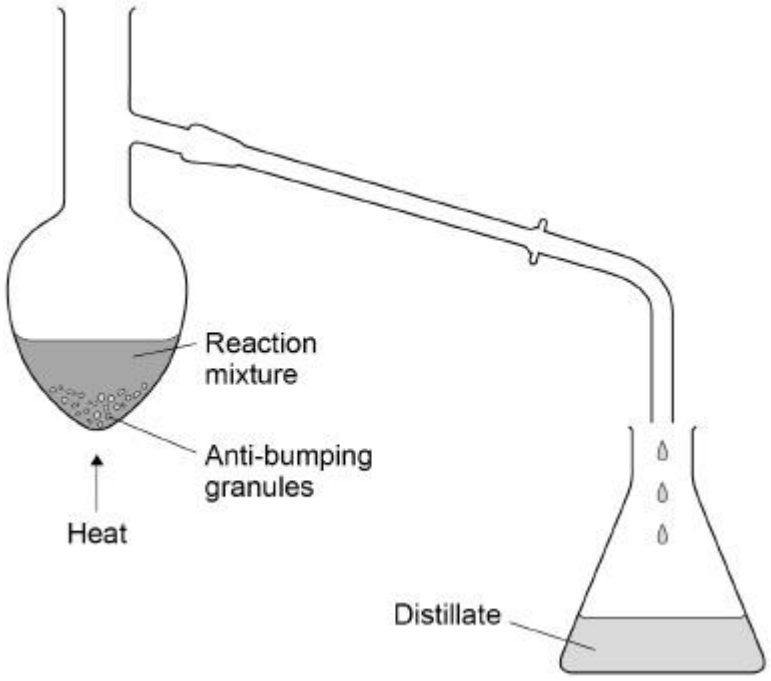
Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

A student prepared cyclohexene by heating cyclohexanol with concentrated phosphoric acid. The cyclohexene produced was distilled off from the reaction mixture.

(a) Complete the diagram of the apparatus used to distil the cyclohexene from the reaction mixture at 83 °C.



(2)

(b) The distillate was shaken with saturated sodium chloride solution. The cyclohexene was separated from the aqueous solution using a separating funnel.

State why cyclohexene can be separated from the aqueous solution using the separating funnel.

_____

_____

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(1)

(c) The cyclohexene separated in part **(b)** was obtained as a cloudy liquid.
The student dried this cyclohexene by adding a few lumps of anhydrous calcium chloride and allowing the mixture to stand.

Give **one** observation that the student made to confirm that the cyclohexene was dry.

_____

_____

(1)

(d) In this preparation, the student added an excess of concentrated phosphoric acid to 14.4 g of cyclohexanol (M_r = 100.0).
The student obtained 4.15 cm^3 of cyclohexene (M_r = 82.0).
Density of cyclohexene = 0.810 g cm^{-3}

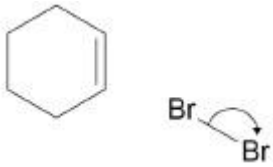
Calculate the percentage yield of cyclohexene obtained.
Give your answer to the appropriate number of significant figures.

% yield _____

(5)

(e) Cyclohexene reacts with bromine.

Complete the mechanism for this reaction.



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(3)
(Total 12 marks)

Q2.

The outer layers of some golf balls are made from a polymer called polyisoprene.
The isoprene monomer is a non-cyclic branched hydrocarbon that contains 88.2 % carbon by mass.
The empirical formula of isoprene is the same as its molecular formula.

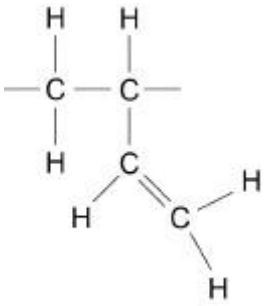
(a) Deduce the molecular formula of isoprene and suggest a possible structure.

Molecular formula _____

Structure

(4)

(b) The insides of some golf balls are made from a mixture of three other polymers.
The repeating unit for one of these polymers is shown.



Draw the skeletal formula of the monomer used to make this polymer.

Give the IUPAC name of the monomer.

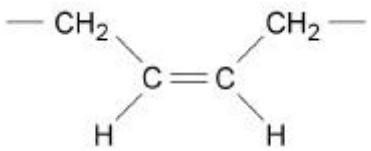
Skeletal formula of monomer

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IUPAC name _____

(2)

(c) A second polymer in the mixture has a repeating unit with the structure shown.



The third polymer in the mixture is a stereoisomer of this polymer.

Draw the structure of the repeating unit of the third polymer.

Give a reason why this type of stereoisomerism arises.

Repeating unit

Reason _____

_____

_____

(2)

(d) Golf balls recovered from lakes and ponds can be used again even after being in water for several years.

Explain why these golf balls do not biodegrade.

_____

_____

_____

(1)

(Total 9 marks)

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