

CHEMISTRY PRELIM REVIEW II

08 OCTOBER 2013

Lesson Description

In this lesson, we:

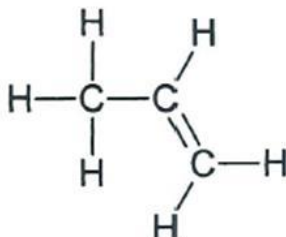
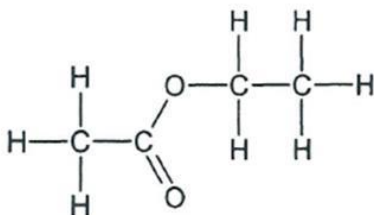
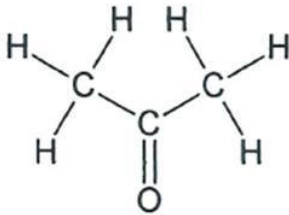
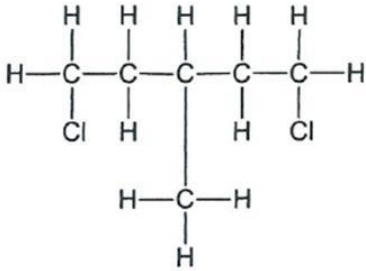
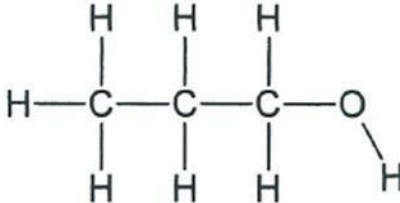
- Review some questions from the 2013 GDE and EC Chemistry Preparatory exams.

Questions

Question 1

(Adapted from Sep 2013, GDE, Paper 2, Question 3)

Consider the organic compounds represented by the letters A to G below:

Propanoic acid		$\text{CH}_3\text{CH}_2\text{CHO}$
A	B	C
		
D	E	
		
F	G	

1.1. Write down the following:

- 1.1.1. Structural formula of the functional group of compound **A** (1)
- 1.1.2. General formulae of the homologous series to which compound **B** belongs (1)
- 1.1.3. Name the homologous series to which compound **D** belongs (1)
- 1.1.4. IUPAC name of compound **F** (2)

1.2. Two of the above compounds are structural isomers.

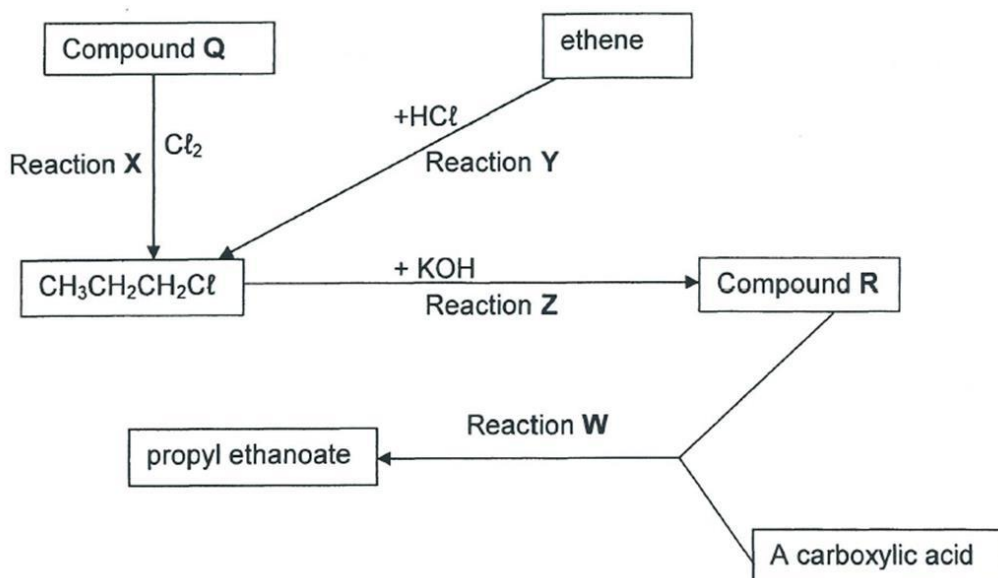
- 1.2.1. Define the term *structural isomer* (2)

- 1.2.2. Write down the letters of TWO compounds that are structural isomers (2)
- 1.3. Explain why compound **G** has a lower boiling point than compound **A**. (2)
- 1.4. How would you test for compound **A**? (1)
- 1.5. Compound **B** is considered as *unsaturated*
 - 1.5.1. Give a reason why compound **B** is unsaturated. (1)
 - 1.5.2. Write down the NAME of a solution that you can use in the laboratory to test whether compound **B** is unsaturated (1)
 - 1.5.3. What will be observed when this solution is added to compound **B**? (2)
 - 1.5.4. Write down the IUPAC name of the product formed. (2)

Question 2

(Adapted from Sep 2013, GDE, Paper 2, Question 4)

In the flow diagram below **W**, **X**, **Y** and **Z** represent four types of organic reactions. **Q** and **R** represent organic compounds.



- 2.1. Write down the STRUCTURAL FORMULA for compound **Q**. (1)
- 2.2. State the reaction condition needed for reaction **X**. (1)
- 2.3. Name the type of addition reaction represented by reaction **Y** (1)
- 2.4. Reaction **Z** represents a substitution reaction. Write down the structural formula of compound **R**. (2)
- 2.5. Give the NAME or FORMULA of the catalyst needed for reaction **W**. (1)
- 2.6. Use structural formulae to write down a balanced equation for the preparation of propyl ethanoate in reaction **W**. (6)

Question 3

The effect of chain length on the boiling points of carboxylic acids is investigated. The results obtained are shown in the table below.

Experiment		
Compounds	Condensed structural formula	Boiling point (°C)
F	CHOOH	101
G	CH ₃ COOH	118
H	CH ₃ CH ₂ COOH	147
I	CH ₃ CH ₂ CH ₂ COOH	166
J	CH ₃ CH ₂ CH ₂ CH ₂ COOH	187

- 3.1. Formulate an investigative question for this investigation (2)
- 3.2. Write down the following for this investigation
 - 3.2.1. The independent variable (1)
 - 3.2.2. The dependent variable (1)
- 3.3. Write down a conclusion that can be drawn from the above results (2)
- 3.4. Fully explain the trend in boiling points as shown in the above table (2)

Question 4

(Adapted from Sep 2013, EC, Paper 2, Question 4.1)

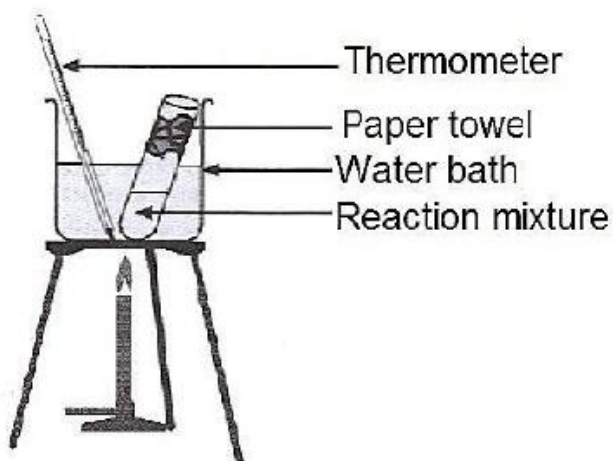
An alkene, dissolved in a non-polar solvent with a Pt catalyst, reacts with hydrogen gas to form propane.

- 4.1. Name the alkene that takes part in this chemical reaction (1)
- 4.2. Use structural formulae to show the balanced chemical equation for the reaction. (3)
- 4.3. What type of chemical reaction takes place here? (2)
- 4.4. Identify the compound in the reaction that is an example of a saturated hydrocarbon. (1)
- 4.5. Give the general formula for the alkenes (2)

Question 5

(Adapted from Sep 2013, EC, Paper 2, Question 4.2)

Esters are known for their pleasant smells and can be prepared by using a carboxylic acid as one of the reactants. An ester with six carbon atoms is prepared using the apparatus below. Butanoic acid is one of the reactants.



- 5.1. Name the other reactant needed to form the above mentioned ester. (1)
- 5.2. Give the molecular formula for the catalyst needed for this reaction (1)
- 5.3. Give the name AND structural formula of the ester formed during this preparation. (4)