

Activity 4_4: Do we measure invisible radiation?

Problem question:

We have measured the effects of the transfer of thermal energy by the radiation coming from a lamp switched on. What happens in the presence of hot objects?

Experiment:

Required:

Home-made radiometer, 50 cl plastic bottle, ruler.

Procedure:

Step 1: Start the measurement of the surface temperature of the radiometer plate and wait 10 seconds before placing the plastic bottle filled with hot water at an horizontal distance of 20 cm from the radiometer plate, vertically and centred with respect to the bottle (see figure).



Step 2: After 500 seconds from the beginning of the experiment, turn the radiometer up to 90 degrees with its plate facing upward (see figure) and continue to measure the surface temperature of the radiometer for further 500 seconds.

Step 3: After 1000 seconds from the beginning of the experiment, remove the bottle from the radiometer view and continue the measurement of the surface temperature of the radiometer for further 500 seconds.

Compare the temperature variation measured during the step 1 with those observed in step 2 and 3; discuss what observed during the whole experiment with the other members of the working group.

Report your comments in the following:

Problem: We have experienced the transfer of thermal energy by the radiation coming from hot objects. What happens in the presence of cold objects?

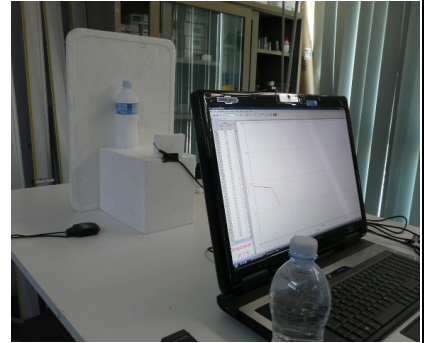
Suggestion for an experiment of deepening:

Required:

Home-made radiometer, 2 plastic bottles (50 cl), ruler.

Procedure:

Step 1: Measure the ambient temperature for 200 seconds without placing any object in front of the radiometer. After this time interval, place a plastic bottle filled with iced water at an horizontal distance of 20 cm from the radiometer (see figure). In this configuration, continue to measure the radiometer temperature for further 500 seconds.



Step 2: After 700 seconds from the beginning of the experiment, remove the bottle from the radiometer view and continue the measurement of the surface temperature of the radiometer for further 500 seconds.

Step 3: By continuing the measurement, place a plastic bottle filled with hot water at an horizontal distance of 20 cm from the radiometer and continue the measurement of the surface temperature of the radiometer.

Step 4: After further 300 seconds, turn the radiometer up to 90 degrees with its plate facing upward and continue the measurement of the temperature for the last 200 seconds.

Compare the temperature variation measured during step 1 up to step 4 and discuss what observed during the whole experiment with the other members of the working group.

Report your comments in the following:
