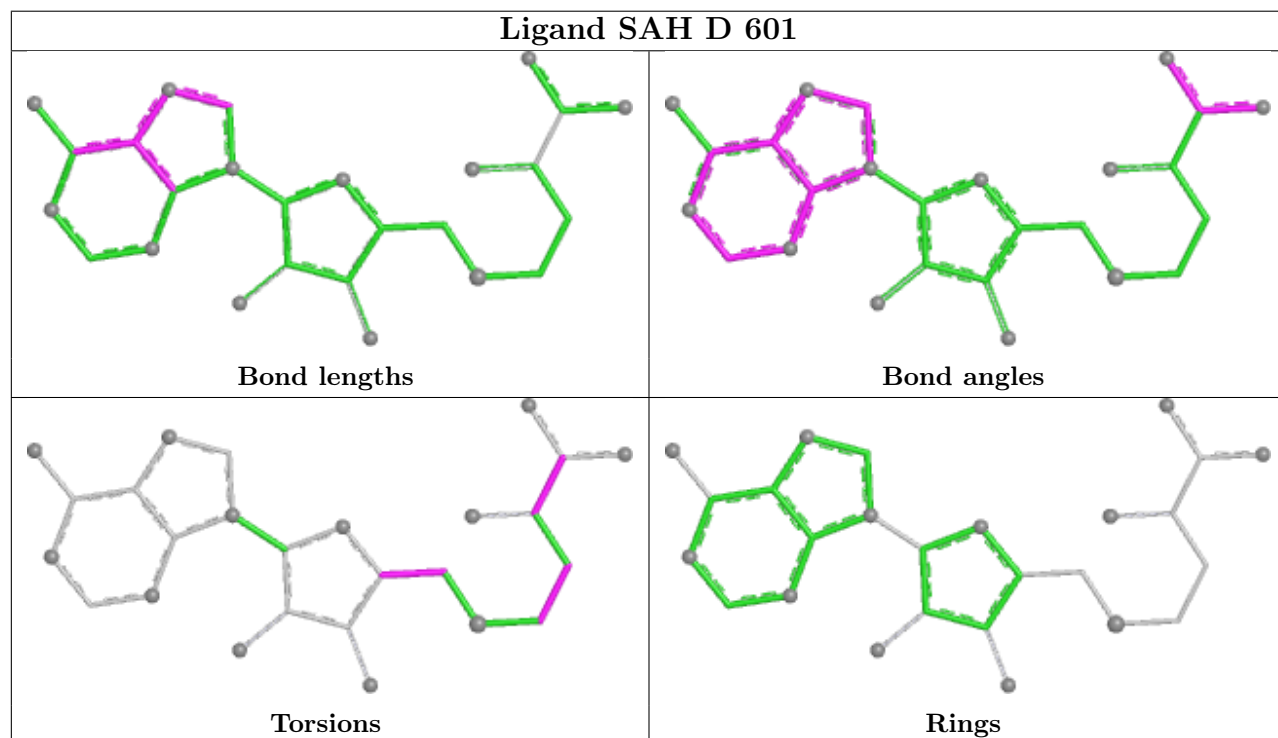
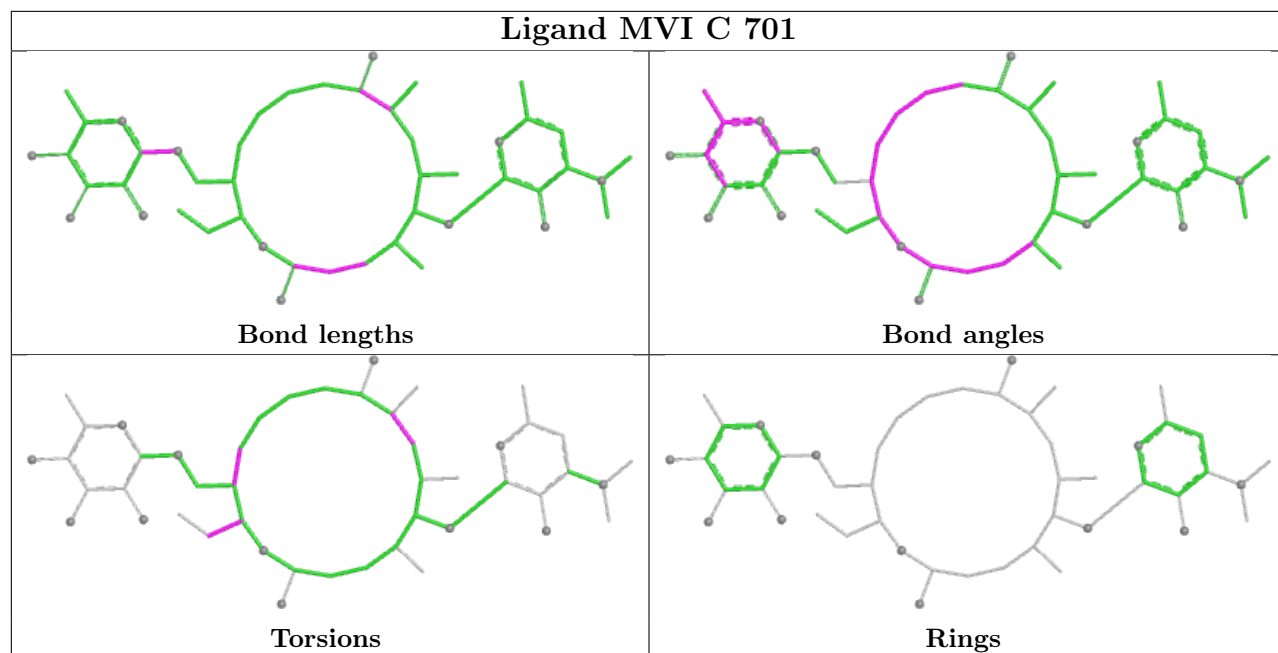
Mol	Chain	Res	Type	Atoms
4	C	701	MVI	CAP-CAT-CBK-CAV
3	D	601	SAH	CA-CB-CG-SD
3	D	601	SAH	OXT-C-CA-N
3	A	601	SAH	C2'-C1'-N9-C8
4	A	701	MVI	CAP-CAT-CBK-CAV
4	A	701	MVI	CAP-CAT-CBK-CBP
4	C	701	MVI	CAP-CAT-CBK-CBP

There are no ring outliers.

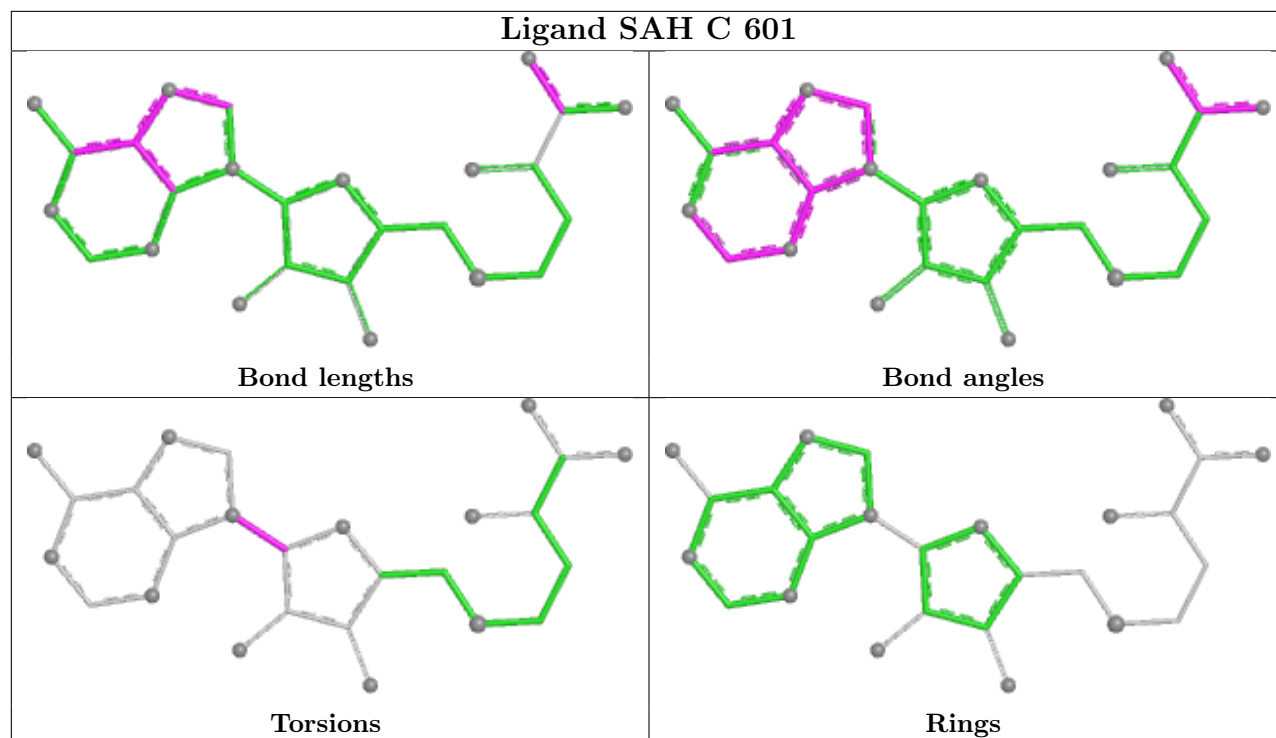
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	401	DMS	1	0
4	A	701	MVI	1	0
6	D	400	GOL	1	0

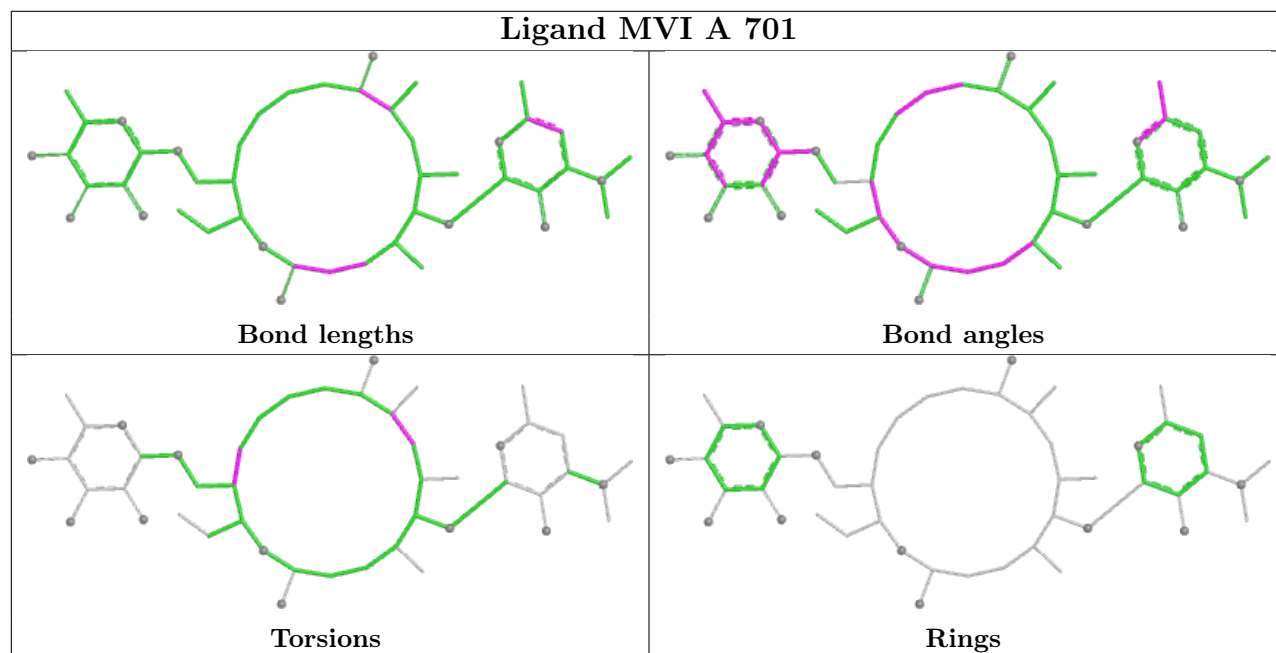
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

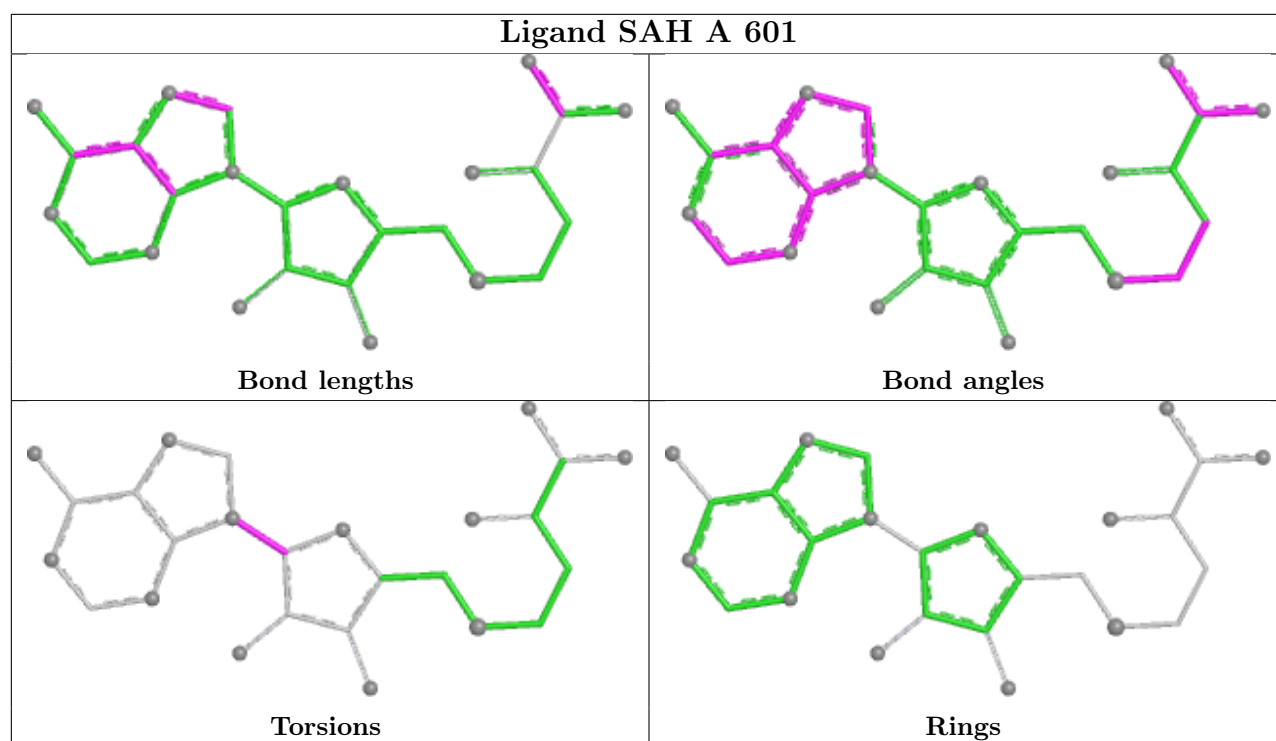


Ligand SAH C 601



Ligand MVI A 701





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	386/419 (92%)	-0.42	3 (0%) 82 80	25, 41, 86, 123	0
1	B	350/419 (83%)	-0.16	9 (2%) 57 53	24, 50, 100, 176	0
1	C	366/419 (87%)	-0.35	3 (0%) 82 80	26, 45, 79, 141	0
1	D	393/419 (93%)	-0.24	5 (1%) 75 71	27, 48, 98, 119	0
All	All	1495/1676 (89%)	-0.30	20 (1%) 75 71	24, 45, 93, 176	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	139	ILE	3.6
1	A	395	SER	3.1
1	B	182	PHE	2.9
1	C	379	ILE	2.9
1	B	135	ALA	2.9
1	D	182	PHE	2.9
1	B	136	VAL	2.9
1	C	381	THR	2.9
1	A	387	PHE	2.8
1	B	277	SER	2.4
1	A	379	ILE	2.3
1	D	319	PRO	2.2
1	B	144	LEU	2.1
1	B	129	LEU	2.1
1	D	179	LEU	2.1
1	B	346	PRO	2.1
1	D	181	TRP	2.1
1	C	380	PRO	2.1
1	B	325	THR	2.0
1	D	5	THR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

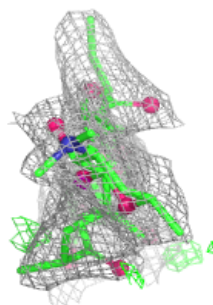
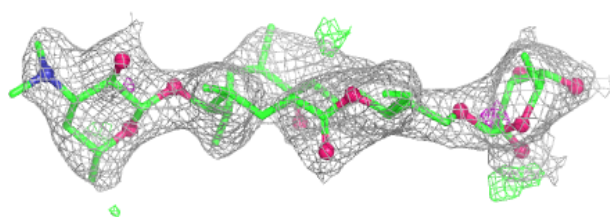
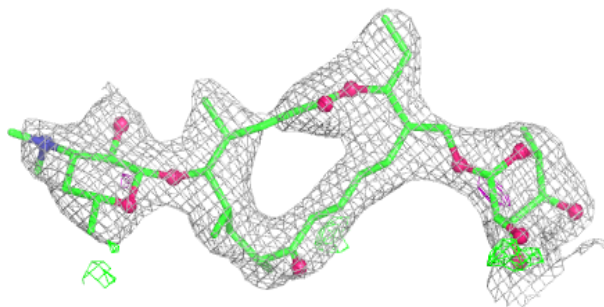
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MG	D	501	1/1	0.77	0.25	84,84,84,84	0
4	MVI	C	701	47/47	0.89	0.13	63,66,68,69	0
4	MVI	A	701	47/47	0.91	0.10	54,63,65,66	0
6	GOL	D	400	6/6	0.91	0.12	78,78,78,80	0
3	SAH	D	601	26/26	0.92	0.08	65,67,70,71	0
5	DMS	A	400	4/4	0.93	0.14	74,74,74,75	0
5	DMS	C	400	4/4	0.95	0.13	71,72,72,73	0
3	SAH	C	601	26/26	0.95	0.07	48,50,52,53	0
5	DMS	A	401	4/4	0.96	0.13	66,66,67,67	0
3	SAH	A	601	26/26	0.97	0.06	36,37,42,43	0
2	MG	C	501	1/1	0.98	0.04	60,60,60,60	0
2	MG	A	501	1/1	0.99	0.02	47,47,47,47	0

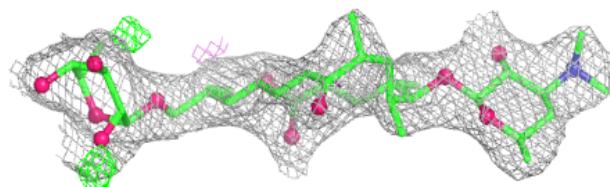
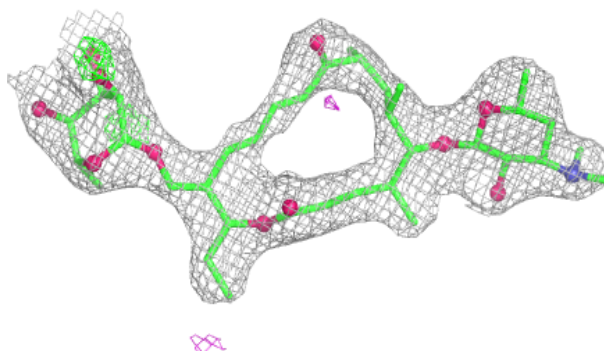
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around MVI C 701:

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

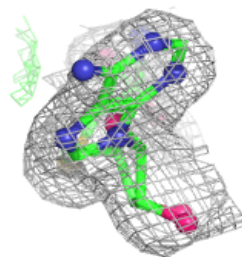
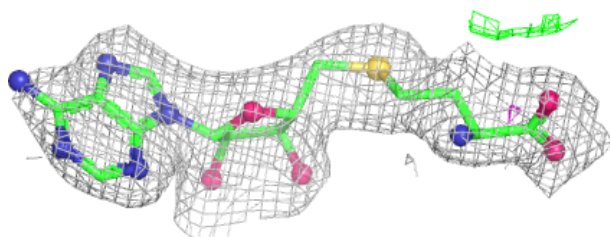
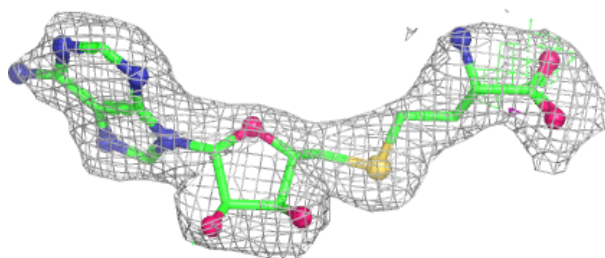
**Electron density around MVI A 701:**

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

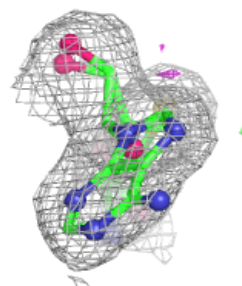
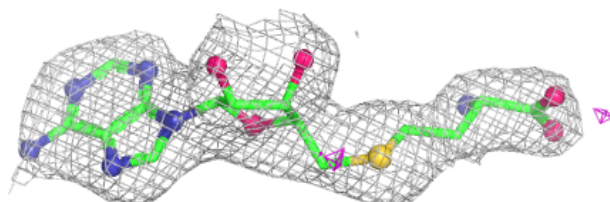
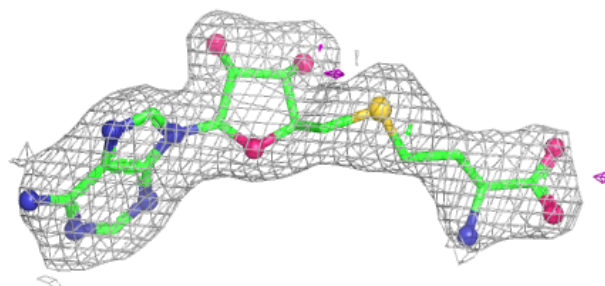


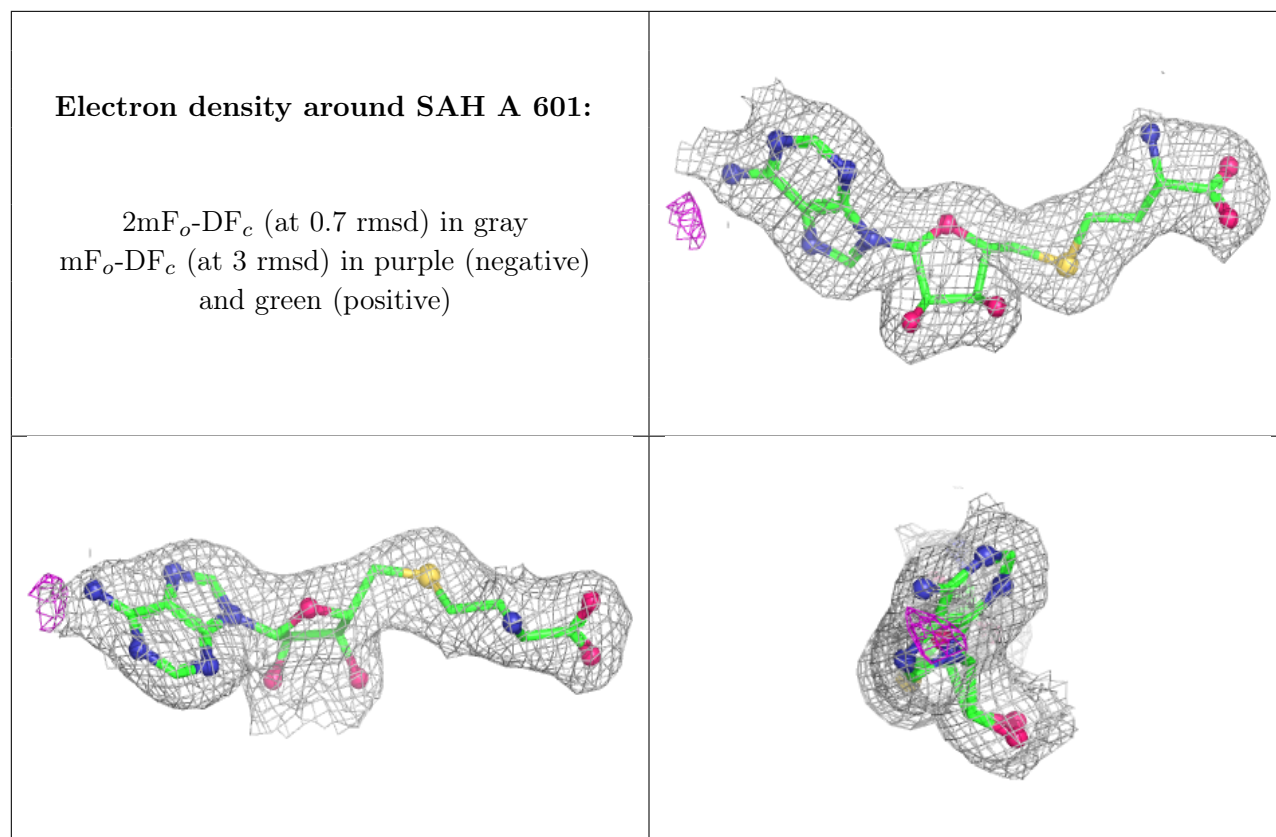
Electron density around SAH D 601:

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

**Electron density around SAH C 601:**

$2mF_o-DF_c$ (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.