Full wwPDB X-ray Structure Validation Report ⓘ

Oct 3, 2023 – 02:47 AM EDT

PDB ID	:	6P6Y
Title	:	Crystal structure of voltage-gated sodium channel NavAb V100C/Q150C disulfide crosslinked mutant in the activated state
Authors	:	Wisedchaisri, G.; Tonggu, L.; McCord, E.; Gamal El-din, T.M.; Wang, L.; Zheng, N.; Catterall, W.A.
Deposited on	:	2019-06-04
Resolution	:	2.89 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)
Xtriage (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 2.89 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 ⓘ

There are 3 unique types of molecules in this entry. The entry contains 2201 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	242	1977	1334	301	328	14	0	0	0

There are 20 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	1100	CYS	VAL	engineered mutation	UNP A8EVM5
A	1150	CYS	GLN	engineered mutation	UNP A8EVM5

- Molecule 2 is 3-[(3-CHOLAMIDOPROPYL)DIMETHYLAMMONIO]-1-PROPANESULFO NATE (three-letter code: CPS) (formula: $C_{32}H_{58}N_2O_7S$).
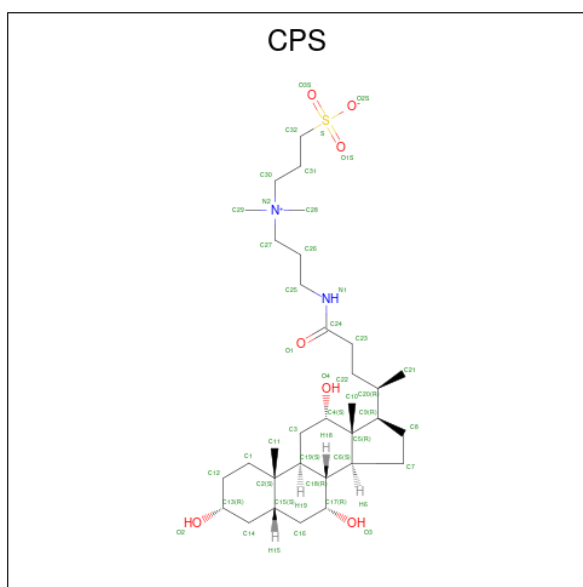
CPS

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			31	26	1	4		
2	A	1	Total	C	N	O	0	0
			29	24	1	4		

- Molecule 3 is 1,2-DIMYRISTOYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PX4) (formula: $C_{36}H_{73}NO_8P$).

PX4

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			46	36	1	8	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			31	21	1	8	1		
3	A	1	Total	C	N	O	P	0	0
			42	32	1	8	1		
3	A	1	Total	C	N	O	P	0	0
			32	23	1	7	1		
3	A	1	Total	C				0	0
			13	13					

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, α, β, γ	125.83Å 125.83Å 189.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.53 – 2.89	Depositor
% Data completeness (in resolution range)	97.6 (44.53-2.89)	Depositor
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.18 (at 2.90Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.214 , 0.273	Depositor
Wilson B-factor (Å^2)	76.2	Xtriage
Anisotropy	0.004	Xtriage
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2201	wwPDB-VP
Average B, all atoms (Å^2)	82.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.41% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

4 Model quality ⓘ

4.1 Standard geometry ⓘ

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

4.2 Too-close contacts ⓘ

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

4.3 Torsion angles ⓘ

4.3.1 Protein backbone ⓘ

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

4.3.2 Protein sidechains ⓘ

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

4.3.3 RNA ⓘ

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

4.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

4.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

4.6 Ligand geometry ⓘ

7 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	PX4	A	1304	-	30,30,45	0.49	0	36,38,53	0.57	0
3	PX4	A	1307	-	12,12,45	0.26	0	11,11,53	0.22	0
3	PX4	A	1303	-	45,45,45	0.36	0	51,53,53	0.71	2 (3%)
2	CPS	A	1302	-	32,32,45	0.46	0	51,51,70	0.75	0
3	PX4	A	1305	-	41,41,45	0.39	0	47,49,53	0.95	1 (2%)
3	PX4	A	1306	-	31,31,45	0.48	0	36,38,53	0.52	0
2	CPS	A	1301	-	34,34,45	0.54	0	52,53,70	0.86	1 (1%)

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
3	PX4	A	1304	-	-	8/34/34/49	-
3	PX4	A	1307	-	-	6/10/10/49	-
3	PX4	A	1303	-	-	21/49/49/49	-
2	CPS	A	1302	-	-	0/9/74/90	0/4/4/4
3	PX4	A	1305	-	-	28/45/45/49	-
3	PX4	A	1306	-	-	17/34/34/49	-
2	CPS	A	1301	-	-	3/12/77/90	0/4/4/4

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	1305	PX4	O7-C23-C24	4.30	120.76	111.50
3	A	1303	PX4	O7-C23-C24	3.36	118.75	111.50
3	A	1303	PX4	O7-C7-C6	2.66	118.03	108.40
2	A	1301	CPS	C6-C5-C4	-2.17	105.38	107.40

There are no chirality outliers.

All (83) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1303	PX4	C1-O3-P1-O1
3	A	1303	PX4	C1-O3-P1-O2
3	A	1303	PX4	C1-O3-P1-O4
3	A	1304	PX4	O3-C1-C2-N1
3	A	1304	PX4	C7-C6-O4-P1
3	A	1304	PX4	O7-C7-C8-O5
3	A	1305	PX4	C1-O3-P1-O1
3	A	1305	PX4	C2-C1-O3-P1
3	A	1305	PX4	O3-C1-C2-N1
3	A	1305	PX4	C24-C23-O7-C7
3	A	1306	PX4	C1-O3-P1-O1
3	A	1306	PX4	C6-O4-P1-O1
3	A	1306	PX4	C24-C23-O7-C7
3	A	1305	PX4	O8-C23-O7-C7
3	A	1306	PX4	O8-C23-O7-C7
3	A	1303	PX4	O6-C9-O5-C8
3	A	1303	PX4	C10-C9-O5-C8
3	A	1303	PX4	C24-C23-O7-C7
2	A	1301	CPS	C21-C20-C22-C23
3	A	1305	PX4	C1-C2-N1-C5
3	A	1303	PX4	O4-C6-C7-O7
3	A	1304	PX4	C23-C24-C25-C26
3	A	1303	PX4	O8-C23-O7-C7
3	A	1306	PX4	C23-C24-C25-C26
3	A	1303	PX4	C6-O4-P1-O3
3	A	1304	PX4	C1-O3-P1-O4
3	A	1305	PX4	C1-O3-P1-O4
3	A	1306	PX4	C1-O3-P1-O4
3	A	1306	PX4	C6-O4-P1-O3
2	A	1301	CPS	C20-C22-C23-C24
3	A	1305	PX4	C1-C2-N1-C4
3	A	1305	PX4	C11-C12-C13-C14
3	A	1307	PX4	C26-C27-C28-C29
3	A	1307	PX4	C25-C26-C27-C28
3	A	1305	PX4	C26-C27-C28-C29
3	A	1306	PX4	C26-C27-C28-C29
3	A	1303	PX4	C11-C12-C13-C14
3	A	1305	PX4	C16-C17-C18-C19
3	A	1305	PX4	C1-C2-N1-C3
3	A	1305	PX4	C18-C19-C20-C21
3	A	1305	PX4	C17-C18-C19-C20
3	A	1303	PX4	C16-C17-C18-C19
3	A	1306	PX4	C27-C28-C29-C30

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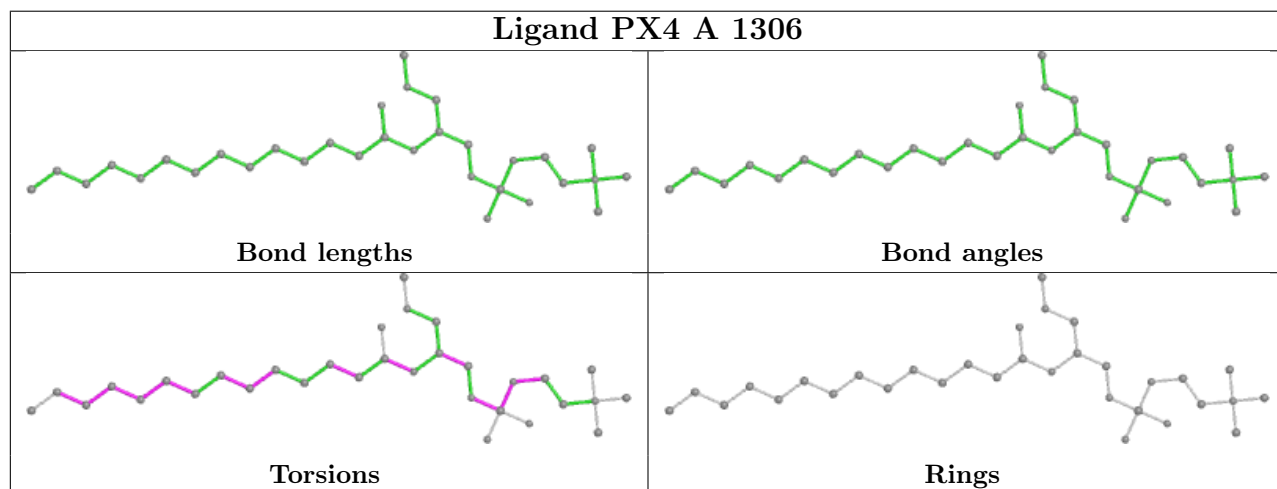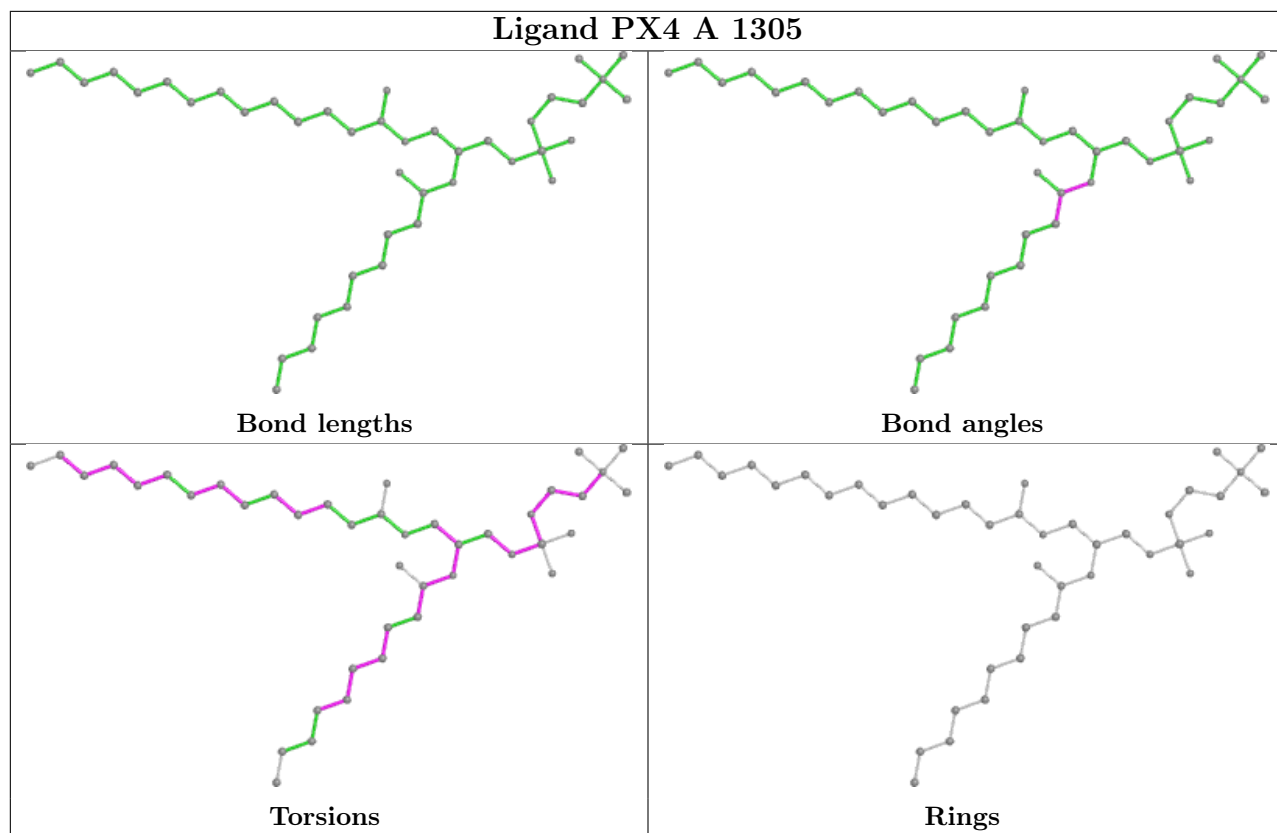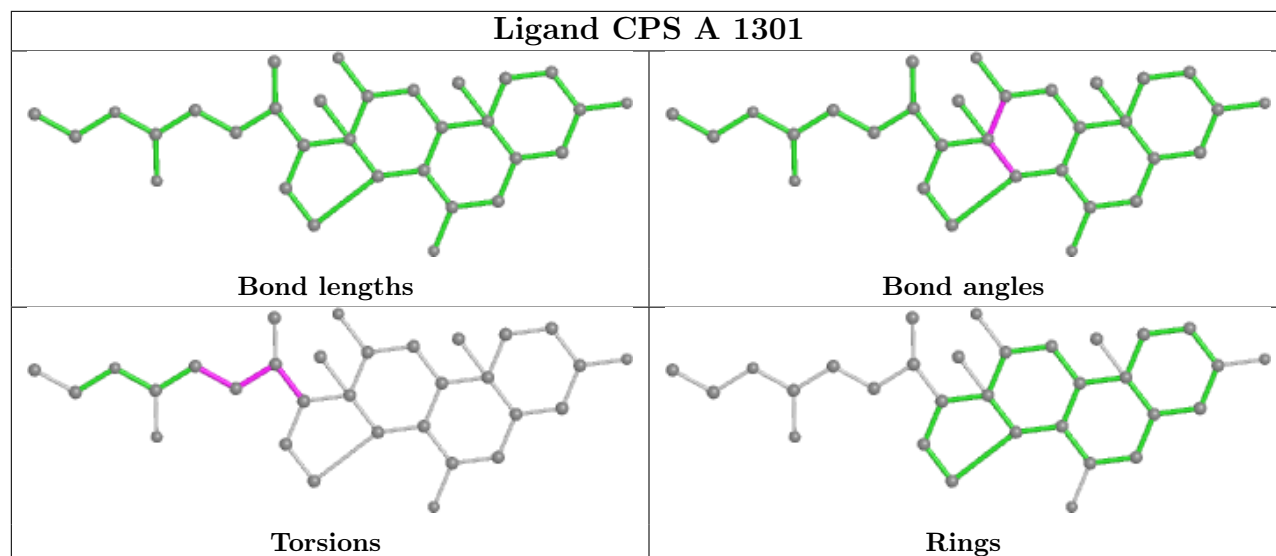| Mol	Chain	Res	Type	Atoms
3	A	1305	PX4	C25-C26-C27-C28
3	A	1305	PX4	C27-C28-C29-C30
3	A	1307	PX4	C28-C29-C30-C31
3	A	1307	PX4	C29-C30-C31-C32
3	A	1306	PX4	C31-C32-C33-C34
3	A	1303	PX4	O4-C6-C7-C8
3	A	1306	PX4	C32-C33-C34-C35
3	A	1304	PX4	C6-C7-C8-O5
3	A	1303	PX4	C15-C16-C17-C18
3	A	1306	PX4	C29-C30-C31-C32
3	A	1303	PX4	C28-C29-C30-C31
3	A	1303	PX4	C33-C34-C35-C36
3	A	1306	PX4	C33-C34-C35-C36
3	A	1306	PX4	C30-C31-C32-C33
3	A	1305	PX4	C6-O4-P1-O3
3	A	1303	PX4	C23-C24-C25-C26
3	A	1306	PX4	O4-C6-C7-C8
3	A	1305	PX4	C10-C11-C12-C13
3	A	1303	PX4	C25-C26-C27-C28
3	A	1305	PX4	C6-C7-C8-O5
3	A	1303	PX4	O7-C7-C8-O5
3	A	1304	PX4	C1-O3-P1-O2
3	A	1306	PX4	C1-O3-P1-O2
3	A	1307	PX4	C31-C32-C33-C34
3	A	1306	PX4	C2-C1-O3-P1
3	A	1304	PX4	C25-C26-C27-C28
3	A	1305	PX4	C19-C20-C21-C22
3	A	1305	PX4	C8-C7-O7-C23
3	A	1305	PX4	C7-C6-O4-P1
3	A	1305	PX4	C13-C14-C15-C16
2	A	1301	CPS	C21-C20-C9-C5
3	A	1305	PX4	O7-C23-C24-C25
3	A	1305	PX4	C24-C25-C26-C27
3	A	1305	PX4	C14-C15-C16-C17
3	A	1305	PX4	C6-C7-O7-C23
3	A	1307	PX4	C24-C25-C26-C27
3	A	1303	PX4	C30-C31-C32-C33
3	A	1303	PX4	C6-C7-C8-O5
3	A	1303	PX4	C6-O4-P1-O2
3	A	1305	PX4	C6-O4-P1-O2

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 then 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 PX4 A 1304

Bond lengths

Bond angles

Torsions

Rings

Ligand PX4 A 1307

Bond lengths

Bond angles

Torsions

Rings

Ligand PX4 A 1303

Bond lengths

Bond angles

Torsions

Rings

Ligand PX4 A 1305

Bond lengths

Bond angles

Torsions

Rings

Ligand PX4 A 1306

Bond lengths

Bond angles

Torsions

Rings

Ligand CPS A 1301

Bond lengths

Bond angles

Torsions

Rings
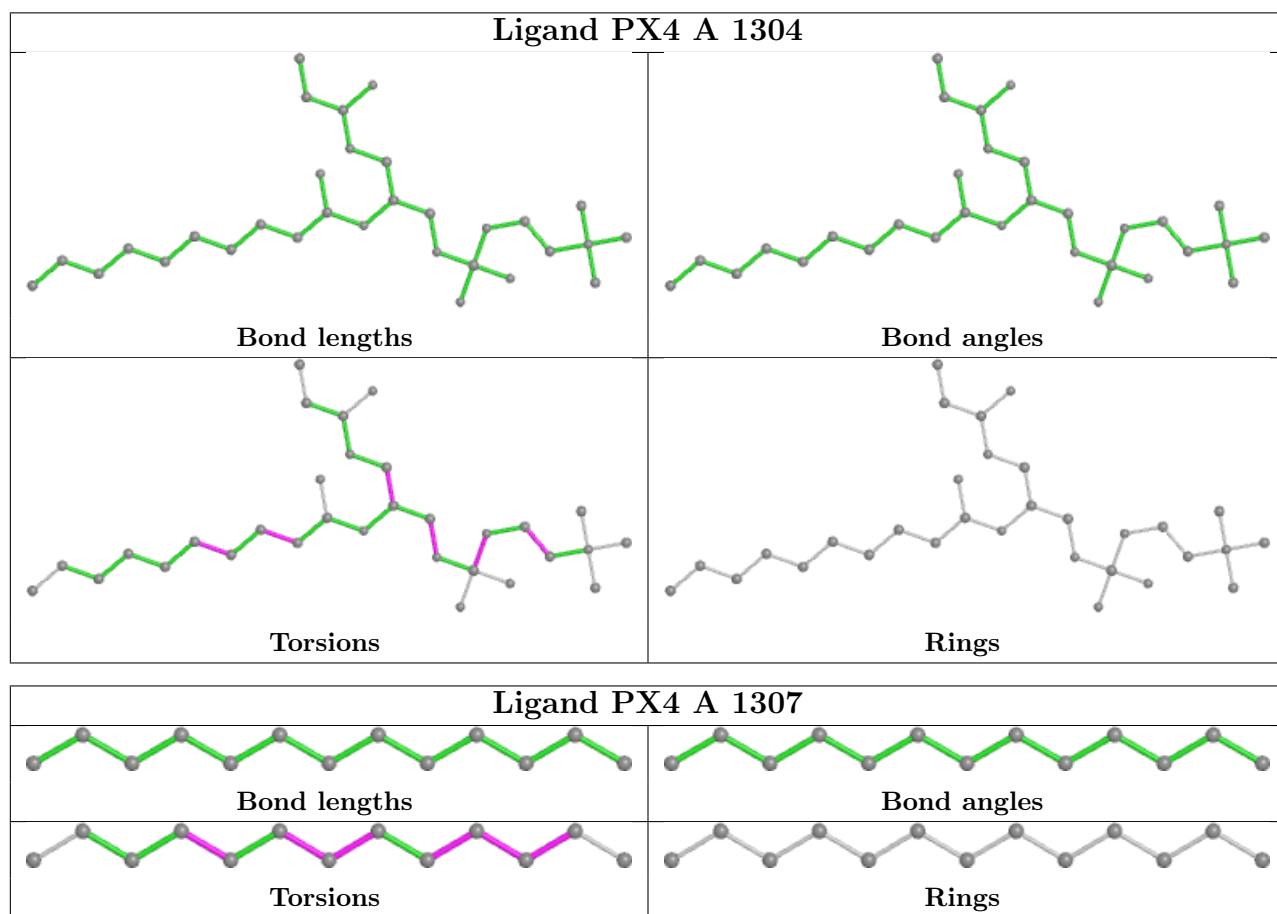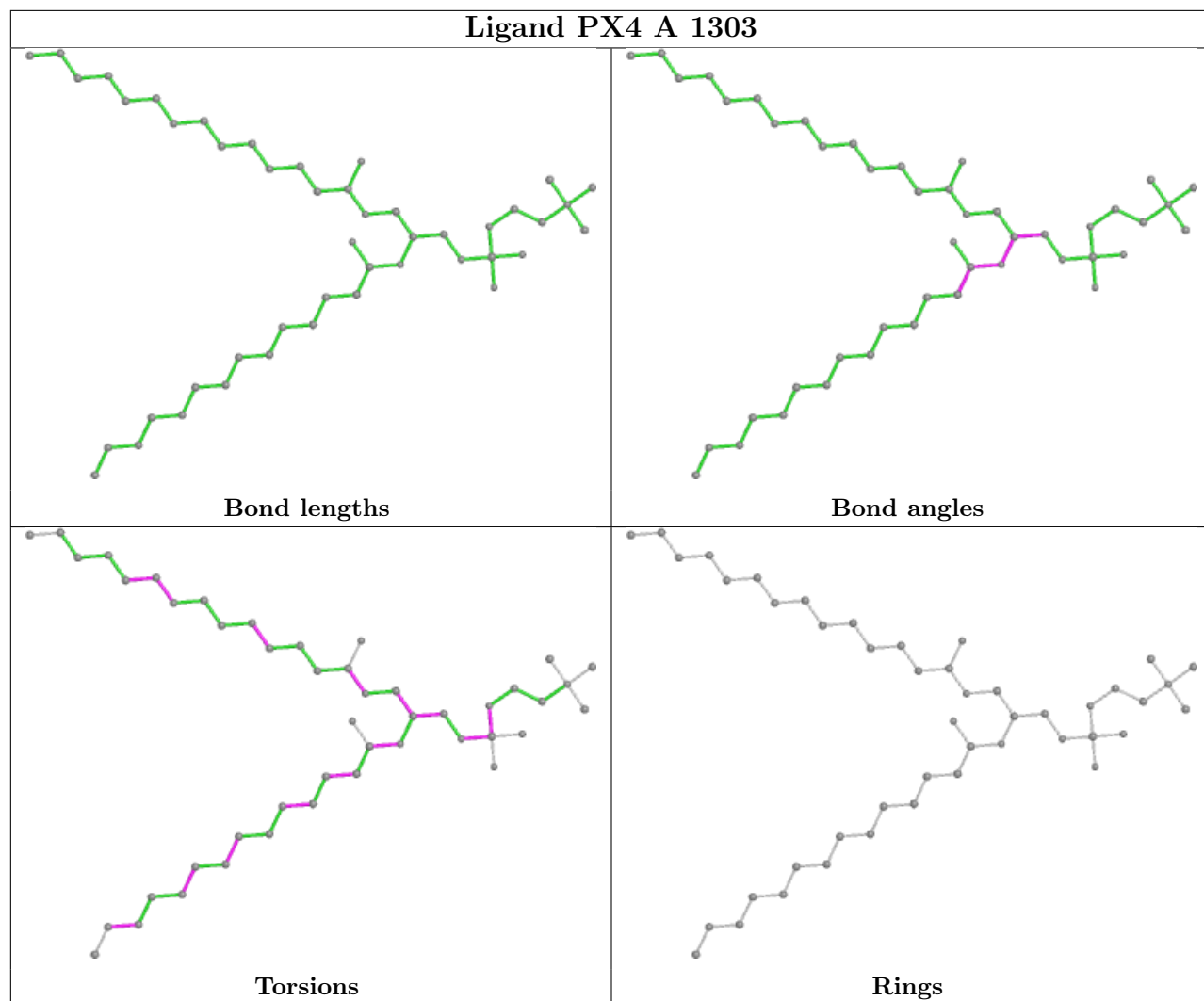
4.7 Other polymers ⓘ

There are no such residues in this entry.

4.8 Polymer linkage issues ⓘ

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.