Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2023 – 01:24 PM EDT

PDB ID	:	6NUB
Title	:	Pyruvate Kinase M2 Mutant - S437Y in Complex with L-serine
Authors	:	Srivastava, D.; Nandi, S.; Dey, M.
Deposited on	:	2019-01-31
Resolution	:	1.70 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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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 11 unique types of molecules in this entry. The entry contains 9203 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 Pyruvate kinase PKM.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	522	Total	C	N	O	S	51	18	0
			4059	2568	714	749	28			
1	B	519	Total	C	N	O	S	3	17	0
			4020	2546	704	741	29			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	MET	-	initiating methionine	UNP P14618
A	-17	GLY	-	expression tag	UNP P14618
A	-16	SER	-	expression tag	UNP P14618
A	-15	SER	-	expression tag	UNP P14618
A	-14	HIS	-	expression tag	UNP P14618
A	-13	HIS	-	expression tag	UNP P14618
A	-12	HIS	-	expression tag	UNP P14618
A	-11	HIS	-	expression tag	UNP P14618
A	-10	HIS	-	expression tag	UNP P14618
A	-9	HIS	-	expression tag	UNP P14618
A	-8	SER	-	expression tag	UNP P14618
A	-7	SER	-	expression tag	UNP P14618
A	-6	GLY	-	expression tag	UNP P14618
A	-5	LEU	-	expression tag	UNP P14618
A	-4	VAL	-	expression tag	UNP P14618
A	-3	PRO	-	expression tag	UNP P14618
A	-2	ARG	-	expression tag	UNP P14618
A	-1	GLY	-	expression tag	UNP P14618
A	0	SER	-	expression tag	UNP P14618
A	437	TYR	SER	engineered mutation	UNP P14618
B	-18	MET	-	initiating methionine	UNP P14618
B	-17	GLY	-	expression tag	UNP P14618
B	-16	SER	-	expression tag	UNP P14618
B	-15	SER	-	expression tag	UNP P14618
B	-14	HIS	-	expression tag	UNP P14618

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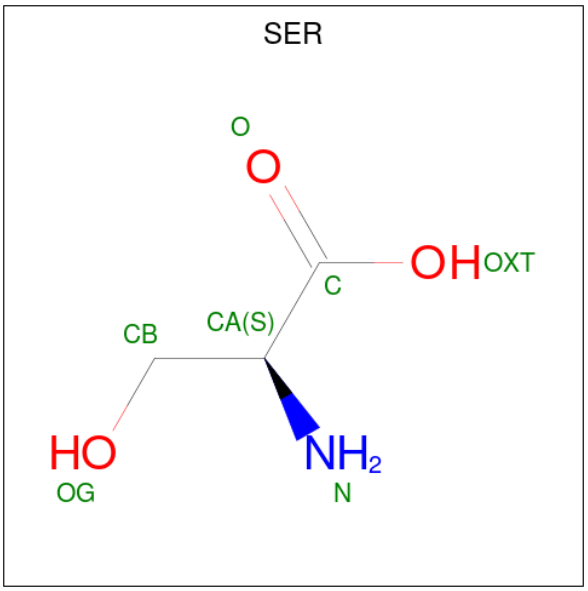
Chain	Residue	Modelled	Actual	Comment	Reference
B	-13	HIS	-	expression tag	UNP P14618
B	-12	HIS	-	expression tag	UNP P14618
B	-11	HIS	-	expression tag	UNP P14618
B	-10	HIS	-	expression tag	UNP P14618
B	-9	HIS	-	expression tag	UNP P14618
B	-8	SER	-	expression tag	UNP P14618
B	-7	SER	-	expression tag	UNP P14618
B	-6	GLY	-	expression tag	UNP P14618
B	-5	LEU	-	expression tag	UNP P14618
B	-4	VAL	-	expression tag	UNP P14618
B	-3	PRO	-	expression tag	UNP P14618
B	-2	ARG	-	expression tag	UNP P14618
B	-1	GLY	-	expression tag	UNP P14618
B	0	SER	-	expression tag	UNP P14618
B	437	TYR	SER	engineered mutation	UNP P14618

- Molecule 2 is SERINE (three-letter code: SER) (formula: $C_3H_7NO_3$).

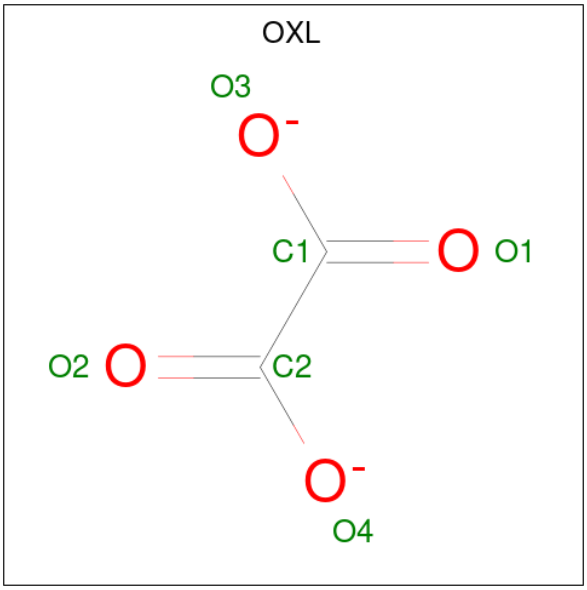


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			7	3	1	3		
2	B	1	Total	C	N	O	0	0
			7	3	1	3		

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

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0

- Molecule 4 is OXALATE ION (three-letter code: OXL) (formula: C_2O_4).

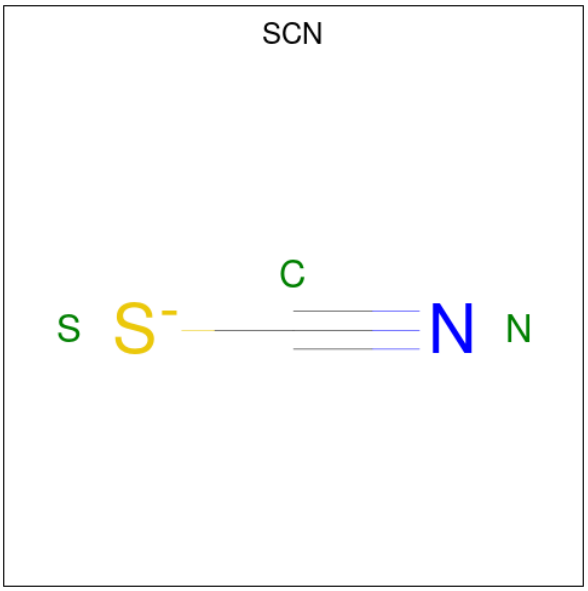


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 2 4	0	0
4	B	1	Total C O 6 2 4	0	0

- Molecule 5 is POTASSIUM ION (three-letter code: K) (formula: K).

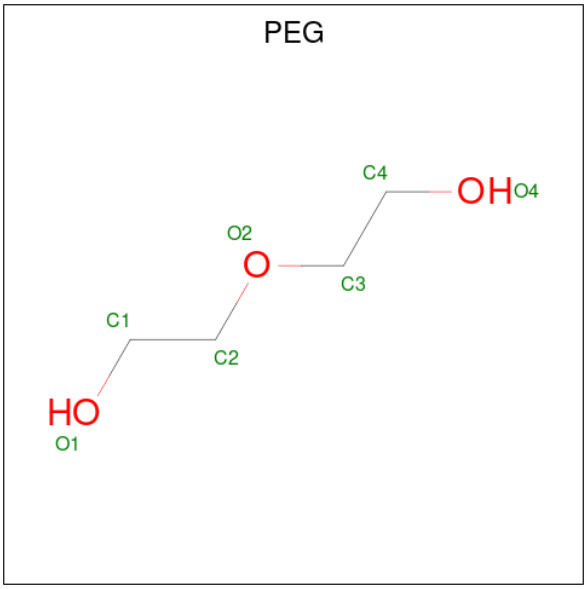
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total K 1 1	0	0
5	B	1	Total K 1 1	0	0

- Molecule 6 is THIOCYANATE ION (three-letter code: SCN) (formula: CNS).



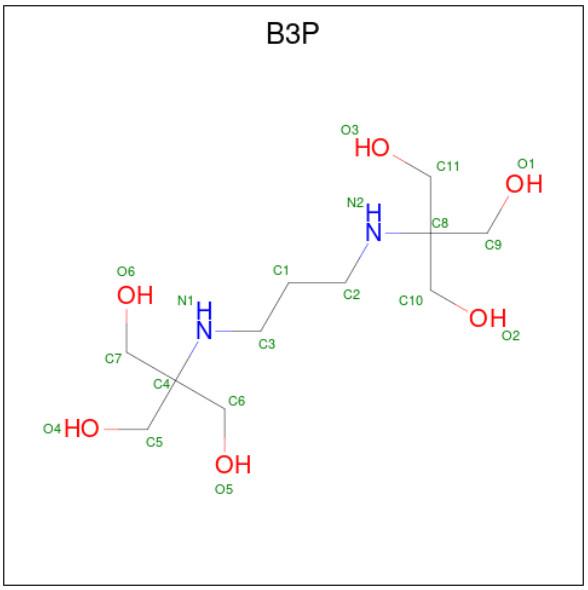
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C N S 3 1 1 1	0	0
6	A	1	Total C N S 3 1 1 1	0	0
6	B	1	Total C N S 3 1 1 1	0	0
6	B	1	Total C N S 3 1 1 1	0	0
6	B	1	Total C N S 3 1 1 1	0	0

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).



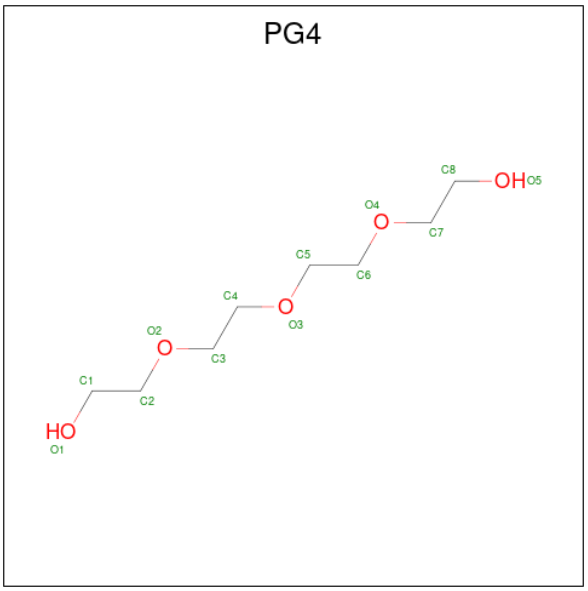
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O 7 4 3	0	0

- Molecule 8 is 2-[3-(2-HYDROXY-1,1-DIHYDROXYMETHYL-ETHYLAMINO)-PROPYL AMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: B3P) (formula: $C_{11}H_{26}N_2O_6$).



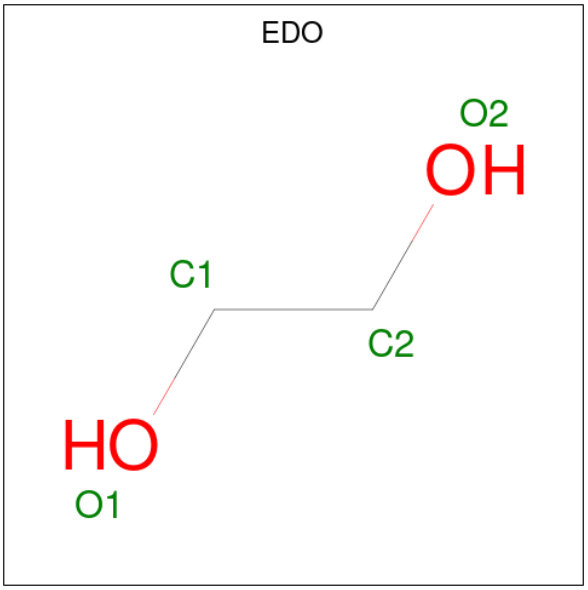
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total C N O 19 11 2 6	0	0
8	B	1	Total C N O 19 11 2 6	0	0

- Molecule 9 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	B	1	Total C O 13 8 5	0	0

- Molecule 10 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 11 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	A	494	Total O 494 494	0	0
11	B	523	Total O 523 523	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	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	110.11Å 94.23Å 109.13Å 90.00° 95.63° 90.00°	Depositor
Resolution (Å)	36.81 – 1.70	Depositor
% Data completeness (in resolution range)	99.6 (36.81-1.70)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.76 (at 1.70Å)	Xtriage
Refinement program	PHENIX (1.15.2_3472: ???)	Depositor
R, R_{free}	0.154 , 0.174	Depositor
Wilson B-factor (Å^2)	13.2	Xtriage
Anisotropy	0.519	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	9203	wwPDB-VP
Average B, all atoms (Å^2)	17.0	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.*

[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

Of 18 ligands modelled in this entry, 4 are monoatomic - leaving 14 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	$\#\|Z\| > 2$
7	PEG	A	607	-	6,6,6	0.49	0	5,5,5	0.70	0
9	PG4	B	608	-	12,12,12	0.51	0	11,11,11	0.62	0
8	B3P	A	608	-	18,18,18	0.66	0	21,23,23	1.35	3 (14%)
10	EDO	B	609	-	3,3,3	0.36	0	2,2,2	0.98	0
8	B3P	B	610	-	18,18,18	0.61	0	21,23,23	1.34	2 (9%)
2	SER	B	601	-	5,6,6	0.91	0	5,7,7	1.33	0
6	SCN	B	607	-	1,2,2	0.43	0	0,1,1	-	-
2	SER	A	601	-	5,6,6	1.01	0	5,7,7	1.41	1 (20%)
6	SCN	B	605	-	1,2,2	0.21	0	0,1,1	-	-
6	SCN	A	605	-	1,2,2	0.60	0	0,1,1	-	-
4	OXL	B	603	3	5,5,5	1.28	0	6,6,6	1.61	2 (33%)
4	OXL	A	603	3	5,5,5	1.22	0	6,6,6	1.61	2 (33%)
6	SCN	B	606	-	1,2,2	0.36	0	0,1,1	-	-
6	SCN	A	606	-	1,2,2	0.37	0	0,1,1	-	-

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
7	PEG	A	607	-	-	4/4/4/4	-
9	PG4	B	608	-	-	5/10/10/10	-
8	B3P	A	608	-	-	13/28/28/28	-
10	EDO	B	609	-	-	0/1/1/1	-
8	B3P	B	610	-	-	4/28/28/28	-
2	SER	A	601	-	-	0/6/6/6	-
2	SER	B	601	-	-	0/6/6/6	-
4	OXL	B	603	3	-	1/4/4/4	-
4	OXL	A	603	3	-	1/4/4/4	-

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	B	610	B3P	C2-N2-C8	-3.73	110.79	116.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	A	608	B3P	C2-N2-C8	-3.62	110.94	116.08
8	B	610	B3P	C3-N1-C4	-2.75	112.17	116.08
4	A	603	OXL	O3-C1-C2	2.71	121.21	113.16
8	A	608	B3P	C3-N1-C4	-2.63	112.34	116.08
4	B	603	OXL	O4-C2-C1	2.63	120.97	113.16
2	A	601	SER	OXT-C-O	-2.52	118.37	124.09
8	A	608	B3P	O4-C5-C4	-2.29	106.99	111.63
4	A	603	OXL	O4-C2-C1	2.21	119.72	113.16
4	B	603	OXL	O3-C1-C2	2.18	119.65	113.16

There are no chirality outliers.

All (28) torsion outliers are listed below:

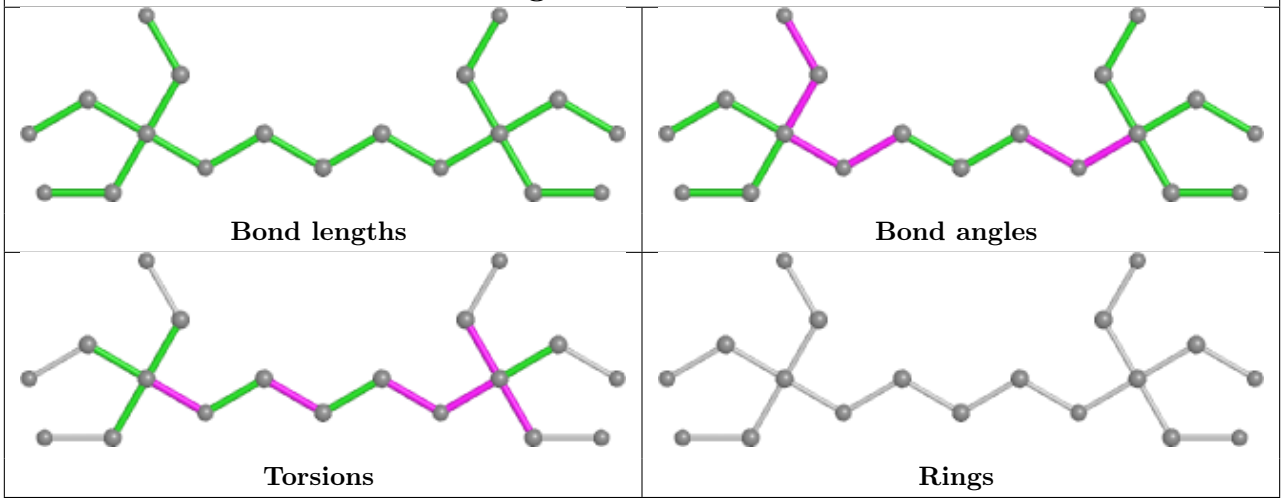
Mol	Chain	Res	Type	Atoms
8	A	608	B3P	C5-C4-N1-C3
8	A	608	B3P	C6-C4-N1-C3
8	A	608	B3P	C7-C4-N1-C3
8	A	608	B3P	C9-C8-N2-C2
8	A	608	B3P	C11-C8-N2-C2
8	A	608	B3P	O3-C11-C8-N2
8	A	608	B3P	O3-C11-C8-C9
8	A	608	B3P	O3-C11-C8-C10
8	A	608	B3P	C2-C1-C3-N1
7	A	607	PEG	O1-C1-C2-O2
9	B	608	PG4	O3-C5-C6-O4
7	A	607	PEG	O2-C3-C4-O4
9	B	608	PG4	O4-C7-C8-O5
8	A	608	B3P	N2-C8-C9-O1
8	A	608	B3P	C10-C8-N2-C2
8	B	610	B3P	C10-C8-N2-C2
9	B	608	PG4	O2-C3-C4-O3
8	A	608	B3P	C1-C2-N2-C8
9	B	608	PG4	C6-C5-O3-C4
7	A	607	PEG	C1-C2-O2-C3
9	B	608	PG4	C5-C6-O4-C7
8	B	610	B3P	C9-C8-N2-C2
8	A	608	B3P	C11-C8-C9-O1
8	B	610	B3P	C5-C4-C7-O6
7	A	607	PEG	C4-C3-O2-C2
8	B	610	B3P	C6-C4-N1-C3
4	A	603	OXL	O3-C1-C2-O4
4	B	603	OXL	O3-C1-C2-O4

There are no ring outliers.

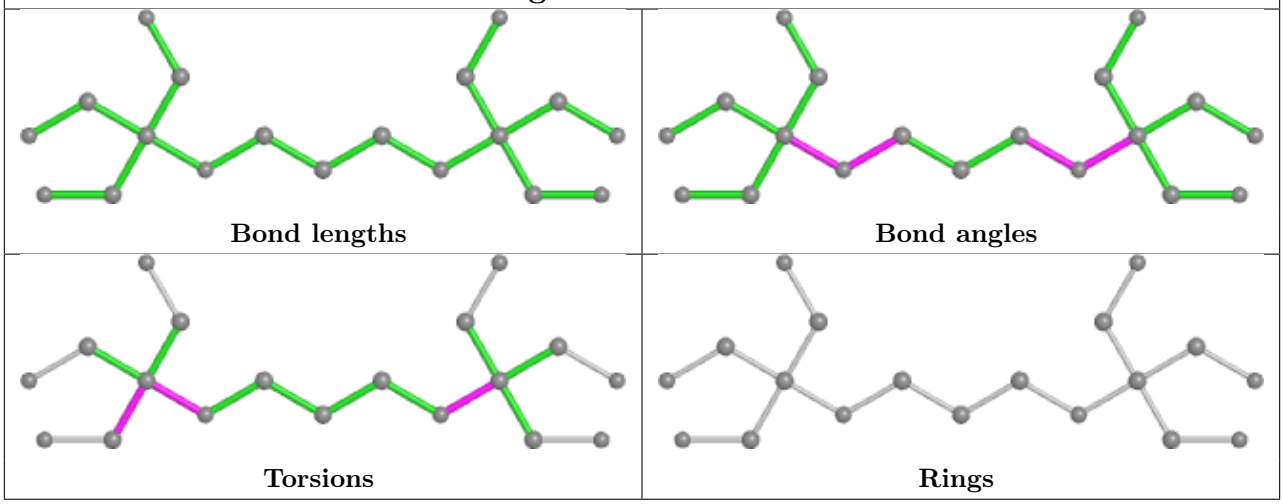
No monomer is involved in short contacts.

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 B3P A 608



Ligand B3P B 610



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.