

Carbonates

Carbonates are usually insoluble; those of the alkali metals being the only important exceptions.

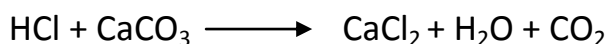
All carbonates, except those of the alkali metals, decompose on heating to form the oxide of the metal and carbon dioxide.

Calcium Carbonate (Limestone) \longrightarrow Calcium oxide (lime or quick lime) + Carbon Dioxide



All carbonates react with dilute acids to form salt of the acid, water and carbon dioxide.

Hydrochloric Acid + Calcium Carbonate \longrightarrow Calcium Chloride + Water + Carbon Dioxide



Calcium carbonate (Limestone CaCO_3)

Uses of limestone:

1) Manufacture of cement:

Cement is made in large scale by heating a mixture of **limestone and clay**.

2) Manufacture of iron:

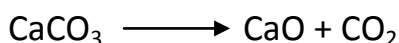
Limestone is added to iron ore, which composes into Calcium Oxide and combines with the impurities in the ore, such as sand and other impurities to make slag (Calcium Silicate).

Calcium Oxide + Silicon (IV) Oxide \longrightarrow Calcium Silicate (Slag)

3) Manufacture of lime:

Lime is made on a large scale by heating limestone in a lime kiln.

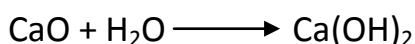
Calcium Carbonate \longrightarrow Calcium oxide + Carbon Dioxide



Lime and slaked lime can be used to neutralize acidic soils and acidic wastes.

When water is added to a lump of lime (Calcium Oxide), a fine powder of slaked lime (Calcium Hydroxide) is formed. The process is known as slaking of lime.

Calcium Oxide + Water \longrightarrow Calcium Hydroxide



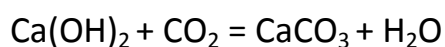
When water is added to slaked lime, a creamy coloured suspension called “milk-of-lime” is formed. If the suspension is filtered, an aqueous solution of calcium hydroxide, called lime water is produced.

Detection of CO₂

The action of carbon dioxide on lime water is the standard method for detecting carbon dioxide.

When carbon dioxide is bubbled through a solution of lime water, the solution turns milky due to the formation of the insoluble calcium carbonate.

Calcium hydroxide + Carbon Dioxide = Calcium Carbonate + Water



Uses of lime, CaO and slaked lime, Ca(OH)₂

Lime and slaked lime are bases and are therefore, used to neutralize acidic soils in agriculture and acidic waste products in industry.

Important:

Limestone = Calcium Carbonate (CaCO₃)

Lime = Calcium Oxide (CaO)

Slaked lime = Calcium Hydroxide (Ca(OH)₂)