Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Alcohols

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Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

An engineer was trying to develop a new fuel for a motorboat by blending mixtures of different alcohols in order to find out which mixture released the most energy when used in the engine.

The engineer had a number of alcohols in unlabelled bottles. It was decided to identify the alcohols by determining their enthalpies of combustion and comparing these values with those from a data book.

(a) Outline a simple practical experiment that the engineer could use, including the measurements to be taken, in order to determine the enthalpy of combustion for one of the unknown alcohols. You do **not** need to include details of any calculations.

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(5)

(b) Other than heat loss to the surroundings, identify **two** major sources of error in the experiment. Do **not** refer to the precision of the equipment.

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(2)

(c) The engineer found that the experimental values for the enthalpies of combustion of butan-1-ol and methylpropan-2-ol were very similar and so these values could not be used to distinguish between the two alcohols.

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Identify a reagent that the engineer could use to distinguish between these two alcohols. Give the observation in each case.

Reagent _____

_____

Butan-1-ol _____

_____

Methylpropan-2-ol _____

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(3)

(d) The filter in the air intake for the engine in the motorboat may become partially blocked by dust and debris.

Explain with the aid of an equation why combustion of methylpropan-2-ol under these circumstances would be of economic and environmental concern to the engineer.

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(3)

(Total 13 marks)

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Q2.

A Grignard reagent is a compound in which magnesium is bonded to an alkyl group (R) and a halogen (X). It can be represented by the formula RMgX.

A Grignard reagent is formed by the reaction of magnesium metal with a haloalkane using dry ethoxyethane as a solvent. Ethoxyethane has a boiling point of 35 ºC, forms a dense vapour and is highly flammable.

(a) Give **one** reason why a hot water bath is used rather than direct heating with a Bunsen burner when preparing the Grignard reagent.

_____

(1)

(b) Grignard reagents react with water.

Suggest **one** reason why the ethoxyethane protects the Grignard reagent from reacting with water vapour in the air.

_____

(1)

(c) A Grignard reagent can be used to introduce an extra carbon atom into an organic molecule. For example, propanone (CH_3COCH_3) reacts with CH_3MgBr in a two-stage process to form 2-methylpropan-2-ol, $(CH_3)_3COH$. The isomer 2-methylpropan-1-ol is not formed in this process.

Suggest a suitable reagent and the associated observations that could be used to distinguish between 2-methylpropan-2-ol and its isomer 2-methylpropan-1-ol.

Reagent _____

Observation with 2-methylpropan-2-ol _____

_____

Observation with 2-methylpropan-1-ol _____

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(3)

(d) At the end of the preparation of the alcohol, the bromine from the Grignard reagent remains as the bromide ion.
Suggest reagents and observations to confirm that this halide ion is Br^- and not I^-

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(4)

(Total 9 marks)

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