

WORKSHOP 4: STUDENT SHEET 1

Limestone Weathering in Ecton Mine

The chemistry of limestone weathering and flowstone formation

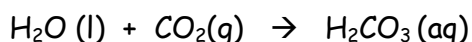
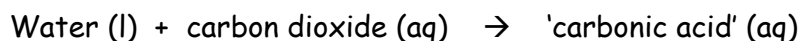


4.1 a) Flowstone in Salt's Level

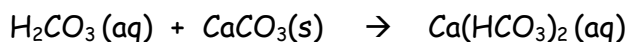


4.1 b) Spectacular Flowstone in a Show Cave

Carbon dioxide derived from bacterial respiration in the soil, dissolves in rainwater percolating through the soil, with which it reacts to produce the very weak acid 'carbonic acid'.

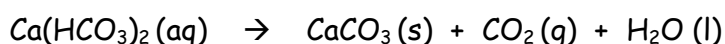


'carbonic acid' being a weak acid reacts with calcium carbonate in limestone:



Calcium hydrogen carbonate is soluble in water, so the effect is to 'dissolve' the limestone.

Water containing calcium hydrogen carbonate in solution percolates through the limestone rock until it emerges into cracks/joints/faults/etc, where any flow of air gradually evaporates the water. This decomposes the calcium hydrogencarbonate:



The carbon dioxide escapes into the air flow, leaving solid calcium carbonate deposited on the surface where the water evaporated.

So calcium carbonate is re-deposited at a distance from where it was originally dissolved. The deposit forms slowly, so crystal growth is slow but confined on a surface - hence the nature of the smooth flowstone deposit.

In limestone caves, over a long period of time, where the solution has dripped continuously, impressive formations, known as stalactites descend from the roof of the cave. Where the solution has dripped on the cave floor beneath, similar formations grow upwards from the floor and these are known as stalagmites.