



# SMELTING WITH RED IRON ORE

This activity is a simple illustration with balloons of various colors that makes the smelting process more understandable. The cutting of the Red Mountain Expressway through Red Mountain exposed layers of limestone and hematite that make up the Red Mountain Formation. Such cross-sectional views of Red Mountain are vivid illustrations of both geologic time and of the natural resources that made the iron industry possible. An estimated 300 million tons of hematite have been taken from Red Mountain's red ore seam since 1870.

Hematite on Red Mountain came from iron rich clays that then turned into ferrous oxide. Hematite also contains bits of calcite – the main ingredient in limestone, along with silica and even bits of shell.

Because it is an ore, hematite must be smelted into a useable product. To make useable iron out of hematite, one must simultaneously remove the impurities, and turn ferrous oxide ( $\text{Fe}_2\text{O}_3$ ) into pure iron (Fe). By heating the iron ore with coke (a form of coal), the oxygen molecules in ferrous oxide combine with carbon molecules from the coke to be released as a gas, carbon monoxide.

Limestone helps the calcite and silica melt into a liquid that is then poured off from the top of the furnace. Because limestone helps turn solid materials into a liquid, it works as a flux. The impure matter that is poured off at the top of the furnace is called slag.

## Activity

Take various colors of balloons and group them to represent materials in the smelting process.

Hematite

Red balloons = iron

White balloons = oxygen

Green balloons = impurities

Coke

Black balloons = carbon

Limestone

Blue balloons

Then regroup the balloons to represent different materials as follows:

White to go with black (carbon monoxide)

Green to go with blue (slag)

Red to stay by itself (pure iron)