

## MINERAL IDENTIFICATION

**INTRODUCTION:** Minerals are naturally occurring inorganic substances made up of definite combinations of chemical elements and are crystalline solids. Their atoms are arranged in an orderly and repeated pattern. Minerals make up rocks which make up the solid portion of our earth. Over 4,000 different minerals have been identified by scientists world-wide.

**PURPOSE:** This activity is designed to teach students how to identify minerals through familiarization of their physical and chemical properties. This will be accomplished through observation and testing procedures.

### ITEMS NECESSARY FOR THIS ACTIVITY:

- Eye dropper bottle with white vinegar or 0.1 % Hydrochloric acid solution (HCl)
- Glass plate
- Penny
- Streak plate (unglazed white porcelain)
- Magnet
- Steel nail, blade or file
- Nevada Mining Association mineral kit with a Mineral Information Key insert
- The **Mineral Background** sheet
- Mineral Identification Worksheet
- Pencil or pen

### PROCEDURE:

1. The mineral samples contained in the Nevada Mining Association black box kit will be used for this activity. Each student will perform a series of tests on **two** of the minerals in the kit.
2. Each student should be equipped with the items listed above.
3. Students should read the **Mineral Background** sheet in order to become familiar with the tests they will perform.
4. Remove 2 minerals from the kit and close the cover of the box. List the two minerals of choice by name and number (taken from the mineral kit key) on the Mineral Identification Worksheet. Perform the tests described on the **Mineral Background** sheet and record the resulting information in the appropriate space on the sheet. A time limit of 10 - 15 minutes per mineral is adequate.
5. When the tests have been completed, look at the Mineral Information Key in the cover of the mineral kit and compare the information obtained from the tests to the information contained on the key.

### A VARIATION OF THE PREVIOUS ACTIVITY IS DESCRIBED BELOW:

1. Using the mineral samples from the kit, set up stations around the classroom with one or two samples and a set of test equipment. **Do not** label the samples with their names or the identification numbers.
2. Divide students into groups with the number of groups equal to the number of mineral stations.
3. Distribute the **Mineral Background** sheet (attached to this exercise) and a Mineral Identification worksheet to each student. Have the students read the **Mineral Background** sheet.
4. Have the groups of students move to the mineral stations, one group per station. Students will perform the physical property tests listed on the **Mineral Background** sheet. A time limit of 3 to 5 minutes per mineral should be adequate for performing tests. Students will record the test information on the Mineral Identification worksheet.
5. Have the groups rotate from station to station until all stations have been visited and the Mineral Identification worksheet is completed.
6. Hand out copies of the mineral information key that comes with the mineral kit. Have the students compare their test results with the information listed on the mineral information key. Can the students correctly name each of the minerals using their worksheets? Write the name of each mineral in the appropriate space on the Mineral Identification worksheet.

## MINERAL BACKGROUND SHEET

The following information is provided to aid students in becoming familiar with the physical properties that must be observed in order to identify minerals:

**SMELL:** Describes the odor given off by the mineral sample. Smell can be described as:

- Earthy
- Sour
- Sweet
- Rotten Egg

**LUSTER:** Describes the surface of the mineral sample. Luster can be described as:

- Glassy/Vitreous – shines like glass
- Earthy/Chalky – dull or dirt-like
- Metallic – shines like metal
- Waxy/Silky/Pearly – dull shine

**CHEMICAL:** Describes the chemical reaction of the mineral.

- Sample fizzes when **white vinegar** or 0.1% hydrochloric acid (HCl) solution is applied by eye dropper to sample.
- **Note:** some minerals will fizz with heated HCl or white vinegar. Others will only fizz if the vinegar/HCl is applied to a ground-up portion of the mineral. If your sample does not fizz at first, try scraping some bits off with a nail and testing the resulting powder.

**MAGNETIC:** Describes the reaction when a magnet is applied to a mineral sample.

- Is the mineral attracted or not attracted to the magnet?

**COLOR:** Describes the color of each mineral sample.

- This is not always the best way to classify a mineral as many different minerals can have a range of colors. For example the mineral quartz can be colorless, white, purple, pink, brown, and black. It can also appear gray, green, orange, yellow, blue, or red. The mineral calcite can be Colorless, white, yellow, brown, orange, pink, red, purple, blue, green, gray, black.

**STREAK:** Describes the color of the powdered mineral residue when the sample is scraped across a plate of unglazed porcelain:

- Is the color the same as or different from the color of the sample?
- Note that some minerals are harder than the streak plate and will therefore scratch the streak plate. It is important to not the difference between a white streak and a scratched streak plate.

**FEEL:** Describes the way a mineral sample feels when touched:

- Gritty – Sandy
- Powdery – Earthy or Chalky
- Smooth – Glassy
- Smooth & Sticky – waxy
- Sharp – Metallic

**HARDNESS:** Compares the hardness of the mineral with other materials of known hardness.

- Scale of 1 – 10 with 10 being the hardest and one being the softest mineral. See the **Mohs Hardness Scale** handout for more information.

**WEIGHT/DENSITY:** Compares the weights and densities of the mineral samples.

- For more information see the **Identifying Minerals Using Hardness and Density** activity.