

# Dissolved Oxygen

Some aquatic animals such as fish must use gills to absorb oxygen from the water around them. That oxygen is dissolved in the water. The amount of **dissolved oxygen** depends on many factors like temperature, turbidity, agitation and **organic matter**.

Microorganisms consume oxygen when decomposing organic matter. Colder water holds more oxygen and warmer water holds less oxygen.



*Pennsylvania Fish & Boat Commission (PFBC) Fisheries Biologist Steve Kepler (retired) taking water quality measurements in a stream with a handheld multiparameter meter.*

Biologists measure the amount of oxygen dissolved in the water as milligrams per liter (mg/l).

See the chart below to get an idea of how temperature affects the maximum amount of oxygen that can be dissolved in the water. This amount is called **saturation**.

## Dissolved Oxygen Concentration at 100% Saturation

Water Temperature (°C)	Dissolved Oxygen (mg/l)
1 (or 34°F)	14.2
10 (or 50°F)	11.3
20 (or 68°F)	9.2
30 (or 86°F)	7.7

## What does it mean?

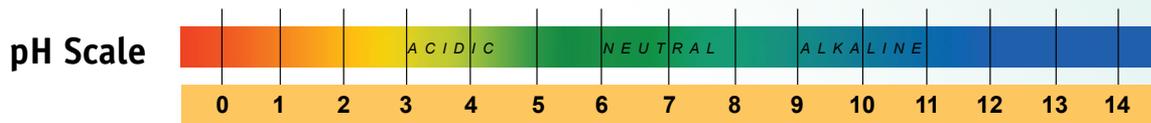
Warmwater fish, like catfish, can tolerate living in water that has less

oxygen. Coldwater fish, like trout, require more oxygen.

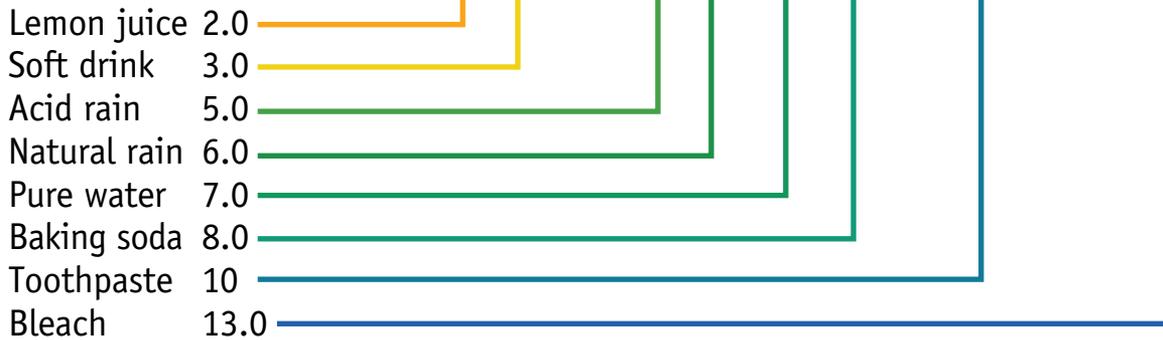
# pH

You may have learned about pH at school or elsewhere. You also know water is  $H_2O$ . Did you know that  $H_2O = H^+ + OH^-$ ? **pH** measures the acidity or  $H^+$  part of that equation. An acid will have more  $H^+$  than  $OH^-$ . A base will have more  $OH^-$  than  $H^+$ . A neutral solution has equal amounts of each part.

Scientists measure pH on a scale from 1 to 14. Each level on the scale changes by ten times. Check out the comparisons below. **Acid rain** is ten times more acidic than natural rain.



## pH of Different Solutions



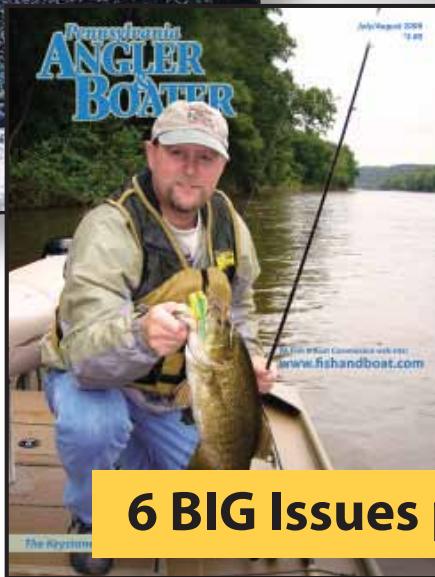
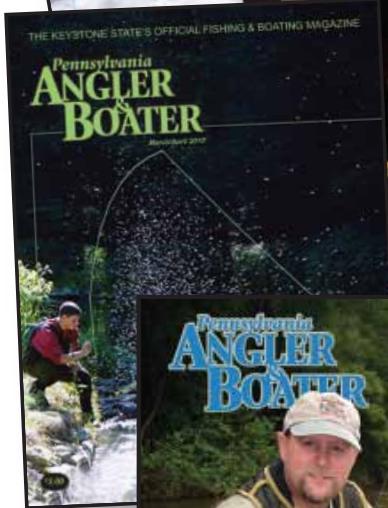
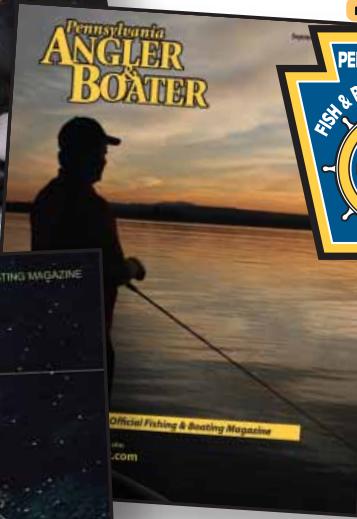
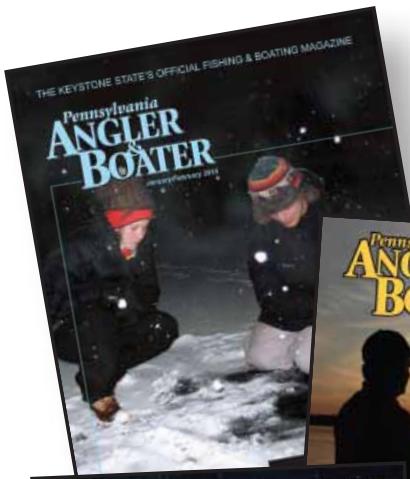
## Why does it matter?

Low pH affects how substances dissolve in water. Some substances may be toxic to aquatic life. If metals like aluminum

are released into the water, it harms the gills of fish. Low pH can also affect the reproduction of some aquatic animals.

### Tolerant ranges for certain species

Mayfly	5.5 to 7.5	Brown Trout	5.0 to 9.5	Common Carp	5.0 to 9.0
Caddisfly	5.5 to 7.5	Brook Trout	4.5 to 7.5	Channel Catfish	5.0 to 10.0
Stonefly	5.5 to 7.5	Yellow Perch	4.5 to 7.5	American Bullfrog	4.5 to 7.5
Snails, Clams, Mussels	6.0 to 9.0	Smallmouth Bass	5.5 to 7.5	Wood Frog	4.0 to 7.5
Crayfish	5.5 to 7.5	Pumpkinseed	5.0 to 7.5	Eastern American Toad	4.5 to 7.5
Rainbow Trout	5.5 to 9.5	Fathead Minnow	6.0 to 7.5	Spotted Salamander	5.0 to 9.5



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