

2528/202

2922/202

**ENVIRONMENTAL POLLUTION CONTROL,
HEALTH AND SAFETY**

June/July 2020

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 indicated.

Candidates should answer the questions in English.

This paper consists of 7 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)

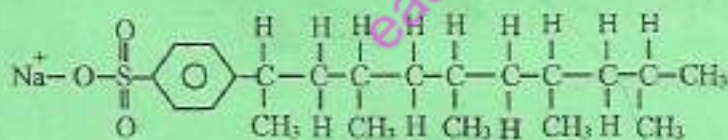
Answer ALL questions in this section.

1. (a) Differentiate between natural source and anthropogenic source of pollution. (2 marks)
- (b) Name two anthropogenic sources of pollution. (2 marks)

2. State four factors which affect chemical reactions of sulphur dioxide in the atmosphere. (4 marks)

3. Write the general structure of each of the following organic compounds:
 - (a) aliphatic alcohols; (1 mark)
 - (b) phenols; (1 mark)
 - (c) ethers; (1 mark)
 - (d) carboxylic acids. (1 mark)

4. State four characteristics of the following compound. (4 marks)



5. Describe two ways of classifying organometallic compounds. (4 marks)

6. Explain the contribution of each of the following disciplines to environmental health:
 - (a) Epidemiology; (2 marks)
 - (b) Ergonomics. (2 marks)

7. Name four ingredients necessary to sustain a combustion process. (4 marks)

8. Differentiate between loss prevention and loss control in safety. (4 marks)
9. State **four** challenges encountered in enforcing health and safety laws in Kenya. (4 marks)
10. State **four** reasons why it is important to ensure safety of the employees in an organization. (4 marks)

SECTION A (60 marks)

Answer any THREE questions from this section.

11. (a) (i) List **four** sources of carbon monoxide in the atmosphere. (4 marks)
- (ii) Describe how carbon monoxide (CO) emission can be controlled in an internal combustion engine. (4 marks)
- (iii) With the aid of chemical equations, explain the removal of atmospheric carbon monoxide to the point of hydroxyl radical regeneration. (6 marks)
- (b) (i) Outline the process of acid rain formation. (3 marks)
- (ii) State **three** effects of acid rain on the environment. (3 marks)
12. (a) Describe biogenic hydrocarbons. (2 marks)
- (b) Match the chemical structure of terpenes with their correct name as shown in table 1. (6 marks)

Table 1

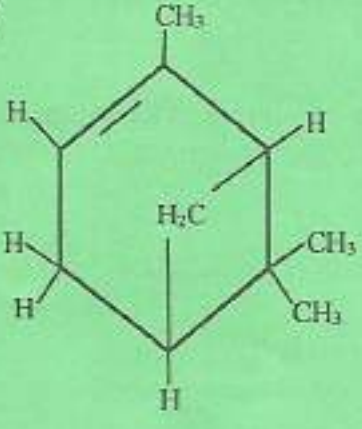
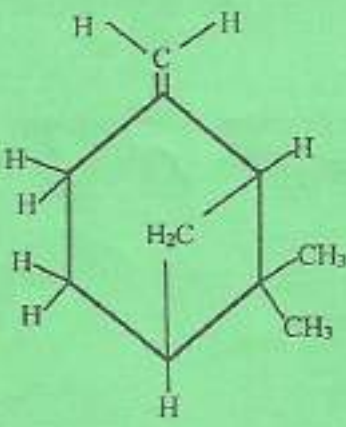
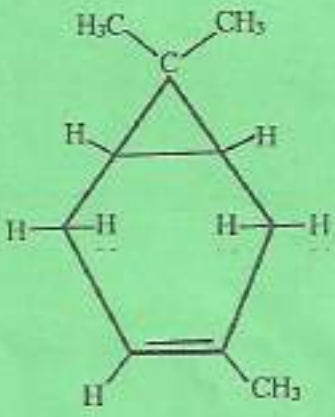
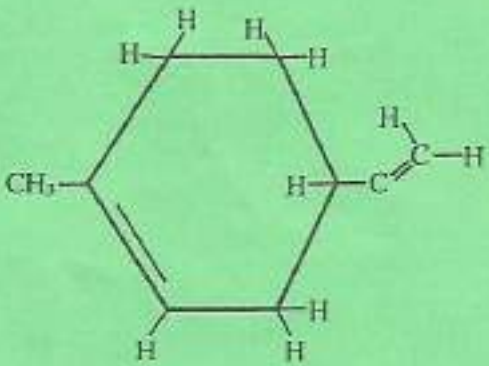
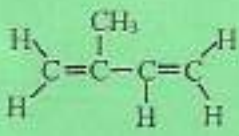
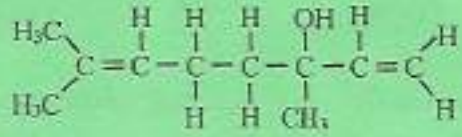
Chemical structure	Name
<p>(i)</p>  <p>Isoprene</p>	Isoprene
<p>(ii)</p>  <p>Δ^3 - Carene</p>	Δ^3 - Carene
<p>(iii)</p>  <p>α - Pinene</p>	α - Pinene

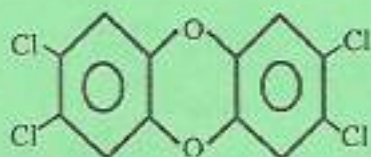
Table 1 (Continued)

<p>(iv)</p> 	<p>Linalool</p>
<p>(v)</p> 	<p>Limonene</p>
<p>(vi)</p> 	<p>B-Pinene</p>

(c) Describe **four** characteristics of each of the following atmospheric pollutants:

(i) perfluorocarbons; (4 marks)

(ii)



(4 marks)

(d) Name **four** types of organonitrogen atmospheric pollutants. (4 marks)

13. (a) Explain **five** safety provisions that ensures the welfare of employees in an organisation. (10 marks)

(b) Outline **five** steps taken by industrial worker in the event of an hazardous chemical spill in a factory. (5 marks)

(c) Name **five** contents of a label on a chemical container. (5 marks)

14. (a) Outline **eight** steps taken in the event of an accident in the workplace. (8 marks)

(b) Explain each of the following considerations observed while conducting safety audits in a chemical processing facility:

(i) workplace analysis; (2 marks)

(ii) administrative controls; (2 marks)

(iii) personal protective equipment. (2 marks)

(c) Describe the roles of each of the following professionals in occupational safety and health activities:

(i) risk manager; (2 marks)

(ii) safety engineer; (2 marks)

(iii) safety manager. (2 marks)

15. (a) Explain five roles of an environmental officer in controlling exposure to hazardous chemicals in a factory. (10 marks)
- (b) Describe five responsibilities of a worker in ensuring safety in a processing facility. (10 marks)

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