PH: 9835859669

JSUNIL TUTORIAL

PUNJABI COLONY GALI 01

Class 10th Carbon and compounds

1. Explain the nature of the covalent bond using the bond formation in CH_3Cl.
2. Draw the electron dot structures for:(a) ethanoic acid (b) H_2S (c) propanone (d) F_2
3. What is homologous series? Explain with examples.
4. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?
5. Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?
6. Why are carbon and its compounds used as fuels for most applications
7. Explain the formation of scum when hard water is treated with soap
8. What change will you observe if you test soap with litmus paper (red and blue)?
9. What is hydrogenation? What is its industrial application?
10. Which of the following hydrocarbons undergo addition reaction?C_2H_6, C_3H_8, C_3H_6, C_2H_2 and CH_4.
11. Give a test that can be used to differentiate chemically between butter and cooking oil.
12. Explain the mechanism of the cleaning action of soaps.

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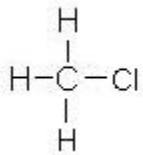
Q1. Answer: The bond line structure of CH_3Cl is given as 

Carbon has four valence electrons. It shares 1 electron each with 3-hydrogen atoms and I electron with chlorine. The bond between C and Cl atoms is *covalent* but due to higher value of electro-negativity of Cl, the C–Cl bond is polar in nature

Q3. Answer: A group of compound of carbon having same general formula and same functional group is called 'Homologous Series'. The members of homologous series are called homologue. For example, alcohol.

Methanol – CH_3OH Ethanol – C_2H_5OH Propanol – C_3H_7OH Butanol – C_4H_9OH

Characteristics of Homologous Series

(a) They have same general formula for all compounds.(b) They have same functional group.

(c) They have same chemical but different physical properties.(d) They have difference of $–CH_2$ between two successive members.(e) Difference between masses of two successive members is 14 amu.

Q4. Answer: Ethanol and Ethanoic acid be differentiated on the basis of their following properties –

(i) Ethanol is a liquid at room temperature with a pleasant smell. Ethanoic acid has a melting point of $17^{O}C$. Since it is below the room temperature so, it freezes during winter. Moreover, ethanoic acid has a smell like vinegar.

(ii) Ethanol does not react with metal carbonates while, ethanoic acid reacts with metal carbonates to form salt, water and carbon dioxide. For example,

$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$

(iii) Ethanol does not react with NaOH while ethanoic acid reacts with NaOH to form sodium ethanoate and water. For example,

$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

(iv) Ethanol is oxidized to give ethanoic acid in presence of acidified $KMnO_4$ while, no reaction takes place with ethanoic acid in presence of acidified $KMnO_4$.

Q5. Answer: Soap molecule consists of two parts – hydrophobic and hydrophilic. Hydrophilic part is the ionic end of the soap molecule which is soluble in water. Hydrophobic part is the organic end and is insoluble in water. Since dirt contains organic mars so, hydrophobic part entraps dirt and hydrophilic part remains suspended in water. Thus, many more molecules of soap are attached to dirt having their one end suspended in water form clusters. These clusters with entrapped dirt are known as micelle.

Since ethanol is not as polar as soap, so micelles will not be formed in other solvents such as ethanol

Q6. Answer: Carbon and its compounds give large amount of heat on combustion due to high percentage of carbon and hydrogen. Carbon compounds used as fuel have optimum ignition temperature with high calorific values and are easy to handle. Their combustion can e controlled. Therefore, carbon and its compounds are used as fuels.

Q7. Answer: Soap is a sodium or potassium salt of long chain fatty acids. Hard water contains soluble salts of Ca and Mg. When soap is dissolved in hard water these calcium and magnesium ions displace sodium and potassium ions from soap and thus, insoluble salts of Ca^{+2} and Mg^{+2} are formed which are called scum.

$Ca^{+2} + 2RCOONa \rightarrow (RCOO)_2Ca + 2Na^{+}$

$Mg^{2+} + RCOONa \rightarrow (RCOO)_2Mg + 2Na^{+}$

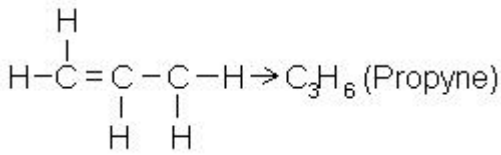
Q8. Answer: Soap solution will turn red litmus paper blue while there will be no effect on blue litmus paper indicating that soaps are basic in nature.

Q9. Answer: The addition of hydrogen to an unsaturated hydrocarbon is called *Hydrogenation*. This process takes place in the presence of nickel or palladium metal as catalyst.

Industrial application of hydrogenation

(1) It is used to prepare Ghee from vegetable oil. (2) Vegetable oil such as ground nut, cotton seed oils are unsaturated and contain double bonds. On hydrogenation in presence of a catalyst, vegetable oil produces vanaspati ghee.

Q10. Answer: Among the said hydrocarbons only C_3H_6 and C_2H_2 undergo addition reaction because they are unsaturated hydrocarbons having double and triple bond between two carbon atoms respectively.



$$H-C\equiv C-H \rightarrow C_2H_2 \text{ (Ethyne)}$$

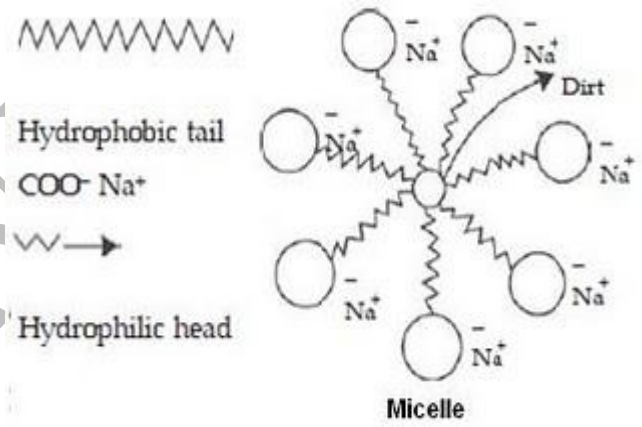
Q11. Answer: If a carbon compound decolorizes bromine water it will be an unsaturated compound. Thus, we can distinguish between a cooking oil and butter by adding Br_2 (aq) to each of them –

(a) cooking oil decolorizes bromine water, as it is unsaturated compound.

(b) butter does not decolorize bromine water, as it is saturated compound.

Moreover, butter does not undergo catalytic hydrogenation which shows it is saturated fat while, oil being unsaturated hydrocarbon can be hydrogenated in presence of a catalyst (Ni / Pd).

Q12. Answer: A soap molecule is a sodium or potassium salt of long chain carboxylic acid. It consists of two parts, *i.e.,* a long hydrocarbon tail and a negatively charged head. The hydrocarbon tail is hydrophobic, *i.e.,* insoluble in water and repelled by water while the polar end is soluble in water and hydrophilic in nature. When soap is applied on a wet dirty surface, the polar end of the soap molecule dissolves in water while the non-polar tail attaches it to dirt molecule, as dirt is non-polar in nature.



This result into the formation of spherical clusters called *Micelle*. In the micelle the hydrophobic tails are in the interior of the cluster while the ionic ends are on the surface of cluster. Due to ion-ion repulsion the micelle stay in the solution as a colloid and do not come together to precipitate. Thus, an emulsion is found which helps to dissolve dirt in water and it is finally washed with running water.