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FACULTY OF BASIC AND APPLIED SCIENCES
DEPARTMENT OF PHYSICAL AND CHEMICAL SCIENCES
FIRST SEMESTER 2020/2021 B,Sc EXAMINATIONS

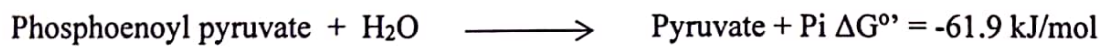
Chafra

BCH 303- Biomembrane and Bioenergetics

Time: 2 hrs

Instruction: Attempt any (3) of the five (5) questions

- Describe the Fluid Mosaic Model of membrane structure (the use of a well-labelled diagram will earn additional marks).
- Diffusion and Osmosis are two forces influencing the movement of water and solutes across plasma membranes. Discuss
- Define membrane fluidity?
 - Why does membrane need to be fluid?
 - Describe how membrane fluidity is influenced by:
 - Cholesterol
 - Temperature and
 - Saturated and unsaturated fatty acids
 - With a well-labelled diagram illustrate the **Fluorescent Recovery After Photobleaching (FRAP)** experiment.
- State the 1st and 2nd Laws of Thermodynamics
 - The portion of a system's energy that can perform work is given by this equation:
$$\Delta G = \Delta H - T\Delta S$$
 - Define each function in the equation and
 - State the conditions under which the equation is valid.
 - Describe the three major types of cellular work requiring the utilization of ATP
 - Calculate the ΔG° of the reaction,
$$\text{Acetaldehyde} + \text{NADH} + \text{H}^+ \longrightarrow \text{Ethanol} + \text{NAD}^+$$
Given the following half reactions:
$$\begin{array}{l} \text{Acetaldehyde} + 2\text{H}^+ + 2\text{e}^- \longrightarrow \text{Ethanol} \quad E^{\circ} = - 0.197 \text{ V} \\ \text{NAD}^+ + 2\text{H}^+ + 2\text{e}^- \longrightarrow \text{NADH} \quad E^{\circ} = - 0.320 \text{ V} \end{array}$$
(Faraday's constant, F , = 96.5 KJ/V. mol)
- Why is ATP the energy currency of the cell?
 - Draw a well-labelled diagram of ATP
 - Phosphoenoyl pyruvate has a large negative standard free energy change (ΔG°) of hydrolysis:



Discuss the chemical basis for the large, negative free energy change?

(c) State four (4) other energy molecules with high phosphoryl group transfer potential in cellular metabolism apart from phosphoenoyl pyruvate.