

Solid Mixtures From Underground

Most underground materials are solids — solid rocks. Most rocks are mixtures. For example, the rock shown in Figure 1 is a mixture of two pure substances: white quartzite and yellow gold. This rock is called gold ore because it can be processed to extract gold. An ore is a mineral (or a group of minerals) that contains a valuable substance. Another example of an ore is iron ore.

The discovery of a large deposit of gold ore is exciting. Gold is valuable because of its beauty and its scarcity. Gold is also valuable because of its practical properties: it resists corrosion, and it is soft enough to carve easily.

Gold is so valuable that people are willing to go to a lot of trouble to get it. Twice in the nineteenth century, reports of newly discovered gold deposits led to a gold rush. Thousands of people travelled to northern California and to Canada's Yukon Territory to "try their luck."

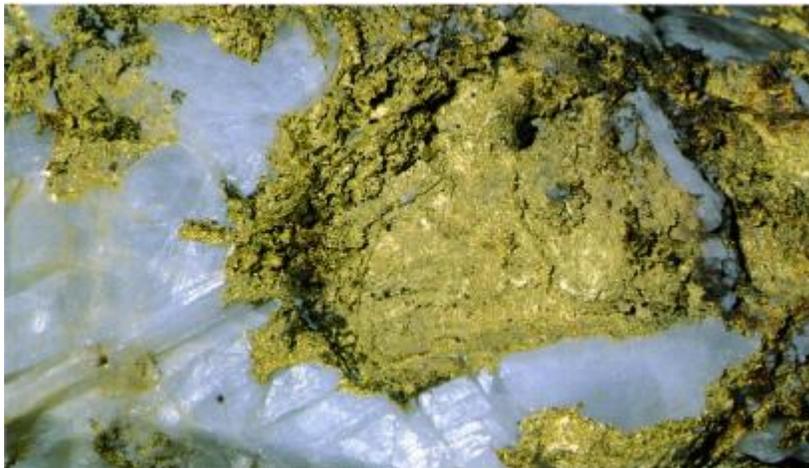


Figure 1. The white part of this rock is quartzite. The yellow parts are nearly pure gold.

The amateur miners in Figure 2 did not have to dig to find gold. They looked in stream beds for chunks of gold that had been washed out of gold ore by the running water. These chunks of gold, mixed with sand or gravel, could be washed a long way downstream from the original deposit.

Separating these chunks or nuggets from the gravel required only settling and sifting. Material from the stream bed was dug out and swirled in a pan with plenty of water. Gold nuggets, no matter how small, have much more mass than gravel or sand grains of the same size. As the mixture was swirled, the lighter pieces of sand, gravel, and mud were washed away, leaving the heavier nuggets of pure gold behind.



Figure 2. During the 1800s, for permission to travel beyond the Chilcoot Pass into Yukon Territory, would-be gold miners had to carry a year's worth of supplies with them. Those without sufficient supplies were turned back by the police, who feared that they would starve.



Figure 3. Panning for gold - a process by which a gold miner takes advantage of the process of settling to separate the gold nuggets from the gravel on the stream bed.

Compared to other kinds of mining, gold panning was easy, even for amateurs. In fact, it was so easy that most stream-bed deposits have now been "worked out." Very little gold is found this way today. Instead, gold ore must be brought up from underground and then processed to extract the gold from the rock.

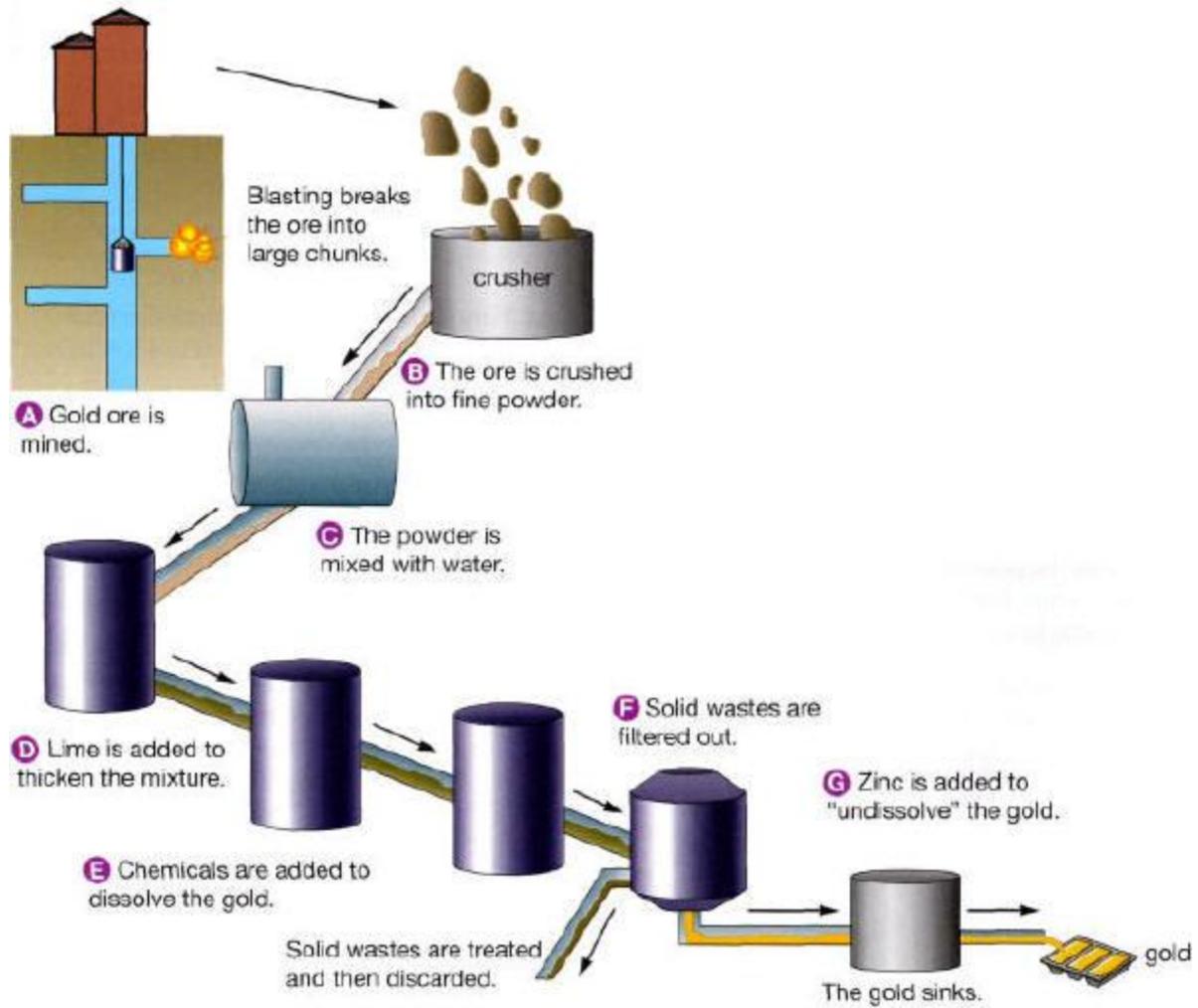


Figure 4. Panning for gold does not work on Gold ore. With the ore, a much more complicated procedure is used.