

Title: Collecting Micrometeorites

Objectives: The students will:

1. Understand the origin of meteorites.
2. Find and examine Micro-meteorites.

Background:

"Shooting stars" are not, of course, really stars. They are actually small bits of rock and metal that collide with Earth's upper atmosphere and, because of friction, burn up. On rare occasions, man made satellites and spacecraft parts fall into the atmosphere and burn up the same way.

The flash of light from this incineration is correctly called a meteor. A meteor is formed when an object, usually the size of a marble or a piece of popcorn, hits the atmosphere at an altitude of 80 to 100 kilometers. The air at that height is very thin but the objects are moving at tens of thousands of kilometers per hour. To get an idea of what friction does, place your hands together and rub them back and forth. Now rub faster. What is happening? That is what is happening to the particles in the upper atmosphere.

Larger objects do not burn up completely. Surviving fragments fall through the atmosphere and land on Earth. Once one of these objects lands it is called a meteorite. Most meteorites fall into Earth's oceans.

Meteorites can be either rock, metal (nickel and iron) or a mixture of both. Stony meteorites are difficult to identify. They do not glow or give off radioactivity. Stones outnumber metals.

But metallic meteorites are easier to find. Rarely are chunks of metal found lying about. A metal detector can be used to search for metallic meteorites. Dry barren areas where there is little vegetation to cover up the ground and turn over the soil are the best. Dry lake beds are good places to search since wind can blow dust off of the surface leaving the meteorites exposed. Many meteorites are found on the Antarctic ice sheet.

Activity:

There is an easy way to collect meteorites, but we must be satisfied with finding small metal ones. They are actually microscopic and are known as micrometeorites. Tons of these fall on Earth each day.

To collect micrometeorites you need to find a place where they can become concentrated. The drains of a house or building work well since rainwater can wash particles off of an entire roof and collect them at the drain spout. Tile roofs are best since they drain very well and do not produce many other sorts of particles or debris.

But dust, plants, pieces of window screens and all other sorts of airborne material also collect there. To find the metallic micrometeorites, collect and dry some of the material from a deep bowl at the base of the drain spout. After removing leaves and other debris, place the remaining material on a piece of paper and place a magnet under the paper. Tilt and tap the paper so that all of the non-metallic particles fall off.

Many of the remaining metallic particles are pieces of space dust! To examine them, place the paper under a microscope. High power will be required to see them clearly. Most of the particles are not from space but the micrometeorites will show signs of their fiery trip through the atmosphere. They will be rounded and may have small pits on their surfaces.

Much of what you are observing are particles that date from the formation of the solar system around 4.6 billion years ago! They are the debris remaining from the raw materials that formed into the nine known planets and the asteroids. Most particles have been broken off or ground down from larger objects.

Resources:

Jet Propulsion Laboratory Public Education Office
Mail Stop CS-530, 4800 Oak Grove Drive, Pasadena CA 91109

Educators can write to the JPL Teaching Resource Center, at the address above, for additional materials.

Evaluation:

No evaluation given