WATER AS A COMPOUND

Water can be discussed as a chemical compound or as a mixture, since pure water do not contain impurities and is a chemical compound while impure water contains a variety of other substances that tend to make it a mixture.

Composition of Water

Priestley (1781) was the first to observe that the explosion of a hydrogen-and-oxygen gas mixture yields water vapour. Later, Cavendish established that the ratio by volume of hydrogen to oxygen in that reaction, at constant temperature and pressure, was 2:1.

Water as an Oxide of Hydrogen

When dry hydrogen gas is ignited in air, it burns with a faint blue flame to give steam, which will condense on contact with any cold surface to form water.

$$2H_{2(g)} + O_{2(g)} \rightarrow 2\,H_2\,O_{(g)}$$

Hydrogen Oxygen Hydrogen oxide (i.e. water)

Physical Properties of Water

Pure water is a clear, colourless, tasteless and odourless liquid with the following properties:

- A boiling point of 100°C
- A freezing point of 0°C
- Maximum density of $1gcm^{-3}$ at 4°C
- Neutral to litmus i.e. it has neutral pH

Water has some unusual or rather unique physical properties. One of these is its relatively high melting and boiling points. This is because of its abundance and aggregations of hydrogen bonds.

Two. When most liquids solidify, their solids are usually denser than the liquids. However, in the case of water, ice is less dense than water, i.e. it floats on water. This is because the molecules in ice are held

together by hydrogen bods and are not crowded together as in liquid water.

Chemical Properties of Water

Water reacts with metals in a number of ways with the degree of reactivity depending on the position of the metal in the electrochemical series. Thus,

- Sodium, potassium and calcium react with cold water to form alkalis and liberate hydrogen;
- Magnesium and zinc react only with steam to liberate hydrogen and form oxides;
- Iron reacts only with excess steam at red heat;
- Copper, gold, silver and mercury do not react with water in any form.