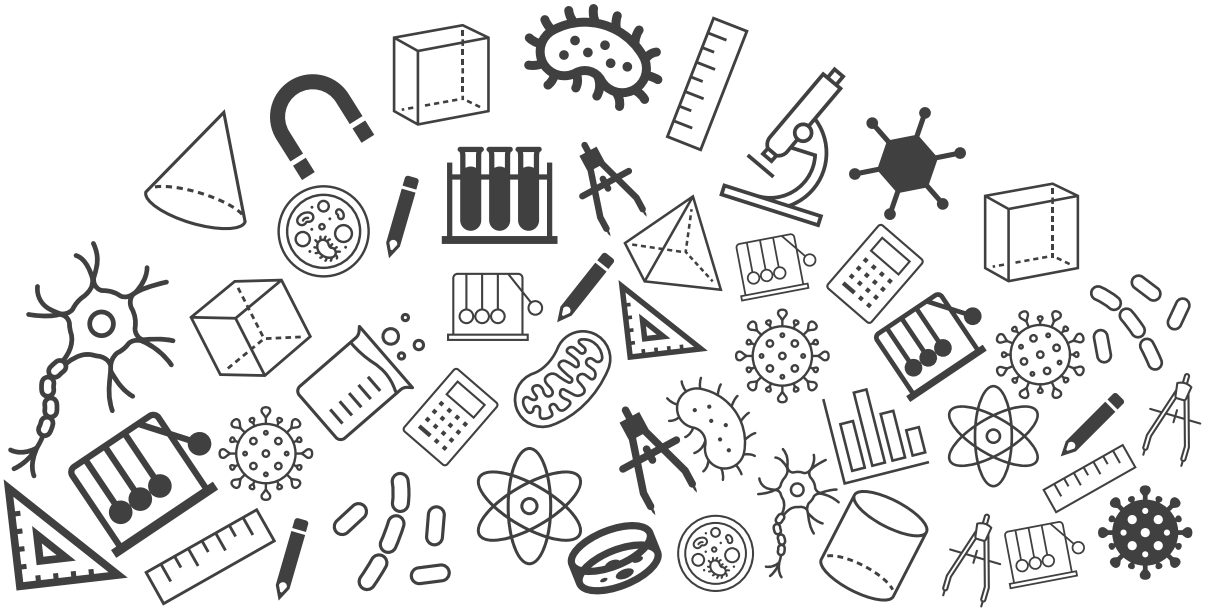
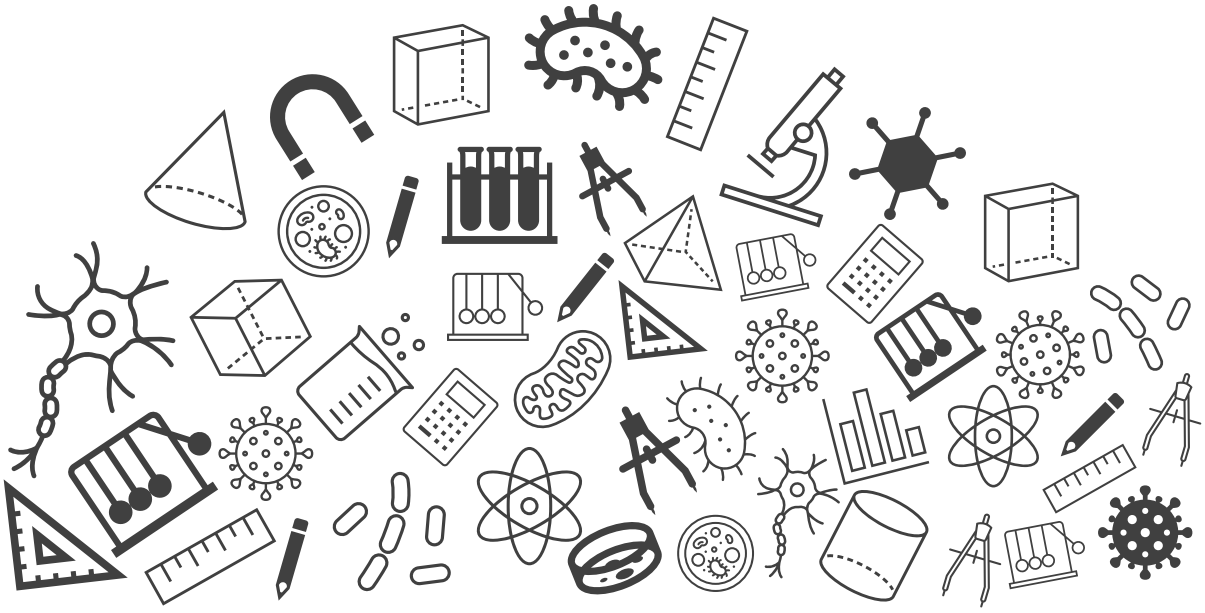
Grade 10: Science
Exam Important Questions



Carbon and its Compounds



Carbon and its Compounds

Topic : Exam Important Questions

1. What do you mean by valence electrons? Find out the number of valence electrons in carbon, hydrogen, and oxygen.

[2 Marks]

The electrons present in the outermost shell of an atom are known as valence electrons.

[0.5 Marks]

Number of valence electrons in the given elements are:

Electronic configuration of elements	**Number of valence electrons**
C (6): 2, 4	4 [0.5 Marks]
H (1): 1	1 [0.5 Marks]
O (8): 2, 6	6 [0.5 Marks]

2. An element E exists in three allotropic forms A, B and C. In allotrope A, the atoms of element E are joined to form spherical molecules. In allotrope B, each atom of element E is surrounded by three other E atoms to form a sheet-like structure. In allotrope C, each atom of element E is surrounded by four other E atoms to form a rigid structure.
   (a) Name the element E.
   (b) What is allotrope A?
   (c) What is allotrope B?
   (d) What is allotrope C?
   (e) Which allotrope is used in making jewellery?
   (f) Which allotrope is used in making the electrode of a dry cell?

   [3 Marks]

   (a) Carbon is the element 'E' which exists in three allotropic forms A, B and C.
   [0.5 Marks]

   (b) Buckminsterfullerene is the allotrope 'A' of carbon in which the atoms are joined to form spherical molecules.
   [0.5 Marks]

   (c) Graphite is the allotrope 'B' of carbon which is surrounded by three other carbon atoms to form a sheet-like structure.
   [0.5 Marks]
   (d) Diamond is the allotrope 'C' of carbon in which each atom is surrounded by four other carbon atoms to form a rigid structure.
   [0.5 Marks]
   (e) The allotrope C (Diamond) is used to make jewellery.
   [0.5 Marks]
   (f) The allotrope B (Graphite) is used in making electrode of a dry cell.
   [0.5 Marks]

3. Give the IUPAC name of the following compounds.

(i) An aldehyde attached to the terminal carbon atom of a chain containing four carbon atoms having single bond between them.
(ii) A ketone derived from propane.
(iii) A monochloride derived from methane.
(iv) An alcohol derived from pentane.
(v) A carboxylic acid containing two carbon atoms.

[5 Marks]

(i) The compound contains four carbon atoms, so the root word is 'but' and the primary suffix is 'ane' as it is an alkane. The secondary suffix is 'al' as the functional group is an aldehyde. Therefore, the name is butanal.

[1 Mark]

(ii) The root word is prop and and the primary suffix is 'ane' as it is an alkane. The secondary suffix is 'one' as the functional group is an ketone. Therefore, the name is propanone.

[1 Mark]

(iii) The root word is meth and and the suffix is 'ane' as it is an alkane. The prefix is 'chloro' as the functional group is a halogen. Therefore, the name is chloromethane.

[1 Mark]

(iv) The root word is pent and and the primary suffix is 'ane' as it is an alkane. The secondary suffix is 'ol' as the functional group is an alcohol. Therefore, the name is pentanol.

[1 Mark]

(v) The root word is eth and and the primary suffix is 'ane' as it is an alkane. The secondary suffix is 'oic acid' as the functional group is a carboxylic acid. Therefore, the name is ethanoic acid.

[1 Mark]

4. State one advantage of soaps over detergents.

[1 mark]

The advantage of soaps over detergents:
Soaps are biodegradable; therefore, they don't cause water pollution, while a few detergents are not biodegradable, thereby pollute water bodies like rivers and lakes.

[1 mark]

5. Define addition reaction. Write its one industrial application.

[2 Marks]

Addition of hydrogen to unsaturated hydrocarbons in presence of a catalyst such as nickel or palladium to form saturated hydrocarbon is called hydrogenation.

[1 Mark]

The process of hydrogenation is used in the industry to convert vegetable oils to vanaspati ghee.

[1 Mark]

6. What happens when ethanoic acid reacts with carbonates and hydrogen carbonates?

[3 Marks]

Ethanoic acid reacts with carbonates and hydrogencarbonates to form salt, carbon dioxide and water. The salt produced is commonly called sodium acetate.

[1 Mark]

The reactions are shown below:

1) Reaction of ethanoic acid with sodium carbonate:

$$2CH_3COOH + Na_2CO_3 \rightarrow 2\,CH_3\,COONa + H_2O + CO_2$$

[1 Mark]

2) Reaction of ethanoic acid with sodium hydrogencarbonate:

$$CH_3\,COOH + NaHCO_3 \rightarrow CH_3\,COONa + H_2O + CO_2$$

[1 Mark]

7. Discuss two physical and three chemical properties of ethanol.

[5 Marks]

Physical properties of ethanol-

1) It is a colourless liquid with characteristic sweet odour.

[1 Mark]

2) It is soluble in water in all proportions.

[1 Mark]

Chemical properties of ethanol-

1) It reacts with sodium leading to the evolution of hydrogen gas and sodium ethoxide.

$$2Na + 2CH_3CH_2OH \rightarrow 2CH_3CH_2O^-Na^+ + H_2$$

[1 Mark]

2) Heating ethanol at 443 K with excess concentrated sulphuric acid results in the dehydration of ethanol to give ethene.

$$CH_3CH_2OH \xrightarrow{Hot\ conc.\ H_2SO_4} CH_2 = CH_2 + H_2O$$

[1 Mark]

3) It gets oxidised to ethanoic acid in the presence of excess alkaline potassium permanganate or acidified potassium dichromate when gently heated.

$$C_2H_5OH \xrightarrow{\text{Excess acidified } K_2Cr_2O_7 + \text{Heat}} CH_3COOH$$

[1 Mark]