

Girl Scout Meteorite Samples

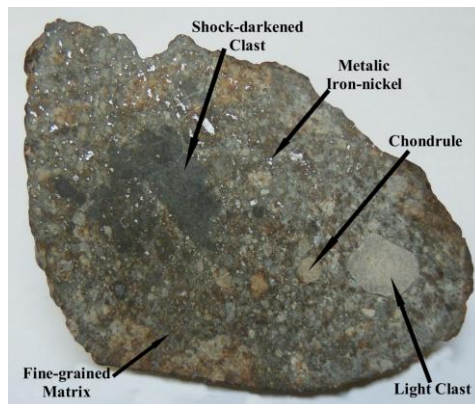
Earth Rocks:

The two rocks on the left are both Earth rocks. The top one is a volcanic rock called a vesicular basalt. It is the type of rock that is used to decorate fish tanks (pumice) because it is so light. It has lots of holes (vesicles). “As magma rises to the surface the pressure on it decreases. When this happens, gasses dissolved in the magma are able to come out of solution, forming gas bubbles (the cavities) inside it. When the magma finally reaches the surface as lava and cools, the rock solidifies around the gas bubbles and traps them inside, preserving them as holes filled with gas called vesicles” (Wikipedia).

The bottom rock is an ordinary rock from the author’s yard.

Chondrite Meteorite:

The next two rocks from the left are cut and polished stony meteorites. Stony meteorites make up about 97% of all known meteorites and chondrites make up about 95% of the stony meteorites. Ordinary chondrites make up more than 95% of the known chondrites (hence the term “ordinary”). Chondrites are primitive (undifferentiated) meteorites. Chondrites are stony (non-metallic) meteorites that are made up mostly of silicates, traces of iron, and sometimes carbon and water. Many, but not all, chondrites contain chondrules. Chondrules form as molten or partially molten droplets in space before being accreted to their parent asteroids. Chondrites represent one of the oldest solid materials within our Solar System and are believed to be the building blocks of the planetary system. Chondrites have not been modified due to melting or differentiation of the of the parent body.

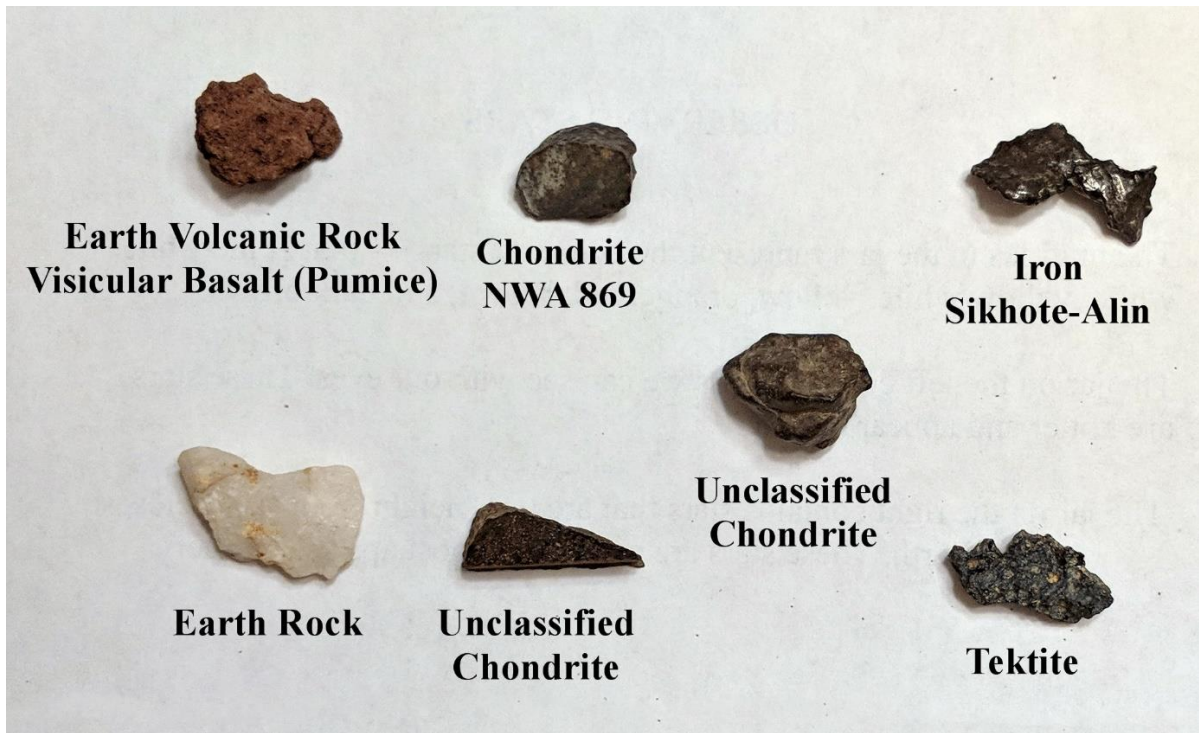


The top chondrite is call NWA 869—the 869th meteorite found in Northwest Africa to be classified. Its surface has been weathered over the years it has been sitting on the ground. NWA 869 is an ordinary chondrite and specifically a chondritic breccia. Regolith breccias are rocks composed of broken fragments of rocks or minerals cemented together by a fine-grained matrix. The rock formed from impact ejecta which was later buried by newer impacts and lithified (solidified) due to the pressure from overlying layers. However, the pressure was not enough to heat and destroy the chondrules. The bottom cut meteorite is also an ordinary chondrite. It was also found in Northwest Africa, but has not been classified since this type of meteorite is so common. It has been heated or under sufficient pressure to destroy all of the chondrules, but is still clearly a meteorite because you can still see the metallic iron-nickel

flakes in it. The next meteorite is an unclassified chondrite, not cut, and shows the slightly melted *fusion crust* formed as the outer surface melted during atmospheric entry.

Iron Meteorite:

The next rock, on top right, is an iron meteorite. This iron meteorite is called Sikhote-Alin and was seen to fall in Siberia in 1947. Iron meteorites are differentiated meteorites and are thought to represent the cores of differentiated asteroids. Iron meteorites consist of almost pure metallic iron with small amounts of nickel and sulfur. Polished faces are commonly treated with dilute nitric acid to bring out the Widmanstätten pattern—parallel patterns of lines intersecting at various angles delineating bands of crystals of kamacite (low nickel) and taenite (high nickel) iron alloys. Iron meteorites were once completely molten and, as indicated by sizes of some individual crystals as large as several meters, cooled slowly over millions of years. It is estimated that the parent bodies of the iron meteorites ranged from a little over 100 km to nearly 1,000 km (the size of Ceres) in diameter. Irons are grouped by chemical composition. Known irons originate from 60–70 parent bodies.



Tektite:

The rock on the bottom right is a tektite. A tektite is an Earth rock that has been melted (or vaporized) by hypervelocity impact. The material has been ejected from the impact crater and, as the molten material reenters the atmosphere, cools rapidly forming unusual shapes due to passage through the atmosphere, spinning, and landing while still slightly soft. While it is the result of the impact of a large “rock from space,” it is not a meteorite, it is an impactite.