



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
(SCIENCES)
4th YEAR 2nd SEMESTER 2023/2024 ACADEMIC YEAR
MAIN REGULAR

COURSE CODE: SPB 9408

COURSE TITLE: Industrial Chemistry

EXAM VENUE:

STREAM: (BEd. Science)

DATE:

TIME:

EXAM SESSION:

INSTRUCTIONS:

- 1. Answer question 1 (Compulsory) in section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**
- 4. Some important information/formulas are found on the last page of this question paper**

SECTION A (30 marks)

Question 1

- a) Briefly describe the process economics of a chemical company (3 marks)
- b) Describe some of the funding models that can enable one start a chemical company and suggest models that can help one get over the 'valley of death' (3 marks)
- c) Briefly discuss the chemicals manufactured in Kenya including their processes (3 marks)
- d) Explain the following with suitable examples and chemical reactions as required:
 - a. Flux and slag (2 mark)
 - b. Coagulation and flocculation (2 mark)
 - c. Cracking (2 mark)
- e) Explain the various processes that take place in the production of iron from iron ore in the blast furnace. (3 marks)
- f) What are the major sources and sinks of CO in atmosphere. Explain a method of estimating CO in air sample. (3 marks)
- g) Explain modified Winkler method for the estimation of dissolved oxygen. What is the importance of dissolved oxygen in a water body and what parameters measure its depletion? (3 marks)
- h) What is geothermal energy? What are the various ways in which it can be harnessed? (3 marks)
- i) Explain the industrial method for the production of potassium dichromate and give its applications. (3 marks)

Section B. Answer any TWO questions (40 marks)

Question 2 (20 marks)

- a) How can the effluents from the following industries be treated? (any two)
- a. Dairy Industry (4 marks)
 - b. Petroleum Industry (4 marks)
 - c. Fertilizer Industry (4 marks)
- b) Briefly discuss biocatalysis and explain two industrial applications of biocatalysts. (4 marks)

Question 3 (20 marks)

- a) Discuss the hazards involved in handling any two of the following pollutants. (10 marks)
- a. Nitrogen
 - b. Chlorine
 - c. Hydrogen peroxide
- b) Discuss the different types of nuclear wastes and the methods of their disposal. (5 marks)
- c) Discuss the various methods for removal of particulate matter from a gas stream (5 marks)

Question 4 (20 marks)

- a) Explain the industrial method for the production of potassium dichromate and give its applications. (10 marks)
- b) Draw and explain the biogeochemical cycle of Sulphur. (5 marks)
- c) What are the causes of ozone layer depletion? (5 marks)

Question 5 (20 marks)

- a) Draw a well labelled diagram of different regions of atmosphere with altitude, temperature variation and the chemical species existing in each layer. (7 marks)
- b) What is sludge digestion? Discuss the methods of further treatment and disposal of digested sludge. (7 marks)
- c) What is meant by coal conversion? Discuss the various methods of coal conversion. (6 marks)