



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

SECOND SEMESTER SPECIAL EXAMINATION FOR THE DIPLOMA IN
EDUCATION (SCIENCE)

SCH 0204: INDUSTRIAL AND ENVIRONMENTAL CHEMISTRY

DATE: 19th Oct 2017

TIME: 11:00 -1:00 pm

INSTRUCTIONS:

- The paper consists of **two** sections.
- Section **A** is **compulsory** (30 marks).
- Answer any **two** questions from section **B** (each 20 marks).

Section A - Compulsory.

1. a) Ammonia is one of the most highly produced inorganic chemicals in the world.
- i) Why is it necessary to remove sulphur compounds from the feedstocks for the ammonia process? [1 mark]
 - ii) With the help of an equation, explain how the sulphur compounds are removed. [2 marks]
 - iii) Describe briefly with the help of a diagram and equations the Haber process for manufacturing of ammonia. [4 marks]
 - iv) Discuss some of the environmental impacts of ammonia production. [2 marks]
- b) Sulphuric acid is one of the commodity chemicals produced in the chemical industry
- i) Describe briefly with the help of equations the production of sulphuric acid using the contact process. [4 marks]
 - ii) Briefly outline the industrial hazards associated with the manufacture of sulphuric acid especially in contact process method. [4 marks]
 - iii) Sulphuric acid can be used as a weapon in crimes of assault. What properties of the acid make it ideal for such type of application? [2 marks]
- c) Chemical industries release a range of pollutants to the environment.
- i) Define the term pollutant. [2 marks]
 - ii) Explain **three** ways through which solid wastes can be disposed [3 marks]
- d) With the aid of equations, explain the manufacture of nitric acid by the ammonia oxidation process. [6 marks]

Section B

Answer any two questions

2. a) Soap and detergents are widely used in our society. Explain the basic steps involved in the Industrial production of soap [10 marks]

- b) Cement is a material which is highly compatible to the earth's eco-system and most adaptable to sustainable development. Outline clearly the various steps involved in the cement manufacture [10 marks]
3. Explain the production process of sugar from sugarcane [20 marks]
4. a) With reference to petrochemical industries, outline the industrial processes that lead to:
- i) Air pollution
 - ii) Water pollution [12 marks]
- b) Most petrochemical industries have developed several pollution prevention measures. Explain **four** of these measures. [8 marks]
5. a) Define the following terms:
- i) Condensation
 - ii) Absorption
 - iii) Adsorption
 - iv) Incineration [4 marks]
- b) Explain **five** ways of controlling pollution from industrial sites [10 marks]
- c) Explain **three** main sources of pollution with major impacts on aquatic systems [6 marks]