***O LEVEL CHEMISTRY 5070* ALCOHOLS AND CARBOXYLIC ACIDS**

***WORKSHEET 1***

1. **The alcohols form an homologous series.**
2. Give three characteristics of an homologous series.

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………[3]

1. The following two alcohols are members of an homologous series and they are isomers



1. Explain why they are isomers.

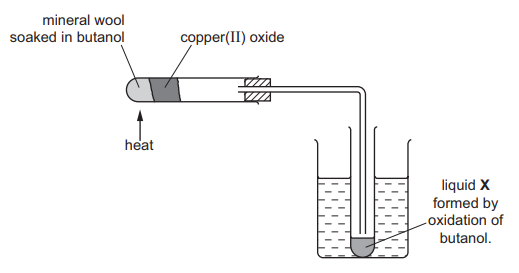
………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..[2]

1. Deduce the structural formula of another alcohol which is also an isomer of these

alcohols.

[2]

* 1. Copper(II) oxide can oxidise butanol to liquid X, whose pH is 4.



* 1. Give the name of another reagent which can oxidise butanol.

…………………………………………………………………………………………… [1]

* 1. Which homologous series does liquid X belong to?

……………………………………………………………………………………………………[1]

* 1. State the formula of liquid X.

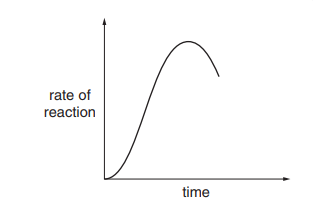
……………………………………………………………………………………………… [1]

* 1. The alcohol ethanol can be made by fermentation. Yeast is added to aqueous glucose.

C6H12O6(aq) → 2C2H5OH(aq) + 2CO2(g)

Carbon dioxide is given off and the mixture becomes warm, as the reaction is exothermic.

The graph shows how the rate of reaction varies over several days.



* 1. Suggest a method of measuring the rate of this reaction.

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..[4]

* 1. Why does the rate initially increase?

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

* 1. Suggest two reasons why the rate eventually decreases

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………[2]

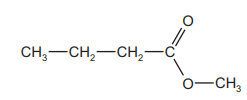
1. **Esters, polyesters and fats all contain the ester linkage.**

Esters can be made from alcohols and carboxylic acids. For example, the ester ethyl ethanoate can be made by the following reaction.



[1]

1. Name the carboxylic acid and the alcohol from which the following ester could be made.



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

1. 6.0 g of ethanoic acid, *M*r = 60, was reacted with 5.5 g of ethanol, *M*r = 46.

Determine which is the limiting reagent and the maximum yield of ethyl ethanoate, *M*r = 88.

1. number of moles of ethanoic acid = .............................................................................. [1]
2. number of moles of ethanol = ....................................................................................... [1]
3. the limiting reagent is .................................................................................................... [1]
4. number of moles of ethyl ethanoate formed = .............................................................. [1]
5. maximum yield of ethyl ethanoate = ............................................................................. [1]
6. The following two monomers can form a polyester

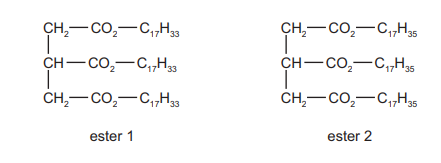


[2]

1. Draw the structural formula of this polyester. Include two ester linkages.

Fats and vegetable oils are esters. The formulae of two examples of natural esters are given

below.



1. Identify which ester is unsaturated?

……………………………………………………………………………………………………………………………[1]

1. Describe a test to distinguish between them.

test ......................................................................................................................................

result with unsaturated ester ..............................................................................................

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

result with saturated ester ..................................................................................................

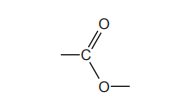
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1. Both esters are hydrolysed by boiling with aqueous sodium hydroxide.

What types of compound are formed?

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

1. **The ester linkage showing all the bonds is drawn as**



or more simply it can be written as –COO–.

1. Give the structural formula of the ester ethyl ethanoate

[2]

1. Deduce the name of the ester formed from methanoic acid and butanol.

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

1. Which group of naturally occurring compounds contains the ester linkage?

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

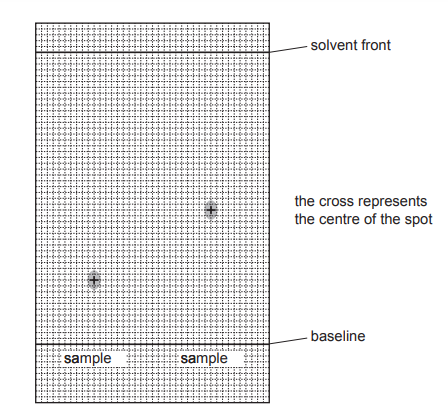
1. Draw the structural formula of the polyester formed from the following monomers.

HOOCC6H4COOH and HOCH2CH2OH

You are advised to use the simpler form of the ester linkage.

[2]

1. Esters can be used as solvents in chromatography. The following shows a chromatogram of plant acids.



An ester was used as the solvent and the chromatogram was sprayed with bromothymol

blue.

1. Suggest why it was necessary to spray the chromatogram.

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

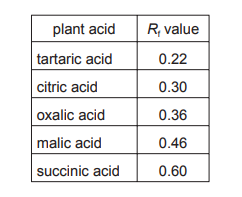
1. Explain what is meant by the *R*f value of a sample.

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

1. Calculate the *R*f values of the two samples and use the data in the table to identify

the plant acids



Sample 1 …………………….Rf value ………………. Its …………………….acid

Sample 2 ……………………Rf value…………………its……………………..acid