BIO FAX!

FLINN SCIENTIFIC, INC
"Your Safer Source for Science Supplies"

P.O. Box 219 • Batavia, IL 60510
(800) 452-1261 • Fax (866) 452-1436
www.flinnsci.com • E-mail: flinn@flinnsci.com

Publication No. 10318

Blue Blood?

Introduction

Why does blood in the veins look blue? Is the blood blue until it comes in contact with air and then it turns red? Does light turn it red?

Concepts

- Absorption
- Reflection
- Visible light spectrum

Background

Many materials transmit light. Objects such as glass, quartz and air transmit nearly all wavelengths of visible light. These objects are called *transparent*. Other materials, such as frosted-glass and certain plastics, transmit light, but objects cannot be seen clearly through them. These materials are often called *translucent*. Lamp shades and many lightbulbs are translucent. Materials such as bricks or concrete transmit no light. They reflect or absorb all light that falls on them. These materials are called *opaque*.

An illuminated body reflects light waves to varying degrees. When an object is illuminated by white light (composed of the visible spectrum of all colors) the light may be reflected, transmitted, or absorbed. The nature of the object and what happens to the illuminated white light spectrum determines its color as perceived by the human eye. An object that is perceived as red, for example, is reflecting the red wavelengths of light from the object to the receptors in our eye. We interpret the reflected wavelengths as "red." All the other wavelengths of light are being absorbed by the object and are thus not reflected back to our eye for interpretation.

Materials

Beaker, 50-mL
Clay, small ball
Glass tubing, 6 cm, 4-mm i.d.
Milk, skim
Petri dish or finger bowl
Pipet, 2
Red food coloring, several drops

Safety Precautions

Use extra care when cutting glass tubing. Be sure to fire polish any cut edges before using the tubing.

Preparation

Cut several pieces of glass tubing about 6 cm in length and fire polish the ends. Make 10 mL of red colored water by adding red food coloring, one drop at a time, to 10 mL of tap water. Make the solution a deep "blood-red" color.

Procedure

1. Place a small piece of clay over the end of a piece of glass tubing to seal one end.
2. Introduce the "blood" solution into the glass tubing using a fine-tipped pipet. Fill the tube nearly full with the red solution.
3. Use another piece of clay to seal the other end of the glass tube. Be sure there are no leaks.
4. Place the red "vein" into a Petri dish or finger bowl. Have students note the color of the blood.

5. Pour milk slowly into the Petri dish until it just barely reaches the top of the "vein."
6. Continue to add milk slowly to the dish using a clean pipet covering the vein to various depths.
7. Note the "apparent" color changes of the "vein" as it gets covered by the opaque milk. At some depth the submerged "vein" will look more bluish or purplish than it does red.
8. Discuss the demonstration in terms of reflection and absorption of white light. Relate the opaque milk to the body tissues covering the red blood vessels within an organism.

Disposal

Prepared colored tubes can be reused several times before disposal. All liquids can be disposed of following Flinn Suggested Disposal Method #26b and all other materials following Flinn Suggested Disposal Method #26a.

Tips

- Further experimentation would actually be required to definitely explain the phenomenon. The milk may not actually be the same as skin. Both would require experimentation to determine their reflective and absorption qualities. The demonstration merely raises the questions. Does it look blue because milk does not transmit red light and only blue light reaches the vessel and is reflected? What is the significance of the depth? Does the vessel just reflect the blue light and absorb the rest? Be sure all students are convinced that their blood is actually red and that it only appears to be a different color when viewed through other tissue.
- Other physical science experiments with white light and colored filters might be done prior to this demonstration.
- A demonstration of real circulating blood in the tail of a goldfish or the webbing of a frog's foot might be used to further dramatize the fact that circulating blood is red.

Reference

S. Havnaer, *Why Does the Blood in Your Veins Look Blue?;* NCSTA Journal, Vol. 6 No. 1, Winter 1998/1999.

