

***The name of this Student Text is
“How do Comets Evolve?”***

The ices, dust and rocky debris that originally made up comets have changed over the billions of years since they were formed.

About half the mass of comets is made of ices of volatile substances. The other half of a comet’s mass is made of rocklike dust bound together by the ices.

With each approach to the sun some of the comet’s dust and volatile material leaves the surface and go off into space. So, as the comet orbits the Sun, its surface changes shape; that is, it evolves.

Volatiles are substances that change into a vapor at a relatively low temperature. In comets, these volatiles are in the form of solid ices when they are at temperatures below two hundred Kelvin.

Examples of volatiles include solid water, the ice with which we are very familiar, and solid carbon dioxide, which we call “dry” ice. Solid ammonia is also found in comets.

When energy from the Sun warms the region of the comet in which volatiles are found, it “bakes” the ices out of the material near the surface. This

sublimation of ices leaves the surface with a dry, powdery consistency.

Solids found in the comet's interior can be carried along with the ices that turn directly into gas. Some of these grains have enough energy to move into the coma where they move in their own orbit.

Other grains that are moving more slowly may be swept up by the comet again and some may just not leave the surface.

Impact craters on comets are important to understanding the evolution of comets. Collision with other Solar System bodies may cause craters and debris from these collisions can also “powder the face” of comets.