



**CRAWFORD UNIVERSITY**  
**FAITH CITY, IGBESA, OGUN STATE**

**2010/2011 HARMATTAN SEMESTER EXAMINATIONS**

**COLLEGE: NATURAL AND APPLIED SCIENCES**

**DEPARTMENT: BIOLOGICAL SCIENCES**

**UNIT: BIOCHEMISTRY**

**COURSE CODE: BCH 215 COURSE UNIT: 2 TIME ALLOWED: 2 HOURS**

**COURSE TITLE: INTRODUCTION TO PHYSICAL BIOCHEMISTRY**

**INSTRUCTION: ANSWER ANY FOUR QUESTIONS**

- 1 Discuss clearly how hydrophobicity and hydrophilicity contribute to membrane topology, integrity and fluidity. Illustrate your answer with diagrams.
- 2 (a) Discuss the role of water in cellular metabolism  
(b) Define the following processes:  
(i) Diffusion (ii) Osmosis (iii) Plasmolysis (iv) dialysis  
(c) Highlight some factors that determine the solubility of biological molecules in solution
- 3(a) Discuss the physical properties of water which qualify it as the best suited fluid for biological systems.  
(b) Water in its solid form is less dense than liquid water. How does this property of water benefit aquatic organisms?
- 4(a) Given the hypothetical compounds with their molecular weights as shown in the table below:

Compound	Relative Molecular Mass
A	40
B	18
C	80
D	100
E	60
F	150

- (i) Arrange the compounds in the order of increasing possibility of existing as a solid.
- (ii) Given that no other molecular force like hydrogen bond is associated with these compounds, if only one of the compounds is a solid, which of the compounds in the table could it be?
- (b)  $O_2$  and  $Cl_2$  molecules with molecular masses 32 and 73 respectively are both gases while water with a molecular mass 18 is a liquid. Explain the existence of water as a liquid.
- 5(a) Arrange the following compounds in order of increasing polarity:  
 $CH_3(CH_2)_3COOH$ ,  $CH_3(CH_2)_5COOH$ ,  $CH_3(CH_2)_7COOH$ ,  $CH_3(CH_2)_9COOH$ ,  
 $CH_3(CH_2)_{11}COOH$ ,  $CH_3(CH_2)_{13}COOH$
- (b) Give reasons for your answer.

- (c) If you were to arrange these compounds in the order of increasing solubility in water, will your answer be different from the answer in 5(a)? If yes, arrange the compounds in order of increasing solubility in water.
- 6(a) What is a buffer?  
(b) Mention two blood buffer systems.  
(c) Calculate the pOH of a solution if its  $[H^+] = 6.2 \times 10^{-6}$ .  
(d) Given that the  $K_a$  of pyruvic acid is  $3.2 \times 10^{-3}$ , calculate the pH of a buffer composed of 0.15M pyruvic acid and 0.25M sodium pyruvate.

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