UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health Science

Main Semester 1 Examination

Dec 2012

Title of paper: Environmental Chemistry

Course code: EHS 413

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

1) ANSWER ONLY FOUR QUESTIONS
2) Each question is weighted 25 marks
3) Write neatly and clearly

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION TO DO SO HAS BEEN GRANTED BY THE CHIEF INVIGILATOR

QUESTION ONE

1. Define weathering and name the three types. (5 marks)
2. With the aid of balanced chemical equations (where applicable), describe the process of weathering through the following:
    a. Oxidation. (5marks).
    b. Carbonation. (5 marks).
    c. Exfoliation. (5 marks).
    d. Frost shuttering. (5 marks).

Total 25 marks

QUESTION TWO

1. Respond to the following:
    a. Define smog. (2 marks)
    b. Name any two types of smog. (2 marks).
    c. Write the full name of the abbreviation PAN. (2 marks).
2. What four conditions are necessary for the formation of a photochemical smog? (4 marks).
3. Describe the influence of meteorological phenomena on the chemical properties of the atmosphere and the general air circulation patterns. (15 marks).

Total 25 marks

QUESTION THREE

a. The atmosphere is one of the important life support systems of the planet Earth. However, in our endeavor to improve our quality of life, we are believed to be deteriorating its role in supporting life. Describe the important benefits and life support services we derive from the atmosphere. (9 marks)
b. With the aid of balanced chemical equations, describe the generation of acidity in precipitation by sulfur. (8 marks).
c. With the aid of balanced chemical equations, describe the role played by Acid-Base reactions in the chemistry of dissolved chemical species in a body of water. (8 marks).

Total 25 marks

QUESTION FOUR

a. "Water supports all forms of life. It would be a grave mistake to temper with its chemistry!" Discuss this statement outlining whether you are in **agreement** or **disagreement** with supporting evidence. (8 marks).
b. Water has a higher surface tension that any other liquid. Describe how surface tension is developed in water with particular reference to the water molecule and explain how this tension is useful in our daily lives. (7 marks).
c. Water has a maximum density as a liquid at 4^0C. Discuss the important life support role this property plays in a given water environment. (5 marks).
d. Discuss the role played by oxidation-reduction reactions in the chemistry of dissolved chemical species in water. [5 marks]

Total 25 marks

QUESTION FIVE

1. Respond to the following:
    a. What do you understand by CEC in the chemistry of soil? (1 mark).
    b. What does the abbreviation CEC stand for? (1 mark).
    c. Explain the crucial role of CEC in the chemistry of soils. (3 marks).
    d. What factors determine the CEC of a given soil? (4 marks).
2. With the aid of a chemical equation, describe the contribution of pyrite oxidation to soil acidity. (5 marks).
3. Discuss the importance of organic matter in the soil. (6 marks).
4. Define soil texture and describe its important role(s) in the soil. (5 marks).

Total 25 marks