



UNIVERSITY OF SWAZILAND
Faculty of Health Science

Department of Environmental Health
Sciences

Supplementary Examination 2007

TITLE OF PAPER : ENVIRONMENTAL CHEMISTRY
COURSE CODE : EHS 401
DURATION : 3 HOURS
MARKS : 100
INSTRUCTIONS : ANSWER ANY FIVE QUESTIONS
: QUESTIONS ONE AND TWO ARE COMPULSORY
: EACH QUESTION CARRIES 20 MARKS
: NO PAPER SHOULD BE BROUGHT INTO NOR OUT
OF THE EXAMINATION ROOM
: BEGIN EACH QUESTION ON A SEPARATE SHEET
OF PAPER

DO NOT OPEN THE QUESTION PAPER UNTIL PERMISSION HAS BEEN
GRANTED BY THE INVIGILATOR.

92

QUESTION ONE

This question is compulsory

1. The correct sequence of layers of the atmosphere from the innermost to outermost is
 - (a) mesosphere-stratosphere-thermosphere-troposphere
 - (b) troposphere-stratosphere-mesosphere-thermosphere
 - (c) stratosphere-thermosphere-troposphere-mesosphere
 - (d) thermosphere-stratosphere-mesosphere-troposphere

2. stratospheric ozone
 - (a) screens out ultraviolet radiation
 - (b) allowed the evolution of life on land
 - (c) prevents ozone formation in the troposphere
 - (d) all of these answers.

3. Human health depends on having
 - (a) low amounts of ozone in the stratosphere
 - (b) enough ozone in the stratosphere and little ozone in the troposphere
 - (c) high amounts of ozone in the troposphere and low amounts in the stratosphere
 - (d) high amounts of ozone in the troposphere and stratosphere.

4. Humans can disrupt earth's gaseous biogeochemical cycles through
 - (a) addition of carbon dioxide from combustion
 - (b) mining limestone
 - (c) emitting waste heat from air conditioners
 - (d) using mister systems to water crops

5. Ozone which contributes to the formation of smog is found in the
 - (a) troposphere
 - (b) mesosphere
 - (c) thermosphere
 - (d) stratosphere

6. All of the following are volatile organic compounds (VOCs) except
 - (a) methane
 - (b) chlorofluorocarbon
 - (c) carbon monoxide
 - (d) benzene

7. All of the following are photochemical oxidants except
- (a) dioxin
 - (b) hydrogen peroxide
 - (c) peroxyacyl nitrates (PANs)
 - (d) benzene
8. Photochemical smog generally requires the presence of
- (a) nitrogen oxides
 - (b) sunlight
 - (c) volatile organic compounds
 - (d) all of the above.
9. All of the following describe soils that are vulnerable to acid deposition except
- (a) thin
 - (b) low in buffering ions
 - (c) high in hydroxyl (OH⁻) ions
 - (d) acidic.
10. Asbestos has been used for the following except
- (a) fire proofing
 - (b) insulation of refrigerators
 - (c) insulation of heaters and pipes
 - (d) wall and ceiling decoration
11. Of the following motor vehicle fuels, the greatest polluter is
- (a) gasoline
 - (b) hydrogen gas
 - (c) alcohol
 - (d) natural gas
12. The greenhouse effect is best described as
- (a) consensus science
 - (b) pioneer science
 - (c) fantasy
 - (d) a convention florists
13. The major greenhouse gases include all of the following except
- (a) chlorofluorocarbons (CFCs)
 - (b) carbon dioxide and water vapour
 - (c) sulphur dioxide
 - (d) ozone and nitrous oxide.

14. Increased greenhouse gases originate from
- (a) burning fossil fuels
 - (b) use of CFCs
 - (c) deforestation
 - (d) all of these answers.
15. The threat to global warming can be addressed by
- (a) using energy more efficiently
 - (b) halting deforestation
 - (c) slowing population growth
 - (d) all of the above
16. Nitrates and Phosphates are examples of
- (a) disease-causing agents
 - (b) oxygen-demanding wastes
 - (c) organic plant nutrients
 - (d) inorganic plant nutrients.
17. Sources of groundwater contamination include
- (a) deep wells used to dispose of liquid hazardous wastes
 - (b) abandoned hazardous waste dumps
 - (c) industrial and livestock waste storage lagoons
 - (d) all of these answers.
18. Which of the following would be used to kill weeds
- (a) herbicides
 - (b) rodenticides
 - (c) fungicides
 - (d) insecticides
19. Broad-spectrum pesticides may increase the number of pest species through
- (a) development of genetic resistance
 - (b) killing of predators of the pest species
 - (c) killing of parasites that may have kept the population of pest low.
 - (d) All of the above
20. 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 of the above.

Total 20 marks

QUESTION TWO:

- (a) Describe how biological fixation of nitrogen differs from atmospheric fixation. (5 marks)
- (b) What does the nitrogen cycle tell us about the significance of inconspicuous microorganisms for the survival of life on earth? (5 marks)
- (c) Mention any five sources of sulphur compounds that enter the atmosphere (5 marks)
- (d) Mention any five effects of sulphur dioxide on the environment. (5 marks)

Total 20 marks.

QUESTION THREE:

- (a) List the five types of pesticides and what they are used to treat. (5 marks)
- (b) Describe the consequences of relying heavily on pesticides. (5 marks)
- (c) Describe the pesticide treadmill. Be sure to describe biological magnification. (5 marks).
- (d) Briefly describe the threat of pesticides to wildlife and human health. (5 marks).

Total 20 marks.

QUESTION FOUR:

- (a) Describe the origin and structure of the following compounds:
- (i) methane
 - (ii) ethylene
 - (iii) xylene
 - (iv) benzene
 - (v) acetylene
 - (vi) naphthalene

(2 marks each)

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(b) Draw the structure of the following halogenated aromatic compounds.

- (i) polychlorinated biphenyl
- (ii) poly chlorinated dibenzo-p-dioxin (TCDD)
- (iii) DDT
- (iv) Polybrominated biphenyl

(2 marks each)

Total 20 marks.

QUESTION FIVE:

(a) List three properties of pesticides and describe the processes by which pesticides are retained or lost in the soil. (10 marks)

(b) You are the environmental health officer at Manzini. A tanker carrying the volatile pesticide “malathion” crushes and spills the whole content around the Bhunu Mall. Explain the measures and procedures that you will take to prevent environmental damage. (10 marks)

QUESTION SIX:

(a) Briefly describe the structure of the periodic table of elements. Distinguish between periods and groups; metals, nonmetals and metalloids. (10 marks)

(b) Define chemical formula. Distinguish between compounds held together by covalent bonds and compounds held together by ionic bonds. Describe the structure of the molecule of water. (10 marks)

GOOD LUCK!!!!