The pH 7 Scale: Life's Good Note

(20 minute activity)

Objectives

The student will be able to:
1) Describe the pH scale
2) List the pH of common products
3) Name connections between pH and wildlife

Materials

- ❑ Common household substances representing the pH scale such as lemon, Epsom salt, milk, etc.
- ❑ pH strips
- ❑ Overhead transparency of the *pH Scale and Productivity* chart (Figure 2)

Background

Everyone has heard of acid rain. What does it really mean and what are its ramifications? All biological systems—animal, plant and microorganism—must live in an environment which supports an optimum range of *pH*. In general, they are most healthy when they are in a nearly neutral pH. pH measures the hydrogen concentration in a liquid or substance, which make it acidic, neutral, or alkaline (basic). The pH scale ranges from 0 to 14. 0 to 6 is acidic, 7 is neutral and 8 to 14 is basic. For every one unit change on the pH scale, there is approximately a tenfold change in how acidic or alkaline a sample is. Lemon is under 2 and Epsom salt is over 9 on the scale. Substances at either extreme of the pH scale tend to be very corrosive; i.e. very acidic battery acid or extremely basic lye.

The pH Scale and Productivity

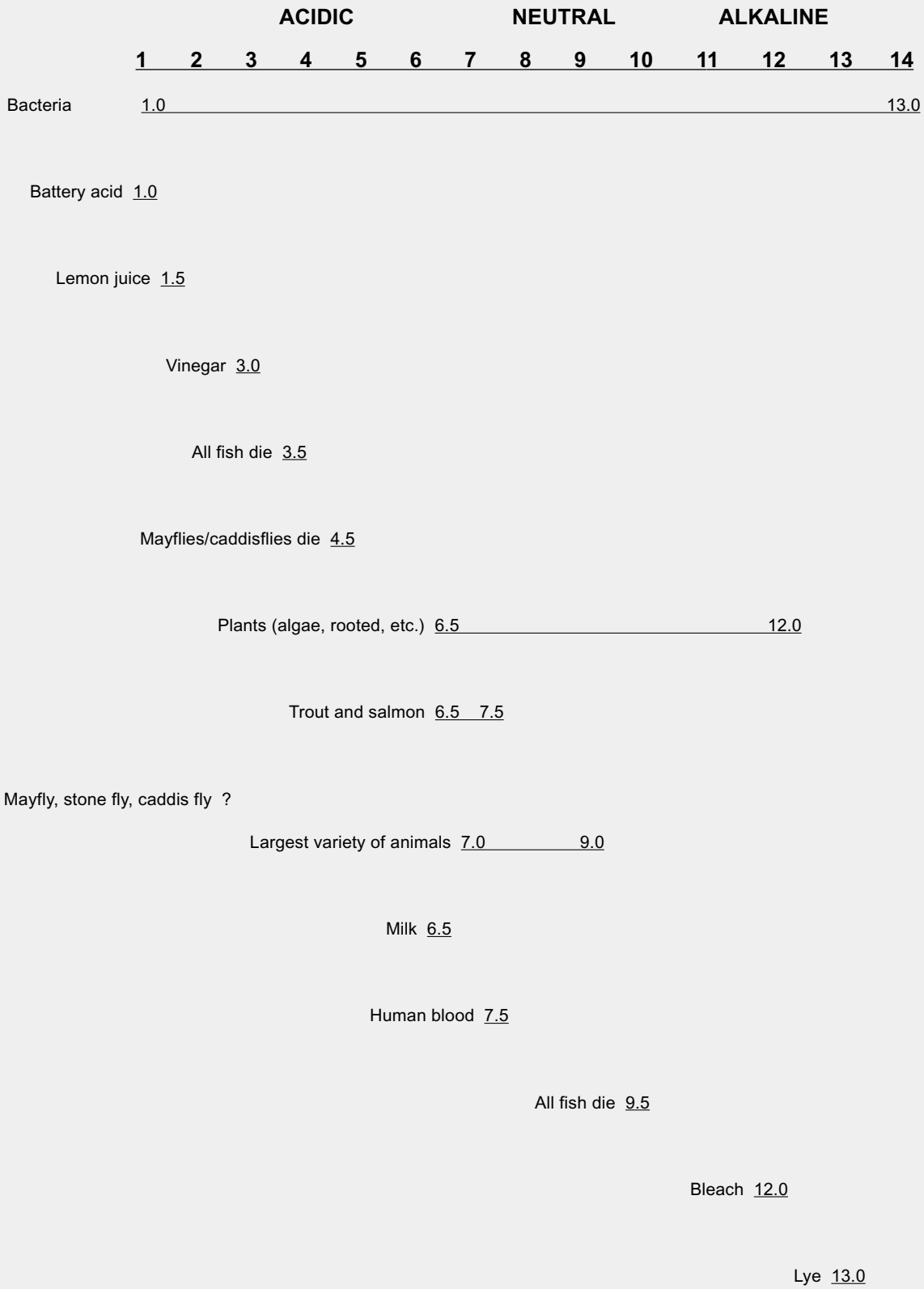

Figure 2. The pH Scale and Productivity

The largest variety of aquatic animals will exist at **pH values of >7 to <9.** Plants can range from 6.5 to 12 on the scale. pH levels in water can be affected by soils and from rain that contacts gases such as sulfur and nitrogen oxide in the atmosphere. These gases from sources such as automobile exhaust combine with water droplets and fall as acid rain.

Procedure

1. Refer to the pH scale in Figure 2. Purchase pH strips and ask students to bring common items from home like milk, vinegar, and bleach, and conduct your own experiments. Can caddisflies survive pH such as milk?

2. With the help of an overhead transparency of the pH chart, cover the answers written on the scale and ask students to fill in the blanks.

3. Research the pH tolerance levels of specific plants and animals not listed. What is their preferred water chemistry overall?

Assessment

Ask students to:

- ❑ List the pH of common products learned in the activity.
- ❑ Discuss the pH tolerances of plants and aquatic wildlife.
- ❑ Write a narrative about the items that could change pH in a stream.

Extensions

Ask students to:

- ❑ Predict the pH of substances found at home or in nature (not listed in the pH chart); test them in the classroom.
- ❑ Identify the pH tolerance range for organisms indicated on the pH scale chart.