Chemical and Physical Change

Background Theory:

Physical changes usually involve a compounds 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

Curriculum Links:

- ***HS-PS1-4.*** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
- ***HS-PS1-5.*** Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

Specific Learning Objectives:

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

What you'll need:

- Iodine
- Ice cubes
- Heating mat
- Magnesium ribbon
- Standard laboratory equipment (glassware etc.)
- Hydrochloric acid
- Calcium carbonate powder.
- Zinc oxide powder
- Copper sulfate solution

Additional Notes:

- To allow maximum involvement, two sets of the five stations can be set up at once.
- Small laminated instruction cards at each station for students to follow, allow for reusability.

What to Do:

- Students will move through five separate stations in groups of two or three.
- At each station, there is an instruction card with a basic experiment, in which they must carry out and record any observations in the results table on their student lab sheet.
- Once the five stations are complete, students can discuss in their groups which change applies to each station.
  Safety: Eye protection must be worn for each experiment.

Station Instructions:

1. **Sublimation of Iodine**
   - Add a spatula of iodine to a beaker and place on a heating mat.
   - Heat iodine gently until purple vapour is released.
   - Place a round-bottomed flask containing ice into the opening of the beaker, sealing the opening. Leave the round-bottomed in place and observe.
   - https://www.youtube.com/watch?v=jX9pskbKSw0

2. **Burning Magnesium**
   - Using metal tongs place a 2cm strip of magnesium ribbon into a blue Bunsen flame.
   - Once alight, remove from flame and observe.
   - https://www.youtube.com/watch?v=mFTY92VHYtc

   Safety: Do not look directly at the burning magnesium

3. **Fizzy Pop**
   - Add 5ml of dilute hydrochloric acid to a clean test tube
   - Add calcium carbonate chips
   - Cover with a balloon
   - Observe and record
   - https://www.youtube.com/watch?v=0S6viHqsy7Y

4. **Zinc Oxide**
   - Weigh out 5 grams of zinc oxide powder
   - Add the zinc oxide to a test tube.
   - Heat gently using a Bunsen and observe until completely cooled.
   - Reweigh zinc oxide, noting any change in mass.
   - https://www.youtube.com/watch?v=cEIujFx2Mro

5. **Heating copper sulfate solution**
   - Add 5 ml of copper sulfate solution to an evaporating basin.
   - Heat gently until the liquid has evaporated.
   - https://www.youtube.com/watch?v=ycqFjqOqpzs