



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2023 – 04:54 AM EDT

PDB ID : 6MWD  
Title : NavAb Voltage-gated Sodium Channel, residues 1-239 with mutation T206S  
Authors : Lenaeus, M.J.; Catterall, W.A.  
Deposited on : 2018-10-29  
Resolution : 2.33 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 2.33 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
5	CPS	B	2307	X	-	-	-
5	CPS	B	2308	X	-	-	-
5	CPS	B	2309	X	-	-	-

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 2217 atoms, of which 101 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.

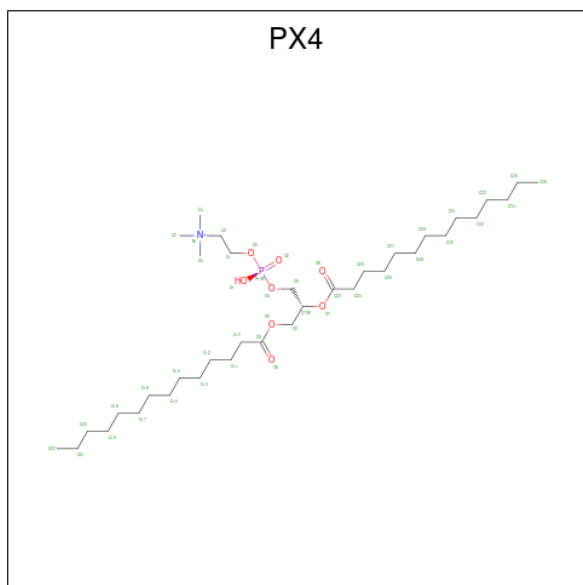
- Molecule 1 is a protein called Ion transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	236	1865	1259	279	316	11	0	3	0

There are 19 discrepancies between the modelled and reference sequences:

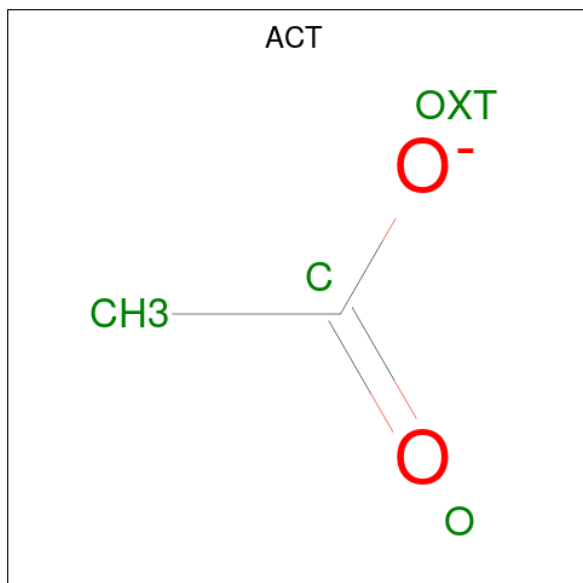
Chain	Residue	Modelled	Actual	Comment	Reference
B	1983	MET	-	initiating methionine	UNP A8EVM5
B	1984	ASP	-	expression tag	UNP A8EVM5
B	1985	TYR	-	expression tag	UNP A8EVM5
B	1986	LYS	-	expression tag	UNP A8EVM5
B	1987	ASP	-	expression tag	UNP A8EVM5
B	1988	ASP	-	expression tag	UNP A8EVM5
B	1989	ASP	-	expression tag	UNP A8EVM5
B	1990	ASP	-	expression tag	UNP A8EVM5
B	1991	LYS	-	expression tag	UNP A8EVM5
B	1992	GLY	-	expression tag	UNP A8EVM5
B	1993	SER	-	expression tag	UNP A8EVM5
B	1994	LEU	-	expression tag	UNP A8EVM5
B	1995	VAL	-	expression tag	UNP A8EVM5
B	1996	PRO	-	expression tag	UNP A8EVM5
B	1997	ARG	-	expression tag	UNP A8EVM5
B	1998	GLY	-	expression tag	UNP A8EVM5
B	1999	SER	-	expression tag	UNP A8EVM5
B	2000	HIS	-	expression tag	UNP A8EVM5
B	2206	SER	THR	engineered mutation	UNP A8EVM5

- Molecule 2 is 1,2-DIMYRISTOYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PX4) (formula: C<sub>36</sub>H<sub>73</sub>NO<sub>8</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			46	36	1	8	1		
2	B	1	Total	C	O	P		0	0
			40	31	8	1			
2	B	1	Total	C	N	O	P	0	0
			31	21	1	8	1		
2	B	1	Total	C	O	P		0	0
			24	17	6	1			

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula:  $C_2H_3O_2$ ).



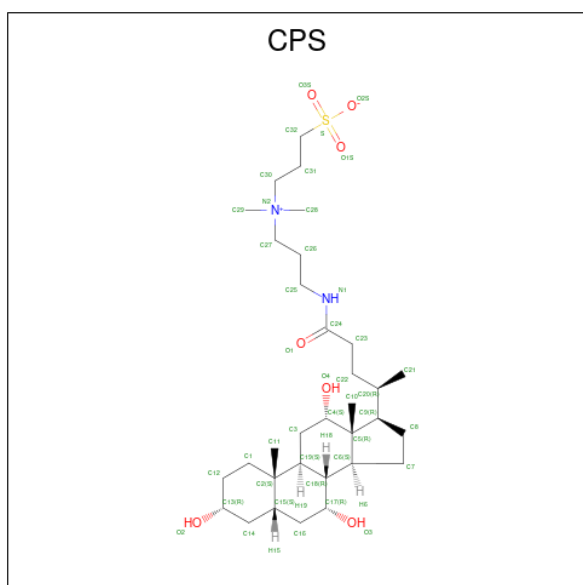
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 5 is 3-[(3-CHOLAMIDOPROPYL)DIMETHYLAMMONIO]-1-PROPANESULFO NATE (three-letter code: CPS) (formula: C<sub>32</sub>H<sub>58</sub>N<sub>2</sub>O<sub>7</sub>S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	H	O	0	0
			55	20	32	3		
5	B	1	Total	C	H	O	0	0
			67	24	39	4		
5	B	1	Total	C	H	O	0	0
			52	19	30	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	28	Total	O	0	0
			28	28		

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	I 4 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	124.50Å 124.50Å 189.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.57 – 2.33	Depositor
% Data completeness (in resolution range)	95.8 (29.57-2.33)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.75 (at 2.34Å)	Xtrriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, $R_{free}$	0.217 , 0.250	Depositor
Wilson B-factor (Å <sup>2</sup> )	56.1	Xtrriage
Anisotropy	0.437	Xtrriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	2217	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	91.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.06% 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](#)

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	SO4	B	2306	-	4,4,4	0.14	0	6,6,6	0.10	0
5	CPS	B	2307	-	26,26,45	2.08	8 (30%)	40,43,70	2.53	15 (37%)
2	PX4	B	2302	-	39,39,45	1.03	5 (12%)	43,44,53	1.35	3 (6%)
2	PX4	B	2301	-	45,45,45	1.03	4 (8%)	51,53,53	1.15	3 (5%)
5	CPS	B	2309	-	25,25,45	1.78	6 (24%)	37,41,70	1.89	9 (24%)
3	ACT	B	2305	-	3,3,3	0.77	0	3,3,3	1.39	0
2	PX4	B	2304	-	23,23,45	1.04	2 (8%)	26,26,53	1.13	1 (3%)
5	CPS	B	2308	-	31,31,45	2.59	10 (32%)	49,49,70	3.00	19 (38%)
2	PX4	B	2303	-	30,30,45	1.23	4 (13%)	36,38,53	1.10	3 (8%)

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	CPS	B	2307	-	1/1/10/15	-	0/4/4/4
2	PX4	B	2304	-	-	12/22/22/49	-
2	PX4	B	2302	-	-	16/41/41/49	-
2	PX4	B	2301	-	-	19/49/49/49	-
5	CPS	B	2309	-	1/1/9/15	-	0/4/4/4
5	CPS	B	2308	-	1/1/11/15	3/7/73/90	0/4/4/4
2	PX4	B	2303	-	-	20/34/34/49	-

All (39) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	2308	CPS	C3-C4	7.81	1.66	1.53
5	B	2308	CPS	O4-C4	-5.77	1.34	1.43
5	B	2307	CPS	C3-C4	5.49	1.62	1.53
5	B	2309	CPS	O4-C4	-5.11	1.35	1.43
5	B	2307	CPS	O4-C4	-4.95	1.35	1.43
5	B	2308	CPS	C10-C5	4.41	1.61	1.54
5	B	2308	CPS	C18-C6	4.21	1.62	1.53
5	B	2307	CPS	C18-C6	3.73	1.61	1.53
5	B	2308	CPS	C20-C9	3.38	1.60	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	2309	CPS	C3-C4	3.34	1.58	1.53
5	B	2308	CPS	C5-C9	3.21	1.61	1.55
5	B	2309	CPS	C18-C6	3.10	1.59	1.53
5	B	2308	CPS	C5-C6	2.98	1.60	1.55
2	B	2302	PX4	P1-O3	2.78	1.65	1.54
5	B	2307	CPS	C2-C15	-2.76	1.50	1.55
2	B	2301	PX4	O7-C7	-2.76	1.39	1.46
2	B	2304	PX4	P1-O3	2.73	1.65	1.54
2	B	2301	PX4	O5-C8	-2.65	1.39	1.45
5	B	2308	CPS	C21-C20	2.62	1.59	1.53
5	B	2308	CPS	C5-C4	-2.58	1.50	1.54
2	B	2303	PX4	O5-C8	-2.47	1.39	1.45
5	B	2307	CPS	C10-C5	2.44	1.58	1.54
2	B	2304	PX4	O5-C9	2.42	1.40	1.33
2	B	2303	PX4	O7-C23	2.39	1.41	1.34
5	B	2307	CPS	C1-C12	-2.39	1.48	1.53
2	B	2302	PX4	O7-C7	-2.39	1.40	1.46
2	B	2302	PX4	O5-C8	-2.32	1.39	1.45
2	B	2303	PX4	O5-C9	2.31	1.40	1.33
2	B	2302	PX4	O7-C23	2.26	1.40	1.34
5	B	2307	CPS	C14-C15	-2.25	1.50	1.53
5	B	2307	CPS	C16-C17	2.23	1.56	1.52
2	B	2301	PX4	O5-C9	2.22	1.39	1.33
5	B	2309	CPS	C10-C5	2.21	1.58	1.54
2	B	2301	PX4	O7-C23	2.17	1.40	1.34
5	B	2309	CPS	O3-C17	-2.15	1.38	1.43
5	B	2308	CPS	O3-C17	-2.15	1.38	1.43
5	B	2309	CPS	C14-C13	2.13	1.55	1.51
2	B	2302	PX4	O5-C9	2.10	1.39	1.33
2	B	2303	PX4	O7-C7	-2.07	1.41	1.46

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	2308	CPS	C8-C9-C5	-8.25	95.46	103.55
5	B	2308	CPS	C21-C20-C9	6.79	123.31	112.92
5	B	2308	CPS	C7-C6-C18	-6.29	109.53	118.33
5	B	2307	CPS	C16-C15-C2	-6.00	106.28	112.66
5	B	2308	CPS	C3-C19-C2	5.86	119.77	113.73
5	B	2309	CPS	C7-C6-C18	-5.73	110.32	118.33
5	B	2308	CPS	C9-C5-C6	5.58	105.72	100.09
5	B	2308	CPS	C10-C5-C6	5.35	119.58	111.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	2308	CPS	C10-C5-C4	-5.27	103.70	109.07
5	B	2307	CPS	C7-C6-C5	-5.21	98.44	103.55
2	B	2302	PX4	O7-C23-C24	5.10	122.50	111.50
5	B	2307	CPS	C6-C5-C9	4.70	104.87	100.10
5	B	2308	CPS	C16-C15-C2	-4.70	107.67	112.66
5	B	2309	CPS	C16-C15-C2	-4.70	107.67	112.66
5	B	2308	CPS	C8-C9-C20	4.65	119.34	112.15
5	B	2308	CPS	C3-C4-C5	-4.52	106.60	111.24
5	B	2307	CPS	C3-C4-C5	4.46	115.83	111.24
5	B	2309	CPS	C7-C6-C5	-4.25	98.72	103.84
5	B	2307	CPS	C7-C6-C18	-4.16	112.52	118.33
2	B	2301	PX4	O7-C23-C24	4.14	120.42	111.50
5	B	2307	CPS	O4-C4-C5	-3.79	104.62	111.03
5	B	2308	CPS	C10-C5-C9	-3.77	105.32	111.21
2	B	2303	PX4	O7-C23-C24	3.53	120.64	110.80
5	B	2307	CPS	C5-C6-C18	3.51	119.22	114.74
5	B	2307	CPS	C9-C5-C4	-3.42	114.55	117.67
5	B	2307	CPS	C16-C17-C18	3.41	115.12	111.48
5	B	2309	CPS	C14-C13-C12	-3.26	106.67	110.55
5	B	2307	CPS	C10-C5-C4	3.17	112.30	109.07
5	B	2308	CPS	C16-C17-C18	3.03	114.72	111.48
5	B	2307	CPS	C19-C18-C17	-3.01	108.27	111.88
2	B	2304	PX4	O5-C9-C10	2.99	121.30	111.91
5	B	2307	CPS	C14-C13-C12	-2.86	107.14	110.55
5	B	2307	CPS	C20-C9-C8	2.82	119.93	113.68
5	B	2307	CPS	C1-C2-C19	-2.75	107.03	111.35
5	B	2308	CPS	C5-C6-C18	2.74	118.24	114.74
5	B	2307	CPS	C3-C19-C2	2.74	116.55	113.73
5	B	2308	CPS	C22-C20-C9	2.72	115.90	110.28
5	B	2308	CPS	C1-C2-C19	-2.68	107.14	111.35
2	B	2301	PX4	C7-O7-C23	-2.58	111.45	117.79
2	B	2302	PX4	C7-O7-C23	-2.54	111.55	117.79
5	B	2308	CPS	C14-C13-C12	-2.54	107.53	110.55
2	B	2303	PX4	C8-C7-C6	-2.51	105.86	111.79
2	B	2302	PX4	O5-C9-C10	2.49	119.73	111.91
5	B	2309	CPS	O4-C4-C5	-2.48	105.86	110.52
2	B	2301	PX4	O5-C9-C10	2.43	119.52	111.91
5	B	2308	CPS	C19-C3-C4	2.40	117.47	114.30
2	B	2303	PX4	O5-C9-C10	2.32	119.20	111.91
5	B	2308	CPS	C2-C19-C18	-2.28	109.37	111.82
5	B	2309	CPS	C8-C7-C6	-2.26	101.11	104.71
5	B	2309	CPS	C3-C19-C18	-2.19	107.67	110.88

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	2308	CPS	O3-C17-C18	-2.12	104.69	109.43
5	B	2309	CPS	C9-C8-C7	2.04	109.77	105.41
5	B	2309	CPS	O3-C17-C18	-2.03	104.89	109.43

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	B	2307	CPS	C5
5	B	2308	CPS	C5
5	B	2309	CPS	C5

All (70) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	2301	PX4	C24-C23-O7-C7
2	B	2302	PX4	C10-C9-O5-C8
2	B	2303	PX4	C1-O3-P1-O2
2	B	2303	PX4	C1-O3-P1-O4
2	B	2303	PX4	C6-O4-P1-O2
2	B	2303	PX4	C7-C6-O4-P1
2	B	2304	PX4	C6-O4-P1-O1
2	B	2304	PX4	C6-O4-P1-O2
2	B	2304	PX4	C6-O4-P1-O3
2	B	2302	PX4	O6-C9-O5-C8
2	B	2301	PX4	O6-C9-O5-C8
2	B	2301	PX4	O8-C23-O7-C7
2	B	2301	PX4	C10-C9-O5-C8
5	B	2308	CPS	C22-C20-C9-C5
2	B	2303	PX4	O4-C6-C7-O7
5	B	2308	CPS	C22-C20-C9-C8
2	B	2303	PX4	C9-C10-C11-C12
2	B	2303	PX4	C1-C2-N1-C4
2	B	2301	PX4	C16-C17-C18-C19
2	B	2303	PX4	C6-O4-P1-O3
5	B	2308	CPS	C21-C20-C9-C8
2	B	2304	PX4	C17-C18-C19-C20
2	B	2301	PX4	C32-C33-C34-C35
2	B	2303	PX4	C13-C14-C15-C16
2	B	2302	PX4	C28-C29-C30-C31
2	B	2302	PX4	C32-C33-C34-C35
2	B	2304	PX4	C10-C9-O5-C8
2	B	2301	PX4	C27-C28-C29-C30

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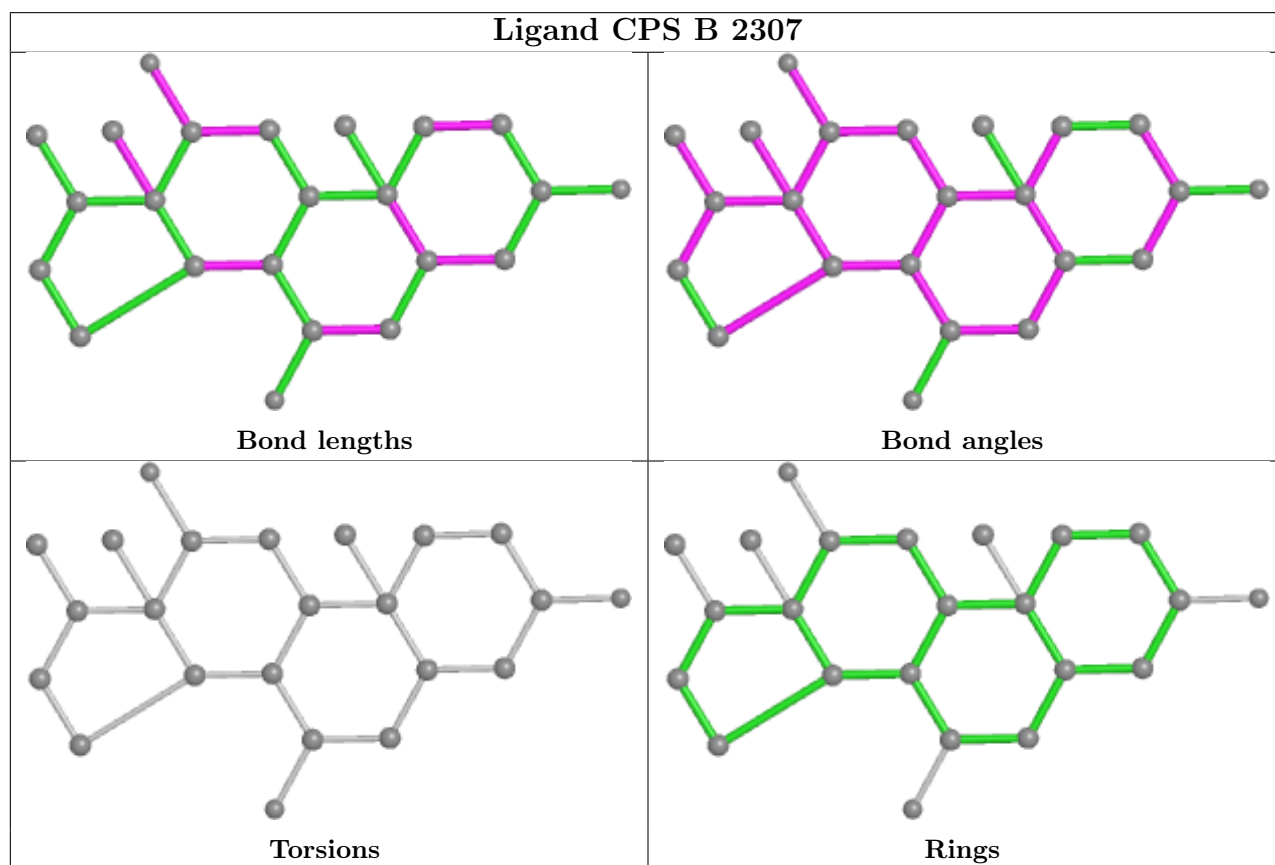
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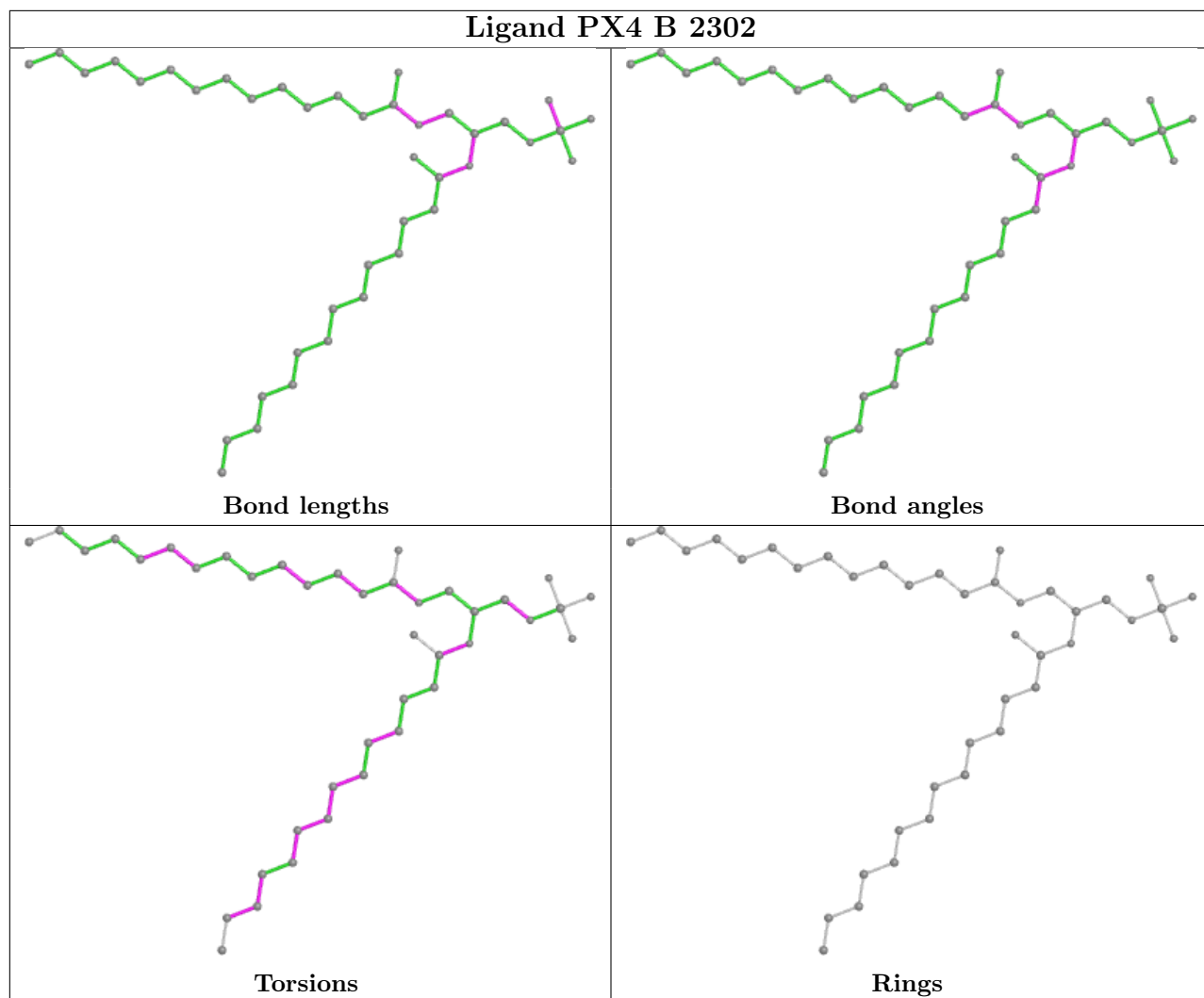
Mol	Chain	Res	Type	Atoms
2	B	2304	PX4	O6-C9-O5-C8
2	B	2304	PX4	C14-C15-C16-C17
2	B	2304	PX4	C15-C16-C17-C18
2	B	2303	PX4	C1-C2-N1-C3
2	B	2303	PX4	C1-C2-N1-C5
2	B	2304	PX4	C16-C17-C18-C19
2	B	2301	PX4	C10-C11-C12-C13
2	B	2301	PX4	C29-C30-C31-C32
2	B	2301	PX4	C6-O4-P1-O3
2	B	2301	PX4	O4-C6-C7-C8
2	B	2304	PX4	C7-C6-O4-P1
2	B	2303	PX4	C8-C7-O7-C23
2	B	2302	PX4	C30-C31-C32-C33
2	B	2302	PX4	C25-C26-C27-C28
2	B	2301	PX4	C31-C32-C33-C34
2	B	2303	PX4	C6-C7-C8-O5
2	B	2303	PX4	O7-C7-C8-O5
2	B	2302	PX4	C27-C28-C29-C30
2	B	2302	PX4	C7-C6-O4-P1
2	B	2303	PX4	O4-C6-C7-C8
2	B	2302	PX4	C24-C23-O7-C7
2	B	2301	PX4	C18-C19-C20-C21
2	B	2301	PX4	O4-C6-C7-O7
2	B	2302	PX4	O8-C23-O7-C7
2	B	2301	PX4	C33-C34-C35-C36
2	B	2302	PX4	C33-C34-C35-C36
2	B	2301	PX4	C6-O4-P1-O1
2	B	2303	PX4	C1-O3-P1-O1
2	B	2303	PX4	C6-O4-P1-O1
2	B	2304	PX4	C12-C13-C14-C15
2	B	2302	PX4	C9-C10-C11-C12
2	B	2303	PX4	O3-C1-C2-N1
2	B	2301	PX4	C17-C18-C19-C20
2	B	2302	PX4	C15-C16-C17-C18
2	B	2302	PX4	C16-C17-C18-C19
2	B	2301	PX4	C11-C12-C13-C14
2	B	2304	PX4	C19-C20-C21-C22
2	B	2303	PX4	C10-C9-O5-C8
2	B	2301	PX4	O7-C23-C24-C25
2	B	2302	PX4	C11-C12-C13-C14
2	B	2302	PX4	C29-C30-C31-C32
2	B	2303	PX4	O6-C9-O5-C8

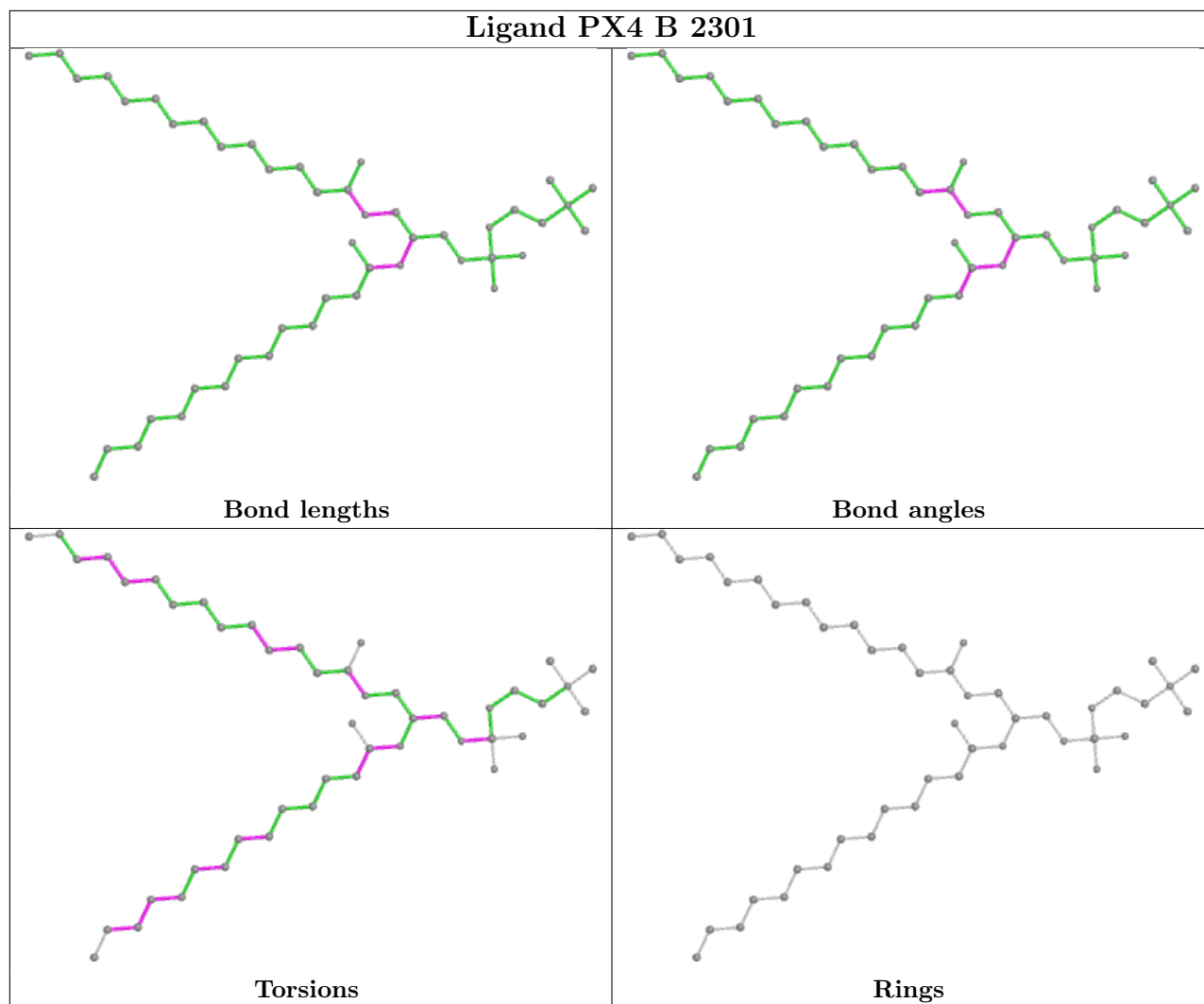
There are no ring outliers.

No monomer is involved in short contacts.

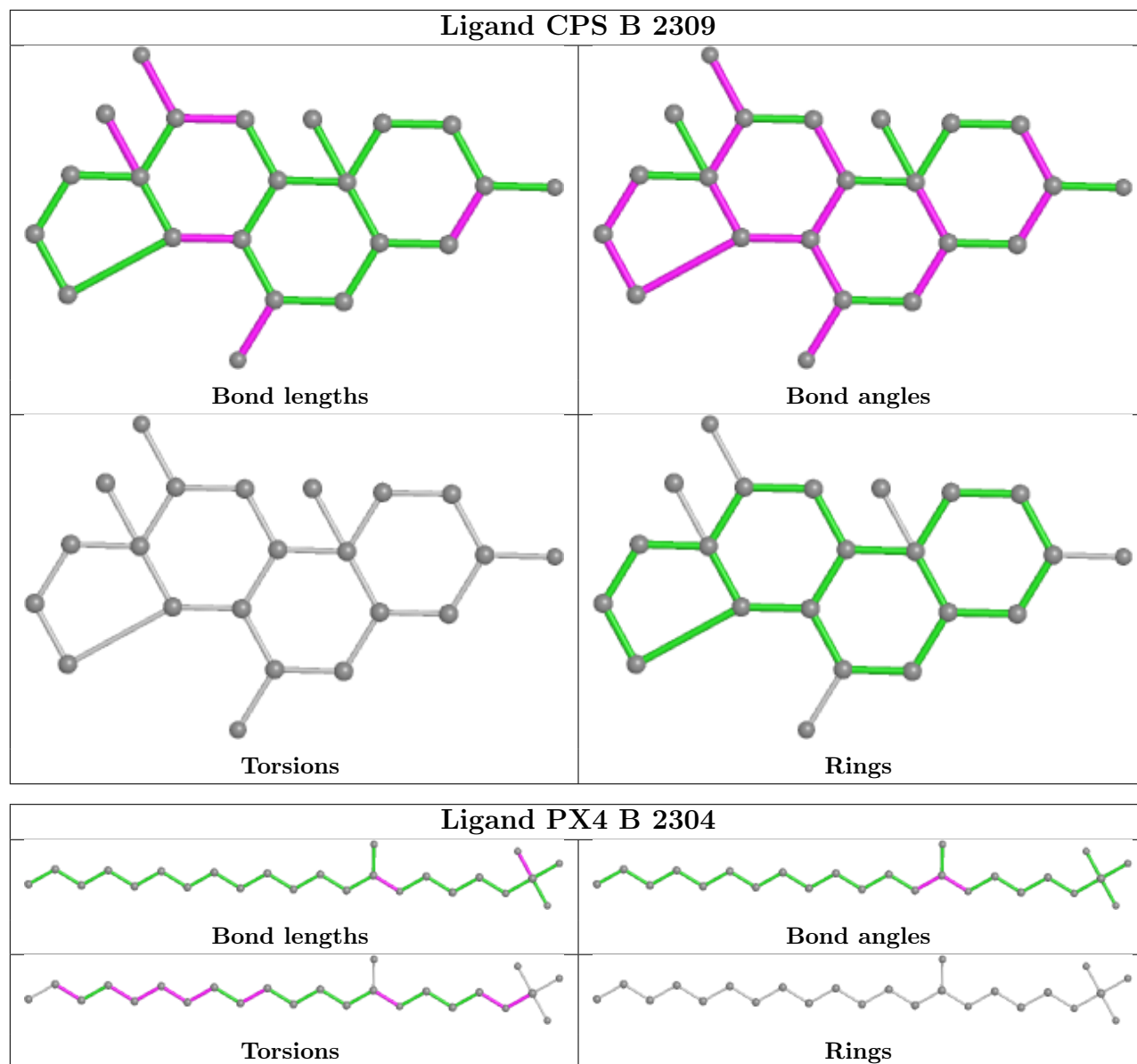
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

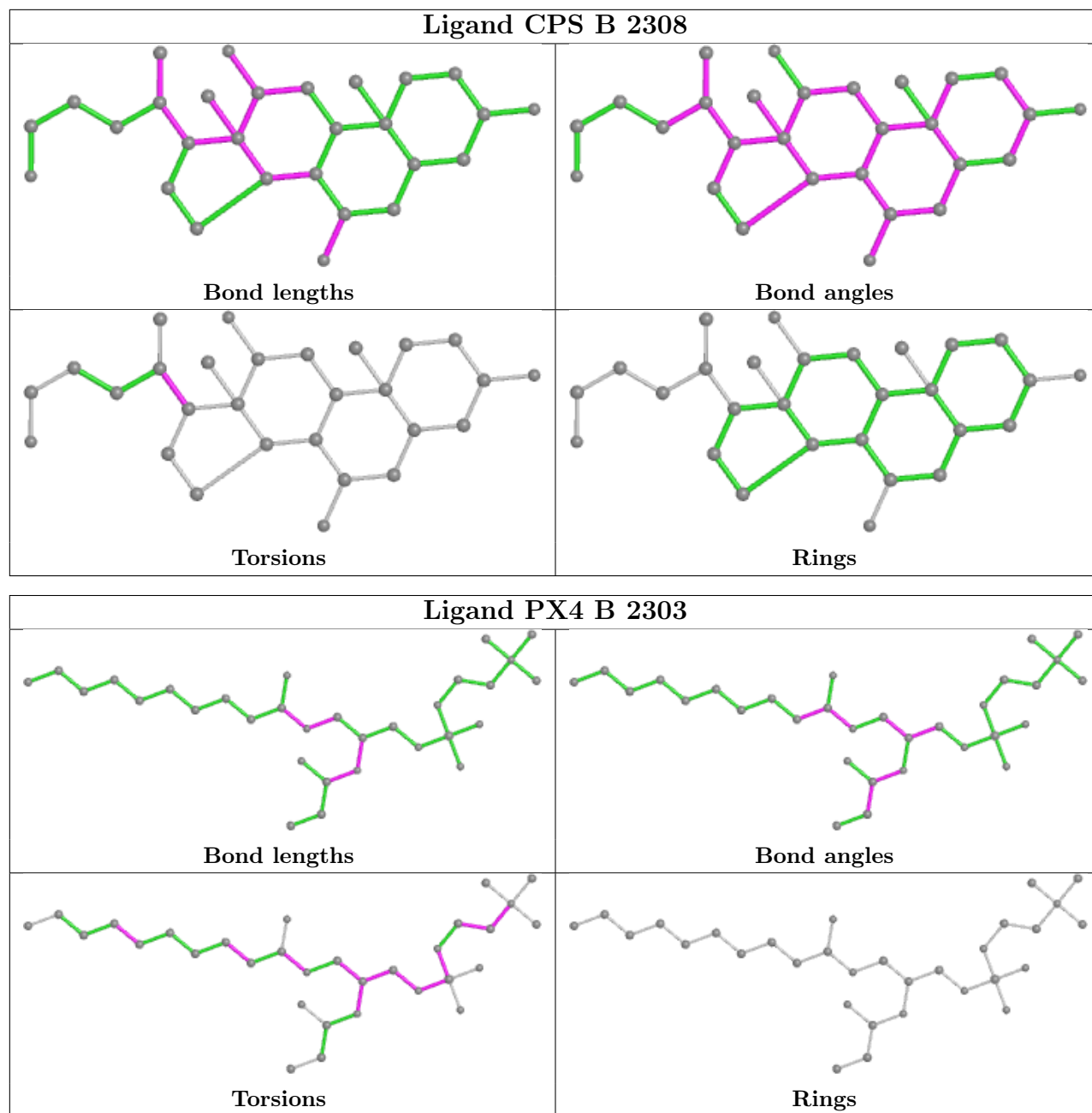












#### 4.7 Other polymers [i](#)

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 failed to run properly - this section is therefore empty.

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

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

### 5.3 Carbohydrates [i](#)

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

### 5.4 Ligands [i](#)

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

### 5.5 Other polymers [i](#)

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