# JSR IAS ACADEMY

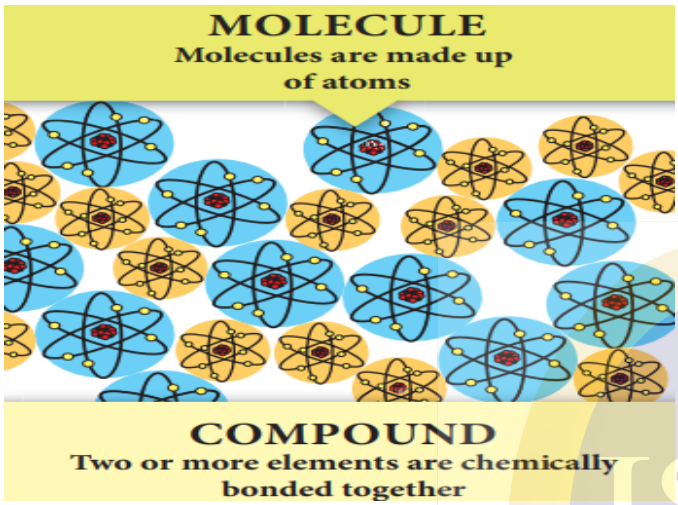
## GENERAL SCIENCE

## CHEMISTRY

# Compounds

**Molecules:**

Atoms of the same element or different elements combine to form a molecule. A molecule is the smallest particle of a pure substance (element or compound), which can exist independently and retain the physical and chemical properties of the substance.




**Compound**

A compound is a pure substance which is formed due to the chemical combination of two or more elements in a fixed ratio by mass.

The properties of a compound are different from those of its constituents.

**Classsification compound**

a) **Inorganic compounds**

Compounds obtained from non living sources such as rock, minerals etc., are called inorganic compounds.
Example: chalk, baking powder etc.,

b) **Organic compounds**

Compounds obtained from living sources such as plants, animals etc., are called organic compound. Example: Protein, carbohydrates, etc.,

Both inorganic and organic compounds exists in all three states of matter ie., solids, liquids and gases.

Brass is an alloy made up of approx. 30% zinc and 70% copper.

**Compounds in solid**

| Compound | Consitituent Elements |
|---|---|
| Carbon dioxide, carbon monoxide | Carbon, Oxygen |
| Sulphur dioxide | Sulphur, Oxygen |
| Methane | Carbon, Hydrogen |
| Nitrogen dioxide | Nitrogen, Oxygen |
| Ammonia | Nitrogen, Hydrogen |

**Compounds in liquid**

| Compound | Consititutent Elements |
|---|---|
| Water | Hydrogen, Oxygen |
| Hydro chloric Acid | Hydrogen, Chlorine |
| Nitric Acid | Hydrogen, Nitrogen, Oxygen |
| Sulphuric Acid | Hydrogen, Sulphur, Oxygen |
| Acetic acid (Vinegar) | Carbon, Hydrogen, Oxygen |

**Compounds in gas**

| Compound | Consititutent Elements |
|---|---|
| Silica (sand) | Silicon, Oxygen |
| Potassium hydrox-ide (caustic potash) | Potassium, Hydrogen, Oxygen |
| Sodium hydroxide (Caustic soda ) | Sodium, Oxygen, Hydrogen |
| Copper sulphate | Copper, Sulphur, Oxygen |
| Zinc carbonate (calamine) | Zinc, carbon, oxygen |

**Uses of Compounds**

| Common Name | Chemical Name | Constituents | Uses |
|---|---|---|---|
| Water | Hydrogen Oxide | Hydrogen and oxygen | For drinking and as solvent |
| Table salt | Sodium chloride | Sodium and chlorine | Essential component of our daily diet, preservative for meat and fish. |
| Sugar | Sucrose | Carbon, hydrogen and oxygen | Preparation of sweets, toffees and fruit juices. |
| Baking soda | Sodium bicarbonate | Sodium, hydrogen, carbon and oxygen | Fire extinguisher, preparation of baking powder and preparation of cakes and bread. |
| Washing soda | Sodium carbonate | Sodium,carbon and oxygen | As cleaning agent in soap and softening of hardwater. |
| Bleaching powder | Calcium oxy chloride | Calcium, oxygen and chlorine | As bleaching agent, disinfectant and sterilisation of drinking water. |
| Quick lime | Calcium oxide | Calcium and oxygen | Manufacture of cement and glass. |
| Slaked lime | Calcium hydroxide | Calcium, oxygen and hydrogen | White washing of walls. |
| Lime stone | Calcium carbonate | Calcium ,carbon and oxygen | Preparation of chalk pieces. |

| Element | Compound |
|---|---|
| Made up of only one kind of atom. | Made up of more than one kind of atom. |
| The smallest particle that retains all its properties is the atom. | The smallest particle that retains all its properties is the molecule. |
| Cannot be broken down into simpler substances. | Can be broken down into elements by chemical methods. |

| Compound | Consititutent Elements |
|---|---|
| Copper sulphate | Blue Vitriol |
| Ferrous sulphate | Green Vitriol |
| Potassium nitrate | Saltpetre |
| Sulphuric acid | Oil of Vitriol |
| Calcium sulphate | Gypsum |
| Calcium sulphate hemi hydrate | Plaster of paris |
| Potassium chloride | Muriate of potash |

Table 9.3 Hydrated salts

| Common Name | IUPAC Name | Molecular Formula |
|---|---|---|
| Blue Vitriol | Copper (II) sulphate pentahydrate | $CuSO_4 \cdot 5H_2O$ |
| Epsom Salt | Magnesium sulphate heptahydrate | $MgSO_4 \cdot 7H_2O$ |
| Gypsum | Calcium sulphate dihydrate | $CaSO_4 \cdot 2H_2O$ |
| Green Vitriol | Iron (II) sulphate heptahydrate | $FeSO_4 \cdot 7H_2O$ |
| White Vitriol | Zinc sulphate heptahydrate | $ZnSO_4 \cdot 7H_2O$ |

| Examples of Compounds | |
|---|---|
| Examples of Formulas for compounds | Examples of names of common compounds |
| $H_2O$ | Water |
| $C_6H_{12}O_6$ | Glucose |
| NaCl | Salt (Sodium Chloride) |
| $C_2H_6O$ | Ethanol |
| $NH_3$ | Ammonia |
| $H_2SO_4$ | Sulphuric Acid |
| $CH_4$ | Methane |
| $C_{12}H_{22}O_{11}$ | Sucrose |

**LPG – Liquefied Petroleum Gas**

It is highly inflammable hydrocarbon gas. It contains mixture of butane and propane gases. LPG, liquefied through pressurisation, is used for heating, cooking, auto fuel etc.


DO YOU KNOW?

Blood is not a pure substance. It is a mixture of various components such as platelets, red and white blood corpuscles and plasma.

**Atomicity**

imply the total number of atoms present in one molecule of an element, compound or a substance.

For example, a molecule of sulphuric acid (H2SO4) consists of 2 hydrogen atom, 1 sulphur atom and 4 oxygen atoms. Hence e its atomicity is 2+1+4=7.

**Atomicity of some elements**

| Element | Atomicity | Elements | Atomicity |
|---|---|---|---|
| H | 2 | F | 2 |
| He | 1 | Ne | 1 |
| Li | 1 | Na | 1 |
| N | 2 | P | 4 |
| O | 2 | S | 8 |

DO YOU KNOW?

**Bismuth in diarrhea medicine**

Bismuth is an element that occurs naturally. It is combined with other elements to make medicine for treating diarrhea.