Full wwPDB X-ray Structure Validation Report (i)

Oct 17, 2023 – 02:22 AM EDT

PDB ID	:	2G70
Title	:	Structure of human PNMT in complex with inhibitor 3-hydroxymethyl-7-nitro-THIQ and AdoMet (SAM)
Authors	:	Tyndall, J.D.A.; Gee, C.L.; Martin, J.L.
Deposited on	:	2006-02-27
Resolution	:	2.40 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 (i) 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 (i)) were used in the production of this report:

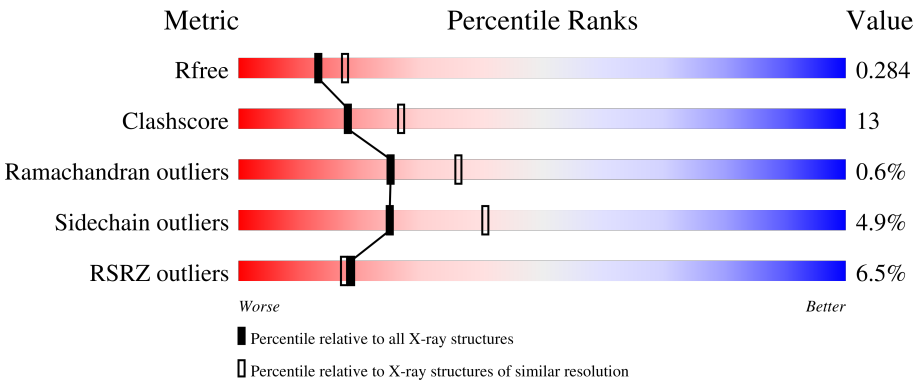
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (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 <=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	289	6% 63% 25% • 10%
1	B	289	6% 69% 21% • 8%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4291 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.

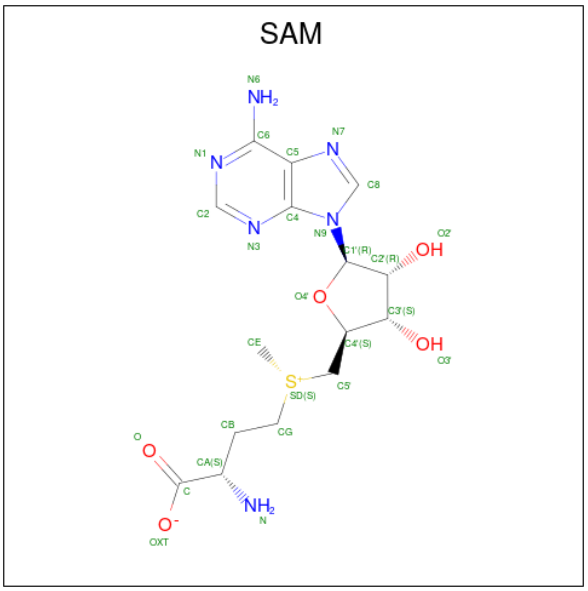
- Molecule 1 is a protein called Phenylethanolamine N-methyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	261	2042	1296	363	374	9	0	0	0
1	B	265	2064	1309	367	379	9	4	0	0

There are 14 discrepancies between the modelled and reference sequences:

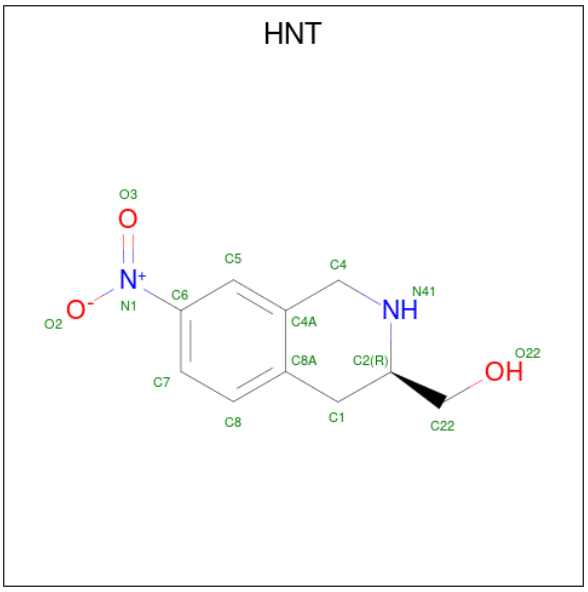
Chain	Residue	Modelled	Actual	Comment	Reference
A	283	GLU	-	expression tag	UNP P11086
A	284	HIS	-	expression tag	UNP P11086
A	285	HIS	-	expression tag	UNP P11086
A	286	HIS	-	expression tag	UNP P11086
A	287	HIS	-	expression tag	UNP P11086
A	288	HIS	-	expression tag	UNP P11086
A	289	HIS	-	expression tag	UNP P11086
B	283	GLU	-	expression tag	UNP P11086
B	284	HIS	-	expression tag	UNP P11086
B	285	HIS	-	expression tag	UNP P11086
B	286	HIS	-	expression tag	UNP P11086
B	287	HIS	-	expression tag	UNP P11086
B	288	HIS	-	expression tag	UNP P11086
B	289	HIS	-	expression tag	UNP P11086

- Molecule 2 is S-ADENOSYLMETHIONINE (three-letter code: SAM) (formula: $C_{15}H_{22}N_6O_5S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	27	15	6	5	1	0	0
2	B	1	27	15	6	5	1	0	0

- Molecule 3 is [(3R)-7-NITRO-1,2,3,4-TETRAHYDROISOQUINOLIN-3-YL]METHANOL (three-letter code: HNT) (formula: $C_{10}H_{12}N_2O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	15	10	2	3	0	0

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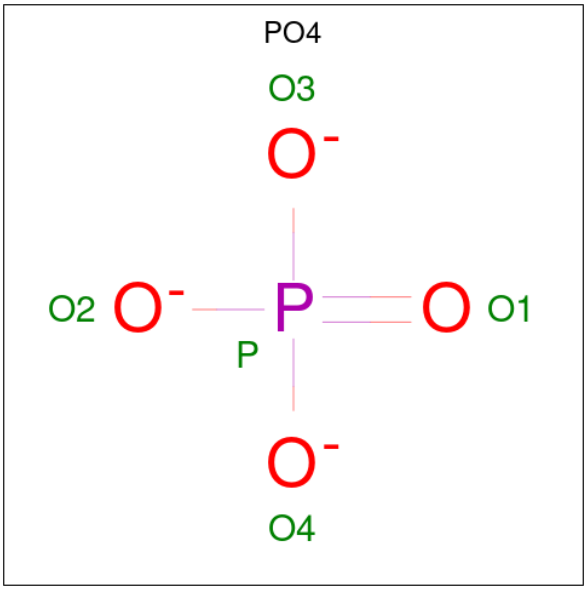
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	15	10	2	3	0	0
3	B	1	15	10	2	3	0	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
4	B	1	5	4	1	0	0

- Molecule 5 is water.

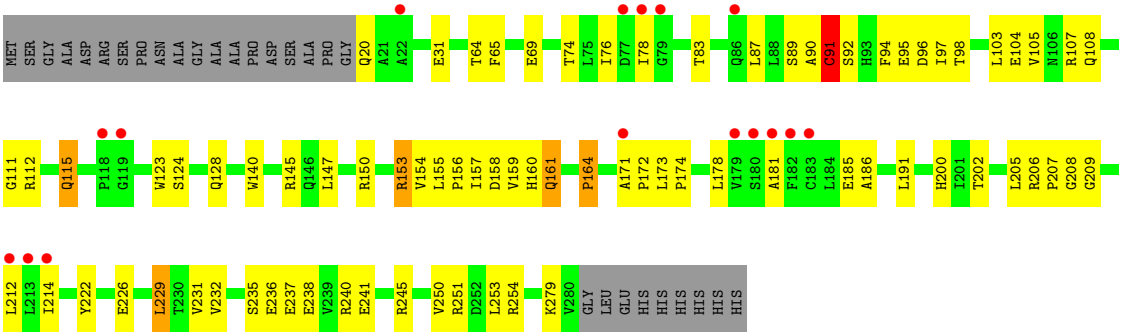
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	37	37	37	0	0
5	B	44	44	44	0	0

3 Residue-property plots (i)

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

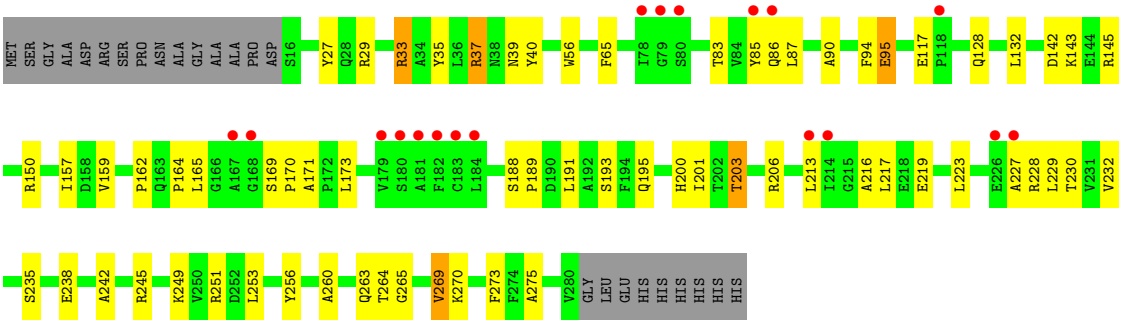
• Molecule 1: Phenylethanolamine N-methyltransferase

Chain A:



• Molecule 1: Phenylethanolamine N-methyltransferase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	94.24Å 94.24Å 187.81Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.80 – 2.40 29.80 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.9 (29.80-2.40) 98.9 (29.80-2.40)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.74 (at 2.39Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.240 , 0.285 0.238 , 0.284	Depositor DCC
R_{free} test set	3339 reflections (9.96%)	wwPDB-VP
Wilson B-factor (Å^2)	53.9	Xtriage
Anisotropy	0.204	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 35.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	4291	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% of the height of the origin peak. No significant pseudotranslation is detected.*

[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, SAM, HNT

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	0.38	0/2093	0.62	0/2849
1	B	0.40	0/2116	0.65	0/2881
All	All	0.39	0/4209	0.64	0/5730

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	2042	0	2010	63	0
1	B	2064	0	2030	50	0
2	A	27	0	22	3	0
2	B	27	0	22	3	0
3	A	30	0	24	5	0
3	B	15	0	12	0	0
4	B	5	0	0	0	0
5	A	37	0	0	1	0
5	B	44	0	0	6	0
All	All	4291	0	4120	112	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 13.

All (112) 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:B:33:ARG:HH11	1:B:33:ARG:HG3	1.05	1.10
1:A:107:ARG:HG2	1:A:154:VAL:HG12	1.44	0.99
1:B:33:ARG:HG3	1:B:33:ARG:NH1	1.85	0.89
1:A:161:GLN:HE21	1:A:161:GLN:HA	1.37	0.88
1:A:76:ILE:HG12	1:A:98:THR:HB	1.63	0.80
1:B:219:GLU:OE1	1:B:269:VAL:HG13	1.83	0.78
1:B:33:ARG:HH11	1:B:33:ARG:CG	1.93	0.77
1:B:200:HIS:O	1:B:203:THR:HB	1.85	0.77
1:A:124:SER:O	1:A:128:GLN:HG3	1.86	0.75
1:B:206:ARG:HD3	5:B:5042:HOH:O	1.86	0.75
1:A:140:TRP:HE1	1:B:128:GLN:HE22	1.38	0.72
1:A:236:GLU:HG2	1:A:253:LEU:HD21	1.74	0.69
1:A:161:GLN:HA	1:A:161:GLN:NE2	2.08	0.67
1:A:250:VAL:HG12	3:A:5003:HNT:H42	1.75	0.67
1:A:253:LEU:HD23	3:A:5003:HNT:O22	1.95	0.66
1:A:161:GLN:HE21	1:A:161:GLN:CA	2.07	0.66
1:A:94:PHE:O	1:A:150:ARG:HD3	1.97	0.64
1:B:263:GLN:O	1:B:265:GLY:N	2.31	0.64
1:B:169:SER:OG	1:B:170:PRO:HD2	1.97	0.64
1:A:111:GLY:O	1:A:115:GLN:HG2	1.97	0.63
1:A:78:ILE:HD11	1:A:178:LEU:HD22	1.82	0.62
1:A:229:LEU:HD22	1:A:229:LEU:N	2.14	0.62
1:A:107:ARG:HG2	1:A:154:VAL:CG1	2.25	0.62
1:B:217:LEU:HD11	1:B:273:PHE:HB3	1.81	0.61
1:A:240:ARG:HD3	3:A:5003:HNT:H222	1.83	0.61
1:A:104:GLU:HG3	1:A:107:ARG:NH2	2.15	0.61
1:B:195:GLN:HE22	1:B:242:ALA:HA	1.66	0.60
1:A:69:GLU:O	1:A:69:GLU:HG2	2.02	0.59
1:B:223:LEU:HD21	1:B:228:ARG:HD2	1.85	0.58
1:A:103:LEU:HB3	1:A:105:VAL:HG22	1.85	0.58
1:A:65:PHE:CZ	1:A:90:ALA:HB2	2.39	0.57
1:A:78:ILE:CD1	1:A:178:LEU:HD22	2.37	0.55
1:A:104:GLU:O	1:A:108:GLN:HG3	2.06	0.55
1:A:140:TRP:HE1	1:B:128:GLN:NE2	2.04	0.55
1:A:107:ARG:CZ	1:A:156:PRO:HG3	2.36	0.55
1:B:37:ARG:CG	1:B:37:ARG:HH11	2.18	0.55
1:A:229:LEU:HD22	1:A:229:LEU:H	1.71	0.54
2:A:2001:SAM:CE	3:A:5001:HNT:H221	2.38	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:35:TYR:CE1	1:B:39:ASN:ND2	2.76	0.53
1:B:157:ILE:HG13	1:B:164:PRO:O	2.10	0.52
1:B:232:VAL:HG13	1:B:232:VAL:O	2.11	0.51
1:A:74:THR:HA	1:A:96:ASP:HB3	1.93	0.50
1:B:260:ALA:HA	1:B:263:GLN:HG3	1.94	0.50
1:A:104:GLU:HG3	1:A:107:ARG:HH21	1.76	0.49
1:A:74:THR:HG21	1:A:172:PRO:HB2	1.94	0.49
1:A:222:TYR:CE1	1:A:229:LEU:HD23	2.48	0.49
1:A:185:GLU:O	1:A:232:VAL:HG12	2.12	0.49
1:A:90:ALA:O	1:A:92:SER:N	2.46	0.49
1:B:37:ARG:HG3	1:B:37:ARG:NH1	2.28	0.48
2:A:2001:SAM:HE1	3:A:5001:HNT:H221	1.94	0.48
1:B:65:PHE:CZ	1:B:90:ALA:HB2	2.48	0.48
1:B:189:PRO:HD2	1:B:193:SER:CB	2.43	0.48
1:A:237:GLU:O	1:A:241:GLU:HG3	2.13	0.48
1:A:157:ILE:HG12	1:A:158:ASP:N	2.30	0.47
1:B:86:GLN:HG2	1:B:87:LEU:HG	1.97	0.47
1:B:253:LEU:HD13	1:B:275:ALA:HB2	1.96	0.47
1:A:173:LEU:HA	1:A:174:PRO:C	2.35	0.47
1:A:74:THR:HA	1:A:96:ASP:O	2.15	0.46
1:A:64:THR:HG21	1:A:212:LEU:HD11	1.97	0.46
1:A:83:THR:HA	1:A:123:TRP:CZ2	2.51	0.46
1:A:164:PRO:HG3	1:A:200:HIS:HB3	1.97	0.46
1:B:37:ARG:CG	1:B:37:ARG:NH1	2.76	0.46
1:B:95:GLU:HB3	5:B:5030:HOH:O	2.15	0.46
1:B:165:LEU:HB2	5:B:5040:HOH:O	2.16	0.46
1:B:188:SER:HA	1:B:189:PRO:HD3	1.73	0.46
1:A:171:ALA:HA	1:A:172:PRO:HD3	1.86	0.46
1:A:235:SER:OG	1:A:238:GLU:HG3	2.16	0.45
1:A:76:ILE:HG22	1:A:78:ILE:HD12	1.97	0.45
1:B:94:PHE:O	1:B:150:ARG:HD3	2.16	0.45
1:B:143:LYS:HD3	5:B:5015:HOH:O	2.15	0.45
1:A:91:CYS:HA	1:A:97:ILE:HD11	1.97	0.45
1:A:207:PRO:C	1:A:209:GLY:H	2.20	0.45
1:B:162:PRO:HD2	5:B:5010:HOH:O	2.17	0.44
1:B:216:ALA:HB1	1:B:269:VAL:CG1	2.48	0.44
1:A:206:ARG:NH1	1:A:207:PRO:O	2.49	0.44
1:B:33:ARG:NH1	1:B:33:ARG:CG	2.61	0.44
1:B:142:ASP:HA	1:B:145:ARG:NH1	2.33	0.44
1:A:91:CYS:O	1:A:150:ARG:HD2	2.18	0.44
1:B:249:LYS:HE3	1:B:251:ARG:HD3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:87:LEU:O	1:A:91:CYS:HB3	2.18	0.43
1:B:142:ASP:OD1	1:B:145:ARG:NH1	2.46	0.43
1:B:83:THR:OG1	2:B:2002:SAM:HA	2.19	0.43
1:A:69:GLU:CD	1:A:251:ARG:HH22	2.21	0.43
1:B:270:LYS:HA	1:B:270:LYS:HD3	1.75	0.43
1:A:128:GLN:HG2	1:A:140:TRP:CD1	2.54	0.43
1:A:140:TRP:NE1	1:B:128:GLN:NE2	2.67	0.43
1:A:159:VAL:HG13	2:A:2001:SAM:H2	2.00	0.43
1:A:202:THR:HG22	1:A:202:THR:O	2.19	0.42
1:A:91:CYS:HB3	1:A:147:LEU:HD13	2.00	0.42
1:A:208:GLY:N	1:A:279:LYS:O	2.43	0.42
1:B:56:TRP:CE2	1:B:256:TYR:HB2	2.54	0.42
1:A:145:ARG:HH11	1:A:145:ARG:HG3	1.84	0.42
1:A:254:ARG:HG2	5:A:5025:HOH:O	2.18	0.42
1:A:158:ASP:OD1	1:A:160:HIS:HB2	2.20	0.42
1:A:186:ALA:HA	1:A:231:VAL:HG13	2.02	0.42
1:B:171:ALA:O	1:B:173:LEU:HG	2.20	0.42
1:A:153:ARG:NH1	1:A:172:PRO:HD3	2.35	0.42
1:B:213:LEU:HD11	5:B:5024:HOH:O	2.20	0.41
1:A:181:ALA:HA	1:A:214:ILE:O	2.20	0.41
1:B:40:TYR:OH	2:B:2002:SAM:OXT	2.26	0.41
1:B:27:TYR:CZ	1:B:229:LEU:HD22	2.56	0.41
1:B:29:ARG:CB	1:B:227:ALA:HB2	2.50	0.41
1:B:159:VAL:HG22	2:B:2002:SAM:N1	2.36	0.41
1:B:235:SER:OG	1:B:238:GLU:HG3	2.21	0.41
1:B:229:LEU:N	1:B:229:LEU:HD12	2.36	0.41
1:A:155:LEU:HA	1:A:156:PRO:HD3	1.93	0.40
1:A:178:LEU:HG	1:A:205:LEU:HD13	2.03	0.40
1:A:31:GLU:OE2	1:A:226:GLU:HG3	2.21	0.40
1:A:76:ILE:HB	1:A:178:LEU:CD2	2.51	0.40
1:B:189:PRO:HD2	1:B:193:SER:OG	2.22	0.40
1:B:201:ILE:C	1:B:203:THR:N	2.73	0.40
1:B:85:TYR:CG	1:B:86:GLN:N	2.89	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	259/289 (90%)	237 (92%)	20 (8%)	2 (1%)	19	29
1	B	263/289 (91%)	250 (95%)	12 (5%)	1 (0%)	34	48
All	All	522/578 (90%)	487 (93%)	32 (6%)	3 (1%)	25	36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	264	THR
1	A	91	CYS
1	A	245	ARG

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	214/233 (92%)	203 (95%)	11 (5%)	24	39
1	B	216/233 (93%)	206 (95%)	10 (5%)	27	43
All	All	430/466 (92%)	409 (95%)	21 (5%)	25	40

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	GLN
1	A	89	SER
1	A	91	CYS

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Mol	Chain	Res	Type
1	A	95	GLU
1	A	112	ARG
1	A	115	GLN
1	A	153	ARG
1	A	161	GLN
1	A	164	PRO
1	A	191	LEU
1	A	229	LEU
1	B	33	ARG
1	B	37	ARG
1	B	95	GLU
1	B	117	GLU
1	B	132	LEU
1	B	191	LEU
1	B	203	THR
1	B	230	THR
1	B	245	ARG
1	B	269	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	GLN
1	A	108	GLN
1	A	128	GLN
1	A	161	GLN
1	A	278	GLN
1	B	20	GLN
1	B	49	ASN
1	B	93	HIS
1	B	128	GLN
1	B	163	GLN
1	B	195	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	HNT	B	5002	-	15,16,16	3.32	2 (13%)	17,22,22	1.21	2 (11%)
3	HNT	A	5003	-	15,16,16	3.34	2 (13%)	17,22,22	0.97	0
3	HNT	A	5001	-	15,16,16	3.31	2 (13%)	17,22,22	1.11	2 (11%)
4	PO4	B	502	-	4,4,4	1.64	0	6,6,6	0.44	0
2	SAM	A	2001	-	24,29,29	0.87	1 (4%)	23,42,42	1.35	3 (13%)
2	SAM	B	2002	-	24,29,29	0.92	1 (4%)	23,42,42	1.34	3 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	HNT	B	5002	-	-	2/4/15/15	0/2/2/2
3	HNT	A	5003	-	-	0/4/15/15	0/2/2/2
3	HNT	A	5001	-	-	0/4/15/15	0/2/2/2
2	SAM	A	2001	-	-	2/12/33/33	0/3/3/3
2	SAM	B	2002	-	-	2/12/33/33	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	5003	HNT	O3-N1	11.70	1.42	1.22
3	B	5002	HNT	O3-N1	11.66	1.42	1.22
3	A	5001	HNT	O3-N1	11.64	1.42	1.22
3	B	5002	HNT	C6-N1	-4.88	1.33	1.45
3	A	5003	HNT	C6-N1	-4.85	1.33	1.45
3	A	5001	HNT	C6-N1	-4.74	1.33	1.45
2	A	2001	SAM	C2-N3	2.38	1.35	1.32
2	B	2002	SAM	C2-N3	2.32	1.35	1.32

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	2001	SAM	CG-SD-C5'	3.29	111.80	103.40
2	B	2002	SAM	C4-C5-N7	3.21	112.75	109.40
2	A	2001	SAM	C4-C5-N7	3.19	112.72	109.40
2	B	2002	SAM	CG-SD-C5'	3.14	111.41	103.40
3	B	5002	HNT	C22-C2-N41	2.69	112.00	109.17
2	B	2002	SAM	C5-C6-N6	2.51	124.17	120.35
3	A	5001	HNT	C22-C2-N41	2.41	111.70	109.17
2	A	2001	SAM	C5-C6-N6	2.28	123.81	120.35
3	B	5002	HNT	C5-C6-N1	2.21	120.69	118.75
3	A	5001	HNT	C5-C6-N1	2.02	120.52	118.75

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	2001	SAM	CB-CG-SD-CE
2	A	2001	SAM	CB-CG-SD-C5'
2	B	2002	SAM	CB-CG-SD-CE
2	B	2002	SAM	CB-CG-SD-C5'
3	B	5002	HNT	C1-C2-C22-O22
3	B	5002	HNT	N41-C2-C22-O22

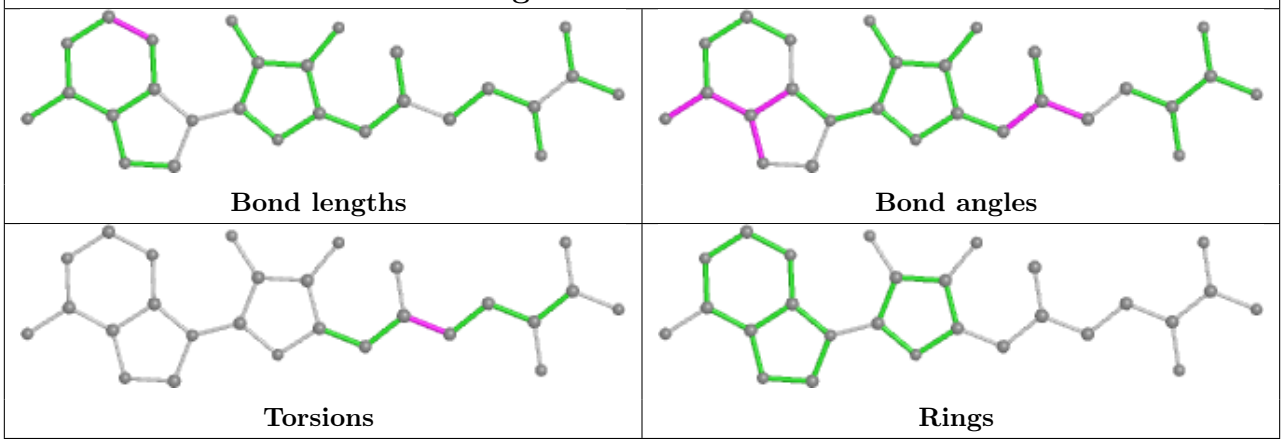
There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5003	HNT	3	0
3	A	5001	HNT	2	0
2	A	2001	SAM	3	0
2	B	2002	SAM	3	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 SAM A 2001



Ligand SAM B 2002

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	261/289 (90%)	0.06	16 (6%)	21	20	36, 62, 87, 103	10 (3%)
1	B	265/289 (91%)	-0.00	18 (6%)	17	15	38, 56, 77, 91	8 (3%)
All	All	526/578 (91%)	0.03	34 (6%)	18	17	36, 58, 83, 103	18 (3%)

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	227	ALA	6.8
1	B	181	ALA	4.8
1	A	181	ALA	4.6
1	B	214	ILE	4.3
1	B	168	GLY	4.3
1	A	183	CYS	4.0
1	B	80	SER	3.9
1	B	180	SER	3.9
1	A	179	VAL	3.4
1	A	119	GLY	3.4
1	A	182	PHE	3.3
1	A	118	PRO	3.2
1	B	183	CYS	3.0
1	A	180	SER	2.9
1	B	213	LEU	2.8
1	B	226	GLU	2.7
1	A	22	ALA	2.7
1	B	86	GLN	2.6
1	A	213	LEU	2.5
1	B	179	VAL	2.5
1	B	79	GLY	2.5
1	B	85	TYR	2.5
1	B	78	ILE	2.5
1	B	118	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	86	GLN	2.5
1	A	79	GLY	2.5
1	B	182	PHE	2.4
1	A	77	ASP	2.3
1	A	214	ILE	2.3
1	B	184	LEU	2.2
1	A	212	LEU	2.2
1	B	167	ALA	2.2
1	A	78	ILE	2.2
1	A	171	ALA	2.1

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 monosaccharides in this entry.

6.4 Ligands (i)

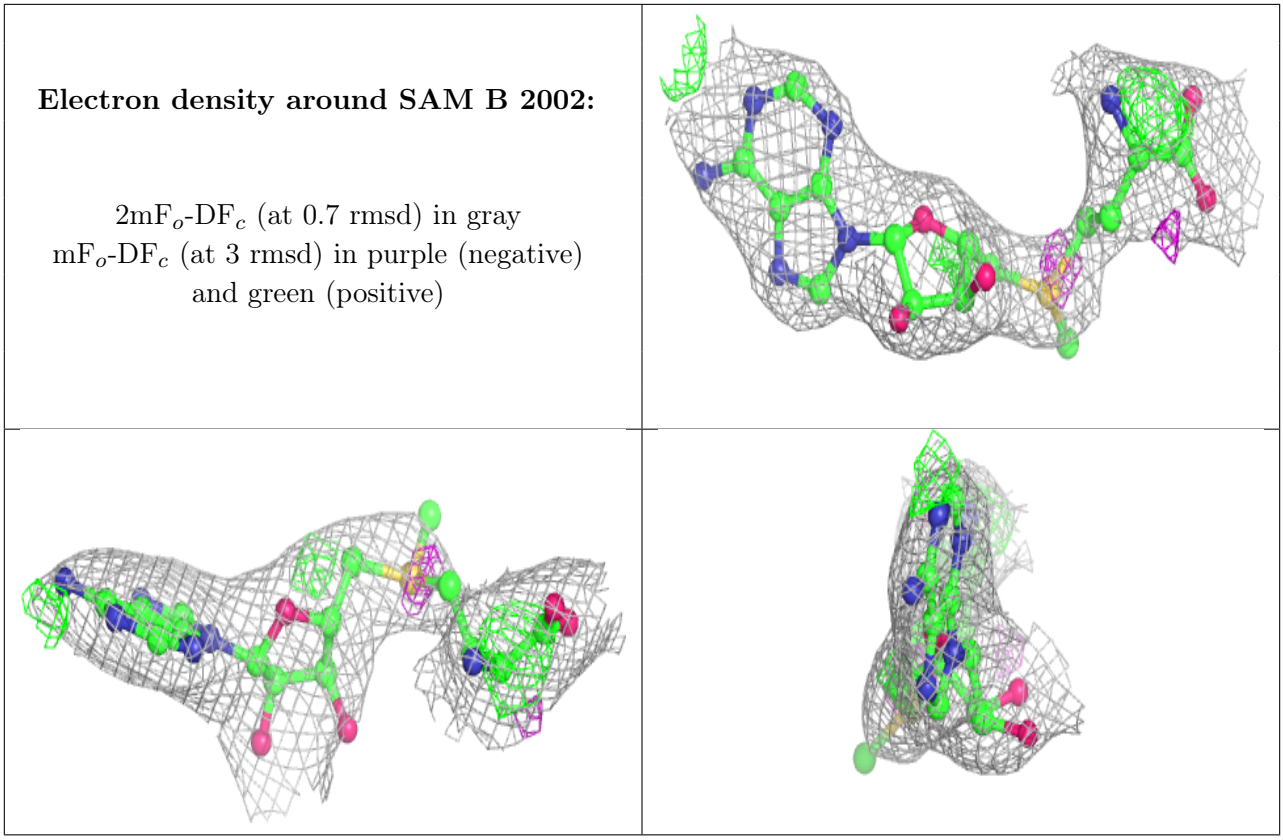
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	PO4	B	502	5/5	0.82	0.29	158,158,158,158	0
2	SAM	B	2002	27/27	0.85	0.25	56,58,66,72	0
2	SAM	A	2001	27/27	0.86	0.27	67,81,85,86	0
3	HNT	A	5003	15/15	0.90	0.21	97,98,101,103	0
3	HNT	B	5002	15/15	0.93	0.23	58,59,66,69	0
3	HNT	A	5001	15/15	0.93	0.23	55,57,60,60	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.

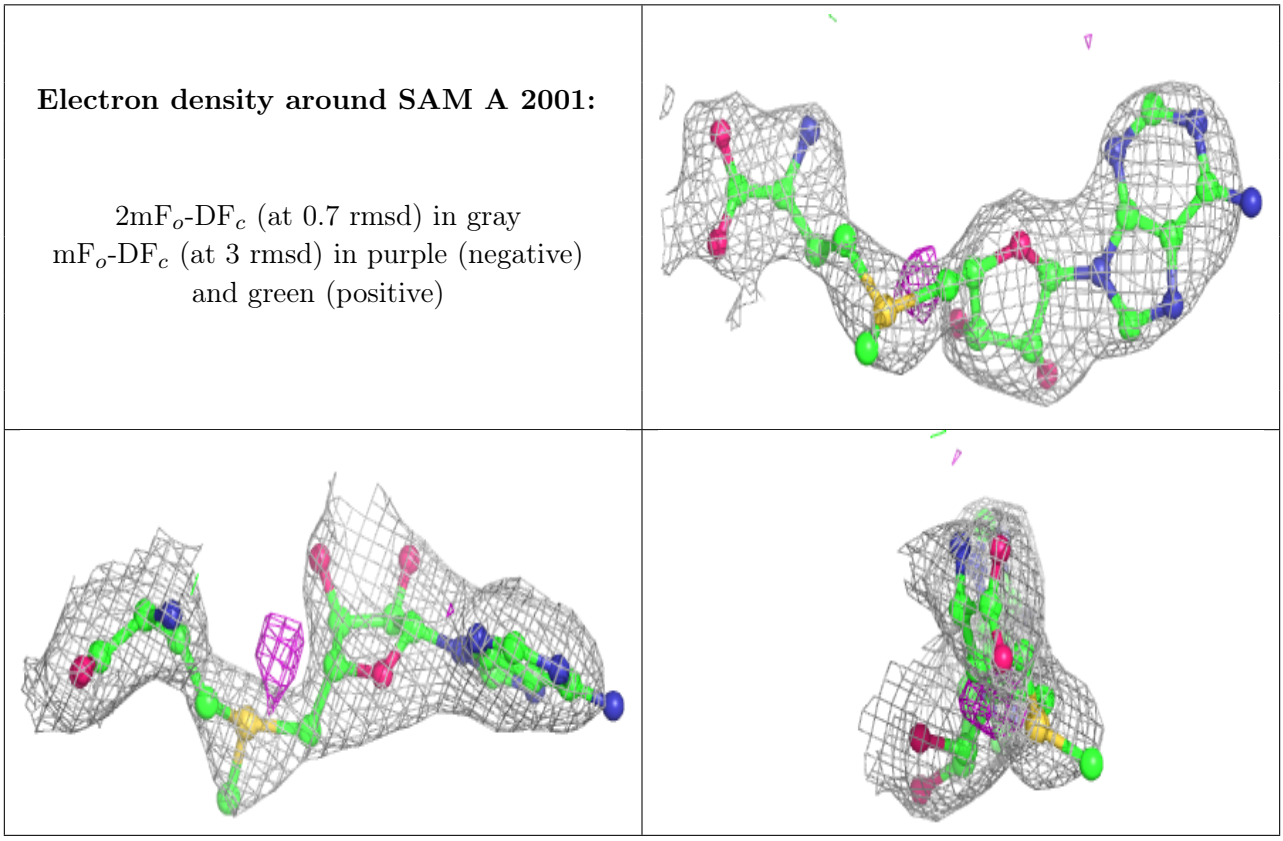
Electron density around SAM B 2002:

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



Electron density around SAM A 2001:

$2mF_o$-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.