# **REPUBLIC OF RWANDA 30/6/2020**

# **MAX:70MARKS**

# **MINISTRY OF EDUCATION**

**ES KANOMBE/EFOTEC**

**Class:** **S5(All)**

**CHEMISTRY HOMOWORK**

**COMBINATIONS: MATHEMATICS-CHEMISTRY-BIOLOGY: MCB**

**PHYSICS-CHEMISTRY-MATHEMATICS: PCM**

**PHYSICS-CHEMISTRY-BIOLOGY: PCB**

**INSTRUCTIONS:**

Attempt **all** questions.

**PART I: MULTIPLE CHOICE QUESTIONS /20MARKS**

**Select the correct answer:**

1) Which of the following acids will show high reactivity towards alkenes.  **2marks**

i) HCl

ii) HBr

iii) HI

iv) HF

2) In which of the following alkenes will show geometrical isomerism **2marks**

i) Propene

ii) But-2-ene

iii) But-1-ene

iv) 2, 3-dimethyl but-2-ene

3) Choose the halogen whose least reactivity towards alkanes. **2marks**

i) F2

ii) Cl2

iii) Br2

iv) I2

4) The boiling points of trans-alkenes are low compared with its cis-alkenes because of: **2marks**

i) Trans alkenes are polar.

ii) Trans-alkenes are unsaturated hydrocarbons.

iii) Trans-alkenes are non-terminal alkenes.

iv) Trans-alkenes have weak induced dipole interactions.

5) Alkynes have lower affinity towards electrophilic addition reactions than alkenes because:

**2marks**

i) they have two π-bonds.

ii) they are hydrocarbons.

iii)they are isomers.

iv) they are oleifins

6) The mechanism of the reaction between ethyne and hydrogen bromide is:  **2marks**

i) Electrophilic addition

ii) Electrophilic substitution

iii) Nucleophilic addition

iv) Nucleophilic substitution

7) What is the number of moles of oxygen required for the complete combustion of one mole of butane?  **2marks**

i) 7 ii) 6.5 iii) 6 iv) 5.5

8) 1.4g of an alkene gives 3.8g of dichloroalkane on reaction with chlorine. Which one of the following is the molecular formula of the alkene? **2marks**

i) C3H6 ii) C4H8 iii) C6H12 iv) C2H4.

9) An organic compound X contains carbon, hydrogen and oxygen only. When 1.29g of X is bunrnt completely, 3.30g of carbon dioxide and 1.35g of water are formed. Which one of the following is the empirical formula of X? **2marks**

i) C2H6O ii) CH2O iii) C5H10O iv) C4H8O

10) Markovnikov’s rule is applied in:  **2marks**

i) Radical substitution reaction

ii) Elimination reaction

iii) Electrophilic addition reaction

iv) Electrophilic substitution reaction

**PART II: OPEN QUESTIOS / 50MARKS**

11. a. Alkane C has a relative molecular mass of 170g/mol and occurs in the kerosene fraction obtained by the fractional distillation of petroleum. ( atomic masses: C=12, H=1)

i) Write the general formula for the homologous series of alkanes.  **2marks**

Answer: ……………………………………………………………………………………………………………………………………………………………………………………………………………

ii) Explain the term homologous series. **2marks**

Answer: ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

iii) Deduce the molecular formula of alkane C. **2marks**

Answer: …………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..............................................................................

b. Three hydrocarbons, D, E and F, all have the molecular formula C6H12. D decolorizes an aqueous solution of bromine and shows geometrical isomerism, E also decolorizes an aqueous solution of bromine but does not shows the geometrical isomerism and F does not decolorizes an aqueous solution of bromine. Draw one possible structure of each for D, E and F. **6marks** Answer: ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….................................

c. Cyclohexene may be prepared by the following:



i. Name or give the formulae of the reagents A and B. **2marks** ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii. Suggest the names of the substance X and Y. **2marks** ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

iii. Propose the type of reaction from X to Y and Y to cyclohexene. **2marks** ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

12.

a. Alkenes react with bromine according to the following equation:



2.8g of an alkene X reacted completely with 4.0g of bromine. (Atomic masses are: C=12, H=1, Br= 80)

(i) Determine the number of moles of X that reacted with bromine.  **2marks**

Answer:

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(ii) Calculate the molecular mass of X. **3marks**

Answer:

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(iii) Determine the molecular formula of X. **4marks**

Answer:

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(iv) Write the structural formulae of all possible isomers of X.  **3marks**

Answer:

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b. Ozonolysis of X gave only one product. Identify X. **2marks**

Answer:

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c. Write the mechanism of the reaction between X and water in the presence of sulphuric acid.

**3marks**

Answer:

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13. The scheme below shows a number of reactions starting with 2-bromopropane A.



a) State the reagent and the type of reaction for converting A into B. **2marks**

Answer: …………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

b) Give the structural formula of compound D. **1mark**

Answer: ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

c) Give the reagent and condition for converting B into C. **2marks**

**Answer:** ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

d) Outline the mechanism for the reaction in which A is converted into B. **5marks**

**Answer:**

14. Crude oil is the major source of hydrocarbons. They are obtained by Fractional distillation, while the use of petroleum products is of major benefit to mankind there are many environmental problems caused by the spillage and combustion of hydrocarbons. Discuss the environmental problems associated with the combustion of hydrocarbons.  **5marks**

Answer:

**GOOD LUCK!!!**