

-) If one combines 0.1 moles of NaH_2PO_4 and 0.2 moles of Na_2HPO_4 in 900 ml of water, the final pH will be _____.

-) At pH 6.0, the net charge on the peptide shown below is _____.

A H M E D

-) The α -chain of human hemoglobin contains 141 amino acids and the β -chain contains 146 amino acids. A single heme group (including the Fe) has a mol. wt. of 614. What is the estimated molecular weight of a hemoglobin molecule?

_____ grams per mole.

-) Goat myoglobin is $2/3$ saturated with O_2 at $\text{PO}_2 = 60$ mm Hg. The P_{50} of this myoglobin is _____ mm Hg.

-) The table below shows kinetic data for a reaction catalyzed by 0.01 μM enzyme. From these data, estimate the enzyme's V_{max} , K_m , and k_{cat} .

[S], mM	V_o , $\mu\text{M}/\text{min}$
0.5	14.0
0.8	20.0
2.0	35.0
4.0	48.0
8.0	56.0
20.0	64.0
400.0	69.5
2,000.0	70.0

$$V_{\text{max}} = \text{_____} \mu\text{M}/\text{min}$$

$$K_m = \text{_____} \text{mM}$$

-) 30 μg of pure enzyme X (mol. wt. = 60,000) can catalyze the formation of 4.5 μmoles of product per minute when saturated with substrate. The k_{cat} (turnover #) of X is

$$\text{_____} \text{min}^{-1}$$

-) An enzyme (E) catalyzes the reversible formation of B from A: ($A \rightleftharpoons B$). To start the reaction, A is dissolved in a buffer at 25°C. Enzyme is then added and the reaction is allowed to proceed to equilibrium, whereupon, the concentrations of A and B are found to be $1.5 \times 10^{-5} \text{ M}$ and $4.5 \times 10^{-4} \text{ M}$, respectively. Calculate K_{eq} for the reaction, the starting concentration of A, and the value of ΔG° for this reaction. (At 25°C, $RT = 2.479 \text{ kJ/mol}$)

$$K_{\text{eq}} = \text{_____}$$

$$[A]_{\text{initial}} = \text{_____} \text{ M}$$

$$\Delta G^\circ = \text{_____} \text{ kJ/mol}$$

The strongest, angle-independent force of attraction between the side-chains of glutamate and lysine within a protein is likely to be

- a electrostatic
- b H-bonding
- c hydrophobic interaction
- d van der Waals
- e a peptide bond

Catalytic efficiency is defined as

- a the factor by which an enzyme enhances a chemical reaction
- b K_m/k_{cat}
- c k_{cat}/K_m
- d V_{max}/K_m
- e V_{max}/k_{cat}

To sequence a protein, it is often cleaved into several peptide fragments which are (these days) most often separated by which method?

- a SDS polyacrylamide gel electrophoresis
- b isoelectric focusing
- c gel filtration
- d ion-exchange chromatography
- e reversed-phase HPLC

In a right-handed α -helix,

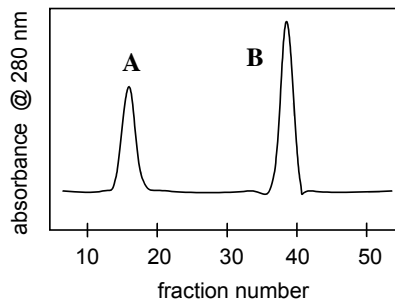
- a all the psi angles are the same for all participating residues
- b all the phi angles are the same for all participating residues
- c a and b are both true
- d a and b are both false
- e the psi and phi angles vary with each residue

Enzymes accelerate reactions by ...

- a increasing the free energy of the overall reaction
- b decreasing the free energy of the overall reaction
- c altering the equilibrium constant
- d destabilizing the transition state
- e stabilizing the transition state

Here is the elution pattern of two proteins separated by size-exclusion chromatography (SEC; also known as gel filtration). Compared with B, protein A has

- a a lower isoelectric point
- b more hydrophobic amino acids
- c fewer hydrophobic amino acids
- d a larger molecular diameter
- e a smaller molecular diameter



If $\Delta G^\circ < 0$ for reaction, the *in vivo* enzyme catalyzed reaction will -----

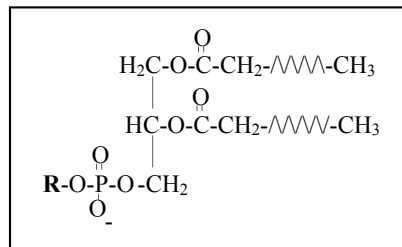
- a always be favored in the forward direction
- b never be favored in the forward direction
- c sometimes be favored in the forward direction
- d always be at exactly at equilibrium

Phosphorylation of enzymes often occurs at the side chain of _____
and is used to _____ the enzyme. -----

- a Asp, irreversibly inhibit
- b Asp, reversibly inhibit
- c Gly, feedback inhibit
- d Ser, irreversibly inhibit
- e Ser, reversibly activate

The compound shown to the right is a -----

- a steroid
- b glycerophospholipid
- c sphingolipid
- d fatty acid
- e triacylglycerol



Myoglobin shows a high content of -----

- a α -helix
- b β -turn
- c parallel β -sheet
- d anti-parallel β -sheet

An amino acid that has no asymmetric carbon. -----

- a Pro
- b Arg
- c Ala
- d Gly
- e Glu

Excluding mirror images, and α -, β - anomeric forms, the number of distinct
ketoheptoses (e.g. glucose) is -----

- a 16
- b 8
- c 6
- d 4

The pH of Ms. Tran's stomach was found to be 2.3. This is equivalent
to an HCl concentration of -----

- a 0.01 mM
- b 0.20 mM
- c 5.0 mM
- d 12.0 mM
- e 15.0 mM
