



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 27, 2026 – 07:50 PM EDT

PDB ID : 1NIR / pdb_00001nir
Title : OXYDIZED NITRITE REDUCTASE FROM PSEUDOMONAS AERUGINOSA
Authors : Nurizzo, D.; Tegoni, M.; Cambillau, C.
Deposited on : 1997-06-17
Resolution : 2.15 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	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	FAILED
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

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 2.15 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.

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
2	PO4	A	604	-	X	-	-
2	PO4	B	604	-	X	-	-

2 Entry composition [i](#)

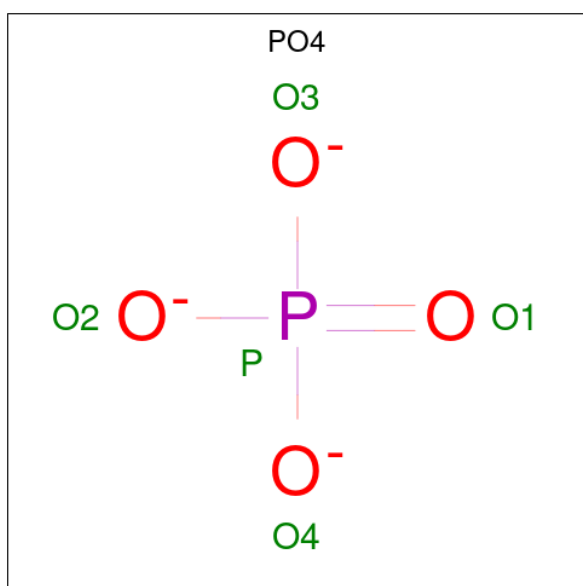
There are 7 unique types of molecules in this entry. The entry contains 9483 atoms, of which 0 are hydrogens and 0 are deuteriums.

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
1	A	538	Total	C	N	O	S	0	0	0
			4203	2665	733	793	12			
1	B	539	Total	C	N	O	S	0	0	0
			4212	2671	735	794	12			

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).

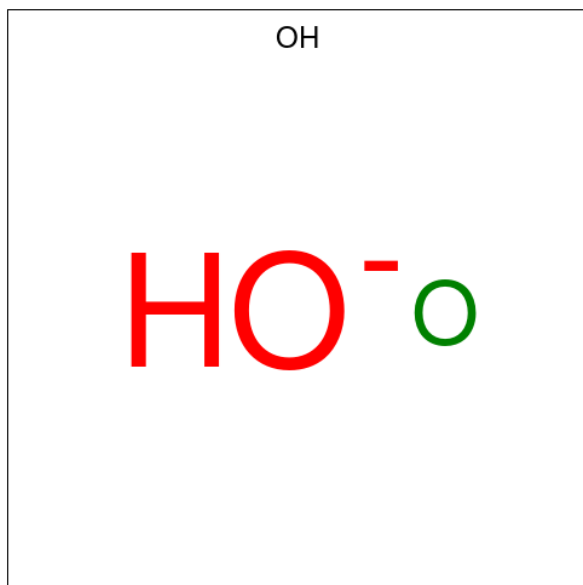


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

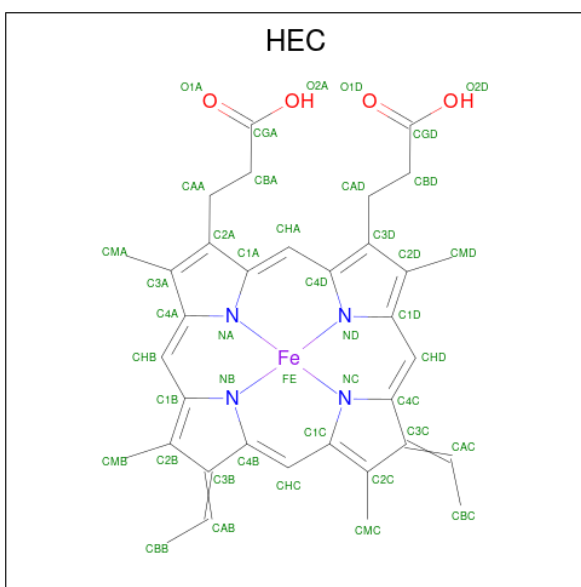
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		

- Molecule 4 is HYDROXIDE ION (CCD ID: OH) (formula: HO).



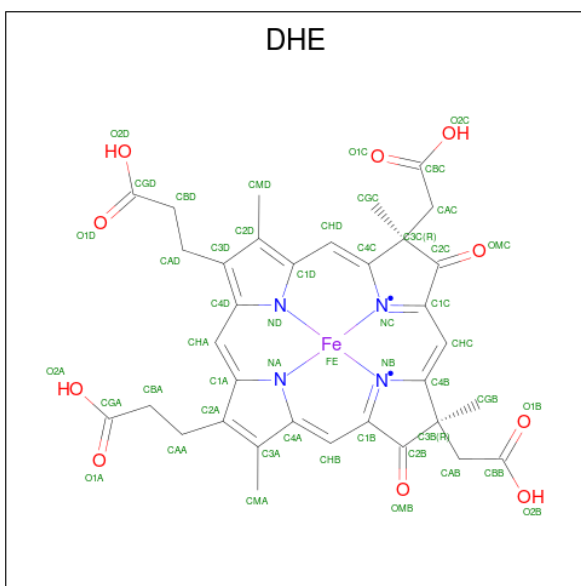
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	O	0	0
			1	1		
4	B	1	Total	O	0	0
			1	1		

- Molecule 5 is HEME C (CCD ID: HEC) (formula: C₃₄H₃₄FeN₄O₄).



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

- Molecule 6 is HEME D (CCD ID: DHE) (formula: $\text{C}_{34}\text{H}_{32}\text{FeN}_4\text{O}_{10}$).



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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	449	Total 449	O 449	0	0
7	B	421	Total 421	O 421	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 2	Depositor
Cell constants a, b, c, α , β , γ	163.07Å 90.07Å 111.89Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.15	Depositor
% Data completeness (in resolution range)	89.0 (30.00-2.15)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.31 (at 2.14Å)	Xtriage
Refinement program	X-PLOR 3.8	Depositor
R, R_{free}	0.209 , 0.242	Depositor
Wilson B-factor (Å ²)	35.2	Xtriage
Anisotropy	0.053	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	9483	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 47.40 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.9823e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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 oligosaccharides in this entry.

4.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 2 are monoatomic and 2 are modelled with single atom - leaving 6 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
5	HEC	B	601	1	46,50,50	1.49	2 (4%)	58,82,82	1.03	4 (6%)
6	DHE	A	602	1,4	52,56,56	1.90	8 (15%)	68,94,94	1.71	10 (14%)
2	PO4	A	604	-	4,4,4	3.39	4 (100%)	6,6,6	0.58	0
6	DHE	B	602	1,4	52,56,56	1.88	8 (15%)	68,94,94	1.73	14 (20%)
2	PO4	B	604	-	4,4,4	3.35	4 (100%)	6,6,6	1.23	1 (16%)
5	HEC	A	601	1	46,50,50	1.45	2 (4%)	58,82,82	1.24	3 (5%)

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
5	HEC	B	601	1	-	6/14/54/54	-
5	HEC	A	601	1	-	6/14/54/54	-
6	DHE	B	602	1,4	1/1/15/19	8/20/108/108	-
6	DHE	A	602	1,4	1/1/15/19	6/20/108/108	-

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	602	DHE	CBD-CAD	-6.52	1.29	1.51
6	B	602	DHE	CBD-CAD	-6.44	1.29	1.51
5	B	601	HEC	CAC-C3C	5.74	1.53	1.35
5	B	601	HEC	CAB-C3B	5.72	1.53	1.35
5	A	601	HEC	CAB-C3B	5.52	1.52	1.35
2	A	604	PO4	P-O1	5.15	1.62	1.50
5	A	601	HEC	CAC-C3C	4.89	1.50	1.35
2	B	604	PO4	P-O1	4.69	1.61	1.50
6	A	602	DHE	FE-NC	4.55	2.08	1.94
6	B	602	DHE	FE-NC	4.32	2.08	1.94
6	B	602	DHE	CGC-C3C	4.22	1.62	1.54
6	A	602	DHE	FE-ND	4.15	2.08	1.95
6	A	602	DHE	CGB-C3B	4.12	1.61	1.54
6	B	602	DHE	FE-NB	4.00	2.07	1.94

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	602	DHE	CGC-C3C	3.86	1.61	1.54
6	B	602	DHE	CGB-C3B	3.80	1.61	1.54
6	B	602	DHE	FE-ND	3.76	2.07	1.95
6	A	602	DHE	FE-NA	3.76	2.07	1.95
6	A	602	DHE	FE-NB	3.70	2.06	1.94
6	B	602	DHE	FE-NA	3.66	2.07	1.95
2	B	604	PO4	P-O3	2.89	1.63	1.54
2	B	604	PO4	P-O2	2.87	1.63	1.54
2	A	604	PO4	P-O4	2.79	1.62	1.54
2	B	604	PO4	P-O4	2.52	1.62	1.54
2	A	604	PO4	P-O3	2.51	1.62	1.54
2	A	604	PO4	P-O2	2.31	1.61	1.54
6	B	602	DHE	CAB-C3B	-2.18	1.48	1.54
6	A	602	DHE	CAB-C3B	-2.13	1.48	1.54

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	602	DHE	CBD-CAD-C3D	5.25	127.06	112.53
6	A	602	DHE	CAD-CBD-CGD	5.05	127.07	113.67
6	B	602	DHE	C1C-NC-C4C	4.87	110.98	105.21
6	A	602	DHE	C1C-NC-C4C	4.82	110.91	105.21
6	A	602	DHE	CBD-CAD-C3D	4.72	125.58	112.53
6	A	602	DHE	C4B-NB-C1B	4.63	110.69	105.21
6	B	602	DHE	CAD-CBD-CGD	4.63	125.93	113.67
6	B	602	DHE	C4B-NB-C1B	4.50	110.53	105.21
5	A	601	HEC	CBB-CAB-C3B	-4.44	118.55	127.43
5	A	601	HEC	CBC-CAC-C3C	-3.76	119.92	127.43
6	A	602	DHE	C3B-C4B-CHC	3.51	125.56	122.44
6	B	602	DHE	C3B-C4B-CHC	3.49	125.54	122.44
6	A	602	DHE	CHB-C1B-NB	3.05	127.71	124.42
6	B	602	DHE	C3C-C4C-CHD	2.60	124.75	122.44
5	B	601	HEC	CBC-CAC-C3C	-2.56	122.32	127.43
6	B	602	DHE	C3D-C4D-ND	-2.51	107.36	110.15
6	A	602	DHE	C3C-C4C-CHD	2.45	124.62	122.44
6	A	602	DHE	C3D-C4D-ND	-2.39	107.50	110.15
6	A	602	DHE	CHC-C1C-NC	2.36	126.97	124.42
6	B	602	DHE	CHB-C1B-NB	2.31	126.91	124.42
5	B	601	HEC	CMA-C3A-C4A	2.29	128.75	124.73
6	B	602	DHE	C1C-CHC-C4B	2.27	128.83	125.23
6	B	602	DHE	CHC-C1C-NC	2.26	126.86	124.42
6	B	602	DHE	C2A-C1A-NA	-2.20	108.20	110.32

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	602	DHE	C4D-ND-C1D	2.17	109.36	105.82
6	A	602	DHE	C1C-CHC-C4B	2.17	128.67	125.23
5	A	601	HEC	CBD-CAD-C3D	-2.11	106.70	112.53
6	B	602	DHE	CHA-C1A-C2A	2.07	128.14	124.86
2	B	604	PO4	O4-P-O1	-2.06	103.66	110.95
5	B	601	HEC	CBB-CAB-C3B	-2.05	123.33	127.43
5	B	601	HEC	CAA-C2A-C3A	-2.04	124.04	127.87
6	B	602	DHE	C4A-NA-C1A	2.03	109.13	105.82

All (2) chirality outliers are listed below:

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

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	601	HEC	C2B-C3B-CAB-CBB
5	A	601	HEC	C4B-C3B-CAB-CBB
5	A	601	HEC	C2C-C3C-CAC-CBC
5	A	601	HEC	C4C-C3C-CAC-CBC
5	B	601	HEC	C2B-C3B-CAB-CBB
5	B	601	HEC	C4B-C3B-CAB-CBB
5	B	601	HEC	C2C-C3C-CAC-CBC
5	B	601	HEC	C4C-C3C-CAC-CBC
6	A	602	DHE	C2D-C3D-CAD-CBD
6	A	602	DHE	C4D-C3D-CAD-CBD
6	B	602	DHE	C2D-C3D-CAD-CBD
6	B	602	DHE	C4D-C3D-CAD-CBD
6	A	602	DHE	C3C-CAC-CBC-O1C
6	B	602	DHE	C3C-CAC-CBC-O1C
6	B	602	DHE	C3C-CAC-CBC-O2C
6	A	602	DHE	C3B-CAB-CBB-O1B
6	B	602	DHE	C3B-CAB-CBB-O1B
6	A	602	DHE	C3B-CAB-CBB-O2B
6	A	602	DHE	C3C-CAC-CBC-O2C
6	B	602	DHE	C3B-CAB-CBB-O2B
5	B	601	HEC	CAA-CBA-CGA-O1A
5	B	601	HEC	CAA-CBA-CGA-O2A
6	B	602	DHE	CAA-CBA-CGA-O2A
5	A	601	HEC	CAA-CBA-CGA-O2A

Continued on next page...

Continued from previous page...

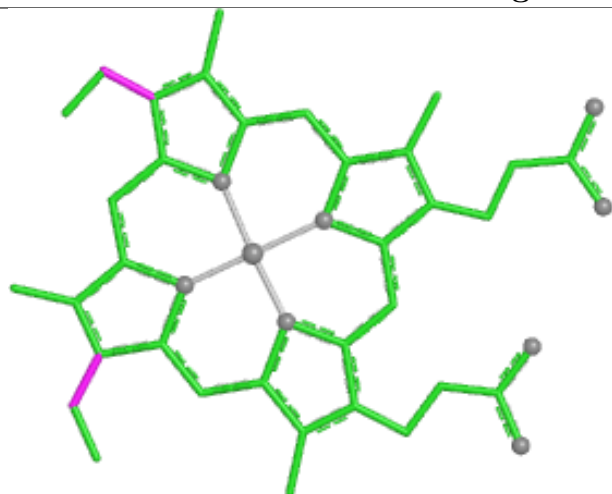
Mol	Chain	Res	Type	Atoms
5	A	601	HEC	CAA-CBA-CGA-O1A
6	B	602	DHE	CAA-CBA-CGA-O1A

There are no ring outliers.

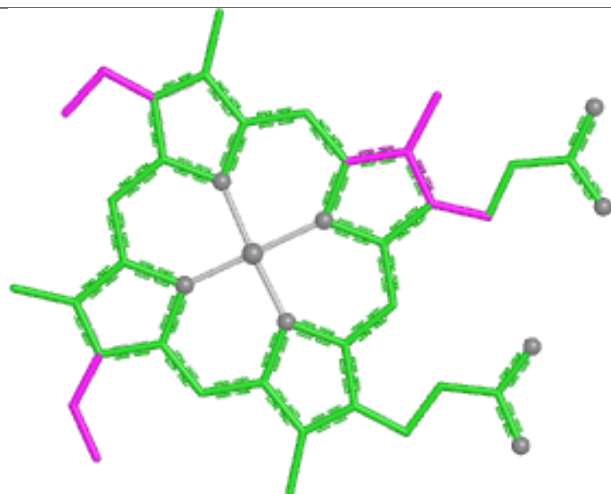
No monomer is involved in short contacts.

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.

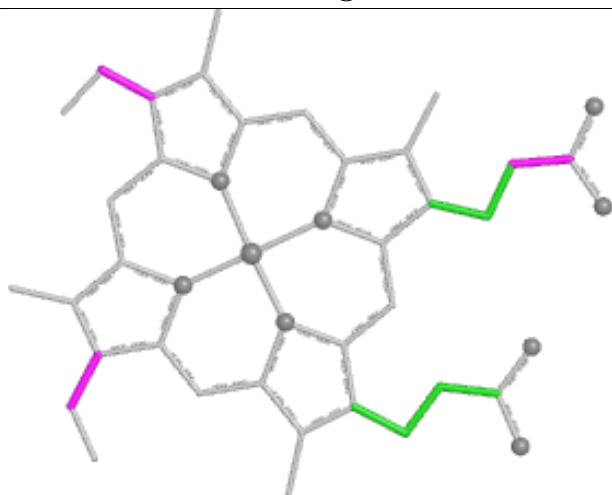
Ligand HEC B 601



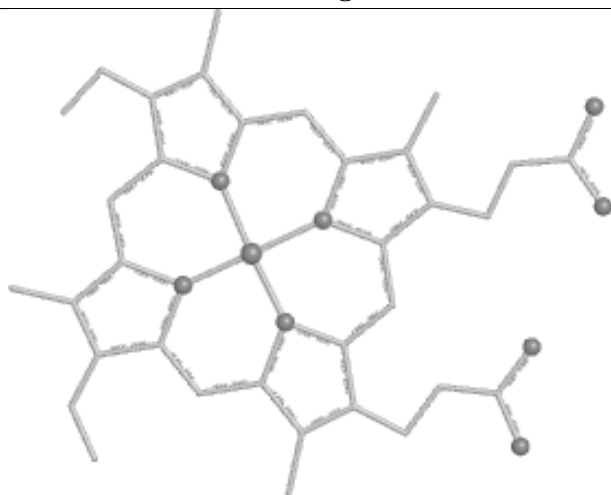
Bond lengths



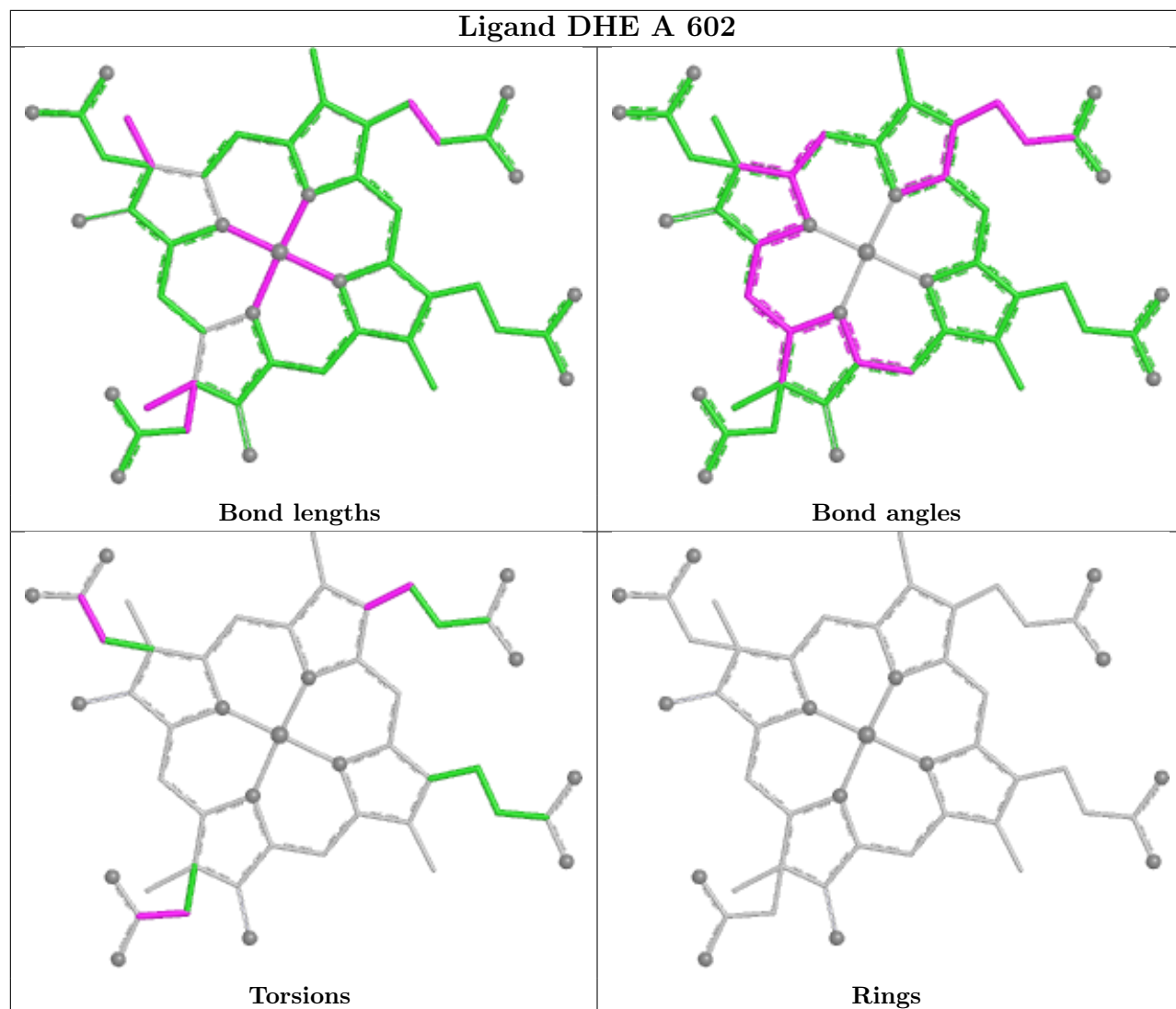
Bond angles

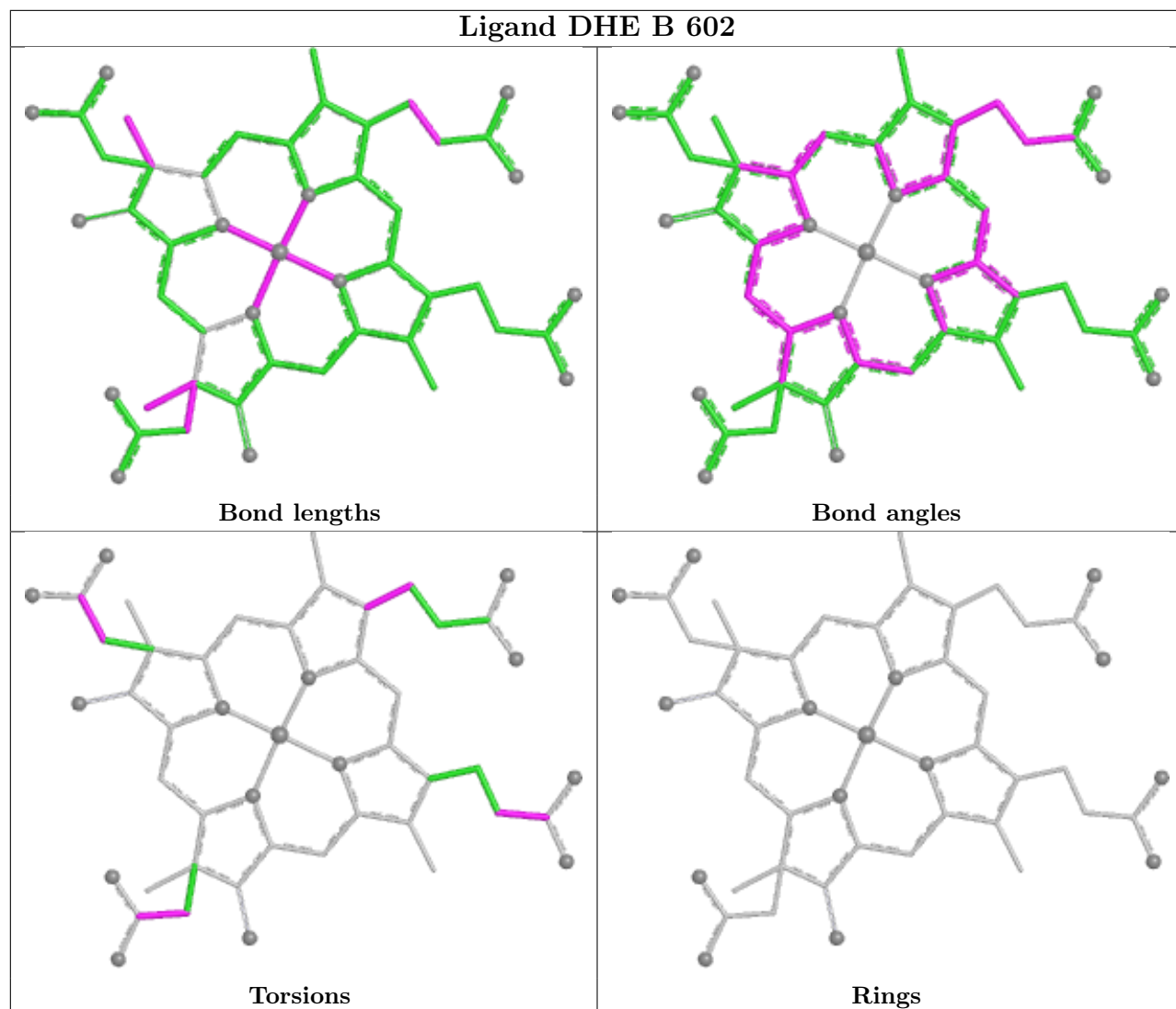


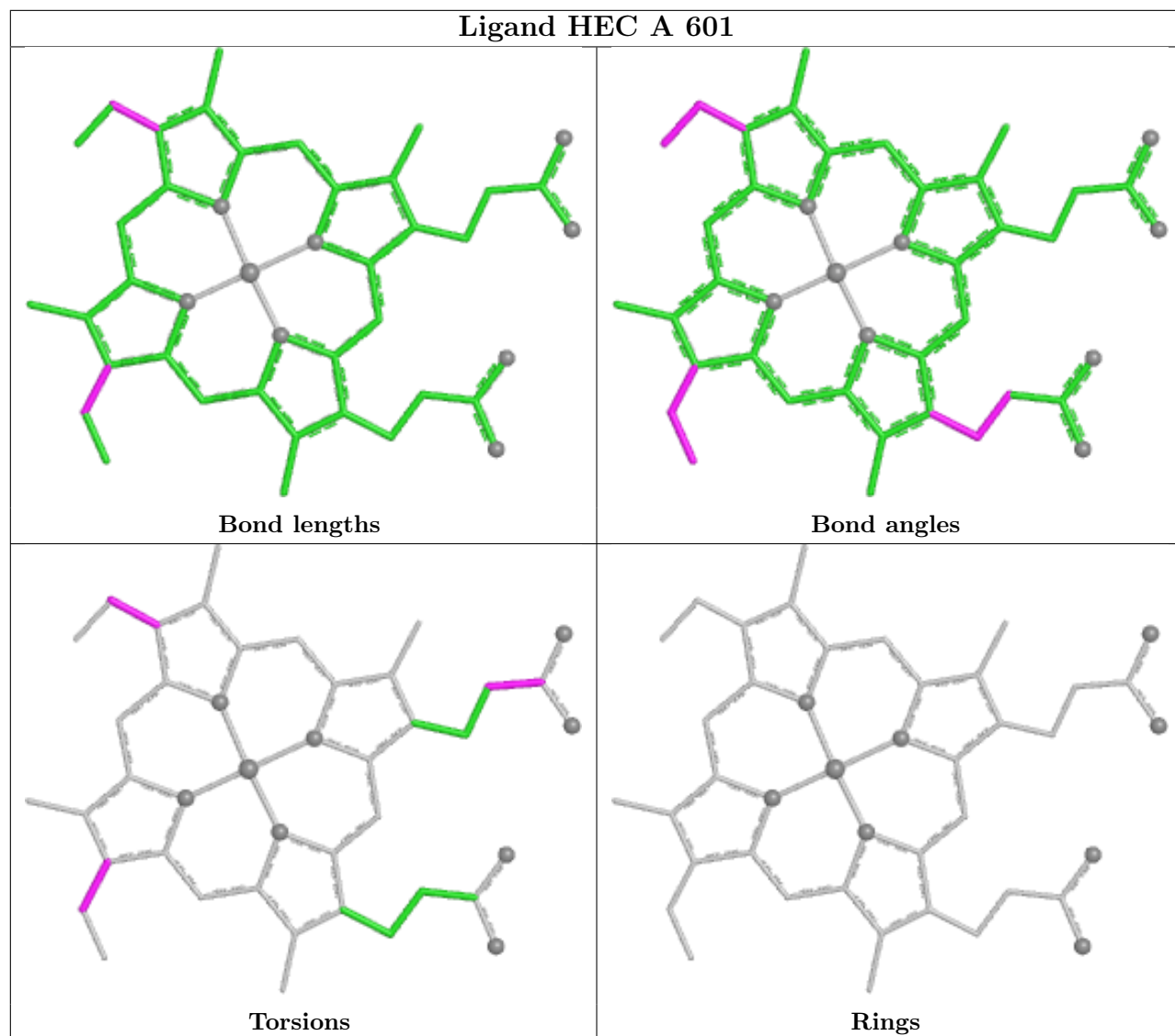
Torsions



Rings







4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	B	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	B	248:PRO	C	249:GLN	N	1.19

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.