

Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 10)

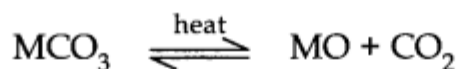
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Date: -21/02/2021

s- block element

Carbonates

Carbonates of alkaline earth metals are thermally unstable and decompose on heating.



The thermal stability increases from $BeCO_3$ to $BaCO_3$.

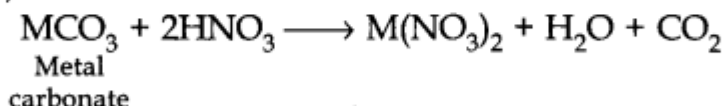
$BeCO_3$ is unstable and kept only in the atmosphere of CO_2 .

Solubility in water. $BeCO_3$ is highly soluble in water whereas $BaCO_3$ is almost insoluble.

Nitrates

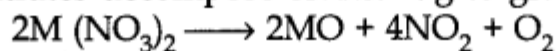
- (i) Nitrates of alkaline earth metals are prepared by treating the corresponding metal carbonates with dilute HNO_3

For example,



(M = Be, Mg, Ca, Sr, Ba)

- (ii) All these metal nitrates decompose on heating to give the oxide

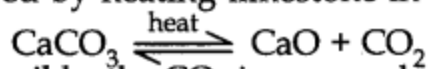


(M = Be, Mg, Ca, Sr, Ba)

• Some Important Compounds of Calcium

(i) Calcium Oxide (Quick Lime) CaO

Preparation: It is prepared by heating limestone in a rotary kiln at 1070 – 1270 K.



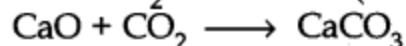
Since the reaction is reversible, the CO_2 is removed as soon as it is formed to enable the reaction to proceed to completion.

Properties:

- (i) It is a white amorphous solid. M.P = 2870 K.
(ii) It reacts with water to become slacked lime. The reaction is highly exothermic and produce hissing sound.



- (iii) On exposure to atmosphere, it absorbs moisture and carbon dioxide.



- (iv) At high temperature it combines with acidic oxides.

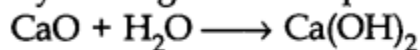


Uses:

- (i) In the manufacture of cement, sodium carbonate, calcium carbide etc.
- (ii) Used in the purification of sugar.
- (iii) In the manufacture of dye stuffs.

(ii) Calcium Hydroxide (slacked lime), Ca(OH)_2

Preparation: It is prepared by adding water to quick lime, CaO .



Properties:

- (i) It is a white amorphous powder.
- (ii) When it is passed through dry Cl_2 bleaching powder is formed.
$$\text{Ca(OH)}_2 + \text{Cl}_2 \longrightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$$
- (iii) When it is treated with CO_2 the solution becomes milky due to the formation of calcium carbonate.



Uses:

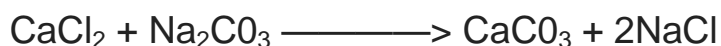
- (i) It is used in the manufacturing of building material.
- (ii) Used in white-wash as a disinfectant.
- (iii) Used to detect CO_2 gas in the laboratory.

(iii) Calcium Carbonate or Limestone (CaCO_3)

Preparation: Calcium carbonate occurs in nature in different forms like limestone, marble, chalk etc. It can be prepared by passing CO_2 through slaked lime in limited amount.

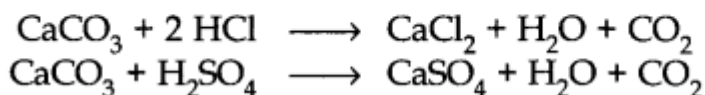


It can also be prepared by the reaction of a solution of sodium carbonate with calcium chloride.



Properties:

- (i) It is a white fluffy powder and is sparingly soluble in water.
- (ii) Upon heating to 1200 K, it decomposes to evolve carbon dioxide.
$$\text{CaCO}_3 \xrightarrow{1200 \text{ K}} \text{CaO} + \text{CO}_2$$
- (iii) It reacts with dilute acids to form corresponding chloride, sulphate, water and CO_2 gas is evolved.

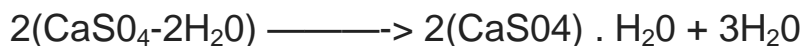


Uses:

- (i) In the manufacturing of Quick Lime.
- (ii) With MgCO_3 used as flux in the extraction of metals.
- (iii) Used as an antacid.
- (iv) In the manufacture of high quality paper.

(iv) Calcium Sulphate (Plaster of Paris) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

Preparation: It is obtained when gypsum $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is heated to 393 K



Above 393 K anhydrous CaSO_4 is formed, which is called 'dead burnt plaster'.

Properties:

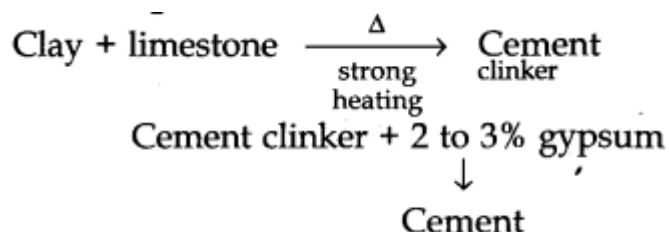
- (i) It is a white atmospheric powder.
- (ii) When it is mixed in adequate quantity of water it forms a plastic hard mass within 15 minutes.

Uses:

- (i) Commonly used in making pottery, ceramics etc.
- (ii) Used in the surgical bandages for setting the fractured bone or sprain.
- (iii) For making statues, ornamental work, decorative material etc.

(v) Cement

Preparation: Prepared by combining a material rich in CaO with other material such as clay, which contains SiO_2 along with the oxides of aluminium, iron and magnesium.



Important Ingredients of portland cement:

- $(\text{Ca}_2\text{SiO}_4)$ dicalcium silicate 26%
- $(\text{Ca}_3\text{SiO}_5)$ Tricalcium silicate 51%
- $(\text{Ca}_3\text{Al}_2\text{O}_6)$ Tricalcium Aluminate 11%

Uses:

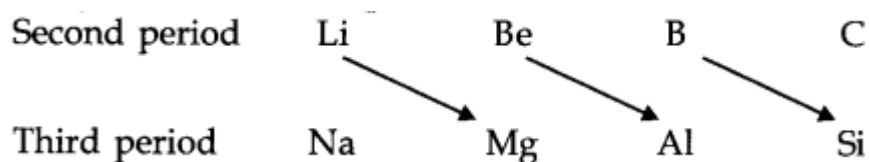
In plastering and in construction purposes.

- s-block elements constitute Group I and II elements.
- General electronic configuration of

Group I = [Noble gas] ns^1

Group II = [Noble gas] ns^2

- Diagonal Relationship



The first three elements of second period (Li, Be, B) show diagonal similarity with the elements (Mg, Al, Si) of third period. Such similarities are termed as diagonal relationship.

- The alkali metals are silvery-white soft metals. They are highly reactive. Their aqueous solutions are strongly alkaline in nature. Their atomic and ionic sizes increase on moving down the group and ionization enthalpies decrease systematically down the group.

- Alkaline earth metals. They are much similar to alkali metals but due to small size some differences are there. Their oxides and hydroxides are less basic than the alkali metals.

- Sodium hydroxide (NaOH) is prepared by the electrolysis of aq NaCl in Castner-Kellner cell.

Slaked lime Ca(OH)_2 is formed by the action of quick lime on water.

- Gypsum is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. On heating upto 390 K $\text{CaSO}_4/2\text{H}_2\text{O}$ (plaster of paris) is formed
