

## CBSE Class 11 Chemistry Chapter 12 Organic Chemistry – Some Basic Principles & Techniques Worksheet – Set 4 (With Answer)

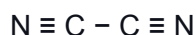
**Q1.** How many sigma and pi bonds are there in cyanogen?

- (a) Three, four
- (b) Two, Three
- (c) One, Two
- (d) None of the above

**Answer:** (a) Three, four

**Explanation:** First, we will draw the structure of cyanogen to calculate the number of sigma and pi bonds.

**Structure of Cyanogen**



It contains one single bond and two triple bonds. Thus, it has three sigma bonds and four pi bonds.

**Q2.** Which of the following elements cannot be detected by Lassaigne's test?

- (a) Nitrogen
- (b) Sulphur
- (c) Chlorine
- (d) None of the above

**Answer:** (d) None of the above

**Explanation:** Lassaigne's test is used to detect the presence of nitrogen, sulphur, chlorine, bromine and iodine.

**Q3.** Which of the following contains a carbonyl functional group?

- (a) Aldehyde
- (b) Ketone
- (c) Carboxylic acid
- (d) All of the above

**Answer:** (d) All of the above

**Explanation:** C=O group is referred to as a carbonyl group. Aldehyde, ketone and carboxylic acid contain a C=O functional group.

**Q4.** What is the general formula of alkenes?

- (a)  $\text{C}_n\text{H}_{2n+2}$
- (b)  $\text{C}_n\text{H}_{2n}$
- (c)  $\text{C}_n\text{H}_{2n-2}$
- (d) None of the above

**Answer:** (b)  $\text{C}_n\text{H}_{2n}$

**Q5.** Which of the following methods is used to estimate nitrogen?

- (a) Carius method
- (b) Duma's method
- (c) Both (a) and (b)
- (d) None of the above

**Answer:** (b) Duma's method

**Explanation:** Duma's method and Lassaigne's test estimate nitrogen in organic compounds. In contrast, the Carius method estimates phosphorous in organic compounds.

**Q6.** What are structural isomers?

**Answer:** The compounds having the same molecular formula but different structures, i.e. different arrangements of atoms or groups of atoms within the molecules, are known as structural isomers. This phenomenon is known as structural isomerism.

**Q7.** Which family is represented by the general formula  $C_nH_{2n-2}$ ? Write the IUPAC name and common name of the first three members of this series.

**Answer:** Alkynes are represented by the general formula  $C_nH_{2n-2}$ .

**IUPAC name and common name of the first three members of this series are as follows:**

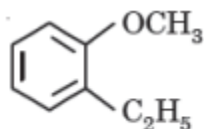
Sl. No.	Member	IUPAC Name	Common Name
1.	$C_2H_2$	Ethyne	Acetylene
2.	$C_3H_4$	Propyne	Methyl acetylene
3.	$C_4H_6$	Butyne	Ethyl acetylene, ethyl ethyne

**Q8.** What is the principle of chromatography?

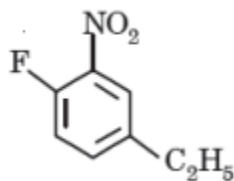
**Answer:** Chromatography is based on the difference in the rates at which the components of a mixture move through a porous medium (stationary phase) under the influence of some solvent or gas (mobile phase).

**Q9.** Draw the structure of o-ethyl anisole and 4-ethyl-1-fluoro-2-nitro benzene.

**Answer: Structure of o-ethyl anisole**



**Structure of 4-ethyl-1-fluoro-2-nitro benzene**



**Q10.** What is an addition reaction? Give an example.

**Answer:** A reaction in which two or more reactants react to form a single product having all atoms of the combining units is known as an addition reaction.

**Example:**



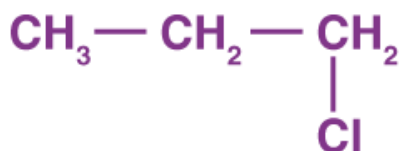
Addition Reaction

**Q11.** Name any two functional groups containing carbonyl bonds.

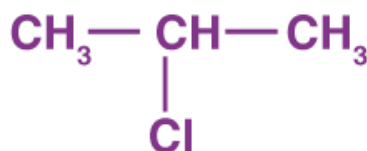
**Answer:** Carboxylic acid and aldehydes contain carbonyl bonds.

**Q12.** Give an example of positional isomers.

**Answer:**



1-Chloropropane



2-Chloropropane

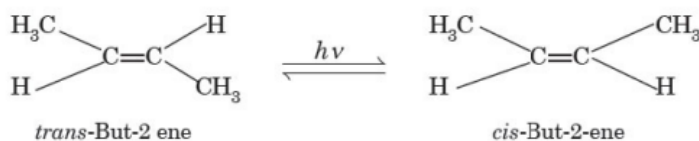
**Q13.** What is a carbocation? Arrange primary, secondary and tertiary carbocation in order of their stability.

**Answer:** A carbocation is a group of atoms containing a positively charged carbon atom with six electrons in its valence shell.

Tertiary carbocation > Secondary carbocation > Primary carbocation.

**Q14.** What is an isomerisation reaction? Give an example.

**Answer:** The reactions which involve the interconversion of isomers wherein the molecular formula and the carbon skeletons of the reactants and products always remain the same is known as an isomerisation reaction. For example, the interconversion of trans-but-2-ene to cis-but-2-ene is a geometrical isomerisation reaction.



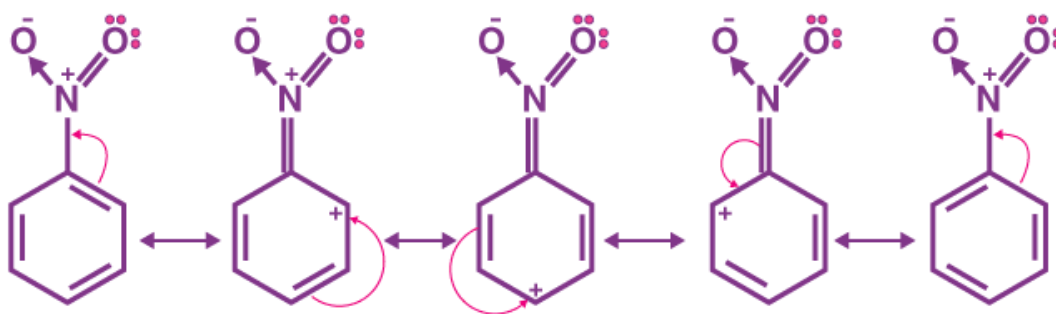
**Q15.** What is dry ice? Give its one use.

**Answer:** Frozen carbon dioxide (CO<sub>2</sub>) is known as dry ice. It is a refrigerant for shipping products such as meats or ice cream.

**Q16.** What is the resonance effect? Draw the resonating structure of nitrobenzene.

**Answer:** The resonance effect is the polarity produced in a molecule due to the interaction between a lone pair of electrons and a pi bond. It is also stimulated due to the interaction of two pi bonds between two adjacent atoms. The resonance effect can be seen in molecules having a conjugated double bond or at least one lone pair of electrons and one double bond. It is denoted as the R effect.

**Resonating structure of nitrobenzene**



**Q17.** Differentiate between distillation, steam distillation and distillation under reduced pressure.

**Answer:**

Sl. No.	Distillation	Distillation under	Steam Distillation
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		Reduced Pressure	
1.	It is used for the purification of compounds associated with non-volatile impurities or those liquids which do not decompose on boiling. In other words, distillation is used to separate volatile liquids from non-volatile impurities or a mixture of those liquids that have sufficient differences in boiling points.	This method is used to purify a liquid that tends to decompose on boiling. Under reduced pressure conditions, the fluid will boil at a lower temperature than its boiling point and will not decompose.	It is used to purify an organic compound, which is volatile and immiscible in water. The compound gets heated up on passing steam, and the steam gets condensed to water. After some time, the mixture of water and liquid starts to boil and passes through the condenser. This condensed mixture of water and fluid is then separated using a funnel.
2.	A mixture of petrol and kerosene is separated by this method.	Glycerol is purified by this method. It boils with decomposition at a temperature of 593 K. At reduced pressure, it boils at 453 K without decomposition.	A mixture of water and aniline is separated by this method.

**Q18.** Explain the principle of Dumas's method of nitrogen estimation.

**Answer:** In the Dumas method, a known amount of an organic compound is heated with excess copper oxide in an atmosphere of carbon dioxide when nitrogen of the organic compound is calculated by the relation.

$$\text{Percentage of Nitrogen} = \frac{28}{22400} \times \frac{\text{Volume of Nitrogen at NTP}}{\text{Mass of substance}} \times 100$$

**Q19.** Differentiate between electrophile and nucleophile.

**Answer:**

Sl. No.	Electrophiles	Nucleophiles
1.	These are deficient in electrons.	These are rich in electrons.
2.	They accept a pair of electrons from the substrate.	They donate a pair of electrons to the substrate.

3.	They behave as a Lewis acid.	They behave as a Lewis base.
4.	They have at least one empty orbital, which accepts electrons from the substrate molecule.	They have at least one lone pair of electrons, which can donate to the substrate molecule.
5.	They are either neutral or positively charged chemical species.	They are either neutral or negatively charged chemical species.

**Q20.** 0.395 g of an organic compound by the Carius method for estimating sulphur gave 0.582g of barium sulphate. Calculate the percentage of sulphur in the compound.

**Answer:** Given,

Mass of Barium sulphate = 0.582 g

We know that

Barium sulphate  $\cong$  Sulphur

Barium sulphate (233 g)  $\cong$  Sulphur (32 g)

233 g of barium sulphate contains 32 g of sulphur

0.582 g of Barium sulphate contains  $\frac{32}{233} \times 0.582$

$$\text{Percentage of Sulphur} = \frac{\text{Weight of Sulphur}}{\text{Weight of Compound}} \times 100$$

$$\text{Percentage of Sulphur} = \frac{32 \times 0.582}{233 \times 0.395} \times 100$$

$$\text{Percentage of Sulphur} = 20.24 \%$$