Name:

**Heat Absorption Lab**

Objective

* To understand how the nature of a substance impacts its ability to absorb energy

Pre-reading

You may have been told at some point in your life that wearing white clothes when the sun is out will keep you cooler, and wearing dark clothes will make you warm. This is true! Different colors absorb and reflect energy in different ways. Dark, rough surfaces are the best at **absorbing** energy – they don’t **reflect** much at all. White, smooth surfaces are the opposite – they reflect most of the energy which hits them.

This has many impacts on weather. For example, areas with lots of snow tend to stay cold because most of the energy received is just reflected right back up into the atmosphere. Areas of the earth with darker colored surfaces, like the rainforest, will absorb most of the solar energy that hits them, and stay very warm during the daytime.

In this lab, you will be gathering data on just how much more energy is absorbed by dark colored surfaces than by light colored ones. You will be using different colored cups, and a small quantity of water. This lab’s procedure is similar to the last one you did involving salt and water.

Pre-lab questions

1. Explain what the word “absorb” means.
2. Explain why a snowy mountain will absorb less solar radiation than a dark forest.
3. Remember from the soil/water lab, something good at absorbing energy is also good at radiating energy. Explain why someone wearing a brown t-shirt will cool off faster in-doors than someone wearing a white polo.

Materials

* Reflective cup
* Black cup
* Heat lamp
* Timer
* Graduated cylinder
* Thermometer

Procedure

1. Collect your materials – you will be running both cups at the same time.
2. Measure out 150 mL of water into each cup.
3. Take and record the starting temperature.
4. Place the cups as close to the heat lamp as safely possible.
5. Every minute, take the temperature. Do this for 15 minutes. Record the temperatures in the data chart.
6. Graph your data, with ‘time’ on the X-axis.

Post-lab Questions

1. Which cup gained more heat over the course of 15 minutes?
2. If you tracked the temperatures for 15 minutes after you removed the lamp, which cup would cool down faster? Why?
3. Given what you know about coloration and energy, would it be better to have a dark-colored house in the winter, or a light colored house? Please explain and support your choice, because there are many correct answers.

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| --- | --- | --- |
| Time Elapsed (Minutes) | Temperature of Dark Cup's Water oC | Temperature of Light Cup's Water oC |
| Starting |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |