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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS(MAIN EXAM)

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE ,CHEMISTRY

COURSE CODE: SCH 251

COURSE TITLE: AQUATIC CHEMISTRY

DATE: 25/04/2022 **TIME:** 12.00 - 2.00 PM.

INSTRUCTIONS TO CANDIDATES

Answer all the Questions

TIME: 2 Hours

Question One (15 MARKS)

1.a) Define the following with reference to aquatic chemistry;

i) Pollutant 2 marks

ii) Pathogen 2 marks

iii) Surfactant 2 marks

b) Discus the significance of following in nature water;

i Turbidity, 3 marks

ii.Temperature 3 marks

iii.. Nitrates and Phosphates 3 marks

Question Two (15 MARKS)

ai). Differentiate between alkalinity and basicity 2 marks

ii) State the sources of Dissolved Oxygen in natural waters 1 mark

iii. State 4 factors that affect Dissolve Oxygen (DO) levels in natural water bodies 2 marks

b) i) What is meant by Biochemical Oxygen Demand (BOD) 2 marks

ii. Explain why COD of a water sample is usually greater than BOD 2 marks

iii. What are the limitations of BOD test when used for water quality monitoring 3 marks

iv A sample of brewery effluent was diluted from 50cm to 5.0 with well aerated pure water. The dissolved oxygen concentration of half the sample was measured immediately. The other half was stored under suitable conditions and its dissolved oxygen concentration was measured later. Concentration of dissolved oxygen of 9.8 and 4.7 ppm respectively were recorded. Calculate the BOD of brewers' effluent 3mks

Question Three (20 MARKS)

a).i What are pesticides? Give 3 reasons why pesticides are of great concern? 4 marks

ii.Suggest 2 alternative to the use of pesticides 2 marks

b) i. Write the formula of four compounds which cause water hardness. 2 marks

ii Measuring alkalinity of natural water is important. Give two reasons to support this statement. 2 marks

ii) Describe how suspended solids are removed from drinking water during water treatment 2 mks

c) Nitrates in drinking water continue to raise concern.

i. Name three main sources of nitrates in drinking water 2 marks

ii. Explain why children are more vulnerable to nitrate poisoning 4 marks

Question Four (20 MARKS)

a)i State and explain how heavy metals are removed from large quantities of water 3 marks

ii.European Union (EU) standards specify that the concentration of lead in drinking water must be below 10 μg/L. Give three reasons why the concentration of this heavy metal should remain low in domestic water 3 marks

iii State two methods of treatment used to eliminate micro-organisms in drinking water 2 marks

b. Briefly explain the following processes in relation to wastewater treatment;

i) Screening; 2 marks

ii) Trickling filters; 2 marks

iii) Activated sludge process. 2 marks

c) The following mineral analysis given below was reported for a water sample. Determine the Total Hardness (TH) and Non-Carbonate hardness (NCH) in milligrams per liter (mg/L/ppm) as $CaCO_3$ using the predominant polyvalent cation definition of hardness. 6 marks

HCO_3^-	216.0 mg/L
Ca^{2+}	67.2 mg/L
Mg^{2+}	40.0 mg/L