

UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health Sciences

SUPPLEMENTARY EXAMINATION

JULY 2015

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Title of paper: INTRODUCTION TO TOXICOLOGY

Course code: EHM 314

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

- 1) Answer ANY FOUR (4) questions
- 2) Each question is weighted 25 marks
- 3) Marks allocation per question are indicated in brackets
- 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

a) Match the terms on the left with their appropriate definitions. Letters can only be used once e.g. IX = Z (7 Marks)

|                               |   |
|-------------------------------|---|
| i. Teratogen                  | A. A scientist who studies the cellular, biochemical or molecular pathways involved in toxicity           |
| ii. Descriptive toxicologist  | B. A scientist who assesses the risk of a given chemical  |
| iii. Mechanistic toxicologist | C. A chemical that causes liver damage  |
| iv. Target organ              | D. A chemical that causes birth-defects   |
| v. Hepatogen                  | E. Tries to understand the ill effects caused by toxicants  |
| vi. Product dev. toxicologist | F. The site where a toxicant will cause the majority of damage or impact                                  |
| vii. Molecular toxicologist   | G. A scientist who performs toxicity testing on whole organism to produce data for safety/risk evaluation |

b) There have been several important people and events in the history of toxicology. Match the person or terms on the left with their accomplishments or definitions on the right e.g. IX = Z (10 Marks)

|                               |  |
|-------------------------------|--|
| i. Sheng Nung                 | a. Supplied arsenic to women who wanted to kill their husband, died due to strangulation |
| ii. Mount Vesuvius            | b. Used arsenic in a concoction called "La Cantrella"                                    |
| iii. GuliaTophania            | c. Convicted poisoner, was burnt at the stake  |
| iv. HieronymaSpara            | d. Group of people who murdered by poison for a fee                                      |
| v. Rodrigo & Cesare Borgia    | e. Christian military order alleged experts in poison                                    |
| vi. LaVoison                  | f. Thy drugs are quick. Thus I die with a kiss   |
| vii. Knights Templars         | g. First to study venomous snakes, discovered that viper venom affects the blood         |
| viii. Venetian Council of Ten | h. Fortune teller who sold arsenic to wealthy wives to kill their husbands               |
| ix. Shakespeare               | i. Pliny the elder suffocated due to volcanic gases                                      |
| x. Felice Fontana             | j. Tasted 365 herbs and died of overdose   |

- c) Differentiate between a toxicant and a toxin (2 Marks)
- d) Write briefly about the functions of an analytical toxicologist (5 Marks)
- e) Name the heavy metal that caused the minamata disease (1 Marks)

## QUESTION 2

- a) There are no harmless substances, there are only harmless ways of using substances, who is famous for this utterances, support his statement in not more than 5 lines (5 Marks)
- b) When was the EPA established and what was its mandate (4 Marks)
- c) The right dose differentiates a poison from remedy...this statement. Who is famous for this statement, do you agree with his assertion and why? (5 Marks)
- d) Name any 3 types of transport mechanism that toxicants use to cross the Blood Placenta Barrier (3 Marks)
- e) What is the Chernobyl accident (3 Marks)
- f) Write briefly about Mr. Yuk 1971 (5 Marks)

## QUESTION 3

- a) What do you call the quantity of a substance administered to an individual over a period of time called? (2 Marks)
- b) What is the lowest point where one can safely say there is some effects caused by a toxicant called? (2 Marks)
- c) What type of a dose would you refer to as a benchmark dose? (2 Marks)
- d) From the following, choose the one that best represents an LD<sub>50</sub>? (3 Marks)
  - i. The effect resulting from a threshold does of 50mg
  - ii. The point at which 50% of the livers' cells are destroyed
  - iii. The estimate dose that will produce 50% deaths in a group of animals
- e) Name the highest data point at which there is no detectable toxic effects in an exposed animal called (2 Marks)
- f) What would be the TI if the LD<sub>50</sub> is 200 and the Ed<sub>50</sub> of 20 (3 Marks)
- g) Briefly name and indicate factors that may affect the rate of passive transport, and state how they do so? (6 Marks)
- h) Which statement is the most correct, only choose the appropriate letter and then support your choice in not more than 4 sentences? (5 Marks)
  - i. Chemicals manufactured by humans are more dangerous to human health than naturally occurring chemicals.
  - ii. Both natural and human-made chemicals are potentially toxic to humans.
  - iii. Naturally occurring chemicals are more poisonous to humans than synthetic chemicals.

#### QUESTION 4

- a) Which drug would be safer to administer between one with a TI of 10 and 3 and why? (4 Marks)
- b) Name the type of transport mechanism that is able to move toxicants faster and is capable of moving larger molecules (3 Marks)
- c) What are the properties of a chemical that would affect its ability for passive transfer to take place? (6 Marks)
- d) Name the cell environment where (6 Marks)
  - i. The concentration of solutes is greater outside the cell than inside
  - ii. Water diffuses into and out of the cell at equal rates
  - iii. Concentration of solutes is greater inside than outside the cell
- e) What are the 3 functions of the suppository routes? (6 Marks)

#### QUESTION 5

- a) Who took the largest dosage of aspirin, calculate the dose for each person in the question, show your calculations and include appropriate units? (5 Marks)

An adult woman who weighs 125 kg and took 300 mg of aspirin  
- A teenage boy who weighs 135 kg and took 600 mg of aspirin  
- A baby who weighs 20kg and took 100 mg of aspirin  
- Lomacala who weighs 5kg and took 50 mg of aspirin
- b) If you want to administer 100mg/kg dose of a drug to a 20g mouse and a 200g rat, what amount of a chemical would you use for each? (6 Marks)
- c) Define potency and exposure (7 Marks)
- d) All of the people listed below live in the same house. Who is most likely to experience more toxic effects from the second-hand smoke and why? (4 Marks)
  - The grandmother, who is very fit and sometimes coughs a lot,
  - The mother, who smokes dagga everyday
  - The father, who smokes
  - The asthmatic teenage daughter
  - The son, who is in 5th grade
- e) Which of the 3 routes do you think may result in more toxicant distribution in the blood and why? (3 Marks)