



# UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health  
Sciences

Main Examination 2010

Title of paper: INTRODUCTION TO TOXICOLOGY 1

Course code: EHS 560

Time allowed: 2 hours

Marks allocation: 100 Marks

**Instructions:**

- 1) **Question 1** is compulsory
- 2) Answer any other **three (3)** questions of your choice
- 3) Each question is weighted 25 marks
- 4) Write neatly and clearly
- 5) Begin each question in a separate sheet of paper

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

**QUESTION 1**

**COMPULSORY**

- a) Compare and contrast the following terms, hormesis and Mithridatism (10)
- b) In Matsapha, the average concentration of diesel fumes in the air is  $28\text{mg/m}^3$  in the 3 months of winter, but is it  $0\text{mg/m}^3$  during the rest of the year. Assume that everyone is exposed daily to diesel fumes in the air they breathe.

Some of these assumptions are also applicable to the second bit of the question (10)

Concentration =  $28\text{mg/m}^3$ ,  $0.35\text{mg/L}$ ,

Body weight for adult = 70kg, child = 15 kg.

Intake rate =  $22\text{m}^3$  adult and  $15\text{m}^3$  for child.

Lifetime = 55 years for adult and 10 years for a child.

Calculate the following

- i. What is the ADD for an adult during the winter?
- ii. ADD for a child during the same period?
- iii. What is the LADD for an adult living IN Matsapha?
- iv. LADD for a child living in Matsapha?

Assuming that a person who lives in G/West 15026 is exposed daily to arsenic concentration in the drinking water of  $0.35\text{ mg/L}$ . Intake rate is 2L and 1L for adult and child respectively.

- i. What is the ADD for an adult living in this area?
- ii. ADD for a child living with his parents?
- iii. What is the LADD for an adult exposed daily?

- c) What is/are the functions of the Endoplasmic Reticulum? (5)

## QUESTION 2

- a) Outline the questions that a Health Risk Assessor may address under hazard identification in order to implicate a certain xenobiotic to an adverse effect (8)
- b) Define the objective of toxicity testing (8)
- c) Toxicants undergo certain processes in the body, clearly explain the following processes (9)
  - i. Biotransformation
  - ii. Disposition
  - iii. Distribution

## QUESTION 3

- a) Deposition of particles in the respiratory system is dependent on the aerodynamic behaviour of the particles. Discuss these behaviours (12)
- b) Some xenobiotics are able to be taken up by the circulatory system but are excreted directly. What is this process called, discuss how this phenomenon occurs? (10)
- c) Name the 3 chemicals that disrupt the testicular vasculature in the Blood Testis Barrier (BTB) (3)

## QUESTION 4

- a) Just name the type of toxicity that is likely to be caused by the following chemicals (6)
  - i. Bromobenzene
  - ii. Vinyl chloride
  - iii. Aniline
  - iv. Dimethylnitrosamine

- v. Carbon tetrachloride
  - vi. Chloroform
- b) The BTB is exposed to a different array of toxicological insult like Cadmium (Cd). However, there are some chemicals that can prevent Cd toxicity in this system, which are these chemicals? (4)
- c) You are an Environmentalist based at Nsenga Royal Kraal. Every Saturday when you attend community meetings, the residents complain of a compound that is affecting them after they have drunk water. How will you go about as an environmental toxicologist in solving this predicament? (10)
- d) What is the theorized shape of a dose – response curve, and what are its assumptions? (5)

#### QUESTION 5

- a) Define a completed exposure pathway to xenobiotics and list the components thereof (10)
- b) Differentiate between an exposure and a dose (4)
- c) Discuss the factors that determine toxicity in test animals (4)
- d) Test animals may be exposed to the same chemicals and yet some of them may not develop a response to that particular chemical, what do we call this response? (3)
- e) Name the 2 factors that determine the rate of passive transfer of xenobiotics (4)