



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2023 – 01:12 PM EDT

PDB ID : 6NWD
Title : X-ray Crystallographic structure of Gloeobacter rhodopsin
Authors : Ernst, O.P.; Morizumi, T.; Ou, W.L.
Deposited on : 2019-02-06
Resolution : 2.00 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 2.00 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

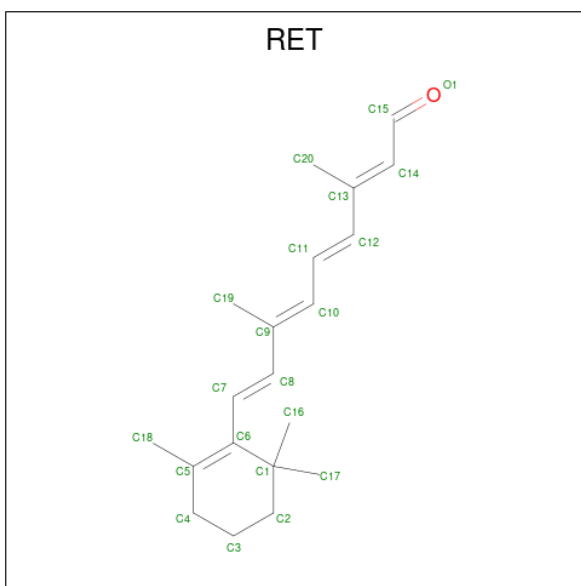
There are 6 unique types of molecules in this entry. The entry contains 2082 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Gll0198 protein.

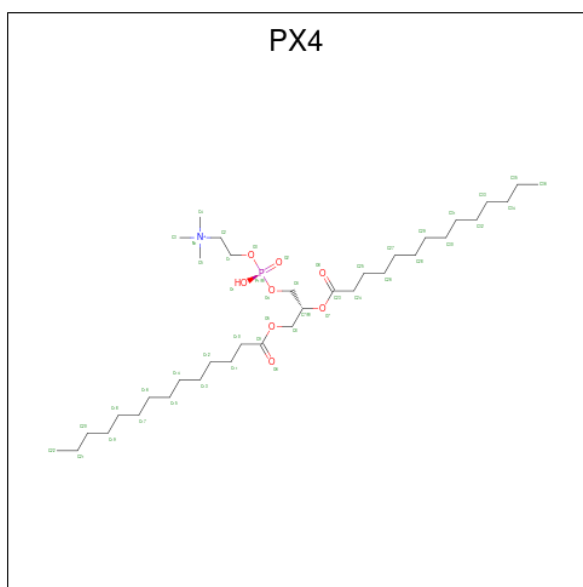
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	246	1924	1284	302	334	4	0	0	0

- Molecule 2 is RETINAL (three-letter code: RET) (formula: C₂₀H₂₈O) (labeled as "Ligand of Interest" by depositor).



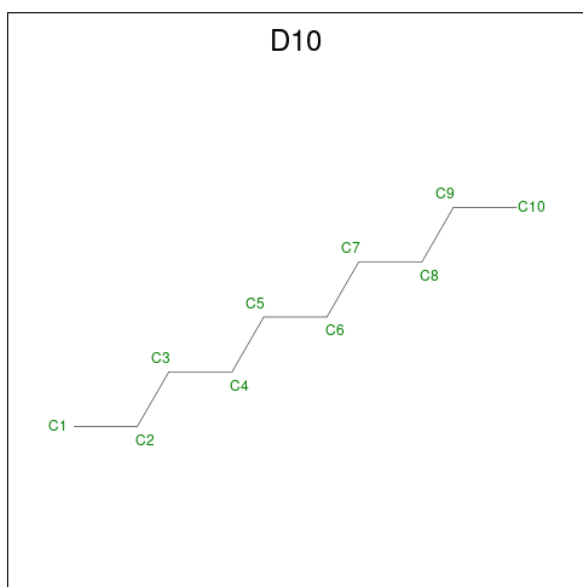
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	C		
2	A	1	20	20	0	0

- Molecule 3 is 1,2-DIMYRISTOYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PX4) (formula: C₃₆H₇₃NO₈P).



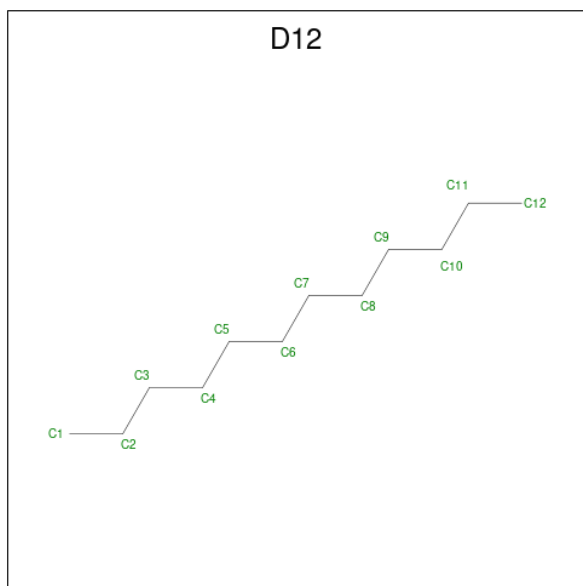
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
3	A	1	34	25	8	1	0	0
3	A	1	34	25	8	1	0	0
3	A	1	34	25	8	1	0	0

- Molecule 4 is DECANE (three-letter code: D10) (formula: C₁₀H₂₂).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	C		
4	A	1	10	10	0	0

- Molecule 5 is DODECANE (three-letter code: D12) (formula: $C_{12}H_{26}$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C 12 12	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	14	Total O 14 14	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	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	54.25Å 129.25Å 82.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.79 – 2.00	Depositor
% Data completeness (in resolution range)	96.4 (42.79-2.00)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.23 (at 2.00Å)	Xtriage
Refinement program	PHENIX (1.15.2_3472)	Depositor
R, R_{free}	0.230 , 0.244	Depositor
Wilson B-factor (Å ²)	31.7	Xtriage
Anisotropy	0.128	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2082	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.48% 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](#)

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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
2	RET	A	1301	1	20,20,21	4.20	11 (55%)	27,27,28	2.42	10 (37%)
4	D10	A	1305	-	9,9,9	0.11	0	8,8,8	0.81	0
3	PX4	A	1303	-	33,33,45	1.16	2 (6%)	37,38,53	1.23	2 (5%)
5	D12	A	1306	-	11,11,11	0.10	0	10,10,10	0.84	0
3	PX4	A	1302	-	33,33,45	1.17	2 (6%)	37,38,53	1.26	2 (5%)
3	PX4	A	1304	-	33,33,45	1.16	2 (6%)	37,38,53	1.19	2 (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
2	RET	A	1301	1	-	4/13/30/31	0/1/1/1
4	D10	A	1305	-	-	3/7/7/7	-
3	PX4	A	1303	-	-	16/35/35/49	-
5	D12	A	1306	-	-	1/9/9/9	-
3	PX4	A	1302	-	-	21/35/35/49	-
3	PX4	A	1304	-	-	11/35/35/49	-

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1301	RET	C5-C6	12.87	1.56	1.34
2	A	1301	RET	C1-C6	-7.48	1.43	1.53
2	A	1301	RET	C2-C3	-6.11	1.37	1.52
2	A	1301	RET	C2-C1	4.84	1.65	1.54
2	A	1301	RET	C4-C5	-4.71	1.41	1.51
3	A	1302	PX4	O5-C9	3.87	1.44	1.33
3	A	1304	PX4	O5-C9	3.78	1.44	1.33
3	A	1303	PX4	O5-C9	3.75	1.44	1.33
2	A	1301	RET	C3-C4	3.68	1.64	1.52
3	A	1302	PX4	O7-C23	3.42	1.43	1.34
3	A	1304	PX4	O7-C23	3.37	1.43	1.34
3	A	1303	PX4	O7-C23	3.35	1.43	1.34
2	A	1301	RET	C8-C9	2.78	1.51	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1301	RET	C12-C13	2.73	1.51	1.45
2	A	1301	RET	C11-C10	2.72	1.51	1.43
2	A	1301	RET	C7-C6	2.14	1.52	1.45
2	A	1301	RET	C14-C13	2.04	1.35	1.33

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1301	RET	C4-C5-C6	-6.34	113.53	122.73
3	A	1302	PX4	O7-C23-C24	4.39	120.96	111.50
3	A	1303	PX4	O7-C23-C24	4.33	120.83	111.50
3	A	1304	PX4	O7-C23-C24	4.27	120.71	111.50
2	A	1301	RET	C2-C1-C6	3.95	116.56	110.48
2	A	1301	RET	C18-C5-C6	-3.89	120.16	124.53
2	A	1301	RET	C18-C5-C4	3.69	120.70	113.62
2	A	1301	RET	C1-C6-C5	-3.49	117.69	122.61
2	A	1301	RET	C11-C10-C9	-3.37	122.50	127.31
2	A	1301	RET	C3-C4-C5	-3.32	108.14	114.08
3	A	1302	PX4	O5-C9-C10	2.79	120.66	111.91
2	A	1301	RET	C8-C7-C6	-2.70	119.61	127.20
2	A	1301	RET	C17-C1-C16	-2.67	100.35	108.53
3	A	1304	PX4	O5-C9-C10	2.49	119.72	111.91
3	A	1303	PX4	O5-C9-C10	2.37	119.36	111.91
2	A	1301	RET	C1-C6-C7	2.09	121.69	115.78

There are no chirality outliers.

All (56) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1301	RET	C1-C6-C7-C8
2	A	1301	RET	C5-C6-C7-C8
3	A	1302	PX4	C6-O4-P1-O1
3	A	1302	PX4	C6-O4-P1-O2
3	A	1302	PX4	C6-O4-P1-O3
3	A	1302	PX4	C24-C23-O7-C7
3	A	1303	PX4	C6-O4-P1-O3
3	A	1303	PX4	O8-C23-O7-C7
3	A	1302	PX4	O6-C9-O5-C8
3	A	1302	PX4	O8-C23-O7-C7
3	A	1304	PX4	O8-C23-O7-C7
3	A	1302	PX4	C10-C9-O5-C8
3	A	1303	PX4	C24-C23-O7-C7

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Mol	Chain	Res	Type	Atoms
3	A	1304	PX4	C24-C23-O7-C7
3	A	1303	PX4	O6-C9-O5-C8
3	A	1303	PX4	C10-C9-O5-C8
2	A	1301	RET	C7-C8-C9-C19
2	A	1301	RET	C7-C8-C9-C10
3	A	1304	PX4	C23-C24-C25-C26
3	A	1303	PX4	C9-C10-C11-C12
3	A	1303	PX4	C23-C24-C25-C26
3	A	1304	PX4	C9-C10-C11-C12
3	A	1303	PX4	C10-C11-C12-C13
3	A	1304	PX4	C30-C31-C32-C33
3	A	1304	PX4	C10-C11-C12-C13
3	A	1302	PX4	C31-C32-C33-C34
3	A	1304	PX4	C25-C26-C27-C28
3	A	1304	PX4	C29-C30-C31-C32
3	A	1302	PX4	C27-C28-C29-C30
3	A	1302	PX4	C25-C26-C27-C28
4	A	1305	D10	C4-C5-C6-C7
3	A	1302	PX4	C6-C7-O7-C23
3	A	1302	PX4	C28-C29-C30-C31
3	A	1303	PX4	O4-C6-C7-O7
3	A	1302	PX4	C6-C7-C8-O5
3	A	1303	PX4	O4-C6-C7-C8
3	A	1303	PX4	C6-O4-P1-O1
3	A	1304	PX4	C11-C12-C13-C14
3	A	1303	PX4	C8-C7-O7-C23
3	A	1304	PX4	C8-C7-O7-C23
3	A	1302	PX4	O7-C7-C8-O5
5	A	1306	D12	C1-C2-C3-C4
3	A	1303	PX4	C6-O4-P1-O2
4	A	1305	D10	C7-C8-C9-C10
3	A	1302	PX4	C24-C25-C26-C27
3	A	1303	PX4	C12-C13-C14-C15
3	A	1302	PX4	C32-C33-C34-C35
3	A	1302	PX4	C11-C12-C13-C14
3	A	1302	PX4	C23-C24-C25-C26
3	A	1303	PX4	C28-C29-C30-C31
3	A	1303	PX4	C11-C12-C13-C14
3	A	1302	PX4	O7-C23-C24-C25
4	A	1305	D10	C6-C7-C8-C9
3	A	1302	PX4	C29-C30-C31-C32
3	A	1302	PX4	O8-C23-C24-C25

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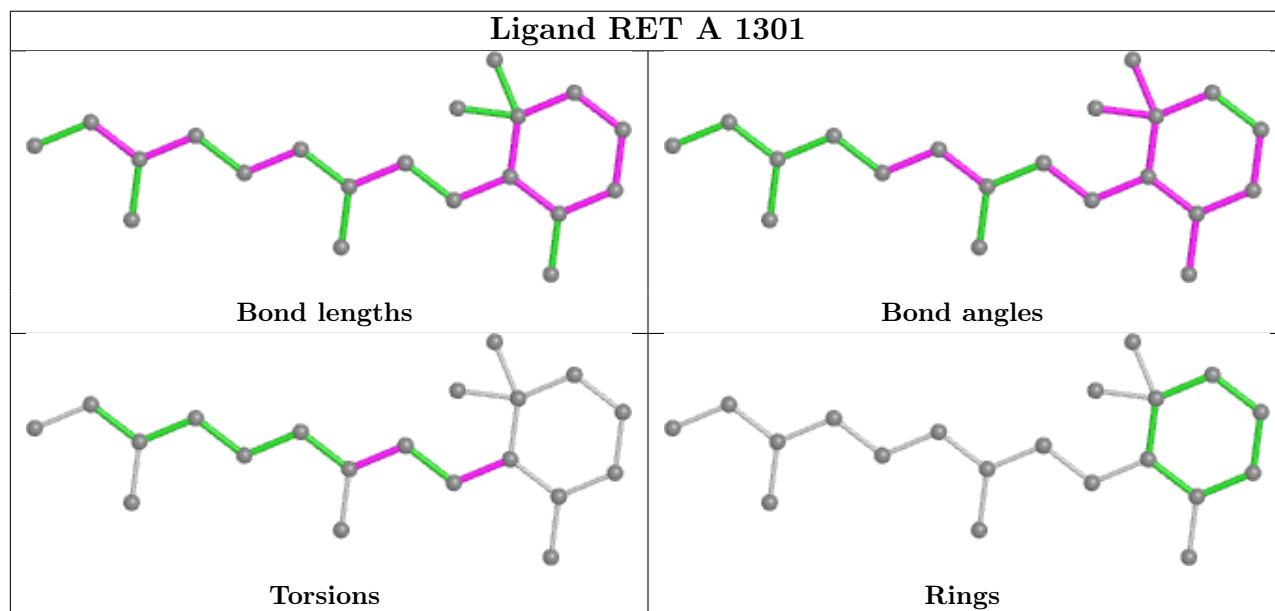
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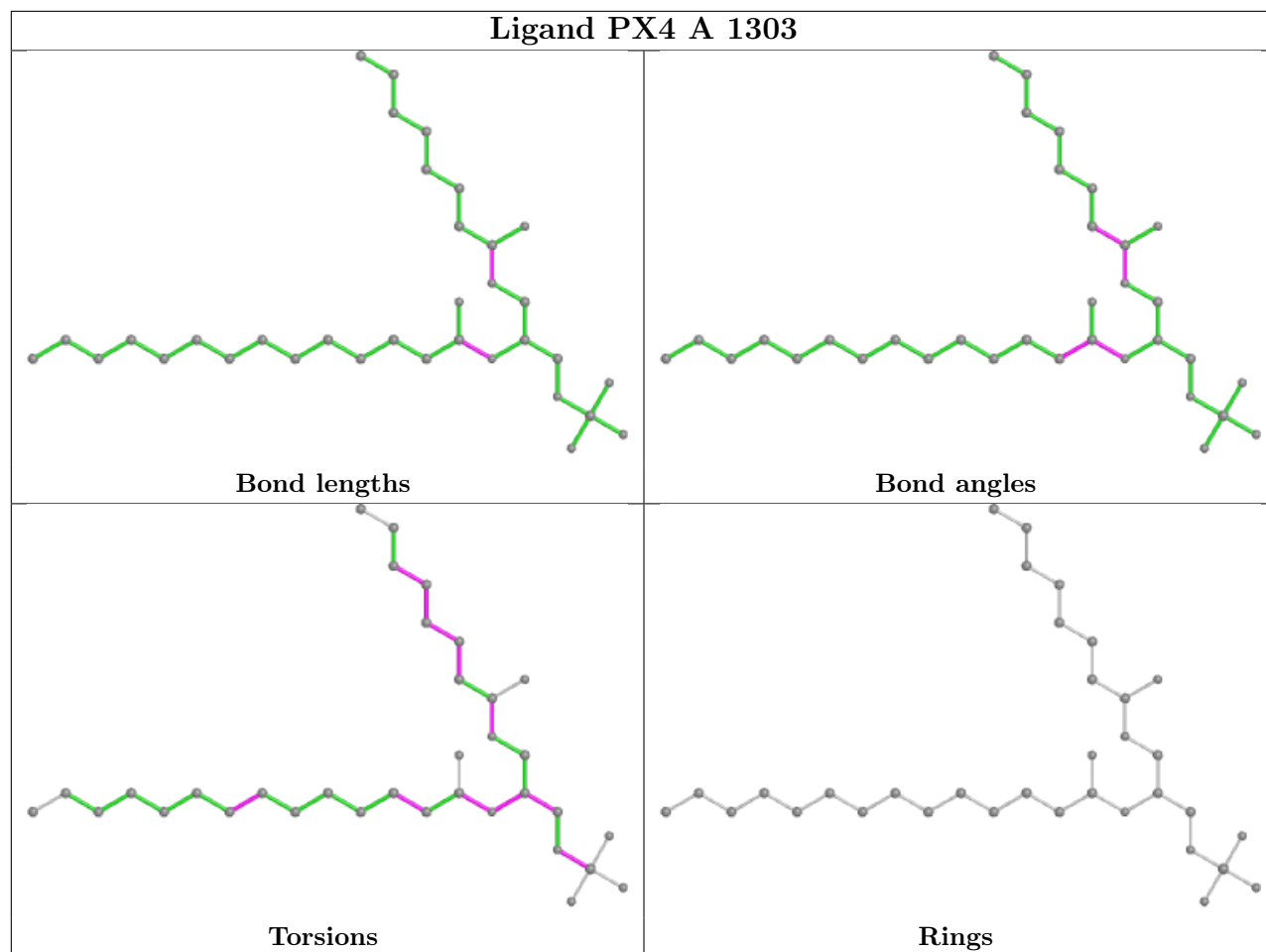
Mol	Chain	Res	Type	Atoms
3	A	1304	PX4	O7-C23-C24-C25

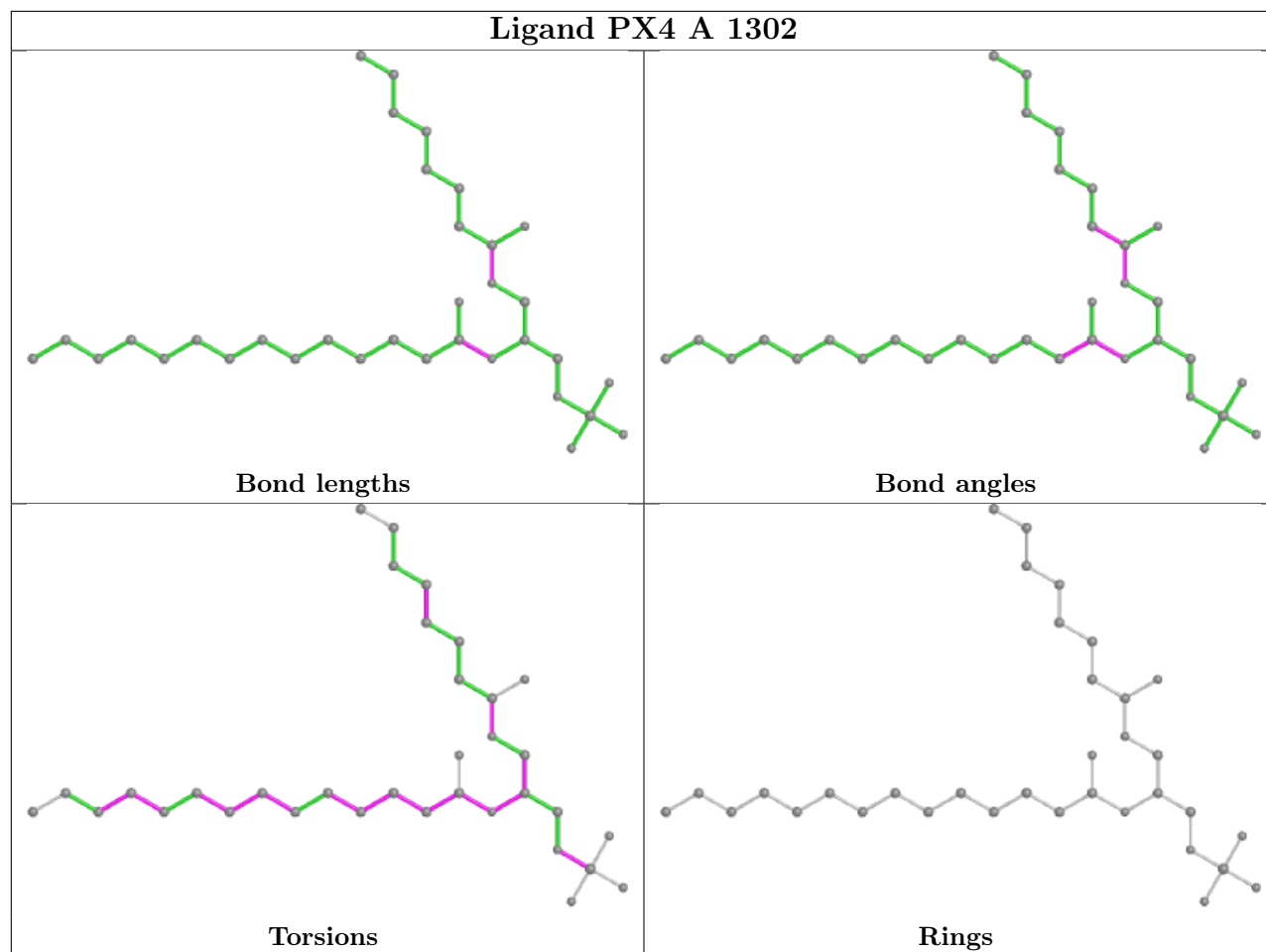
There are no ring outliers.

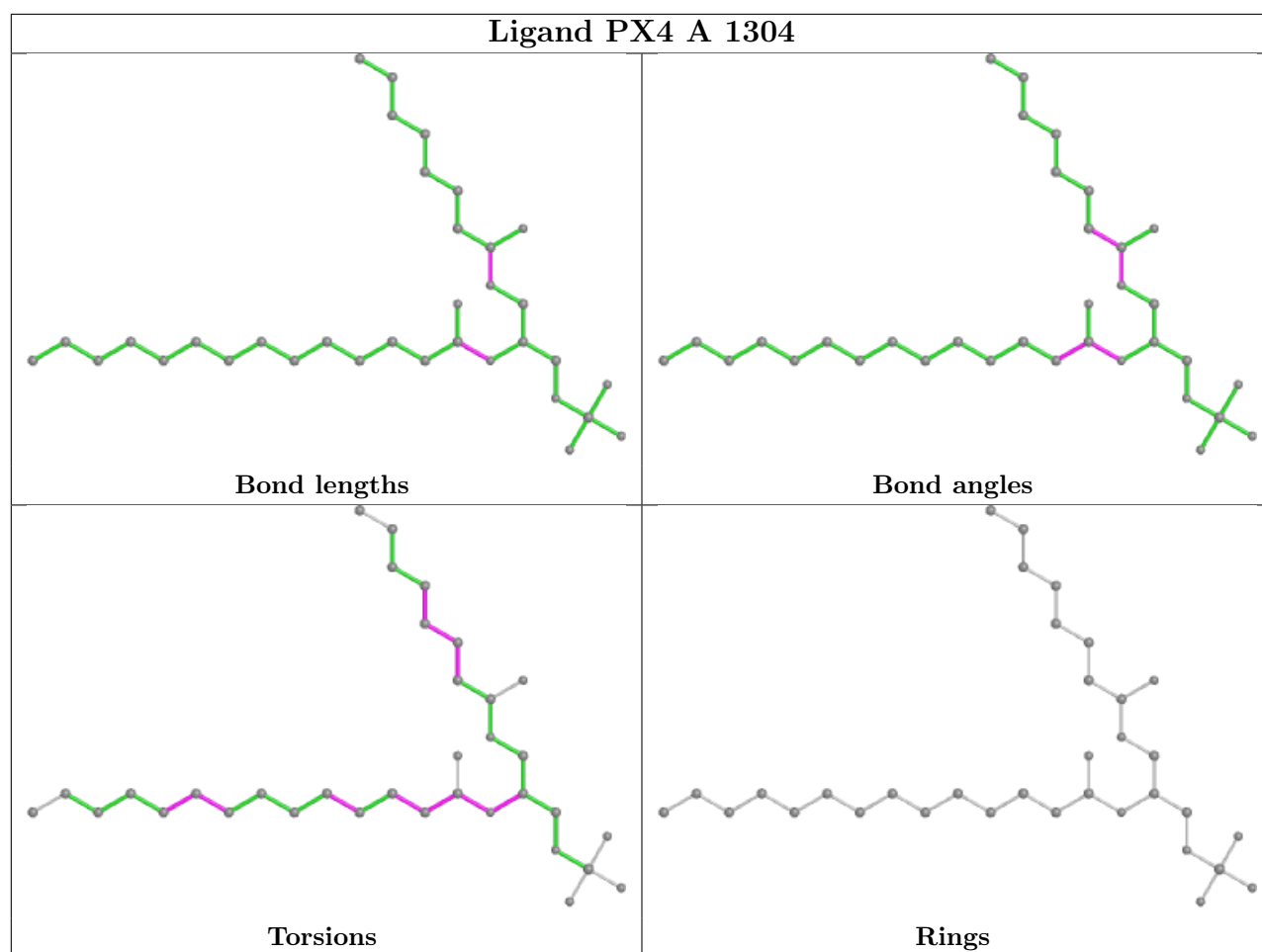
No monomer is involved in short contacts.

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.