Chemical and Physical Changes Caused by Heat

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?



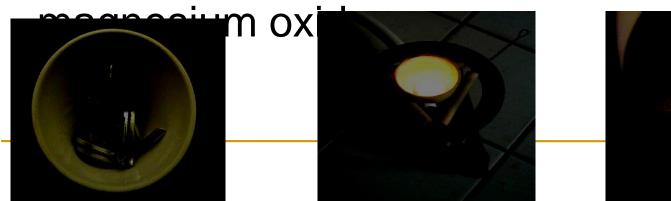


Heat's affect on substances

- 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.

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 it's ignition point (when it catches fire), it reacts with the oxygen in the air to produce





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.

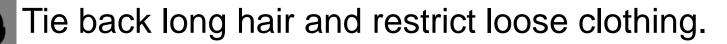
Predict the outcome

Prediction:

Safety Precautions

GOGGLES
MUST BE WORN
AT ALL TIMES





Do not smell or taste the chemicals.

Handle chemical only with the scoop.

Only use a test tube clamp to pick up test tubes.

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

Report any broken glassware, spills, or accidents immediately

Wash hands before leaving lab.



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.

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.

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?

Clean Up Procedures

- Partner 1: empty the solid residue form 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.

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?

Lab Activity 6 – Heating Substances

Errors & New Questions: