



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 21, 2026 – 12:54 PM JST

PDB ID : 21CG / pdb_000021cg
Title : Crystal structure of sulX in complex with FMN and sulfanilamide
Authors : Hu, Y.M.; Liu, W.H.; Zhang, Q.S.; Gao, Z.D.; Zhang, H.L.; Li, H.; Dai, L.H.
Deposited on : 2025-12-07
Resolution : 2.83 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 : 1.8.5 (274361), CSD as541be (2020)
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 : 9.0.015 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

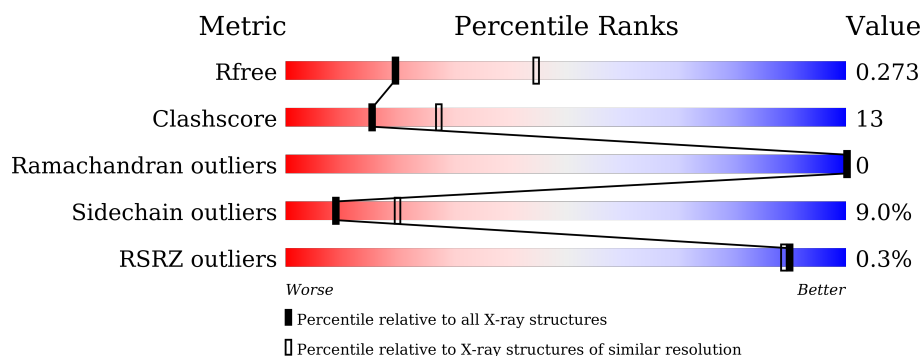
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.83 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	1520 (2.86-2.82)
Clashscore	190562	1559 (2.86-2.82)
Ramachandran outliers	187476	1517 (2.86-2.82)
Sidechain outliers	187428	1518 (2.86-2.82)
RSRZ outliers	180081	1521 (2.86-2.82)

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	423	

2 Entry composition [i](#)

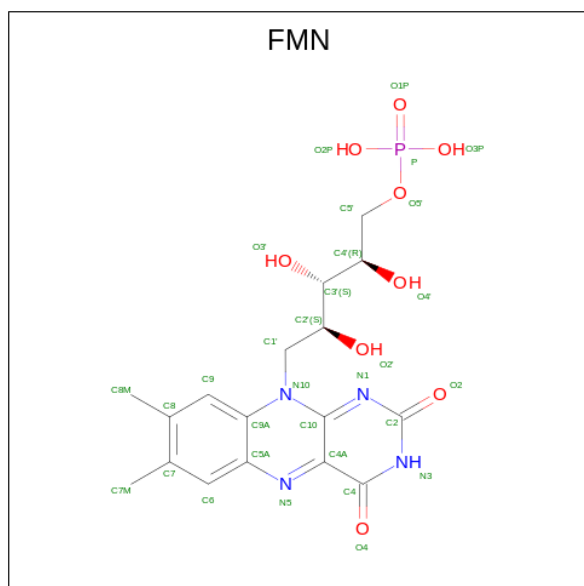
There are 5 unique types of molecules in this entry. The entry contains 3079 atoms, of which 0 are hydrogens and 0 are deuteriums.

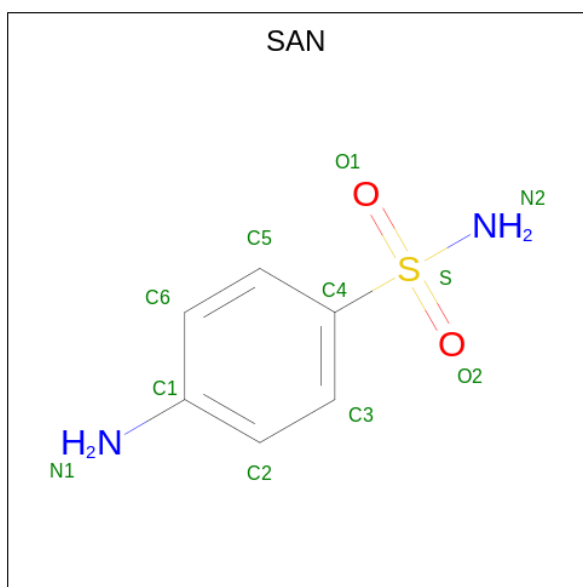
In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Sulfonamide monooxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	394	Total	C	N	O	S	0	0	0
			3017	1886	531	590	10			

- Molecule 2 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$) (labeled as "Ligand of Interest" by depositor).





Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			11	6	2	2	1		

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	3	Total	Zn	0	0
			3	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	17	Total	O	0	0
			17	17		

- Molecule 1: Sulfonamide monooxygenase

D331	D203	F87	MET
D332	T206	Q88	VAL
V337	E208	T93	TYR
T338	D209	L97	GLN
N339		T98	ARG
R340	R217	A99	GLY
G341	G226	I100	ILE
Q342	T227	I101	GLN
I343	E228	A102	MET
D344		R103	LYS
			SER
R348	R235	A113	VAL
I351	D240	S117	GLN
		M118	SER
S355	V243	I133	THR
T371	D253		ALA
A372	E254	N137	ALA
G374	T259	P138	ASP
S375	P260	R139	GLY
	G262	A140	GLY
L384	L261	R141	GLY
	G263	T142	HIS
D390	H264	T143	SER
	F265	V144	PHE
H397	V270	N147	VAL
V400		P148	PRO
V401	G275	A149	E30
V402			I31
G403	Q278	T153	S32
V404	A284	K158	N35
S405	L285	V159	L36
K406		G162	I49
V409	L288		A53
	P289	I165	P54
S412	V293	S173	D57
L413	T294		R60
E418	V295	L176	R61
M421	T296	Q179	
F422	K297	W180	D68
I423	Y298	V181	E71
	S302	N182	E72
			L73
	N316	D186	D74
	D319	I189	Q77
	T320		
A321	R322	A192	T80
R322		P193	P81
		V194	R82
	R327	R195	R83

4 Data and refinement statistics

Property	Value	Source
Space group	P 62 2 2	Depositor
Cell constants a, b, c, α , β , γ	134.18Å 134.18Å 139.76Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	24.96 – 2.83 24.96 – 2.83	Depositor EDS
% Data completeness (in resolution range)	94.9 (24.96-2.83) 95.0 (24.96-2.83)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.19 (at 2.84Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.200 , 0.274 0.213 , 0.273	Depositor DCC
R_{free} test set	852 reflections (4.65%)	wwPDB-VP
Wilson B-factor (Å ²)	83.9	Xtriage
Anisotropy	0.605	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 57.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3079	wwPDB-VP
Average B, all atoms (Å ²)	113.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% 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

5.1 Standard geometry

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

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	1.13	1/3078 (0.0%)	1.60	14/4192 (0.3%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	343	ILE	C-O	5.70	1.30	1.24

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	80	THR	CB-CA-C	9.25	122.85	109.26
1	A	390	ASP	CA-CB-CG	5.98	118.58	112.60
1	A	331	ASP	CA-CB-CG	5.96	118.56	112.60
1	A	344	ASP	CA-CB-CG	5.85	118.45	112.60
1	A	344	ASP	CB-CA-C	5.63	121.22	109.68
1	A	226	GLY	CA-C-O	-5.51	116.30	120.76
1	A	371	THR	CA-CB-OG1	-5.48	101.39	109.60
1	A	322	ARG	N-CA-C	-5.37	105.59	111.82
1	A	319	ASP	N-CA-C	-5.23	105.58	111.28
1	A	285	LEU	CA-C-N	5.14	127.59	120.29
1	A	285	LEU	C-N-CA	5.14	127.59	120.29
1	A	409	TYR	N-CA-C	-5.05	105.86	111.36
1	A	203	ASP	CA-CB-CG	5.02	117.62	112.60
1	A	217	ARG	N-CA-C	-5.01	105.82	111.28

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3017	0	2926	80	1
2	A	31	0	19	3	0
3	A	11	0	8	0	0
4	A	3	0	0	0	0
5	A	17	0	0	0	0
All	All	3079	0	2953	81	1

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 (81) 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:401:ASN:ND2	1:A:404:VAL:HB	1.51	1.22
1:A:401:ASN:ND2	1:A:404:VAL:CB	2.20	1.04
1:A:401:ASN:HD21	1:A:404:VAL:H	1.06	1.01
1:A:401:ASN:ND2	1:A:404:VAL:H	1.65	0.93
1:A:77:GLN:HA	1:A:80:THR:CG2	2.06	0.85
1:A:401:ASN:HD21	1:A:404:VAL:N	1.76	0.82
1:A:401:ASN:ND2	1:A:404:VAL:N	2.28	0.81
1:A:293:VAL:O	1:A:296:THR:HB	1.86	0.76
1:A:293:VAL:HB	1:A:296:THR:HG21	1.68	0.74
1:A:401:ASN:HD21	1:A:404:VAL:CB	1.99	0.73
1:A:401:ASN:HD22	1:A:404:VAL:HB	1.54	0.73
1:A:77:GLN:HA	1:A:80:THR:HG22	1.72	0.70
1:A:401:ASN:HD21	1:A:404:VAL:HG23	1.59	0.68
1:A:337:VAL:HG12	1:A:338:THR:HG23	1.74	0.68
1:A:263:PRO:HB3	1:A:351:ILE:HG21	1.76	0.67
1:A:61:ARG:HD2	1:A:176:LEU:HD13	1.76	0.67
1:A:74:ASP:OD1	1:A:139:ARG:NH2	2.23	0.67
1:A:296:THR:HG22	1:A:298:TYR:H	1.61	0.64
1:A:401:ASN:ND2	1:A:404:VAL:CG2	2.60	0.64
1:A:397:HIS:HB3	1:A:400:VAL:HG23	1.81	0.63
1:A:401:ASN:HD21	1:A:404:VAL:CG2	2.09	0.63
1:A:60:ARG:NH2	1:A:209:ASP:OD1	2.32	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:348:ARG:NH2	1:A:423:ILE:O	2.33	0.62
1:A:228:GLU:HA	1:A:228:GLU:OE2	2.01	0.60
1:A:137:ASN:HD21	1:A:139:ARG:HB2	1.64	0.60
1:A:270:VAL:HG11	1:A:355:SER:O	2.03	0.59
1:A:278:GLN:OE1	1:A:322:ARG:NH2	2.29	0.58
1:A:401:ASN:ND2	1:A:401:ASN:O	2.37	0.57
1:A:401:ASN:ND2	1:A:404:VAL:CA	2.68	0.56
1:A:327:ARG:HD2	1:A:327:ARG:C	2.30	0.56
1:A:83:ARG:NE	1:A:254:GLU:OE1	2.35	0.55
1:A:77:GLN:HA	1:A:80:THR:HG23	1.85	0.55
1:A:401:ASN:HB3	1:A:421:MET:HE1	1.88	0.54
1:A:293:VAL:HB	1:A:296:THR:CG2	2.38	0.53
1:A:397:HIS:CE1	2:A:501:FMN:H2'	2.44	0.53
1:A:173:SER:HB2	2:A:501:FMN:O4	2.09	0.53
1:A:100:GLU:O	1:A:103:ARG:HB2	2.09	0.52
1:A:87:PHE:O	1:A:88:GLN:C	2.53	0.51
1:A:158:LYS:HE3	1:A:162:GLY:O	2.11	0.51
1:A:102:ALA:HB3	1:A:275:GLY:HA3	1.93	0.50
1:A:35:ASN:HD22	1:A:36:LEU:N	2.10	0.50
1:A:71:GLU:OE2	1:A:71:GLU:HA	2.11	0.49
1:A:409:TYR:CE2	1:A:413:LEU:HD11	2.47	0.49
1:A:35:ASN:HD22	1:A:35:ASN:C	2.20	0.49
1:A:53:ALA:HB3	1:A:54:PRO:HD3	1.94	0.49
1:A:118:ASN:ND2	1:A:144:TRP:HB3	2.29	0.48
1:A:243:VAL:O	1:A:348:ARG:NH2	2.47	0.48
1:A:401:ASN:CG	1:A:404:VAL:HB	2.30	0.48
1:A:49:ILE:HD13	1:A:101:ILE:HG23	1.94	0.48
1:A:186:ASP:OD1	1:A:195:ARG:HD2	2.14	0.48
1:A:409:TYR:CZ	1:A:413:LEU:HD11	2.48	0.48
1:A:289:PRO:HA	1:A:302:SER:OG	2.14	0.47
1:A:401:ASN:ND2	1:A:404:VAL:HG23	2.26	0.47
1:A:259:THR:HA	1:A:341:GLY:O	2.14	0.46
1:A:143:THR:HG23	1:A:181:VAL:HG23	1.96	0.46
1:A:288:LEU:N	1:A:289:PRO:CD	2.79	0.46
1:A:133:ILE:HG12	1:A:180:TRP:CD2	2.51	0.45
1:A:32:SER:HA	1:A:333:ASP:OD2	2.16	0.45
1:A:337:VAL:HG12	1:A:338:THR:CG2	2.42	0.45
1:A:179:GLN:CD	1:A:179:GLN:N	2.76	0.43
1:A:207:LEU:HD23	1:A:207:LEU:HA	1.90	0.43
1:A:316:ASN:ND2	1:A:316:ASN:C	2.77	0.43
1:A:348:ARG:CZ	1:A:423:ILE:O	2.67	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:261:LEU:HD11	1:A:265:PHE:CE2	2.53	0.43
1:A:98:THR:CG2	1:A:113:ALA:HB2	2.49	0.43
1:A:148:PRO:O	1:A:149:ALA:C	2.62	0.43
1:A:189:ILE:O	1:A:192:ALA:O	2.37	0.42
1:A:294:THR:HG22	1:A:295:TYR:CD1	2.54	0.42
2:A:501:FMN:H9	2:A:501:FMN:H1'2	1.87	0.42
1:A:260:PRO:HD3	1:A:341:GLY:O	2.20	0.42
1:A:402:VAL:O	1:A:406:LYS:HG3	2.19	0.42
1:A:53:ALA:N	1:A:54:PRO:HD2	2.35	0.42
1:A:296:THR:CG2	1:A:298:TYR:HB2	2.49	0.42
1:A:118:ASN:ND2	1:A:144:TRP:CB	2.82	0.42
1:A:80:THR:HA	1:A:81:PRO:HD3	1.89	0.42
1:A:98:THR:HG23	1:A:113:ALA:HB2	2.02	0.42
1:A:100:GLU:OE1	1:A:103:ARG:NH1	2.54	0.41
1:A:339:ASN:HD22	1:A:342:GLN:HB2	1.85	0.41
1:A:158:LYS:C	1:A:159:VAL:HG13	2.46	0.40
1:A:181:VAL:HG22	1:A:182:ASN:N	2.36	0.40
1:A:284:ALA:HA	1:A:373:ILE:HD11	2.02	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:68:ASP:OD2	1:A:68:ASP:OD2[10_444]	1.79	0.41

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	392/423 (93%)	373 (95%)	19 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	311/334 (93%)	283 (91%)	28 (9%)	9 20

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	ILE
1	A	57	ASP
1	A	80	THR
1	A	82	ARG
1	A	93	THR
1	A	97	LEU
1	A	117	SER
1	A	141	ARG
1	A	147	ASN
1	A	153	THR
1	A	165	ILE
1	A	189	ILE
1	A	194	VAL
1	A	206	THR
1	A	207	LEU
1	A	227	THR
1	A	235	ARG
1	A	240	ASP
1	A	253	ASP
1	A	296	THR
1	A	316	ASN
1	A	320	THR
1	A	337	VAL
1	A	344	ASP
1	A	375	SER
1	A	384	LEU
1	A	412	SER
1	A	418	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	35	ASN
1	A	77	GLN
1	A	137	ASN
1	A	264	ASN
1	A	266	ASN
1	A	316	ASN
1	A	342	GLN
1	A	401	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 3 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	$\# Z > 2$
2	FMN	A	501	-	33,33,33	1.54	5 (15%)	48,50,50	1.96	14 (29%)
3	SAN	A	502	-	11,11,11	3.00	4 (36%)	16,16,16	1.73	4 (25%)

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	FMN	A	501	-	-	5/18/18/18	0/3/3/3
3	SAN	A	502	-	-	0/6/6/6	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502	SAN	O2-S	6.50	1.55	1.43
3	A	502	SAN	O1-S	4.68	1.52	1.43
2	A	501	FMN	C9A-C5A	4.57	1.48	1.41
3	A	502	SAN	S-N2	4.30	1.68	1.60
2	A	501	FMN	C8-C7	3.35	1.49	1.40
2	A	501	FMN	C4A-N5	2.56	1.35	1.30
2	A	501	FMN	C4-N3	-2.44	1.34	1.38
3	A	502	SAN	C3-C4	2.16	1.42	1.38
2	A	501	FMN	P-O1P	2.04	1.57	1.50

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	FMN	C4-C4A-N5	6.15	126.98	118.23
2	A	501	FMN	O2P-P-O5'	-4.54	94.64	106.73
2	A	501	FMN	O2-C2-N1	-3.58	115.89	121.83
3	A	502	SAN	C4-S-N2	3.58	113.44	108.38
2	A	501	FMN	C4A-C10-N10	3.37	121.41	116.48
3	A	502	SAN	O2-S-N2	3.33	112.30	107.36
2	A	501	FMN	C10-C4A-N5	-3.33	117.79	124.86
2	A	501	FMN	O2P-P-O1P	3.00	122.41	110.68
3	A	502	SAN	O1-S-N2	-2.79	103.22	107.36
2	A	501	FMN	C5A-N5-C4A	2.61	122.41	118.07
2	A	501	FMN	C10-N1-C2	2.40	121.70	116.90
2	A	501	FMN	O2'-C2'-C3'	2.35	114.81	109.10
2	A	501	FMN	C6-C5A-N5	2.27	122.47	118.51
3	A	502	SAN	O2-S-O1	-2.26	115.04	118.76
2	A	501	FMN	C9-C8-C7	-2.13	116.61	119.67
2	A	501	FMN	C4A-C10-N1	-2.07	119.92	124.73
2	A	501	FMN	C9A-C9-C8	2.07	123.47	119.30
2	A	501	FMN	C8M-C8-C7	2.02	124.88	120.74

There are no chirality outliers.

All (5) torsion outliers are listed below:

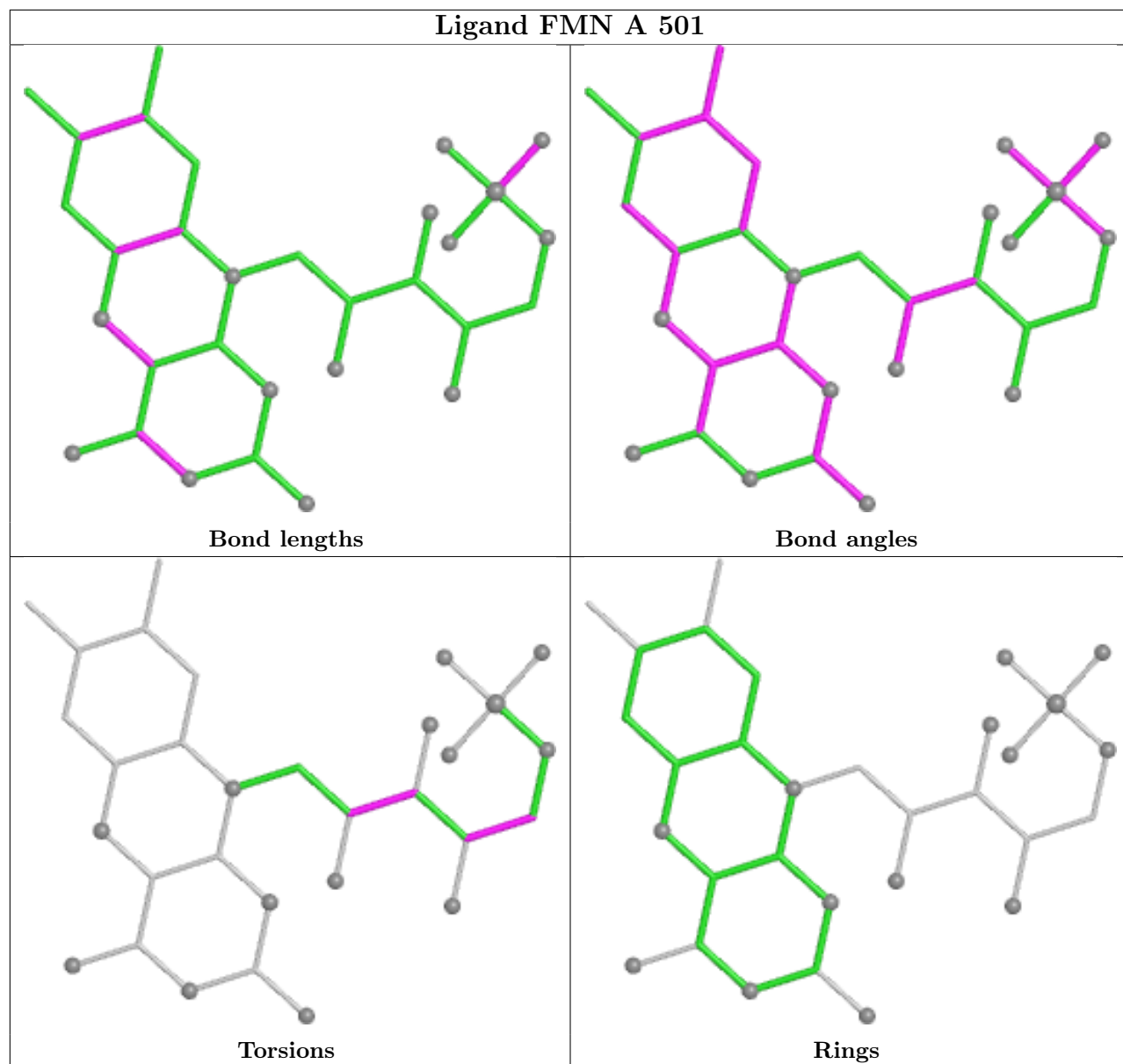
Mol	Chain	Res	Type	Atoms
2	A	501	FMN	C1'-C2'-C3'-O3'
2	A	501	FMN	O2'-C2'-C3'-O3'
2	A	501	FMN	C1'-C2'-C3'-C4'
2	A	501	FMN	C3'-C4'-C5'-O5'
2	A	501	FMN	O4'-C4'-C5'-O5'

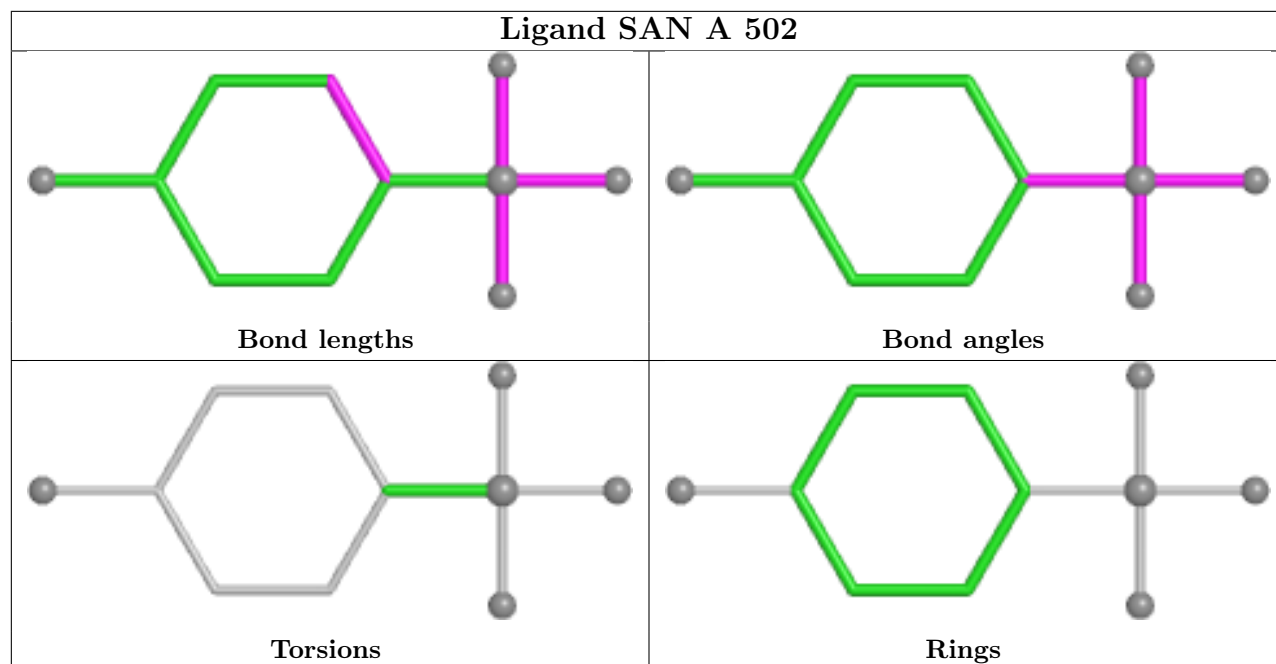
There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	FMN	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 than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	394/423 (93%)	-0.49	1 (0%) 90 89	84, 108, 154, 197	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	72	GLU	2.4

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.

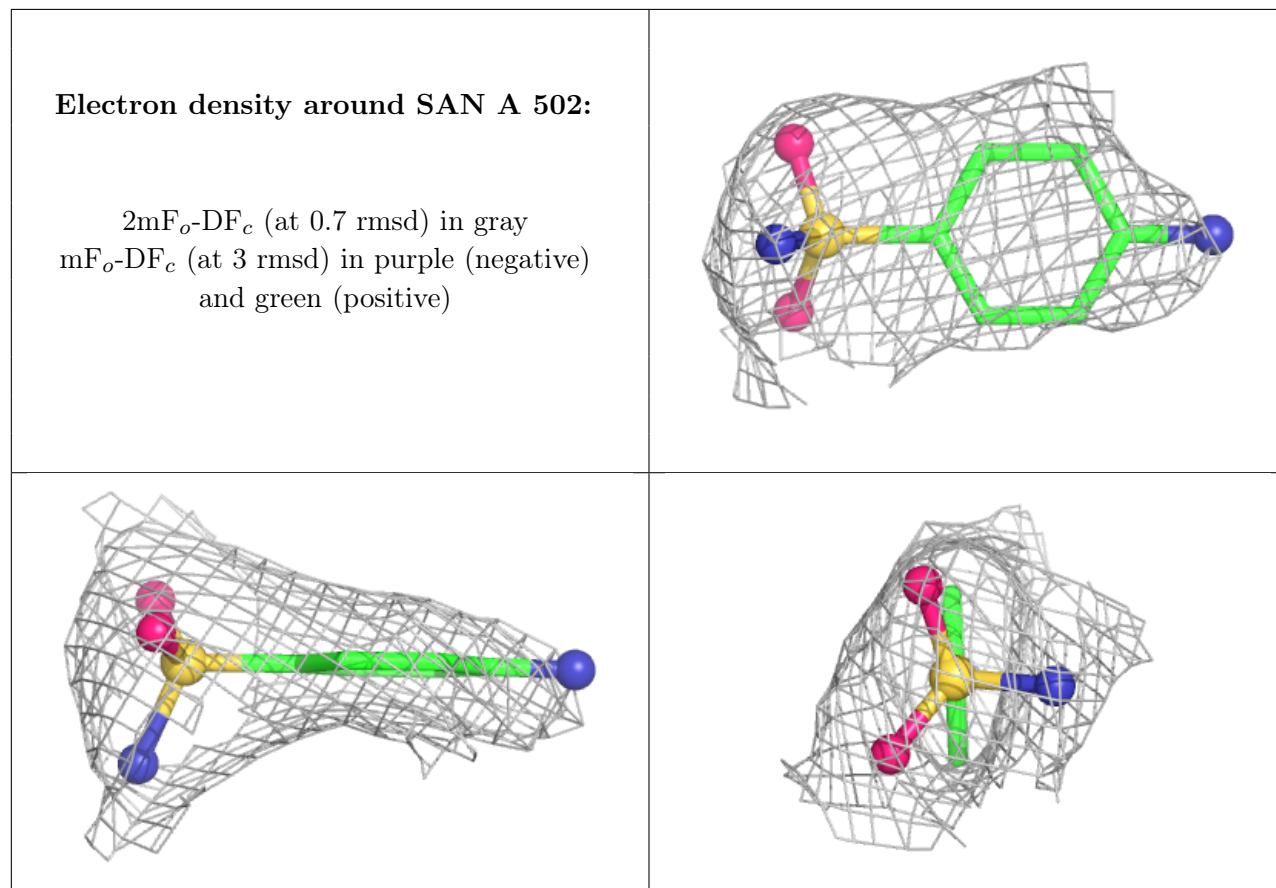
6.4 Ligands [i](#)

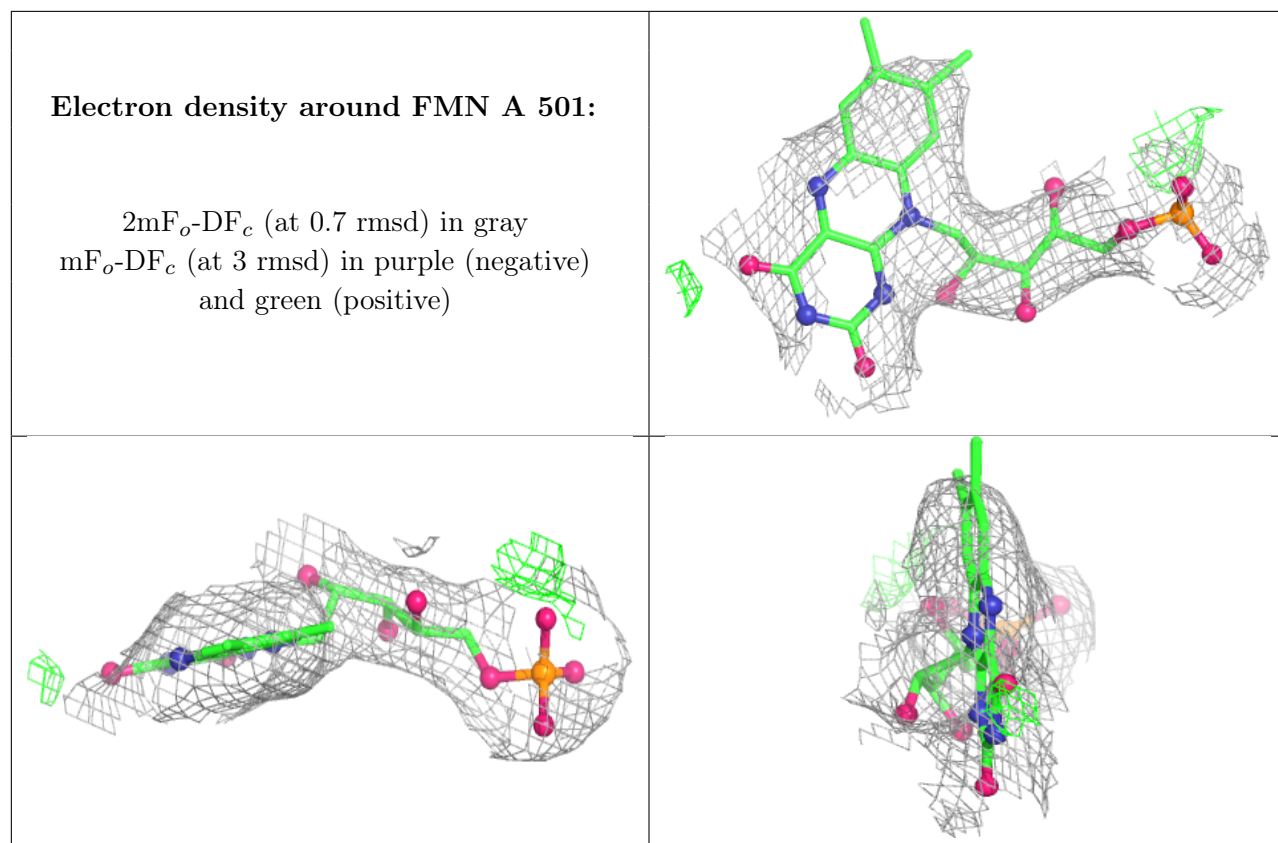
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	ZN	A	503	1/1	0.37	0.29	144,144,144,144	0
4	ZN	A	504	1/1	0.91	0.07	152,152,152,152	0
4	ZN	A	505	1/1	0.91	0.12	118,118,118,118	0
3	SAN	A	502	11/11	0.92	0.09	109,127,143,145	0
2	FMN	A	501	31/31	0.94	0.08	92,114,134,141	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.