KAMPALA SECONDARY SCHOOL

DEPARTMENT OF CHEMISTRY 2025

A LEVEL CHEMISTRY

TERM TWO

SENIOR FIVE

TOPIC: ORGANIC CHEMISTRY ONE

SUB TOPIC: INTRODUCTION TO ORGANIC COMPOUNDS

COMPETENCY: The learner analyses the structures, functional groups and reactivity of organic compounds and applies knowledge of organic reactions and organic reaction mechanisms to synthesize organic molecules

DURATION: 1 HOUR 20 MINUTES

SCENARIO

A petrochemical company was given the following orders by different clients;

i. A small scale soap manufacturer who needs propene to make a disinfectant.
ii. A small group of tourists who need a fuel that has a lowest boiling point to use to make fire in their camp meetings.
iii. A community group that needs ethane to make light weight plastics

An industrial operator decided to use a hydro carbon P to produce the ethene and propene. When P was heated in excess oxygen it gave 4 moles of carbon dioxide and 5 moles of water. However, when P was heated in a combustion cylinder in absence of oxygen at 435℃ it gave ethene, propene he wanted but the ethene and propene were mixed with traces of unknown compounds Q and R. He decided to mix compound R with little amounts of chlorine in presence of sunlight he obtained a new compound K

The available compounds to choose the fuel are as below;

Hexane

Heptane

2-Methyl hexane

Octane

2,2,4-trimethylpentane

2,3-dimethylbutane

2,2-dimethylbutane

TASK

a) Using your knowledge based on carbon to carbon arrangements write the structures for the suggested compounds and arrange them beginning with the one with highest to lowest melting point and select a compound he will choose as fuel. Clearly explain why is the order is as suggested by you
b) Using your knowledge based on equations;

i. Determine the molecular formula of hydro carbon P and write its condensed formula
ii. Using the condensed structure of P, the products (ethene, propene and R) write and equation and use it to predict the formulae for Q and R, explain using mechanisms how Q and R can be obtained.
iii. Based on equation and explanations based on mechanisms show how compound R can react with chlorine to form compound K
iv. Select from the following reagents and write equations showing how compounds Q and R can be prepared (show the relevant conditions)

Ethanoic acid, solid sodium hydroxide, solid calcium oxide ethanol, compound
Concentrated hydrochloric acid, zinc, ethanol, copper.

END