

CHAPTER No. 4

Carbon and its compounds

HOTS: (High Order Thinking Skill) Questions with Answers:

1. An organic compound X with a molecular formula C_2H_6O undergoes oxidation with in presence of alkaline $KMnO_4$ to form a compound Y. X on heating in presence of Conc. H_2SO_4 at 443K gives Z. which on reaction with H_2O in presence of H_2SO_4 gives back 'X'. 'Z' reacts with Br_2 (aq) and decolorizes it. Identify X, Y, & Z. and write the reactions involved.
2. An organic compound 'A' is widely used as a preservative in pickles and has a molecular formula $C_2H_2O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'.
 - (i) Identify the compound 'A'
 - (ii) Write the chemical equation for its reaction with ethanol to form compound 'B'.
 - (iii) How can we get compound 'A' back from 'B'?
 - (iv) Name the process and write corresponding chemical equation.
 - (v) Which gas is produced when compound 'A' reacts with washing soda? Write the chemical equation.
3. Hydrocarbon 'X' and 'Y' having molecular formulae C_3H_8 and C_3H_6 respectively. Both are burnt in different spatula on the bunsen flame. Indicate the color of the flame produced by 'X' and 'Y'. Identify 'X' and 'Y'. Write the structural formulae.
4. A compound 'X' has molecular formula C_4H_{10} . It undergoes substitution reaction readily than addition reaction. It burns with blue flame and is present in LPG. Identify 'X' and give the balanced equation for its combustion and substitution reaction with Cl_2 in presence of sunlight.
5. 'A' compound works well with hard water. It is used for making shampoos & products for cleaning clothes. A is not 100% biodegradable and causes water pollution. 'B' does not work well with hard water. It is 100% biodegradable and does not create water pollution. Identify A & B.
6. An organic compound P with molecular formula C_2H_6O is an active ingredient of all alcoholic drinks. It is also used in medicines such as tincture iodine, cough syrups. Identify 'P'. Drop a small piece of sodium into the test tube containing 'P'. A new compound 'Q' is formed with the evolution of colorless and odorless gas Name the gas evolved and compound 'Q' write the chemical reaction.
7. A cyclic compound 'X' has molecular formula C_6H_6 . It is unsaturated and burns with sooty flame. Identify 'X' and write its structural formula. Will it decolorize bromine water or not and why?
8. An organic compounds 'A' is a constituent of antifreeze and has the molecular formula C_2H_6O . upon reaction with alkaline $KMnO_4$, the compound 'A' is oxidized to

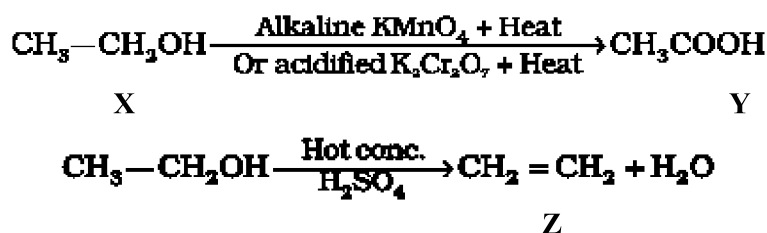
another 'B' with formula $C_2H_6O_2$. Identify the compound 'A' and 'B'. Write the chemical equation for the reaction which leads to the formulation of 'B'

9. Two compounds 'X' and 'Y' have the same formula $C_2H_4O_2$. One of them reacts with sodium metal to liberate H_2 and CO_2 with $NaHCO_3$. Second one does not react with Na metal and $NaHCO_3$ but undergo hydrolysis with $NaOH$ to form salt of carboxylic acid and compound 'Z' which is called wood spirit. Identify 'X', 'Y', and 'Z' and write chemical equation for the reaction involved.

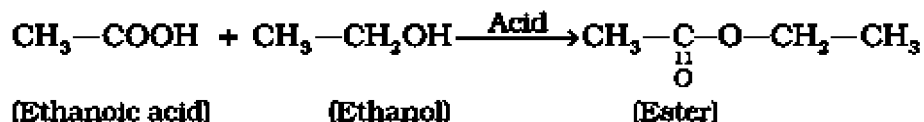
10. A compound 'X' with molecular formula C_2H_4 burns with a sooty flame. It decolourise bromine water. Identify 'X'. Will it dissolve in water or not? Will it conduct electricity in aq. Solution? Will it have high melting point or low melting point ?

Answers

Ans 1.



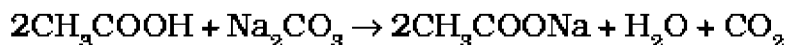
Ans 2.



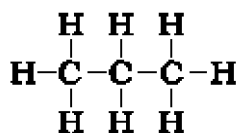
(iii) Esters react in the presence of an acid or a base to give back the alcohol and carboxylic acid.



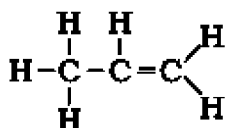
(v) CO_2



Ans 3: 'Y' will burn with a sooty flame. So it is an unsaturated hydrocarbon.

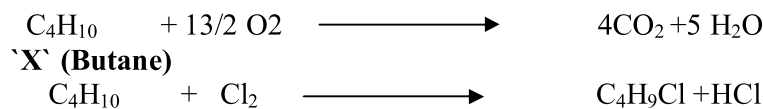


Propane (X)



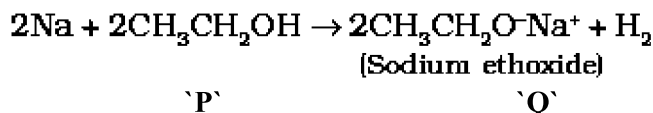
Propene (Y)

Ans 4:

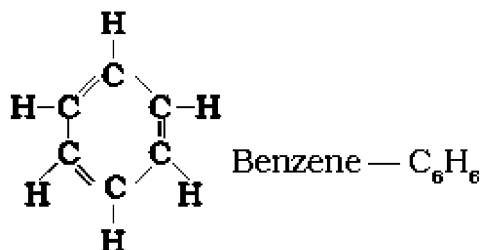


Ans 5 A is detergent & B is soap.

Ans 6:



Ans 7:

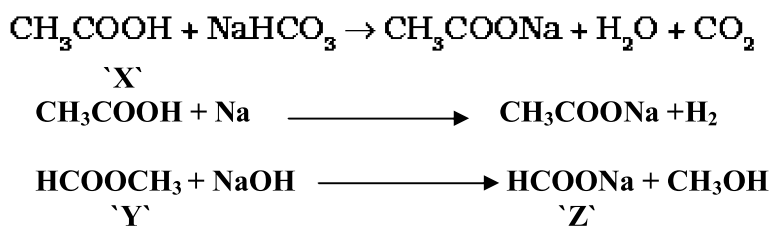


It does not decolorize bromine water because it does not undergo addition reaction.

Ans 8:



Ans 9:



Ans 10:

'X' is ethene. It will neither dissolve in water nor conduct electricity because it is a covalent compound. It has low melting point.

PRACTICE QUESTIONS

1. Write the formula for 'ethanoic acid' and name the functional group present in it.
2. Allotropy is a property shown by which class:-
Substances, elements, compounds, mixture.
3. What is the use of oxyacetylene flame?

4. Name the gas which is formed by decomposition of plants and animal matter in marshy areas?
5. Mention the name of the by product of soap industry/
6. Write the molecular formula and structures of benzene.
7. Match the following:-
 1. Ethane - Used in anti freeze solution.
 2. Ethanol - fruity smell.
 3. Ester - fossil fuel.
8. Write two uses of fullerenes.
9. Complete and balance following equation:-
 - a) $\text{CH}_2=\text{CH}_2 + \text{H}_2 \xrightarrow{\text{heat, Ni}}$
 - b) $\text{CH}_4 + \text{O}_2 \longrightarrow$
10. Two alkanes A and B have 4 and 6 carbon atoms respectively in their molecule. In which physical state will they occur at room temp?
 - 1) Give a test that can be used to differentiate chemically between butter and cooking oil.
 - 2) How will you distinguish between ethanol and ethanoic acid by a suitable chemical test? Write chemical reactions involved.
 - 3) Complete the following reactions :-
 - 1) $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \longrightarrow \xrightarrow{\text{conc. H}_2\text{SO}_4}$
 - 2) $\text{HCOOH} + \text{CH}_3\text{OH} \longrightarrow$
 - 3) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O} \longrightarrow$
 - 4) Name the compound $\text{CH}_3\text{COOC}_2\text{H}_5$. Name the acid and alcohol from which it is made .write equation.