

Meteorite or Meteorwrong? ...the Path to Identification

Have you ever wondered if that “interesting rock” is a meteorite?

Here are some clues that are used to help distinguish real meteorites from terrestrial rocks and manmade materials. Further classification of meteorite type requires sophisticated analytical techniques. When in doubt ask a meteoriticist.

- **Does the rock have a fusion crust?**

This is a thin, black coating formed as a meteorite passes through Earth’s atmosphere. Fusion crust weathers to a rusty-brown color the longer it is exposed to oxygen and water. Don’t be fooled by black desert varnish that is very common in desert regions or slags that have a “melted” appearance.

- **Does the “fusion crust” look different than the interior of the rock?**

It should be smooth and not too rough or frothy. It won’t necessarily look melted.

- **Is the sample magnetic?**

Most meteorites are very magnetic and are easily found with metal detectors. But so are many meteorwrongs such as iron-bearing rocks and metal debris. If the sample is not magnetic, does it have a fusion crust? Some rare meteorites are not noticeably magnetic.

- **If the sample is dense (heavy for its size), is it metallic?**

The densest meteorites are the iron-nickel and stony-iron type. Stony meteorites may or may not seem heavier than common rocks. Some rocks and slag are very dense.

- **Iron-nickel meteorites will exhibit a diagnostic criss-cross “Widmanstätten” pattern when etched with a special acid mixture.** This is best done in a laboratory.

- **Do you see small flecks of metal inside the sample?**

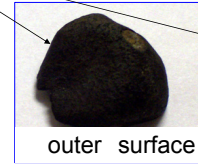
This is a very important feature of ordinary chondrites. These are sometimes confused with glints of light reflected from crystal faces. Use a magnifier or microscope to check.

- **Are there chondrules (tiny, 1mm diameter, spheres) visible in the interior?**

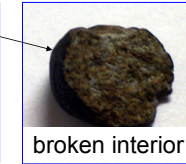
These may or may not be easily discernable depending on the meteorite type. (Iron-nickel meteorites and some rare stony meteorites don’t have chondrules).

Typical Meteorites

Fresh, black fusion crust

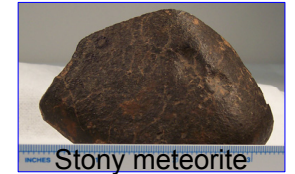


outer surface



broken interior

Weathered fusion crust



Stony meteorite

iron-nickel meteorite

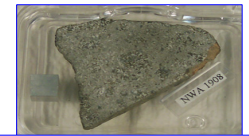


Cut & etched iron-nickel meteorite

Odessa IAB

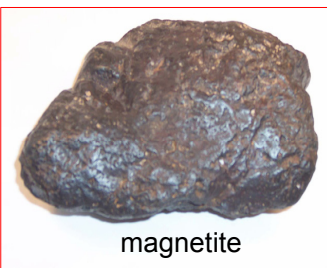


Metal flecks & chondrules

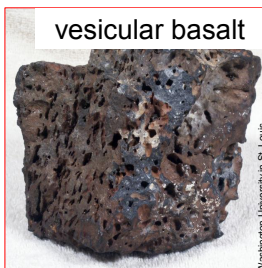


Rare stony meteorite: no chondrules, not very magnetic.

Typical Meteorwrongs: Iron tools, mill balls, slag, magnetite, hematite, iron-rich rocks, basalt, volcanic rocks, clinkers, river rocks, concretions.



magnetite



vesicular basalt

Washington University in St. Louis



Iron debris



concretions

Washington University in St. Louis

- **Does the rock have vesicles or gas bubbles?**

Very few meteorites have vesicles large enough to see.

- **Does the sample have large, colorful crystals?**

Meteorites generally lack large, colored crystals like those seen in geodes.

- **Does the sample have sedimentary texture?**

Meteorites do not exhibit layers or cemented grains or pebbles.

- **Is the rock colored (red, purple, blue)?**

Meteorites are not very colorful. Colors in terrestrial rocks are often formed from mineral rich fluids (water).

- **Are there other rocks like this one in the area?**

If so, this is a clue there might be a reasonable geological explanation as in magnetite and concretions.