

ACTIVITY 2. MINERAL IDENTIFICATION

NOTE TO TEACHERS: This activity conforms to the Nevada Science Content Standards listed below:

Grade 4 and 5

- ✓ Scientific Inquiry (Nature of Science Unifying Concept A):
 - USING DATA**
 - N.5.A.1 - Investigations
 - N.5.A.2 - Comparing results
 - RECORD KEEPING**
 - N.5.A.3 - Drawing Conclusions from Evidence
 - SAFE EXPERIMENTATION**
 - N.5.A.5 - Plan and conduct a safe and simple investigation

- ✓ Science, Technology and Society (Nature of Science Unifying Concept B):
 - RISKS AND BENEFITS**
 - N.5.B.1 - Diversity
 - COLLABORATION**
 - N.5.B.3 - Team Work and Sharing

- ✓ Matter (Physical Science Unifying Concept A)
 - PROPERTIES OF MATTER**
 - P.5.A.1 - Matter Exists in Different States Which Have Distinct Physical Properties
 - P.5.A.3 - Material Classification by Observable Physical and Chemical Properties

- ✓ Earth's Composition and Structure (Earth and Space Science Unifying Concept C)
 - EARTH'S COMPOSITION AND RESOURCES**
 - E.5.C.4 - Rock is Composed of Different Combinations of Minerals

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 with 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
- ★ Quartz crystal
- ★ Penny
- ★ Streak plate (unglazed white porcelain)
- ★ Magnet
- ★ Steel nail, blade or file
- ★ Nevada Mining Association mineral kit with “Mineral Information Key” insert
- ★ The **MINERAL BACKGROUND** sheet
- ★ Mineral Identification Worksheet
- ★ Pencil or pen

ACTION:

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 from the kit.
2. Divide students into groups with the number of groups equal to the number of mineral stations.
3. Distribute a **MINERAL BACKGROUND** sheet 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 – Describe the odor given off by the sample:

- Earthy
- Sour
- Sweet
- Rotten Egg

LUSTER – Describe the surface of the mineral sample:

- | | | | |
|--------------------------|-------------------|---|-------------------|
| <input type="checkbox"/> | Glassy/Vitreous | - | shines like glass |
| <input type="checkbox"/> | Earthy/Chalky | - | dull or dirt like |
| <input type="checkbox"/> | Metallic | - | shines like metal |
| <input type="checkbox"/> | Waxy/Silky/Pearly | - | dull shine |

CHEMICAL – Describe the chemical reaction:

- ★ Sample “fizzes” when **heated white vinegar** or 0.1 % hydrochloric acid solution is applied by eye dropper to sample.

MAGNETIC – Describe the reaction when a magnet is applied to samples.

- ▶ Attracted or not attracted to the magnet.

COLOR – Describe the color of each sample:

STREAK – Describe 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?

FEEL – Describe the way the sample feels when touched:

- | | | | |
|--------------------------|-----------------|---|------------------|
| <input type="checkbox"/> | Gritty | - | Sandy |
| <input type="checkbox"/> | Powdery | - | Earthy or Chalky |
| <input type="checkbox"/> | Smooth | - | Glassy |
| <input type="checkbox"/> | Smooth & Sticky | - | Waxy |
| <input type="checkbox"/> | Sharp | - | Metallic |

HARDNESS – Compare the minerals’ hardness with materials of known hardness:

<u>Moh’s Scale of Hardness</u>	<u>Mineral Scratched by:</u>
1	
2	Fingernail
3	
4	Penny
5	Steel (Nail, blade or file)
6	Glass plate or quartz crystal
7-10	Mineral will scratch steel blade/glass plate**

****NOTE TO TEACHERS:** When students are using the glass plate, the plate should always be positioned on a flat surface and the mineral sample scratched across it. Never hold the plate in one’s hand! The glass plate could break, resulting in injury.

WEIGHT – Compare the weights of the mineral samples:

- Weight varies from very light (**gypsum**) to very heavy (**magnetite**).

Mineral Identification Worksheet

Mineral	Smell	Luster	Chemical (reacts with HCl)	Magnetic	Color	Streak	Feel	Hardness	Weight