



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 3, 2023 – 12:35 AM EDT

PDB ID : 6PFZ  
Title : Structure of a NAD-Dependent Persulfide Reductase from *A. fulgidus*  
Authors : Sazinsky, M.H.; Shabdar, S.; Garcia-Constineiras, A.; Crane III, E.J.  
Deposited on : 2019-06-23  
Resolution : 3.10 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](mailto: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>.

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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 3.10 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 16676 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 NADH oxidase (NoxA-3).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	D	536	Total 4044	C 2560	N 685	O 782	S 17	0	0	0
1	A	541	Total 4081	C 2585	N 691	O 788	S 17	0	0	0
1	B	541	Total 4106	C 2599	N 703	O 787	S 17	0	0	0
1	C	535	Total 4023	C 2551	N 682	O 773	S 17	0	0	0

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula:  $C_{27}H_{33}N_9O_{15}P_2$ ).



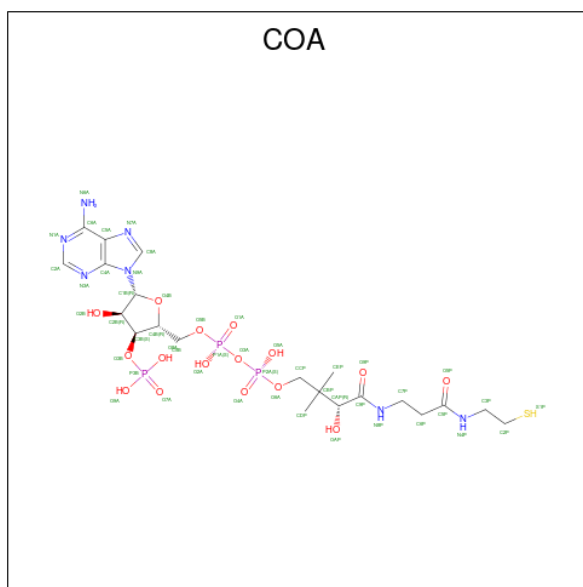
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	D	1	Total 53	C 27	N 9	O 15	P 2	0	0
2	A	1	Total 53	C 27	N 9	O 15	P 2	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is COENZYME A (three-letter code: COA) (formula:  $C_{21}H_{36}N_7O_{16}P_3S$ ).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	D	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	A	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	B	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	C	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	3	Total O 3 3	0	0
5	B	11	Total O 11 11	0	0

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 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	84.98Å 100.36Å 136.20Å 90.00° 91.89° 90.00°	Depositor
Resolution (Å)	39.48 – 3.10	Depositor
% Data completeness (in resolution range)	97.9 (39.48-3.10)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.09 (at 2.77Å)	Xtrriage
Refinement program	PHENIX 1.10_2155	Depositor
R, $R_{free}$	0.202 , 0.229	Depositor
Wilson B-factor (Å <sup>2</sup> )	58.6	Xtrriage
Anisotropy	0.038	Xtrriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.039 for h,-k,-l	Xtrriage
Total number of atoms	16676	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.75% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> 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](#)

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### 4.2 Too-close contacts [i](#)

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### 4.3 Torsion angles [i](#)

#### 4.3.1 Protein backbone [i](#)

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#### 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](#)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 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
3	COA	C	902	-	41,50,50	2.30	10 (24%)	52,75,75	2.22	19 (36%)
3	COA	B	902	-	41,50,50	2.37	8 (19%)	52,75,75	1.87	13 (25%)
2	FAD	B	901	-	53,58,58	1.80	16 (30%)	68,89,89	1.44	13 (19%)
2	FAD	D	901	-	53,58,58	1.71	12 (22%)	68,89,89	1.56	15 (22%)
3	COA	A	902	-	41,50,50	2.34	10 (24%)	52,75,75	2.14	14 (26%)
2	FAD	C	901	-	53,58,58	1.75	14 (26%)	68,89,89	1.66	18 (26%)
2	FAD	A	901	-	53,58,58	1.80	13 (24%)	68,89,89	1.75	19 (27%)
3	COA	D	902	-	41,50,50	2.26	8 (19%)	52,75,75	1.79	12 (23%)

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	COA	C	902	-	-	12/44/64/64	0/3/3/3
3	COA	B	902	-	-	11/44/64/64	0/3/3/3
2	FAD	B	901	-	-	4/30/50/50	0/6/6/6
2	FAD	D	901	-	-	5/30/50/50	0/6/6/6
3	COA	A	902	-	-	17/44/64/64	0/3/3/3
2	FAD	C	901	-	-	10/30/50/50	0/6/6/6
2	FAD	A	901	-	-	10/30/50/50	0/6/6/6
3	COA	D	902	-	-	6/44/64/64	0/3/3/3

All (91) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	902	COA	O4B-C1B	8.48	1.52	1.41
3	D	902	COA	O4B-C1B	7.12	1.51	1.41
3	C	902	COA	O4B-C1B	7.04	1.50	1.41
3	B	902	COA	O4B-C1B	6.80	1.50	1.41
3	B	902	COA	C9P-N8P	6.27	1.47	1.33
3	C	902	COA	C9P-N8P	6.17	1.47	1.33
3	B	902	COA	C5P-N4P	5.93	1.46	1.33
3	A	902	COA	C9P-N8P	5.82	1.46	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	902	COA	C5P-N4P	5.75	1.46	1.33
3	D	902	COA	C9P-N8P	5.53	1.45	1.33
3	C	902	COA	C5P-N4P	5.12	1.45	1.33
3	A	902	COA	C5P-N4P	4.79	1.44	1.33
2	D	901	FAD	C4-N3	-4.77	1.30	1.38
2	A	901	FAD	C4-N3	-4.70	1.30	1.38
2	B	901	FAD	C4-N3	-4.64	1.30	1.38
2	C	901	FAD	C4-N3	-4.57	1.30	1.38
3	B	902	COA	C2B-C1B	-4.16	1.47	1.53
2	B	901	FAD	C2B-C1B	-4.00	1.47	1.53
3	C	902	COA	C2B-C3B	-3.94	1.44	1.52
2	C	901	FAD	C2-N3	-3.90	1.29	1.39
2	A	901	FAD	C5X-N5	-3.83	1.32	1.39
2	A	901	FAD	C2-N3	-3.67	1.30	1.39
3	D	902	COA	C2B-C3B	-3.62	1.44	1.52
2	D	901	FAD	C2-N3	-3.61	1.30	1.39
2	C	901	FAD	C9A-C5X	3.55	1.47	1.41
3	B	902	COA	C6A-N6A	3.52	1.46	1.34
3	B	902	COA	C2B-C3B	-3.49	1.45	1.52
2	C	901	FAD	C5X-N5	-3.47	1.32	1.39
2	A	901	FAD	C9A-C5X	3.42	1.46	1.41
2	C	901	FAD	C2B-C1B	-3.39	1.48	1.53
2	B	901	FAD	C5X-N5	-3.29	1.33	1.39
2	D	901	FAD	C9A-C5X	3.24	1.46	1.41
2	D	901	FAD	C5X-N5	-3.22	1.33	1.39
3	A	902	COA	C2B-C3B	-3.19	1.45	1.52
3	C	902	COA	C6A-N6A	3.17	1.45	1.34
3	D	902	COA	C2B-C1B	-3.16	1.49	1.53
3	B	902	COA	C4A-N3A	-3.14	1.31	1.35
3	A	902	COA	C6A-N6A	3.13	1.45	1.34
3	C	902	COA	C2B-C1B	-3.08	1.49	1.53
2	A	901	FAD	C2B-C1B	-3.05	1.49	1.53
3	D	902	COA	C6A-N6A	3.01	1.45	1.34
2	B	901	FAD	C2-N3	-2.99	1.32	1.39
2	A	901	FAD	C4'-C3'	-2.97	1.47	1.53
3	A	902	COA	O4B-C4B	2.89	1.51	1.45
2	D	901	FAD	C2B-C1B	-2.85	1.49	1.53
3	D	902	COA	O4B-C4B	2.67	1.51	1.45
2	B	901	FAD	C6-C7	-2.67	1.35	1.39
2	B	901	FAD	C9A-C5X	2.63	1.45	1.41
2	A	901	FAD	C6-C7	-2.63	1.35	1.39
3	C	902	COA	P3B-O9A	-2.61	1.44	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	902	COA	O4B-C4B	2.53	1.50	1.45
2	D	901	FAD	C6-C7	-2.49	1.35	1.39
2	D	901	FAD	O4B-C4B	-2.46	1.39	1.45
2	A	901	FAD	C6-C5X	-2.46	1.36	1.40
2	B	901	FAD	P-O2P	-2.43	1.43	1.55
2	A	901	FAD	C2'-C3'	-2.39	1.49	1.53
2	A	901	FAD	P-O2P	-2.38	1.44	1.55
2	B	901	FAD	P-O1P	-2.38	1.42	1.50
3	A	902	COA	C5A-N7A	2.37	1.48	1.39
2	B	901	FAD	C4'-C3'	-2.34	1.49	1.53
2	C	901	FAD	C6-C7	-2.32	1.36	1.39
2	C	901	FAD	O4B-C4B	-2.31	1.39	1.45
2	C	901	FAD	PA-O2A	-2.30	1.44	1.55
2	D	901	FAD	C2B-C3B	-2.29	1.47	1.53
2	D	901	FAD	C1'-C2'	-2.29	1.49	1.52
3	B	902	COA	O4B-C4B	2.28	1.50	1.45
3	A	902	COA	P1A-O5B	2.27	1.68	1.59
2	B	901	FAD	C6-C5X	-2.26	1.36	1.40
2	C	901	FAD	C6-C5X	-2.24	1.36	1.40
3	C	902	COA	P3B-O3B	2.24	1.63	1.59
2	B	901	FAD	C1'-C2'	-2.23	1.49	1.52
3	A	902	COA	C5A-C4A	2.19	1.46	1.40
3	D	902	COA	C2A-N3A	2.19	1.35	1.32
2	B	901	FAD	C2B-C3B	-2.19	1.47	1.53
2	B	901	FAD	C4A-N3A	-2.16	1.32	1.35
2	A	901	FAD	PA-O2A	-2.12	1.45	1.55
2	D	901	FAD	PA-O2A	-2.10	1.45	1.55
3	A	902	COA	C2B-C1B	-2.10	1.50	1.53
2	D	901	FAD	C5A-N7A	-2.09	1.32	1.39
2	C	901	FAD	C5A-N7A	-2.08	1.32	1.39
2	A	901	FAD	P-O1P	-2.07	1.43	1.50
2	B	901	FAD	O4B-C4B	-2.07	1.40	1.45
2	A	901	FAD	C5A-N7A	-2.06	1.32	1.39
2	D	901	FAD	P-O2P	-2.06	1.45	1.55
2	C	901	FAD	P-O2P	-2.05	1.45	1.55
2	C	901	FAD	C2B-C3B	-2.05	1.47	1.53
2	C	901	FAD	C9-C8	-2.05	1.36	1.39
2	B	901	FAD	PA-O2A	-2.05	1.45	1.55
2	B	901	FAD	C5A-N7A	-2.05	1.32	1.39
3	C	902	COA	P3B-O8A	-2.02	1.47	1.54
2	C	901	FAD	C8-C7	2.01	1.45	1.40

All (123) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	902	COA	C2P-C3P-N4P	-7.48	95.22	112.31
3	C	902	COA	CEP-CBP-CCP	-5.52	99.22	108.23
3	A	902	COA	CEP-CBP-CAP	5.29	117.99	108.82
2	A	901	FAD	C4'-C3'-C2'	-5.19	102.56	113.36
3	D	902	COA	C6P-C7P-N8P	-4.94	101.93	111.90
3	A	902	COA	O4B-C1B-C2B	-4.66	100.12	106.93
3	C	902	COA	O6A-CCP-CBP	-4.36	103.53	110.55
3	A	902	COA	C6P-C7P-N8P	-4.31	103.20	111.90
3	B	902	COA	C5B-C4B-C3B	-4.17	100.58	114.40
2	A	901	FAD	N3A-C2A-N1A	-4.12	122.25	128.68
3	B	902	COA	CEP-CBP-CAP	4.08	115.90	108.82
3	C	902	COA	N3A-C2A-N1A	-4.08	122.31	128.68
3	C	902	COA	CDP-CBP-CCP	-3.98	101.74	108.23
2	D	901	FAD	O3B-C3B-C2B	-3.98	98.96	111.82
3	A	902	COA	N3A-C2A-N1A	-3.84	122.68	128.68
2	C	901	FAD	N3A-C2A-N1A	-3.82	122.70	128.68
3	C	902	COA	C2P-C3P-N4P	-3.78	103.68	112.31
3	B	902	COA	C7P-C6P-C5P	-3.77	106.07	112.36
3	C	902	COA	C6P-C7P-N8P	-3.77	104.29	111.90
2	C	901	FAD	C4X-C10-N1	-3.70	116.14	124.73
2	C	901	FAD	O3B-C3B-C2B	-3.68	99.91	111.82
2	A	901	FAD	C4X-C10-N1	-3.68	116.19	124.73
3	D	902	COA	N3A-C2A-N1A	-3.68	122.93	128.68
3	B	902	COA	C3P-N4P-C5P	-3.65	116.05	122.84
2	D	901	FAD	N3A-C2A-N1A	-3.64	122.99	128.68
2	A	901	FAD	O3B-C3B-C2B	-3.60	100.18	111.82
2	D	901	FAD	O2B-C2B-C3B	-3.57	100.27	111.82
3	D	902	COA	C5B-C4B-C3B	-3.56	102.60	114.40
3	C	902	COA	O9P-C9P-N8P	-3.56	115.36	122.99
3	B	902	COA	P2A-O3A-P1A	-3.52	120.74	132.83
2	D	901	FAD	C4X-C10-N1	-3.47	116.67	124.73
2	B	901	FAD	N3A-C2A-N1A	-3.39	123.38	128.68
2	C	901	FAD	O2B-C2B-C3B	-3.38	100.88	111.82
2	A	901	FAD	C4A-C5A-N7A	-3.38	105.88	109.40
3	C	902	COA	CEP-CBP-CDP	3.27	115.82	109.17
3	D	902	COA	C7P-C6P-C5P	-3.22	107.00	112.36
2	C	901	FAD	C4'-C3'-C2'	-3.14	106.82	113.36
3	C	902	COA	CAP-C9P-N8P	3.11	122.76	116.58
2	C	901	FAD	C4-N3-C2	-3.09	119.93	125.64
3	C	902	COA	O3B-C3B-C2B	-3.05	100.63	111.68
2	B	901	FAD	C4X-C10-N1	-3.04	117.68	124.73
3	C	902	COA	P2A-O3A-P1A	-3.00	122.54	132.83
2	B	901	FAD	O3B-C3B-C2B	-2.99	102.16	111.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	901	FAD	C4X-C10-N10	2.96	120.81	116.48
3	B	902	COA	C6P-C5P-N4P	2.95	121.40	116.42
3	D	902	COA	P2A-O3A-P1A	-2.95	122.69	132.83
3	B	902	COA	N3A-C2A-N1A	-2.90	124.14	128.68
3	D	902	COA	C7P-N8P-C9P	-2.90	117.42	122.59
2	A	901	FAD	C4-N3-C2	-2.88	120.32	125.64
2	A	901	FAD	O2'-C2'-C3'	-2.86	102.13	109.10
3	B	902	COA	O4B-C1B-C2B	-2.83	102.80	106.93
2	C	901	FAD	N3-C2-N1	2.81	124.91	119.38
2	A	901	FAD	N3-C2-N1	2.80	124.87	119.38
3	C	902	COA	CDP-CBP-CAP	2.74	113.57	108.82
3	D	902	COA	C5A-C6A-N6A	-2.72	116.22	120.35
3	A	902	COA	CAP-C9P-N8P	2.71	121.97	116.58
2	B	901	FAD	O2B-C2B-C3B	-2.69	103.11	111.82
3	A	902	COA	O9P-C9P-N8P	-2.67	117.27	122.99
2	B	901	FAD	O4B-C1B-C2B	-2.64	103.08	106.93
3	A	902	COA	C7P-C6P-C5P	-2.63	107.98	112.36
2	C	901	FAD	C10-N1-C2	2.61	122.13	116.90
2	C	901	FAD	C9A-N10-C10	-2.59	116.72	120.77
3	D	902	COA	N6A-C6A-N1A	2.56	123.89	118.57
2	A	901	FAD	C9A-N10-C10	-2.56	116.77	120.77
3	C	902	COA	O5B-C5B-C4B	2.56	117.79	108.99
2	B	901	FAD	C4-C4X-N5	2.55	121.86	118.23
2	A	901	FAD	O4-C4-C4X	-2.55	119.84	126.60
2	A	901	FAD	O2A-PA-O1A	2.54	124.80	112.24
3	A	902	COA	C1B-N9A-C4A	-2.54	122.18	126.64
2	D	901	FAD	C4-C4X-N5	2.53	121.83	118.23
2	A	901	FAD	O2B-C2B-C3B	-2.53	103.64	111.82
3	D	902	COA	O4B-C1B-C2B	-2.53	103.23	106.93
2	D	901	FAD	C4X-C4-N3	2.51	119.56	113.19
3	D	902	COA	C2P-C3P-N4P	-2.51	106.58	112.31
2	C	901	FAD	C4A-C5A-N7A	-2.50	106.80	109.40
2	D	901	FAD	C4-N3-C2	-2.48	121.06	125.64
3	C	902	COA	O2B-C2B-C3B	-2.47	104.14	111.17
2	C	901	FAD	C2A-N1A-C6A	2.46	122.96	118.75
2	C	901	FAD	P-O3P-PA	-2.45	124.43	132.83
2	D	901	FAD	C10-N1-C2	2.40	121.70	116.90
2	A	901	FAD	C2A-N1A-C6A	2.40	122.85	118.75
3	C	902	COA	C5B-C4B-C3B	-2.39	106.46	114.40
2	D	901	FAD	O4-C4-C4X	-2.37	120.30	126.60
3	A	902	COA	O5B-C5B-C4B	2.37	117.14	108.99
2	A	901	FAD	C4X-C10-N10	2.36	119.94	116.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	901	FAD	C4A-C5A-N7A	-2.36	106.94	109.40
2	C	901	FAD	C4X-C4-N3	2.35	119.16	113.19
3	A	902	COA	CDP-CBP-CCP	2.33	112.04	108.23
2	C	901	FAD	O2'-C2'-C3'	-2.33	103.44	109.10
3	C	902	COA	O8A-P3B-O3B	2.32	116.37	105.99
2	A	901	FAD	C10-N1-C2	2.31	121.53	116.90
2	B	901	FAD	C4X-C10-N10	2.31	119.86	116.48
2	C	901	FAD	C2B-C3B-C4B	2.31	107.13	102.64
2	B	901	FAD	C4A-C5A-N7A	-2.30	107.00	109.40
2	A	901	FAD	O4B-C1B-C2B	-2.30	103.57	106.93
2	D	901	FAD	C4'-C3'-C2'	-2.29	108.61	113.36
2	D	901	FAD	N3-C2-N1	2.26	123.83	119.38
3	B	902	COA	C2A-N1A-C6A	2.26	122.62	118.75
2	D	901	FAD	P-O3P-PA	-2.25	125.09	132.83
2	A	901	FAD	C4X-C4-N3	2.24	118.87	113.19
2	A	901	FAD	C2B-C3B-C4B	2.24	106.99	102.64
3	B	902	COA	O9A-P3B-O7A	-2.23	101.95	110.68
3	D	902	COA	O8A-P3B-O7A	-2.23	101.96	110.68
3	D	902	COA	P1A-O5B-C5B	-2.22	108.66	121.68
3	B	902	COA	CAP-C9P-N8P	2.22	121.00	116.58
2	A	901	FAD	O4'-C4'-C3'	-2.21	103.73	109.10
3	B	902	COA	O5P-C5P-C6P	-2.20	118.00	122.02
3	C	902	COA	O2A-P1A-O1A	-2.19	101.42	112.24
3	A	902	COA	C5B-C4B-C3B	-2.19	107.15	114.40
2	B	901	FAD	O4'-C4'-C3'	-2.18	103.80	109.10
2	D	901	FAD	C2B-C3B-C4B	2.17	106.86	102.64
2	C	901	FAD	C5B-C4B-C3B	-2.15	107.14	115.18
2	B	901	FAD	N3-C2-N1	2.14	123.58	119.38
3	C	902	COA	C2B-C3B-C4B	2.14	107.02	103.22
2	B	901	FAD	O2'-C2'-C3'	-2.13	103.91	109.10
2	B	901	FAD	C10-N1-C2	2.13	121.16	116.90
3	A	902	COA	O2B-C2B-C1B	2.11	118.63	110.85
2	C	901	FAD	O4-C4-C4X	-2.09	121.06	126.60
3	C	902	COA	O5A-P2A-O4A	-2.09	101.92	112.24
3	A	902	COA	O5A-P2A-O4A	-2.08	101.93	112.24
3	B	902	COA	O5A-P2A-O4A	-2.06	102.05	112.24
2	D	901	FAD	N10-C10-N1	2.01	124.12	118.35
2	B	901	FAD	C4'-C3'-C2'	-2.00	109.19	113.36

There are no chirality outliers.

All (75) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	901	FAD	C5B-O5B-PA-O1A
2	D	901	FAD	C3B-C4B-C5B-O5B
2	A	901	FAD	C5B-O5B-PA-O3P
2	A	901	FAD	C3'-C4'-C5'-O5'
2	A	901	FAD	O4'-C4'-C5'-O5'
2	A	901	FAD	C5'-O5'-P-O3P
2	A	901	FAD	PA-O3P-P-O5'
2	C	901	FAD	O4B-C4B-C5B-O5B
2	C	901	FAD	C3B-C4B-C5B-O5B
2	C	901	FAD	C3'-C4'-C5'-O5'
2	C	901	FAD	O4'-C4'-C5'-O5'
2	C	901	FAD	C5'-O5'-P-O1P
2	C	901	FAD	C5'-O5'-P-O2P
3	D	902	COA	P2A-O3A-P1A-O5B
3	D	902	COA	CCP-O6A-P2A-O4A
3	D	902	COA	S1P-C2P-C3P-N4P
3	A	902	COA	C3B-O3B-P3B-O7A
3	A	902	COA	C5B-O5B-P1A-O1A
3	A	902	COA	C5B-O5B-P1A-O2A
3	A	902	COA	C5B-O5B-P1A-O3A
3	A	902	COA	CAP-CBP-CCP-O6A
3	A	902	COA	OAP-CAP-CBP-CCP
3	A	902	COA	OAP-CAP-CBP-CEP
3	A	902	COA	N8P-C9P-CAP-OAP
3	B	902	COA	C3B-O3B-P3B-O7A
3	B	902	COA	N8P-C9P-CAP-OAP
3	C	902	COA	C3B-O3B-P3B-O9A
3	C	902	COA	C3B-C4B-C5B-O5B
3	C	902	COA	O4B-C4B-C5B-O5B
3	C	902	COA	C5B-O5B-P1A-O1A
3	C	902	COA	C9P-CAP-CBP-CEP
3	C	902	COA	S1P-C2P-C3P-N4P
2	D	901	FAD	O4B-C4B-C5B-O5B
3	A	902	COA	O4B-C4B-C5B-O5B
3	B	902	COA	C4B-C3B-O3B-P3B
3	C	902	COA	C4B-C3B-O3B-P3B
3	B	902	COA	C2B-C3B-O3B-P3B
3	C	902	COA	C2B-C3B-O3B-P3B
3	A	902	COA	C3B-C4B-C5B-O5B
3	A	902	COA	O9P-C9P-CAP-OAP
3	B	902	COA	O9P-C9P-CAP-OAP
3	A	902	COA	OAP-CAP-CBP-CDP
2	C	901	FAD	P-O3P-PA-O1A

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Mol	Chain	Res	Type	Atoms
2	C	901	FAD	PA-O3P-P-O5'
3	C	902	COA	P2A-O3A-P1A-O5B
2	D	901	FAD	C5B-O5B-PA-O3P
2	B	901	FAD	C5'-O5'-P-O3P
2	A	901	FAD	O4B-C4B-C5B-O5B
3	D	902	COA	P1A-O3A-P2A-O5A
2	D	901	FAD	C5B-O5B-PA-O2A
2	A	901	FAD	C5B-O5B-PA-O1A
2	A	901	FAD	C5B-O5B-PA-O2A
2	A	901	FAD	C5'-O5'-P-O1P
3	B	902	COA	C3B-C4B-C5B-O5B
3	A	902	COA	CDP-CBP-CCP-O6A
3	B	902	COA	CEP-CBP-CCP-O6A
3	C	902	COA	OAP-CAP-CBP-CEP
2	C	901	FAD	P-O3P-PA-O2A
3	A	902	COA	P1A-O3A-P2A-O5A
2	B	901	FAD	O4B-C4B-C5B-O5B
3	B	902	COA	CDP-CBP-CCP-O6A
2	A	901	FAD	PA-O3P-P-O1P
3	B	902	COA	P1A-O3A-P2A-O4A
2	B	901	FAD	C3B-C4B-C5B-O5B
3	A	902	COA	CEP-CBP-CCP-O6A
2	C	901	FAD	C5'-O5'-P-O3P
3	D	902	COA	CCP-O6A-P2A-O3A
3	D	902	COA	P1A-O3A-P2A-O4A
3	C	902	COA	P1A-O3A-P2A-O4A
3	C	902	COA	P1A-O3A-P2A-O5A
2	B	901	FAD	C5'-O5'-P-O1P
3	A	902	COA	CCP-O6A-P2A-O4A
3	B	902	COA	C5B-O5B-P1A-O1A
3	A	902	COA	O9P-C9P-CAP-CBP
3	B	902	COA	O9P-C9P-CAP-CBP

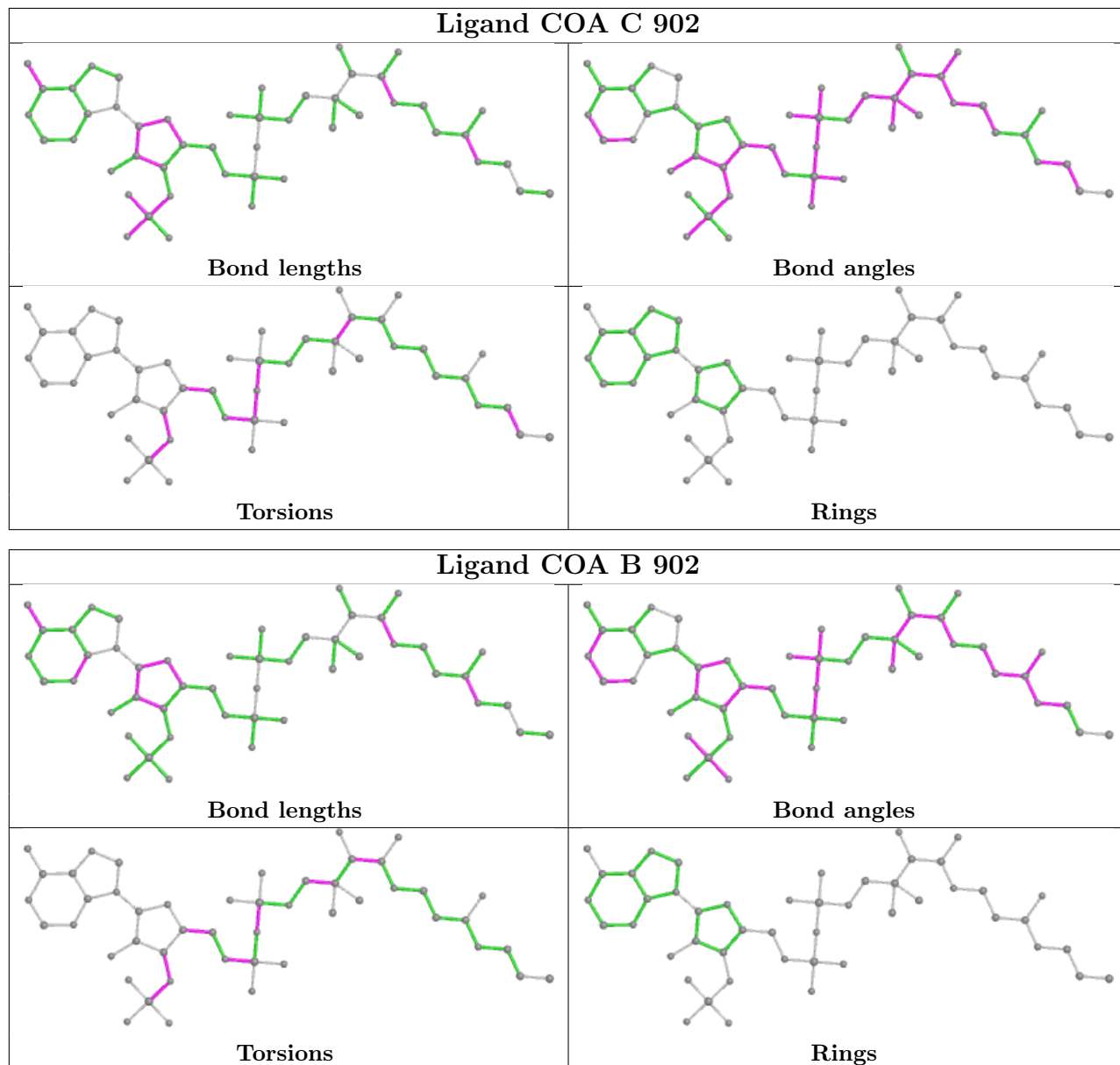
There are no ring outliers.

No monomer is involved in short contacts.

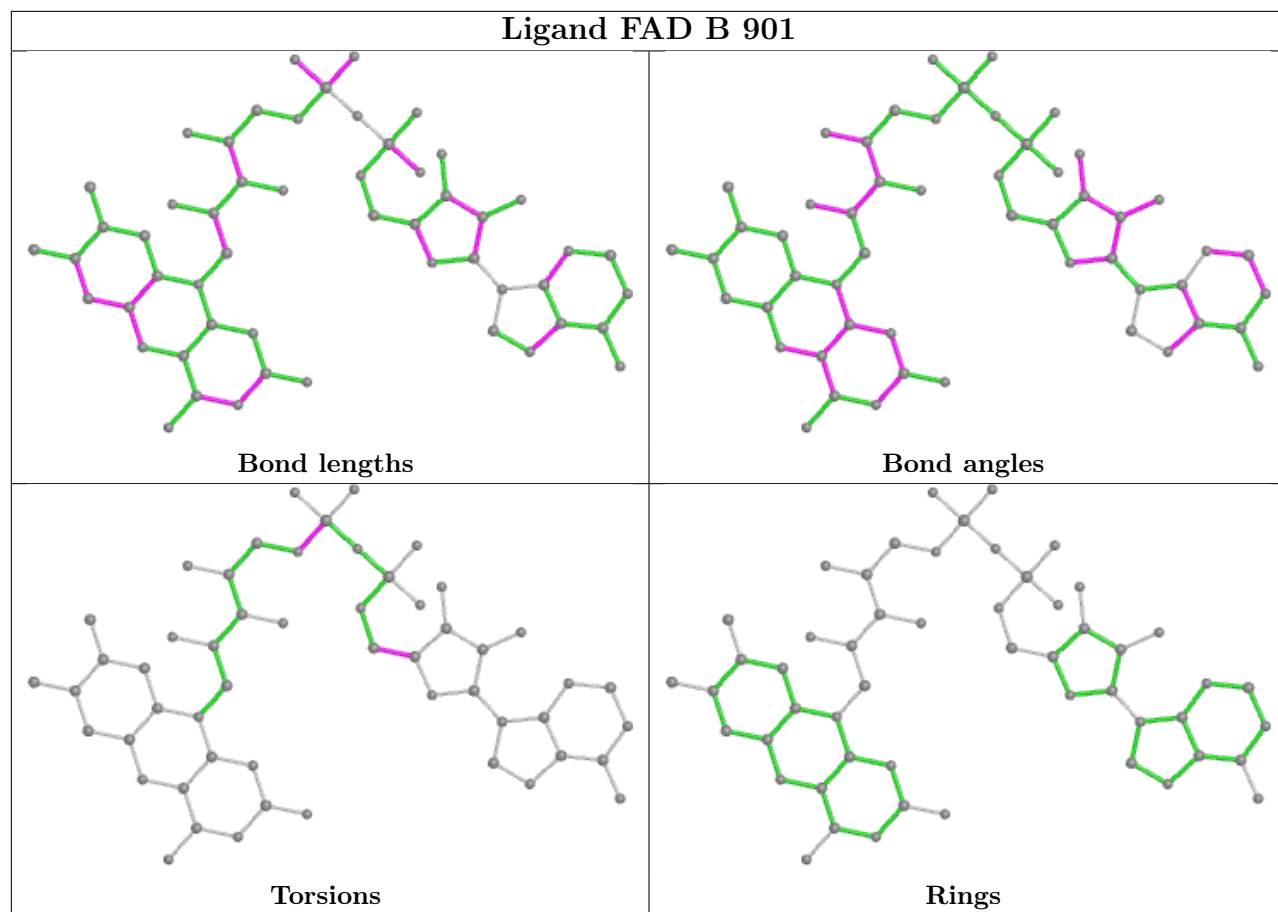
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

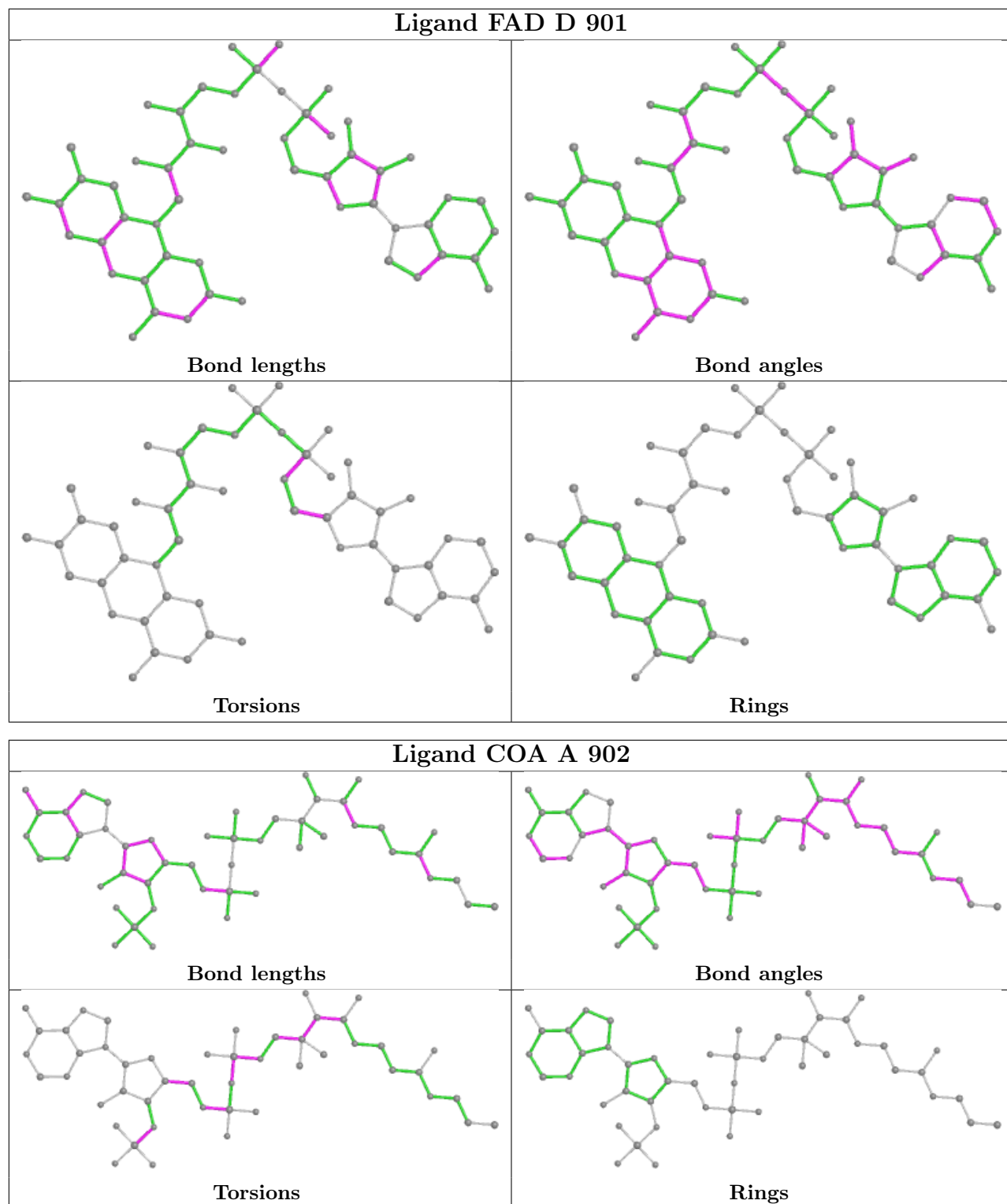


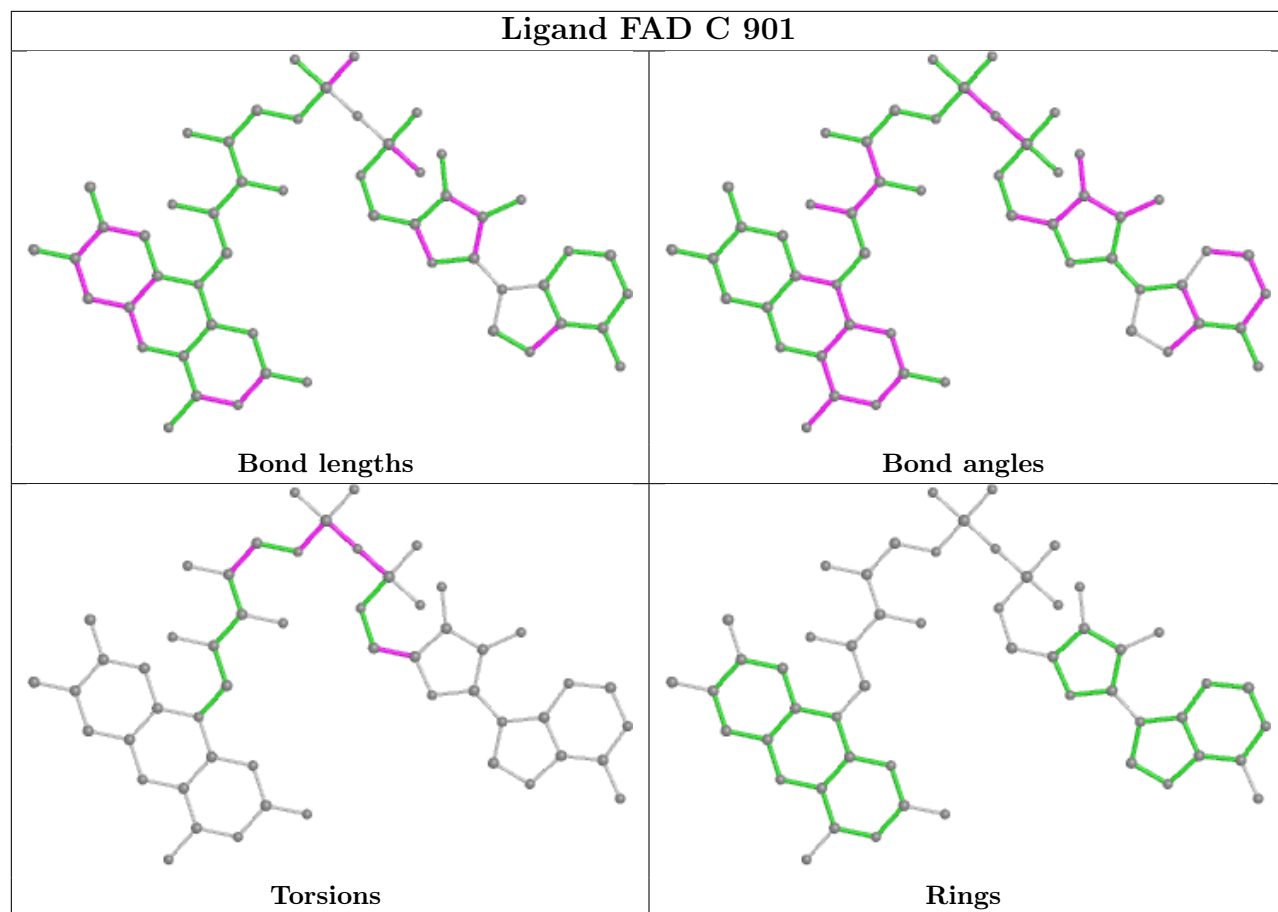
in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

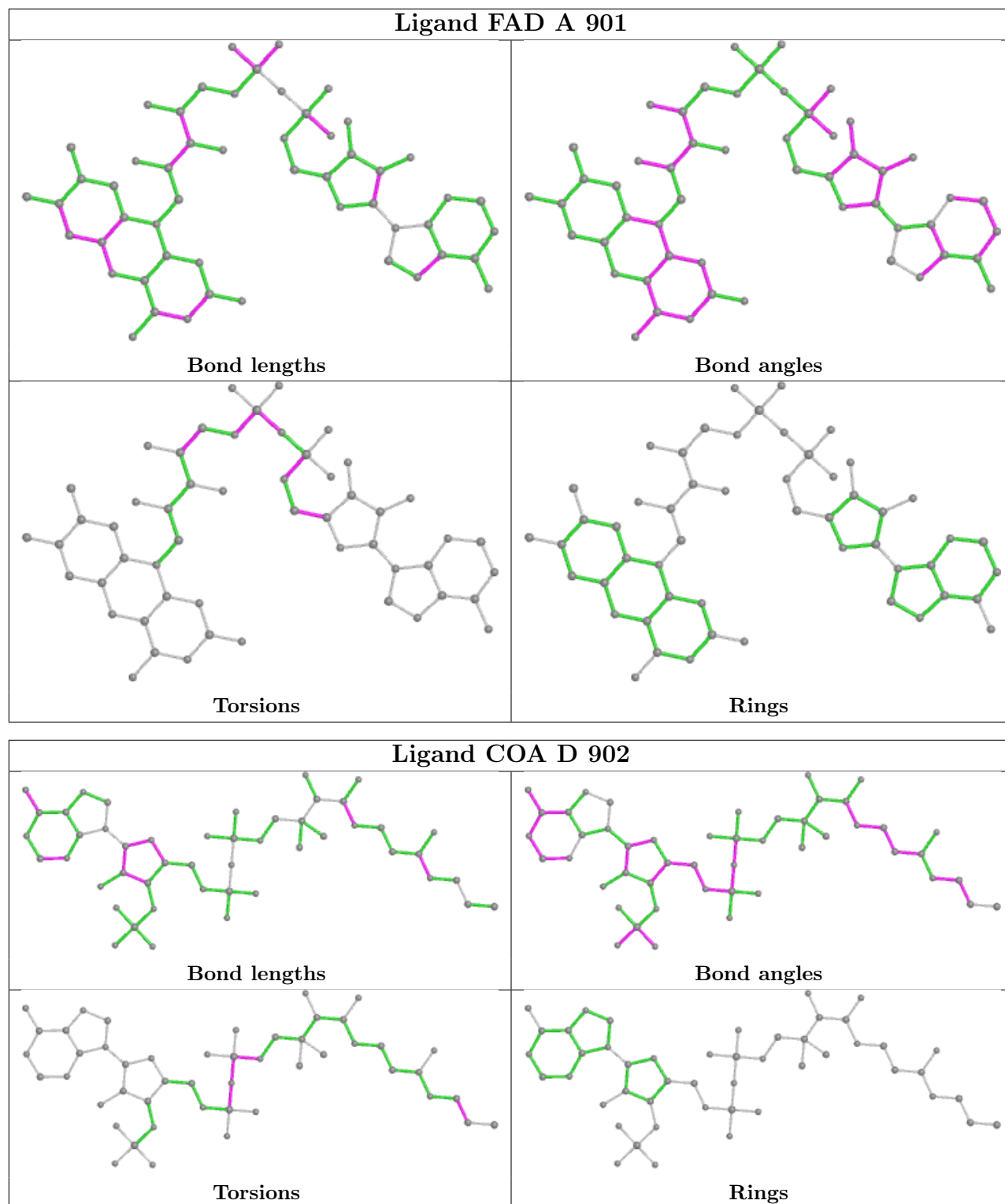












#### 4.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

## 4.8 Polymer linkage issues

There are no chain breaks in this entry.

## 5 Fit of model and data

### 5.1 Protein, DNA and RNA chains

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

### 5.2 Non-standard residues in protein, DNA, RNA chains

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

### 5.3 Carbohydrates

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

### 5.4 Ligands

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

### 5.5 Other polymers

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