



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2023 – 08:14 AM EDT

PDB ID : 6N2O
Title : 2-oxoglutarate:ferredoxin oxidoreductase from *Magnetococcus marinus* with 2-oxoglutarate, coenzyme A and succinyl-CoA bound
Authors : Chen, P.Y.-T.; Drennan, C.L.
Deposited on : 2018-11-13
Resolution : 2.82 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 2.82 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 9 unique types of molecules in this entry. The entry contains 13224 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.

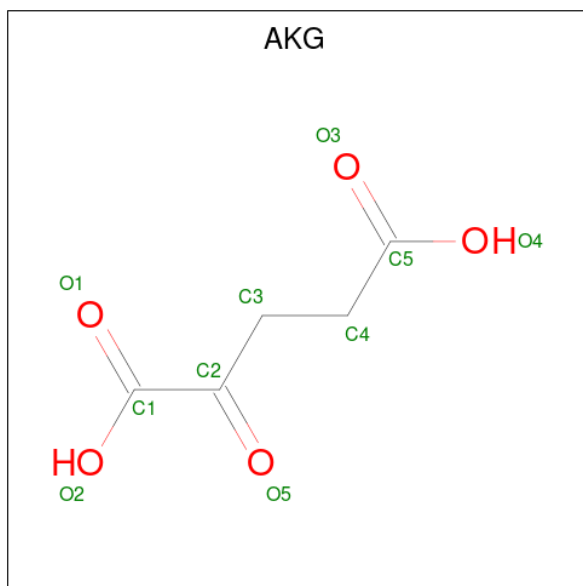
- Molecule 1 is a protein called Pyruvate flavodoxin/ferredoxin oxidoreductase domain protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	572	Total 4327	C 2754	N 716	O 831	S 26	0	0	0
1	C	572	Total 4288	C 2727	N 710	O 825	S 26	0	0	0

- Molecule 2 is a protein called Pyruvate ferredoxin/flavodoxin oxidoreductase, beta subunit.

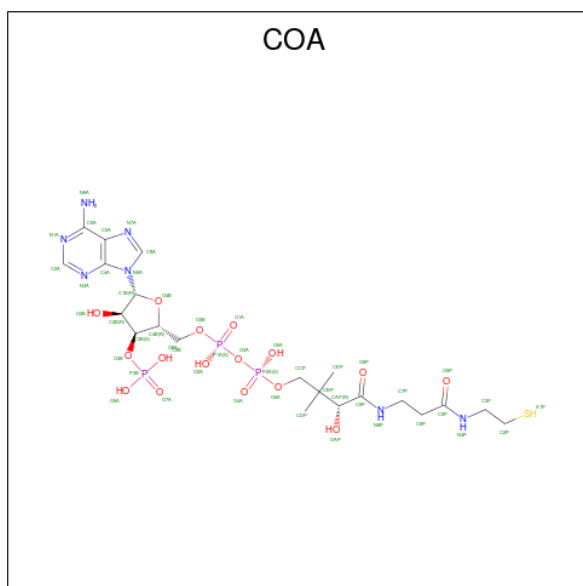
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	291	Total 2197	C 1391	N 376	O 410	S 20	0	0	0
2	D	291	Total 2207	C 1396	N 376	O 415	S 20	0	0	0

- Molecule 3 is 2-OXOGLUTARIC ACID (three-letter code: AKG) (formula: C₅H₆O₅) (labeled as "Ligand of Interest" by depositor).



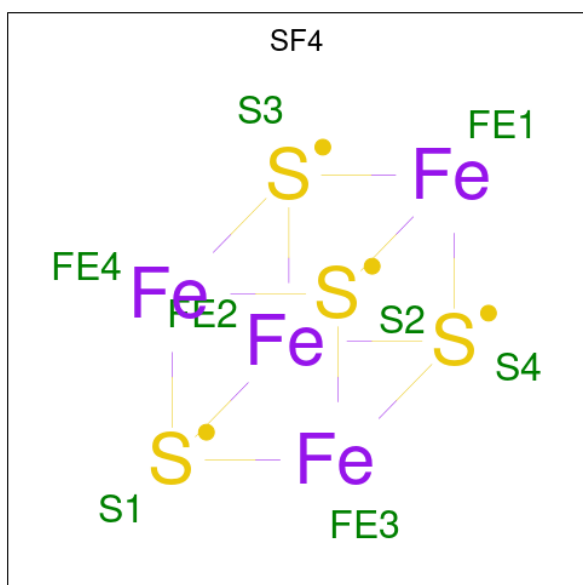
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			10	5	5		

- Molecule 4 is COENZYME A (three-letter code: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$) (labeled as "Ligand of Interest" by depositor).



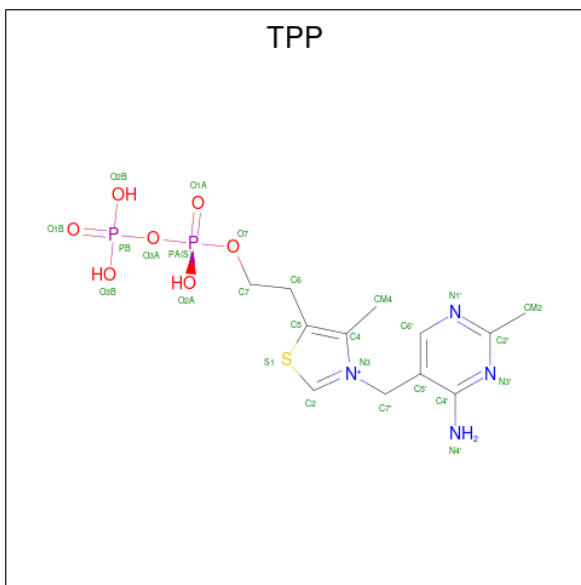
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
4	A	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		

- Molecule 5 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	Fe	S	0	0
			8	4	4		
5	D	1	Total	Fe	S	0	0
			8	4	4		

- Molecule 6 is THIAMINE DIPHOSPHATE (three-letter code: TPP) (formula: C₁₂H₁₉N₄O₇P₂S).

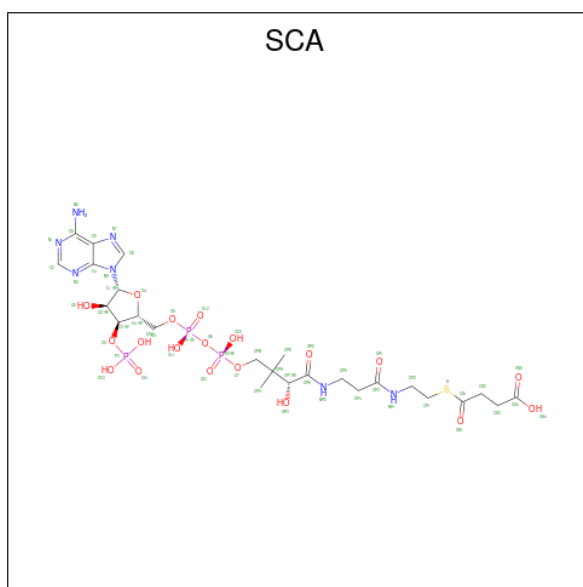


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
6	B	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
6	D	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total	Mg	0	0
			1	1		
7	D	1	Total	Mg	0	0
			1	1		

- Molecule 8 is SUCCINYL-COENZYME A (three-letter code: SCA) (formula: C₂₅H₄₀N₇O₁₉P₃S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
8	C	1	55	25	7	19	3	1	0	0

- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	8	Total O 8 8	0	0
9	B	6	Total O 6 6	0	0
9	C	6	Total O 6 6	0	0
9	D	2	Total O 2 2	0	0

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

3 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.41Å 100.53Å 202.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	90.01 – 2.82	Depositor
% Data completeness (in resolution range)	89.5 (90.01-2.82)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.13	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.92 (at 2.82Å)	Xtrriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, R_{free}	0.212 , 0.261	Depositor
Wilson B-factor (Å ²)	60.8	Xtrriage
Anisotropy	0.750	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	13224	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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.

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](#)

Of 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 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
8	SCA	C	601	6	49,57,57	2.28	4 (8%)	61,84,84	2.74	11 (18%)
4	COA	A	602	-	41,50,50	0.84	1 (2%)	52,75,75	1.40	6 (11%)
6	TPP	D	402	7,8	22,27,27	2.16	7 (31%)	29,40,40	2.31	8 (27%)
3	AKG	A	601	-	9,9,9	1.39	2 (22%)	11,11,11	2.75	2 (18%)
5	SF4	D	401	2	0,12,12	-	-	-	-	-
5	SF4	B	401	2	0,12,12	-	-	-	-	-
6	TPP	B	402	7	22,27,27	1.98	6 (27%)	29,40,40	1.82	6 (20%)

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
8	SCA	C	601	6	-	14/52/72/72	0/3/3/3
4	COA	A	602	-	-	12/44/64/64	0/3/3/3
6	TPP	D	402	7,8	-	1/16/17/17	0/2/2/2
3	AKG	A	601	-	-	2/9/9/9	-
5	SF4	D	401	2	-	-	0/6/5/5
5	SF4	B	401	2	-	-	0/6/5/5
6	TPP	B	402	7	-	1/16/17/17	0/2/2/2

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	C	601	SCA	OS1-CS1	14.57	1.44	1.21
6	D	402	TPP	C6-C5	5.33	1.53	1.50
6	B	402	TPP	C4-N3	-4.77	1.35	1.39
6	D	402	TPP	C4-N3	-3.94	1.36	1.39
6	D	402	TPP	C4'-N4'	3.81	1.43	1.34
6	B	402	TPP	C4'-N4'	3.63	1.43	1.34
6	B	402	TPP	C7'-N3	-3.29	1.42	1.48
6	D	402	TPP	C7'-N3	-3.19	1.42	1.48
3	A	601	AKG	O1-C1	3.18	1.31	1.22
6	D	402	TPP	C7'-C5'	3.15	1.57	1.51
6	B	402	TPP	C7'-C5'	3.09	1.57	1.51
8	C	601	SCA	OS5-CS4	2.83	1.31	1.22

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	602	COA	P2A-O6A	2.76	1.70	1.59
8	C	601	SCA	P2-O7	2.65	1.70	1.59
6	B	402	TPP	C6-C5	2.64	1.52	1.50
3	A	601	AKG	O2-C1	-2.59	1.23	1.30
6	B	402	TPP	C6'-C5'	2.46	1.42	1.37
8	C	601	SCA	OS4-CS4	-2.46	1.22	1.30
6	D	402	TPP	C6'-C5'	2.34	1.42	1.37
6	D	402	TPP	C2-N3	2.19	1.40	1.36

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	601	SCA	OS1-CS1-CS2	-13.39	108.18	123.99
8	C	601	SCA	OS1-CS1-S	-11.46	107.73	122.61
6	D	402	TPP	C6-C5-C4	-8.87	120.31	127.43
3	A	601	AKG	O1-C1-C2	-7.84	111.25	121.72
6	B	402	TPP	C6-C5-C4	-5.29	123.19	127.43
8	C	601	SCA	N3-C2-N1	-4.63	121.44	128.68
4	A	602	COA	N3A-C2A-N1A	-4.49	121.66	128.68
8	C	601	SCA	CS2-CS1-S	-4.49	108.23	113.46
3	A	601	AKG	O2-C1-C2	4.30	125.73	113.97
8	C	601	SCA	CP8-CPA-CP9	-4.30	100.41	109.17
4	A	602	COA	CEP-CBP-CDP	-3.76	101.50	109.17
4	A	602	COA	C7P-N8P-C9P	3.43	128.71	122.59
6	D	402	TPP	CM4-C4-N3	3.31	126.76	122.53
6	D	402	TPP	C6'-N1'-C2'	3.11	121.26	115.96
8	C	601	SCA	OS5-CS4-CS3	-3.06	113.25	123.08
6	B	402	TPP	N4'-C4'-N3'	3.02	121.30	117.03
8	C	601	SCA	OS4-CS4-CS3	2.96	123.53	114.03
4	A	602	COA	C3P-N4P-C5P	2.92	128.26	122.84
6	B	402	TPP	C6'-N1'-C2'	2.88	120.87	115.96
6	B	402	TPP	C5'-C6'-N1'	-2.87	119.04	123.82
8	C	601	SCA	CP1-S-CS1	2.81	110.61	101.87
6	D	402	TPP	C5'-C6'-N1'	-2.73	119.27	123.82
6	D	402	TPP	CM4-C4-C5	-2.57	121.98	127.60
6	D	402	TPP	PA-O3A-PB	-2.56	124.04	132.83
6	B	402	TPP	PA-O3A-PB	-2.54	124.10	132.83
6	D	402	TPP	N4'-C4'-N3'	2.45	120.50	117.03
4	A	602	COA	C3B-C2B-C1B	2.45	105.31	99.89
8	C	601	SCA	CP8-CPA-CPB	2.31	112.00	108.23
8	C	601	SCA	CP5-CP4-CP3	-2.29	108.54	112.36
6	B	402	TPP	CM4-C4-N3	2.26	125.41	122.53

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	601	SCA	CP2-NP1-CP3	2.08	126.70	122.84
6	D	402	TPP	N1'-C2'-N3'	-2.08	121.97	125.54
4	A	602	COA	C1B-N9A-C4A	2.01	130.17	126.64

There are no chirality outliers.

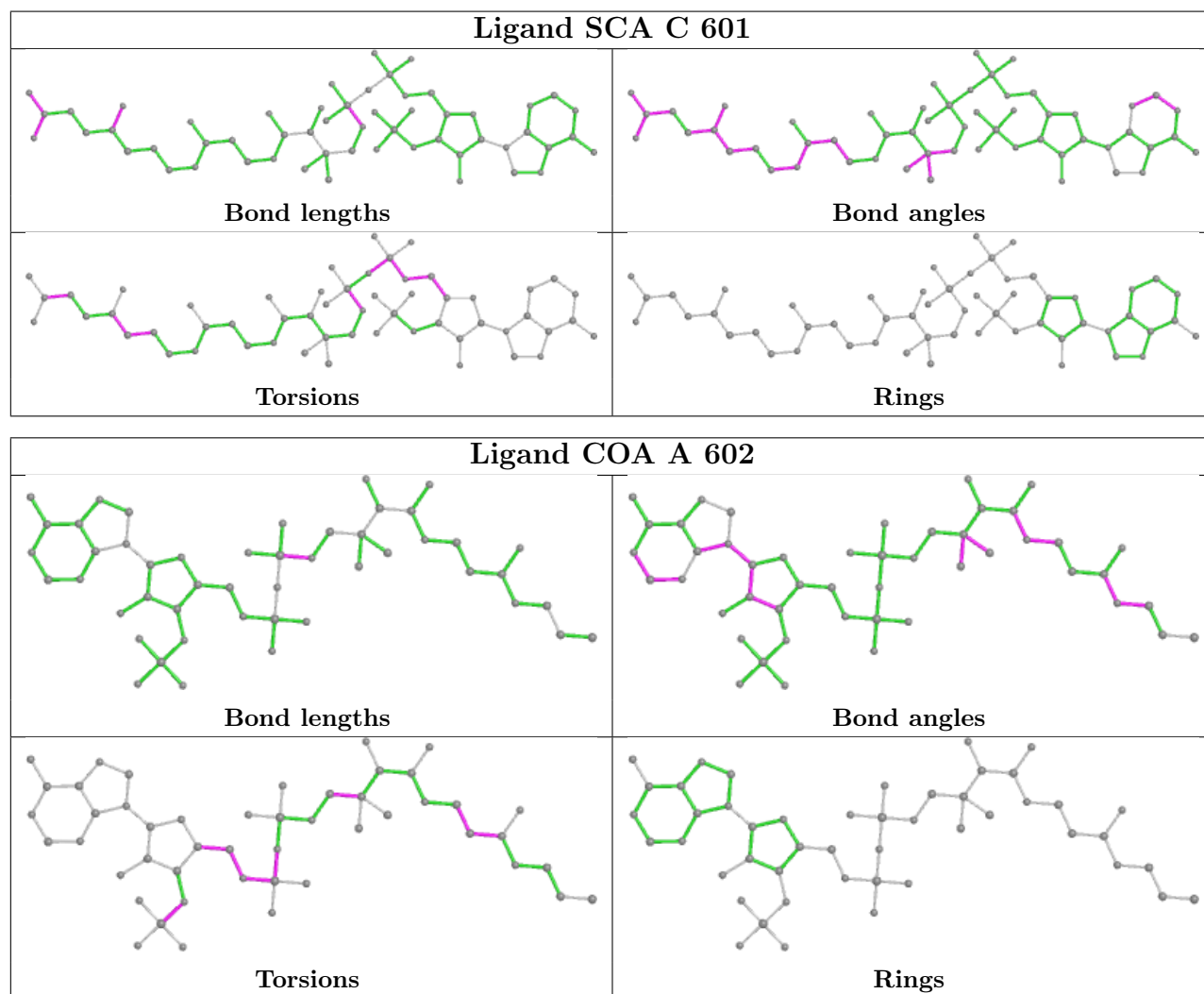
All (30) torsion outliers are listed below:

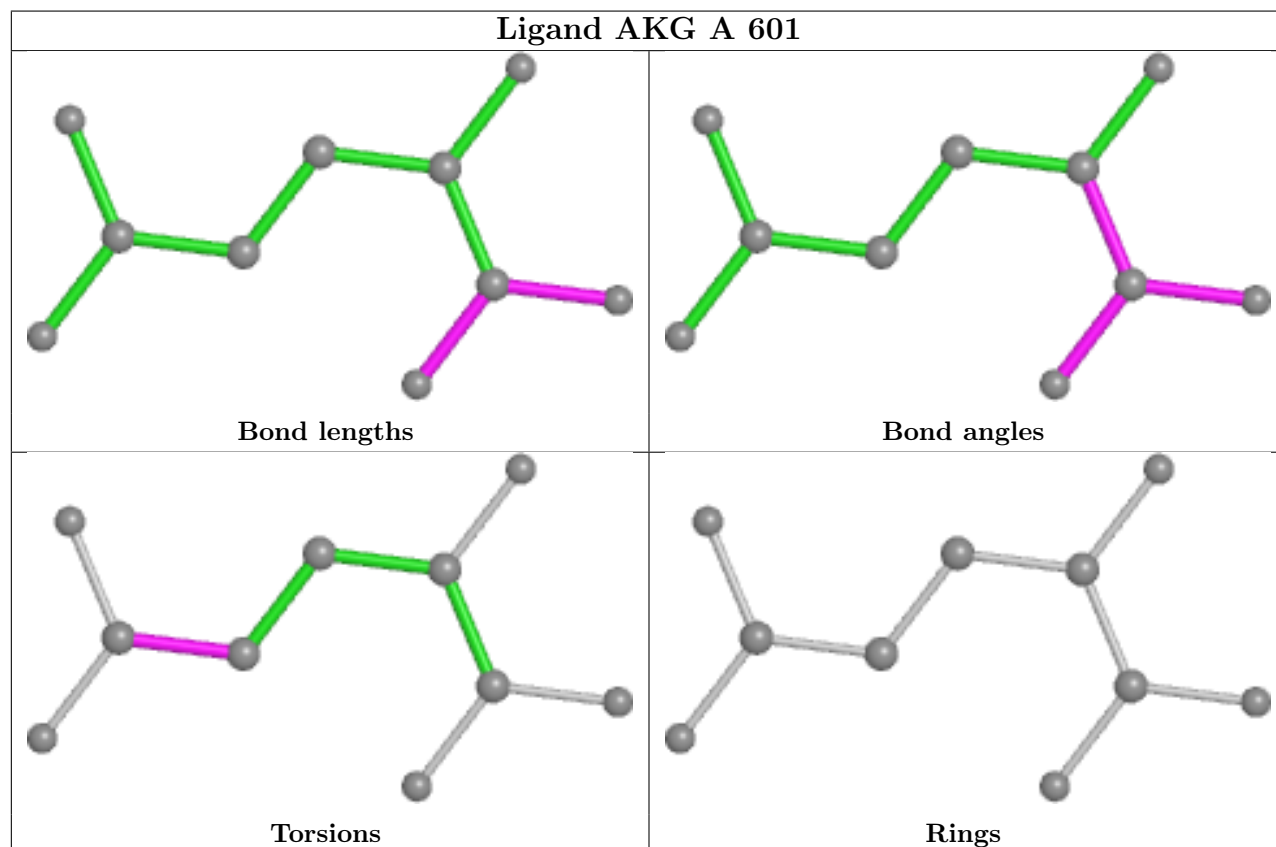
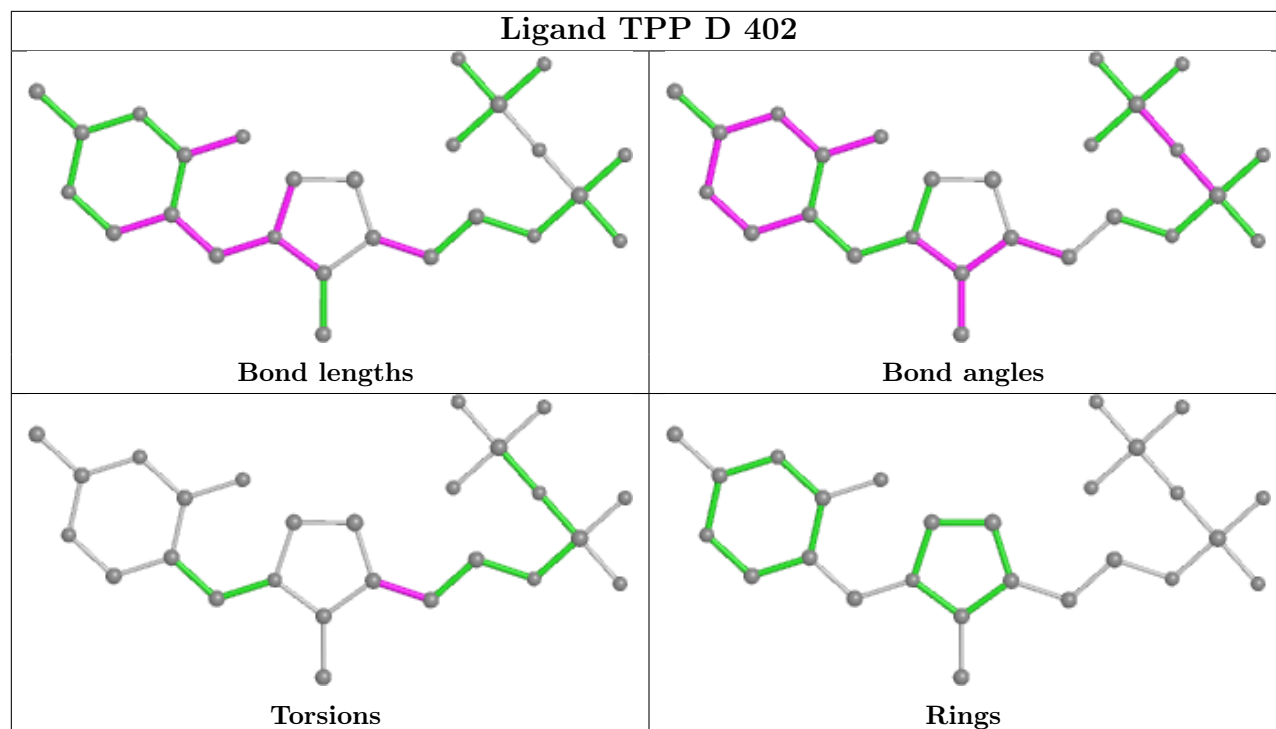
Mol	Chain	Res	Type	Atoms
4	A	602	COA	C3B-O3B-P3B-O7A
4	A	602	COA	C5B-O5B-P1A-O1A
4	A	602	COA	C5B-O5B-P1A-O2A
4	A	602	COA	C5P-C6P-C7P-N8P
8	C	601	SCA	C5'-O5'-P1-O12
8	C	601	SCA	P2-O6-P1-O5'
8	C	601	SCA	CPB-O7-P2-O6
8	C	601	SCA	CP2-CP1-S-CS1
8	C	601	SCA	OS1-CS1-S-CP1
8	C	601	SCA	CS2-CS1-S-CP1
4	A	602	COA	O5P-C5P-C6P-C7P
4	A	602	COA	N4P-C5P-C6P-C7P
4	A	602	COA	P2A-O3A-P1A-O5B
4	A	602	COA	C4B-C5B-O5B-P1A
8	C	601	SCA	C5'-O5'-P1-O6
8	C	601	SCA	C5'-O5'-P1-O11
8	C	601	SCA	CPB-O7-P2-O21
6	B	402	TPP	C4-C5-C6-C7
3	A	601	AKG	C3-C4-C5-O3
8	C	601	SCA	CS2-CS3-CS4-OS4
8	C	601	SCA	C4'-C5'-O5'-P1
4	A	602	COA	CEP-CBP-CCP-O6A
3	A	601	AKG	C3-C4-C5-O4
8	C	601	SCA	CS2-CS3-CS4-OS5
4	A	602	COA	C3B-O3B-P3B-O9A
4	A	602	COA	C5B-O5B-P1A-O3A
8	C	601	SCA	P2-O6-P1-O12
4	A	602	COA	O4B-C4B-C5B-O5B
8	C	601	SCA	O4'-C4'-C5'-O5'
6	D	402	TPP	C4-C5-C6-C7

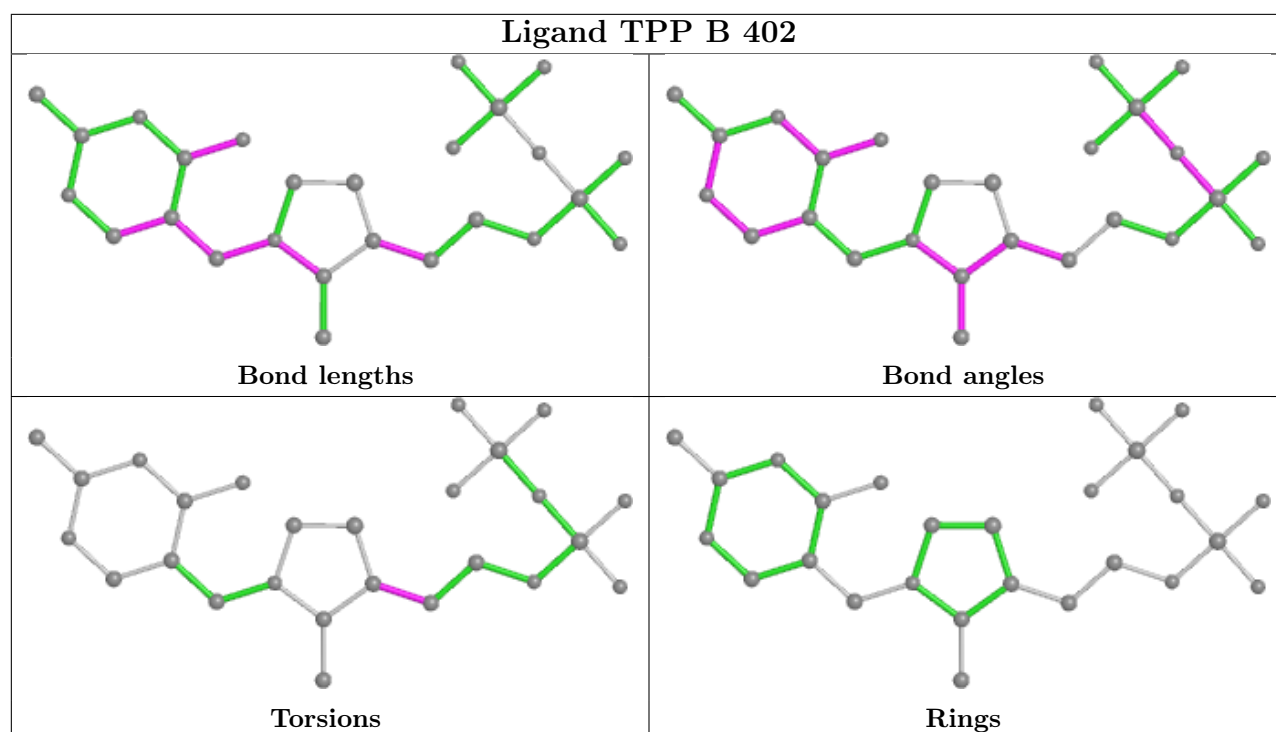
There are no ring outliers.

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

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.