



wwPDB X-ray Structure Validation Summary Report

Oct 3, 2023 – 01:06 AM EDT

PDB ID : 6PD2
Title : PntC-AEPT: fusion protein of phosphonate-specific cytidyltransferase and 2-aminoethylphosphonate (AEP) transaminase from *Treponema denticola* in complex with cytidine monophosphate-AEP
Authors : Suits, M.D.L.; Whiteside, J.
Deposited on : 2019-06-18
Resolution : 1.95 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 1.95 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 9 unique types of molecules in this entry. The entry contains 21090 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 Nucleotidyl transferase/aminotransferase, class V.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	615	4831	3084	798	914	35	0	0	0
1	B	615	4831	3084	798	914	35	0	0	0
1	C	616	4838	3089	799	915	35	0	0	0
1	D	608	4776	3051	786	904	35	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

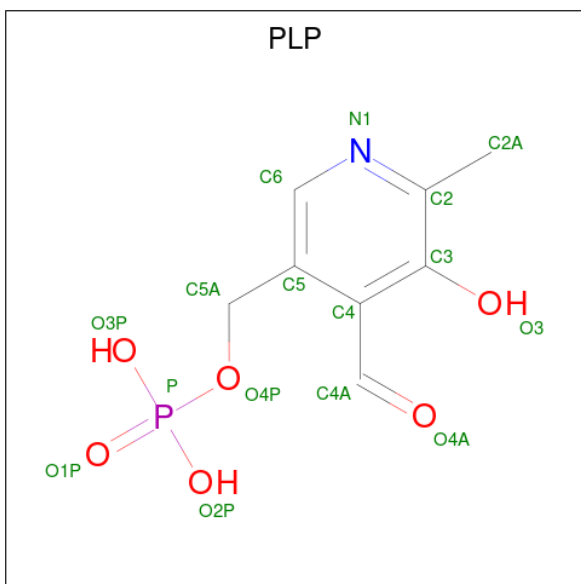
Chain	Residue	Modelled	Actual	Comment	Reference
A	617	LEU	-	expression tag	UNP Q73MU2
A	618	GLU	-	expression tag	UNP Q73MU2
A	619	HIS	-	expression tag	UNP Q73MU2
A	620	HIS	-	expression tag	UNP Q73MU2
A	621	HIS	-	expression tag	UNP Q73MU2
A	622	HIS	-	expression tag	UNP Q73MU2
A	623	HIS	-	expression tag	UNP Q73MU2
A	624	HIS	-	expression tag	UNP Q73MU2
B	617	LEU	-	expression tag	UNP Q73MU2
B	618	GLU	-	expression tag	UNP Q73MU2
B	619	HIS	-	expression tag	UNP Q73MU2
B	620	HIS	-	expression tag	UNP Q73MU2
B	621	HIS	-	expression tag	UNP Q73MU2
B	622	HIS	-	expression tag	UNP Q73MU2
B	623	HIS	-	expression tag	UNP Q73MU2
B	624	HIS	-	expression tag	UNP Q73MU2
C	617	LEU	-	expression tag	UNP Q73MU2
C	618	GLU	-	expression tag	UNP Q73MU2
C	619	HIS	-	expression tag	UNP Q73MU2
C	620	HIS	-	expression tag	UNP Q73MU2
C	621	HIS	-	expression tag	UNP Q73MU2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	622	HIS	-	expression tag	UNP Q73MU2
C	623	HIS	-	expression tag	UNP Q73MU2
C	624	HIS	-	expression tag	UNP Q73MU2
D	617	LEU	-	expression tag	UNP Q73MU2
D	618	GLU	-	expression tag	UNP Q73MU2
D	619	HIS	-	expression tag	UNP Q73MU2
D	620	HIS	-	expression tag	UNP Q73MU2
D	621	HIS	-	expression tag	UNP Q73MU2
D	622	HIS	-	expression tag	UNP Q73MU2
D	623	HIS	-	expression tag	UNP Q73MU2
D	624	HIS	-	expression tag	UNP Q73MU2

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C₈H₁₀NO₆P).

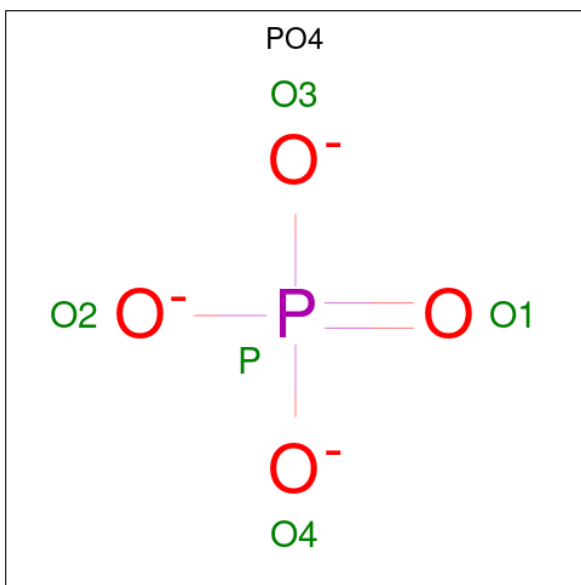


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			16	8	1	6	1		
2	B	1	Total	C	N	O	P	0	0
			16	8	1	6	1		
2	C	1	Total	C	N	O	P	0	0
			16	8	1	6	1		
2	D	1	Total	C	N	O	P	0	0
			16	8	1	6	1		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Mg 2 2	0	0
3	B	2	Total Mg 2 2	0	0
3	C	2	Total Mg 2 2	0	0
3	D	2	Total Mg 2 2	0	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



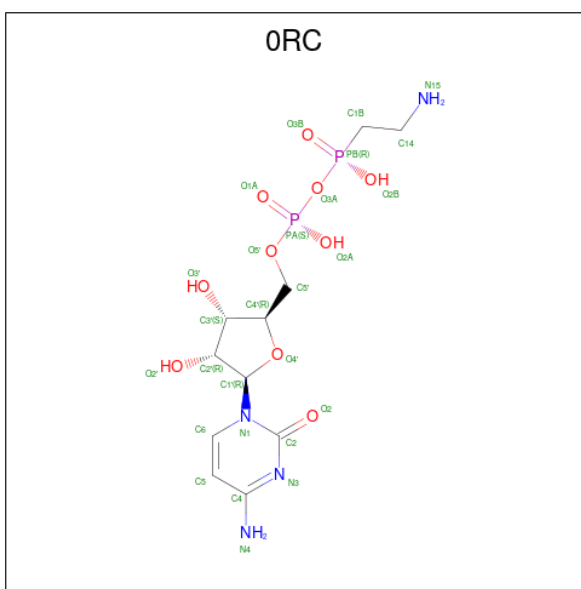
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O P 5 4 1	0	0
4	A	1	Total O P 5 4 1	0	0
4	B	1	Total O P 5 4 1	0	0
4	B	1	Total O P 5 4 1	0	0
4	B	1	Total O P 5 4 1	0	0
4	C	1	Total O P 5 4 1	0	0
4	C	1	Total O P 5 4 1	0	0
4	C	1	Total O P 5 4 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	O	P	0	0
			5	4	1		
4	D	1	Total	O	P	0	0
			5	4	1		
4	D	1	Total	O	P	0	0
			5	4	1		

- Molecule 5 is 5'-O-[(S)-{[(R)-(2-aminoethyl)(hydroxy)phosphoryl]oxy}(hydroxy)phosphoryl]cytidine (three-letter code: 0RC) (formula: C₁₁H₂₀N₄O₁₀P₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
5	A	1	Total	C	N	O	P	0	0
			27	11	4	10	2		
5	B	1	Total	C	N	O	P	0	0
			27	11	4	10	2		
5	C	1	Total	C	N	O	P	0	0
			27	11	4	10	2		
5	D	1	Total	C	N	O	P	0	0
			27	11	4	10	2		

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

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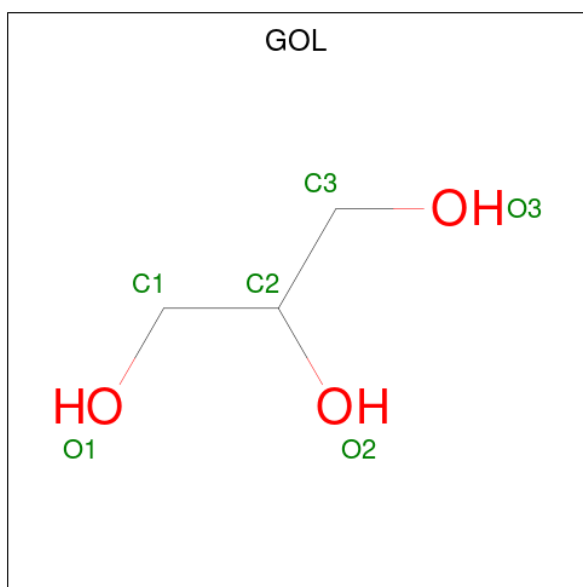
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	354	Total	O	0	0
			354	354		
9	B	352	Total	O	0	0
			352	352		
9	C	411	Total	O	0	0
			411	411		
9	D	330	Total	O	0	0
			330	330		

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 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	76.45Å 154.05Å 134.58Å 90.00° 90.90° 90.00°	Depositor
Resolution (Å)	47.98 – 1.95	Depositor
% Data completeness (in resolution range)	98.0 (47.98-1.95)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.01 (at 1.95Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.220 , 0.254	Depositor
Wilson B-factor (Å ²)	23.1	Xtrriage
Anisotropy	0.768	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.039 for h,-k,-l	Xtrriage
Total number of atoms	21090	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.21% 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](#)

Of 59 ligands modelled in this entry, 8 are monoatomic - leaving 51 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
6	EDO	C	2214	-	3,3,3	0.53	0	2,2,2	0.59	0
4	PO4	D	709	-	4,4,4	1.05	0	6,6,6	0.79	0
6	EDO	D	711	-	3,3,3	0.31	0	2,2,2	0.82	0
4	PO4	C	2215	-	4,4,4	0.94	0	6,6,6	0.83	0
6	EDO	D	712	-	3,3,3	0.59	0	2,2,2	0.56	0
6	EDO	C	2210	-	3,3,3	0.58	0	2,2,2	0.51	0
6	EDO	A	713	-	3,3,3	0.43	0	2,2,2	0.31	0
6	EDO	A	706	-	3,3,3	0.74	0	2,2,2	0.24	0
7	ACT	A	715	-	3,3,3	1.22	0	3,3,3	1.37	0
8	GOL	B	711	-	5,5,5	1.81	3 (60%)	5,5,5	1.10	0
4	PO4	D	704	-	4,4,4	0.63	0	6,6,6	0.70	0
6	EDO	B	710	-	3,3,3	0.64	0	2,2,2	0.53	0
6	EDO	A	709	-	3,3,3	0.52	0	2,2,2	0.76	0
6	EDO	A	710	-	3,3,3	0.34	0	2,2,2	0.94	0
6	EDO	A	714	-	3,3,3	0.43	0	2,2,2	0.42	0
8	GOL	B	709	-	5,5,5	0.53	0	5,5,5	1.05	0
4	PO4	C	2207	-	4,4,4	0.72	0	6,6,6	0.68	0
6	EDO	B	706	-	3,3,3	0.25	0	2,2,2	0.37	0
6	EDO	A	708	-	3,3,3	0.56	0	2,2,2	0.25	0
6	EDO	C	2208	-	3,3,3	0.37	0	2,2,2	0.96	0
6	EDO	C	2206	-	3,3,3	0.42	0	2,2,2	0.67	0
7	ACT	C	2201	-	3,3,3	1.43	0	3,3,3	1.25	0
5	ORC	C	2205	3	27,28,28	4.12	13 (48%)	36,42,42	1.49	7 (19%)
5	ORC	A	705	3	27,28,28	4.21	12 (44%)	36,42,42	1.94	6 (16%)
2	PLP	B	701	-	16,16,16	1.24	1 (6%)	20,23,23	1.23	3 (15%)
6	EDO	C	2213	-	3,3,3	0.63	0	2,2,2	0.25	0
5	ORC	D	705	3	27,28,28	4.12	14 (51%)	36,42,42	1.40	5 (13%)
6	EDO	A	716	-	3,3,3	0.43	0	2,2,2	0.95	0
2	PLP	D	702	-	16,16,16	1.20	2 (12%)	20,23,23	1.21	2 (10%)
6	EDO	A	712	-	3,3,3	0.31	0	2,2,2	0.92	0
6	EDO	C	2209	-	3,3,3	0.79	0	2,2,2	0.16	0
6	EDO	D	706	-	3,3,3	0.46	0	2,2,2	0.76	0
6	EDO	A	717	-	3,3,3	0.26	0	2,2,2	0.31	0
4	PO4	B	712	-	4,4,4	0.32	0	6,6,6	0.79	0
7	ACT	A	707	-	3,3,3	1.98	1 (33%)	3,3,3	1.38	0
6	EDO	D	708	-	3,3,3	0.58	0	2,2,2	0.43	0
4	PO4	B	708	-	4,4,4	0.84	0	6,6,6	0.64	0
6	EDO	A	711	-	3,3,3	0.64	0	2,2,2	1.24	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PO4	A	704	-	4,4,4	0.88	0	6,6,6	1.04	0
2	PLP	A	701	-	16,16,16	1.16	2 (12%)	20,23,23	1.46	4 (20%)
6	EDO	C	2212	-	3,3,3	0.57	0	2,2,2	0.09	0
4	PO4	C	2204	-	4,4,4	0.64	0	6,6,6	1.24	0
6	EDO	D	710	-	3,3,3	0.62	0	2,2,2	0.06	0
4	PO4	B	704	-	4,4,4	0.86	0	6,6,6	0.84	0
6	EDO	B	707	-	3,3,3	0.40	0	2,2,2	0.43	0
4	PO4	A	718	-	4,4,4	1.04	0	6,6,6	0.62	0
4	PO4	D	714	-	4,4,4	0.41	0	6,6,6	0.70	0
6	EDO	D	713	-	3,3,3	0.61	0	2,2,2	0.39	0
2	PLP	C	2202	-	16,16,16	1.08	1 (6%)	20,23,23	1.09	1 (5%)
6	EDO	D	707	-	3,3,3	0.52	0	2,2,2	0.54	0
5	ORC	B	705	3	27,28,28	4.21	14 (51%)	36,42,42	1.75	8 (22%)

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
6	EDO	C	2214	-	-	0/1/1/1	-
6	EDO	D	711	-	-	0/1/1/1	-
6	EDO	D	712	-	-	0/1/1/1	-
6	EDO	C	2210	-	-	0/1/1/1	-
6	EDO	A	713	-	-	1/1/1/1	-
8	GOL	B	711	-	-	2/4/4/4	-
2	PLP	C	2202	-	-	2/8/8/8	0/1/1/1
6	EDO	B	710	-	-	1/1/1/1	-
6	EDO	A	709	-	-	1/1/1/1	-
6	EDO	A	710	-	-	0/1/1/1	-
6	EDO	A	714	-	-	1/1/1/1	-
8	GOL	B	709	-	-	2/4/4/4	-
6	EDO	B	706	-	-	1/1/1/1	-
6	EDO	A	708	-	-	0/1/1/1	-
6	EDO	C	2208	-	-	0/1/1/1	-
6	EDO	C	2206	-	-	1/1/1/1	-
5	ORC	C	2205	3	-	2/17/36/36	0/2/2/2
5	ORC	A	705	3	-	4/17/36/36	0/2/2/2
2	PLP	B	701	-	-	1/8/8/8	0/1/1/1
6	EDO	C	2213	-	-	0/1/1/1	-
5	ORC	D	705	3	-	4/17/36/36	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	A	716	-	-	0/1/1/1	-
2	PLP	D	702	-	-	1/8/8/8	0/1/1/1
6	EDO	A	712	-	-	1/1/1/1	-
6	EDO	C	2209	-	-	0/1/1/1	-
6	EDO	D	706	-	-	1/1/1/1	-
6	EDO	A	717	-	-	0/1/1/1	-
6	EDO	D	708	-	-	0/1/1/1	-
6	EDO	A	711	-	-	0/1/1/1	-
2	PLP	A	701	-	-	1/8/8/8	0/1/1/1
6	EDO	C	2212	-	-	1/1/1/1	-
6	EDO	D	710	-	-	0/1/1/1	-
6	EDO	B	707	-	-	1/1/1/1	-
6	EDO	D	713	-	-	0/1/1/1	-
6	EDO	A	706	-	-	0/1/1/1	-
6	EDO	D	707	-	-	0/1/1/1	-
5	ORC	B	705	3	-	3/17/36/36	0/2/2/2

The worst 5 of 63 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	2205	ORC	PB-O3A	10.60	1.70	1.58
5	A	705	ORC	PB-O3A	10.40	1.70	1.58
5	B	705	ORC	PB-O3A	9.65	1.69	1.58
5	D	705	ORC	PB-O3A	9.41	1.68	1.58
5	B	705	ORC	C2'-C3'	-7.98	1.31	1.53

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	705	ORC	PB-C1B-C14	-7.59	97.86	114.06
5	B	705	ORC	PB-O3A-PA	-4.41	118.57	132.56
5	A	705	ORC	PB-O3A-PA	-4.17	119.35	132.56
5	B	705	ORC	C3'-C2'-C1'	4.03	109.08	101.43
5	B	705	ORC	O4'-C1'-C2'	-3.85	98.26	106.64

There are no chirality outliers.

5 of 32 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	705	ORC	C14-C1B-PB-O3B
5	A	705	ORC	C14-C1B-PB-O3A

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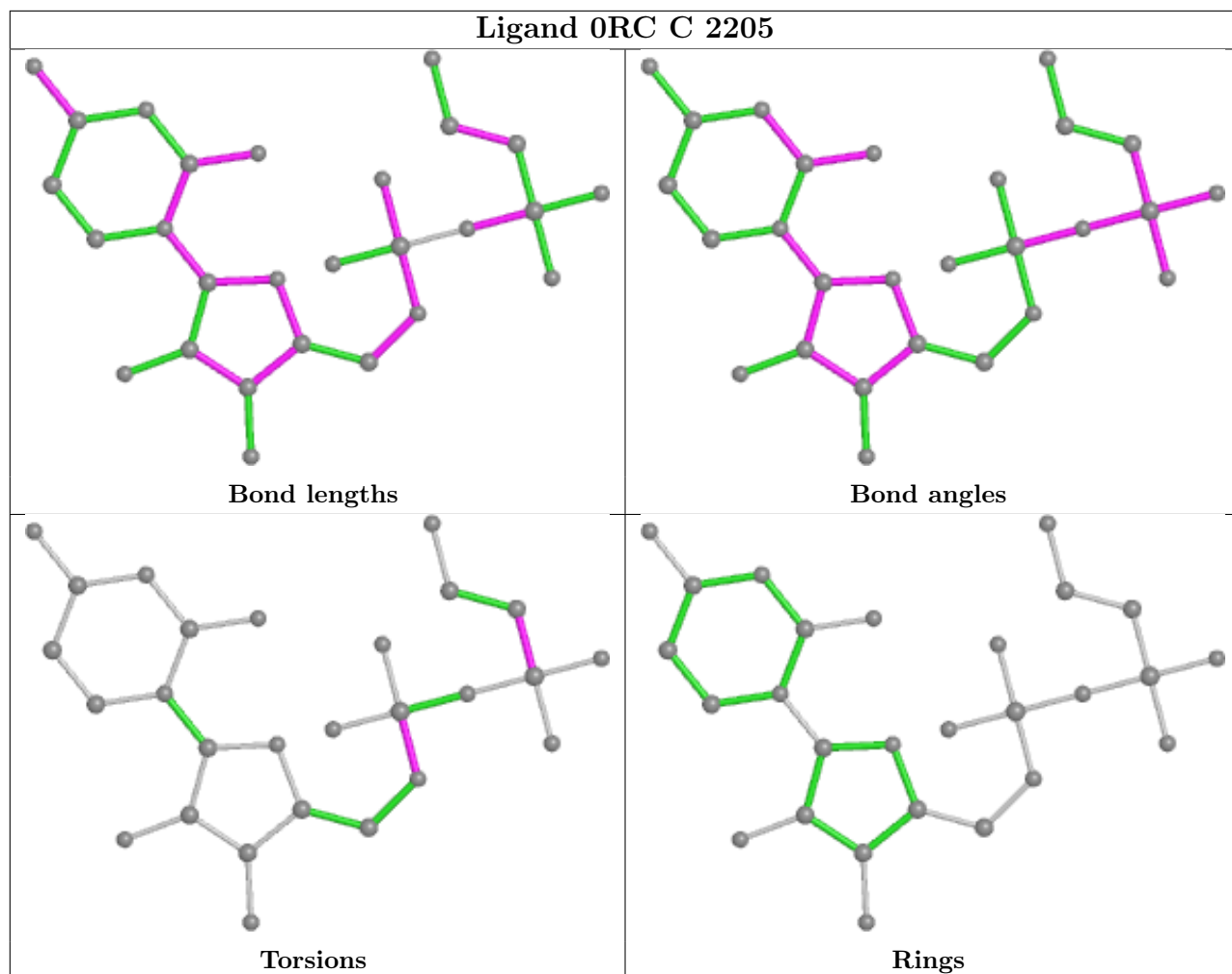
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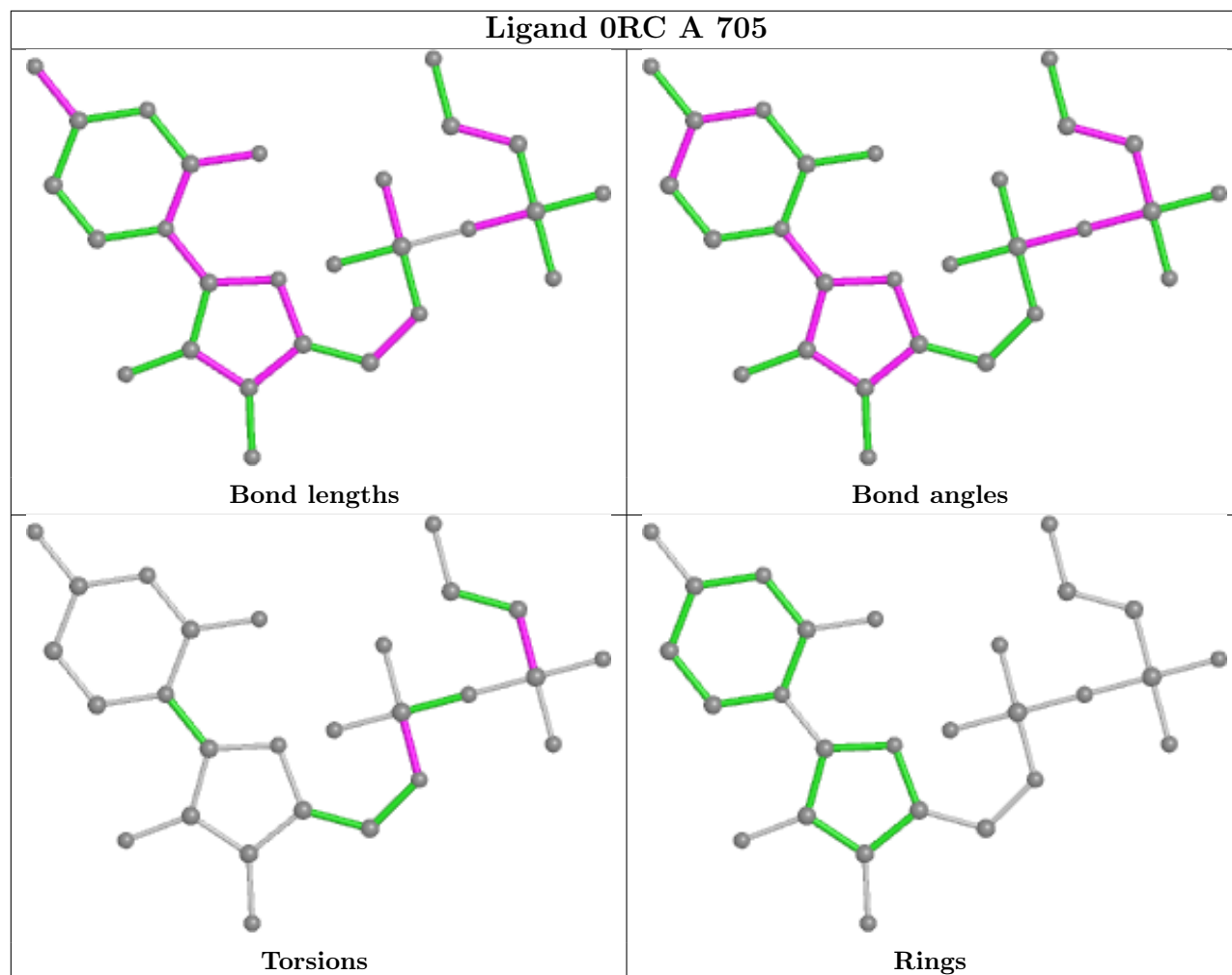
Mol	Chain	Res	Type	Atoms
5	B	705	0RC	C14-C1B-PB-O3B
5	B	705	0RC	C14-C1B-PB-O2B
5	B	705	0RC	C14-C1B-PB-O3A

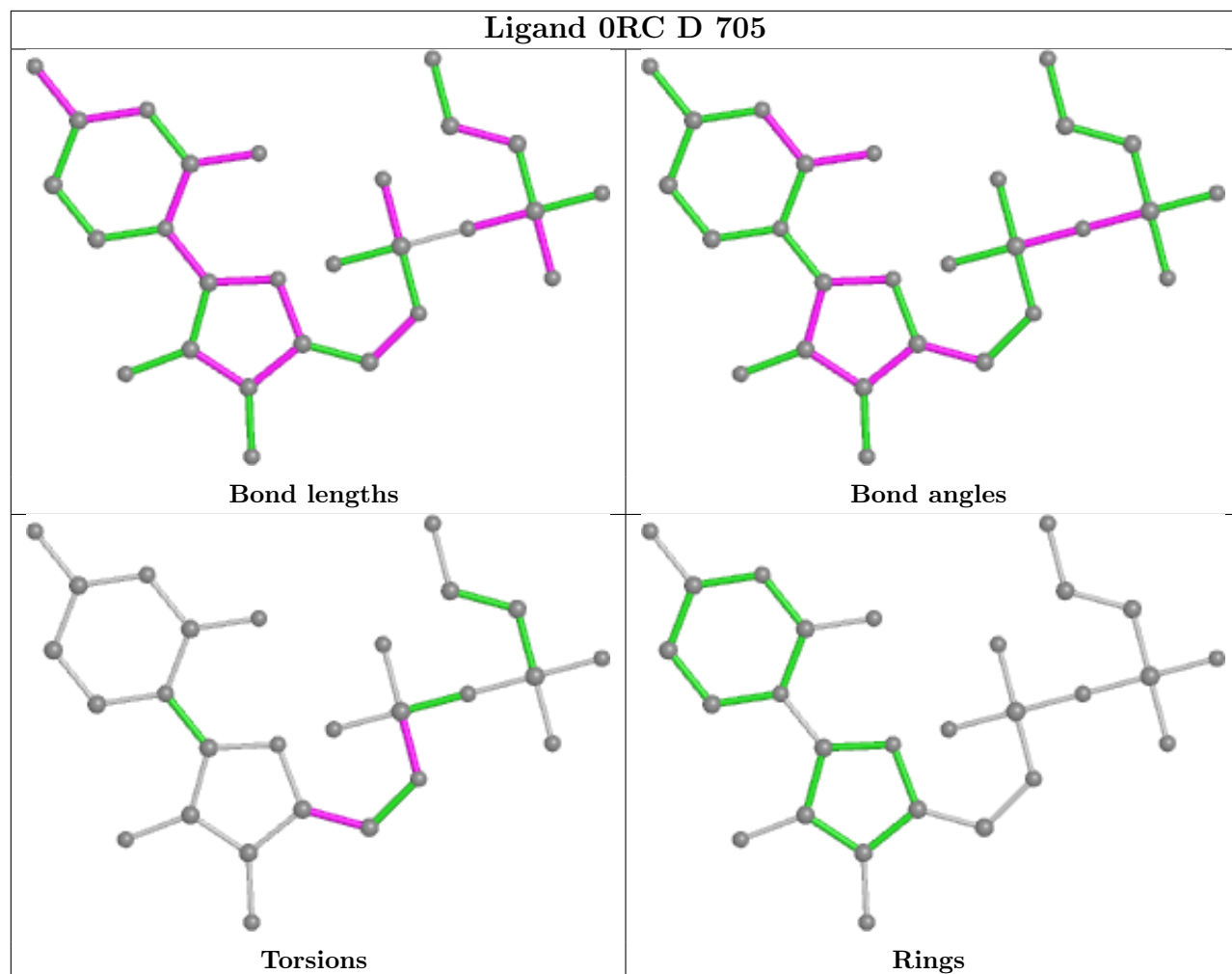
There are no ring outliers.

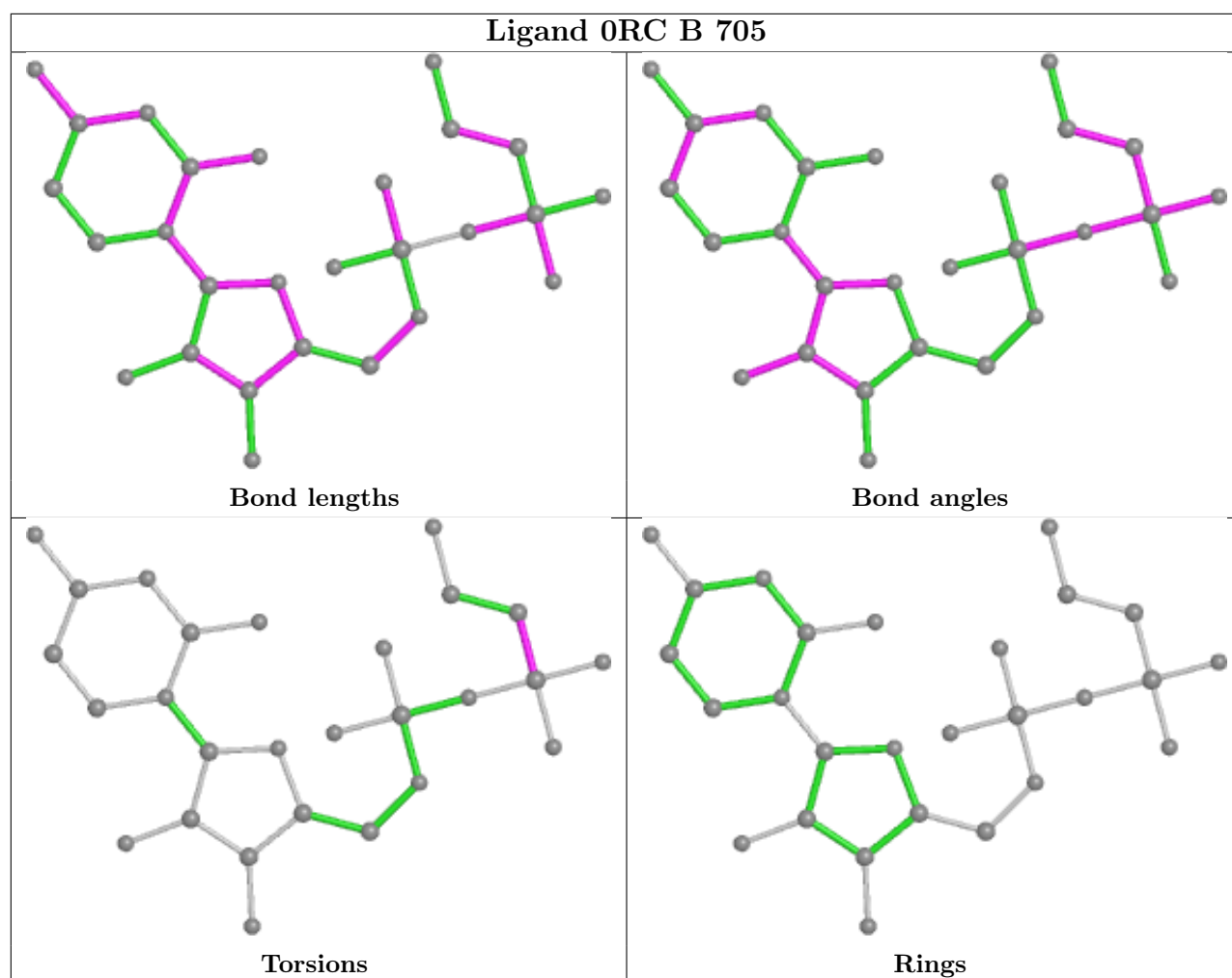
No monomer is involved in short contacts.

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.