



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2023 – 05:08 AM EDT

PDB ID : 6MVV
Title : NavAb voltage-gated sodium channel, I217C/F203A
Authors : Lenaeus, M.J.; Catterall, W.A.
Deposited on : 2018-10-28
Resolution : 2.90 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 2.90 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 4 unique types of molecules in this entry. The entry contains 7195 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 Ion transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	222	1755	1191	265	287	12	0	0	0
1	B	228	1792	1212	266	302	12	0	0	0
1	C	217	1692	1151	251	279	11	0	0	0
1	D	222	1744	1186	257	288	13	0	0	0

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	983	MET	-	initiating methionine	UNP A8EVM5
A	984	ASP	-	expression tag	UNP A8EVM5
A	985	TYR	-	expression tag	UNP A8EVM5
A	986	LYS	-	expression tag	UNP A8EVM5
A	987	ASP	-	expression tag	UNP A8EVM5
A	988	ASP	-	expression tag	UNP A8EVM5
A	989	ASP	-	expression tag	UNP A8EVM5
A	990	ASP	-	expression tag	UNP A8EVM5
A	991	LYS	-	expression tag	UNP A8EVM5
A	992	GLY	-	expression tag	UNP A8EVM5
A	993	SER	-	expression tag	UNP A8EVM5
A	994	LEU	-	expression tag	UNP A8EVM5
A	995	VAL	-	expression tag	UNP A8EVM5
A	996	PRO	-	expression tag	UNP A8EVM5
A	997	ARG	-	expression tag	UNP A8EVM5
A	998	GLY	-	expression tag	UNP A8EVM5
A	999	SER	-	expression tag	UNP A8EVM5
A	1000	HIS	-	expression tag	UNP A8EVM5
A	1203	ALA	PHE	engineered mutation	UNP A8EVM5
A	1217	CYS	ILE	engineered mutation	UNP A8EVM5
B	1983	MET	-	initiating methionine	UNP A8EVM5

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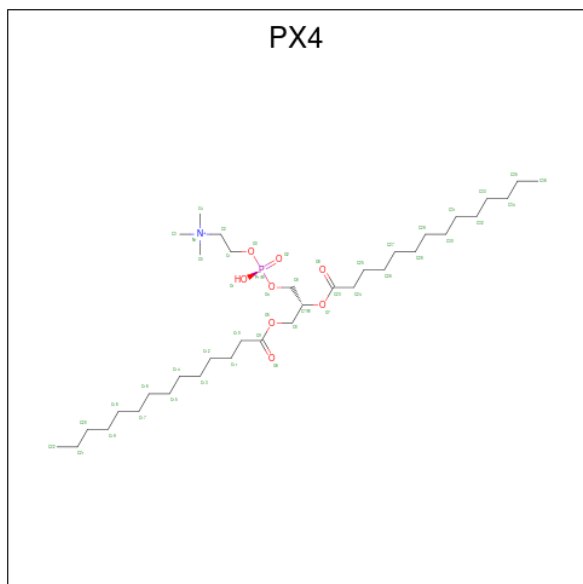
Chain	Residue	Modelled	Actual	Comment	Reference
B	1984	ASP	-	expression tag	UNP A8EVM5
B	1985	TYR	-	expression tag	UNP A8EVM5
B	1986	LYS	-	expression tag	UNP A8EVM5
B	1987	ASP	-	expression tag	UNP A8EVM5
B	1988	ASP	-	expression tag	UNP A8EVM5
B	1989	ASP	-	expression tag	UNP A8EVM5
B	1990	ASP	-	expression 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	2203	ALA	PHE	engineered mutation	UNP A8EVM5
B	2217	CYS	ILE	engineered mutation	UNP A8EVM5
C	983	MET	-	initiating methionine	UNP A8EVM5
C	984	ASP	-	expression tag	UNP A8EVM5
C	985	TYR	-	expression tag	UNP A8EVM5
C	986	LYS	-	expression tag	UNP A8EVM5
C	987	ASP	-	expression tag	UNP A8EVM5
C	988	ASP	-	expression tag	UNP A8EVM5
C	989	ASP	-	expression tag	UNP A8EVM5
C	990	ASP	-	expression tag	UNP A8EVM5
C	991	LYS	-	expression tag	UNP A8EVM5
C	992	GLY	-	expression tag	UNP A8EVM5
C	993	SER	-	expression tag	UNP A8EVM5
C	994	LEU	-	expression tag	UNP A8EVM5
C	995	VAL	-	expression tag	UNP A8EVM5
C	996	PRO	-	expression tag	UNP A8EVM5
C	997	ARG	-	expression tag	UNP A8EVM5
C	998	GLY	-	expression tag	UNP A8EVM5
C	999	SER	-	expression tag	UNP A8EVM5
C	1000	HIS	-	expression tag	UNP A8EVM5
C	1203	ALA	PHE	engineered mutation	UNP A8EVM5
C	1217	CYS	ILE	engineered mutation	UNP A8EVM5
D	1983	MET	-	initiating methionine	UNP A8EVM5
D	1984	ASP	-	expression tag	UNP A8EVM5
D	1985	TYR	-	expression tag	UNP A8EVM5

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1986	LYS	-	expression tag	UNP A8EVM5
D	1987	ASP	-	expression tag	UNP A8EVM5
D	1988	ASP	-	expression tag	UNP A8EVM5
D	1989	ASP	-	expression tag	UNP A8EVM5
D	1990	ASP	-	expression tag	UNP A8EVM5
D	1991	LYS	-	expression tag	UNP A8EVM5
D	1992	GLY	-	expression tag	UNP A8EVM5
D	1993	SER	-	expression tag	UNP A8EVM5
D	1994	LEU	-	expression tag	UNP A8EVM5
D	1995	VAL	-	expression tag	UNP A8EVM5
D	1996	PRO	-	expression tag	UNP A8EVM5
D	1997	ARG	-	expression tag	UNP A8EVM5
D	1998	GLY	-	expression tag	UNP A8EVM5
D	1999	SER	-	expression tag	UNP A8EVM5
D	2000	HIS	-	expression tag	UNP A8EVM5
D	2203	ALA	PHE	engineered mutation	UNP A8EVM5
D	2217	CYS	ILE	engineered mutation	UNP A8EVM5

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



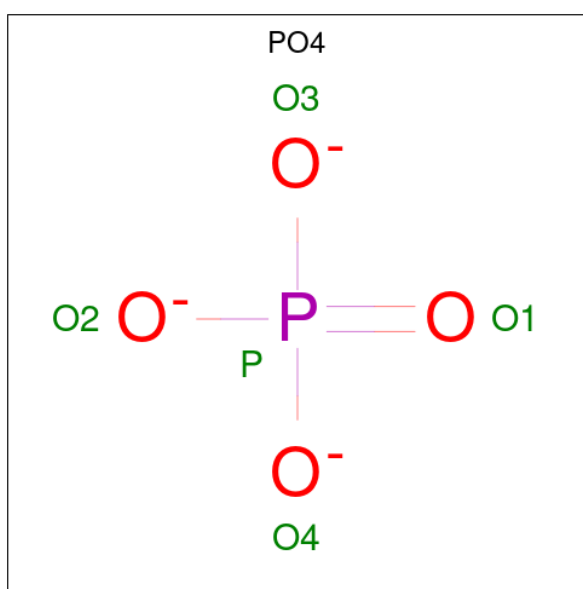
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	31	22	1	7	1	0	0
2	B	1	30	22	1	6	1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			34	24	1	8	1		
2	C	1	Total	C	N	O	P	0	0
			36	26	1	8	1		
2	C	1	Total	C	N	O	P	0	0
			22	14	1	6	1		
2	D	1	Total	C	N	O	P	0	0
			31	21	1	8	1		

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	O P	0	0
			5	4 1		
3	A	1	Total	O P	0	0
			5	4 1		
3	B	1	Total	O P	0	0
			5	4 1		
3	C	1	Total	O P	0	0
			5	4 1		
3	D	1	Total	O P	0	0
			5	4 1		

- Molecule 4 is water.

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

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

3 Data and refinement statistics i

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

Property	Value	Source
Space group	P 21 2 21	Depositor
Cell constants a, b, c, α , β , γ	125.78Å 125.97Å 192.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.93 – 2.90	Depositor
% Data completeness (in resolution range)	99.9 (29.93-2.90)	Depositor
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.90 (at 2.90Å)	Xtrriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.216 , 0.256	Depositor
Wilson B-factor (Å ²)	63.0	Xtrriage
Anisotropy	0.384	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.23$	Xtrriage
Estimated twinning fraction	0.468 for k,h,-l	Xtrriage
Total number of atoms	7195	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.58% 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](#)

11 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
3	PO4	A	1303	-	4,4,4	0.87	0	6,6,6	0.44	0
2	PX4	C	1301	-	35,35,45	1.28	3 (8%)	41,43,53	1.13	3 (7%)
2	PX4	A	1301	-	30,30,45	1.09	2 (6%)	35,37,53	1.10	1 (2%)
2	PX4	D	2301	-	30,30,45	1.38	3 (10%)	36,38,53	1.18	2 (5%)
3	PO4	B	2303	-	4,4,4	0.90	0	6,6,6	0.41	0
2	PX4	B	2302	-	33,33,45	1.18	3 (9%)	39,41,53	1.10	2 (5%)
3	PO4	A	1302	-	4,4,4	0.90	0	6,6,6	0.45	0
3	PO4	D	2302	-	4,4,4	0.94	0	6,6,6	0.47	0
2	PX4	B	2301	-	29,29,45	1.16	3 (10%)	34,36,53	1.33	2 (5%)
3	PO4	C	1303	-	4,4,4	0.93	0	6,6,6	0.36	0
2	PX4	C	1302	-	21,21,45	1.22	2 (9%)	26,27,53	0.80	1 (3%)

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	PX4	C	1301	-	-	25/39/39/49	-
2	PX4	A	1301	-	-	20/33/33/49	-
2	PX4	D	2301	-	-	16/34/34/49	-
2	PX4	B	2302	-	-	17/36/36/49	-
2	PX4	B	2301	-	-	16/31/31/49	-
2	PX4	C	1302	-	-	10/22/22/49	-

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	2301	PX4	O5-C9	3.95	1.44	1.33
2	C	1301	PX4	O5-C9	3.66	1.44	1.33
2	C	1301	PX4	O7-C23	3.60	1.44	1.34
2	C	1302	PX4	O7-C23	3.40	1.43	1.33
2	D	2301	PX4	O7-C23	3.32	1.43	1.34
2	B	2301	PX4	O7-C23	3.32	1.43	1.34
2	A	1301	PX4	O7-C23	3.24	1.43	1.34
2	B	2302	PX4	O7-C23	3.18	1.43	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1301	PX4	C4-N1	-2.93	1.41	1.50
2	C	1301	PX4	C4-N1	-2.90	1.41	1.50
2	C	1302	PX4	C4-N1	-2.78	1.41	1.50
2	D	2301	PX4	C4-N1	-2.77	1.41	1.50
2	B	2302	PX4	C4-N1	-2.75	1.42	1.50
2	B	2301	PX4	C4-N1	-2.64	1.42	1.50
2	B	2302	PX4	O5-C9	2.32	1.44	1.33
2	B	2301	PX4	O7-C7	-2.15	1.43	1.47

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2301	PX4	O7-C23-C24	4.50	121.20	111.50
2	B	2302	PX4	O7-C23-C24	4.48	121.15	111.50
2	A	1301	PX4	O7-C23-C24	4.30	120.76	111.50
2	D	2301	PX4	O7-C23-C24	4.15	120.45	111.50
2	B	2301	PX4	C7-O7-C23	-3.83	112.95	117.88
2	C	1301	PX4	O7-C23-C24	3.79	119.67	111.50
2	D	2301	PX4	O5-C9-C10	3.18	121.89	111.91
2	C	1301	PX4	O5-C9-C10	2.76	120.56	111.91
2	C	1302	PX4	O7-C23-C24	2.39	119.41	111.91
2	C	1301	PX4	C11-C10-C9	-2.25	105.45	113.62
2	B	2302	PX4	C7-O7-C23	-2.10	112.62	117.79

There are no chirality outliers.

All (104) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1301	PX4	C1-O3-P1-O2
2	A	1301	PX4	C6-O4-P1-O1
2	A	1301	PX4	C6-C7-C8-O5
2	A	1301	PX4	O7-C7-C8-O5
2	A	1301	PX4	C24-C23-O7-C7
2	B	2301	PX4	C1-O3-P1-O1
2	B	2301	PX4	C1-O3-P1-O2
2	B	2301	PX4	C6-O4-P1-O1
2	B	2301	PX4	C6-O4-P1-O2
2	B	2301	PX4	O3-C1-C2-N1
2	B	2301	PX4	O4-C6-C7-O7
2	B	2302	PX4	C1-O3-P1-O2
2	B	2302	PX4	O3-C1-C2-N1
2	C	1301	PX4	O3-C1-C2-N1

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Mol	Chain	Res	Type	Atoms
2	C	1301	PX4	O7-C7-C8-O5
2	C	1302	PX4	C1-O3-P1-O1
2	C	1302	PX4	C1-O3-P1-O2
2	C	1302	PX4	C1-O3-P1-O4
2	C	1302	PX4	C6-O4-P1-O1
2	C	1302	PX4	C6-O4-P1-O2
2	C	1302	PX4	O3-C1-C2-N1
2	C	1302	PX4	O4-C6-C7-O7
2	D	2301	PX4	C1-O3-P1-O2
2	D	2301	PX4	C1-O3-P1-O4
2	D	2301	PX4	C6-O4-P1-O1
2	D	2301	PX4	O4-C6-C7-O7
2	D	2301	PX4	O8-C23-O7-C7
2	D	2301	PX4	C24-C23-O7-C7
2	A	1301	PX4	O8-C23-O7-C7
2	B	2302	PX4	O6-C9-O5-C8
2	B	2302	PX4	C10-C9-O5-C8
2	B	2302	PX4	C24-C23-O7-C7
2	A	1301	PX4	C23-C24-C25-C26
2	B	2301	PX4	C23-C24-C25-C26
2	A	1301	PX4	C28-C29-C30-C31
2	D	2301	PX4	C23-C24-C25-C26
2	A	1301	PX4	C6-O4-P1-O3
2	B	2301	PX4	C1-O3-P1-O4
2	B	2301	PX4	C6-O4-P1-O3
2	C	1302	PX4	C6-O4-P1-O3
2	D	2301	PX4	C6-O4-P1-O3
2	C	1301	PX4	C9-C10-C11-C12
2	C	1302	PX4	C23-C24-C25-C26
2	B	2302	PX4	O8-C23-O7-C7
2	C	1301	PX4	C1-C2-N1-C5
2	C	1301	PX4	C14-C15-C16-C17
2	B	2302	PX4	C31-C32-C33-C34
2	B	2302	PX4	C30-C31-C32-C33
2	B	2302	PX4	C7-C6-O4-P1
2	C	1301	PX4	C17-C18-C19-C20
2	C	1301	PX4	C1-C2-N1-C3
2	C	1301	PX4	C1-C2-N1-C4
2	C	1301	PX4	C18-C19-C20-C21
2	D	2301	PX4	C24-C25-C26-C27
2	C	1301	PX4	C16-C17-C18-C19
2	A	1301	PX4	C24-C25-C26-C27

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Mol	Chain	Res	Type	Atoms
2	B	2301	PX4	C30-C31-C32-C33
2	C	1301	PX4	C11-C12-C13-C14
2	D	2301	PX4	C25-C26-C27-C28
2	B	2302	PX4	C23-C24-C25-C26
2	B	2302	PX4	C24-C25-C26-C27
2	C	1301	PX4	C24-C23-O7-C7
2	A	1301	PX4	C25-C26-C27-C28
2	C	1301	PX4	O8-C23-O7-C7
2	C	1301	PX4	C10-C11-C12-C13
2	D	2301	PX4	C10-C11-C12-C13
2	B	2301	PX4	C28-C29-C30-C31
2	B	2301	PX4	C33-C34-C35-C36
2	C	1301	PX4	C19-C20-C21-C22
2	B	2301	PX4	C27-C28-C29-C30
2	B	2301	PX4	C25-C26-C27-C28
2	C	1301	PX4	C6-C7-C8-O5
2	B	2302	PX4	C1-O3-P1-O4
2	B	2302	PX4	O7-C7-C8-O5
2	D	2301	PX4	O4-C6-C7-C8
2	B	2301	PX4	C26-C27-C28-C29
2	A	1301	PX4	C32-C33-C34-C35
2	B	2302	PX4	C26-C27-C28-C29
2	A	1301	PX4	C1-O3-P1-O4
2	A	1301	PX4	C6-O4-P1-O2
2	C	1301	PX4	C1-O3-P1-O2
2	D	2301	PX4	C6-O4-P1-O2
2	C	1301	PX4	C2-C1-O3-P1
2	C	1302	PX4	C25-C26-C27-C28
2	C	1301	PX4	O4-C6-C7-O7
2	C	1301	PX4	O7-C23-C24-C25
2	D	2301	PX4	O7-C23-C24-C25
2	C	1301	PX4	C11-C10-C9-O5
2	A	1301	PX4	O7-C23-C24-C25
2	C	1301	PX4	O4-C6-C7-C8
2	A	1301	PX4	C1-C2-N1-C3
2	A	1301	PX4	C1-C2-N1-C5
2	A	1301	PX4	C1-C2-N1-C4
2	A	1301	PX4	O8-C23-C24-C25
2	C	1301	PX4	O8-C23-C24-C25
2	B	2302	PX4	C6-C7-C8-O5
2	C	1301	PX4	C11-C10-C9-O6
2	D	2301	PX4	O8-C23-C24-C25

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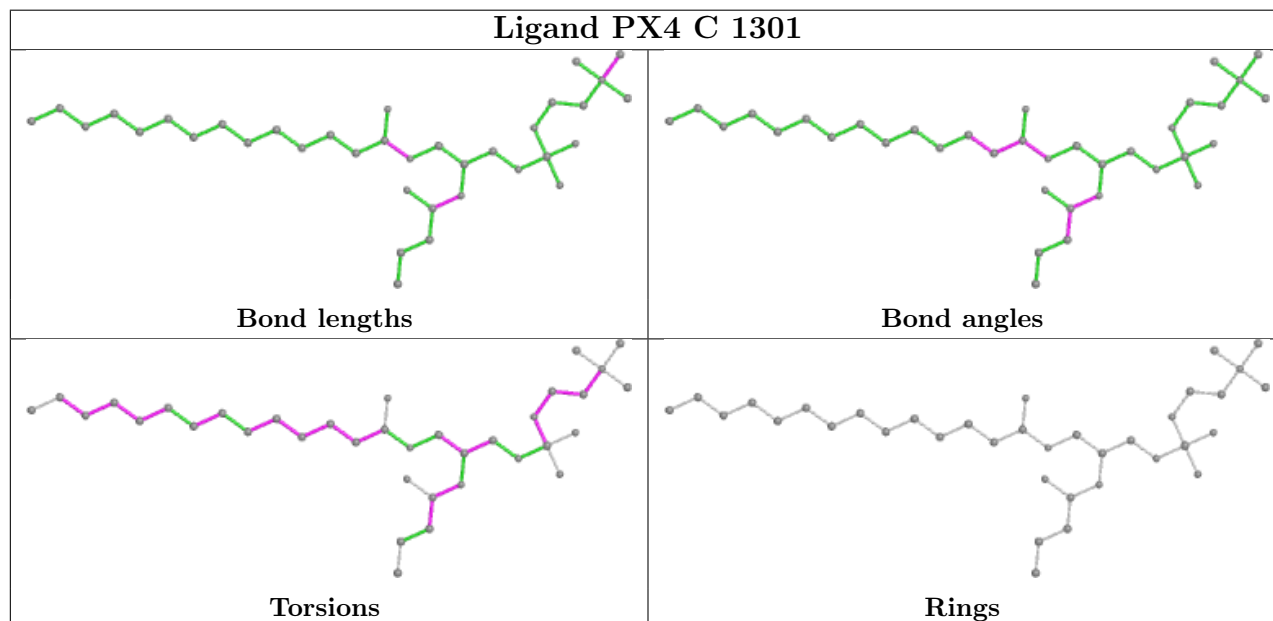
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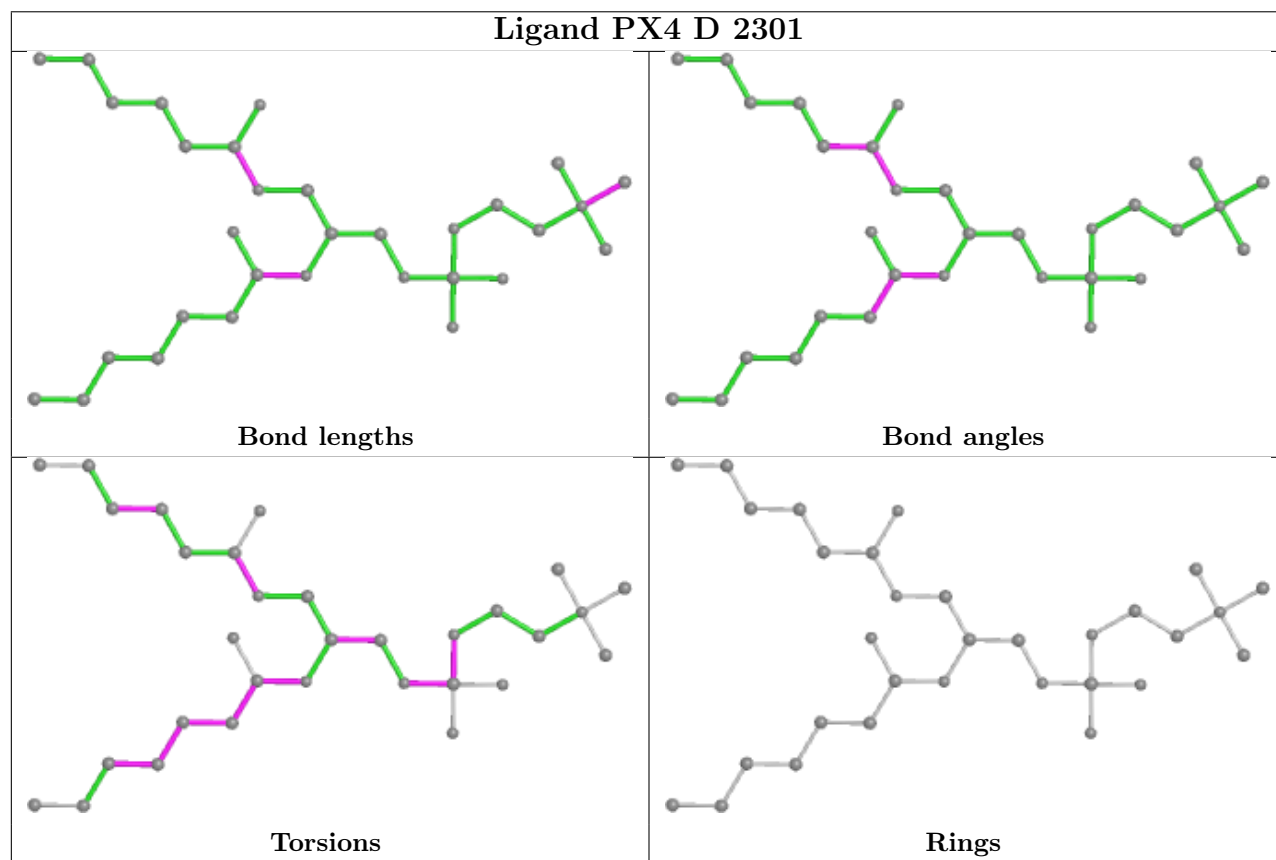
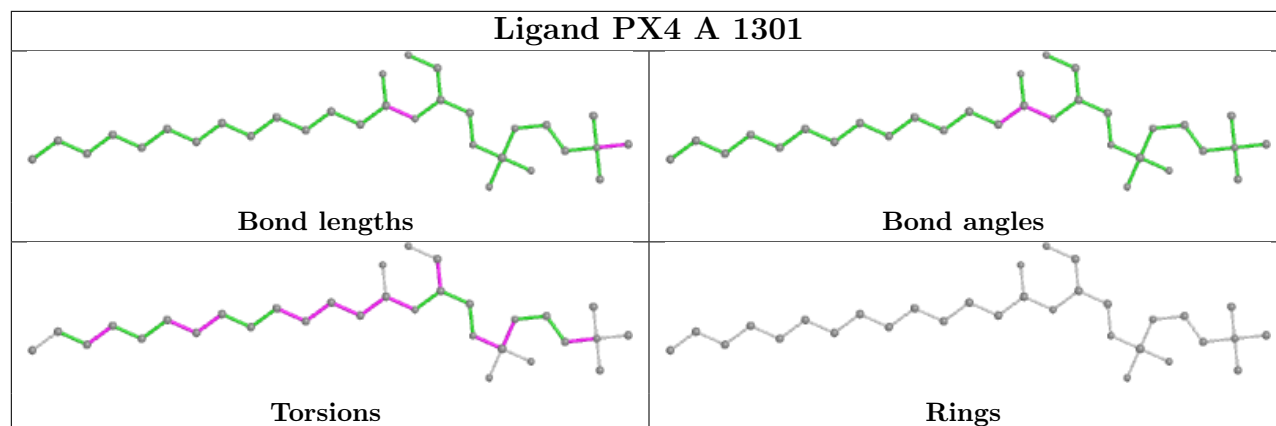
Mol	Chain	Res	Type	Atoms
2	B	2302	PX4	C6-O4-P1-O2
2	C	1301	PX4	C12-C13-C14-C15
2	D	2301	PX4	C10-C9-O5-C8
2	A	1301	PX4	C29-C30-C31-C32
2	B	2301	PX4	C24-C25-C26-C27
2	B	2302	PX4	C27-C28-C29-C30

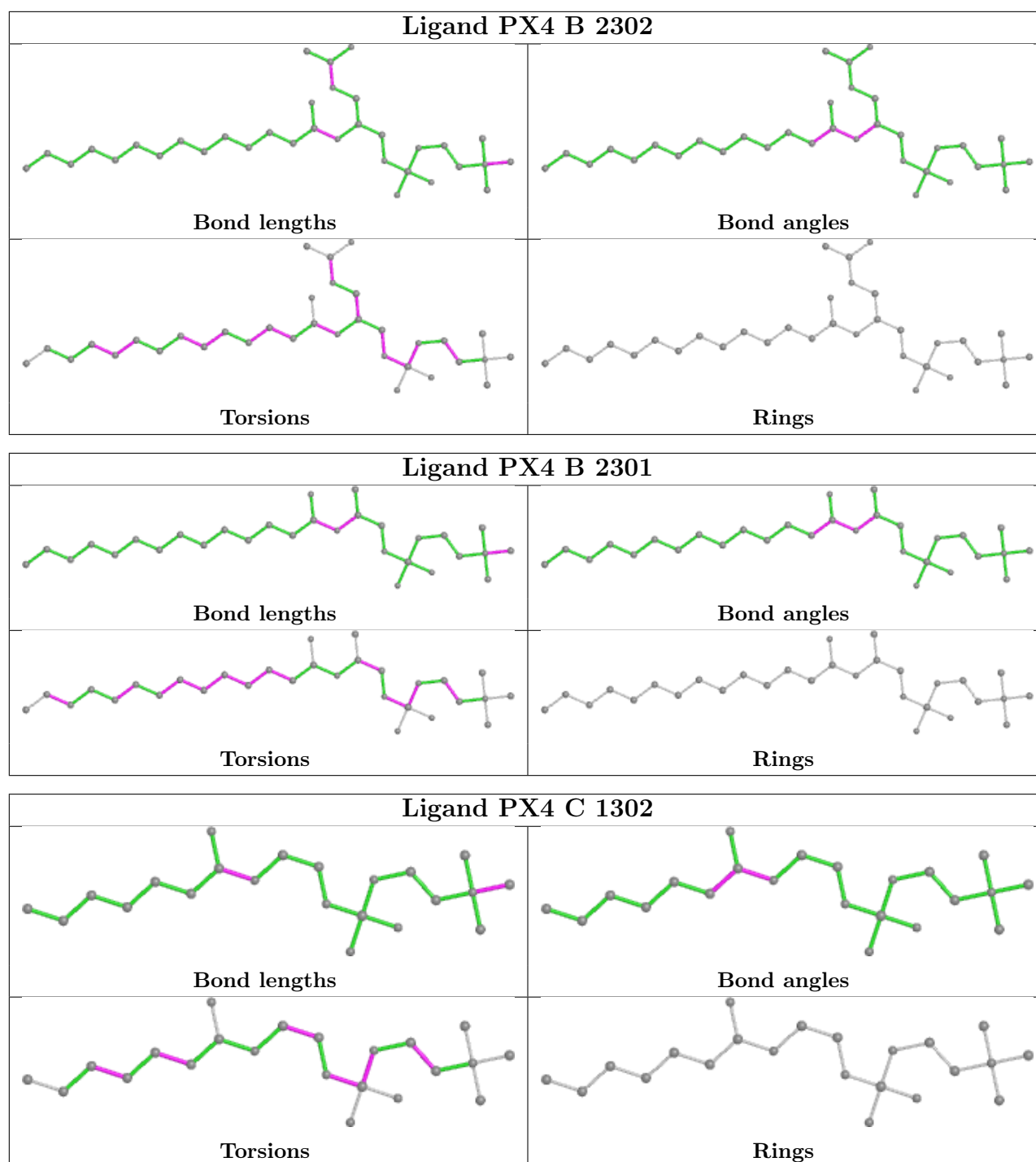
There are no ring outliers.

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.