352

(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF

SCIENCE AND TECHNOLOGY

(MMUST)

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF SCIENCE (CHEMISTRY) AND BACHELOR OF EDUCATION (SCIENCE)

COURSE CODE: SCH 400

COURSE TITLE: INDUSTRIAL CHEMISTRY

(Main exam)

DATE: 12th April, 2023   **TIME: 3.00-5.00 PM**

INSTRUCTIONS TO CANDIDATES

Answer **ALL** the Questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

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Question One (18 marks)

a) Briefly describe the three processes done during refinery of petroleum   (3mks)

b) In general, crude oil, once refined, yields three basic groupings of products. Briefly describe these fractions.   (5mks)

c) Differentiate between the following terms as used in petroleum chemistry

    i.   Atmospheric residuum and vacuum residuum   (2mks)

    ii.   Thermal cracking processes and catalytic cracking processes   (4mks)

d) i) Describe catalytic reforming   (2mks)

   ii) Identify 2 of the major reforming reactions   (2mks)

Question Two (17 Marks)

a) Describe two properties of dyes that differentiate them from pigments   (2mks)

b) i) Briefly outline the unit flowchart for manufacture of dyes   (3mks)

   ii) Write a chemical equation to show the reaction of amination   (2mks)

c) Describe how the amine molecule is used in preparing a dye intermediate   (3mks)

d) Briefly describe the phases in the clinical research and development of a new drug.

(3mks)

e) Outline advantages and disadvantages of dust formulations   (2mks)

f) Identify the monomers of nylon-6, 6.   (2mks)
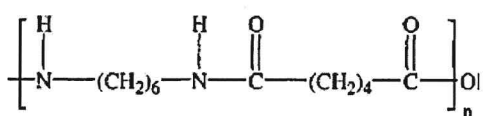
Poly(hexamethylene adipamide)
(nylon-6,6)

Question Three (17marks)

a) Briefly describe the difference between heterogeneous and homogeneous catalysts giving examples   (2mks)

b) Outline 3 characteristics of catalysts   (3mks)

c) Explain 2 theories of catalysis   (4mks)

d) Define the terms   (2mks)

I) Ore

II) Mineral

e) Briefly explain the reduction steps involved in pyrometallurgy   **(6mks)**

Question Four (18marks)

a) Describe the recovery of TiO_2 from ilmenite ore   **(4mks)**

b) Write the cell equations of the mercury cell for the manufacture of caustic soda   **(3mks)**

c) i) Outline with relevant equations the main steps in manufacture of sulphuric acid by contact process   **(3mks)**

ii) In manufacture of ammonium sulphate, 340 kg of ammonia was reacted with 980 kg sulphuric acid for a single batch. Calculate the amount of ammonium sulphate manufactured during the batch. H=1, S=32, O=16, N=14   **(4mks)**

d) Name the sources of raw materials in manufacture of cement   **(4mks)**