



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

MAIN EXAMINATION PAPER DECEMBER 2018

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| TITLE OF PAPER | : | RODENTS AND VERMIN CONTROL |
| COURSE CODE | : | EHS307 |
| DURATION | : | 2 HOURS |
| MARKS | : | 100 |
| INSTRUCTIONS | : | READ THE QUESTIONS & INSTRUCTIONS CAREFULLY |
| | : | ANSWER <u>QUESTION 1 AND ANY THREE OTHER</u> QUESTIONS |
| | : | EACH QUESTION <u>CARRIES 25</u> MARKS. |
| | : | WRITE NEATLY & CLEARLY |
| | : | NO PAPER SHOULD BE BROUGHT INTO OR OUT OF THE EXAMINATION ROOM. |
| | : | BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER. |

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION 1

- a. **MULTIPLE CHOICE:** Indicate your responses to the items in this question by writing the letter corresponding to your chosen answer. (20)
- i. The common name for *Rattus rattus rattus* is:
- A. Normay rat
 - B. Brown rat
 - C. Roof rat
 - D. Sewer rat
 - E. Domestic rat
- ii. A householder sets up rodent bait impregnated with a rodenticide known as bromethalin inside the kitchen which was regularly visited by rodents at night. Unfortunately, a 1 year old child finds the bait and eats part of it resulting to accidental poisoning of the child. What is the best substance are healthcare workers likely to give to the child in order to delay development of severe symptoms?
- A. Make the child drink a lot of cold water to dilute the rodenticide
 - B. Give the child a lot of milk to drink
 - C. Give the child vitamin K₁
 - D. Make the child drink warm water and induce vomiting
 - E. Give the child tablets such as panado or paracetamol to prevent development of fever
- iii. Piperonyl butoxide is often added into insecticide cans containing other insecticides. What purpose is served by the piperonylbutoxide in the cans?
- A. To repel insects
 - B. To kill more insects on contact
 - C. To provide synergy for the active insecticide
 - D. To dissolve the active insecticide
 - E. To provide residual killing of insect that receive a sub-lethal dose of the active insecticide
- iv. Which one of the following is NOT true about the toxic effects of pesticides on man?
- A. A dose-effect relationship does not exist for most pesticides
 - B. A concentration-effect relationship exists for most pesticides
 - C. Pesticide poisoning has more deleterious effects on a child than on an adult
 - D. Pesticides that have a high toxicity but are readily metabolized result to an acute type of hazard
 - E. Some rapidly eliminated pesticides may induce persistent, long-term biological effects even at low doses
- v. A spray personnel wants to spray brick, plaster, cement or dried mud surfaces so that the insecticide which later evaporates over insects that alight and walk on the surface come to their contact leading to death of the insects. The most likely formulation the sprayer will choose is a(n):

- A. water-dispersible powder
- B. pellet
- C. granule
- D. emulsifiable concentrate
- E. insecticidal surface coatings

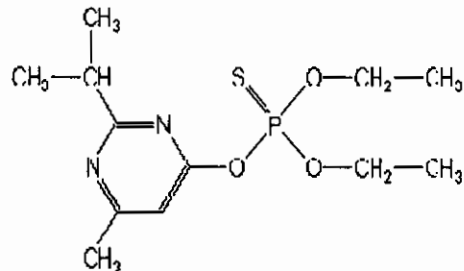
vi. Which one of the rodenticides below IS NOT a first-generation rodenticide?

- A. Warfarin
- B. Pindone
- C. Bromadiolone
- D. Diphacinone
- E. chlorophacinone

vii. A measure of the likelihood that a toxic effect due to pesticide poisoning will occur is referred to as a(n):

- A. accident
- B. toxic hazard
- C. danger
- D. risk
- E. probability

viii. A pesticide has the formula shown below.



Which one of the pesticides below is this likely to be:

- A. DDT
- B. Propoxur
- C. Bendicarb
- D. Diazinon
- E. Dieldrin

ix. The resistance which occurs when resistance to one insecticide confers resistance to another insecticide within the same class or group with similar mode of action even if the insect has not been exposed to the latter product is known as:

- A. cross-resistance
- B. double-resistance
- C. multiple-resistance
- D. single-resistance
- E. non-resistance

EHS307 MAIN EXAM DEC 2018

- x. In which of the groups of insecticides below has the highest resistance been reported:
- A. DDT
 - B. Carbamates
 - C. Cyclodienes
 - D. Organophosphoates
 - E. Pyrethroids
- b. **TRUE OR FALSE:** Write **T** (for true) or **F** (for false) against each of the items below to indicate your response. (5)
- i. Whole body bee, wasp hornet, and yellow jacket antigen is a safe and effective method of desensitization
 - ii. Assessments of knockdown or mortality of mosquitoes are made at 10 minute intervals when using CDC bottle kits
 - iii. The tail of *Rattus norvegicus* is longer than the rest of the body
 - iv. When a cat becomes poisoned after eating a rodent that ingested large amounts of pesticides it's referred to as primary poisoning.
 - v. Synthetic pyrethroids have been chemically stabilized to increase their persistence in field applications and/or increase toxicity

QUESTION 2

- a. Giving one example in each case, describe FOUR methods by which arthropod venoms may be introduced into the body of a vertebrate such as human. (8)
- b. Write down the scientific names of two spiders commonly involved in the deadly envenomation of humans in certain parts of the world. (2)
- c. Explain how spiders cause envenomation of arthropod victims including man. (6)
- d. List FOUR areas around households that are commonly inhabited by spiders? (4)
- e. What first aid measures would you apply to a victim of spider envenomation prior to transfer to a health facility? (5)

[25 marks]

QUESTION 3

- a. List FOUR precautions that pregnant women have to take in order to prevent the effect of pesticides on the foetus. (4)
- b. In the pesticide cycle, there are only two changes that may occur to a pesticide to reduce the effect of the pesticide in the environment.
 - i. Describe the two ways (4)
 - ii. List FIVE ways that describe other fates of an insecticide that has been sprayed to the environment. (5)
- c. Explain what a synergist is and how the use of synergists benefits pesticide use against insects. (3)
- d. The LC_{50} of a resistant species of insect is determined to be 300 while the LC_{50} in a susceptible population of the same species is found to be 140. Using this information, calculate the resistant factor of the insecticide. (3)

EHS307 MAIN EXAM DEC 2018

- e. The success of every indoor residual spray programme depends on five factors.
- i. What is the working principle of indoor residual spray programmes? (2)
 - ii. List FOUR factors that determine the success of every indoor residual spray programme. (4)
- [25 marks]

QUESTION 4

A household brings a complaint of rodent infestation to your office of environmental health. Describe the steps you would follow in assisting the household until the infestation has been removed. Include strategies you may employ to reduce chances of future infestation.

[25 marks]

QUESTION 5

- a. Define the following terms as applied to pesticide use.
 - i. Maximum Exposure Limit (MEL) (2)
 - ii. Occupational Exposure Standards (2)
- b. What is the difference between a pesticide and an insecticide? (4)
- c. Pesticides sometimes have negative effects on humans through local or systemic effects.
 - i. What is the difference between a local and a systemic effect of a pesticide? (2)
 - ii. Describe THREE different ways through which pesticides may enter the body of humans? (3)
- d. List FIVE general negative effects that may result following high pesticide intake in humans? (5)
- e. What is the difference between bioaccumulation and biomagnification of pesticides? (4)
- f. During susceptibility testing, the following categories are established.
 - i. 98 - 100% mortality
 - ii. 80 - 97 % mortality
 - iii. Less than 80% mortality

What interpretation in terms of susceptibility is given for each? (3)

[25 marks]

QUESTION 6

- a. Explain the difference between vector susceptibility and insecticide resistance? (4)
- b. Outline the principle of the WHO test kits for insecticide susceptibility. (4)
- c. Organophosphates have made considerable contribution to insect pest control efforts for many years. Explain the insecticidal method of organophosphates. (2)
- d. List SEVEN factors that are favourable for rapid development of resistance to insecticides. (7)
- g. Discuss strategies you are likely to include in a vector control programme in order to manage development of resistance. (8)

[25 marks]