Name

Lakes and pH

Do you know . . .

Water has an important chemical nature. We measure this chemical nature with a pH scale. If you look at the pH scale below, you will see this watery environment can be very acid (0 on the pH scale) or very alkaline (14 on the pH scale) or anywhere in between. We meet these extremes every day in our foods—vinegar is very acid and baking soda or antacid pills are very alkaline. Pure distilled water has a neutral pH of about 7.

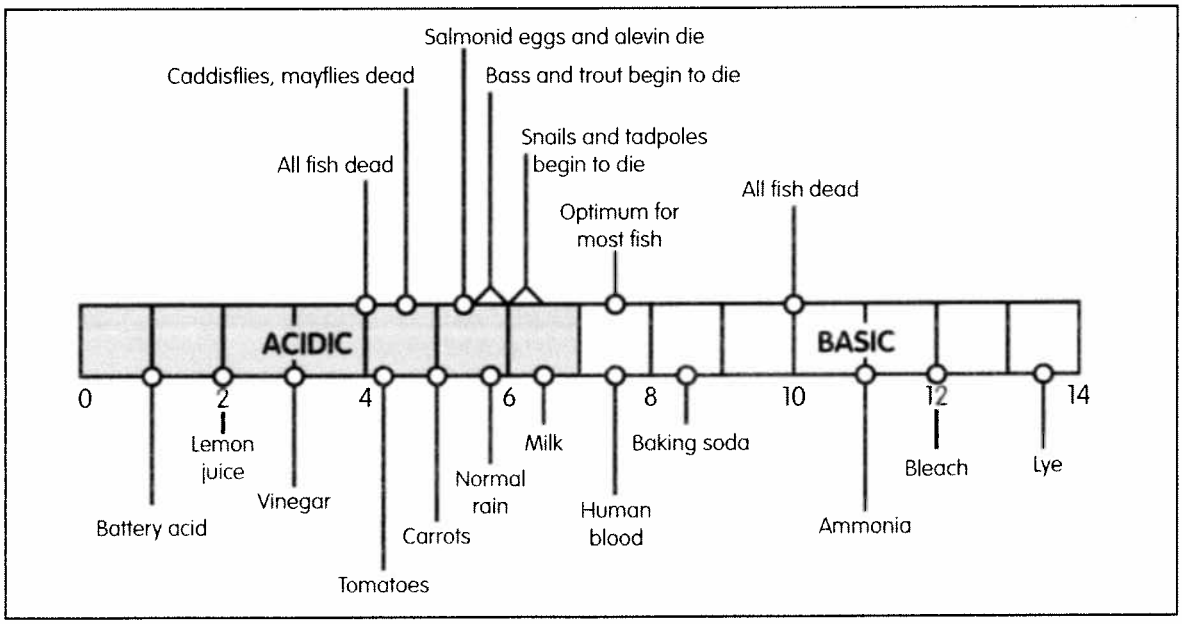
Each increase in value away from the neutral point of 7 is 10 times greater than the previous value. Small changes in the acidity or alkalinity of water can have big impacts on aquatic life, most of which require a pH level ranging from 6.0 to 8.5. Even if fish could survive changes in pH, insects on which they feed and aquatic plants cannot. The food chain can collapse if the pH goes beyond these narrow boundaries.

Acid rain results when water vapor in the air becomes acidified through chemical reactions with pollution coming from refineries and factories, coal- or oil-fired power plants, and cars. It falls to earth as acid rain. Acidified water can be very harmful to living organisms.

Soils also have a chemical nature. When soils are mixed with water, the pH may change. In eastern Oregon, where soils are high in alkali content, the pH of many lakes and streams can be greater than 10—or very alkaline. Forested soils are usually slightly acidic. Their influence creates a pH near 6 in the streams and lakes near them. Natural rainfall has a pH of 5.7.

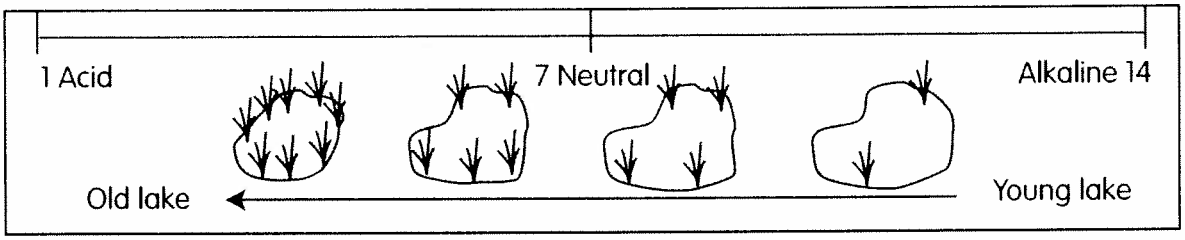
Some areas of the country have a major problem with acid rain while in other areas the threat is not as great. The degree to which acid rainfall affects a watershed depends on the system's natural "buffering capacity." In areas with alkaline soils, natural runoff is enough to keep the water from becoming too acidic. In forested areas, soils have far less ability to buffer the effects of acid rain.

pH Scale



Student sheet

pH Scale

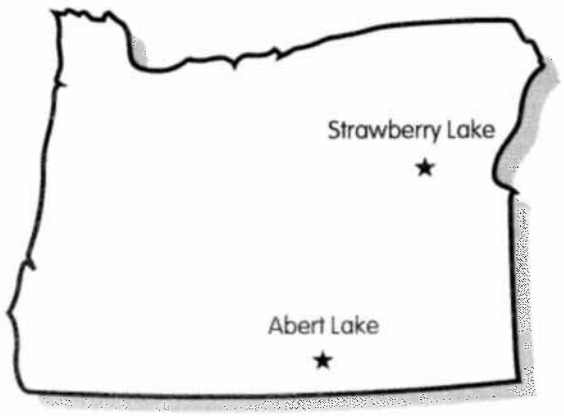


The age of a lake influences the pH of the water in the lake. The drawing below illustrates how this happens.

As trees and other plants grow, die and decompose, they release carbon dioxide (CO_2) into the water. This succession forms carbonic acid and makes the lake more acidic as time passes.

Now it's your turn . . .

Does Oregon have acidic or alkaline lakes? In this exercise you will study the descriptions of two Oregon lakes. Compare the factors that may influence their pH and answer the questions that follow.



Description

Strawberry Lake is found in the Strawberry Mountains of eastern Oregon. Forest covers more than 75% of its steeply sloped watershed. A survey of Strawberry Lake found the following information:

	Depth	Dissolved Oxygen	Temp	pH
Maximum	27 ft.	8.4 ppm	64.8°F	6.5
Average	9 ft.			

Abert Lake has no outlet, and is found in an arid, highly mineralized area of southeastern Oregon. Forest covers 30 percent of its moderately sloped watershed. A survey of Abert Lake found the following information:

	Depth	Dissolved Oxygen	Temp	pH
Maximum	11 ft.	9.5 ppm	65.3°F	10.1
Average	7 ft.			

QUESTIONS: **pH and Lakes** NAME: _____

1. Why is the pH different in the two lakes?

2. Which lake could support the most life? Why?

3. If both lakes dried up, which lake bed would most likely have the best chemical environment to become colonized by plants? Why?

4. If acid rain becomes a problem in Oregon, predict what could happen to Strawberry Lake?

5. What could happen to Albert Lake?