# Phase Change Device Worksheet – Student Submission

## Benchmark Test

Temperature of the room: 22°C

Time it took for ice to melt at room temperature: 12 minutes

Notes or observations during the benchmark test: Ice melted steadily. A small puddle formed around the base after 10 minutes.

## Goal

Goal: Slow down ice melting

## Existing Devices

Notes about existing devices you researched: I researched coolers and thermal insulation devices. Most effective devices use foam, reflective materials, and reduce airflow.

## First Device

Sketch of device: A foam cup lined with aluminum foil and sealed with a plastic lid (not drawn here).

Materials needed: Foam cup, aluminum foil, plastic wrap, rubber band, tape.

Description of the design: The ice cube was placed inside a foam cup lined with aluminum foil. The top was sealed using plastic wrap to prevent air from entering. The foil helps reflect heat while the foam insulates.

Time it took for ice to melt with the device: 18 minutes

Observations: The ice melted slower than in the benchmark test. Some condensation formed on the inside of the wrap.

## Modified Device

What will you change in your device? I added a second foam cup as an outer layer and inserted a layer of cotton between the two cups for extra insulation.

Why did you make these changes? To reduce heat transfer even more by adding another barrier and insulating material.

Time it took for ice to melt in the modified device: 25 minutes

Observations: The ice melted much slower. There was less condensation inside the cup, and the outer cup felt room temperature.

## Final Analysis

Was your second design more effective than the first? Why or why not? Yes, the second design was more effective because the ice lasted longer (25 minutes vs. 18). The extra insulation clearly slowed heat transfer.

What did you learn about how your device affects the rate of ice melting? I learned that insulation materials and layering help slow down melting. Keeping air out and using materials that reflect or block heat can make a big difference.