



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2026 – 03:25 AM EDT

PDB ID : 6W8V / pdb_00006w8v
Title : Crystal structure of mouse DNMT1 in complex with ACG DNA
Authors : Anteneh, H.; Song, J.
Deposited on : 2020-03-21
Resolution : 3.12 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

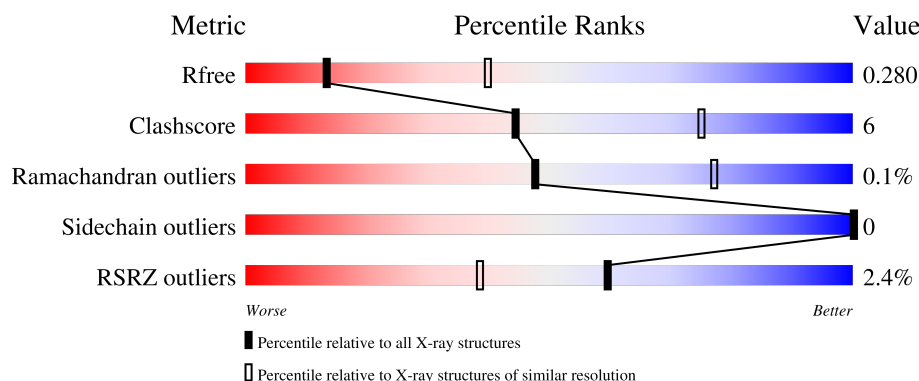
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.12 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	1816 (3.14-3.10)
Clashscore	190562	1906 (3.14-3.10)
Ramachandran outliers	187476	1802 (3.14-3.10)
Sidechain outliers	187428	1802 (3.14-3.10)
RSRZ outliers	180081	1816 (3.14-3.10)

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	873	2% 81% 14% 5%
1	B	873	2% 82% 13% 5%
2	C	12	8% 42% 58%
2	E	12	17% 25% 67% 8%
3	D	12	8% 42% 50% 8%

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Mol	Chain	Length	Quality of chain
3	F	12	58% 33% 8%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 13955 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called DNA (cytosine-5)-methyltransferase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	831	Total	C	N	O	S	0	0	0
			6493	4127	1133	1192	41			
1	B	825	Total	C	N	O	S	0	1	0
			6428	4082	1128	1179	39			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	730	SER	-	expression tag	UNP P13864
B	730	SER	-	expression tag	UNP P13864

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	12	Total	C	N	O	P	0	0	0
			240	117	40	72	11			
2	E	12	Total	C	N	O	P	0	0	0
			240	117	40	72	11			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	12	Total	C	F	N	O	P	0	0
			249	119	1	50	68	11		
3	F	12	Total	C	F	N	O	P	0	0
			249	119	1	50	68	11		

- Molecule 4 is S-ADENOSYL-L-HOMOCYSTEINE (CCD ID: SAH) (formula: C₁₄H₂₀N₆O₅S) (labeled as "Ligand of Interest" by depositor).



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

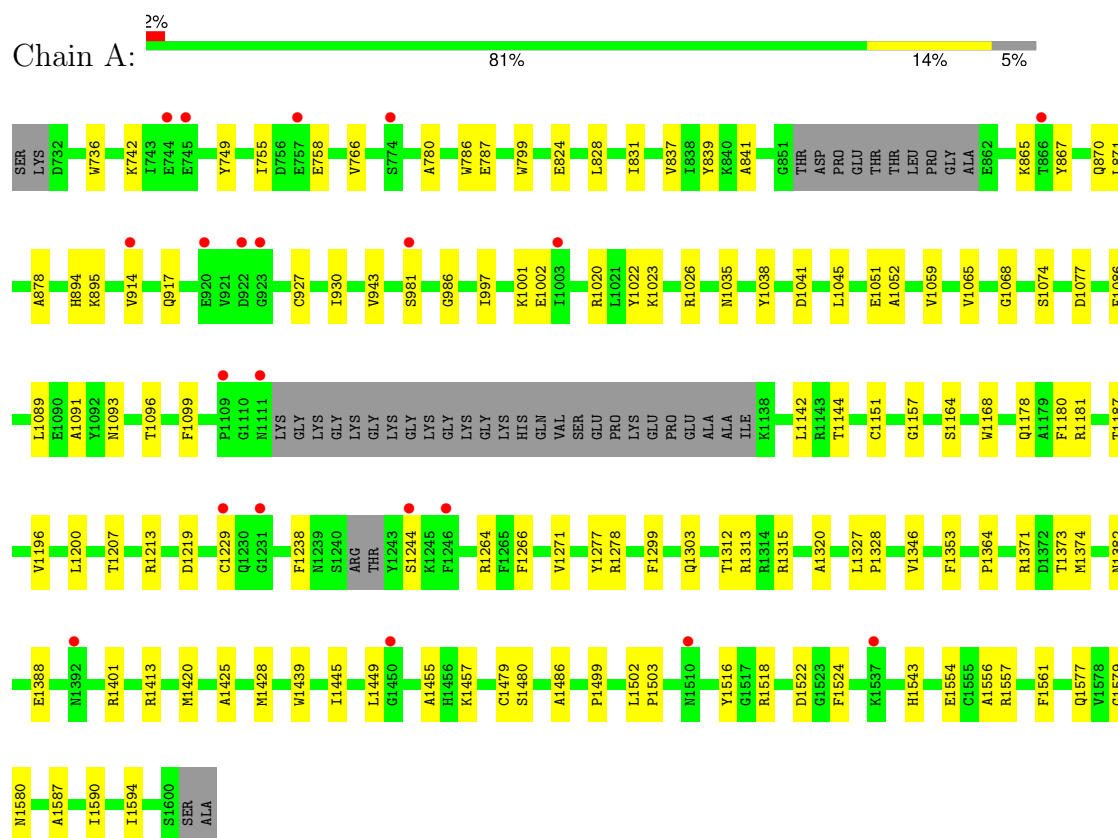
- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

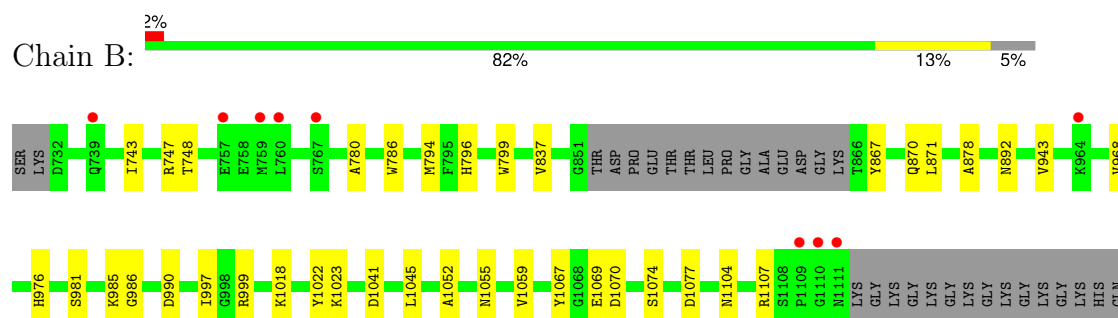
3 Residue-property plots [i](#)

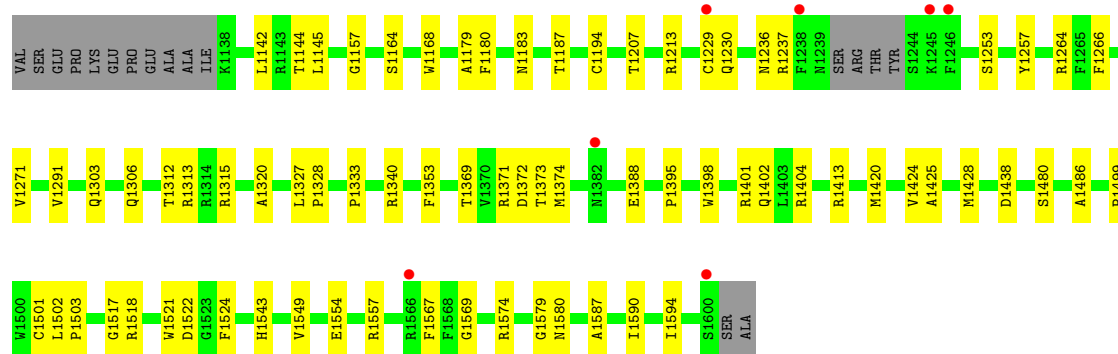
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

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

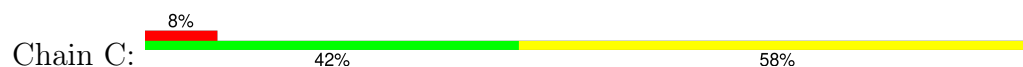


• Molecule 1: DNA (cytosine-5)-methyltransferase 1

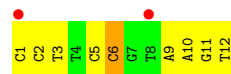




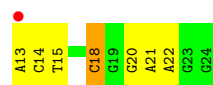
- Molecule 2: ACG DNA (5'-D(*CP*CP*TP*TP*CP*(5CM)P*GP*TP*AP*AP*GP*T)-3')



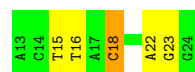
- Molecule 2: ACG DNA (5'-D(*CP*CP*TP*TP*CP*(5CM)P*GP*TP*AP*AP*GP*T)-3')



- Molecule 3: ACG DNA (5'-D(*AP*CP*TP*TP*AP*(C49)P*GP*GP*AP*AP*GP*G)-3')



- Molecule 3: ACG DNA (5'-D(*AP*CP*TP*TP*AP*(C49)P*GP*GP*AP*AP*GP*G)-3')



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.24Å 152.15Å 96.05Å 90.00° 94.29° 90.00°	Depositor
Resolution (Å)	48.47 – 3.12 48.47 – 3.12	Depositor EDS
% Data completeness (in resolution range)	99.0 (48.47-3.12) 99.0 (48.47-3.12)	Depositor EDS
R_{merge}	0.39	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.15 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.15.2_3472	Depositor
R, R_{free}	0.246 , 0.278 0.247 , 0.280	Depositor DCC
R_{free} test set	2000 reflections (4.39%)	wwPDB-VP
Wilson B-factor (Å ²)	67.9	Xtriage
Anisotropy	0.547	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 45.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	13955	wwPDB-VP
Average B, all atoms (Å ²)	80.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.64% 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: ZN, 5CM, C49, 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	0.15	0/6666	0.37	0/9058
1	B	0.13	0/6600	0.36	0/8979
2	C	0.30	0/244	0.64	0/372
2	E	0.30	0/244	0.57	0/372
3	D	0.29	0/256	0.57	0/392
3	F	0.28	0/256	0.52	0/392
All	All	0.16	0/14266	0.38	0/19565

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	6493	0	6154	73	0
1	B	6428	0	6057	68	0
2	C	240	0	140	6	0
2	E	240	0	140	13	0
3	D	249	0	136	11	0
3	F	249	0	136	5	0
4	A	26	0	19	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	26	0	19	1	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
All	All	13955	0	12801	161	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (161) 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:1229:CYS:SG	3:D:18:C49:C6	2.07	1.39
1:A:1229:CYS:SG	3:D:18:C49:C5	2.56	0.92
1:A:1229:CYS:SG	3:D:18:C49:F	2.26	0.83
1:A:1068:GLY:HA3	1:A:1089:LEU:HD23	1.70	0.74
1:A:1229:CYS:SG	3:D:18:C49:N1	2.60	0.73
1:B:1266:PHE:HB3	1:B:1320:ALA:HB3	1.72	0.71
2:E:2:DC:H2"	2:E:3:DT:H72	1.70	0.71
1:B:1569:GLY:O	1:B:1574:ARG:NH1	2.25	0.69
1:B:1230:GLN:O	1:B:1236:ASN:ND2	2.28	0.66
1:A:1065:VAL:HG22	1:A:1086:PHE:HB2	1.79	0.65
1:A:917:GLN:HA	1:A:927:CYS:HA	1.78	0.64
1:A:1266:PHE:HB3	1:A:1320:ALA:HB3	1.79	0.64
1:B:1388:GLU:HG2	1:B:1413:ARG:HG2	1.82	0.62
3:F:22:DA:H2"	3:F:23:DG:H5"	1.80	0.62
1:A:1313:ARG:NH2	1:A:1579:GLY:O	2.35	0.60
1:A:1388:GLU:HG2	1:A:1413:ARG:HG2	1.84	0.59
1:A:837:VAL:HG22	1:A:867:TYR:HB2	1.85	0.59
1:B:981:SER:OG	3:F:15:DT:OP1	2.21	0.58
1:A:799:TRP:HE1	1:A:824:GLU:HG2	1.67	0.58
1:B:985:LYS:NZ	3:F:16:DT:OP2	2.33	0.57
1:A:1445:ILE:HA	1:A:1457:LYS:HE2	1.86	0.56
1:B:1518:ARG:NH2	1:B:1543:HIS:O	2.36	0.56
1:A:1178:GLN:OE1	1:A:1181:ARG:NH1	2.38	0.56
1:B:1374:MET:HG2	1:B:1554:GLU:HG2	1.88	0.56
1:B:999:ARG:HB3	1:B:1022:TYR:HB2	1.88	0.55
1:A:755:ILE:HD11	1:A:828:LEU:HD23	1.87	0.55
1:A:1373:THR:HG22	1:A:1557:ARG:HB3	1.87	0.55
1:B:990:ASP:OD2	1:B:1340:ARG:NH2	2.39	0.55
1:A:1518:ARG:NH2	1:A:1543:HIS:O	2.36	0.55
1:A:1374:MET:HG2	1:A:1554:GLU:HG2	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1180:PHE:HE1	1:A:1187:THR:HG21	1.71	0.54
1:B:1104:ASN:OD1	1:B:1107:ARG:HD3	2.07	0.54
2:C:2:DC:H2''	2:C:3:DT:H71	1.90	0.54
2:E:9:DA:H1'	2:E:10:DA:C8	2.42	0.54
1:B:1157:GLY:HA3	1:B:1587:ALA:HB3	1.89	0.54
1:A:878:ALA:HB2	1:A:1353:PHE:CD1	2.43	0.53
3:D:13:DA:H2''	3:D:14:DC:O5'	2.08	0.53
1:A:1207:THR:HG22	1:A:1213:ARG:HA	1.91	0.53
2:E:11:DG:H2'	2:E:12:DT:C6	2.44	0.53
1:A:981:SER:OG	3:D:15:DT:OP1	2.28	0.52
1:B:1074:SER:OG	1:B:1077:ASP:OD2	2.26	0.52
1:B:968:VAL:HG21	1:B:976:HIS:CD2	2.44	0.52
1:B:1501:CYS:HB2	2:E:5:DC:H3'	1.92	0.52
1:B:1501:CYS:CB	2:E:5:DC:H3'	2.40	0.52
1:A:1480:SER:OG	1:A:1486:ALA:O	2.27	0.52
1:B:1502:LEU:HB2	1:B:1503:PRO:HD3	1.91	0.52
1:A:1502:LEU:HB2	1:A:1503:PRO:HD3	1.91	0.52
1:B:1145:LEU:HD13	1:B:1168:TRP:HB2	1.91	0.51
1:B:786:TRP:HZ3	1:B:796:HIS:HB2	1.75	0.51
1:B:870:GLN:NE2	1:B:1291:VAL:O	2.41	0.51
1:A:1074:SER:OG	1:A:1077:ASP:OD2	2.28	0.51
1:A:914:VAL:HA	1:A:930:ILE:HG22	1.91	0.51
1:B:1237:ARG:NH1	2:E:6:5CM:H1'	2.26	0.51
1:A:1157:GLY:HA3	1:A:1587:ALA:HB3	1.93	0.51
1:B:1580:ASN:HB3	4:B:1701:SAH:SD	2.51	0.51
1:A:1371:ARG:NH2	1:A:1522:ASP:OD1	2.39	0.51
1:B:1425:ALA:HA	1:B:1428:MET:HE2	1.94	0.50
1:A:1556:ALA:HB1	1:A:1561:PHE:HB2	1.94	0.50
1:B:878:ALA:HB2	1:B:1353:PHE:CD1	2.46	0.50
1:A:1023:LYS:HE2	1:A:1052:ALA:HB2	1.93	0.50
3:D:21:DA:H2''	3:D:22:DA:C8	2.47	0.50
1:B:1041:ASP:OD1	1:B:1401:ARG:NH1	2.43	0.50
2:C:11:DG:H2'	2:C:12:DT:C6	2.46	0.50
1:B:1499:PRO:HB2	1:B:1502:LEU:HG	1.92	0.49
1:A:1091:ALA:O	1:A:1099:PHE:HA	2.12	0.49
1:B:1420:MET:HE3	1:B:1549:VAL:HG11	1.94	0.49
1:A:1151:CYS:HB3	1:A:1577:GLN:HB3	1.95	0.49
1:B:1194:CYS:O	1:B:1257:TYR:OH	2.23	0.49
1:A:1327:LEU:HD12	1:A:1328:PRO:HD2	1.94	0.49
1:A:1303:GLN:HE22	1:A:1312:THR:HG23	1.77	0.48
1:B:1327:LEU:HD12	1:B:1328:PRO:HD2	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:2:DC:H2''	2:C:3:DT:C7	2.43	0.48
1:A:749:TYR:HA	1:A:786:TRP:HA	1.95	0.48
1:A:1026:ARG:NH2	1:A:1364:PRO:O	2.41	0.48
2:C:9:DA:H4'	2:C:10:DA:H5'	1.96	0.48
2:E:2:DC:H2''	2:E:3:DT:C7	2.41	0.48
1:B:1023:LYS:HE2	1:B:1052:ALA:HB2	1.96	0.48
1:B:837:VAL:HG22	1:B:867:TYR:HB2	1.96	0.48
1:A:986:GLY:HA2	1:A:1524:PHE:CE2	2.49	0.48
2:E:9:DA:H2'	2:E:9:DA:OP2	2.13	0.47
1:B:1313:ARG:NH2	3:F:18:C49:O2	2.47	0.47
1:A:1580:ASN:HB3	4:A:1701:SAH:SD	2.53	0.47
3:D:14:DC:H2''	3:D:15:DT:C6	2.49	0.47
1:B:1018:LYS:NZ	1:B:1055:ASN:OD1	2.38	0.47
1:B:1180:PHE:HE1	1:B:1187:THR:HG21	1.80	0.47
1:A:736:TRP:NE1	1:A:787:GLU:OE1	2.47	0.47
1:B:943:VAL:HG11	1:B:1059:VAL:HG22	1.97	0.47
1:B:1142:LEU:HD21	1:B:1264:ARG:HH21	1.80	0.47
1:B:1373:THR:HG22	1:B:1557:ARG:HB3	1.97	0.46
1:A:1001:LYS:HG2	1:A:1002:GLU:HG3	1.98	0.46
1:A:1238:PHE:O	1:A:1238:PHE:CG	2.68	0.46
1:B:1438:ASP:HA	1:B:1517:GLY:HA2	1.97	0.46
1:B:747:ARG:HB2	1:B:786:TRP:HB2	1.97	0.46
1:B:1207:THR:HG22	1:B:1213:ARG:HA	1.97	0.46
1:B:997:ILE:HD12	1:B:1045:LEU:HD11	1.97	0.46
1:B:1303:GLN:HE22	1:B:1312:THR:HG23	1.79	0.46
2:E:1:DC:H2'	2:E:2:DC:C5	2.51	0.45
2:E:1:DC:H2'	2:E:2:DC:C6	2.52	0.45
1:A:1439:TRP:HB3	1:A:1516:TYR:HB2	1.98	0.45
2:C:9:DA:H2'	2:C:9:DA:OP2	2.16	0.45
1:A:1590:ILE:O	1:A:1594:ILE:HG13	2.17	0.45
1:B:1480:SER:OG	1:B:1486:ALA:O	2.35	0.45
1:A:1093:ASN:HB3	1:A:1096:THR:OG1	2.17	0.45
1:A:1041:ASP:OD1	1:A:1401:ARG:NH1	2.50	0.45
1:B:892:ASN:OD1	1:B:892:ASN:N	2.50	0.45
2:C:9:DA:H1'	2:C:10:DA:C8	2.52	0.45
1:B:1070:ASP:OD1	1:B:1107:ARG:NH2	2.49	0.44
1:A:1196:VAL:O	1:A:1200:LEU:HG	2.18	0.44
1:A:943:VAL:HG23	1:A:1059:VAL:HG13	1.99	0.44
1:A:780:ALA:HB2	1:A:799:TRP:CE3	2.52	0.44
1:A:1238:PHE:HE1	3:D:20:DG:H4'	1.83	0.44
1:A:1002:GLU:HB2	1:A:1020:ARG:HG2	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1306:GLN:HB3	1:B:1333:PRO:HB3	2.00	0.44
1:B:870:GLN:O	1:B:871:LEU:HD23	2.18	0.44
1:B:1371:ARG:NH2	1:B:1522:ASP:OD1	2.43	0.44
1:A:1299:PHE:HE2	1:A:1346:VAL:HG11	1.83	0.44
2:E:5:DC:H2''	2:E:6:5CM:O5'	2.18	0.43
1:B:1369:THR:OG1	1:B:1521:TRP:O	2.35	0.43
1:B:1229:CYS:N	3:F:18:C49:F	2.41	0.43
1:A:1238:PHE:CE1	3:D:20:DG:H4'	2.53	0.43
1:B:1144:THR:OG1	1:B:1164:SER:HB2	2.19	0.43
1:A:997:ILE:HD12	1:A:1045:LEU:HD11	2.00	0.43
1:A:1382:ASN:HD21	1:A:1420:MET:HG2	1.84	0.43
1:A:1499:PRO:HB2	1:A:1502:LEU:HG	2.00	0.43
1:B:1067:TYR:CE2	1:B:1069:GLU:HB2	2.53	0.43
2:E:2:DC:C2'	2:E:3:DT:H72	2.46	0.43
1:A:766:VAL:HG13	1:A:831:ILE:HG23	2.00	0.43
1:B:1237:ARG:HH11	2:E:6:5CM:H1'	1.84	0.43
1:B:1395:PRO:HG3	1:B:1404:ARG:HD3	2.01	0.43
1:A:1449:LEU:HD11	1:A:1455:ALA:HB2	2.01	0.43
1:B:943:VAL:HG13	1:B:1059:VAL:HG13	2.01	0.43
1:B:1271:VAL:HA	1:B:1315:ARG:HD3	2.01	0.43
1:A:1144:THR:OG1	1:A:1164:SER:HB2	2.19	0.42
1:A:1035:ASN:HA	1:A:1038:TYR:CZ	2.54	0.42
1:B:780:ALA:HB2	1:B:799:TRP:CE3	2.54	0.42
1:A:755:ILE:O	1:A:758:GLU:HB2	2.19	0.42
1:A:1142:LEU:HD21	1:A:1264:ARG:HH21	1.85	0.42
1:A:1479:CYS:SG	1:A:1480:SER:N	2.92	0.42
1:B:1424:VAL:O	1:B:1428:MET:HG3	2.19	0.42
1:A:1001:LYS:HD3	1:A:1022:TYR:CZ	2.54	0.42
1:A:1271:VAL:HA	1:A:1315:ARG:HD3	2.02	0.42
1:B:1590:ILE:O	1:B:1594:ILE:HG13	2.19	0.42
1:A:1001:LYS:NZ	1:A:1051:GLU:OE2	2.53	0.42
1:B:986:GLY:HA2	1:B:1524:PHE:CE2	2.55	0.42
1:B:1313:ARG:NH2	1:B:1579:GLY:O	2.52	0.42
1:A:755:ILE:HD11	1:A:828:LEU:HB3	2.02	0.41
1:A:865:LYS:HE2	1:A:867:TYR:CZ	2.54	0.41
1:B:786:TRP:CE2	1:B:794:MET:HB2	2.55	0.41
1:B:1369:THR:HG23	1:B:1372:ASP:H	1.85	0.41
3:D:21:DA:H2''	3:D:22:DA:H8	1.85	0.41
1:A:839:TYR:CE2	1:A:841:ALA:HB2	2.56	0.41
1:A:1277:TYR:CE2	1:A:1278:ARG:HG3	2.55	0.41
1:B:1179:ALA:O	1:B:1183:ASN:ND2	2.44	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1398:TRP:O	1:B:1402:GLN:HG2	2.20	0.41
1:B:1567:PHE:HB3	1:B:1574:ARG:HG2	2.03	0.41
1:B:743:ILE:HD12	1:B:748:THR:HG22	2.03	0.40
1:A:870:GLN:O	1:A:871:LEU:HD23	2.21	0.40
1:A:1425:ALA:HA	1:A:1428:MET:HE2	2.03	0.40
1:B:1253:SER:O	1:B:1257:TYR:HD1	2.05	0.40
1:A:894:HIS:CE1	1:A:895:LYS:HG2	2.56	0.40
1:A:1168:TRP:CH2	1:A:1219:ASP:HB3	2.56	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	823/873 (94%)	790 (96%)	31 (4%)	2 (0%)	43	71
1	B	818/873 (94%)	784 (96%)	34 (4%)	0	100	100
All	All	1641/1746 (94%)	1574 (96%)	65 (4%)	2 (0%)	48	77

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1244	SER
1	A	742	LYS

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	679/759 (90%)	679 (100%)	0	100	100
1	B	668/759 (88%)	668 (100%)	0	100	100
All	All	1347/1518 (89%)	1347 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	827	GLN
1	A	976	HIS
1	A	1538	GLN
1	B	1306	GLN
1	B	1382	ASN
1	B	1538	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	5CM	E	6	3,2	18,21,22	4.59	12 (66%)	24,30,33	1.43	5 (20%)
3	C49	F	18	3	17,22,24	4.86	10 (58%)	17,33,38	2.05	4 (23%)
3	C49	D	18	3	17,22,24	4.90	10 (58%)	17,33,38	1.99	4 (23%)
2	5CM	C	6	3,2	18,21,22	4.61	12 (66%)	24,30,33	1.47	3 (12%)

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	5CM	E	6	3,2	-	2/7/21/22	0/2/2/2
3	C49	F	18	3	-	4/7/40/46	0/2/2/2
3	C49	D	18	3	-	4/7/40/46	0/2/2/2
2	5CM	C	6	3,2	-	0/7/21/22	0/2/2/2

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	18	C49	C2-N1	10.05	1.49	1.35
3	D	18	C49	C2-N1	10.04	1.49	1.35
2	C	6	5CM	C2'-C3'	-8.47	1.31	1.52
3	D	18	C49	C3'-C4'	-8.37	1.31	1.53
3	F	18	C49	C3'-C4'	-8.14	1.31	1.53
2	E	6	5CM	C2'-C3'	-8.11	1.32	1.52
3	D	18	C49	O4'-C4'	7.86	1.62	1.45
3	F	18	C49	O4'-C4'	7.70	1.62	1.45
2	E	6	5CM	C6-C5	7.69	1.47	1.34
2	C	6	5CM	C6-C5	7.63	1.47	1.34
2	E	6	5CM	O4'-C4'	-7.43	1.28	1.45
2	C	6	5CM	O4'-C4'	-7.04	1.29	1.45
2	C	6	5CM	C1'-N1	-6.88	1.30	1.48
3	F	18	C49	C2-N3	6.86	1.49	1.38
2	E	6	5CM	C1'-N1	-6.84	1.30	1.48
3	D	18	C49	C2-N3	6.73	1.49	1.38
2	C	6	5CM	O4'-C1'	6.47	1.56	1.42
2	E	6	5CM	O4'-C1'	6.40	1.56	1.42
3	F	18	C49	CM5-C5	6.35	1.64	1.51
3	D	18	C49	CM5-C5	6.25	1.64	1.51
2	C	6	5CM	C2-N3	5.38	1.47	1.36
2	E	6	5CM	C2-N3	5.37	1.47	1.36
3	D	18	C49	O4'-C1'	-5.15	1.30	1.42
3	F	18	C49	O4'-C1'	-5.14	1.30	1.42
3	D	18	C49	C6-N1	-5.07	1.41	1.46
2	E	6	5CM	C4-N3	4.97	1.42	1.34
2	C	6	5CM	C4-N3	4.95	1.42	1.34
3	F	18	C49	C6-N1	-4.89	1.41	1.46
3	F	18	C49	F-C5	-4.38	1.34	1.42
3	D	18	C49	F-C5	-4.31	1.34	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	6	5CM	C3'-C4'	3.94	1.63	1.53
2	E	6	5CM	C3'-C4'	3.89	1.63	1.53
2	C	6	5CM	C5-C4	3.69	1.46	1.44
2	E	6	5CM	C5-C4	3.51	1.46	1.44
2	C	6	5CM	C2-N1	3.40	1.47	1.40
2	E	6	5CM	C2-N1	3.35	1.47	1.40
2	C	6	5CM	C4-N4	3.18	1.42	1.34
2	E	6	5CM	C4-N4	3.14	1.42	1.34
2	E	6	5CM	C6-N1	2.58	1.42	1.38
3	D	18	C49	O3'-C3'	2.57	1.48	1.43
2	C	6	5CM	C6-N1	2.55	1.42	1.38
3	F	18	C49	O3'-C3'	2.50	1.48	1.43
3	D	18	C49	C4-N3	2.10	1.42	1.36
3	F	18	C49	C4-N3	2.08	1.42	1.36

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	18	C49	F-C5-CM5	-5.20	99.36	106.49
3	D	18	C49	F-C5-CM5	-4.98	99.66	106.49
3	F	18	C49	N3-C2-N1	3.90	120.56	116.65
3	D	18	C49	N3-C2-N1	3.71	120.38	116.65
3	D	18	C49	C2'-C1'-N1	-3.46	111.48	115.59
2	C	6	5CM	O4'-C1'-N1	3.19	113.53	107.86
3	F	18	C49	C2'-C1'-N1	-3.18	111.81	115.59
2	E	6	5CM	C4'-O4'-C1'	-3.15	102.02	109.51
3	F	18	C49	O2-C2-N1	-2.90	119.61	123.10
2	E	6	5CM	C5-C6-N1	-2.88	120.18	123.31
3	D	18	C49	O2-C2-N1	-2.83	119.70	123.10
2	C	6	5CM	C5-C6-N1	-2.83	120.25	123.31
2	C	6	5CM	C2'-C3'-C4'	2.20	107.27	102.80
2	E	6	5CM	C2'-C3'-C4'	2.15	107.16	102.80
2	E	6	5CM	O4'-C1'-C2'	-2.11	102.30	106.25
2	E	6	5CM	O4'-C1'-N1	2.08	111.56	107.86

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	6	5CM	O4'-C4'-C5'-O5'
3	D	18	C49	O4'-C1'-N1-C6
3	F	18	C49	O4'-C1'-N1-C6

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Mol	Chain	Res	Type	Atoms
3	D	18	C49	C2'-C1'-N1-C6
3	D	18	C49	C2'-C1'-N1-C2
3	F	18	C49	C2'-C1'-N1-C6
3	F	18	C49	C2'-C1'-N1-C2
2	E	6	5CM	C3'-C4'-C5'-O5'
3	D	18	C49	O4'-C1'-N1-C2
3	F	18	C49	O4'-C1'-N1-C2

There are no ring outliers.

3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	6	5CM	3	0
3	F	18	C49	2	0
3	D	18	C49	4	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	B	1701	-	27,28,28	1.10	4 (14%)	36,40,40	2.03	9 (25%)
4	SAH	A	1701	-	27,28,28	1.10	4 (14%)	36,40,40	2.05	10 (27%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SAH	B	1701	-	-	5/15/31/31	0/3/3/3
4	SAH	A	1701	-	-	7/15/31/31	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1701	SAH	C2-N3	2.65	1.38	1.33
4	B	1701	SAH	C2-N1	2.58	1.38	1.33
4	B	1701	SAH	C2-N3	2.58	1.38	1.33
4	A	1701	SAH	C2-N1	2.51	1.38	1.33
4	A	1701	SAH	OXT-C	-2.28	1.23	1.30
4	B	1701	SAH	OXT-C	-2.17	1.23	1.30
4	B	1701	SAH	C8-N7	2.14	1.35	1.31
4	A	1701	SAH	C8-N7	2.12	1.35	1.31

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1701	SAH	N3-C2-N1	-5.61	120.10	128.58
4	A	1701	SAH	N3-C2-N1	-5.50	120.25	128.58
4	A	1701	SAH	C5-C4-N3	-4.61	120.37	126.72
4	B	1701	SAH	C5-C4-N3	-4.51	120.50	126.72
4	A	1701	SAH	N9-C8-N7	-3.85	108.48	113.94
4	B	1701	SAH	N9-C8-N7	-3.80	108.54	113.94
4	B	1701	SAH	C2-N3-C4	3.45	120.27	111.83
4	A	1701	SAH	C2-N3-C4	3.45	120.25	111.83
4	A	1701	SAH	C5-N7-C8	3.39	108.77	103.45
4	B	1701	SAH	C5'-SD-CG	-3.32	92.40	102.26
4	B	1701	SAH	C5-N7-C8	3.32	108.67	103.45
4	A	1701	SAH	C5'-SD-CG	-3.16	92.88	102.26
4	A	1701	SAH	N3-C4-N9	3.07	132.39	127.17
4	B	1701	SAH	N3-C4-N9	2.99	132.25	127.17
4	A	1701	SAH	OXT-C-O	-2.72	117.90	124.08
4	B	1701	SAH	OXT-C-O	-2.70	117.95	124.08
4	A	1701	SAH	O4'-C1'-N9	2.54	112.96	108.09
4	A	1701	SAH	C4-C5-N7	-2.34	107.91	110.58
4	B	1701	SAH	C4-C5-N7	-2.30	107.95	110.58

There are no chirality outliers.

All (12) torsion outliers are listed below:

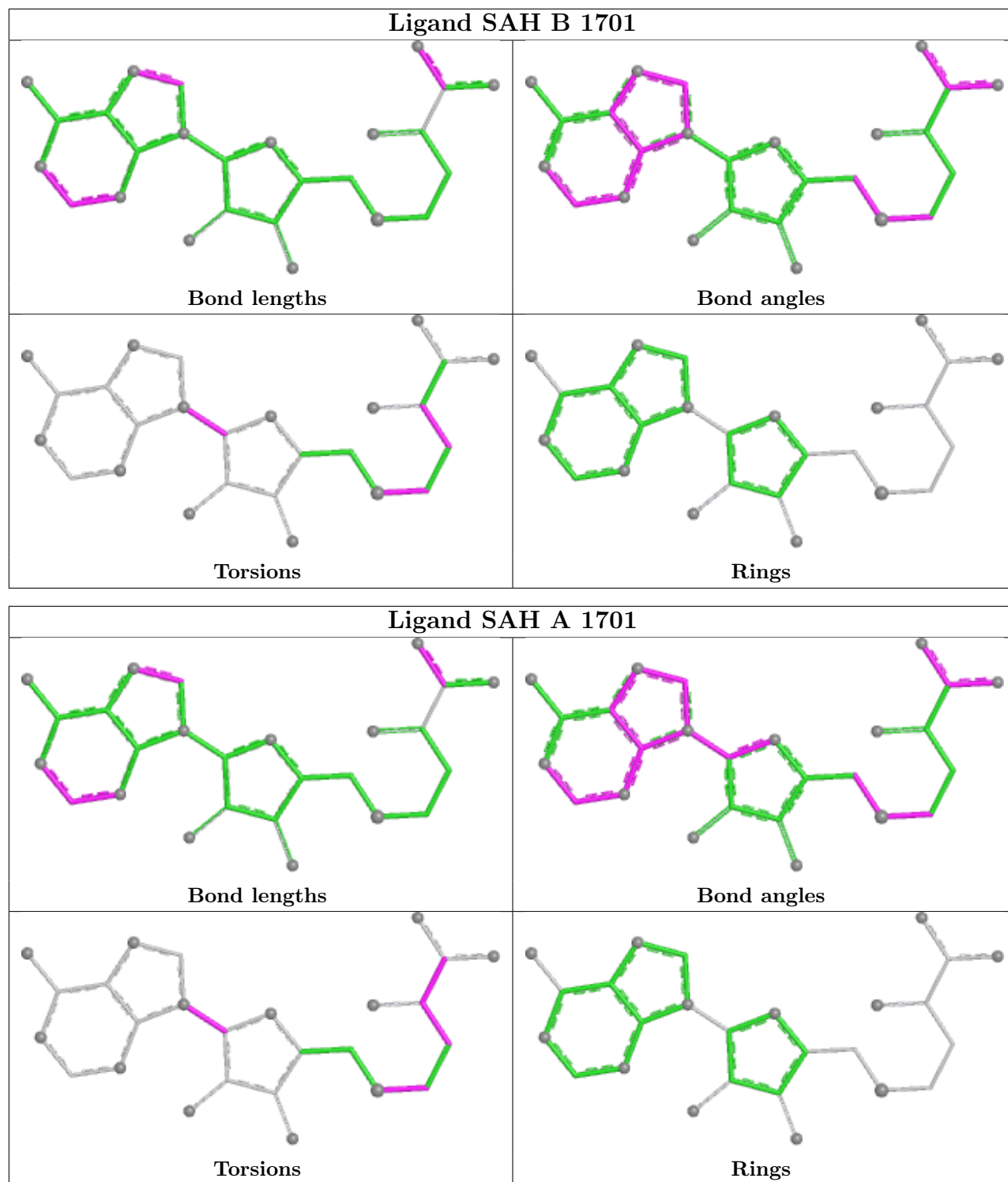
Mol	Chain	Res	Type	Atoms
4	A	1701	SAH	N-CA-CB-CG
4	A	1701	SAH	C-CA-CB-CG
4	B	1701	SAH	N-CA-CB-CG
4	B	1701	SAH	C-CA-CB-CG
4	A	1701	SAH	C2'-C1'-N9-C8
4	B	1701	SAH	C2'-C1'-N9-C8
4	A	1701	SAH	CB-CG-SD-C5'
4	B	1701	SAH	CB-CG-SD-C5'
4	A	1701	SAH	OXT-C-CA-CB
4	A	1701	SAH	O-C-CA-CB
4	A	1701	SAH	O4'-C1'-N9-C8
4	B	1701	SAH	O4'-C1'-N9-C8

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1701	SAH	1	0
4	A	1701	SAH	1	0

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



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	831/873 (95%)	0.22	21 (2%) 58 37	37, 74, 133, 185	0
1	B	825/873 (94%)	0.17	16 (1%) 66 45	30, 70, 146, 217	1 (0%)
2	C	11/12 (91%)	1.17	1 (9%) 15 8	81, 132, 161, 177	0
2	E	11/12 (91%)	1.04	2 (18%) 3 2	67, 118, 157, 168	0
3	D	11/12 (91%)	1.00	1 (9%) 15 8	90, 107, 150, 156	0
3	F	11/12 (91%)	0.73	0 100 100	75, 104, 139, 147	0
All	All	1700/1794 (94%)	0.22	41 (2%) 59 38	30, 73, 142, 217	1 (0%)

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1238	PHE	5.2
1	B	1229	CYS	3.3
1	A	1229	CYS	2.9
1	A	866	THR	2.9
1	B	1382	ASN	2.9
1	A	923	GLY	2.9
1	A	914	VAL	2.8
1	A	1244	SER	2.7
1	B	757	GLU	2.7
1	A	1510	ASN	2.7
1	A	745	GLU	2.6
1	A	1231	GLY	2.6
1	A	757	GLU	2.6
2	E	8	DT	2.5
2	C	12	DT	2.4
1	B	1111	ASN	2.4
1	A	922	ASP	2.4
1	A	1450	GLY	2.4
1	A	1111	ASN	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	1600	SER	2.4
3	D	13	DA	2.3
1	A	1246	PHE	2.3
1	A	1003	ILE	2.3
1	A	920	GLU	2.2
1	B	767	SER	2.2
1	B	759	MET	2.2
1	A	1392	ASN	2.2
1	B	760	LEU	2.2
1	B	1110	GLY	2.2
1	A	981	SER	2.1
1	B	1566[A]	ARG	2.1
1	A	744	GLU	2.1
2	E	1	DC	2.1
1	B	1109	PRO	2.1
1	B	964	LYS	2.1
1	B	739	GLN	2.1
1	A	1109	PRO	2.1
1	B	1245	LYS	2.0
1	A	774	SER	2.0
1	B	1246	PHE	2.0
1	A	1537	LYS	2.0

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
3	C49	F	18	21/23	0.86	0.15	66,85,110,124	0
3	C49	D	18	21/23	0.88	0.14	81,85,90,114	0
2	5CM	C	6	20/21	0.93	0.13	72,82,89,90	0
2	5CM	E	6	20/21	0.93	0.10	64,69,80,116	0

6.3 Carbohydrates [i](#)

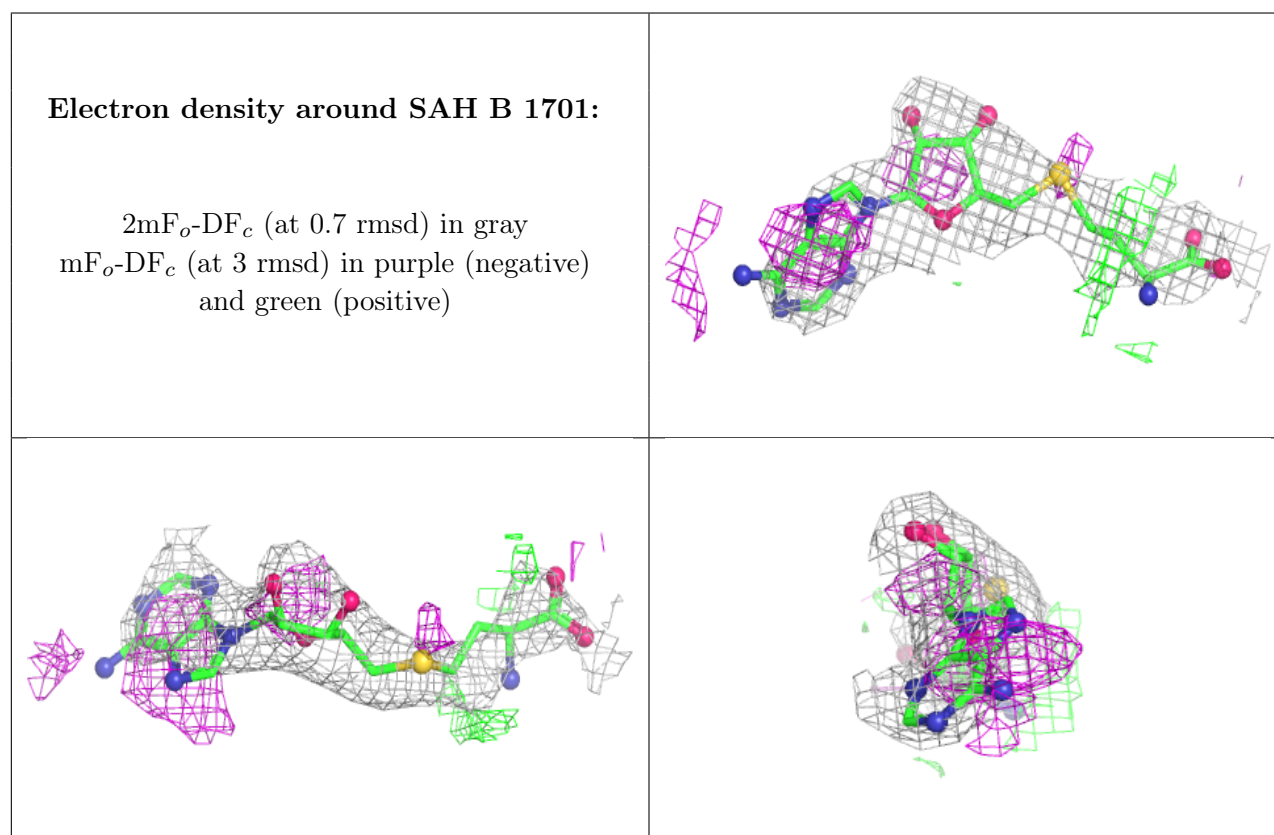
There are no oligosaccharides in this entry.

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.

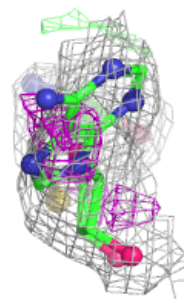
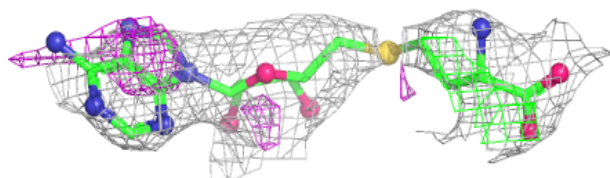
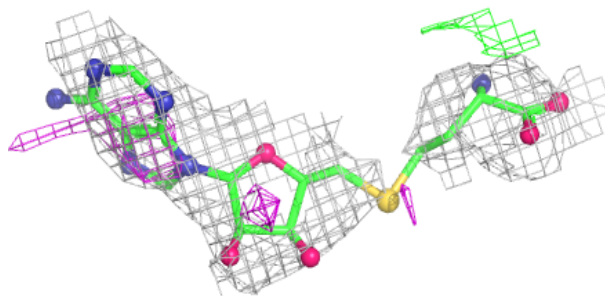
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	SAH	B	1701	26/26	0.65	0.20	58,82,93,108	0
4	SAH	A	1701	26/26	0.73	0.15	68,78,96,110	0
5	ZN	B	1703	1/1	0.98	0.04	95,95,95,95	0
5	ZN	A	1703	1/1	0.99	0.03	72,72,72,72	0
5	ZN	B	1702	1/1	1.00	0.02	59,59,59,59	0
5	ZN	A	1702	1/1	1.00	0.02	55,55,55,55	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 1701:

$2mF_o-DF_c$ (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.