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MASINDE MULIRO UNIVERSITY OFSCIENCE AND TECHNOLOGY

(MMUST)

Main CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

Semester II

FIRST YEAR SUPPLIMENTARY AND SPECIAL EXAMINATION

(BSC Chemistry)

FOR THE DEGREE

OF

BACHELOR OF SCIENCE IN CHEMISTRY

COURSE CODE: **SCI 160**

COURSE TITLE: **Introduction to Industrial chemistry**

DATE: 05/08/2022 **TIME:** 8.00 am – 10.00 am

INSTRUCTIONS TO CANDIDATES

Answer all the Questions

TIME: 2 HOURS

QUESTION ONE (20 MARKS)

1 a). Explain what Unit Operation is. (2 marks)

b). Arrange the following as unit operations and unit processes, as terms used in industrial chemistry; (10 marks)

Agitation, Carboxylation, Hydrogenation, Distillation, Fermentation, Gas absorption, Aromatization ,Size reduction, Heat transfer, Condensation

Unit process	Unit Operations

c). In the material balance equation, explain through a sketch of accumulation equation of how material flow balance in a chemical process can be analysed. Explain each parameter in the equation. (8 Marks)

QUESTION TWO (20 MARKS)

2 a). Explain what Agglomeration is (3 marks)

b). State Five (5) Purposes of size enlargement (5 marks)
c). In a pellet roller i.e. a die, the Pellet quality and capacity depends on what properties? (5 marks)

d). Explain what Tumbling agglomerator is. (3 marks)
e). Answer the following questions on commodities;

i. Why sulphuric acid is termed as the top of the list Basic Inorganic chemical (BIC)? (2 marks)

ii. What are the top ranking Basic Organic chemicals (BOC) in production of polymers (2 marks)

QUESTION THREE (18 Marks)

Answer the following questions about Sulphuric Acid Manufacture

a). Give commonly used raw materials that can be used in the manufacture of sulfuric acid.

(3 marks)

b).Outline the main steps in the contact process plant in order in which they proceed (4 marks)

c). Complete the following equations (5 marks)

i. $S(s) + O_{2(g)} \longrightarrow A$
ii. $2SO_2 + B \longrightarrow 2SO_{3(g)}$
iii. $SO_{3(g)} + H_2O_{(l)} \longrightarrow C$
iv. $SO_3 + H_2SO_{4(l)} \longrightarrow D$
v. $H_2S_2O_{7\,(l)} + E \longrightarrow 2H_2SO_{4(l)}$

d). At which stage or process do we require a catalyst? (2 marks)

e). What is the name of the catalyst used (2 marks)

f). What is the main major use of sulphuric acid (2 marks)

QUESTION FOUR (12 MARKS)

4 a). You are provided with the following Operations, processes and materials that are not arranged in order: Cooler, Kiln, Grinding, second grinding, clinker, plaster, cement, raw material. Sketh a Block diagram for the manufacture of cement. (8 marks)

b). Answer the following questions;

i. Write the general/overall equation for the electrolysis of brine in the chloro-alkali process

(2 marks)

ii.In the Hall-Heroult process, what is the cathode for the electrolytic process? (2 Marks)

.....70 marks.....