

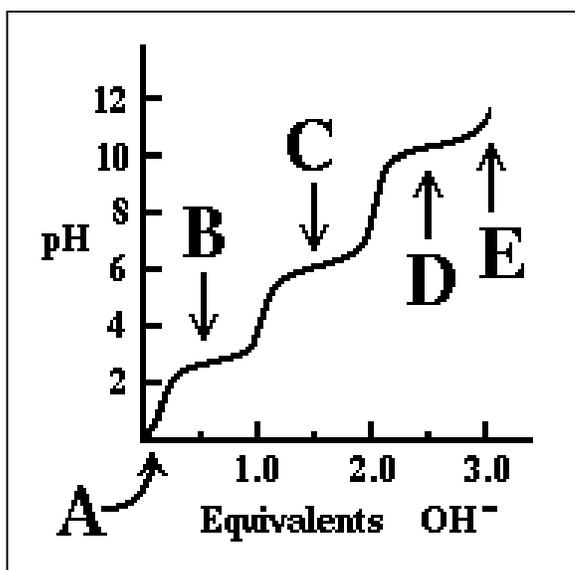
1) The  $\text{H}_2\text{PO}_4^-/\text{HPO}_4^{2-}$  system has a  $\text{pK}_a = 6.7$ . Which of the following phosphate buffers has the most buffering capacity at  $\text{pH} = 5.7$ ?

- a) 0.01 M buffer
- b) 0.02 M buffer
- c) 0.05 M buffer
- d) 0.10 M buffer
- e) 0.20 M buffer\*

2) The  $\text{pH}$  of a solution that contains near equal amounts of  $^+\text{NH}_3\text{-CH}_2\text{-COO}^-$  and  $^+\text{NH}_3\text{-CH}_2\text{-COOH}$  is approximately

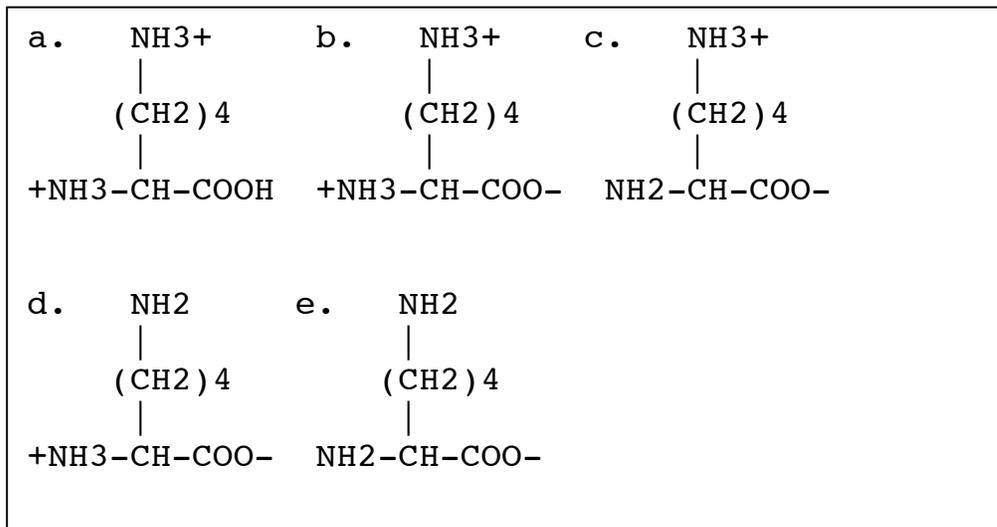
- a) 0
- b) 2\*
- c) 5
- d) 8
- e) 12

3) This is a titration curve of



- a) aspartate
- b) cysteine
- c) lysine
- d) histidine \*
- e) tyrosine

4) The predominate ionic form of lysine at pH 7 is



a || b \*|| c || d || e.

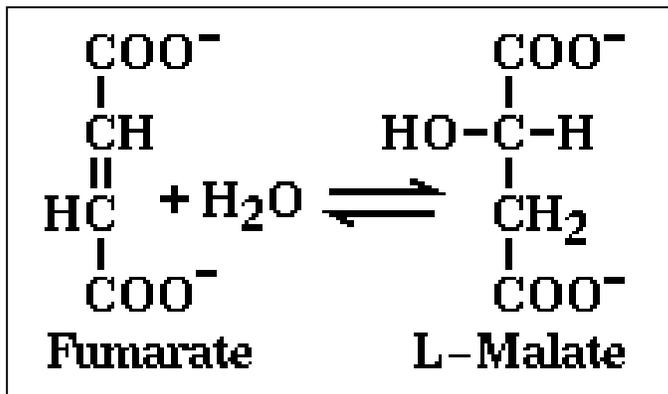
5) One milliliter of a bicarbonate buffer (in vitro) contains 0.022 mmoles  $\text{HCO}_3^-$  and 0.0012 mmoles  $\text{CO}_2$ . If 0.01 mmoles HCl is added, what will be the approximate final  $[\text{HCO}_3^-]/[\text{CO}_2]$  ratio under conditions where the system is open?

- a) 20
- b) 10\*
- c) 1
- d) 0.1
- e) 0.05

6) A compound has two ionizable groups, with pKa's of 6.2 and 9.5. A 1.0 M solution (100 ml) is found to have a pH of 6.8. If 60 ml 1.0 M HCl is added to the solution, the pH will be

- a) <6.2 \*
- b) 6.2
- c) 6.3 - 6.7
- d) 6.8-9.4
- e) >9.4

7) The enzyme subclass that catalyzes this type of reaction:



- a) aminotransferase
- b) dehydratase \*
- c) dehydrogenase
- d) kinase
- e) mutase .

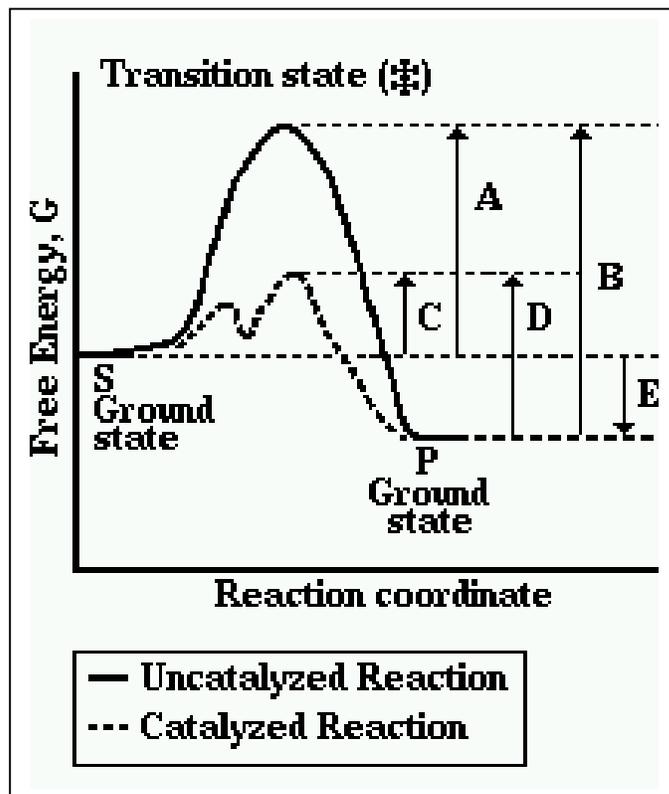
8) Which of the following amino acids is most hydrophobic?

- a) Glycine
- b) Glutamine
- c) Phenylalanine \*
- d) Tyrosine
- e) Serine

9) The Rossmann fold of the enzyme lactate dehydrogenase is designed to bind

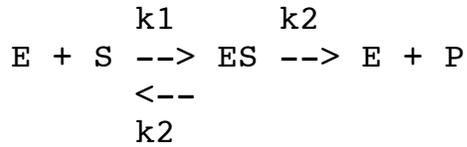
- a)  $\text{Ca}^{2+}$ .
- b) DNA
- c) heme.
- d) retinol.
- e) nicotinamide adenine dinucleotide ( $\text{NAD}^+$ ). \*

10) Reaction coordinate diagram for uncatalyzed and enzyme-catalyzed conversion of a reactant S to its product P ( $\text{S} \leftrightarrow \text{P}$ ): Activation energy for the catalyzed conversion of  $\text{S} \rightarrow \text{P}$  (G) is represented by the arrow:



- a) A
- b) B
- c) C \*
- d) D
- e) E

11) If the concentration of substrate is 5 mM, and the initial velocity,  $V_0$ , is 20% of  $V_{max}$ , then the calculated  $K_m$  of the enzyme for its substrate is

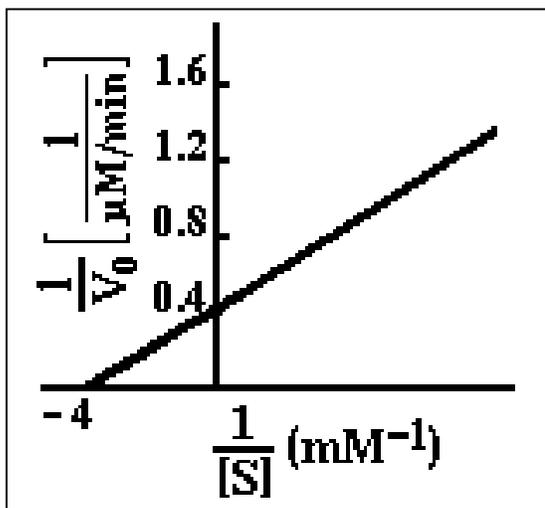


- a) 2mM.
- b) 4mM.
- c) 16mM.
- d) 20 mM. \*
- e) 25mM.

12) If conversion of ES to E + P is rate limiting, how would you define  $V_0$ ?

- a)  $k_1/k_{-1}$
- b)  $k_{-1} + k_2/k_1$
- c)  $k_{-1} [\text{ES}]$
- d)  $k_2$
- e)  $k_2 [\text{ES}]$  \*

13) What is the calculated  $V_{max}$  of the reaction?



- a) 0.1 microM/min
- b) 0.4 microM/min
- c) 1 microM/min
- d) 2.5 microM/min\*
- e) 5.0 microM/min