

UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

FINAL EXAMINATION PAPER 2005

TITLE OF PAPER: ENVIRONMENTAL CHEMISTRY

COURSE CODE : EHS 401

DURATION : THREE HOURS

MARKS : 100

INSTRUCTIONS : ANSWER ONLY FIVE QUESTIONS.

: EACH QUESTION CARRIES 20 MARKS.

: QUESTIONS ONE AND TWO ARE COMPULSARY.

**: NO QUESTION PAPER SHOULD BE BROUGHT INTO NOR
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 ONE:

Answer all these questions by correctly writing down the correct number of the question and then writing the correct answer in front of it.

1. All of the following are elements except
 - (a) water
 - (b) oxygen
 - (c) nitrogen
 - (d) hydrogen

2. N_2 and O_2 are examples of
 - (a) compounds consisting of different elements
 - (b) elements consisting of a compound and an ion
 - (c) molecules consisting of two atoms of the same element
 - (d) molecules consisting of two elements of the same compound.

3. The volume of an atom is mostly
 - (a) electron cloud
 - (b) protons
 - (c) neutrons
 - (d) free space

4. The atomic number is the number of
 - (a) atoms in a molecule
 - (b) protons in an atom
 - (c) neutrons in a molecule
 - (d) electrons in an atom

5. The atomic mass is equal to the sum of the
 - (a) neutrons and isotopes
 - (b) neutrons and electrons
 - (c) neutrons and protons
 - (d) neutrons, protons, and electrons

6. Ions have
 - (a) a net positive charge
 - (b) a net negative charge
 - (c) no charge
 - (d) a net positive or negative charge

7. Ionic compounds
 - (a) are held together by covalent bonds
 - (b) are held together by hydrogen bonds
 - (c) consist of networks of oppositely charged ions
 - (d) are generally liquids at room temperature and pressure.

8. All organic compounds are characterized by the presence of
- (a) carbon
 - (b) hydrogen
 - (c) oxygen
 - (d) nitrogen
9. Organic compounds include all of the following except
- (a) chlorofluorocarbons
 - (b) hydrocarbons
 - (c) chlorinated hydrocarbons
 - (d) carbon dioxide.
10. H₂O and NaCl are
- (a) elements
 - (b) mixtures
 - (c) inorganic compounds
 - (d) organic compounds
11. Chlorinated hydrocarbons are more likely to--- than organophosphates and carbamates
- (a) contaminate surface water and ground water
 - (b) degrade quickly in the environment
 - (c) be more toxic to organisms other than the targeted pests
 - (d) become magnified in the food chain
12. Which of the following groups of pesticides would persist in an area the longest?
- (a) pyrethroids
 - (b) chlorinated hydrocarbons
 - (c) carbamates
 - (d) contact insecticides
13. Atrazine and paraquat are
- (a) contact herbicides
 - (b) rotenoids
 - (c) systemic herbicides
 - (d) pyrethroids.
14. According to proponents of pesticides, which of the following statements is true
- (a) the health risks of pesticides are insignificant compared with their health and other benefits
 - (b) safer and more effective pesticides are constantly being developed
 - (c) insecticides lower food costs
 - (d) all of these answers
15. Broad-spectrum pesticides may increase the number of pest species through

- (a) the development of genetic resistance
- (b) the killing of other forms of life
- (c) killing of parasites that may have kept the population of the pest low
- (d) all of these answers.

16. The pesticide treadmill involves

- (a) use of stronger doses of pesticide
- (b) a switch to new chemicals
- (c) use of more frequent doses of pesticide
- (d) all the above answers.

17. Farm workers in developing countries are especially vulnerable to pesticide poisoning for all of the following reasons except

- (a) few warnings
- (b) little use of protective equipment
- (c) a gene pool particularly susceptible to pesticides
- (d) predominantly hand-application of pesticides.

18. An integrated pest management program can

- (a) increase input of fertilizer and irrigation water
- (b) reduce preharvest pest-induced crop losses by 50%
- (c) increase pesticide use
- (d) decrease yield and increase costs.

19. Topsoil contains all of the following except

- (a) plant roots
- (b) humus
- (c) freshly fallen leaves
- (d) some inorganic minerals.

20. Soil texture most directly determines

- (a) porosity
- (b) pH
- (c) color
- (d) nutrient content.

TOTAL 20 MARKS

QUESTION TWO:

- (a) Define soil horizon (2 marks)
- (b) Briefly describe six soil layers (12 marks)
- (c) Describe the problems of salinization of soils and how they can be controlled. (8 marks)

TOTAL 20 MARKS

QUESTION THREE:

- (a) Describe (with the aid of balanced chemical equations) the origin of stratospheric ozone and the role it plays in protecting life on Earth. (5 marks)
- (b) Briefly describe changes which have been occurring in stratospheric ozone. (15 marks)

TOTAL 20 MARKS

QUESTION FOUR:

List and explain the effects and significance of each of the eight important properties of water. (20 marks)

TOTAL 20 MARKS

QUESTION FIVE:

- (a) What does the abbreviation PAN stand for? (2 marks)
- (b) Write the chemical formula for PAN (2 marks)
- (c) AT what point in the smog-producing chain reaction is PAN formed? (2 marks)
- (d) What are the main species responsible for the oxidation of NO to NO₂ in a smoggy atmosphere? (2 marks)
- (e) Briefly describe the effects of enhanced UV-B radiation on
 - Human health (4 marks)
 - Microorganisms (4 marks)
 - Animals and plants (4 marks)

TOTAL 20 MARKS

QUESTION SIX:

- (a) Describe the green-house effect and what the earth would be like without a green-house effect. (10 marks)
- (b) List three green-house gases which have risen in the last few decades. (3 marks)
- (c) Distinguish between green-house effect and global warming. (3 marks)
- (d) List four human activities which contribute green-house gases to the atmosphere. (4 marks)

TOTAL 20 MARKS

GOOD LUCK!!!!