UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

Department of Environmental Health Science

Main Examination Dec, 2013

Title of paper: AIR SAMPLING AND ANALYSIS 1

Course code: EHS 564

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

1) Answer ANY FOUR (4) questions
2) Each question is weighted 25 marks
3) Write neatly and clearly
4) Begin each question on a separate sheet of paper

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

QUESTION 1

a) What is the advantage of sealing the detector tubes with a rubber cap? (2)
b) If one is using the detector tube, how can one improve accuracy of the collected data (4)
c) Why are grab samples less preferred for sampling measurement as opposed to the others? (4)
d) What is the demerit and merit of area sampling? (4)
e) What is the purpose of threshold limit values as guidelines used by occupational safety professionals (4)
f) List the pollutants that are normally analyzed using the following methods (7)
- automatic method
- Longpath analysers

QUESTION 2

a) Outline the consideration has to take into account when deciding on sampling duration (6)
b) Briefly discuss what is entailed by shift – weighting (5)
c) In order to rightfully characterize contaminants, OSH professional have to have information from 2 of the HRA process, which ones are those? (4)
d) What are the units used to express contaminants of the following? (3)
   - Asbestos fibre
   - Dust
   - Fumes
e) Outline the 6 situations under which the wet scrubber could be used (6)
f) Define a homogenous exposure group (1)

QUESTION 3

a) Wet scrubbing is a 2-step process, what are those 2 steps called? (4)
b) Briefly discuss the Brownian diffusion (10)
c) List the gases that can be removed by wet scrubbers (7)
d) What are CEMs and what is their use? (4)

QUESTION 4

a) Dry scrubbers cannot remove all pollutants in the workplace, what are these gases that can be removed by dry scrubbers? (3)
b) Differentiate between absorption and adsorption (4)
c) Outline the 3 major categories of dry scrubbers techniques (6)
d) What kind of reagent is used in a spray dry absorber? (2)
e) Outline the 2 stages that are employed by flue gas desulfurization (4)
f) What is the objective of residence time in the flue gas desulfurization (1)
g) The fundamental mechanism employed to collect particulates in wet scrubbers are particle size dependent. Do you agree with this statement, support it by outlining the most commonly used mechanism (5)

QUESTION 5

a) What could be the selection of wet scrubbing be based on (4)
b) List 5 properties of coal that will affect flue gas desulfurization operation (5)
c) Outline the various types of sampling periods excluding grab sampling in their sequence of preference and state in not more than a sentence why is a certain period preferred more than the other (12)
d) Write a formula for TWA and its relevant units of measurement (4)