



**UNIVERSITY OF SWAZILAND**  
Faculty of Health Science

Department of Environmental Health  
Sciences

Final Examination 2009

Title of paper: Introduction to Environmental Toxicology

Course code: EHS 560

Time allowed: 2 hours

Marks allocation: 100 Marks

Instructions:

- 1) Read the questions and instructions carefully
- 2) Answer ANY FOUR(4) 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

**INTRODUCTION TO TOXICOLOGY EXAMINATION –**  
**DECEMBER 2009**

**QUESTION 1:**

- A) For the following, match the item in column B with the item in column A  
(2 marks each). Total marks = 20 marks)

<b>COLUMN A</b>	<b>COLUMN B</b>
1. Additive Effects	A) Venoms and substances of biological origins producing an adverse health effect.
2. Potentiation effects	B) The combined effects of two chemicals are must greater than the sum of the effects of each agent given alone.
3. Antagonistic effects	C) A chemical effect of two chemicals is equal to the sum of the effects of each given alone.
4. Synergistic effects	D) A molecule or atom with an unpaired electrons that is very reactive.
5. Idiosyneratic effects	E) The chemical species that react with indigenous target molecule.
6. Toxin	F) A chemical producing an adverse health effect.
7. Toxicant	G) A toxic and non toxic chemical when administered simultaneously elevates the adverse effects of the toxic chemical far above its normal levels.
8. Acute Toxicity	H) Toxicity occurring with less than 24 hrs
9. Free Radical	I) A genetically determined abnormal reactivity to a chemical.
10. Reversible toxic effect	J) When two chemicals administered together interfere with each other's actions or one interferes with the action of the other.

- B) i) Write short notes on aflatoxins (5 marks)

**Total Marks (25 marks)**

## **QUESTION 2:**

- a) What is a dose response curve? *(5 marks)*
- b) With the aid of a graph explain the following biological effects
- NOEL
  - LOEL
  - NOAEL
  - LAEL
  - FEL *(5 marks)*
- c) What are the assumptions of a dose-response curve? *(5 marks)*
- d) Assume you are in policy decision position, a monograph is being published about the relative potencies and efficacies of a series of organo chlorines. There is a disagreement within your team as to how the data should be presented ie, in which graphical form. Given the attached diagrams below as a guide, explain what each type of graph would give information to your readers and what are the advantages and disadvantages of the presentation of each panel. *(10 marks)*

*(Total = 25 marks)*

## **QUESTION 3:**

- a) Name any five (5) Phases I and any five (5) Phase 2 major biotransformation reactions. *(10 marks)*
- b) What is the “first pass effect” and why this form of elimination result to a low level of expression of toxicity from a xenobiotic *(5 marks)*
- c) What is the different between the margin of safety and the therapeutic index. How are these determined? *(5 marks)*
- d) What is meant by “Disposition” of a toxic substance *(5 marks)*

*(Total = 25 marks)*

## **QUESTION 4:**

- a) Repair is an important process that may ultimately determine whether or not a chemical will manifest toxicity. Describe briefly the three (3) levels of repair and give examples of each. *(15 marks)*
- b) Briefly discuss the cytochrome P-450 and its importance in the biotransformation of toxic chemicals. *(5 marks)*

- c) Discuss the major anatomical and physiological properties that are responsible for the “blood brain barrier” in the central nervous system (5 marks)

*(Total = 25 marks)*

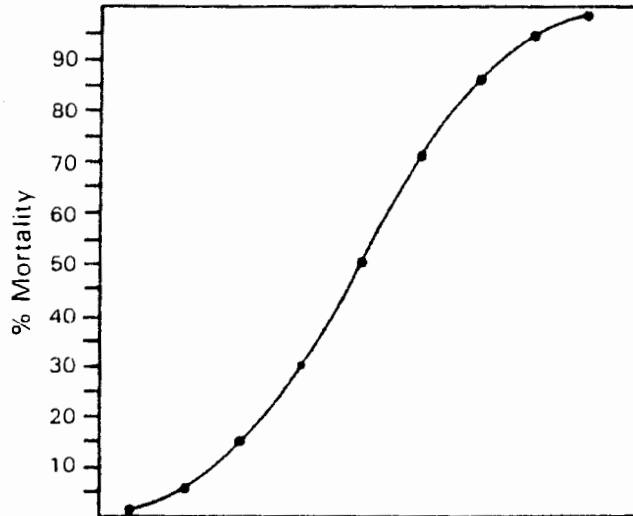
**QUESTION 5:**

- I) Assume you are a safety, health and environment (SHE) officer for Usuthu Pulp Company in Swaziland. On one of the days you are called to investigate a case of poisoning where a valve of a poisonous gas broke open and exposed the gas to two employees. On investigation, you determine that two employees were involved and were exposed to the same dose of the gas. Your further investigation reveals that one of the employees became nauseated, got very confused weak and fainted and the second employee felt a little nauseated and was able to walk out of the factory. You are required to explain or advise the senior management about this accident.
- a) Explain in detail to the management on the information the medical practitioner should have or did ask about the incident to ensure proper medical care was given to the employees and that no law suit would be preferred against the company.
  - b) Explain in detail to management on the possible explanations for the differences in toxic effects of the toxicant. (15 marks)
- II) What is a material safety data sheet? Give ten (10) main headings that may appear on an MSDS. (10 marks)

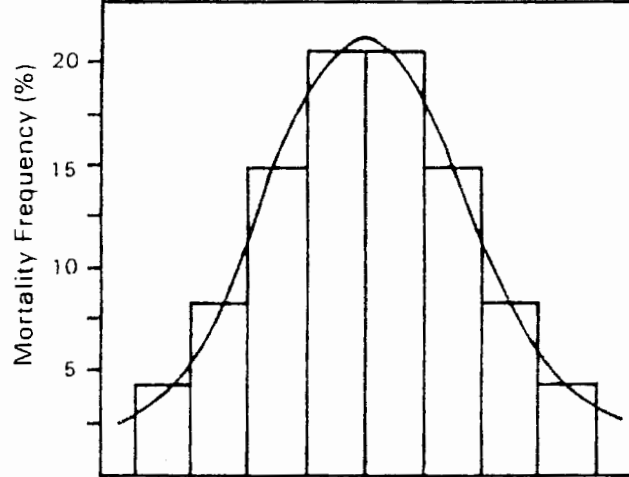
*(Total = 25 marks)*

Q. 2 (d)

A,



B,



C,

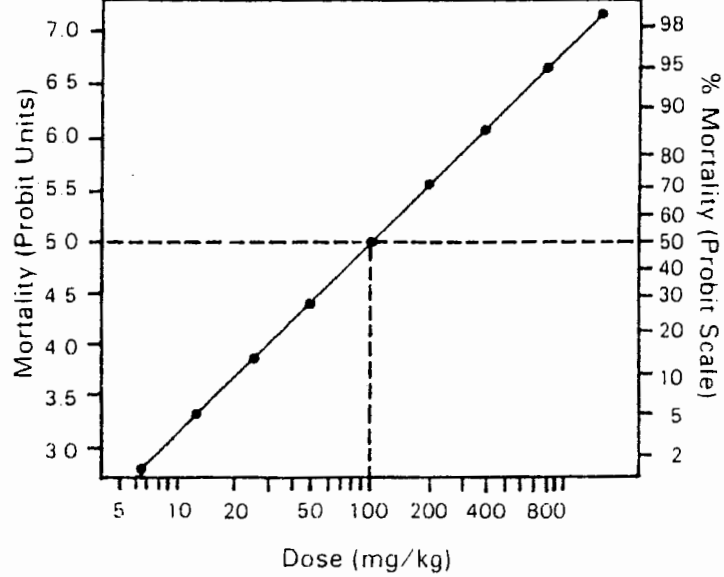


Diagram of quantal dose-reponse relationship.