

Carbon and Its Compounds: Exercise Questions

Q.1 Ethane, with the molecular formula C_2H_6 has

- (a) 6 covalent bonds.
- (b) 7 covalent bonds.
- (c) 8 covalent bonds.
- (d) 9 covalent bonds.

Sol. (b) 7 covalent bonds.

Q.2 Butanone is a four-carbon compound with the functional group

- (a) carboxylic acid.
- (b) aldehyde.
- (c) ketone.
- (d) alcohol.

Sol. (c) ketone

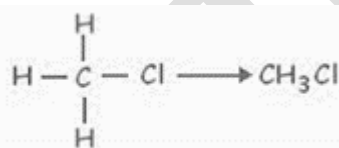
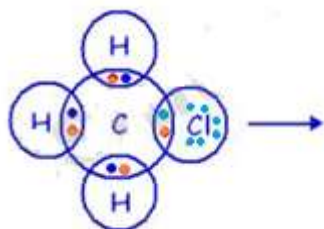
Q.3 While cooking, if the bottom of the vessel is getting blackened on the outside, it means that

- (a) the food is not cooked completely.
- (b) the fuel is not burning completely.
- (c) the fuel is wet.
- (d) the fuel is burning completely.

Sol. (b) The fuel is not burning completely.

Q.4 Explain the nature of the covalent bond using the bond formation in CH_3Cl .

Sol. The bond formation in CH_3Cl



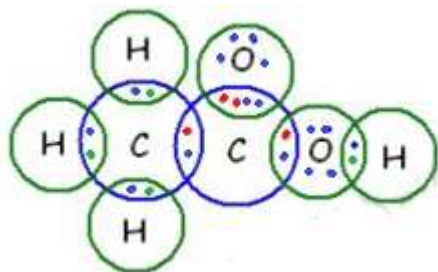
Carbon has 4 electrons in its outermost shell. In order to become stable, it makes the octet by sharing its four electrons with each of the three hydrogen atoms and one chloride atom. Since bonds are formed by sharing of electrons, hence these are covalent bonds.

Q.5 Draw the electron dot structures for

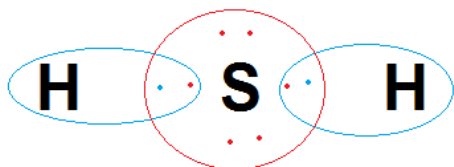
- (a) ethanoic acid.
- (b) H_2S .
- (c) Propanone.
- (d) F_2 .

Sol. The electron dot structures for:

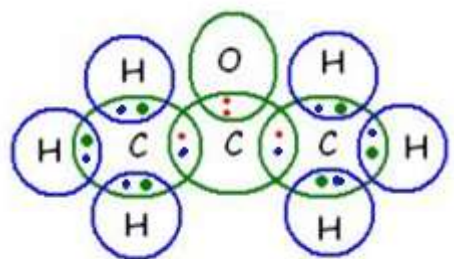
(a) Ethanoic Acid



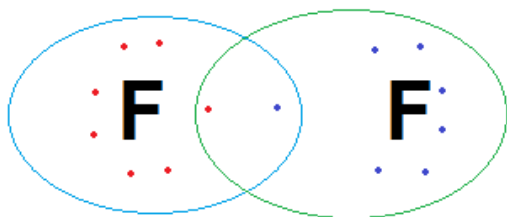
(b) H_2S



(c) Propanone



(d) F_2



Q.6 What is a homologous series? Explain with an example.

Sol. The organic compounds of a homologous series can differ by $-\text{CH}_2$ from their consecutive members. It is represented by the same general formula. All the members of a homologous series show similar chemical and physical properties.

Example: Alkanes; members of this homologous series are Methane, Ethane, Propane, Butane, etc. belong to the same homologous series.

Methane (CH_4) and Ethane (C_2H_6) differ by $-\text{CH}_2$.

Ethane (C_2H_6) and propane (C_3H_8) differ by $-\text{CH}_2$ and so on.

Similarly, all alkenes and alkynes belong to another homologous series.

Q.7 How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

Sol. Difference between ethanol and ethanoic acid on the basis of their physical and chemical properties:

Ethanol	Ethanoic Acid
1. It has a good smell.	1. It has smell like vinegar.
2. It does not freeze in winter.	2. It freezes, its temperature below 17°C .
3. It is known as spirit or alcohol.	3. It is known as glacial acetic acid.

4. It evaporate at room temperature.	4. It does not evaporate at room temperature.
5. Ethanol does not react with metal carbonate or metal hydrogen carbonate.	5. Ethanoic acid gives carbon dioxide when it reacts with metal carbonate or metal hydrogen carbonate.
6. No change in color of litmus paper.	6. It turns blue litmus paper to red.

Q.8 Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?

Sol. Soap molecule has two ends, one is hydrophilic and another is hydrophobic. When clothes are put in the soapy solution, the hydrophobic ends of soap molecules surround a particle of grease or dirt and converge in a typical fashion to make a structure, is called micelle. It is a spherical structure. In this, the hydrophilic end is outside the sphere and hydrophobic end is towards the centre of the sphere. That's why formation of micelle takes place when soap is dissolved to water. Micelle is not formed in other solvent such as ethanol.

Q.9 Why are carbon and its compounds used as fuels for most applications?

Sol. Carbon and its compounds used as fuels for most applications because Carbon and its compounds have high calorific value due to maximum number of carbon and hydrogen. Therefore, most of the carbon compounds release maximum amount of heat and light when it is burnt in air.

Q.10 Explain the formation of scum when hard water is treated with soap.

Sol. Hard water consist of salts of calcium and magnesium. Soap molecules react with this salts and form a precipitate which begins floating as an off-white layer over water. This layer is called scum. Soaps lose their cleansing property due to formation of scum.

Q.11 What change will you observe if you test soap with litmus paper (red and blue)?

Sol. As we know that soaps are basic, thus it turns red litmus paper blue. If we dip blue litmus paper is dipped in soap solution it remains blue.

Q.12 What is hydrogenation? What is its industrial application?

Sol. Hydrogenation is the process or chemical reaction between hydrogen and other compounds in the presence of catalyst. Hydrogenation is an addition of hydrogen to unsaturated hydrocarbon to get a saturated hydrocarbon in presence of catalyst. Example: When ethene is heated with the catalyst nickel, to form ethane.

Industrial application: Hydrogenation is used to prepare vegetable ghee from vegetable oils.

Q.13 Which of the following hydrocarbons undergo addition reactions:

C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4 .

Sol. Unsaturated hydrocarbons undergo addition reactions. Since, C_3H_6 and C_2H_2 are unsaturated hydrocarbons. So, addition reactions takes place in these compounds..

Q.14 Give a test that can be used to differentiate chemically between butter and cooking oil.

Sol. Bromine –water test is used to differentiate chemically between butter and cooking oil. Butter is saturated hydrocarbon compound, on the other hand cooking oil is unsaturated hydrocarbon compound. An unsaturated hydrocarbon compound decolorizes bromine water while a saturated hydrocarbon does not decolorize bromine water. Now, add bromine water to a little of the given sample in test-tubes. If the given sample does not decolorize the bromine water, it is butter and the one which decolorizes bromine water is cooking oil.

Q.15 Explain the mechanism of the cleaning action of soaps.

Sol. Soap molecule has two ends, one is hydrophilic and another is hydrophobic. When clothes are put in the soapy solution, the hydrophobic ends of soap molecules surround a particle of grease or dirt and converge in a typical fashion to make a structure, is called micelle. It is a spherical structure. In this, the hydrophilic end is outside the sphere and hydrophobic end is towards the centre of the sphere. Micelle is rinsed away from clothes.

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