



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 5, 2023 – 05:58 AM EDT

PDB ID : 6V33
Title : X-ray structure of a sugar N-formyltransferase from *Pseudomonas congelans*
Authors : Girardi, N.M.; Thoden, J.B.; Holden, H.M.
Deposited on : 2019-11-25
Resolution : 2.03 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 : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : **FAILED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

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 2.03 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 4269 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.

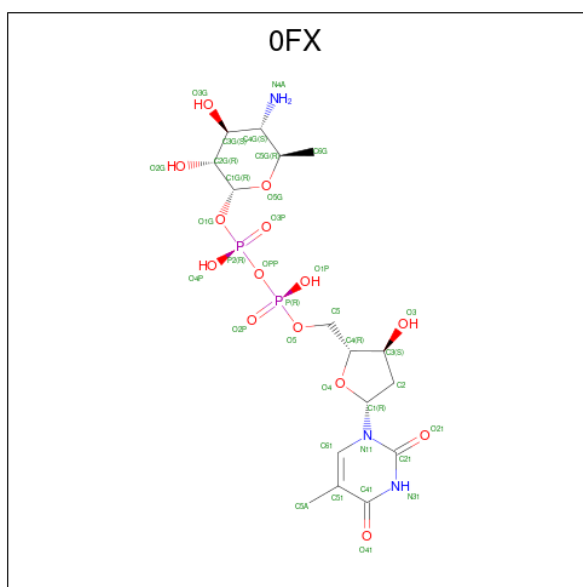
- Molecule 1 is a protein called dTDP-4-amino-4,6-dideoxyglucose formyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	246	Total	C	N	O	S	0	4	0
			1961	1249	333	371	8			
1	B	245	Total	C	N	O	S	0	1	0
			1936	1233	329	366	8			

There are 22 discrepancies between the modelled and reference sequences:

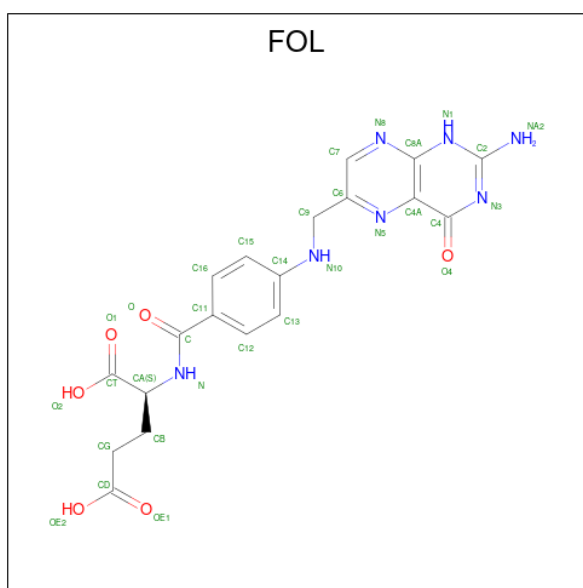
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP A0A0N8R1B2
A	56	SER	GLY	conflict	UNP A0A0N8R1B2
A	75	LEU	PHE	conflict	UNP A0A0N8R1B2
A	255	LEU	-	expression tag	UNP A0A0N8R1B2
A	256	ARG	-	expression tag	UNP A0A0N8R1B2
A	257	HIS	-	expression tag	UNP A0A0N8R1B2
A	258	HIS	-	expression tag	UNP A0A0N8R1B2
A	259	HIS	-	expression tag	UNP A0A0N8R1B2
A	260	HIS	-	expression tag	UNP A0A0N8R1B2
A	261	HIS	-	expression tag	UNP A0A0N8R1B2
A	262	HIS	-	expression tag	UNP A0A0N8R1B2
B	1	MET	-	initiating methionine	UNP A0A0N8R1B2
B	56	SER	GLY	conflict	UNP A0A0N8R1B2
B	75	LEU	PHE	conflict	UNP A0A0N8R1B2
B	255	LEU	-	expression tag	UNP A0A0N8R1B2
B	256	ARG	-	expression tag	UNP A0A0N8R1B2
B	257	HIS	-	expression tag	UNP A0A0N8R1B2
B	258	HIS	-	expression tag	UNP A0A0N8R1B2
B	259	HIS	-	expression tag	UNP A0A0N8R1B2
B	260	HIS	-	expression tag	UNP A0A0N8R1B2
B	261	HIS	-	expression tag	UNP A0A0N8R1B2
B	262	HIS	-	expression tag	UNP A0A0N8R1B2

- Molecule 2 is dTDP-4-amino-4,6-dideoxyglucose (three-letter code: OFX) (formula: C₁₆H₂₇N₃O₁₄P₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	A	1	Total	C	N	O	P	0	0
			35	16	3	14	2		
2	B	1	Total	C	N	O	P	0	0
			35	16	3	14	2		

- Molecule 3 is FOLIC ACID (three-letter code: FOL) (formula: C₁₉H₁₉N₇O₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	Total	C	N	O	0	0
			23	14	7	2		
3	B	1	Total	C	N	O	0	0
			23	14	7	2		

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	
5	A	145	Total	O	0	0
			145	145		
5	B	103	Total	O	0	0
			103	103		

MolProbity and EDS failed to run properly - this section is therefore empty.

3 Data and refinement statistics i

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	90.36Å 90.36Å 124.65Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.60 – 2.03	Depositor
% Data completeness (in resolution range)	95.0 (29.60-2.03)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	12.38 (at 2.03Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.201 , 0.221	Depositor
Wilson B-factor (Å ²)	33.5	Xtrriage
Anisotropy	0.056	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	0.031 for -h,-k,l	Xtrriage
Total number of atoms	4269	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.82% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical 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.

4 Model quality [i](#)

4.1 Standard geometry [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.2 Too-close contacts [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3 Torsion angles [i](#)

4.3.1 Protein backbone [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3.2 Protein sidechains [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3.3 RNA [i](#)

MolProbity failed to run properly - this section is therefore empty.

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

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

4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

4.6 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	FOL	A	302	-	25,25,34	3.50	4 (16%)	32,35,47	4.57	17 (53%)
2	0FX	A	301	-	33,37,37	1.94	4 (12%)	52,57,57	2.57	12 (23%)
2	0FX	B	301	-	33,37,37	1.95	6 (18%)	52,57,57	2.21	13 (25%)
3	FOL	B	302	-	25,25,34	3.24	7 (28%)	32,35,47	4.26	18 (56%)
4	EDO	A	303	-	3,3,3	0.37	0	2,2,2	0.17	0
4	EDO	B	303	-	3,3,3	0.09	0	2,2,2	0.24	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
3	FOL	A	302	-	-	5/9/9/22	0/3/3/3
2	0FX	A	301	-	-	5/21/53/53	0/3/3/3
2	0FX	B	301	-	-	4/21/53/53	0/3/3/3
3	FOL	B	302	-	-	1/9/9/22	0/3/3/3
4	EDO	A	303	-	-	1/1/1/1	-
4	EDO	B	303	-	-	1/1/1/1	-

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	302	FOL	C7-N8	11.26	1.50	1.31
3	A	302	FOL	C7-C6	9.25	1.55	1.39
3	B	302	FOL	C7-N8	8.72	1.46	1.31
3	B	302	FOL	C6-N5	8.53	1.48	1.32
3	B	302	FOL	C7-C6	8.23	1.53	1.39
3	A	302	FOL	C6-N5	8.19	1.47	1.32
2	A	301	0FX	O21-C21	6.73	1.35	1.23
2	B	301	0FX	O21-C21	6.30	1.34	1.23
2	B	301	0FX	O41-C41	5.60	1.34	1.23
2	A	301	0FX	C61-C51	5.24	1.43	1.34
2	A	301	0FX	O41-C41	4.43	1.32	1.23
2	B	301	0FX	C3G-C4G	-3.32	1.49	1.53
2	B	301	0FX	C61-C51	3.30	1.40	1.34
3	B	302	FOL	C11-C	3.18	1.55	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	0FX	C41-C51	-3.16	1.39	1.44
3	B	302	FOL	C9-C6	3.02	1.57	1.51
2	B	301	0FX	C41-C51	-2.89	1.40	1.44
3	B	302	FOL	C4A-N5	2.67	1.37	1.33
3	A	302	FOL	C4-N3	2.46	1.37	1.33
3	B	302	FOL	C4-N3	2.33	1.37	1.33
2	B	301	0FX	O5G-C1G	2.17	1.47	1.41

All (60) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	302	FOL	C6-C7-N8	-14.95	108.48	123.13
3	A	302	FOL	C7-C6-N5	-14.54	111.35	120.85
3	B	302	FOL	C7-C6-N5	-13.28	112.18	120.85
3	B	302	FOL	C6-C7-N8	-12.19	111.18	123.13
2	A	301	0FX	C51-C41-N31	9.99	123.84	115.31
2	A	301	0FX	C41-N31-C21	-8.62	116.19	127.35
3	B	302	FOL	C7-N8-C8A	8.05	124.78	116.69
2	B	301	0FX	C51-C41-N31	7.13	121.40	115.31
2	B	301	0FX	C41-N31-C21	-6.99	118.31	127.35
3	A	302	FOL	C2-N1-C8A	6.59	122.89	115.36
2	A	301	0FX	N31-C21-N11	6.45	123.46	114.89
2	B	301	0FX	N31-C21-N11	5.82	122.62	114.89
3	A	302	FOL	N1-C2-N3	-5.58	119.77	127.22
3	A	302	FOL	C9-C6-N5	-5.38	107.11	116.66
2	A	301	0FX	C51-C61-N11	-5.14	118.05	123.34
3	B	302	FOL	C6-N5-C4A	5.02	124.37	118.45
3	B	302	FOL	N1-C2-N3	-4.63	121.05	127.22
3	B	302	FOL	C2-N1-C8A	4.53	120.53	115.36
2	B	301	0FX	C5A-C51-C41	4.52	123.74	118.77
3	A	302	FOL	C4A-C4-N3	-4.21	117.67	123.43
3	B	302	FOL	N8-C8A-N1	4.17	120.58	115.82
3	A	302	FOL	O-C-C11	-3.93	114.93	119.63
3	A	302	FOL	C2-N3-C4	3.83	122.01	115.93
3	B	302	FOL	C9-C6-N5	-3.77	109.97	116.66
2	A	301	0FX	O41-C41-C51	-3.75	120.56	124.90
3	A	302	FOL	C11-C-N	3.67	122.16	117.75
3	B	302	FOL	C4-C4A-N5	3.45	122.54	118.60
3	B	302	FOL	O-C-N	-3.41	117.73	122.58
3	A	302	FOL	C9-C6-C7	-3.28	115.83	121.55
2	A	301	0FX	P-OPP-P2	-3.26	121.64	132.83
3	A	302	FOL	NA2-C2-N3	3.24	122.29	117.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	0FX	C5A-C51-C61	-3.20	118.58	122.85
2	B	301	0FX	O21-C21-N31	-3.10	115.74	121.50
3	B	302	FOL	C8A-C4A-N5	-3.08	118.84	122.33
2	A	301	0FX	O1G-P2-O3P	3.02	120.79	109.47
3	A	302	FOL	N8-C8A-N1	2.94	119.18	115.82
3	A	302	FOL	C8A-C4A-N5	-2.92	119.02	122.33
2	B	301	0FX	C51-C61-N11	-2.84	120.42	123.34
3	B	302	FOL	C11-C-N	2.78	121.08	117.75
3	A	302	FOL	C4-C4A-N5	2.68	121.66	118.60
3	B	302	FOL	C9-C6-C7	-2.68	116.89	121.55
2	A	301	0FX	O21-C21-N31	-2.62	116.63	121.50
2	A	301	0FX	C3G-C4G-N4A	-2.61	105.70	111.05
2	B	301	0FX	OPP-P2-O1G	2.61	107.75	102.48
2	A	301	0FX	O41-C41-N31	-2.60	115.13	120.12
3	B	302	FOL	C2-N3-C4	2.49	119.89	115.93
2	B	301	0FX	O4-C1-N11	2.46	112.25	107.86
2	B	301	0FX	C6G-C5G-C4G	-2.39	109.08	114.10
3	B	302	FOL	C4A-C4-N3	-2.38	120.18	123.43
3	A	302	FOL	C7-N8-C8A	2.35	119.05	116.69
3	B	302	FOL	C15-C14-N10	2.32	125.79	120.97
2	B	301	0FX	O41-C41-N31	-2.21	115.88	120.12
2	B	301	0FX	O5-P-O2P	2.19	117.64	109.07
2	A	301	0FX	O21-C21-N11	-2.18	119.89	122.79
3	B	302	FOL	NA2-C2-N3	2.17	120.63	117.25
3	A	302	FOL	C4A-C8A-N1	-2.12	118.23	121.80
2	B	301	0FX	O41-C41-C51	-2.12	122.44	124.90
3	A	302	FOL	C6-N5-C4A	2.11	120.94	118.45
3	B	302	FOL	C8A-C4A-C4	-2.06	118.59	119.95
2	A	301	0FX	O5-P-O2P	-2.02	101.18	109.07

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	0FX	C5-O5-P-O2P
3	A	302	FOL	C6-C9-N10-C14
3	A	302	FOL	O-C-C11-C12
3	A	302	FOL	N-C-C11-C12
3	A	302	FOL	O-C-C11-C16
3	A	302	FOL	N-C-C11-C16
2	A	301	0FX	C1G-O1G-P2-OPP
2	B	301	0FX	C1G-O1G-P2-OPP

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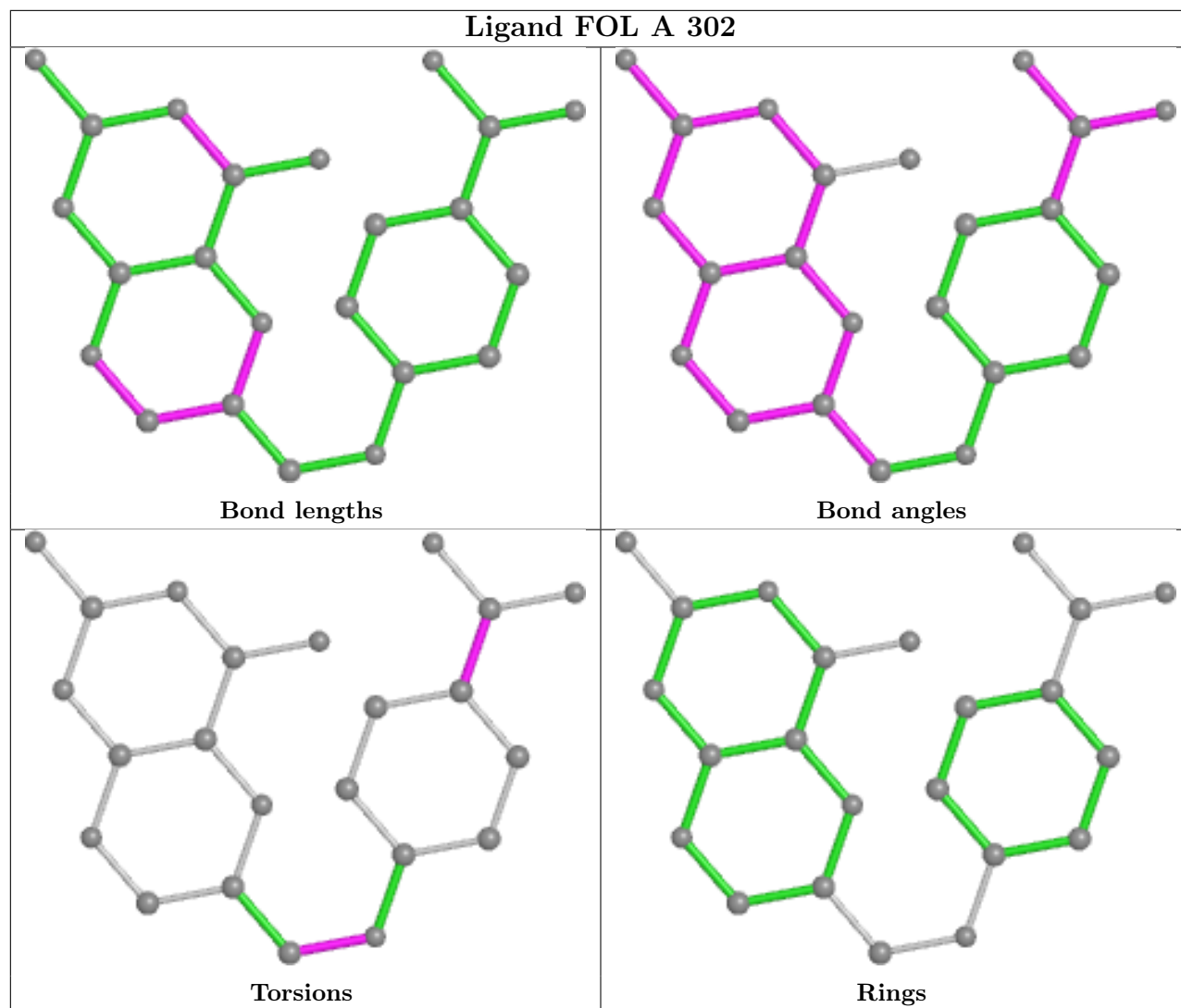
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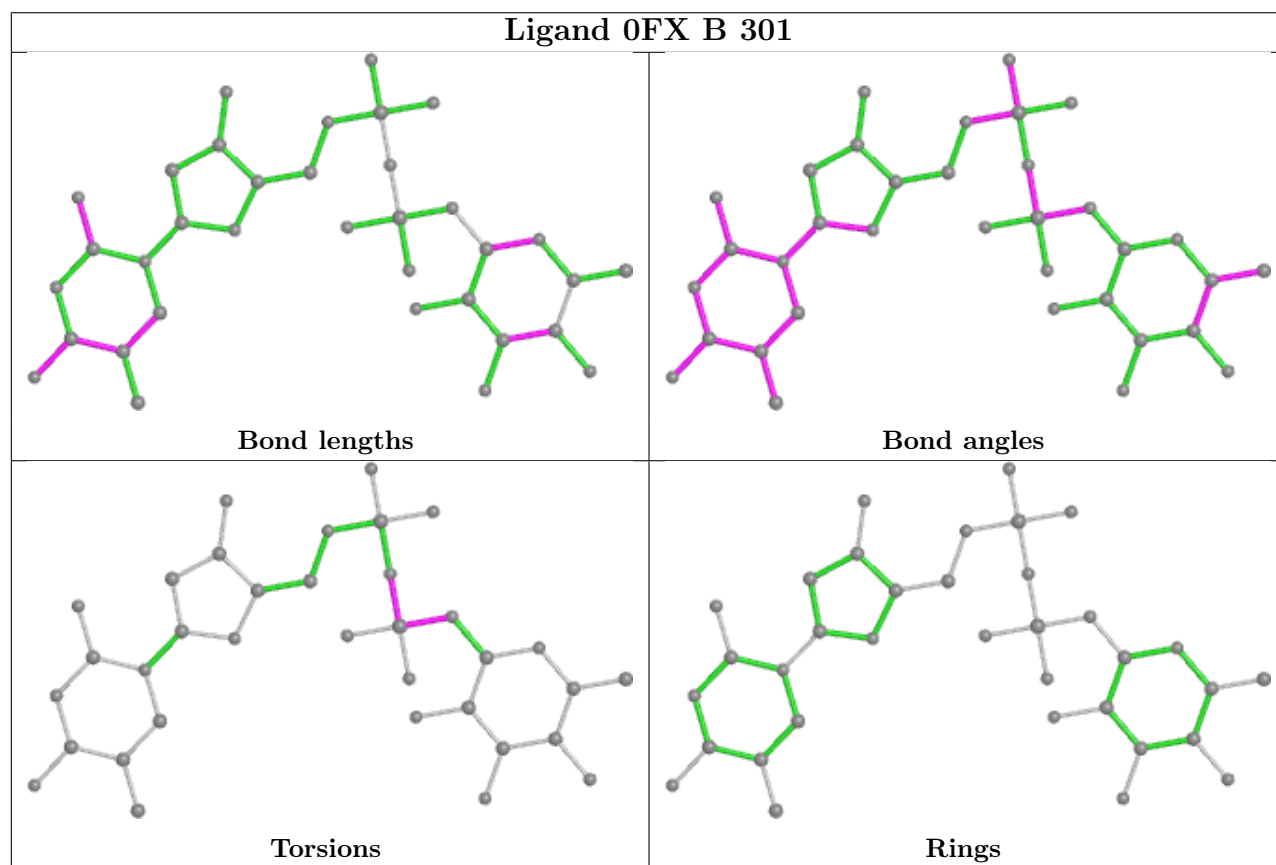
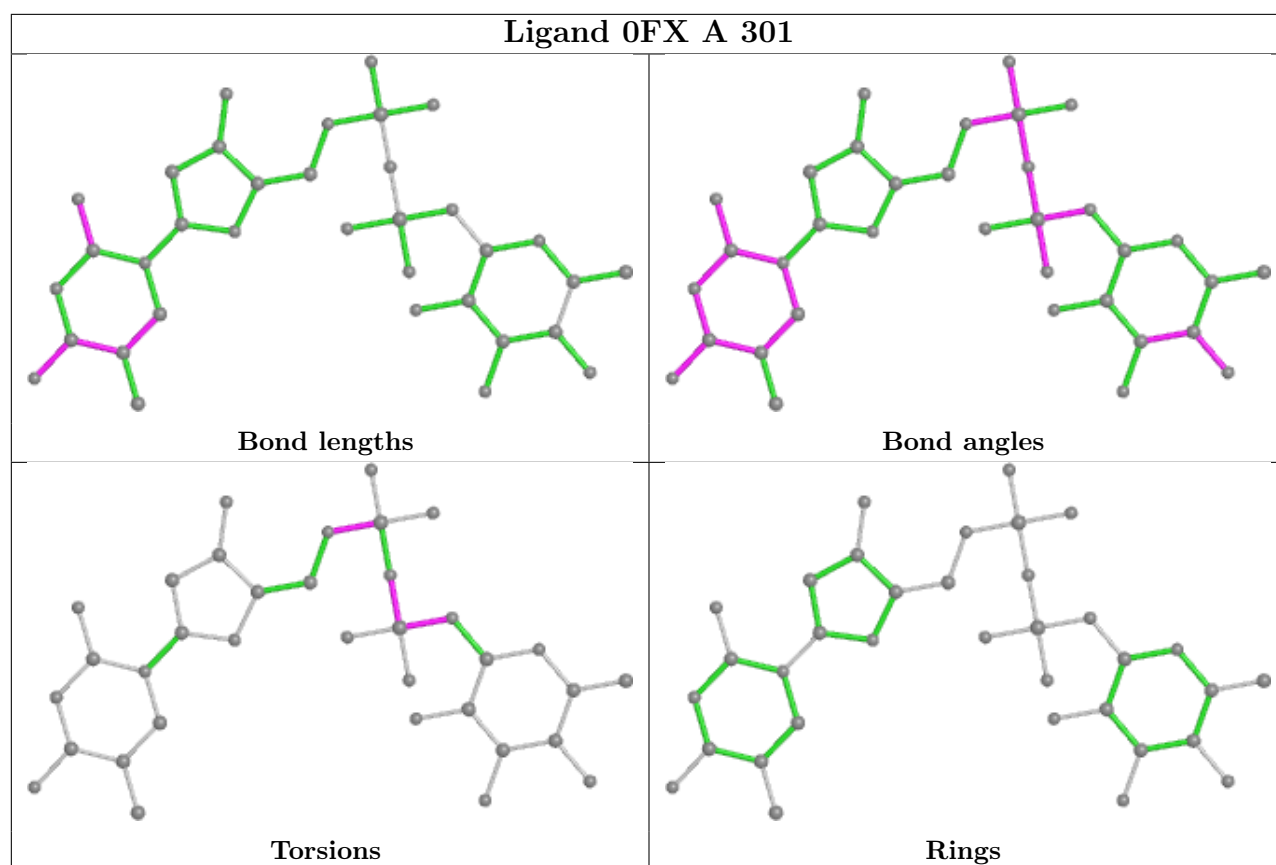
Mol	Chain	Res	Type	Atoms
3	B	302	FOL	C6-C9-N10-C14
4	B	303	EDO	O1-C1-C2-O2
2	B	301	0FX	P-OPP-P2-O3P
2	A	301	0FX	P-OPP-P2-O1G
2	B	301	0FX	P-OPP-P2-O1G
2	A	301	0FX	C5-O5-P-OPP
4	A	303	EDO	O1-C1-C2-O2
2	A	301	0FX	C1G-O1G-P2-O4P
2	B	301	0FX	C1G-O1G-P2-O4P

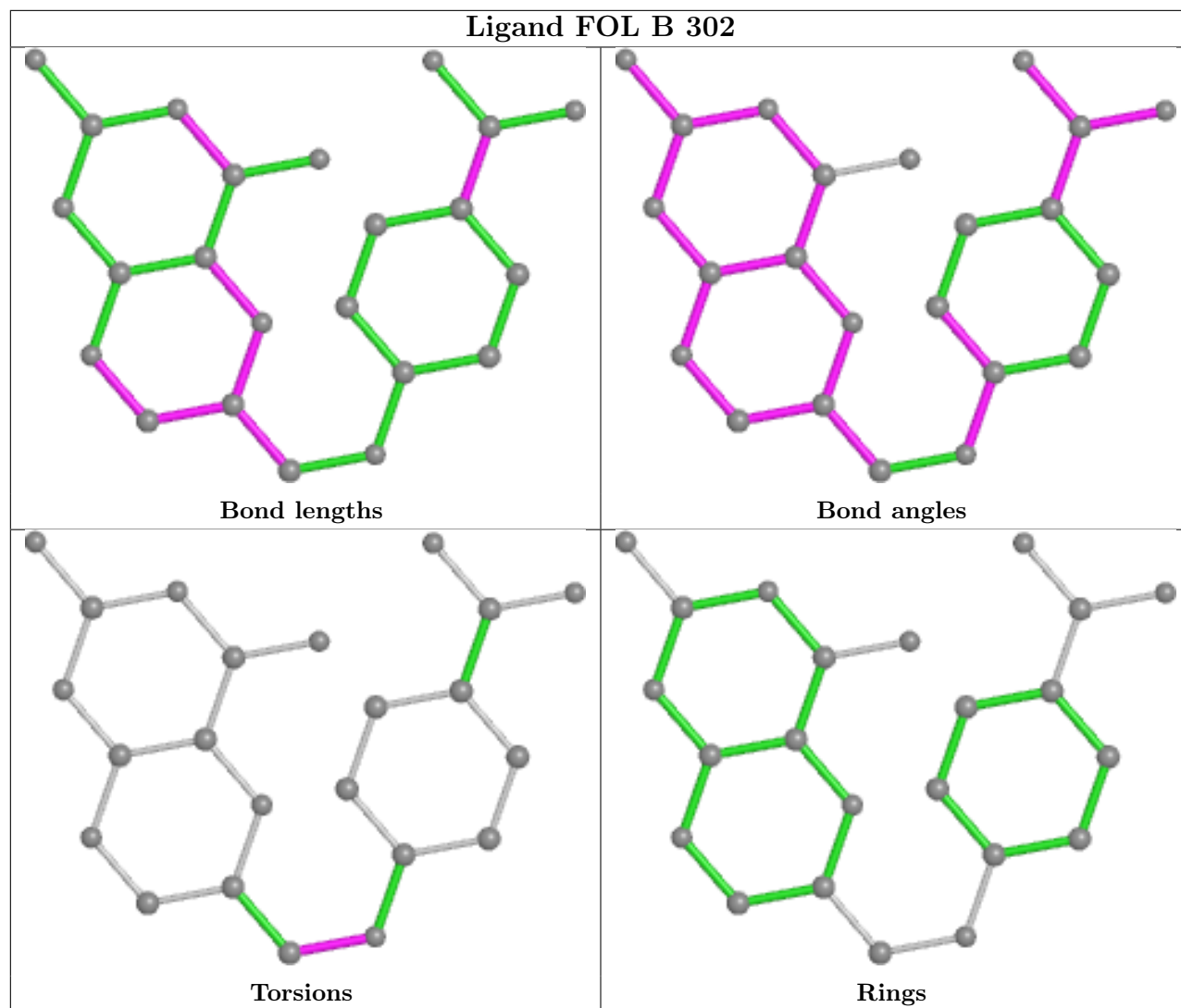
There are no ring outliers.

No monomer is involved in short contacts.

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.







4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

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

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

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates [i](#)

EDS failed to run properly - this section is therefore empty.

5.4 Ligands [i](#)

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers [i](#)

EDS failed to run properly - this section is therefore empty.