Name _____

The Role of Small Solar System Bodies in Planetary Science

Asteroids, comets, and meteoroids play an essential role in shaping our understanding of the solar system's history and structure. These objects are often referred to as "leftovers" from the planetary formation process-fragments that never coalesced into full planets due to gravitational disruptions and other factors.

Asteroids, typically found in the asteroid belt, are rocky or metallic in composition. Some are hundreds of kilometers wide, while others are the size of pebbles. Though most asteroids follow predictable orbits, some near-Earth asteroids (NEAs) pose potential threats due to their trajectories bringing them close to our planet. Efforts like NASA's DART mission aim to study and potentially redirect such objects in the future.

Comets, which originate from the colder, outer parts of the solar system, such as the Oort Cloud, are composed primarily of ice, dust, and organic compounds. As a comet nears the Sun, solar radiation causes sublimation of its icy components, producing a glowing coma and sometimes multiple tails. The solar wind pushes these tails away from the Sun. Studying comets can offer insight into the composition of the early solar system and even theories about how water and organic molecules were delivered to Earth.

Meteoroids are significantly smaller and are often created when larger objects like asteroids or comets break apart. If one enters Earth's atmosphere, it becomes a meteor; should it survive the descent, it's known as a meteorite. Some meteorites contain carbon-rich materials and even amino acids, supporting hypotheses that organic material from space may have contributed to the origins of life on Earth.

Comprehension Questions

1. What are near-Earth asteroids, and why are they significant?

2. How do scientists believe comets may have influenced life on Earth?

3. What causes a comet's tail to always point away from the Sun?

4. What is the difference in composition between comets and asteroids?

5. Why might meteorites be considered important to the study of life's origin?