

Activity 4_2: Not only visible light heats up the objects!

Problem question:

Could the heating of a house be produced by external sources of energy different from the visible light?

Questions:

1) Describe some cases of heating produced by sources of energy different from the visible light:

2) Design your experiment to measure the effects of thermal radiation produced by a not-visible light source; describe briefly which experiment you could perform by using the home-made radiometer previously described:

Sketch your experimental setup of measurement in the following:

Suggested experiment:

Required:

Home-made radiometer, halogen lamp, ruler, chronometer, filter for visible light. In the absence of the filter, it is possible to realize an home-made filter for visible light by assembling sun-exposed and developed color photographic film or the opaque magnetic support inside a floppy disk.

Procedure:

Step 1: Place the radiometer at an horizontal distance of 30 cm from the halogen lamp switched off, with the surface of the plate placed vertically and centred in front of the lamp. Start the measurement of the surface temperature of the radiometer plate and wait 10 seconds before switching on the lamp for further 30 seconds, illuminating the radiometer. Then switch off the lamp and remove it from the view of the radiometer. Continue the measurement until the temperature of the radiometer does not reach again the initial temperature.

Step 2: Repeat the experiment exactly as described in step 1, but this time by filtering completely the visible light coming from the halogen lamp.

Step 3: Compare the results with those obtained in the presence of visible light.

Question n. 1: Why the surface temperature of the radiometer increases even in the absence of visible light?

Question n. 2: Try to put your hand in front of the lamp with visible light filtered. What do you feel when the lamp is switched on and then back switched off?

Question n. 3: In the absence of visible light, who transmits the energy that causes the rise of surface temperature of the radiometer?
