



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

Department of Environmental Health
Science

Main Examination 2012

Title of paper: WATER TREATMENT II

Course code: EHS 585

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

- 1) Answer **Four (4)** questions
- 2) Each question is weighted 25 marks
- 3) Write neatly and clearly
- 4) Begin each question in a separate sheet of paper

This paper is not to be opened until the invigilator has granted
permission

EHS 585 II

Question 1.

- i) What are the various steps required to treat water high in *E. Coli* and turbidity (5)
- ii) What are the expected characteristics of effluent to make it not objectionable (5)
- iii) What are the fundamental differences between slow and rapid sand filters? (5)
- iv) Describe the mechanism that take place in both slow and rapid sand filters (10)

Question 2.

A drinking Water Treatment Plant wants to use Sodium Hypochlorite (NaOCL) as a disinfectant to their water supply.

- i) The NaOCL stock solution is produced by adding NaOCL to pure (de-ionized) water to give a 500 mM solution. The solution does not contain any dissolved carbon dioxide. Estimate the pH of the stock solution. (8)
- ii) Estimate the volume of 10 N HCl would you need to add to 1L of the stock to achieve a pH of 8.0. Assume that the stock solution remains isolated from the atmosphere. Ignore the effect of the stock solution with acid. (7)
- iii) The water treatment plant operator add a very small volume of the stock solution from part A (no acid added) to treated drinking water. The treated drinking water is equilibrated with the atmosphere and has a pH of 8.3 before hypochlorite addition. After the hypochlorite is added, the water remains in equilibrium the atmosphere and the pH of the water increases to 8.5. What is the total hypochlorite concentration in the water (10)

Question 3.

- i) In water treatment aimed at the production of drinking water, what is the most important treatment step and why? (15)
- ii) Mention the different methods available to effect this treatment step. (10)

Question 4.

i) What do you understand by Ct Concept in Water Treatment? (10)

ii) Briefly describe Ultra-violet Irradiation kinetics. (15)

Question 5.

You are an Environmental Health Officer stationed at Lavumisa Town and the source of water supply is Jozini dam.

i) With an aid of a flow diagram, clearly show the treatment steps to treat such water after filtration. (15)

ii) Give your reasons for the inclusion for each operational step. (10)