

Chemical and Physical Change

Background Theory:

Physical changes usually involve a compound's state of matter where heat energy is added or removed. For this reason, physical changes can be reversed. By contrast, chemical changes occur at the molecular level when two or more molecules are interacting. Chemical changes involve the bonds in a compound being broken and new bonds being formed during a chemical reaction. Since the reactants are no longer present, a chemical change cannot be easily reversed.

<https://www.youtube.com/watch?v=x49BtB5dOwg>

In this lab you will:

1. Identify chemical and physical changes by observing a variety of reactions.
2. Provide justification for identifying a reaction as chemical or physical.

Pre-lab Questions:

1. Give TWO key features of CHEMICAL changes
Not easily reversed, new smell/odor, colour change, new substance formed, precipitation occurs, effervescence,
2. Give TWO key features of PHYSICAL changes
Easily reversed, original substance is still present, color change, change of state

Instructions:

1. Working in groups of two or three, progress through each station in the lab to complete the results chart below.
2. At each station, read the instructions and then carry out the experiment, recording any observations as the experiment progresses.
3. Once all five stations have been completed, decide in your group whether each experiment is an example of a physical change or a chemical one.

Results:

Reaction	Observations	Type of Change
1. Iodine	<i>Iodine crystals change from solid to purple vapor and then return to solid crystalline structure upon cooling</i>	<i>Physical</i>
2. Magnesium	<i>Magnesium ribbon catches alight, and then produces a bright white flame. A white powdery</i>	<i>Chemical</i>

	<i>residue is left.</i>	
3. Fizzy Pop	<i>Calcium carbonate chips begin to bubble and fizz. Test tube becomes hot to the touch. Over time the calcium carbonate disappears.</i>	<i>Chemical</i>
4. Zinc Oxide	<i>White powder turns to yellow and then returns to white colour upon cooling.</i>	<i>Chemical (due to loss of oxygen when heating)</i>
5. Copper sulfate solution	<i>Copper sulphate solution bubbles, liquid reduces, leaving a blue, crystalline solid behind.</i>	<i>Physical</i>

Post-Lab Questions:

For each of the following activities, decide if it is an example of a physical or chemical change. Provide justification for your choice:

- A log burning on the fire
 Change: *Chemical*
 Justification: *Heat is given off, new substance is formed (e.g carbon dioxide), reaction is not reversible*
- Boiling water
 Change: *Physical*
 Justification: *Water can return to its original temperature, steam from boiling can condense back into liquid water again upon cooling.*
- Frying an egg
 Change: *Chemical*
 Justification: *New substance is formed, proteins in egg are cooked (denaturation), egg cannot be returned to its raw/uncooked state.*
- An iron pipe rusting
 Change: *Chemical*
 Justification: *Iron reacts with the air and moisture to form iron (III) oxide, a new substance. Reaction cannot be reversed.*
- An iceberg melting
 Change: *Physical*
 Justification: *Ice can be refrozen. Change is therefore reversible.*
- Fruit rotting
 Change: *Chemical*
 Justification: *New substances are formed, gas (CO₂) released, alcohol is formed as a new substance (fermentation reaction)*
- Shredding cheese
 Change: *Physical*

Justification: *No new substance is formed, only the shape of the cheese has been changed.*

8. A pond freezing

Change: *Physical*

Justification: *The water from the pond can melt once the environment warms up (reversible).
No new substance has been made.*