



# Technical University of Mombasa

Faculty of Applied and Health Sciences

**DEPARTMENT OF PURE AND APPLIED SCIENCES**  
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF  
TECHNOLOGY IN APPLIED CHEMISTRY  
**BTAC12J /BTAC12M**

**ACH 4304: BIOINORGANIC CHEMISTRY**

SEMESTER EXAMINATION

DECEMBER 2013 SERIES

2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions

Answer question **ONE** (compulsory) and any other **TWO** questions

## QUESTION ONE

a) State any one biological function of each of the following ions

- |       |           |                |
|-------|-----------|----------------|
| (i)   | Magnesium | <b>(1mark)</b> |
| (ii)  | Nickel    | <b>(1mark)</b> |
| (iii) | Copper    | <b>(1mark)</b> |

b) Explain the **FOUR** classes of essentiality of chemical elements to life forms **(8marks)**

c) (i) Define an active site of an enzyme **(2marks)**

- (ii) Using a specific example draw the structure of a metalloide enzyme and show the active site **(2marks)**

- d) State the THREE factors that defines the essentiality of elements **(3marks)**
- e) (i) Define the term porphyrin **(2marks)**
- (ii) Draw a general structure of porphyrin **(2marks)**
- (iii) Explain the importance of the peripheral groups in a porphyrin **(2marks)**
- f) List the components of nitrogenase **(3marks)**
- g) State the function of vitamin B<sub>12</sub> as a bioinorganic molecule **(2marks)**
- h) (i) State the components of chlorophyll as a metalloenzyme **(3marks)**
- (ii) State the function of the metallic ion in chlorophyll **(1mark)**

## **QUESTION TWO**

- a) (i) With the help of features illustrate the difference between Deoxyhaemoglobin and oxyhaemoglobin **(6marks)**
- (ii) How is Deoxyhaemoglobin and oxyhaemoglobin detected in blood **(2marks)**
- (iii) What is the medicinal importance of the detection of Deoxyhaemoglobin and oxyhaemoglobin in blood. **(2marks)**
- b) Explain the “cooperative effect phenomenon” in oxygen transport **(10marks)**

## **QUESTION THREE**

Discuss cyanide poisoning under the following

- (i) Source **(4marks)**
- (ii) Mechanism of action **(6marks)**
- (iii) Diagnosis **(4marks)**
- (iv) Treatment **(6marks)**

#### **QUESTION FOUR**

- a) By use of a graph illustrate a general representation of a dose response curve **(5marks)**
- b) Explain the interpretation of the dose-response curve **(5marks)**
- c) Discuss giving specific examples the application of Bioinorganic chemistry. **(10marks)**

#### **QUESTION FIVE**

- a) What are cytochromes **(2marks)**
- b) Give the structures of the three types of cytochromes **(9marks)**
- c) State the specific functions of each of the three types of cytochromes in (b) above **(3marks)**
- d) Illustrate the difference in active site between cytochrome and haemoglobin. **(6marks)**