Name _____

Exploring the Cosmic Ingredients: The Composition of Comets

Open-Ended Response Answer Key

1. Comets are indeed "time capsules" of the early solar system as they contain materials that have remained relatively unchanged for billions of years. They provide information about the composition of the early solar system, the presence of ices, organic molecules, and the conditions that led to its formation. This helps us understand the building blocks of planets and the potential for life's emergence.
2. The discovery of complex organic molecules on a comet would suggest that these molecules can exist in diverse environments in the universe. It would expand our understanding of the distribution of organic compounds and their relevance to the origins of life beyond Earth.
3. Gas tails and dust tails differ in their composition and formation. Gas tails consist of ionized gas pushed away from the Sun by the solar wind, while dust tails contain solid particles released by the comet. Gas tails are usually bluish and point directly away from the Sun, while dust tails are yellowish and follow a curved path.
4. Objectives of a space mission to study a comet might include collecting samples, analyzing the comet's composition, studying its behavior, and monitoring its interaction with solar wind. Challenges may include spacecraft navigation, withstanding solar radiation, and ensuring successful sample collection and analysis.