Student Sheet

Science as Inquiry

A Physical Challenge

Can elements be classified by physical properties?

Overview:

How do we know something is a metal? This activity provides the physical tests to determine this answer.

Procedure:

Obtain element samples labeled A through G. Make observations of these properties: color, luster, malleability, conductivity and density. Make a data table to record your observations, first recording the color and luster of each sample. Next, tap each sample with a hammer to determine if the element is malleable (flattens out) or brittle (shatters). Gently rub each sample with sandpaper. Construct a conductivity apparatus using the materials provided and test each sample for conductivity. Observe and record whether the results indicate that the material is a conductor or nonconductor. Obtain the density of each sample. To get the volume, drop the sample into a graduated cylinder containing water and note the volume difference. Use your observations and the "Table of Densities" supplied by your teacher to determine which samples are metals, which are nonmetals, and the identity of each metal.

Questions:

1. Which lettered samples of elements were metals? Which were nonmetals?

2. What are some common characteristics of metals?

3. What are some common characteristics of nonmetals?

4. Could any of the elements you tested be called metalloids? Which ones? Why did you classify them in this manner?

5. Is there any generalization you can make about the densities of metals vs. nonmetals?

6. Identify the name of each element you tested, e.g., A=iron, B=zinc, etc.

7. Are the other properties you did not report on or test in this activity that might distinguish a metal from a nonmetal?

8. Are there any properties that you observed that might give you a clue why nonmetals are poor conductors of electricity?

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