

SCOB
S.4 CHEMISTRY PAPER TWO

TIME: 2 HOURS

INSTRUCTIONS:

- This paper consists of two sections A and B.
- Answer all questions
- Use relevant equations where applicable.

SECTION A

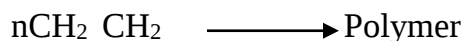
1. a) Explain what is meant by the term polymerisation. (1 mk)

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- b) Ethene undergoes polymerisation according to the equation. (1 mk)



- i) Name the polymer (1 mk)

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- ii) Draw the structure of the polymer (1 mk)

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- iii) State the conditions under which this reaction occurs. (1 mk)

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- iv) State one use of polymer X (1 mk)

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2. A hydrocarbon R consists of 85.95% carbon and has a vapour density of 35gcm^{-3} .

- a) Calculate the empirical formula of R (C = 12, H = 1) (1 ½ mks)

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- b) Determine the molecular formula of R (1 ½ mks)

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- c) Calculate the volume of carbondioxide (in cm^3) formed when 14g of R was completely burnt at room temperature (1 mole of a gas at room temperature occupies 24dm^3) (2 mks)
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3. a) Explain what is meant by each of the following

- i) Thermosoftening plastics (1 mk)
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- ii) Thermosetting plastics. (1 mk)
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- b) Give one example of each of the plastics in (a) above. (1 mk)
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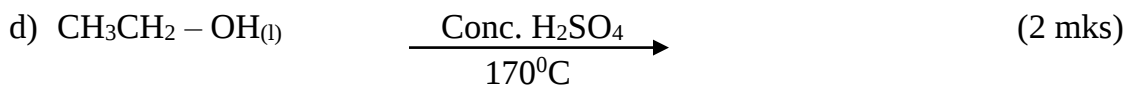
- c) State one disadvantage of large scale use of plastics. (1 mk)
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4. Write the structural formula and name of the main organic products in each of the following reactions.

- a) $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \longrightarrow$ (1 mk)

- b) $\text{CH}_2 = \text{CH}_2(\text{g}) + \text{Br}_2(\text{g}) \longrightarrow$ (1 mk)

- c) $\text{CH}_2 = \text{CH}_2(\text{g}) + \text{H}_2(\text{g}) \longrightarrow$ (1 mk)



5. Molasses contain sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ which is converted to ethanol by catalytic reaction involving two enzymes produced by yeast.

a) i) Name the reaction in which the enzymes of yeast convert sucrose to ethanol (1 mk)

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ii) Name two enzymes produced by yeast which are involved in this reaction.

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iii) Name one by-product of the process in (a) (i) above. (1 mk)

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b) Name the process by which ethanol can be concentrated. (1 mk)

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6. a) Give the similarity in the structure of a soap and a detergent molecule. (1 mk)

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b) Most detergents produced today are biodegradable.

i) Explain what is meant by term biodegradable? (1 mk)

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ii) Why is it necessary that detergents should be biodegradable? (1 mk)

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c) i) What happens when soap is dissolved in water containing calcium ions in solution? (1 mk)

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ii) Give the name of one calcium compound commonly found in solution of natural waters. (1 mk)

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7. An organic compound has a molecular formula C_4H_8 .

a) Identify the class of compound to which this compound belongs. (1 mk)

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b) i) Give any three structural formulae of the compound which can be represented by the above molecular formula. (1 ½ mks)

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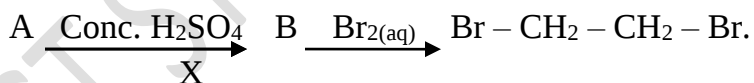
ii) Give the systematic names of the compounds in (b) (i). (1 ½ mks)

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c) Write the equation of reaction of one of the compounds in above with bromine (1 mk)

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8. Consider the reaction scheme.



a) Name substances. (½ mk)

i) A

ii) B

b) Identify conditions of reaction X. (1 mk)

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c) State what is observed if B is reacted with

i) $\text{Br}_2(\text{aq})$ (1 mk)

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ii) Alkaline potassium manganate (VII) (1 mk)

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d) Write an equation of reaction between B and hydrogen gas in presence of Nickel at 150°C . (1 mk)

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9. a) Distinguish between temporary and permanent hard water. (1 mk)

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b) Ordinary soap forms scum with the above water in (a). What is scum? (1 mk)

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c) Name one

i) Physical method used for removal of both types of hardness. (1 mk)

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ii) Chemical method used for removal of both types of hardness. (1 mk)

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d) Give

i) advantage of hard water ($\frac{1}{2}$ mk)

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ii) disadvantages of hard water ($\frac{1}{2}$ mk)

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10. The following are hydrocarbons with two carbon atoms.

A	B	C
C_2H_6	C_2H_4	C_2H_2

- a) i) Name each of the hydrocarbons. (1 ½ mks)

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- ii) Write each of the structural formulae of each of the hydro carbon. (1 ½ mks)

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SECTION B

11. a) Alkanes and alkenes are hydro carbons.

- i) Define the term hydro carbons. (1 mk)
ii) State the structural difference between alkanes and alkenes. (1 mk)

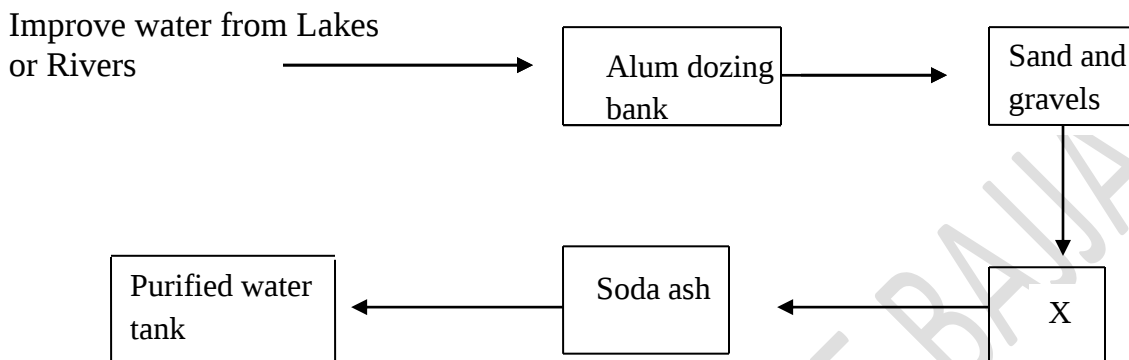
- b) The boiling points of strait chain alkanes having two to seven carbon atoms are shown in the table below.

Number of Carbon	2	3	5	6	7
Boiling point (°C)	-79	-42	37	69	98

- i) Plot a graph of boiling point against the number of carbon atoms. (4 mks)
ii) From the graph, determine the boiling point of the alkane with four carbon atoms (1 mk)
c) i) What is the shape of your graph? (1 mk)
ii) State the relationship between the boiling point of an alkane and the number of carbon atoms in the alkane. (1 mk)
d) i) Name one reagent other than bromine that can be used to distinguish between ethane and ethene. (1 mk)
ii) State what would be observed if the reagent you have named in (d) (i) was separately treated with ethane and ethene. (2 mks)
12. a) What is meant by the term water pollution? (2 mks)
b) i) Name two substances that can cause water pollution. (1 mk)

- ii) Describe how each of the substances you have named in (b) (i) above can cause water pollution. (3 mks)

c) The following diagram below shows the general scheme used in water purification.



- i) State the purpose of the alum dozing and the sand and gravels. (2 mks)
- ii) Identify X and state its purpose. (2 mks)
- iii) State the role of soda ash. (2 mks)
- iv) Write equations to show the role of soda ash. (3 mks)
13. a) State the difference between fats and oils. (1 mk)
- b) Fats and oils can be used to make soap.
- i) Define the term soap. (2 mk)
- ii) Name atleast one other raw materials apart from oils and fats that can be used to make soap. (1 mk)
- c) Briefly describe how soap can be prepared. (4 mks)
- d) Under suitable laboratory conditions, ethene can be converted to a compound with the general formula, $(H_2C - CH_2)_n$ (1 mk)
- i) What is the change from ethene to $(H_2C - CH_2)_n$? (1 mk)
- ii) What name is given to compound $(H_2C - CH_2)_n$? (1 mk)
- iii) Write an equation for the reaction leading to the formation of $(H_2C - CH_2)_n$ (1 mk)
- iv) State the possible use of $(H_2C - CH_2)_n$ (1 mk)
- e) Name one other compound of the category of $(H_2C - CH_2)_n$ in which is not man made. (1 mk)
14. a) i) Describe how you would obtain a sample of sugar crystals from sugar cane. (7 ½ mks)
- ii) State two uses of sugar in the world of the sick. (2 mks)

- b) Concentrated sulphuric acid was added to sugar. (½ mk)
i) What was observed? (½ mk)
ii) What name is given to this process? (½ mk)
iv) How would you convert sugar to alcohol (ethanol)? (½ mk)
- c) A mass of 3.10g of an organic compound that contains carbon, hydrogen and oxygen atoms only, produced 4.40g of carbondioxide and 2.70g of water on complete combustion.

Calculate the emprical formula of the organic compound. (03 mks)

(C = 12, O = 16, H = 1)

DO NOT RELAX, THE STRUGGLE CONTINUES
TR. NZAI GEORGE
END