CUPELS, SCORIFIERS AND CRUCIBLES

When we first imagine the gold rush and silver rush days of the 19th century, we tend to think of prospecting and striking it rich in the same way that so many young men thought of it at the time. They left their homes believing that precious metals would be "easy pickin's." Prospecting and mining were difficult. Long hours of hard labor, blasting and clearing mine shafts, or shoveling the sandy beds of ice-cold rivers into sluice boxes could result in only a minimal return, or none at all.

One of the most important elements in successful mining is knowing the amount of precious metal in the ore from a mine or the sand sifted from a stream. The person who calculates that figure is called an assayer. An assayer crushes the ore into a powder, mixes it with a lesser metal, usually lead, and packs the mixture into a cup-sized container called a cupel. The cupel is then placed in a furnace under high heat. The lead burns away or is absorbed into the walls and bottom of the cupel, leaving a gold or silver "button" as the residue. This firing process is called cupellation. Weighing the cupel before and after the firing tells the assayer the percentage of precious metal in the ore sample. Cupellation is an ancient process. Greek scientists first mentioned it in 300CE. During the Middle Ages, early chemists, called alchemists, used cupellation in their search for the legendary "philosopher's stone," a substance that supposedly turned base metals into gold or silver. Cupels were used because they were easy to make from materials that were readily at hand.

The most common cupel was made from bone ash. This is a white material produced by heating bones to very high temperatures and then crushing the bones into a powder. It is especially good for assaying because it has a very high melting point (3038F/1670C) and it readily absorbs the heated lead and lead by-products. Bone ash cupels were easy to make, very effective and could be easily replaced. When larger amounts of ore needed to be tested, scorifiers were used. A scorifier is similar to a cupel, but slightly larger. The metal "button" that remained as the by-product of cupellation is more pure as the scorifier absorbs more lead. At the end of the 19th century, both cupels and scorifiers were mass-produced and shipped around the world. One of the most famous manufacturers was the Battersea Works in Battersea (South London), England.

Crucibles, which are normally made of clay and glazed with enamel, have generally replaced cupels and scorifiers in a wide variety of laboratory chemical analyses and processes. Crucibles vary in size depending upon the processes involved. Today, any large container used in a reduction process (heating at extremely high temperatures) is normally referred to as a crucible, regardless of its composition or the compounds involved.