

Name \_\_\_\_\_

## The Mystery of Minerals: Identifying Through Physical Properties

### Open-Ended Response Answer Key

1. The Mohs scale of mineral hardness is crucial in mineral identification because it helps geologists and mineralogists determine a mineral's resistance to being scratched. This property is often one of the most reliable ways to identify minerals since it provides a direct comparison between different minerals. For example, talc, with a hardness of 1, is incredibly soft and can be easily scratched with a fingernail. Quartz, with a hardness of 7, is harder and cannot be scratched by a fingernail but can be scratched by a steel file. Diamond, at the top of the scale with a hardness of 10, is the hardest mineral and can only be scratched by another diamond. So, when identifying minerals, their relative positions on the Mohs scale help us determine which mineral can scratch another, providing a valuable clue for identification.
2. Given the provided properties of glassy luster, a hardness of 7, and a density of  $2.7 \text{ g/cm}^3$ , I can narrow down the possibilities for this mineral. The glassy luster suggests a non-metallic appearance, and the hardness of 7 places it in the middle range on the Mohs scale, eliminating the softest and hardest minerals. The density of  $2.7 \text{ g/cm}^3$  is consistent with many common minerals. Based on these properties, one possible identification could be quartz, which matches all the given properties. However, further tests or observations would be needed to confirm the identification, as other minerals could also share these properties.
3. One example of a mineral with a unique crystal habit is halite, or table salt. Halite often forms cubic crystals with perfect cleavage, meaning it breaks into perfect cubes. The distinctive growth pattern of halite crystals is due to its crystal structure and the way its sodium and chlorine atoms arrange themselves during growth. This cubic habit is an excellent identification characteristic because it is relatively rare among minerals, and few other minerals form such distinct, well-defined cubes. When identifying minerals, observing their crystal habit can provide valuable clues, helping geologists distinguish between different minerals with similar physical properties.
4. The study of a mineral's physical properties is essential for geologists and scientists because it serves as a fundamental tool in understanding Earth's processes and history. These properties provide valuable information about the conditions under which minerals formed, the geological processes that shaped them, and the history of the Earth itself. For example, a mineral's hardness can indicate the level of abrasion it has experienced over time, providing insights into past environmental conditions. The density of minerals can offer clues about their origin and how they have been transported within the Earth's crust. Additionally, the study of mineral properties aids in the identification of rock types, which in turn helps geologists reconstruct geological events and the Earth's evolution over millions of years.

