

Oxygen

and its importance for natural waters, ponds and aquaria

by

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Oxygen is one of the elementary components of our planet. Without it, no higher form of life is possible, neither on the land, nor in the water.

The solubility of oxygen in water depends on the water temperature and salinity, as well as the air pressure and its oxygen content. Of special practical significance is the fact that the oxygen content of water drops as the temperature increases, while at the same time the O₂ requirements of organisms rises.

In natural waters, just as in aquaria and garden ponds, a sufficient supply of oxygen is a prerequisite for the creation of a stable biological balance. The critical factor is the interplay between oxygen producers and consumers.

While flowing waters and larger ponds and lakes can to a great extent meet these needs by absorbing atmospheric oxygen at their surfaces, aquaria in particular must rely on supplementary sources of oxygen. In addition to various technical means, the most important factor here is aquarium plants. During the process of photosynthesis, by which water as well as land plants use light and carbon dioxide to produce the glucose required for continued growth, oxygen is released as a waste product. Since plants can only assimilate CO₂, and thereby produce oxygen, in the light, and like other organisms breathe in oxygen during the night, measurements produce interesting, rhythmical variations in the oxygen content of water.

Amongst the main consumers of oxygen in water are of course fish. Depending on the species, water temperature and level of activity, they breathe in daily 15 mg of oxygen per gram of body weight. Many of the countless micro-organisms also need oxygen for their important work of breaking down organic waste in the water into its component parts, thereby purifying the water. Since the oxygen consumption of these organisms increases in line with the level of pollution of the water, corresponding measurements are used as an important factor in the evaluation and determination of the quality of the water (BSB - biological oxygen requirement).

Measuring the oxygen level can help the aquarium owner to spot potential problems. If the O₂-content is continuously too low, the population density in the tank, feeding, filtration and plant growth must be checked to discover any sources of high organic consumption. Fish maintained in a state of continuous oxygen deficiency suffer from loss of appetite, weakening of resistance to diseases and increased occurrence of infections, reducing their overall life expectancy. Measurement and control of the oxygen level thus also has aspects relevant to animal care, as a control parameter for their optimal maintenance.

The oxygen content of water can be measured with the aid of various chemical reagents or - more easily and with less contamination - by means of modern sensor technology.