

C1 - Limestone Quiz

What is the formula for limestone?

CaCO₃

What is produced when limestone is heated strongly?

CaCO₃ --> CaO + CO₂

What are the chemical and everyday names of CaO and Ca(OH)_{2(s)} and Ca(OH)_{2(aq)}?

CaO is calcium oxide or quicklime. Ca(OH)_{2(s)} is calcium hydroxide or slaked lime, Ca(OH)_{2(aq)} is calcium hydroxide or limewater.

What type of reaction is CaCO₃ --> CaO + CO₂?

Thermal decomposition (heat is used to break down a compound)

What is limestone used for?

Building material, statues, abrasive in toothpaste, cement, and mortar and concrete.

Limestone is thermally decomposed inside a rotary kiln. Explain why large amounts of CO₂ are produced in this process.

Thermal decomposition of limestone releases CO₂. The fuel that is combusted to produce the high heat required (methane), releases CO₂.

One of the waste gases leaving the limekiln is nitrogen. Where does this gas come from?

From the hot air that is blast into the kiln to provide the heat needed for thermal decomposition. Air contains 78% nitrogen.

Not all metal carbonates decompose when heated with a Bunsen flame. Give a reason for this.

They require a higher temperature to break the bonds present in the compound.

How do you test for carbon dioxide?

Bubble the gas through limewater. If carbon dioxide is present, the limewater will turn cloudy as finely suspended calcium carbonate precipitate is produced.

What is produced when metal carbonates such as calcium carbonate react with acids?

Salt, water and carbon dioxide; for example magnesium carbonate + hydrochloric acid --> magnesium chloride + water + carbon dioxide

Write equations for the limestone cycle

CaCO_{3(s)} --> CaO(s) + CO_{2(g)}

CaO(s) + H₂O(l) --> Ca(OH)_{2(s)}

Ca(OH)_{2(s)} + more water --> Ca(OH)_{2(aq)}

Ca(OH)_{2(aq)} + CO_{2(g)} --> CaCO_{3(s)} + H₂O(l)

When green copper carbonate is heated, a gas is given off and a black solid is formed. Identify the black solid.

Copper oxide

How can you use limewater to find how long it takes for a metal carbonate to decompose?

Time how long it takes for limewater to turn cloudy. Start the stopwatch when you start heating the metal carbonate and stop timing when the limewater begins to turn cloudy.

Buildings made from limestone are affected by burning fossil fuels containing sulfur Explain why.

The sulphur reacts with oxygen when the fuel is burnt. This produces sulphur dioxide which dissolves in rain water producing acid rain which reacts with limestone.

Calcium carbonate reacts with sulphuric acid. Use the equation to explain why the reaction stops quickly: $\text{CaCO}_3(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$

A layer of CaSO_4 forms around the CaCO_3 . This layer prevents the acid from reacting further with the CaCO_3 , so the reaction stops.

Plaster is made by mixing slaked lime with water. Why does plaster become hard over time?

Plaster is $\text{Ca}(\text{OH})_2(\text{aq})$. When it is exposed to air, it reacts with CO_2 in the air and forms solid CaCO_3 and H_2O . The water evaporates.

How do you produce mortar?

By mixing cement with water and sand.

Why does mortar hold bricks together?

The calcium hydroxide reacts with the carbon dioxide in the air, forming solid limestone which holds the bricks together.

What are the disadvantages of mortar and cement?

Large amounts of CO_2 are produced when making cement and mortar.

How do you make cement?

Heat limestone with clay in a kiln.

How do you make concrete?

Add water, cement, sand and small stones or crushed rock.

Why do builders use concrete rather than pure cement?

Pure cement would be too expensive

Give reasons for using concrete rather than limestone as a building material.

Can be poured into shapes, weather and corrosion resistant, stronger.

Give reasons against building with concrete.

Ugly; production releases carbon dioxide which adds to the greenhouse effect.

Give reasons for mining limestone.

Many uses, especially as a building material; mining provides jobs, workers will move to local area improving the local economy.

Give reasons against mining limestone.

Destruction of habitats; air pollution (CO₂) from lorries driving to and from the mine; noise and dust pollution; tourists stay away.