Performance Task

11.3 Phase Change and Latent Heat 20.

You have been tasked with designing a baking pan that will bake batter the fastest. There are four materials available for you to test.

- Four pans of similar design, consisting of aluminum, iron (steel), copper, and glass
- Oven or similar heating source
- Device for measuring high temperatures
- Balance for measuring mass

Instructions

Procedure

1. Design a safe experiment to test the specific heat of each material (i.e., no extreme temperatures should be used)
2. Write down the materials needed for your experiment and the procedure you will follow. Make sure that you include every detail, so that the experiment can be repeated by others.
3. Carry out the experiment and record any data collected.
4. Review your results and make a recommendation as to which metal should be used for the pan.
    a. What physical quantities do you need to measure to determine the specific heats for the different materials?
    b. How does the glass differ from the metals in terms of thermal properties?
    c. What are your sources of error?

Teacher Support

Teacher Support

- NGSS-HS-PS3-3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
    a. The specific heat of aluminum is greatest, so that the aluminum pan will take longest to reach a given temperature. Copper has the lowest specific heat, and so will reach a given temperature fastest.
    b. Compare the time it takes for the glass pan and the aluminum pan to reach a specific temperature. Although their specific heats are comparable, the thermal conductivity is greater in aluminum, making it heat faster than the glass, which is an insulator.