



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 3, 2023 – 11:58 am GMT

PDB ID : 1HJ4
Title : Cytochrome cd1 Nitrite Reductase, x-ray reduced dioxygen complex
Authors : Sjogren, T.; Hajdu, J.
Deposited on : 2001-01-08
Resolution : 1.60 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 : 1.8.4, CSD as541be (2020)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
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) : 2.36

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 1.60 Å.

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

MolProbity failed to run properly; EDS was not executed - the sequence quality summary graphics cannot be shown.

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	DHE	A	602	X	-	-	-
3	DHE	B	602	X	-	-	-
4	GOL	A	611	-	X	-	-

2 Entry composition [i](#)

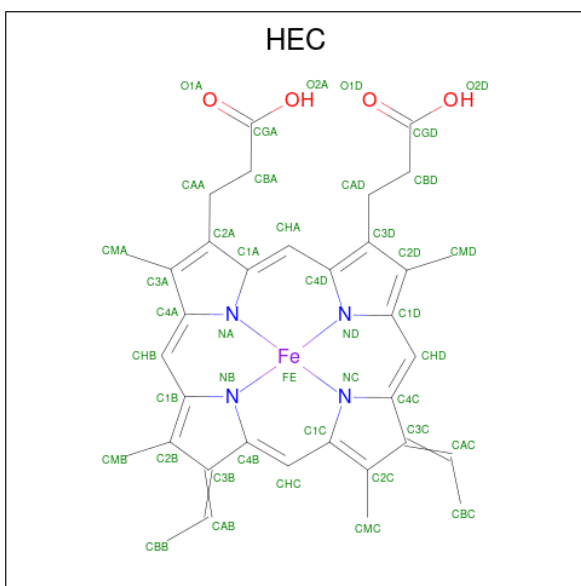
There are 6 unique types of molecules in this entry. The entry contains 9597 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Nitrite reductase.

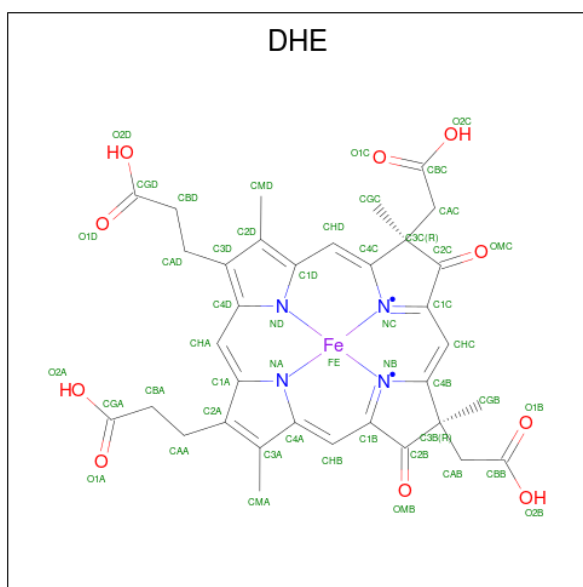
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	551	Total	C	N	O	S	0	0	0
			4290	2710	720	846	14			
1	B	542	Total	C	N	O	S	0	0	0
			4207	2661	701	831	14			

- Molecule 2 is HEME C (three-letter code: HEC) (formula: $C_{34}H_{34}FeN_4O_4$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is HEME D (three-letter code: DHE) (formula: $C_{34}H_{32}FeN_4O_{10}$).



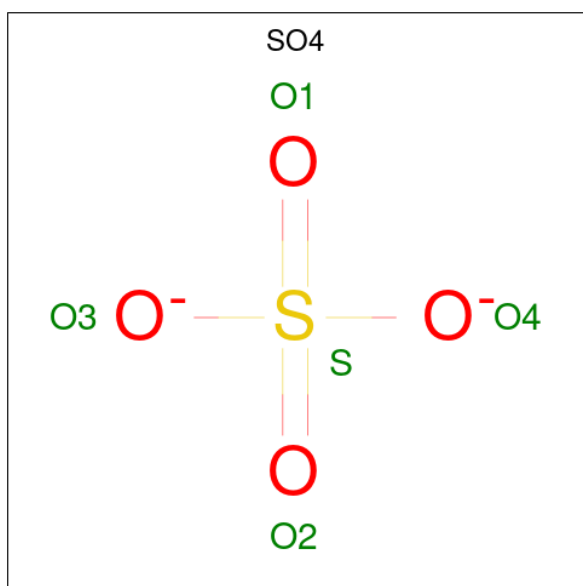
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
3	A	1	49	34	1	4	10	0	0
3	B	1	49	34	1	4	10	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	C O		
4	A	1	6	3 3	0	0
4	A	1	6	3 3	0	0

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	447	Total	O	0	0
			447	447		
6	B	442	Total	O	0	0
			442	442		

MolProbity failed to run properly; EDS was not executed - this section is therefore empty.

3 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	106.69Å 60.90Å 100.59Å 90.00° 112.08° 90.00°	Depositor
Resolution (Å)	30.00 – 1.60	Depositor
% Data completeness (in resolution range)	93.9 (30.00-1.60)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	0.04	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.202 , 0.226	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	9597	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

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](#)

9 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
4	GOL	A	611	-	5,5,5	3.99	1 (20%)	5,5,5	2.70	3 (60%)
3	DHE	B	602	1	50,56,56	4.65	11 (22%)	44,94,94	1.95	13 (29%)
5	SO4	B	622	-	4,4,4	0.62	0	6,6,6	0.04	0
3	DHE	A	602	1	50,56,56	4.74	12 (24%)	44,94,94	1.93	12 (27%)
2	HEC	B	601	1	32,50,50	2.17	4 (12%)	24,82,82	2.16	12 (50%)
5	SO4	B	621	-	4,4,4	0.66	0	6,6,6	0.13	0
2	HEC	A	601	1	32,50,50	2.19	4 (12%)	24,82,82	2.13	13 (54%)
4	GOL	A	612	-	5,5,5	3.82	1 (20%)	5,5,5	2.03	1 (20%)
5	SO4	A	621	-	4,4,4	0.60	0	6,6,6	0.14	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
4	GOL	A	611	-	-	2/4/4/4	-
3	DHE	B	602	1	1/1/15/19	6/20/108/108	-
3	DHE	A	602	1	1/1/15/19	7/20/108/108	-
2	HEC	B	601	1	-	3/10/54/54	-
2	HEC	A	601	1	-	3/10/54/54	-
4	GOL	A	612	-	-	2/4/4/4	-

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	602	DHE	OMC-C2C	18.04	1.54	1.22
3	B	602	DHE	OMC-C2C	17.81	1.53	1.22
3	B	602	DHE	OMB-C2B	17.77	1.53	1.22
3	A	602	DHE	OMB-C2B	17.73	1.53	1.22
3	A	602	DHE	C3B-C2B	-12.64	1.33	1.52
3	B	602	DHE	C3C-C2C	-12.44	1.33	1.52
3	A	602	DHE	C3C-C2C	-12.43	1.33	1.52
3	B	602	DHE	C3B-C2B	-11.58	1.35	1.52
4	A	611	GOL	C1-C2	8.87	1.88	1.51
4	A	612	GOL	C1-C2	8.31	1.85	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	602	DHE	CAC-CBC	-7.31	1.28	1.50
2	B	601	HEC	C3C-C2C	-6.99	1.33	1.40
3	B	602	DHE	CAC-CBC	-6.99	1.29	1.50
2	A	601	HEC	C2B-C3B	-6.98	1.33	1.40
2	A	601	HEC	C3C-C2C	-6.93	1.33	1.40
2	B	601	HEC	C2B-C3B	-6.80	1.33	1.40
3	B	602	DHE	CAB-CBB	-6.80	1.29	1.50
3	A	602	DHE	CAB-CBB	-6.42	1.31	1.50
2	A	601	HEC	CBC-CAC	-3.07	1.38	1.49
3	A	602	DHE	CAB-C3B	-3.06	1.44	1.54
2	B	601	HEC	CBC-CAC	-3.06	1.38	1.49
3	A	602	DHE	O1C-CBC	3.00	1.32	1.22
2	A	601	HEC	CBB-CAB	-2.96	1.38	1.49
3	B	602	DHE	CAC-C3C	-2.81	1.45	1.54
3	B	602	DHE	O1C-CBC	2.70	1.31	1.22
3	A	602	DHE	CMA-C3A	2.57	1.56	1.50
2	B	601	HEC	CBB-CAB	-2.56	1.39	1.49
3	B	602	DHE	CMA-C3A	2.42	1.55	1.50
3	A	602	DHE	CAC-C3C	-2.35	1.47	1.54
3	A	602	DHE	CHA-C1A	2.25	1.38	1.35
3	B	602	DHE	CAB-C3B	-2.23	1.47	1.54
3	A	602	DHE	O1B-CBB	2.20	1.29	1.22
3	B	602	DHE	O1B-CBB	2.13	1.29	1.22

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	602	DHE	CGB-C3B-C2B	-5.11	95.96	109.47
4	A	611	GOL	C3-C2-C1	-4.34	94.82	111.70
3	B	602	DHE	CGB-C3B-C2B	-3.93	99.08	109.47
2	A	601	HEC	CBD-CAD-C3D	3.86	119.21	112.62
2	B	601	HEC	CBD-CAD-C3D	3.86	119.21	112.62
3	B	602	DHE	CGC-C3C-C2C	-3.83	99.33	109.47
3	A	602	DHE	O2C-CBC-O1C	-3.58	114.37	123.30
3	A	602	DHE	O2C-CBC-CAC	3.57	125.82	114.35
3	A	602	DHE	CAA-CBA-CGA	3.55	121.25	113.60
3	B	602	DHE	O2C-CBC-CAC	3.44	125.40	114.35
3	A	602	DHE	CBD-CAD-C3D	3.42	118.46	112.62
2	B	601	HEC	CMD-C2D-C1D	-3.42	123.21	128.46
2	A	601	HEC	CMC-C2C-C1C	-3.41	123.22	128.46
2	B	601	HEC	CMC-C2C-C1C	-3.40	123.25	128.46
3	A	602	DHE	OMC-C2C-C3C	3.37	130.14	125.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	HEC	CMD-C2D-C1D	-3.36	123.30	128.46
3	B	602	DHE	O2C-CBC-O1C	-3.31	115.05	123.30
4	A	612	GOL	C3-C2-C1	-3.28	98.94	111.70
3	B	602	DHE	CMD-C2D-C1D	-3.24	123.48	128.46
3	B	602	DHE	CAA-CBA-CGA	3.23	120.56	113.60
2	A	601	HEC	CMC-C2C-C3C	3.17	129.55	125.82
3	B	602	DHE	O2B-CBB-O1B	-3.16	115.42	123.30
2	B	601	HEC	CMB-C2B-C1B	-3.13	123.65	128.46
3	B	602	DHE	OMC-C2C-C3C	3.12	129.82	125.92
2	B	601	HEC	CMC-C2C-C3C	3.09	129.45	125.82
4	A	611	GOL	O2-C2-C1	-3.07	95.60	109.12
3	B	602	DHE	C1D-CHD-C4C	-3.06	124.06	130.12
3	A	602	DHE	OMB-C2B-C3B	3.05	129.73	125.92
3	B	602	DHE	O2B-CBB-CAB	3.01	124.03	114.35
3	B	602	DHE	OMB-C2B-C3B	2.99	129.66	125.92
3	A	602	DHE	CMD-C2D-C1D	-2.98	123.88	128.46
2	A	601	HEC	CMB-C2B-C1B	-2.98	123.88	128.46
2	B	601	HEC	CMB-C2B-C3B	2.92	129.25	125.82
4	A	611	GOL	O1-C1-C2	-2.87	96.46	110.20
2	A	601	HEC	CMB-C2B-C3B	2.77	129.08	125.82
3	B	602	DHE	CBD-CAD-C3D	2.76	117.33	112.62
2	B	601	HEC	CBA-CAA-C2A	2.69	117.13	112.60
2	A	601	HEC	CMA-C3A-C2A	2.62	129.87	124.94
3	A	602	DHE	O2B-CBB-CAB	2.55	122.53	114.35
3	A	602	DHE	C1D-CHD-C4C	-2.51	125.15	130.12
2	A	601	HEC	CBA-CAA-C2A	2.49	116.80	112.60
2	B	601	HEC	CMA-C3A-C2A	2.31	129.29	124.94
2	B	601	HEC	O1D-CGD-CBD	-2.25	115.86	123.08
2	B	601	HEC	CMD-C2D-C3D	2.18	129.06	124.94
2	B	601	HEC	C2B-C3B-C4B	2.16	108.68	106.35
3	B	602	DHE	O1D-CGD-CBD	-2.15	116.17	123.08
3	A	602	DHE	O1D-CGD-CBD	-2.12	116.28	123.08
2	A	601	HEC	O1D-CGD-CBD	-2.10	116.34	123.08
3	A	602	DHE	O2B-CBB-O1B	-2.09	118.08	123.30
2	A	601	HEC	CMD-C2D-C3D	2.06	128.82	124.94
2	A	601	HEC	C2B-C3B-C4B	2.04	108.56	106.35
2	B	601	HEC	O1A-CGA-CBA	-2.04	116.53	123.08
2	A	601	HEC	O1A-CGA-CBA	-2.02	116.60	123.08
2	A	601	HEC	C4C-C3C-C2C	2.00	108.51	106.35

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	602	DHE	NA
3	B	602	DHE	NA

All (23) torsion outliers are listed below:

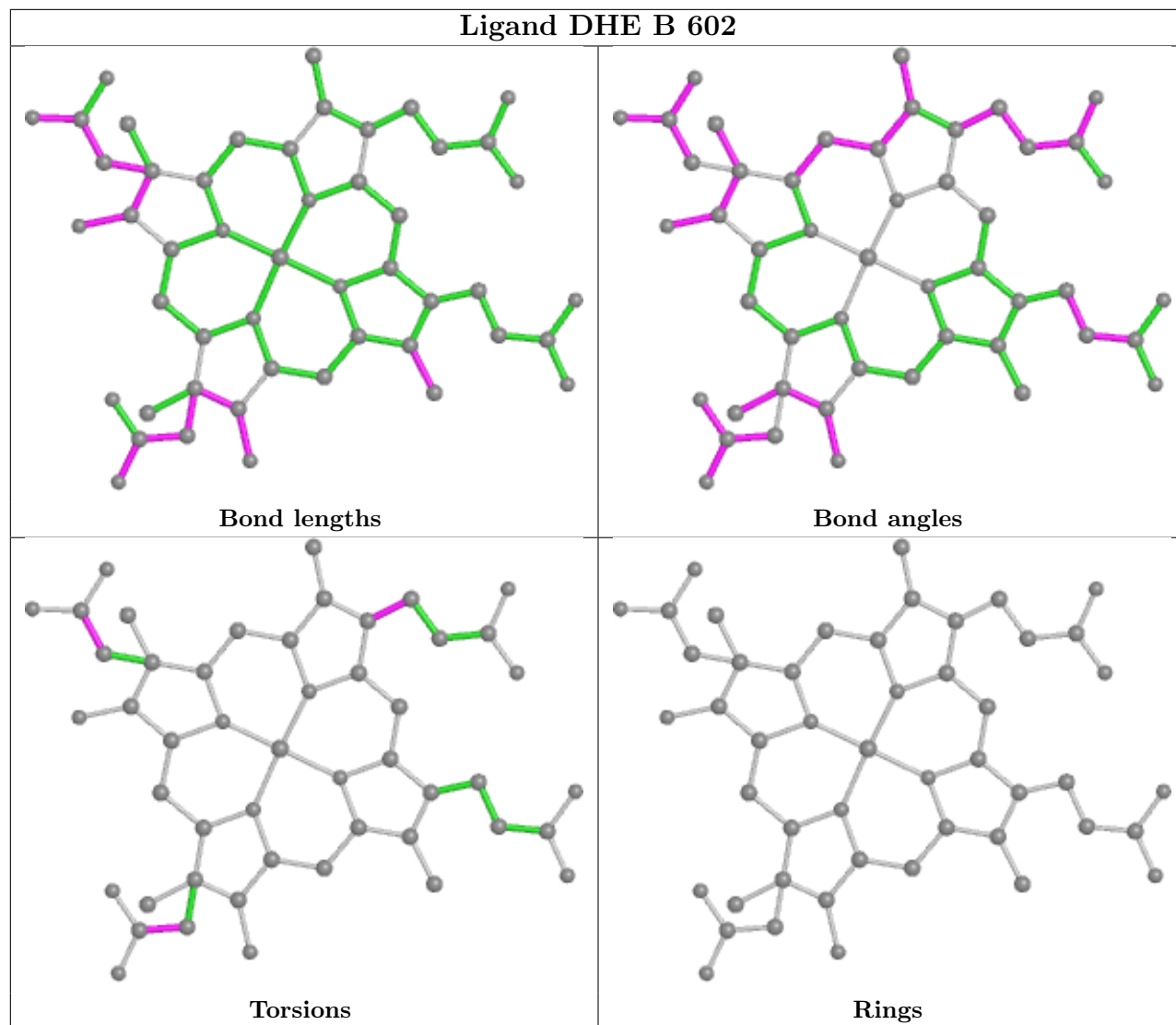
Mol	Chain	Res	Type	Atoms
3	A	602	DHE	C4B-C3B-CAB-CBB
3	A	602	DHE	C2D-C3D-CAD-CBD
3	A	602	DHE	C4D-C3D-CAD-CBD
3	B	602	DHE	C2D-C3D-CAD-CBD
3	B	602	DHE	C4D-C3D-CAD-CBD
4	A	611	GOL	C1-C2-C3-O3
4	A	612	GOL	O2-C2-C3-O3
4	A	612	GOL	C1-C2-C3-O3
3	B	602	DHE	C3B-CAB-CBB-O1B
3	A	602	DHE	C3B-CAB-CBB-O2B
3	B	602	DHE	C3B-CAB-CBB-O2B
3	A	602	DHE	C3B-CAB-CBB-O1B
3	A	602	DHE	C3C-CAC-CBC-O1C
3	A	602	DHE	C3C-CAC-CBC-O2C
3	B	602	DHE	C3C-CAC-CBC-O2C
2	B	601	HEC	C2D-C3D-CAD-CBD
2	B	601	HEC	C4D-C3D-CAD-CBD
3	B	602	DHE	C3C-CAC-CBC-O1C
2	A	601	HEC	CAD-CBD-CGD-O2D
2	A	601	HEC	CAD-CBD-CGD-O1D
4	A	611	GOL	O2-C2-C3-O3
2	A	601	HEC	C2A-CAA-CBA-CGA
2	B	601	HEC	CAA-CBA-CGA-O2A

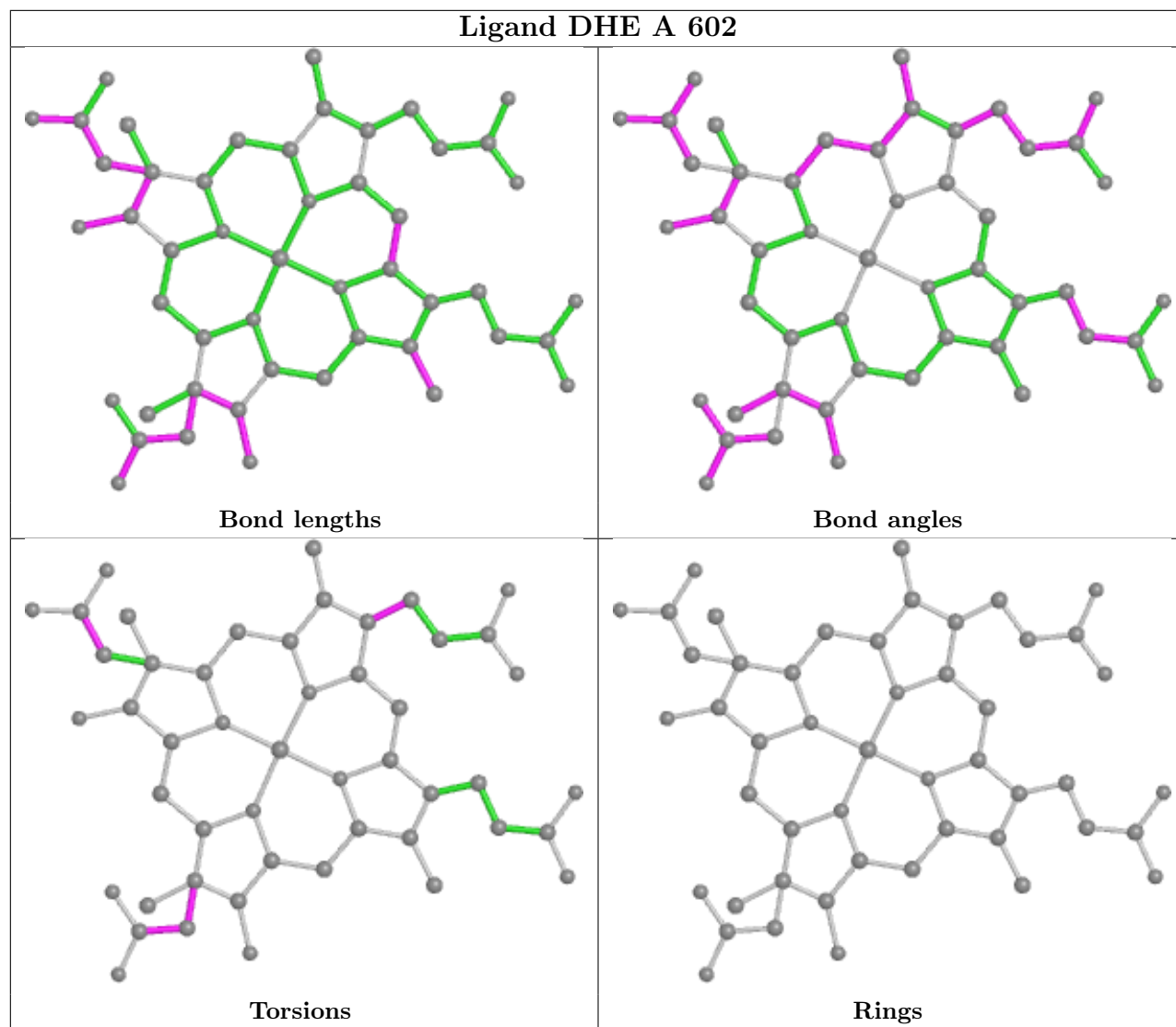
There are no ring outliers.

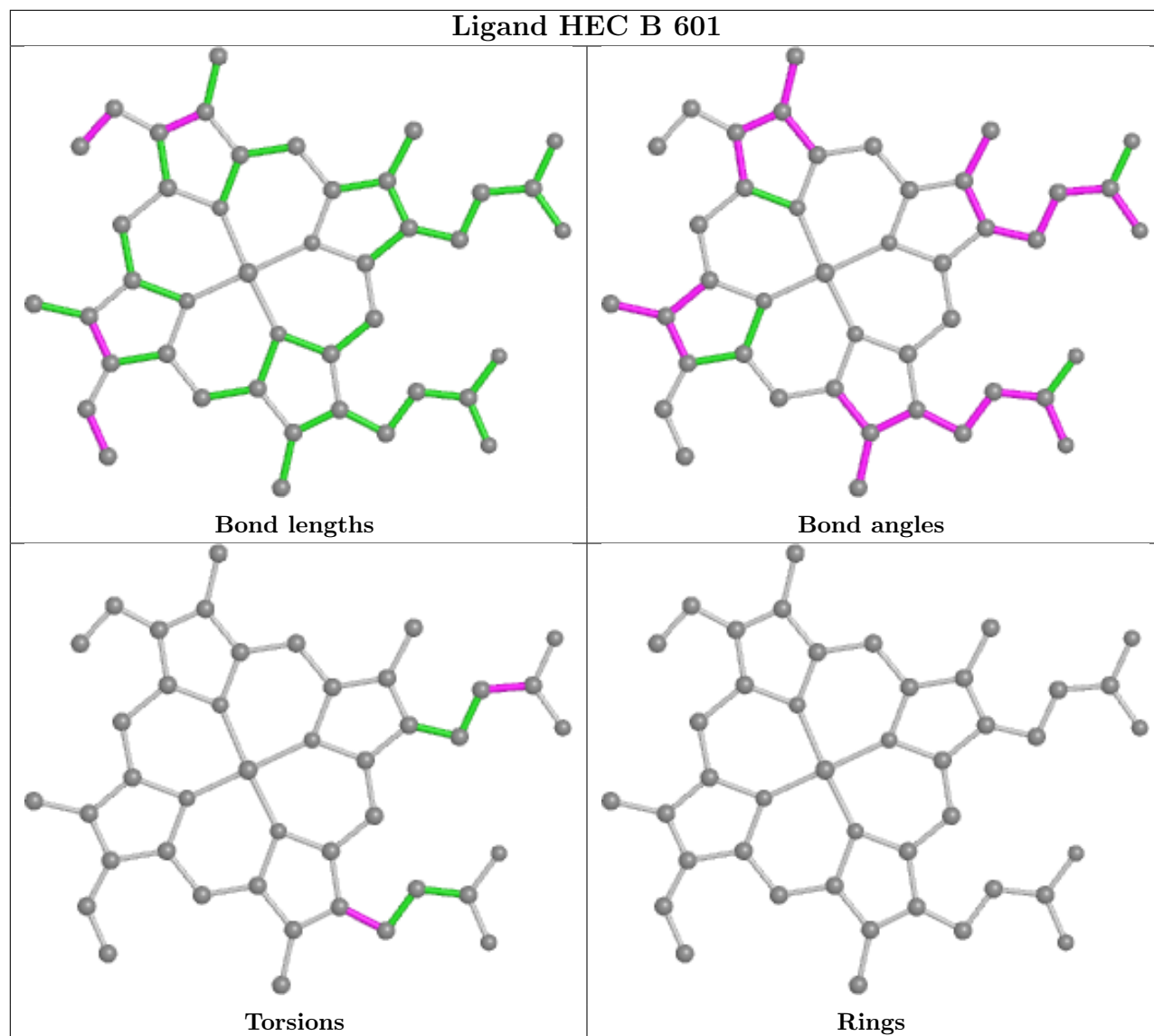
No monomer is involved in short contacts.

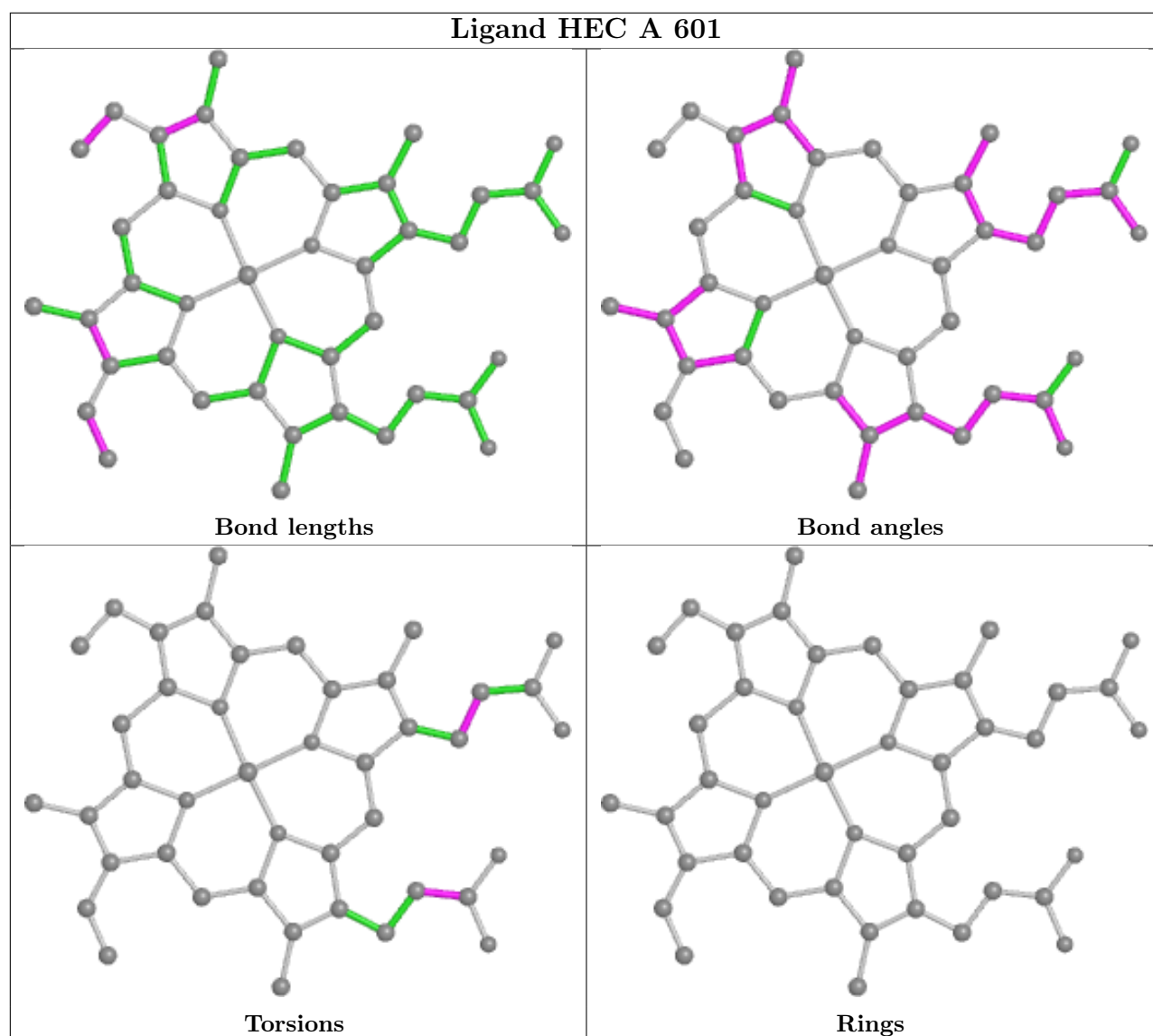
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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 was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

5.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

5.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

5.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.