13. CHEMICAL CHANGE AND CHEMICAL BOND

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

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

a. An ……. is drawn in between the reactants and products while writing the equation for a chemical reaction.

Ans. arrow

b. Rusting of iron is a …….chemical change.

Ans. slow

c. The spoiling of food is a chemical change which is recognized from the generation of certain ……. due to it.

Ans. smell

d. A colorless solution of calcium hydroxide in a test tube turns…….on blowing in it through a blow tube for some time.

Ans. milky

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

Ans. chemical

f. Oxygen is a ……. in respiration.

Ans. reactant

g. Sodium chloride is a …….Compound while hydrogen chloride is ……. compound.

Ans. ionic, covalent

h. Electron …….is complete in each hydrogen in a hydrogen molecule.

Ans. duplet

i. Chloride (Cl_2) molecule is formed by …… of electrons between two chlorine atoms.

Ans. sharing

Q 2) Explain by writing a word equation.

a. Respiration is a chemical change.

Ans. 1) Respiration is a continuously occurring biological process, in which we inhale air, oxygen is present in air that reacts with glucose that forms carbon dioxide and water.

2) Word equation:

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

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

Ans. 1) Hard water is a mixture containing the chloride and sulphate salts of calcium and magnesium in dissolved form. For softening hard water, washing soda is added to it as a result a chemical reaction occurs. 2) The chemical reaction forms a precipitate of insoluble salts of calcium and magnesium, when the dissolved salts of calcium and magnesium are removed the water is softened.

3) Word equation is:

Calcium chloride + Sodium carbonate → Calcium carbonate + Sodium chloride
(Washing soda) (precipitate)

c. Lime stone powder disappears on adding to dilute hydrochloric acids.

Ans. 1) When the reaction of dilute HCl and lime stone ($CaC0_3$) powder occurs lime stone vanishes gradually and CO_2 releases.

2)Word equation:

Calcium Carbonate + hydrochloric acid → Calcium chloride + Carbon dioxide +Water

d. Bubbles are seen on adding lemon juice to baking soda.

1) A chemical change takes place when lemon juice is added to baking soda as citric acid in lemon juice reacts and carbon dioxide gets formed.

2) Word equation:

Citric Acid + Sodium bicarbonate ⟶ Carbon dioxide + Sodium citrate + Salt

(Lemon juice) Alkali (Baking soda) CO_2

This reaction is called as neutralization reaction.

Q 3) Match the pairs.

Column 'A'	Column 'B'
a. Photosynthesis	Tendency to lose electrons
b. Water	Reactant in combustion
c. Sodium chloride	Chemical change
d. Dissolution of salt in water	Covalent bond
e. Carbon	Ionic bond
f. Fluorine	physical change
g. Magnesium	Tendency to form anion

Ans.

Column 'A'	Column 'B'
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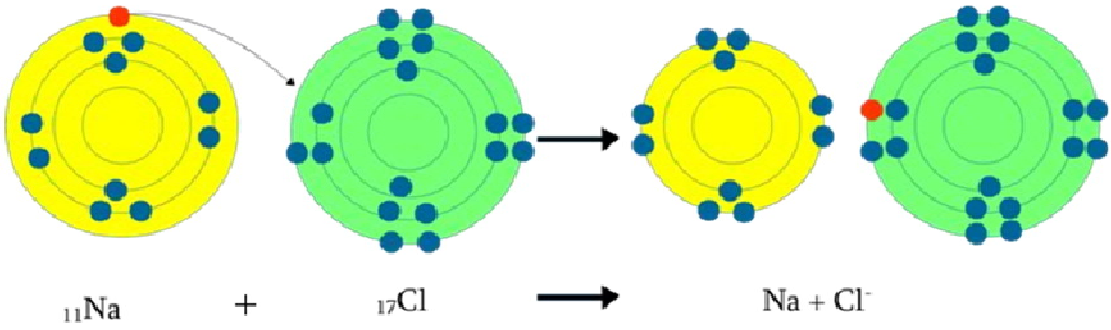
b. Water	Covalent bond
c. Sodium chloride	Ionic bond
d. Dissolution of salt in water	physical change
e. Carbon	Reactant in combustion
f. Fluorine	Tendency to form anion
g. Magnesium	tendency to lose electrons

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

a. Sodium chloride

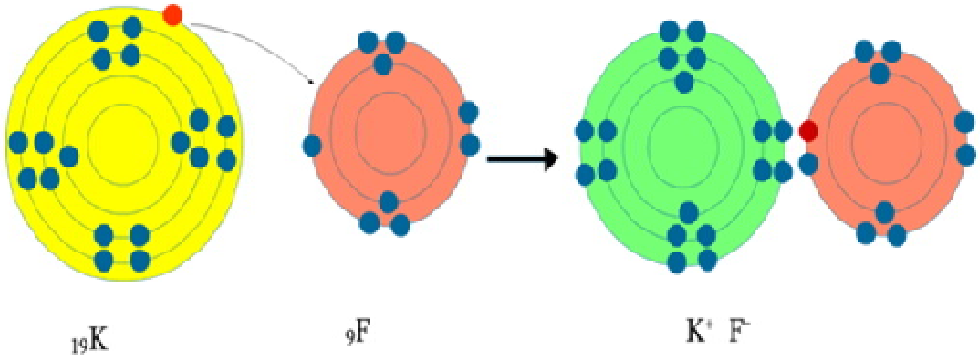
Ans.



1) The valency of sodium is 1. Sodium has only 1 electron in the outermost shell Atomic number of sodium is 11 and electronic configuration is (2, 8,1).. Therefore sodium atom can donate 1 electron and fas a result forms sodium cation Na^+. 2) The valency of chlorine is 1. Chlorine contains 7 electrons in its outermost shell .The atomic number of chlorine is 17 and so its electronic configuration is (2, 8, 7). It requires more electrons to get the stable insert gas configuration. 3) Hence a chlorine atom carries 1 electron forms a negatively charged chloride ion Cl^-. 4) The elements of sodium and chlorine get together , a sodium atom gives its valence electron to a chlorine atom. Which forms Na^+ cation and Cl^- anion are formed. Now, sodium reacts with chlorine, and transfers 1 outermost electron to the chlorine atom and loses 1 electron and forms sodium ion Na^+ and by getting 1 electron, the chlorine atom forms a chloride ion Cl^-. 5) The charge on Sodium ions is positive and chloride ions is negative charge. Because of the opposite charges, sodium and chloride ions are bound with the electrostatic force of attraction and thus forms sodium chloride – NaCl.

b. Potassium fluoride

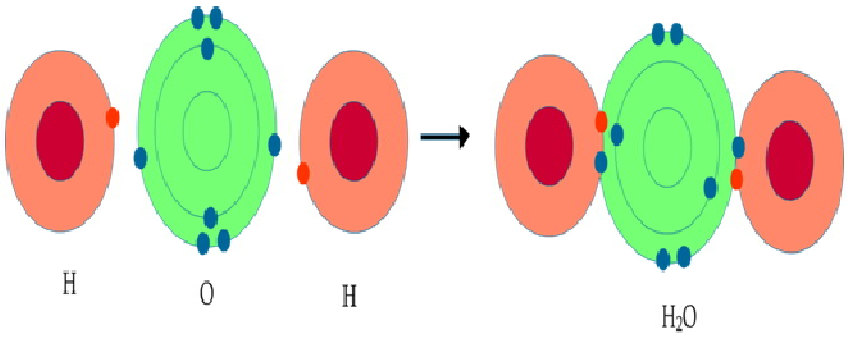
Ans.



1)Potassium has electronic configuration (2, 8, 8, 1) and fluorine has electronic configuration (2, 7).So, Atomic number of potassium is 19 and electronic configuration is (2, 8, 8, 1). The outermost orbit of Potassium has one electron . A positive charge is formed as it donate one electron. 2) The Atomic number of fluorine is 9 and its electronic configuration is (2, 7). Its outermost orbit requires only one electron to complete its octet. Fluorine accepts one electron and form a negative charge. An ionic compound KF, is formed two oppositely charged ions have strong electrostatic force of attraction between each other.

c. Water

Ans.



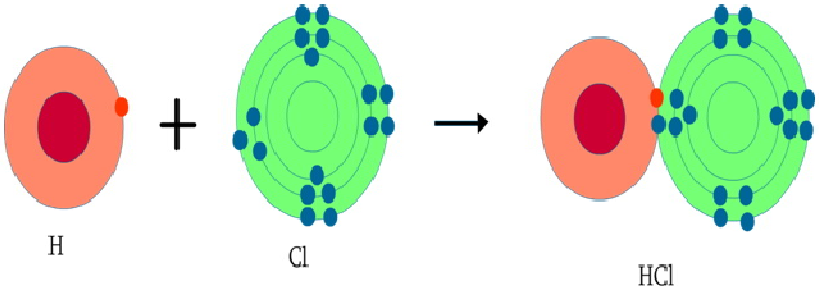
1) Water molecule is a covalent compound, it is obtained from hydrogen and oxygen atoms. Atom of oxygen contains six electrons in its valence shell and requires two electrons to complete the electron octet. As, valency of oxygen

atom is two. 2) For H_2O molecule, the oxygen atom octet is completed by forming two covalent bonds, each with two hydrogen atoms . A hydrogen atom contains only one electron and it requires one electron for completing its electron duplet. So, the valency of hydrogen atom is one. 3) The oxygen atom shares two electrons by completing its octet with two hydrogen atoms. Each of two hydrogen atoms completes its electron duplet. The duplets of the two hydrogen atoms get completed by sharing. 4) It forms two covalent bonds.

5) The diagram for the formation of water molecule (H_2O) is as follows:

d. Hydrogen chloride

Ans.



1) Hydrogen atom's outermost orbit contain 1 electron. It has 1 electron in K shell and for duplet state requires 1 electron. It valency is 1. Therefore, it can share only one electron. 2) A chlorine atom has seven electrons in its valence shell and it requires one electron to complete its orbit. 3) The hydrogen and chlorine share 1 electron with each other. A covalent bond is formed between them as electron duplet of hydrogen and octet is complete