

UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

FIRST SEMESTER MAIN EXAMINATION PAPER DECEMBER 2014

TITLE OF PAPER : ENVIRONMENTAL CHEMISTRY I

COURSE CODE : EHS413

DURATION : TWO HOURS

MARKS : 100

INSTRUCTIONS : ANSWER ANY FOUR QUESTIONS

: EACH QUESTION CARRIES 25 MARKS

: BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

QUESTION ONE

You are an environmental health inspector for the Mbabane Municipal Council. You realize that of late, the corrugated iron roofs of the buildings around the industrial cite rusting and some of the monuments crumbling down fast. You suspect an air pollution episode.

- A. What type of air pollution and the associated chemical is associated for this observation? (2 marks).
- B. What atmospheric phenomenon and topographic condition could have made this pollution episode to be concentrated around the industrial area and not the other parts of city? (2 marks).
- C. With the aid of balanced chemical equations, describe the chemical reactions that resulted to the rusting of the iron. (10 marks).
- D. Assuming that the material used to build the monuments was limestone. With the aid of balanced chemical equation(s), describe the chemical reaction(s) that resulted in the crumbling of the monuments. (6 marks).
- E. What other five environmental and health impacts could this pollution episode cause? (5marks).

TOTAL 25 MARKS

QUESTION TWO

Greenhouse effects and global warming are buzzwords climatic studies in this Century.

- A. What is the general name given to the chemical substances associated with **greenhouse effect**? (2 marks).
- B. What are the chemical substances associated with the greenhouse (1 mark).
- C. List **five** of the chemical substances in B above. (5 marks).
- D. In detail, describe how the global warming phenomenon is brought about. (12 marks)
- E. List **five** environmental problems associated with global warming. (5 marks).

TOTAL 25 MARKS

QUESTION THREE

Congratulations. Your application for the position of a water quality controller at the Swaziland Water Services Corporation has been successful. Your first task at the job is to enlighten a community on issues associated with the chemistry of water.

- A. List and describe with the aid of balanced chemical equations **five** important chemical reactions involving water chemistry. (15 marks).
- B. Explain to this community the negative aspects associated with water. (10 marks).

TOTAL 25 MARKS

QUESTION FOUR

You have been appointed an environmental manager by Inyatsi Construction Company. Your company wins a tender to undertake the construction of the high way to the newly opened King Mswati III International Airport. Your job is to advise the constructing engineers on the impacts on the soils along the construction route.

- A. What three major groups of soil physical properties to look for along the construction route r? (3 marks).
- B. For each group of properties, list two examples. (6 marks).
- C. What kind of information would the color of the soils along the route for the road? (5 marks).
- D. What is Cation Exchange Capacity (CEC) of soil? (1 mark)
- E. What five factors would determine the CEC of a soil? (5 marks).
- F. Explain how moisture content of the soils along this route would be determined. (5 marks).

TOTAL 25 MARKS

QUESTION FIVE

This question is composed of a mixture of questions from water, soil and atmospheric, chemistry. Respond to all the questions in this question.

- A. Water Chemistry question
 - a. Explain why water is sometimes referred to as being hard? (2 mark).
 - b. What causes water to be hard? (4 marks).
 - c. What are the types of water hardness? (2 marks).
 - d. What differentiates between the two types of hardness? (4 marks).
- B. Soil Chemistry question
 - a. Define the word soil. (3 marks).
 - b. Explain how crystallization brings about soil formation through physical weathering. (5 marks).
- C. Atmospheric chemistry question
 - a. What starts a photochemical reaction? (1 mark).
 - b. Explain the role of sulphur dioxide in smog formation. (4 marks).

TOTAL 25 MARKS