



DATE: 29-10-2018

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
M.Sc. CHEMISTRY - III SEMESTER
SEMESTER EXAMINATION: October 2018
CH-9317 - BIOLOGICAL CHEMISTRY

Time- 2 1/2 hrs

Max Marks-70

Supplementary candidates only.

Attach the question paper with the answer booklet

This paper contains 2 printed pages and three parts

Part A

Answer any 6 questions, each question carries 2 marks.

1. Which of the two types of plots – Eadie-Hofstee or Lineweaver-Burk is superior, why?
2. Give the equation obtained when a reaction follows Briggs-Haldane kinetics?
3. What is responsible for the power stroke during muscle contraction?
4. What are the criteria for a process to be called a pseudocycle?
5. Give the reaction for the synthesis of NO, what is its physiological role?
6. "Hydrophobic interactions are entropy driven processes" – support the statement with a suitable example?
7. What is cytochrome P450? Give the reaction it is involved in?
8. Why is penicillamine a better chelating agent than BAL?

Part B

Answer any 4 questions, each question carries 12 marks.

9. a) Explain how equilibria on the surface of an enzyme can be very different from that in solution.
b) Give the equation and the graphical representation of the Scatchard plot and the Hill plot. What information does one obtain from such graphs?
(6+6)
10. a) Show that for the conversion of $A \longrightarrow B$ where $K_{eq} = 1.5 \times 10^{-3}$, the reaction occurs spontaneously if it is coupled to the hydrolysis of ATP where the ΔG° for the coupled reaction is = -14 kJ/mol?
b) Draw the structure of chlorophyll a and give the reactions occurring in the two stages of photosynthesis?
(6+6)
11. a) What is valinomycin draw its structure? Account for the 10,000 fold greater binding affinity of valinomycin for K^+ over Na^+ ?
b) Give the reactions involved in the first stage of the synthesis of cholesterol, which of them is the rate determining step? (6+6)
12. a) What is the mechanism by which glyceraldehyde-3-phosphate dehydrogenase catalyses the conversion of glyceraldehyde-3-phosphate to 1,3-diphosphoglycerate?

b) What is the mechanism for the conversion of pyruvate to acetylphosphate by a TPP dependent decarboxylase?

(6+6)

13. a) What is the mechanism by which VitB₁₂ coenzyme dependent methyl malonyl coenzyme A mutase catalyses the conversion of methyl malonyl conenzyme A into succinyl coenzyme A?

b) Give a schematic diagram of the active site of mono and binuclear superoxide dismutase? Why are there two such enzymes?

(6+6)

14. a) Briefly describe the structure of ferritin and propose a mechanism by which it is able to store iron? How is iron transported in higher animals?

b) Name three trace elements and give their biological role. (8+4)

Part C

Answer any 2 questions, each question carries 5 marks.

15. In the conversion of pyruvate to phosphoenolpyruvate in gluconeogenesis, the addition of CO₂ is followed by decarboxylation. Why would nature add the CO₂ only to remove it in the next step? Is the carbon added the same as the one removed?

16. How does the V_{max} for an enzyme compare to the V_{max} app (apparent) of the inhibited enzyme for (a) A competitive inhibitor (b) An uncompetitive inhibitor

17. During Diwali a host of flies are born to die so to speak, as they die within minutes of being hatched. It is believed that they die due to exhaustion because of excessive flapping of wings. Give a plausible mechanism that would logically explain their death?