

Instructions for Using the Set of 3 Radiation Cans P927

Objective:

To investigate how surface colour affects heat absorption and emission using three identical cans painted black, white, and silver.

Materials Needed:

- 3 identical metal cans: one black, one white, one silver
 - Immersion thermometers -10C to 110C is ideal (1 for each can or an infrared thermometer)
 - Hot water (same volume for each can, e.g. 300 mL)
 - Measuring jug
 - Stopwatch or timer
 - Optional: Clamp stand and light source (e.g. heat lamp or desk lamp for absorption test)
 - Data recording sheet
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Part 1: Emission Test (Cooling Down)

Purpose: To compare how quickly each can loses heat.

Setup:

1. Boil water or heat it to a consistent temperature (around 70–80°C).
2. Place the three cans on a heat-resistant surface.
3. Pour the same volume of hot water into each can.
4. Insert a thermometer into each can (or prepare to use an infrared thermometer).
5. Start the timer immediately after pouring the water.

Procedure:

1. Record the starting temperature of the water in each can.
2. Record the temperature in each can every minute for at least 10–15 minutes.
3. Observe which can cools fastest and slowest.

Expected Result:

- The **black can** will lose heat the fastest (emits infrared radiation more efficiently).
 - The **silver can** will retain heat the longest (poor emitter).
 - The **white can** will be intermediate.
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Part 2: Absorption Test (Heating Up)

Purpose: To compare how quickly each can absorbs heat.

Note: This part is optional if you do not have a suitable heat source (lamp). Do not use open flames.

Setup:

1. Empty the cans and let them return to room temperature.
2. Place the cans an equal distance from a heat source (e.g., a lamp).
3. Place thermometers in or on each can, depending on setup.
4. Ensure the room is dim to avoid external light interference.

Procedure:

1. Turn on the lamp and start the timer.
2. Record the temperature of each can every minute for 10–15 minutes.
3. Compare how fast each can heats up.

Expected Result:

- The **black can** will heat up the fastest (best absorber).
 - The **silver can** will heat up the slowest (poor absorber).
 - The **white can** will heat up moderately.
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Discussion Points for Students:

- Why does color affect heating and cooling?
 - How does this relate to real-world scenarios (e.g., clothing, buildings, car colors)?
 - How do materials and color affect radiation in space or engineering?
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Safety Notes:

- Always supervise use of hot water and heat sources.
- Ensure thermometers are suitable for the temperature range.
- Do not allow students to handle hot cans directly.

Please contact Haines Educational on 1300 330 232 for any questions.