



UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health Sciences

Main Examination 2012

Title of paper: INTRODUCTION TO TOXICOLOGY I

Course code: EHS 560

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Examiner: M.V. Mamba

Instructions:

- 1) Question 1 is compulsory**
- 2) Answer ANY OTHER THREE (3) questions**
- 3) Each question is weighted 25 marks**
- 4) Write neatly and clearly**
- 5) Begin each question on a separate sheet of paper**

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

QUESTION 1

In Mbabane Campus, the average concentration of diesel fumes in the air is 28mg/m^3 in the 3 months of winter, but it is 0mg/m^3 during the rest of the year. Assume that everyone is exposed daily to diesel fumes in the air that they breathe (14)

The following assumptions are made;

Concentration = 28mg/m^3 , 0.35mg/L , Body weight for adult = 70kg , child = 15kg . Intake rate = 22m^3 adult and 15m^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 winter?
- ii. ADD for a child during the same period?
- iii. What is the LADD for an adult living in Mbabane?
- iv. LADD for a child living in Mbabane?

Assuming that a person who lives in Gaborone is exposed daily to arsenic concentration in the drinking water of 0.35mg/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?

a) Match the following scientists with their contribution to toxicology, do not write the full names and descriptions e.g. f = vii (10)

a) Gula	i) Wrote of the use of arrows poisoned with venom
b) Homer	ii) Died after eating amanita palliloids mushroom
c) Pope Clement VII	iii) Toxicologist at Edinburg university, invented poison harpoon for whaling that contained prussic acid
d) Richard Meade	iv) Female deity, was associated with charms, spells & poisons
e) Robert Christison	v) Wrote a mechanical account of poisons dedicated to poison, snakes, animals and plants

b) Define a human equivalent dose (1)

QUESTION 2

- a) Differentiate between a RfD and a benchmark dose? (6)
- b) Write the formulae for the following as they relate to toxicology (10)
 - i. Exposure
 - ii. Average Daily Dose
 - iii. Lifetime Average Daily Dose
 - iv. Margin of Safety
 - v. Therapeutic Index
- c) There are no harmless substances. There are only harmless ways of using substances. Who is famous for making this statement? Do you agree with his assertion and why? (6)
- d) What do you understand by acute and sub – acute exposures? (3)

QUESTION 3

- a) If you were studying test animals on the importance of the blood testicular barrier, what are the health effects that you will be looking for if your test animals have been acutely exposed to cadmium? (5)
- b) Briefly discuss the 6 possible limitations of the blood placental barrier with relevant examples (12)
- a) Under toxicant reactions, what chemical reactions would be best represented by these numbers? (6)
 - i. $1 + 1 = 2$
 - ii. $1 + 1 = 4$
 - iii. $0 + 1 = 5$
- c) Define the threshold level in the dose relationship curve (2)

QUESTION 4

- a) You have been asked to make a presentation on the factors that influence toxicity to animals in your locality. As an environmental student, your area of expertise will have to cover environmental factors. Take us thorough the salient points that your presentation will cover (15)
- b) Briefly discuss cholinesterase inhibition under the following topics: (10)
 - i. Types
 - ii. Manifestation of severity dependents
 - iii. Health effects thereof
 - iv. How human exposure occurs?

QUESTION 5

- b) Compare and contrast the three types of studies that are used in toxicological studies (9)**
- c) The strength of a poison is measured by its potency. explain what is meant by the term potency (2)**
- d) Sequentially indicate the level of toxicity rating category and labeling requirements for pesticides (8)**
- e) What are the 3 key functions of the blood brain barrier? (6)**