WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

May 29, 2024 – 11:17 AM EDT

PDB ID : 1YGP
Title : PHOSPHORYLATED FORM OF YEAST GLYCOGEN PHOSPHORYLASE
WITH PHOSPHATE BOUND IN THE ACTIVE SITE.
Authors : Lin, K.; Rath, V.L.; Dai, S.C.; Fletterick, R.J.; Hwang, P.K.
Deposited on : 1996-05-30
Resolution : 2.80 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

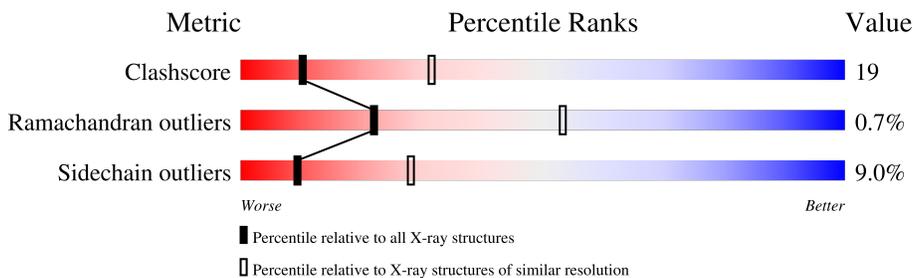|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 2.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.

Metric	Percentile Ranks	Value
Clashscore		19
Ramachandran outliers		0.7%
Sidechain outliers		9.0%

Worse   *Better*

▌Percentile relative to all X-ray structures

▯Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	879	71% 23% · ·
1	B	879	61% 30% 6% ·

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
2	PO4	B	1900	-	X	-	-
2	PO4	B	859	-	X	-	-

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 13538 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 YEAST GLYCOGEN PHOSPHORYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	858	Total 6744	C 4331	N 1140	O 1253	S 20	0	0	0
1	B	858	Total 6744	C 4331	N 1140	O 1253	S 20	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	LEU	LYS	conflict	UNP P06738
A	50	VAL	ALA	conflict	UNP P06738
A	115	LEU	GLY	conflict	UNP P06738
A	254	LEU	PHE	conflict	UNP P06738
A	255	ASN	ALA	conflict	UNP P06738
A	267	ALA	PRO	conflict	UNP P06738
A	412	GLU	GLN	conflict	UNP P06738
A	596	ARG	LYS	conflict	UNP P06738
B	8	LEU	LYS	conflict	UNP P06738
B	50	VAL	ALA	conflict	UNP P06738
B	115	LEU	GLY	conflict	UNP P06738
B	254	LEU	PHE	conflict	UNP P06738
B	255	ASN	ALA	conflict	UNP P06738
B	267	ALA	PRO	conflict	UNP P06738
B	412	GLU	GLN	conflict	UNP P06738
B	596	ARG	LYS	conflict	UNP P06738

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

PO4

O3

O⁻

O2 O⁻ — P = O O1

P

O⁻

O4
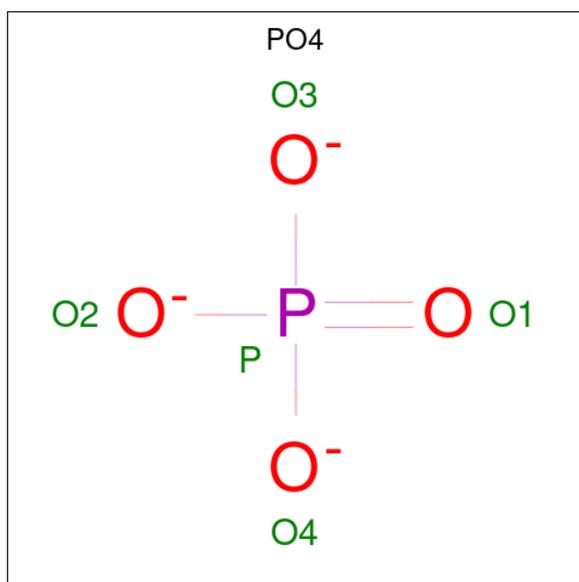
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 5	O 4	P 1	0	0
2	A	1	Total 5	O 4	P 1	0	0
2	B	1	Total 5	O 4	P 1	0	0
2	B	1	Total 5	O 4	P 1	0	0

- Molecule 3 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: $C_8H_{10}NO_6P$).

PLP

N1

N

C6 C2A

C2

C5A C5

C3

C4

OH

O3

O3P

HO

P O O4P C4A

P

O O4A

O1P O

OH

O2P
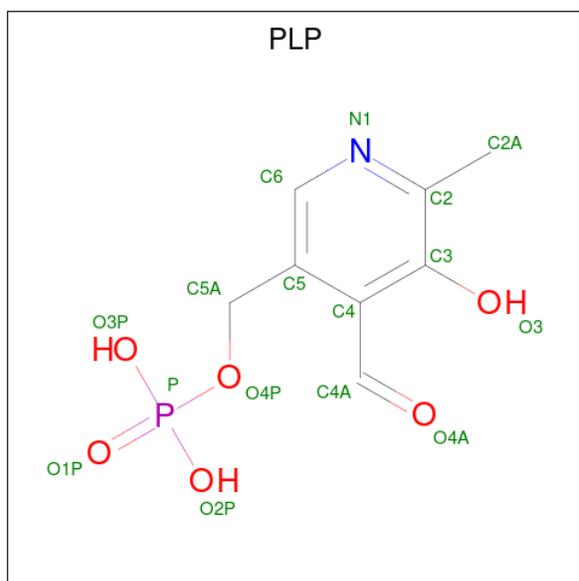
| Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P		0	0
			15	8	1	5	1			
3	B	1	Total	C	N	O	P		0	0
			15	8	1	5	1			

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

- Molecule 1: YEAST GLYCOGEN PHOSPHORYLASE

Chain A:
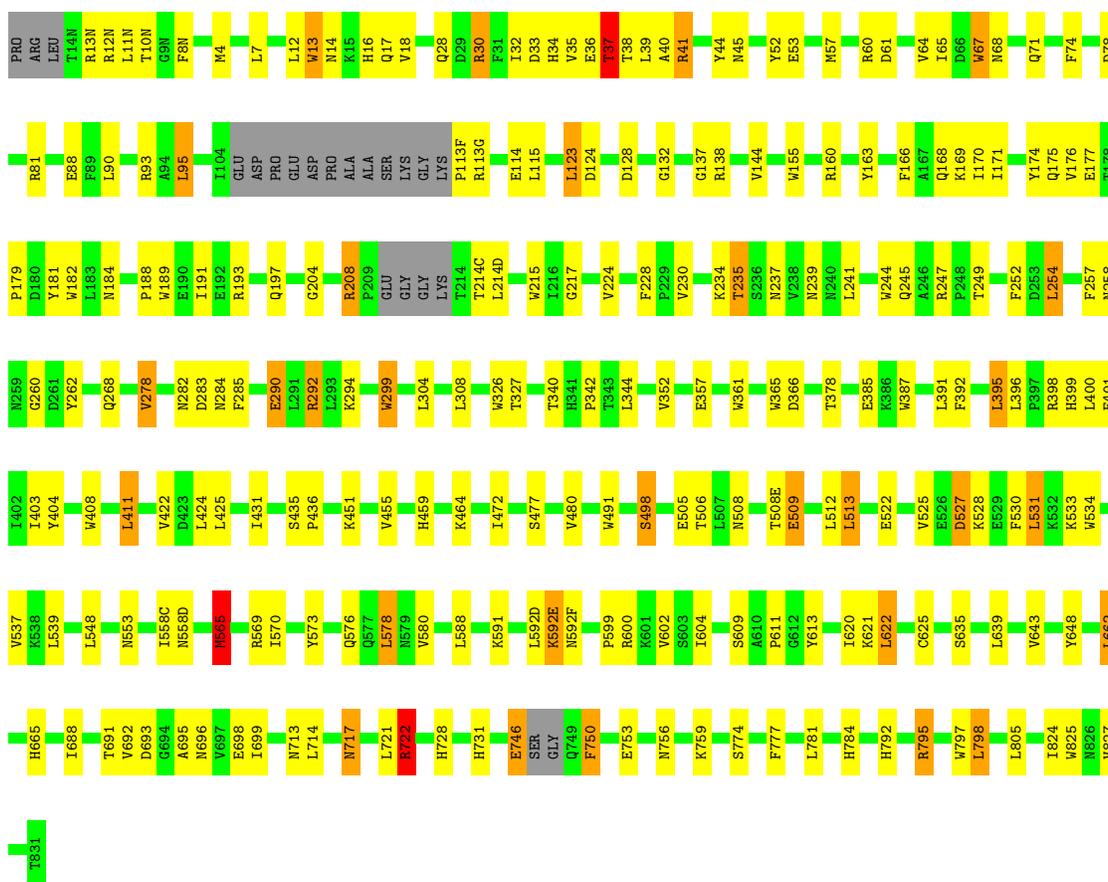
- Molecule 1: YEAST GLYCOGEN PHOSPHORYLASE

Chain B:

4 Data and refinement statistics ⓘ

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	103.91Å 143.93Å 169.26Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (6.00-2.80)	Depositor
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.179 , 0.239	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	13538	wwPDB-VP
Average B, all atoms (Å^2)	21.0	wwPDB-VP

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PLP, PO4

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 $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$ >5	RMSZ	#$|Z|$ >5
1	A	0.74	0/6901	1.44	86/9378 (0.9%)
1	B	1.60	45/6901 (0.7%)	1.61	115/9378 (1.2%)
All	All	1.25	45/13802 (0.3%)	1.53	201/18756 (1.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	2
All	All	0	4

The worst 5 of 45 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	67	TRP	NE1-CE2	-6.96	1.28	1.37
1	B	361	TRP	CG-CD2	-6.92	1.31	1.43
1	B	357	GLU	CD-OE2	-6.83	1.18	1.25
1	B	150	GLU	CD-OE2	-6.79	1.18	1.25
1	B	790	GLU	CD-OE1	-6.69	1.18	1.25

The worst 5 of 201 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	365	TRP	CD1-CG-CD2	11.48	115.48	106.30
1	B	365	TRP	CE2-CD2-CG	-9.98	99.32	107.30
1	B	797	TRP	CD1-CG-CD2	9.78	114.12	106.30
1	B	299	TRP	CD1-CG-CD2	9.62	114.00	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	189	TRP	CD1-CG-CD2	9.23	113.69	106.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	208	ARG	Peptide
1	A	435	SER	Peptide
1	B	208	ARG	Peptide
1	B	435	SER	Peptide

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6744	0	6429	372	1
1	B	6744	0	6434	425	32
2	A	10	0	0	0	0
2	B	10	0	0	0	0
3	A	15	0	7	0	0
3	B	15	0	7	2	0
All	All	13538	0	12877	496	32

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 19.

The worst 5 of 496 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:191:ILE:CD1	1:B:40:ALA:HB3	1.29	1.57
1:A:257:PHE:CZ	1:B:278:VAL:HG11	1.44	1.52
1:A:36:GLU:CD	1:B:18:VAL:HB	1.21	1.51
1:A:32:ILE:HG22	1:B:18:VAL:CG2	1.00	1.47
1:A:60:ARG:HH22	1:B:39:LEU:CA	1.23	1.46

The worst 5 of 32 symmetry-related close contacts are listed below. The label for Atom-2 includes

the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:7:LEU:CD2	1:B:203:TYR:CA[4_535]	0.92	1.28
1:B:6:PRO:CA	1:B:394:HIS:CE1[4_535]	0.93	1.27
1:B:5(N):GLN:CG	1:B:261:ASP:OD2[4_535]	1.22	0.98
1:B:7:LEU:CD2	1:B:203:TYR:CB[4_535]	1.29	0.91
1:B:6:PRO:CB	1:B:394:HIS:CE1[4_535]	1.33	0.87

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	850/879 (97%)	802 (94%)	43 (5%)	5 (1%)	25	56
1	B	850/879 (97%)	800 (94%)	43 (5%)	7 (1%)	19	49
All	All	1700/1758 (97%)	1602 (94%)	86 (5%)	12 (1%)	22	53

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	422	VAL
1	A	528	LYS
1	A	750	PHE
1	B	422	VAL
1	B	528	LYS

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	697/781 (89%)	634 (91%)	63 (9%)	9	28
1	B	697/781 (89%)	635 (91%)	62 (9%)	9	28
All	All	1394/1562 (89%)	1269 (91%)	125 (9%)	9	28

5 of 125 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	756	ASN
1	B	592(F)	ASN
1	B	113(F)	PRO
1	B	592(E)	LYS
1	B	746	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	14	ASN
1	B	713	ASN
1	B	239	ASN
1	B	494	GLN
1	B	237	ASN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5   Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6   Ligand geometry ⓘ

6 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	$\#|Z| > 2$
2	PO4	A	859	-	4,4,4	1.87	2 (50%)	6,6,6	0.49	0
2	PO4	B	1900	-	4,4,4	2.37	4 (100%)	6,6,6	0.62	0
2	PO4	A	1900	-	4,4,4	1.64	0	6,6,6	0.24	0
3	PLP	A	860	1	15,15,16	1.79	1 (6%)	20,22,23	1.29	3 (15%)
3	PLP	B	860	1	15,15,16	2.01	2 (13%)	20,22,23	1.35	3 (15%)
2	PO4	B	859	-	4,4,4	2.61	4 (100%)	6,6,6	0.47	0

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	PLP	A	860	1	-	4/6/6/8	0/1/1/1
3	PLP	B	860	1	-	4/6/6/8	0/1/1/1

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	860	PLP	C4A-C4	-6.26	1.38	1.51
3	A	860	PLP	C4A-C4	-5.51	1.40	1.51
2	B	1900	PO4	P-O2	-3.01	1.45	1.54
2	B	859	PO4	P-O4	-2.86	1.46	1.54
2	B	859	PO4	P-O2	-2.85	1.46	1.54

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	860	PLP	O3P-P-O1P	3.36	123.84	110.68
3	B	860	PLP	O3P-P-O1P	3.28	123.51	110.68
3	A	860	PLP	C6-C5-C4	2.62	120.22	118.16
3	B	860	PLP	C6-C5-C4	2.57	120.18	118.16
3	B	860	PLP	O2P-P-O4P	-2.42	100.29	106.73

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	860	PLP	C5A-O4P-P-O2P
3	A	860	PLP	C5A-O4P-P-O3P
3	B	860	PLP	C5A-O4P-P-O2P
3	B	860	PLP	C5A-O4P-P-O3P
3	B	860	PLP	C4-C5-C5A-O4P

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	860	PLP	2	0

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.