

# Metals

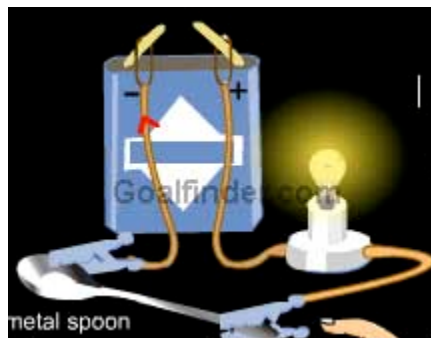
## Physical Properties

- Malleable-material can be pounded into shapes
  - Gold is the most malleable metal followed



by aluminum.

- Ductile-material can be pulled into a wire.
  - Copper wires used for wiring electricity in the house.
- Good conductors of heat and electricity



- Luster-shiny in light



- High Density and Melting Points

### Chemical Properties

- Usually react by losing or sharing electrons
  - The most reactive metal is Fr Francium
  - Gold and Platinum lack reactivity which is why we use them for jewelry

### Non-metals

### Physical Properties

- Brittle-not malleable or ductile



- Poor Conductors of heat and electricity
- Dull
- Low Density and Low Melting points

### Chemical Properties

- Usually react with other compounds by gaining or sharing electrons
  - The most reactive nonmetal is F Fluorine.
  - The nonmetals that do not react are called the Noble gases and they are located in group 18 of the periodic table of elements.

### Metalloids

### Physical Properties

- The metalloids tend to have the same physical characteristics as metals. Malleable, Luster, Ductile, good conductors of heat and electricity.

### Chemical Properties

- The metalloids tend to have the same chemical properties of nonmetals. They react with other elements by gaining or sharing electrons.

## Alkali Metals

Which group are the Alkali Metals in on the Periodic Table?

Group 1 of the periodic table.

The diagram shows a simplified periodic table with the following structure:

- Row 1: 2 cells (1st and 2nd columns)
- Row 2: 2 cells (1st and 2nd columns)
- Row 3: 18 cells (1st to 18th columns)
- Row 4: 18 cells (1st to 18th columns)
- Row 5: 18 cells (1st to 18th columns)
- Row 6: 18 cells (1st to 18th columns)
- Row 7: 18 cells (1st to 18th columns)
- Row 8: 18 cells (1st to 18th columns)
- Row 9: 18 cells (1st to 18th columns)

The first column (Group 1) is highlighted in green. The text "ALKALI METALS" is written in green above the first column.

Are these metals found uncombined (as a pure element) in nature? Why or Why not.

The Alkali metals are not found uncombined in nature because they are very reactive.

As pure elements, the alkali metals are very soft and shiny. What could you use to cut these metals?

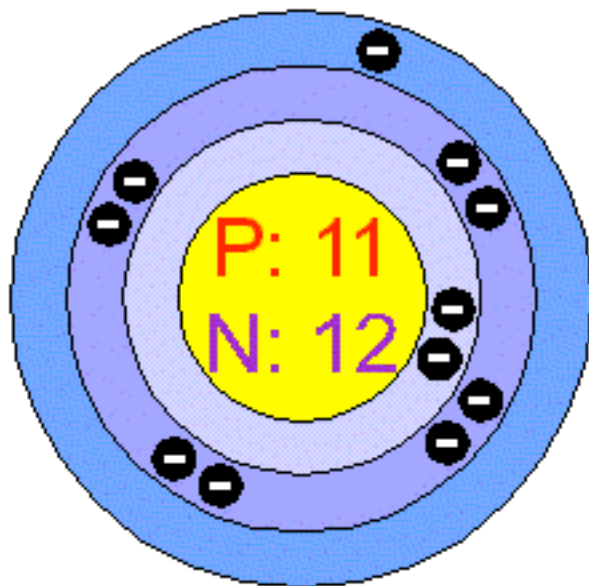
The alkali metals could be cut with a plastic knife.

How many valence electrons do the alkali metals have?

The alkali metals have 1 valence electron

What is a valence electron?

Electrons that are on the outside edge of the atom (furthest away from the nucleus); these electrons are involved in chemical reactions.



What are the two most important alkali metals? And why?

The two most important alkali metals are Sodium and Potassium.

These two metals are important because they are essential for life.

What do we use lithium for?

We use lithium in batteries and some drugs.

Why do the alkali metals lose their only valence electron?

The alkali metals lose the valence electron in order to become more stable.

In a moment we will see a couple of videos showing the reaction of sodium and potassium in water. After those videos write down which one reacted faster (more violently)?



Potassium reacted faster with the water than sodium.

Which one of the alkali metals reacts the fastest?

Francium

## Alkaline Earth Metals

1. What group are the alkaline earth metals located in on the periodic table of elements?
  - a. The alkaline earth metals are located in group 2.
2. Can you find the alkaline earth metals uncombined in nature?
  - a. No the alkaline earth metals cannot be found uncombined in nature.
3. In comparison to the alkali metals, how reactive are the alkaline earth metals?
  - a. The alkaline earth metals are less reactive than the alkali metals.
4. Besides the alkali metals, how reactive are the alkaline earth metals compared to all the other metals?
  - a. The alkaline earth metals are more reactive than most other metals.
5. Give three characteristics for the alkaline earth metals.
  - a. The alkaline earth metals are fairly hard, bright white, and are good conductors of electricity.
6. What are the two most common alkaline earth metals?
  - a. The two most common alkaline earth metals are magnesium and calcium.
7. Magnesium is widely used in an alloy when combined with aluminum. List some items made from such alloys.
  - a. Ladders, airplane parts, and others.
8. Why was magnesium used in light bulbs?
  - a. Magnesium was used in lights because it gives off a very bright light when burned.

9. What is Calcium an essential part of?
  - a. Calcium is an essential part of teeth and bones.
10. In what other ways is calcium important to us?
  - a. Calcium also helps muscles work properly.
11. How do we get calcium into our bodies?
  - a. We get calcium from milk and other dairy products, as well as green, leafy vegetables.
12. What alkaline earth metal is in Limestone?
  - a. Calcium is in the compound that makes up limestone.
13. How many valence electrons do the alkaline earth metals have?
  - a. The alkaline earth metals have 2 valence electrons.

## **Transition Metals**

1. What group (s) are the **transition metals**?
  - a. Group 3 thru 12 are called the transition metals.
2. Why are the metals in group 3 thru 12 called the transition metals?
  - a. The metals in group 3 thru 12 are called the transition metals because they form a bridge between the very reactive metals on the left side of the periodic table and the least reactive metals and other elements on the right side of the periodic table.
3. What are the more familiar metals that are included in the transition metals?
  - a. The more familiar metals of the transition metals are iron, copper, nickel, silver, and gold.
4. What are some characteristics of most of the transition metals?

- a. Most of the transition metals are hard, shiny, and good conductors of electricity.
5. The transition metals are fairly stable, meaning they react slowly or not at all with air and water. What example does the textbook give to support this fact?
  - a. The textbook gives the example of ancient gold coins and jewelry remaining beautiful and detailed even today just like they were thousands of years ago.
6. What molecule in your body is iron, a transition metal, an important part of?
  - a. Iron is an important part of hemoglobin.
7. Why is hemoglobin important to our bodies?
  - a. Hemoglobin is important to our bodies because it carried oxygen in our bloodstream.
8. List four colors of paints that are made with transition metals.
  - a. Cobalt blue
  - b. Zinc white
  - c. Cadmium red
  - d. Chromium oxide green

### **The C, N, O Families**

For this worksheet you will be working in pairs. Using book K chapter 3, answer the questions below. Be sure to use complete sentences for your answers.

Some groups in the periodic table of elements do not have a special name. These groups use the name of the first element in the group as a family name. The first group is the Carbon Family.

#### Carbon Family

1. How many valence electrons do the elements of the carbon family have?
  - a. The elements of the carbon family all have 4 valence electrons.
2. How many metals, nonmetals, and metalloids does the Carbon family have?
  - a. The carbon family has 1 nonmetal, 2 metalloids, and 2 metals.
3. Why is carbon especially important in the chemistry of life?
  - a. Carbon is important to the chemistry of life because all living things contain compounds that are made up of long chains of carbon atoms.

#### Nitrogen Family

1. How many valence electrons does the elements of the nitrogen family contain?
  - a. The elements of the nitrogen family contain 5 valence electrons.

2. How much of the atmosphere is nitrogen?
  - a. The atmosphere is made up of 80% nitrogen.
3. What do farmers use that contains nitrogen compounds?
  - a. Farmers use fertilizers that contain nitrogen compounds.
4. Phosphorus is a fairly reactive element that we use in what two items?
  - a. We use phosphorus in matches and flares.

#### Oxygen family

1. The oxygen family is in group 16 of the periodic table. How many valence electrons do the elements in this family have?
  - a. The elements in the oxygen family contain 6 valence electrons.
2. Oxygen forms a compound called ozone. Why is ozone important to life on the earth?
  - a. Ozone is important to life on the earth because it screens out the harmful radiation from the sun.
3. Sulfur is the other common element of the oxygen family. Where do we use sulfur?
  - a. Sulfur is used in rubber bands, automobile tires, and many medicines.

#### The Halogens

1. The halogens are in what group of the periodic table?
  - a. The halogens are located in group 17 of the periodic table.
2. How many valence electrons do the halogens have?
  - a. Each element of the halogen family contains 7 valence electrons.
3. Which element is the most reactive of the halogen family?
  - a. Fluorine is the most reactive member of the halogen family.
4. Most of the halogens are dangerous to humans; however, many of the compounds that halogens form are also quite useful. What are some uses for fluorine compounds?
  - a. Some fluorine compounds are found in nonstick cookware and compounds that help prevent tooth decay.
5. Table salt is a compound of sodium and what halogen.

- a. Table salt is a compound of sodium and chlorine.
6. What is the compound calcium chloride, also a salt, used for?
- a. Calcium chloride is used for melting snow.
7. What is silver bromide used for?
- a. Silver bromide is used in photographic film.

## **The Noble Gases**

For this worksheet you will be working in pairs. Using book K chapter 3, answer the questions below. Be sure to use complete sentences for your answers.

1. What group of the periodic table are the noble gases located in?
  - a. The noble gases are located in group 18 of the periodic table of elements.
2. Why are the elements in group 18 called “noble”?
  - a. The elements in group 18 are called “noble” because they do not form compounds with any other element.
3. Explain why the noble gases do not form compounds with other elements. (Hint: it has to deal with the valence electrons.)
  - a. The noble gases do not form compounds with the other elements because they do not gain, lose, or even share their valence electrons.
4. When were the noble gases discovered?
  - a. The noble gases were discovered in the late 1800s.
5. When helium was discovered, what was the scientist studying?
  - a. Scientists were studying the sun when helium was discovered.
6. What noble gas is found in a floating balloon?
  - a. Helium gas is found in a floating balloon.
7. What else are the noble gases used for?
  - a. The noble gases are also used in glowing electric lights called Neon Lights.
8. What state of matter are all the elements of group 18 in at room temperature?
  - a. The group 18 elements are all gases at room temperature.
9. What type of element are the noble gases?
  - a. The noble gases are all nonmetals.