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# **Chemical and Physical Changes Caused by Heat**

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# Heating Substances

- **Question:** How do various substances react when heated?



# Vocabulary

.Chemical Reaction- process by which one or more substances may be transformed into one or more new substances.

.Phase Change- A change from one state (solid or liquid or gas) to another without a change in chemical composition.

.Reactant- A substance that is changed during a chemical reaction.

.Product- A new substance that is formed during a chemical reaction.

# Engage

What are some ways that heat affects substances?

Water?

An egg?

Wax?

A hot air balloon?

Gasoline?

What are some other things that you recall having heated? How did they react?



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# Heat's affect on substances

- Substances react differently to heat, according to their chemical and physical properties.
  - Substances that are combustible or flammable may explode or catch fire.
  - Substances may melt, or boil and evaporate depending on their melting and boiling points.
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# Chemical Changes

- In some cases, heating a substance can cause it to undergo a chemical change, and a new substance (or more) will be formed from the old one.
- Example: If magnesium is heated above its ignition point (when it catches fire), it reacts with the oxygen in the air to produce magnesium oxide.



# Physical Changes

- In other cases, substances may have a high ignition point and will not catch fire, but its molecules will begin moving faster, causing it to change phase, or increase in volume.
- Example: heating a steamer bag of vegetables will cause the water in the veggies to evaporate (change from a liquid to a gas) and the gas the bag will allow it.



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# Predict the outcome

**Prediction:**





# Safety Precautions

**CAUTION**

**GOGGLES  
MUST BE WORN  
AT ALL TIMES**



Wear safety goggles at ALL times



Tie back long hair and restrict loose clothing.



Do not smell or taste the chemicals.



Handle chemical only with the scoop.



Do not walk around while substances are being heated; remain at your lab station at all times.



Report any broken glassware, spills, or accidents immediately



– Wash hands before leaving lab.

**LAB SAFELY**



**DON'T BE  
"THAT GUY"**

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# Lab Activity 6 – Heating Substances

- **Procedures:**
  - Place ONE scoop of the first substance into a test tube.
  - Examine the substance and record your observations in the correct box of your data table.
  - Attach the test tube clamp near the mouth of the test tube.
  - Heat the bottom of the test tube for 1-2 minutes. Keep the test tube moving to evenly heat the substance, and remember not to point it at anyone.
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# Lab Activity 6 – Heating Substances

- **Procedures:**
  - Record any changes that occur to the substance while it is being heated in the appropriate box of your data table.
  - Place the hot test tube into a 250 ml beaker, and allow it to cool for 1-2 minutes. Examine the substance again, and record your observations in the appropriate box of your data table.
  - Repeat these procedures with the remaining substances, using a clean test tube.
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# Data & Observations

Substance	Appearance before heating	Change observed during heating	Appearance after heating	Type of change
Sucrose				
Ammonium Chloride				
Copper (II) Carbonate				
Copper (II) Sulphate				
Sodium Chloride				
Zinc Oxide				
Sulfur				

# Data & Observations

- Which Substance (if any) showed no change when heated?
- Which of these substances produced new substances when heated?
- How can heating a substance help you identify it?

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# Clean Up Procedures

- Partner 1: empty the solid residue from the tubes into the trash. Use a test tube brush and water to thoroughly clean the tubes. Stand them upside down in your test tube rack.
  - Partner 2: Wipe down your side of your lab table, and return everything to how it was when you came in, including pushing in the stools.
  - Everyone: Wash your hands before leaving and wait to be dismissed by table.
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# Lab activity 6 Heating Substances

- **Conclusion:** I will not be writing this for you!  
Write a summary of the lab, that includes the following things:
  - ❑ Did any of the substances behave similarly while heating?
  - ❑ Which substances looked different after being heated?
  - ❑ Which substances still looked different after cooling?
  - ❑ Explain what you think this means.
  - ❑ Did any of the substances not react to the heat?
  - ❑ Why do you think it didn't do anything?



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# Lab Activity 6 – Heating Substances

- Errors & New Questions:

