

Chemical Properties of Matter

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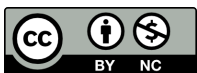
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CHAPTER

1

Chemical Properties of Matter

- Define chemical property.
- Describe examples of chemical properties of matter.



Look at the two garden trowels pictured here. Both trowels were left outside for several weeks. One tool became rusty, but the other did not. The tool that rusted is made of iron, and the other tool is made of aluminum. The ability to rust is a chemical property of iron but not aluminum.

What Are Chemical Properties?

Chemical properties are properties that can be measured or observed only when matter undergoes a change to become an entirely different kind of matter. For example, the ability of iron to rust can only be observed when iron actually rusts. When it does, it combines with oxygen to become a different substance called iron oxide. Iron is very hard and silver in color, whereas iron oxide is flakey and reddish brown. Besides the ability to rust, other chemical properties include reactivity and flammability.

Reactivity

Reactivity is the ability of matter to combine chemically with other substances. Some kinds of matter are extremely reactive; others are extremely unreactive. For example, potassium is very reactive, even with water. When a pea-sized piece of potassium is added to a small amount of water, it reacts explosively. You can observe this reaction in the video at the URL below. (*Caution:* Don't try this at home!) In contrast, noble gases such as helium almost never react with any other substances.

<https://www.youtube.com/watch?v=Jy1DC6Euqj4> (0:19)



MEDIA

Click image to the left or use the URL below.

URL: <http://www.ck12.org/flx/render/embeddedobject/125138>

Flammability

Flammability is the ability of matter to burn. When matter burns, it combines with oxygen and changes to different substances. Wood is an example of flammable matter, as seen in **Figure 1.1**.



FIGURE 1.1

When wood burns, it changes to ashes, carbon dioxide, water vapor, and other gases. You can see ashes in the wood fire pictured here. The gases are invisible.

Q: How can you tell that wood ashes are a different substance than wood?

A: Ashes have different properties than wood. For example, ashes are gray and powdery, whereas wood is brown and hard.

Q: What are some other substances that have the property of flammability?

A: Substances called fuels have the property of flammability. They include fossil fuels such as coal, natural gas, and petroleum, as well as fuels made from petroleum, such as gasoline and kerosene. Substances made of wood, such as paper and cardboard, are also flammable.

Summary

- Chemical properties are properties that can be measured or observed only when matter undergoes a change to become an entirely different kind of matter. They include reactivity, flammability, and the ability to rust.
- Reactivity is the ability of matter to react chemically with other substances.
- Flammability is the ability of matter to burn.

Explore More

The chart below shows the reactivity of several different metals. The metals range from very reactive to very unreactive. Study the chart and then answer the questions below.

| | | | | |
|-----------|---------------------|----------------------|------------------|--------------------|
| Potassium | | | Very reactive | |
| Sodium | React with water | | | |
| Lithium | | | | |
| Calcium | | | | |
| Magnesium | | | | |
| Aluminium | | | | |
| Zinc | | React with acids | | |
| Iron | | | | |
| Tin | | | | |
| Lead | | | | |
| Copper | | | | Very unreactive |
| Mercury | | React with oxygen | | |
| Silver | | | | |
| Gold | | | | |

1. What is the most reactive metal in the chart? What is the least reactive metal?
2. Complete this sentence: Only the most reactive metals in the chart react with _____.
3. Is this statement true or false? Most metals in the chart react with oxygen.
4. Which of the following metals reacts with oxygen and acids but not with water?
 - a. calcium
 - b. magnesium
 - c. copper

Review

1. What is a chemical property?
2. Define the chemical property called reactivity.
3. What is flammability? Identify examples of flammable matter.

References

1. James Thompson. [Wood burning in a fire](#) . CC BY 2.0