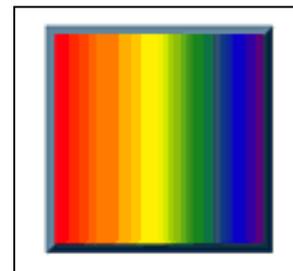


Activity #7

Title: Detecting the Invisible- ANSWER SHEET-TEACHER'S COPY



Procedure/Inquiry: Part I

1. A single “pop” or short static burst is heard when the light first hits the solar cell. After that, no sound is heard.
2. Each time a hand is waved over the solar cell a “popping” sound is heard.
3. Rapidly moving a hand through the beam of light produces a series of “pops” or continuous static.
4. In order to “hear” light, one must shine a light onto a solar cell that then sends an electric signal to the amplified speaker that produces a popping sound.
5. This visible spectrum including red, orange, yellow, green, blue and violet bands of color are displayed on the screen.
6. The spectrum produced by the diffraction grating has the colors reversed from those produced by the prism in Activity #5. Instead of ROYGB(I)V, we now get V(I)BGYOR. Also, the colors in this spectrum are much more intense and brighter than those produced by the prism.
7. For all three colors of light (red, yellow and green), a popping sound was heard when the photo detector was placed in their beams with a hand waved through the incoming light.
8. Answers will vary.
9. The previous response was correct if the prediction stated that a popping sound would be heard.
10. If no (light) energy were present in this region, no popping sound would be produced.
11. This invisible region must have wavelengths longer than that of red light. Infrared energy is found on the electromagnetic spectrum just beyond the long wavelengths of visible light.

Procedure/Inquiry: Part II

1. Answers will vary.
2. Only the red band of the spectrum remained on the screen. The others colors were blocked out or absorbed by the red gel.
3. Answers will vary.
4. Only the green and little bit of the blue bands of light remained on the screen. The green filter absorbed the other colors of the spectrum.
5. Answers will vary.

6. No colors appeared on the screen (because the green gel only allowed the green and some blue light to pass through and these were absorbed by the red filter...or vice versa).
7. Answers will vary here.
8. No audible sound was detected when the photocell receiver was placed in the regions where the visible light was once displayed.
9. Answers will vary here. Some students may not think ANY energy is allowed to pass through the gels from the results of step #6. Others will assume that because the question is being asked that perhaps infrared energy can pass through both of the gels.
10. A very faint pop was, in fact, detected.
11. The production of the popping sound proves that invisible energy is passing through the gels and is being projected on the screen to the right of the red band region of the visible spectrum.
12. If the student thinks it MAY BE possible: Because invisible infrared energy was proven to exist beyond the red band of visible light in our spectrum produced in the classroom, it is very possible that the invisible infrared energy from the Sun also exists above the red band of a rainbow.

If the student thinks that it is NOT possible: Dispersing light through a diffraction grating is not the same as refracting and reflecting the light through raindrops, so no infrared energy will exist in rainbows.