**Solar Absorption Lab**

Integrated Science

Radiant energy from the sun is given off not just as visible light but also as radio, infrared, ultraviolet even x-rays. Roughly half of this energy is blocked by our atmosphere, (ex. ozone blocks most ultraviolet) or is reflected back into space. The remaining solar energy is absorbed by both the atmosphere and the planet’s continents and oceans. When the radiant energy is absorbed, it speeds up the molecules of the surface and thus increases the temperature of the surface.

The amount of energy required to heat 1 gram of a substance by 10C is called its *specific heat (or natural heat capacity)*. Some substances have a high specific heat; it requires a large amount of energy absorption before they begin to heat up. Others have a low specific heat; they heat and cool very quickly.

The oxygen and hydrogen in a water molecule do not share electrons equally and result in positive and negative regions called dipoles. Water is said to be a *polar* molecule-one with dipoles. The positive ends of one molecule pull on the negative ends of another water molecule. This attraction of water to itself is called *cohesion* and results in some interesting properties of water- of which can be seen when water is heated or cooled to freezing.

Hypothesis-

Which material (sand or water) do you think will change temperature faster and why?

Procedure

1. Weigh out 100 grams of sand and place in a beaker.

2. Measure out 100 mL of water and place in an equal size beaker. (1g of water is equal to 1mL).

3. Attach a clamp from a ring stand such that an attached thermometer will hang above each cup. Adjust each thermometer so that just the bulb of the thermometer is covered by both the water and the sand.

4. Position a lamp 30cm above both cups being careful that both cups receive an equal amount of light.

5. Record the starting temperature of both sand and water (they do not need to start at the same temperature but that is preferred). Continue to record the temperature every minute for a total of 15 minutes?

6. After 15 minutes, turn the lamp off and continue to record the temperature every minute for another 15 minutes. Add observations of the rate of change for both sand and water to your data table.

7. Graph the change in temperature for both sand and water over the 30-minute time period. Analyze your results.

Lab Notebook Format

I. PRE-LAB

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| LAB QUESTION *What testable question are you trying to answer in the investigation?* | |
| INDEPENDENT VARIABLE  *What are you changing in each trial as a test?* | DEPENDENT VARIABLE  *What is being measured as data?* |
| HYPOTHESIS  *Format: IF (IV: this is changed), THEN (DV: this result will change in this way), BECAUSE (of this reason)* | |
| EXPERIMENTAL DESIGN *Diagram and describe (annotate) each group in the experiment* | |
| CONSTANTS *Factors held the same in all trials*  *Evident in your design diagrams* | CONTROL(s) *Lacks any change to the IV*  *Trial for comparison to the experimental group/s* |