

2528/202
2922/202
ENVIRONMENTAL POLLUTION CONTROL,
HEALTH AND SAFETY
June/July 2019
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

MODULE II

ENVIRONMENTAL POLLUTION CONTROL, HEALTH AND SAFETY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

answer booklet;

non-programmable scientific calculator.

This paper consists of TWO sections: A and B.

Answer ALL the questions in section A and any THREE questions from section B in the answer booklet provided.

Each question in section A carries 4 marks while each question in section B carries 20 marks.

Maximum marks for each part of a question are as shown.

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (40 marks)

Answer ALL questions in this section.

1. Name **four** chemical compounds resulting from atmospheric chemical reactions of nitrogen oxide. (4 marks)
2. State any **four** sources of ammonia in the atmosphere. (4 marks)
3. Outline the process of alkane degradation in the atmosphere. (4 marks)
4. (a) Draw the chemical structure of phenol. (2 marks)
(b) Explain how phenol air pollutants are produced in coal coking operations. (2 marks)
5. Name any **four** sources of organo-sulfur compounds in the atmosphere. (4 marks)
6. State **four** potential causes of explosions in a hazardous waste materials site. (4 marks)
7. State **four** advantages of maintaining adequate lighting in a workplace. (4 marks)
8. State **four** factors to be considered in selecting respiratory protective equipment in a chemical industry. (4 marks)
9. Outline **four** steps taken after an injury of a worker in the workplace. (4 marks)
10. State **four** benefits of designing an ergonomic work environment in an organization. (4 marks)

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) Explain the rapid growth of water hyacinth in lake Victoria. (6 marks)
(b) With the aid of a generalised graph, describe the growth of an aquatic organism in relation to pH. (3 marks)
(c) Explain how each of the following factors affect aquatic life:
 - (i) acidity; (2 marks)
 - (ii) alkalinity; (2 marks)
 - (iii) salinity. (2 marks)



- (d) Figure 1 shows the oxygen sag curve resulting from the addition of oxidizable material to a water stream. Name zone A, B, C, D and E. (5 marks)

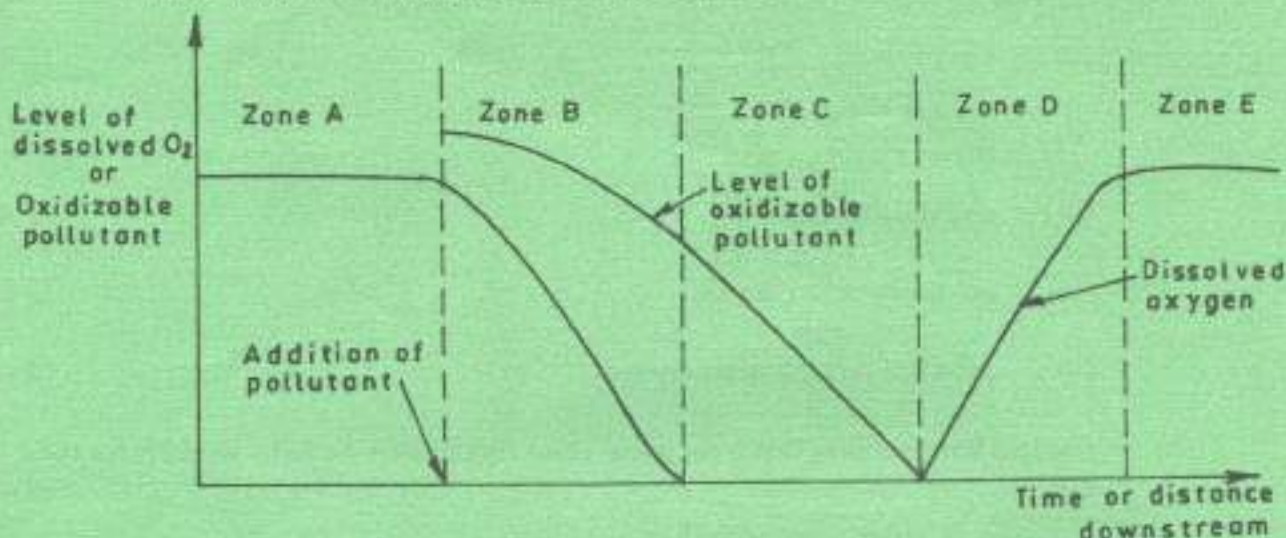


Fig. 1

12. (a) State five primary constituents of effluent from a city sewage system. (5 marks)
- (b) Using a labelled diagram, describe the solids settling pattern of municipal effluent released into an ocean. (9 marks)
- (c) Explain any three measures that can be adopted by a county government to minimize pollution caused by municipal sewage. (6 marks)

13. (a) (i) Define the term 'toxicant'. (2 marks)
- (ii) State any six factors that affect toxicity of a substance. (6 marks)
- (iii) State any four effects of exposure to toxic substances on human reproductive system. (4 marks)
- (b) Describe four main routes through which hazardous substances enter the human body. (8 marks)



14 (a) Explain each of the following prevention and control measures used in the workplace to ensure safety:

(i) elimination; *- replacement of materials* (2 marks)

(ii) substitution; (2 marks)

(iii) engineering controls; (2 marks)

(iv) administrative controls; (2 marks)

(v) personal protective equipment. (2 marks)

(b) Explain five facilities that a chemical plant should provide to its workers for their welfare. *- Sanitary food, shower, first aid, rest area, drinking water* (10 marks)

15 (a) Explain the importance of each of the following activities in monitoring exposure to hazardous substances in a manufacturing industry:

(i) pre-placement medical examination; (3 marks)

(ii) periodic medical examination; (3 marks)

(iii) taking occupational history; (3 marks)

(iv) post sickness examination. (3 marks)

(b) Explain four human factors that can contribute to accidents in a mining industry. *1. Ability of the workers to use the equipment in the mine. 2. Excessive fatigue due to shiftwork - 1100 hrs. shiftwork. 3. 4.* (8 marks)

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13 SEP 2019