13. Chemical Change and Chemical Bond

Practice Questions

Question. 1) Complete the statement by filling the gaps using appropriate term from the terms given in the bracket.

(slow, coloured, arrow, fast, smell, milky, physical, product, chemical, reactant, covalent, ionic, octet, duplet, exchange, sharing, equality sign)

1) An _____is drawn in between the reactants and products while writing the equation for a chemical reaction.

Ans: Arrow

2) Rusting of iron is a _____ chemical change.

Ans: Slow

3) The spoiling of food is a chemical change which is recognized from the generation of certain _____ due to it.

Ans: Smell

4) A colourless solution of calcium hydroxide in a test tube turns _____ on blowing in it through a blow tube for some time.

Ans: Milky

5) The white particles of baking soda disappear when put in lemon juice. This means that it is a _____ change.

Ans: Chemical

6) Oxygen is a _____ in respiration.

Ans: Reactant

7) a) Sodium chloride is _____ compound, while b) hydrogen chloride is _____ compound.

Ans: a) Ionic b) Covalent

8) Electron _____ is complete in each hydrogen in a hydrogen molecule.

Ans: Duplet

9) Chlorine (Cl_2) molecule is formed by _____ of electrons between two chlorine atoms.

Ans: Sharing

Question. 2) Explain by writing a word equation.

1) Respiration is a chemical change.

Ans: Respiration is a continuously occurring biological process. The glucose in the cells reacts with oxygen in the inhaled air and carbon dioxide and water vapour is formed and released/ thrown out. But glucose and oxygen cannot be obtained again from carbon dioxide and water vapour. Therefore, respiration is a chemical change.

Word equation:

$$\text{Glucose + Oxygen} \xrightarrow{\text{respiration}} \text{Carbon dioxide + Water}$$

2) Hard water gets softened on mixing with a solution of washing soda.

Ans: Hard water is brackish to taste and does not form lather with soap. This is because of hard water contains the chloride and sulphate salts of calcium and magnesium in dissolved state. To soften the hard water, a solution of washing soda is added to it. This results in a chemical reaction to form a precipitate of insoluble carbonate salts of calcium and magnesium. As the dissolved salts of calcium and magnesium go out in the form of precipitate of the carbonate salts, the water is softened.

Word equation:

Calcium chloride + Sodium carbonate →Calcium carbonate + Sodium chloride

3) Lime stone powder disappears on adding to dilute hydrochloric acids.

Ans: The chemical reaction takes place when lime stone powder is added to dilute hydrochloric acids. The calcium chloride, water and carbon dioxide gases are formed in it. In this way, lime stone powder disappears on adding to dilute hydrochloric acids.

Word equation:

Calcium carbonate + Hydrochloric acid → Calcium chloride + Carbon dioxide + Water

4) Bubbles are seen on adding lemon juice to baking soda.

Ans: When lemon juice is added to baking soda a chemical change takes place. Chemical reaction takes place between citric acid and the chemical component like sodium bicarbonate present in it and it is seen that carbon dioxide gas is formed in the form of bubbles.

Word equation:

Citric acid + Sodium carbonate

Acid + Alkali → Carbon Dioxide + Sodium citrate

(Lemon soda) (Baking soda) CO_2 + Salt

Question. 3) Match the pairs.

Group A	Group B
a) Photosynthesis	1) Tendency to lose electrons
b) Water	2) Reactant in combustion process
c) Sodium chloride	3) Chemical change
d) Dissolution of salt in water	4) Covalent bond
e) Carbon	5) Ionic bond
f) Fluorine	6) Physical change
g) Magnesium	7) Tendency to form anion

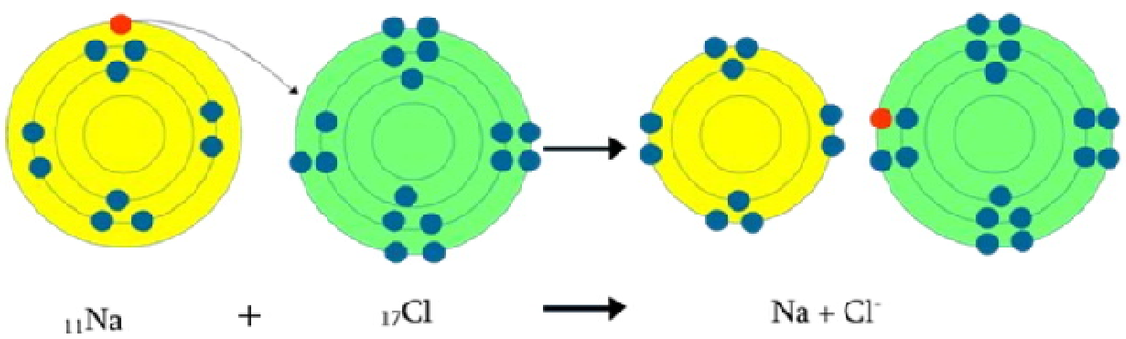
Ans:

Group A	Group B
a) Photosynthesis	1) Chemical change
b) Water	2) Covalent bond
c) Sodium chloride	3) Ionic bond
d) Dissolution of salt in water	4) Physical change
e) Carbon	5) Reactant in combustion process
f) Fluorine	6) Tendency to form anion
g) Magnesium	7) Tendency to lose electrons

Question. 4) Show with the help of diagram of electronic configuration how the following compound are formed from the constituent atoms.

a) Sodium chloride

Ans: Diagram



1) The atomic number of sodium (Na) is 11 and its electronic configurationis 2, 8, 1.

2) Sodium atom has 1 electron in its outermost shell.

3) On loss of a valence electron from ‘M’ shell, the penultimate shell ‘L’ of sodium atom becomes outermost shell. It has eight electrons in it.

4) The number of protons in nucleus of sodium is 11 but it becomes 10 after losing 1 electron. Hence, due to addition of one positive charge, positive charged ion of sodium is formed.

5) There are seven electrons in the outermost shell of the chlorine atom and it needs one electron to complete its octet state. At that time, sodium atom gives one electron to chlorine atom.

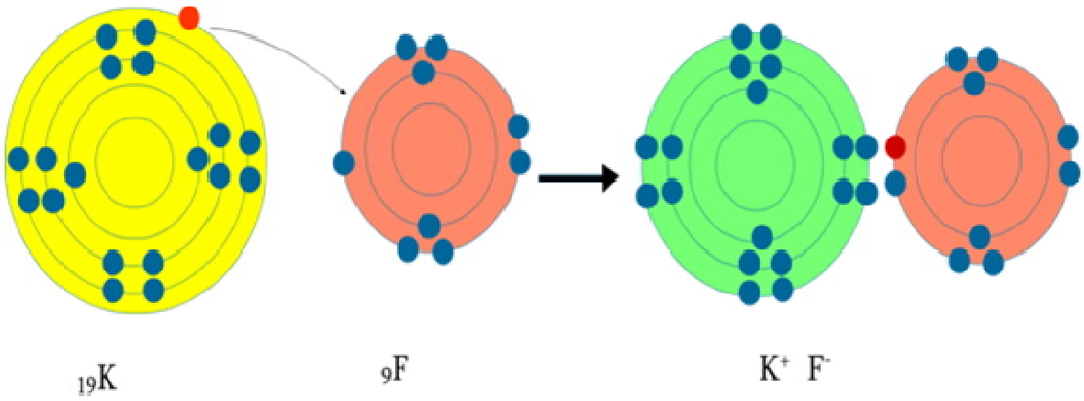
6) On accepting an electron, the octet state of chlorine is completed and total number of electrons in K, L and M shell of chlorine becomes 18. But the number of protons in nucleus remains 17 only. Hence, anion of chloride (Cl^-) are formed of chlorine atom.

7) In this way, negatively charged chloride is formed by accepting 1 electron from sodium and positively charged sodium is formed by giving 1 electron of sodium atom.

8) Due to opposite charges on chloride and sodium ions, attraction of force is created between them. This results in the formation of ionic bond between them and sodium chloride molecule (compound) is formed.

b) Potassium fluoride

Ans: Diagram



1) The atomic number of potassium (K) is 19. Its electronic configuration is 2, 8, 8, 1.

2) There is one electron in the outermost shell of the potassium atom. On loss of a valence electron from N shell, the penultimate shell M of potassium atom becomes outermost shell and octet of this shell becomes stable.

3) The number of protons in the nucleus of potassium is 19. But after losing 1 electron, it becomes 18. This results in the increase of one positive charge and positively charged ion of potassium is formed.

4) There are 7 electrons in the outermost shell of fluorine and it needs one electron to complete octet state. Then potassium atom gives one electron to fluorine atom.

5) When fluorine atom accepts one electron, its octet is completed and the number of electrons in K and L shell together becomes 10. But the number of protons in nucleus

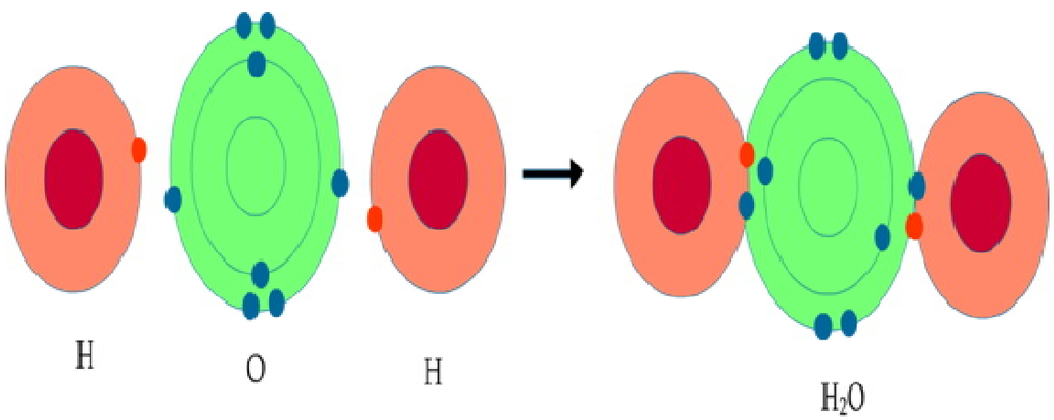
remains 9 only and negatively charged fluoride ion is formed of fluorine atom.

6) In this way, negatively charged fluoride is formed by accepting 1 electron from potassium and positively charged potassium is formed by giving 1 electron of potassium atom.

7) Due to opposite charges on potassium and fluoride ions, attraction of force is created between them. This results in the formation of ionic bond between them and potassium fluoride (KF) ionic compound is formed.

3) Water

Ans: Diagram



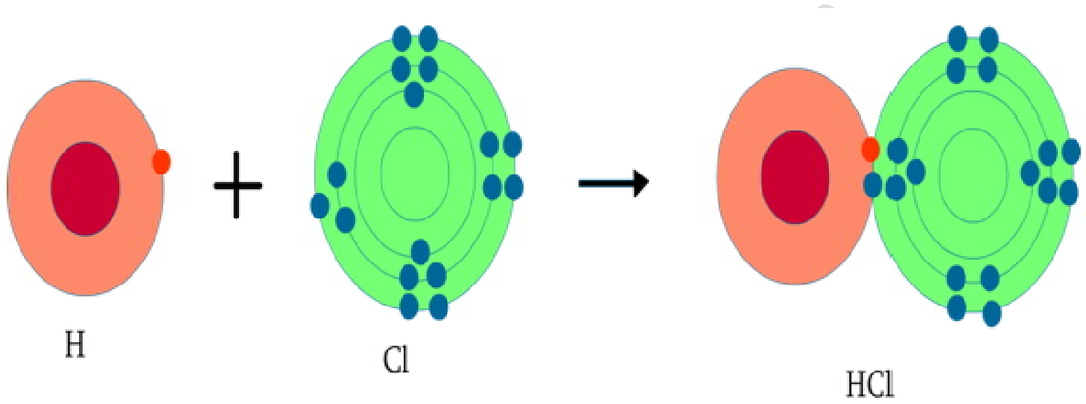
1) The atomic number of hydrogen is 1 and its electronic configuration is 1. There is 1 electron in the outermost shell K of hydrogen atom.

2) The atomic number of oxygen is 8 and its electronic configuration is 2, 6. There are 6 electrons in the outermost shell of oxygen and it needs 2 electrons to complete octet state. It means valency of oxygen is 2.

3) In the H_2O molecule the oxygen atom completes its octet by forming two covalent bonds, one each with the two hydrogen atoms. While this happens, the duplets of the two hydrogen atoms also are completed.

4) Hydrogen chloride

Ans: Diagram



1) The atomic number of hydrogen is 1 and electronic configuration is 1. There is 1 electron in the outermost shell K of hydrogen (H) atom and it needs1 electron to complete its duplet state. So the valency of hydrogen is 1.

2) The electronic configuration of chlorine is 2, 8, 7 and it has 7 electrons in the outermost shell and it needs 1 electron to complete its octet state.

3) One atom of hydrogen and one atom of chlorine exchanges their valence electrons with each other. Due to it, duplet of hydrogen and octet of chlorine gets completed and covalent bond is formed due to exchange of 2 valence electrons.

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