

## THE CONFUSED FLASHLIGHT

**A. Question:** *Can light rays change color?*

**B. Materials Needed:**

1. A strong flashlight.
2. A large beaker, medicine dropper and stirrer.
3. A few milliliters of regular cow milk.

**C: Procedure:**

1. With the medicine dropper, place one drop at a time of milk in the water and stir.
2. After each drop of milk added to the water, shine the flashlight through the water. Fill the beaker nearly full with water.
3. By holding it on the side of the beaker: let the light beams shine perpendicular to and into the student's view.
4. Keep adding the drops of milk to the water until the light shone into the student's view becomes red.

**D: Anticipated Results:**

Students should observe a change in color of the light rays after adding milk to the water.

**E: Thought Questions for Class Discussion:**

1. What made the color of the light change?
2. What purpose does the milk have?
3. If the water were the earth's atmosphere and the flashlight were the sun, what can the milk droplets be equated to?

**F: Explanation:**

Increasing the milk droplets in the water is like increasing the water and dust particles in the atmosphere. When the sun moves to the west approaching sunset, the atmosphere through which we are looking is much thicker. This means that we are actually looking through more dust and water particles. When we look to the west during sunset, we look directly into the sun rays, seeing the sun as a red ball. Looking up towards the sky when the sun is in the west, still leaves the sky blue. The sun rays are now perpendicular to the direction of our view. This difference in color is caused by the refraction of the blue light. The shorter the wavelength (blue), the more it is bent or refracted by milk droplets. The light with the longer wavelength (red) is not as much refracted and this is why the light from the flashlight is red when we look directly into it.