Making Calcium Carbonate

Various plants and animals take in calcium and carbonate from seawater and later deposit calcite in their shells or secrete (ooze) calcium carbonate into the water. Aragonite is another type of calcium carbonate that is found in the shells of clams, oysters (including pearls), and snails. Aragonite is sometimes found around hot springs and in stalactites and stalagmites in caves. Calcite is more common than aragonite and makes up most limestone deposits on Earth.

Seawater contains two important ingredients that react with each other to form calcium carbonate, calcium, and bicarbonate. Bicarbonate is closely related to carbonate. The calcium in the water comes from the chemical weathering of rocks such as granite.

Bicarbonate forms when the carbon dioxide in the air combines with rainwater, creating carbonic acid. Carbonic acid splits up to form bicarbonate and hydrogen. Depending on several factors, such as temperature and the available amount of calcium and bicarbonate, the calcium and bicarbonate react and form calcium carbonate.

Some geologists have spent their entire careers delving into the mysteries of how carbonates form. Many kinds of marine plants and animals take calcium carbonate directly from seawater for their shells. These organisms range from primitive one-celled animals such as foraminifera (forams), to oysters, clams, and other invertebrates, to primitive algae and complex plants such as aquatic grasses.

Most of the carbonate sediment (or calcareous ooze) forming in oceans today is composed of shells and calcium carbonate secretions from such organisms. A portion of these secretions is created when the carbon dioxide given off by these marine organisms combines with calcium in the water.

Calcium carbonate is often deposited in warm tropical seas, such as around the islands of the Grand Bahamas. Calcium carbonate is easily available to the animals and plants living in these seas. The shells and secretions of these organisms create the calcareous ooze on the ocean bottom. This ooze over time solidifies and becomes the rock known as limestone. Most limestones throughout Earth's history were formed in relatively shallow, warm seas.

Geologists have discovered that in colder water the shells of animals using calcium carbonate dissolve when the animals die. So nothing is left to form carbonate sediments. Other types of sediments, such as siliceous ooze, are indicators of a colder-water environment. Certain microorganisms, such as diatoms and radiolarians, use silica in their shells and secrete silica into the water. When they die, the shells and secretions settle to the bottom, creating siliceous ooze.