

O Level Combined Chemistry Structured

Organic Chemistry Test 5.0

Q1

Ethanol can be produced from sugar.

- (a)(i) Describe the process to produce ethanol from sugar. [3]

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.....
.....
.....
.....

The temperature of the process used to produce ethanol from sugar is monitored. Figure 10.1 shows the temperature readings taken in the first three days of the process.



Figure 10.1

- (ii) State and explain whether the process to produce ethanol from sugar is an exothermic or endothermic reaction. [2]

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.....
.....

- (iii) Explain whether the temperature recorded will ever reach 50°C. [1]

.....
.....

(b) When the ethanol produced in (a) is exposed to air, the taste of the ethanol turned sour.

(i) Explain with appropriate equation why the ethanol turned sour when exposed to air. [2]

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.....
.....
.....

(ii) Suggest a chemical that can used in the laboratory to achieve the same effect observed in (b)(i). Describe the observation that will be made when this chemical is added to ethanol. [2]

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Q2

(a) State why ethene can be made into a polymer but ethane cannot.

.....
.....

[1]

(b) Describe what happens when ethene molecules undergo polymerization.

.....
.....

[1]

(c) Fig. 7.1 shows the structural formula of part of an addition polymer.

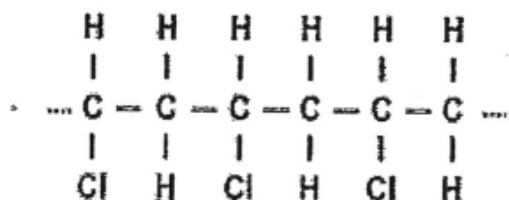


Fig. 7.1

Draw the structural formula of the monomer from which this polymer is made. [1]

(d) This polymer is **non-biodegradable**. Explain the meaning of the term in bold and hence, describe the problems which the objects made of this polymer can cause.

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.....
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[2]

Q3

The hydrocarbon, $C_{10}H_{22}$, is present in crude oil. Fig.11.1 shows some of the products that can be obtained from this hydrocarbon.

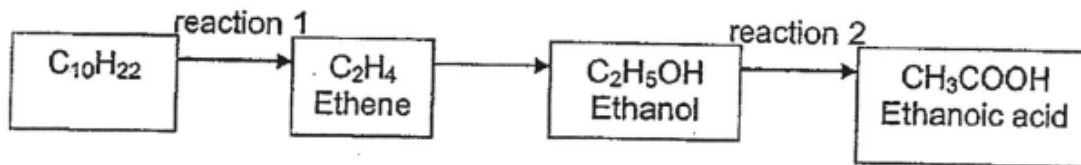


Fig. 11.1

- (a) Name the reagent necessary for reaction 2 to occur.

..... [1]

- (b) Reaction 1 is an example of cracking. Besides C_2H_4 , another hydrocarbon, T and a gas, U, which extinguishes a lighted splint with a pop sound, are also produced.

Identify the hydrocarbon T and gas U and write your answers in Fig. 11.2.

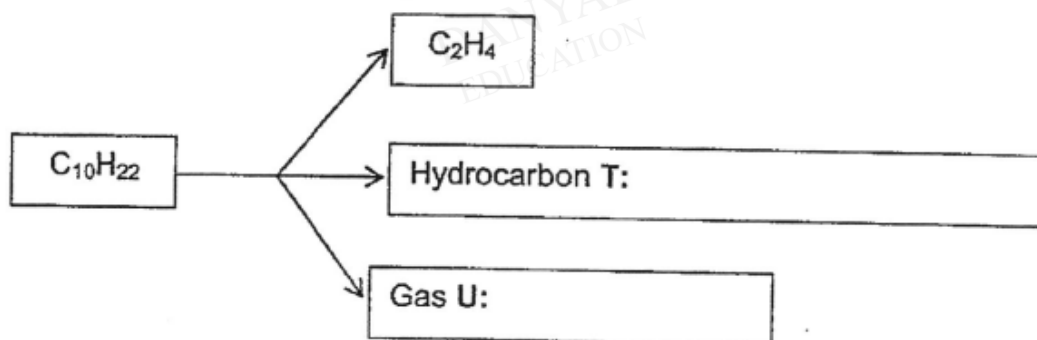


Fig. 11.2

[2]

- (c) Describe a chemical test to distinguish between C_2H_4 and C_2H_6 .

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.....

[2]

- (d) A solution of ethanol can be made by fermentation of glucose. Describe how this process is carried out in the laboratory, stating all the essential reagents and conditions.

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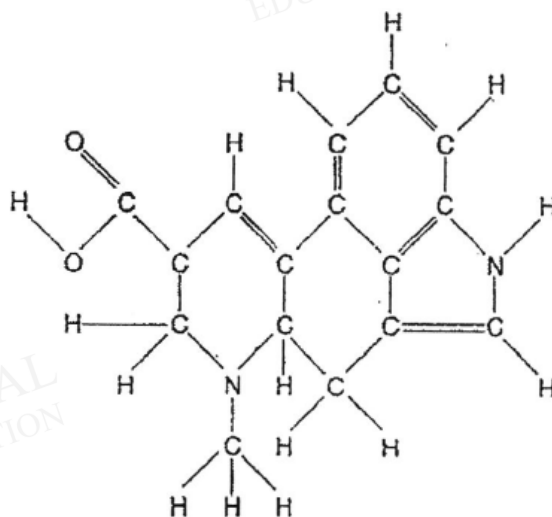
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[5]

Q4

The diagram below shows the structural formula of a drug called LSD. (Lysergic acid diethylamide)



- (a) What is the molecular formula of LSD?

..... [1]

- (b) What would be observed if aqueous bromine is added to LSD?

..... [1]

- (c) LSD is acidic. Circle the part of the drug that indicates that it is acidic.

[1]

Q5

Ethanol can be manufactured from sugar cane.

- (a) Describe how glucose from sugar cane can be converted into ethanol by the process of fermentation.

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.....
.....
..... [3]

- (b) (i) Explain why the yield of ethanol produced is around 15%.

.....
..... [1]

- (ii) Suggest a method to obtain pure ethanol to be used as a fuel.

..... [1]

- (c) Ethanol can also be oxidised in the laboratory to produce ethanoic acid. Describe how this can be done in the laboratory.

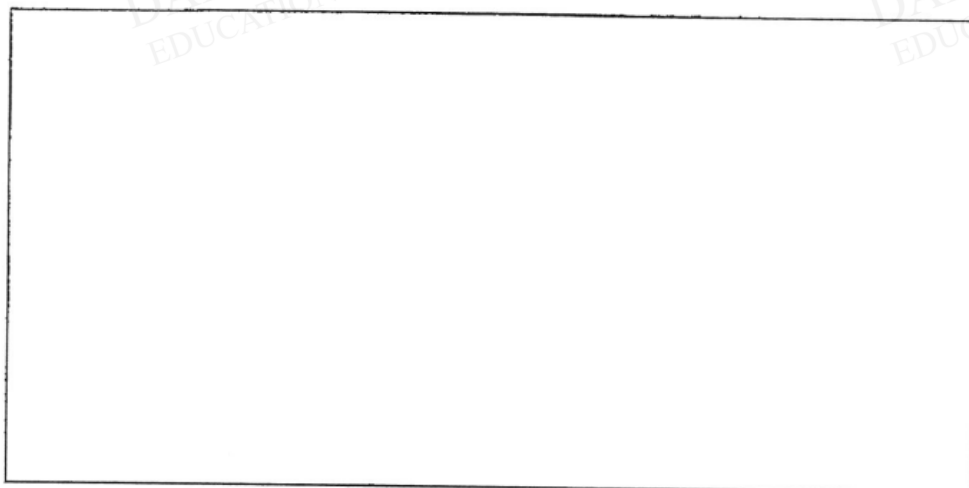
.....
.....
..... [2]

- (d) Write a balanced chemical equation, including state symbols for this reaction.

..... [2]

- (e) Draw the full structural formula of ethanoic acid.

[1]



Answers

Organic Chemistry Test 5.0

Q1

- (a)(i) Describe the process to produce ethanol from sugar. [3]

Sugar and yeast are added into a container to carry out fermentation. [1]

The process is carried out 37 °C in the absence of air. [1]

The ethanol formed is then separated from the mixture using fractional distillation. [1]

- (ii) State and explain whether the process to produce ethanol from sugar is an exothermic or endothermic reaction. [2]

Exothermic reaction [1]

The temperature increases during the fermentation process. [1]

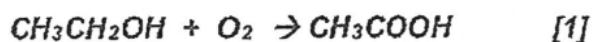
- (iii) Explain whether the temperature recorded will ever reach 50°C. [1]

No. This is because the yeast would be denatured at temperature above 40°C and the fermentation process would have stopped.

- (b) When the ethanol produced in (a) is exposed to air, the taste of the ethanol turned sour.

- (i) Explain with appropriate equation why the ethanol turned sour when exposed to air. [2]

The ethanol produced would be oxidised by the oxygen in the air. [1]

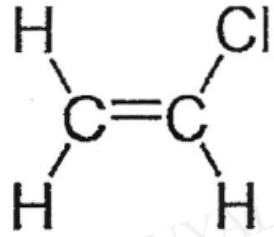


- (ii) Suggest a chemical that can be used in the laboratory to achieve the same effect observed in (b)(i). Describe the observation that will be made when this chemical is added to ethanol. [2]

Acidified KMnO₄ [1]

It will turn from purple to colourless [1]

Q2

a	Ethene has c=c double bond (unsaturated) but ethane has c-c single bonds (saturated).
b	Thousands of ethene molecules join together by breaking the c=c to form a long chain macromolecule polyethene.
c	
d	It is not able to decompose by microorganisms in the soil naturally. Discarded plastic objects will lead to land pollution as they are non-biodegradable and if they are burnt they will produce harmful gases that can harm the environment.

Q3

a	Acidified potassium manganate (VII) or oxygen in the air
b	T: C_8H_{16} and H_2
c	Bromine solution decolourises in the presence of C_2H_4 . Bromine solution remains reddish brown in the presence of C_2H_6 .
d	Mix glucose solution and yeast in a conical flask. Maintain the reaction at the temperature of $37^\circ C$ as yeast works best at this temperature. Yeast catalyses the breakdown of glucose to ethanol. Carbon dioxide is formed in this reaction. The ethanol is then extracted from the liquid mixture by fractional distillation. If chemical equation is given – 1m

Q4

(a)	$C_{16}H_{15}O_2N_2$
(b)	Reddish brown aqueous bromine will turn colourless .
(c)	-COOH circled.

Q5

(a)	Add yeast (1) to the sugar solution at 37°C (1), in the absence of oxygen. (1)
(bi)	Yeast will denatured when the concentration is too high.
(bii)	Fractional distillation
(c)	Heat a mixture of ethanol with acidified potassium manganate (VII).(1) The purple solution will turn colourless to show that oxidation has taken place. (1)
(d)	$C_2H_5OH (aq) + 2[O] \rightarrow CH_3COOH (aq) + H_2O (l)$ 1m eqn, 1m ss
(e)	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C} \\ \quad // \\ \text{H} \quad \text{O} \\ \quad \quad \\ \quad \quad \text{O}-\text{H} \end{array}$

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