



LESSON PLAN

Subject: 8th Grade Science

Lesson: Forging Metals and Metallic Properties

Standards Addressed:

- Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. (8.P.1.2)
- Compare physical changes such as size, shape and state to chemical changes that are the result of a chemical reaction to include changes in temperature, color, formation of a gas or precipitate. (8.P.1.3)

Objectives:

- Students will be able to classify materials based on properties.
- Students will be able to assess the physical properties of color, luster, conductivity and malleability.
- Students will be able to draw conclusions about an element's placement on the Periodic Table and that element's physical and chemical properties.

Materials Needed:

- Devise for showing *Forging Metals and Metallic Properties* video
- "From Chaos to Order" activity sheet
- "Bag of Chaos" items (iron, copper, aluminum, tin, sulfur, charcoal, wood, plastic, etc.)
- Circuit-testing materials: wires, AA batteries, light bulbs

Outline:

- Prior to this lesson, students should understand that matter can be categorized and arranged on the Periodic Table based on physical and chemical properties.
- Show the video.
- Discuss the activity prompts.
- Students complete the activity with a partner or as a group.

Take It Further: Have students color code metals, nonmetals and metalloids on the periodic table. Have students identify and describe the properties of alkali metal, alkaline earth metals, transition metals, lanthanides, and actinides. Students should color-code a periodic table to identify each of these groups.

Cross-Curriculum Connection: If you could be a superhero in the form of an elemental metal or metalloid which would you choose? What special properties would you have? Research your chosen elemental metal and write a short story (being accurate and descriptive regarding the state of metallic element that you have chosen) about a heroic deed you performed.





From Chaos to Order

8th Grade Science

Student Name _____

Date _____

Activity 1: Forming Categories Based on Physical Properties

Examine the items in your “Bag of Chaos”. Using what you know about the physical properties of elements, try to group the items according to the elements of which they are made.

Category of Element	Items	Reasons for Placing Items in This Category
Metals		
Nonmetals		
Metalloids		



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Student Name _____

Date _____

Activity 2: Assessing Physical Properties

Follow the directions below to assess each of the items' physical properties. Record your results in the table.

Color: Describe the color of each item.

Luster: Describe the luster (shininess) of each item. You can do so by ranking the luster of the items. (For example, "This item has the greatest luster.")

Conductivity: For this test, prepare a circuit by following these steps:

1. Connect one end of a wire to a battery. Temporarily leave the other end of the wire loose.
2. Connect a second wire between the other end of the battery and the light bulb.
3. Connect a third wire to the light bulb. Temporarily leave the other end of the wire loose.
4. Now connect the item between the two loose ends of wire: one from the battery and one from the light bulb.

If the bulb lights (even faintly), then the item is conductive. You may want to double-check each item for this test. You can describe the items' conductivity like you did for *luster* by ranking them.

Malleable: Try to bend or flatten each item. If the item bends or flattens, then the item is malleable. If the item breaks or does not change, then it is not malleable. Describe each item's malleability.

Item	Color	Luster	Conductivity	Malleable





From Chaos to Order

Student Name _____

Date _____

Activity 3: Drawing Conclusions about Physical Properties and Elements

Review your responses in Activity 1 but do not change anything. Explain how you can use what you learned in Activity 2 to better categorize the items in the “Bag of Chaos”.

Activity 4: Considering Chemical Properties

In this activity, we examined only physical properties. Explain what **chemical** properties you could investigate to further assist you in placing these items in the proper category.



From Chaos to Order

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Answer Key

Activity 1: Forming Categories Based on Physical Properties

Examine the items in your “Bag of Chaos”. Using what you know about the physical properties of elements, try to group the items according to the elements of which they are made.

Category of Element	Items	Reasons for Placing Items in This Category
Metals	<p>Possible responses, depending on what is placed in the bag:</p> <p>Iron Copper Aluminum Tin</p>	<p>Possible responses:</p> <p>They are shiny. I think they will conduct heat and electricity. I think they are magnetic. They are heavy for their size (dense).</p>
Nonmetals	<p>Possible responses, depending on what is placed in the bag:</p> <p>Sulfur Charcoal Wood Plastic</p>	<p>Possible responses:</p> <p>They are not shiny. I do not think they will conduct heat or electricity. I do not think they are magnetic. They do not seem to be very dense.</p>
Metalloids	<p>Possible responses, depending on what is placed in the bag:</p> <p>Boron Silicon Antimony</p>	<p>Possible responses:</p> <p>They are shiny like metals but seem more brittle.</p>

From Chaos to Order

Answer Key

Activity 2: Assessing Physical Properties

Follow the directions below to assess each of the items' physical properties. Record your results in the table.

Color: Describe the color of each item.

Luster: Describe the luster (shininess) of each item. You can do so by ranking the luster of the items. (For example, "This item has the greatest luster.")

Conductivity: For this test, prepare a circuit by following these steps:

1. Connect one end of a wire to a battery. Temporarily leave the other end of the wire loose.
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4. Now connect the item between the two loose ends of wire: one from the battery and one from the light bulb.

If the bulb lights (even faintly), then the item is conductive. You may want to double-check each item for this test. You can describe the items' conductivity like you did for *luster* by ranking them.

Malleable: Try to bend or flatten each item. If the item bends or flattens, then the item is malleable. If the item breaks or does not change, then it is not malleable. Describe each item's malleability.

Item	Color	Luster	Conductivity	Malleable
Iron	Bluish black	Slight unless polished	High	Yes
Copper	Orange/brown	Very shiny	Extremely high	Yes
Aluminum	Sliver	Very shiny	Extremely high	Yes
Tin	Sliver	Shiny	High	Yes
Sulfur	Yellow	Little	No	No
Charcoal	Black	No	No	No
Wood (Pine)	Yellow/white	No	No	No
Plastic (Clear)	Translucent	Slight	No	Slightly



From Chaos to Order

Answer Key

Activity 3: Drawing Conclusions about Physical Properties and Elements

Review your responses in Activity 1 but do not change anything. Explain how you can use what you learned in Activity 2 to better categorize the items in the “Bag of Chaos”.

Responses may be similar to:

Electric conductivity allowed for a better understanding of each material. When the light shined brightest, the object could be determined to be a better conductor of electricity. When an object is identified to be lustrous, malleable, and conductive it could be assumed that the object is a metal.

Activity 4: Considering Chemical Properties

In this activity, we examined only physical properties. Explain what chemical properties you could investigate to further assist you in placing these items in the proper category.

Responses may be similar to:

I could test to see if the items are flammable. I could test to see how items react with oxygen, water and other substances. I could determine if the items' toxicity, acidity and reactivity.

