HU GK-12 Program

1-10-07

Activity:

The fellow will help demonstrate principles of energy transfer

Title

“Boiling Over”

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DCPS Standards:

8.5.8.

Investigate and explain that heat energy is a common product of an energy transformation, for example, in biological growth, the operation of machines, the operation of a light bulb, and the motion of people.

8.5.11.

Compare and contrast how heat energy can be transferred through radiation, convection, or conduction.

Goals

The students will demonstrate knowledge of heat transfer through a lab activity.

Objectives

The students will form hypotheses and analyze heat transfer through classroom discussion

Background

Heat is defined by Prentice Hall as the transfer of thermal energy from one object to another because of a temperature difference, which essentially allows heat to flow spontaneously from hot objects to cold objects. Temperature is a measure of how hot or cold an object is compared to a reference point. Therefore, temperature is very similar to kinetic energy because particles in motion act randomly. This is reason why hot liquids have molecules that are bumping past each other while solid liquids have molecules that are not in motion at all. Essentially, this goes to

show the potential energy that will be transferred to kinetic energy during any of the liquid phase changes. The concept that was just described is known as thermal energy, because thermal energy is the total potential and kinetic energy of all particles in an object.

Materials:

- Ice
- Water (room temperature)
- Hot plates or Bunsen burners
- 200 mL beakers
- Stopwatches

Procedure/Evaluation and Assessment

1) Begin by turning on the hot plate to the same temperature setting on each of the hot plates (Each group should have 2 hot plates).

2) After the hot plates have reached their optimum temperature, place a beaker with 150 ml or water and 150 ml of pre-measured ice on the hot plates.

3) Hypothesize what will happen first, water evaporating or ice changing to water?

4) Use a stopwatch or clock to time each beaker's water phase change.

5) Stop timing when ice is completely melted into water and when water is completely evaporated (2 timers need to be used for each different beaker).

6) If time and supplies allow, repeat this experiment and design a line graph based on the data.

7) What phase changes the quickest, ice to water or water to completely evaporated away? Explain why.

Reference:

Classroom text:

Physical Science. Frank, Wysession, and Yancopolous. Prentice Hall. Boston, MA. 2006.