

Pre-Lab Homework Assignment

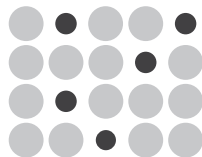
1. A student is preparing to study alloys on lab day. Look at Figure 1 in the *Background* section.
 - a. Are the electrons stationary or mobile? Relate this to the statement “metals are good conductors.”

- b. Can the metal ions easily move around? What does this mean when arguing that a metal is malleable and ductile?

2. Reason through the following particulate-level diagrams. Answer Parts *a–d*.



a.



b.

- a. What type of alloys do these diagrams represent?

- b. Explain why these representations of metallic bonding are not stable?

- c. Redraw correct representations of diagrams a and b.

- d. Observe the new representations from 2c. How would the densities of each compare to the densities of the original metals?

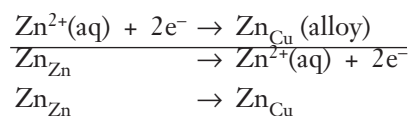
3. Consider a property pure metals possess that makes them more desirable than their alloys.
4. Determine the type of alloy formed in the following scenarios.
 - a. Two different metals with similar atomic radii.
 - b. Two different metals with vastly different atomic radii.
 - c. A metal and a non-metal, where the non-metal has a much smaller atomic radii than the metal.

5. Provide an example of each of the following scenarios.

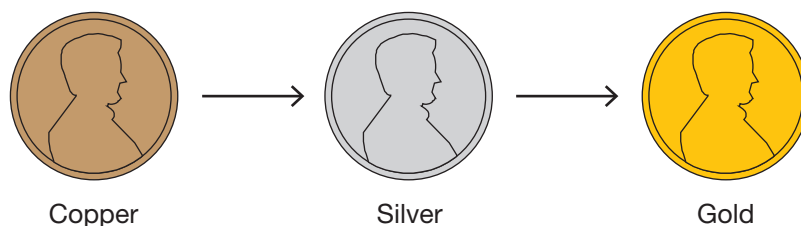
a. An alloy formed from being molten.

b. An alloy formed at room temperature.

6. On lab day, make your own alloy from a penny and determine its identity and the type of alloy. Make sure the penny is very shiny. Place the penny in 25 mL of boiling 1 M zinc chloride solution containing 1 g of granular zinc. The penny develops a zinc “silver-colored” coating. Placing copper, or a copper-coated penny, in a mixture of zinc metal and aqueous zinc chloride causes zinc metal to plate out on the copper surface. This reaction occurs due to electrochemical potential differences that result when different “forms” of zinc solid are contained in a solution of 1 M ZnCl_2 . Overall reactions:



Note: Zn_{Zn} = zinc that deposits on the granular zinc
 Zn_{Cu} = zinc that deposits on the copper
 $E = +1.0 \text{ V}$



With a lab partner, discuss and determine the last step needed to alloy the penny. Once the penny is alloyed, determine the identity of the alloy and type. Following helpful tips:

- Think safety first. Make sure you have the proper personal protective equipment (PPE) available to perform this lab (i.e., goggles, apron and gloves).
- Make a list of the equipment and glassware needed for this lab. What piece of equipment is needed to make the alloy?
- Number the steps in your procedure; remember to be as detailed as possible, from set-up to clean-up.
- Draw necessary data tables in your notebook for data collection during the lab.
- Study the overall reaction given in Question 6, then use scholarly resources to determine the identity and type of alloy made. *Hint:* Look at Table 1. in the *Background* section.