LEARNING IN PLACE

LESSON PLAN

Subject: Grade 8 Science **Lesson:** *Brass Casting: Sea of Electrons*

Standard Addressed: Understand the properties of matter and changes that occur when matter interacts in an open and closed container. (NC.8.P.1)

Objectives:

- Students will classify matter as elements, compounds, or mixtures.
- Students will use the Periodic Table to identify the physical properties of elements and their reactivity.
- Students will 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.

Materials Needed:

- Device for showing the video: *Brass Casting: Sea of Electrons*
- Brass Casting activity

Outline:

- Prior to this lesson, students should understand that all matter is made up of atoms and atoms of the same element are all alike but are different from atoms of other elements. Students should also be familiar with the Periodic Table and be able to use it to find an element's symbol, atomic number, atomic mass, state of matter at room temperature, and number of outer energy level electrons.
- Show the 7:17 minute video, https://youtu.be/iZ9c3v9f8fg
- Discuss the activity prompt.
- Students finish the activity independently or with a partner.

Take It Further: Have students investigate plasmas and prepare a digital presentation. The presentation should include information about the arrangement of atoms in plasmas, examples of plasmas, where most plasmas are found, and what family of elements can be transformed into plasmas (including how this is achieved).

Cross-Curriculum Connection: If you could be a superhero in the form of a solid, a liquid, or a gas, which would you choose? What special properties would you have? Write a short story (being accurate and descriptive regarding the state of matter you have chosen) about a heroic deed you performed.

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BRASS CASTING: Sea of Electrons

Grade 8 Science

Name: _____ **Date**: _____

You saw the process of brass casting in the video. Casting metal involves knowing about elements and chemical reactions.

Using what you have learned about elements and chemical reactions, complete the following.

1. Compare *elements*, *mixtures,* and *compounds.*

ELEMENTS	MIXTURES	COMPOUNDS

2. Is brass an element, mixture, or compound? Explain.

_____

_____

_____

3. Explain why brass is an alloy?

_____

_____

_____

Grade 8 Science

LEARNING IN PLACE

BRASS CASTING: Sea of Electrons

Name: _____ **Date**: _____

4. Using the Periodic Table, enter the information about brass in the chart below.

ELEMENTS THAT FORM BRASS	SYMBOL OF EACH ELEMENT	ATOMIC NUMBER OF EACH ELEMENT	ATOMIC MASS OF EACH ELEMENT	STATE OF MATTER AT ROOM TEMPERATURE OF THIS ELEMENT	NUMBER OF OUTER ENERGY LEVEL ELECTRONS OF EACH ELEMENT

5. Using your completed chart, explain how many protons are in each element that makes up brass.

_____

_____

6. What is ductility? Is it a *physical* or *chemical* property? Explain.

_____

_____

_____

7. Using the periodic table, tell whether the following are *metals*, *nonmetals* or *metalloids*.

A. Argon _____ C. Cadmium _____

B. Antimony _____ D. Carbon _____

8. Which of the elements listed in the question above have chemical properties similar to the elements that make up brass?

_____

BRASS CASTING: Sea of Electrons

Grade 8 Science

ANSWER KEY

You saw the process of brass casting in the video. Casting metal involves knowing about elements and chemical reactions.

Using what you have learned about elements and chemical reactions, complete the following.

1. Compare *elements*, *mixtures,* and *compounds. Possible responses include:*

ELEMENTS	MIXTURES	COMPOUNDS
Elements are pure substances that cannot be changed into simpler substances. Elements are composed of one kind of atom.	Mixtures are physical combinations of two or more different substances that retain their own individual properties when they are combined (mixed together). Mixtures can be separated into their components by physical means (filtration, sifting, or evaporation). Mixtures may be heterogeneous (not uniform throughout) or homogeneous (is uniform throughout).	Compounds are pure substances that are composed of two or more types of elements that are chemically combined. Compounds can only be changed into simpler substances called elements through chemical changes.

2. Is brass an element, mixture, or compound? Explain. *Possible responses include:*

Brass is a mixture. It is a mixture because it is the physical combination of two different substances that retain their own individual properties when they are mixed together. It is not an element because it is composed of more than one type of atom. It is not a compound because the elements composing brass are not chemically combined.

3. Explain why brass is an alloy? *Possible responses include:*

Brass is an alloy because it is composed of two metallic elements.

BRASS CASTING: Sea of Electrons

Grade 8 Science

ANSWER KEY

4. Using the Periodic Table, enter the information about brass in the chart below.

ELEMENTS THAT FORM BRASS	SYMBOL OF EACH ELEMENT	ATOMIC NUMBER OF EACH ELEMENT	ATOMIC MASS OF EACH ELEMENT	STATE OF MATTER AT ROOM TEMPERATURE OF THIS ELEMENT	NUMBER OF OUTER ENERGY LEVEL ELECTRONS OF EACH ELEMENT
Copper	Cu	29	63.546	Solid	1
Zinc	Zn	30	65.38	Solid	2

5. Using your completed chart, explain how many protons are in each element that makes up brass. *Possible responses include:*

There are 29 protons in Copper and 30 protons in Zinc. I know this because the atomic number of elements is the number of protons in that element's nucleus.

6. What is ductility? Is it a *physical* or *chemical* property? Explain. *Possible responses include:*

Ductility is the ability of a substance to be stretched into a thin wire without breaking. Ductility is a physical property because it can be observed and measured without changing the kind of matter being studied.

7. Using the periodic table, tell whether the following are *metals*, *nonmetals* or *metalloids*.

A. Argon nonmetal

B. Antimony metalloid

C. Cadmium metal

D. Carbon nonmetal

8. Which of the elements listed in the question above has chemical properties similar to the elements that make up brass?

Cadmium