

Blue, Blue, Where Are You?

Purpose

To learn how aerosols scatter light

Procedure

1. Fill the glass container 3/4 full with water.
2. Place the container on a flat surface and let the water become still.
3. Once the water is still, turn on the flashlight and shine it through the side of the container. Observe the beam of light from the side and from the end.
4. Hold the index card about 30 cm away from the container and directly opposite the beam of light. See diagram. Observe the light as it projects onto the card.
5. Add a spoonful of milk to the water and stir.
6. Repeat steps 3-5.
7. Continue to add spoonfuls of milk to the container until the light will no longer shine through the water.

Materials

clear glass container
such as a jar or beaker
flashlight
small amount of milk
spoon
plain index card
water

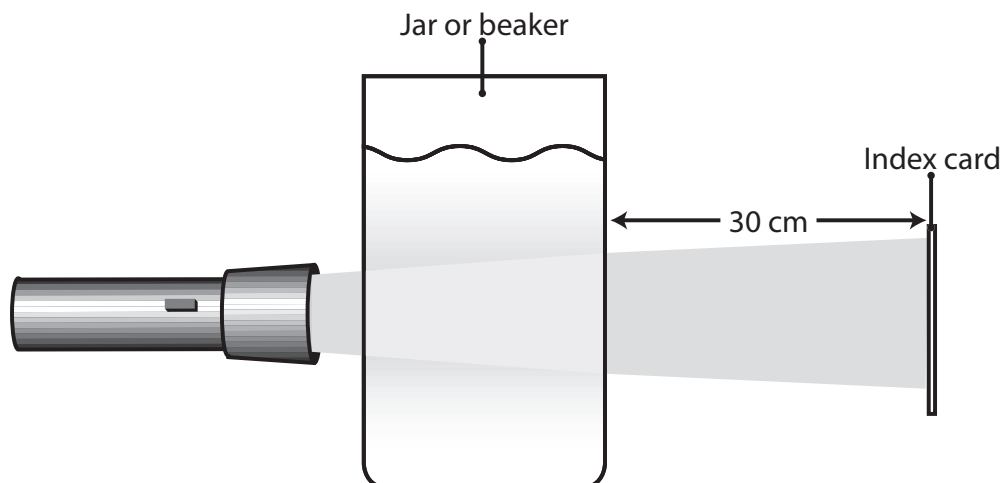
Conclusion

1. What color was the light as you viewed it through the container of clear water? What color was the light on the index card? _____

2. Describe what happened when you added a spoonful of milk. Why? _____

3. Describe what happened as you continued to add milk? Why did this occur? _____

4. How can this experiment explain blue skies during the day and red skies at sunrise and sunset? _____



ANSWERS

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1. From the side, the light looks bluish-white; but from the end and on the index card, it looks yellow-orange.
2. The beam of light from the side became more yellow-orange and the light on the index card became more orange-red because the milk created particles in the water that scattered the blue light component of white light.
3. The beam of light continued to become a darker yellow-orange, and the light on the index card became even redder because more particles were added to scatter more of the blue light. Eventually, if enough milk is added, the water becomes too cloudy for light to pass through.
4. As sunlight (white light – a composite of all colors) enters the atmosphere, tiny particles and aerosols in the sky cause the light to scatter. The blue part (short wavelengths) of white light scatters more easily than does the red or orange parts (longer wavelengths). Thus the blues are scattered across the sky and the sky looks blue in color. As the sun rises or sets, sunlight has to travel through more atmosphere, causing the light to encounter many more particles and aerosols as compared to the main part of the day when the sun is higher overhead. This causes much more scattering in the rising and setting sunlight – the result being that the easier-to-scatter blues are scattered so much that they are lost back into space, leaving on the harder-to-scatter reds and oranges. Consequently, the early morning or late evening sky often has a reddish or orangish color. Adding more milk to the container added more particles and created the thicker “morning or evening atmosphere” in the jar of water.