"Minerals that do things…"

Hands-on demonstrations of mineral properties

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Fire From the Rock

Object: Early settlers used flint and steel to start fires. Students can relive the days of the early pioneers when they strike **sparks from flint** to make a **fire**.

Procedure description: Students hold a fist-sized fragment of flint in one hand and a piece of steel in the other. The best technique is hold the flint steady and strike downward with the long edge of the steel, hitting a crisp edge of the flint with a glancing, grating blow.

Hold the steel firmly between the tips of your thumb and fingers, keeping your knuckles clear. With practice a spray of sparks is produced. Most sparks will fly in the direction of the blow, but it is still important to wear safety glasses or goggles to protect your eyes.

If you catch the sparks in tinder, a flame can be created. Pioneers would have used charred cloth and maybe mouse nests to ignite a flame, but for demonstration purposes extra fine steel wool will serve as tinder, allowing you to nurse a spark into a flame. Hold the flint and steel a couple of inches above a small, fluffed up patch of steel wool sitting in the center of a shallow basin. When you strike the flint and a spark lands in the steel wool, the thin wires will begin to burn. If you blow on the burning steel wool, it will burst into flame. With a little practice, you'll succeed in making fire from a rock. Use water to put out the burning steel wool and keep a fire extinguisher on hand for emergencies.

Specimens to test: Flint; chert (higher quality material works best).

Equipment needed: Hard steel bar (metalworking files work well – break an old, used file into pieces about three- to four-inch in length); safety glasses or goggles; extra-fine (000) steel wool; plastic basin; water; fire extinguisher.

Fire From the Rock Page 2 of 2

Scientific discussion: Before the advent of the safety match in the mid-1800's, flint and steel was one of the better ways to start a fire. One advantage the flint and steel method has over matches is that flint and steel still work after you've fallen in the creek.

Flint is hard enough that it knocks small chips off the steel. Small fragments of steel flying off burning as sparks, ignited by the frictional energy of the strike. They burn hot enough that, if brought into contact with a fuel (in the form of a fine tinder) a flame can be generated. Extra-fine (triple-0) steel wool will burn quite readily (coarser grades will not work as well). The steel wool's wires are so fine that they will begin to oxidize rapidly (i.e., burn incandescently) when hit by a hot spark. Blowing on the burning steel wool greatly increases the oxidation rate and the steel wool can burst into flame.

Additional possibilities: It is possible to buy ready-made flint and steel fire-starting kits just like those that the early pioneers would have carried. In these kits the steel piece is usually in the form of a large "C", fashioned so that you can grasp it in the manner of brass knuckles.

Notes for demo tables: If you are doing demonstrations for large numbers of visitors be careful with the sparks. I've found that many indoor venues (such as trade shows) tend to frown on open flames so your ability to do this demo may be limited. You may have to just show the spark-generating effect and not use the steel wool. On the other hand, burning steel wool is very impressive: youngsters find it fascinating. You can have visitors try their hand at the flint and steel. Occasionally, you'll find one – usually a Boy Scout – who is really good at it. Getting good quality flint (the best material comes from Flint Ridge, Ohio) and good hard steel are keys to a successful demo.