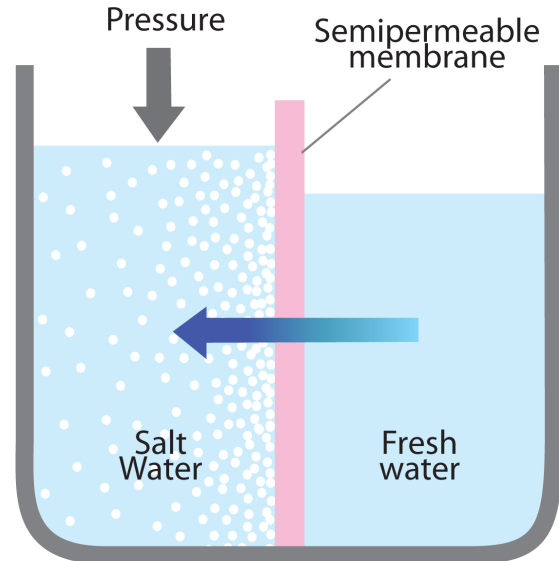


Salt Application in Aquariums and Ponds

Salt, or sodium chloride (NaCl), is used often in aquariums, koi ponds, and water gardens for treatment of fish diseases. Salt treatment for ponds and aquariums is a proven practice in the health care and maintenance of koi and aquarium fish in aquaculture, aquarium stores, ponds, and wholesalers worldwide.

Freshwater fish maintain a normal internal concentration of salt in their body fluids higher than that of their liquid environment. Osmosis causes water to transfer from the lower salinity of the water into the tissues of the fish. This additional water build up is eliminated by the kidneys. Salt added to ponds and aquariums lowers the osmotic pressure. This reduces the effort the fish must expend in eliminating the excess water. The saved energy is then available for use by the fish's own immune system to take care of other potential problems. Salt also affects the internal fluids of some pathogens that cause fish disease by disrupting the organism's internal pressure and reducing its ability to complete its disease cycle. The presence of salt also helps counteract any nitrite toxicity. In some cold climate areas, salt is added in the winter to lower the freezing point of the water in outdoor ponds.

Salt can cause plant damage as the concentration increases. Floating pond plants, (water hyacinth, water lettuce, etc.) are affected at lower concentrations more than most bog plants. Salt may provide some minor control of algae in the higher concentrations.



The amount of salt dissolved in water is termed the salinity and is measured as a percentage, in parts-per-thousand (ppt), or in parts-per-million (ppm) (where 10 ppt = 1% = 10000 ppm). The more common parts-per-thousand measurement is the weight of the salt in pounds per thousand pounds of water (about 125 gallons). Pond-keepers often talk about the pounds of salt per hundred gallons of water. Since 100 gallons of pure water weighs about 800 pounds, one pound of salt per hundred gallons equates to a salinity of 1.25ppt (0.125% or 1250ppm). (1ppt = 0.8 pounds per hundred gallons)

[Note: Koi internal fluid salinity is on the order of 9ppt (about the same as ours). Sea water is around 35ppt to 70ppt depending upon geographical location. The Great Salt Lake has a nominal concentration of about 250ppt.]

There is some confusion about salt in koi ponds. If freshwater fish were put into an absolutely pure (distilled) water environment, the osmotic pressure would be so high that they would be unable to eliminate the excess water and would die almost

as if by drowning. On the other hand, if the salinity approaches that of the internal tissues of the fish, the osmosis process will decrease or even reverse. This can also cause the fish to die, essentially of dehydration.

Discussions should center not on should salt be used but how much. The acceptable salinity range is 0 - 6ppt. The addition



of one to two pounds of salt per hundred gallons of water (1.25 - 2.5ppt) is recommended for most ponds, especially in the spring and fall. This is a fairly conservative dosage.

If nitrite is present, two pounds of salt per hundred gallons is appropriate to reduce the nitrite toxicity. After the initial application, the dosage applies ONLY to the amount of water being taken out and replaced, NOT to the amount of water in the entire pond, and NOT to water being added to replace that lost by evaporation. Except for very short-term medicinal baths at concentrations often around 25ppt (1 pound per 5 gallons), and administered under tightly controlled conditions, it is not recommended that koi be subjected to a salinity exceeding 5-6ppt (4 pounds per hundred gallons), especially for extended periods. Please note: each species of fish has different tolerances for salt, so find out about the particular species before dosing

with salt. Do not exceed the minimum dosage above unless you are familiar with the species being treated.

Use caution to avoid direct contact with fish as salt as it is added to the water. Although fish will probably not swallow pieces of salt, direct contact with crystalline salt for more than a few seconds can cause injuries similar to burns. When making the initial or any large application, it is better to divide it into two to four daily partial additions rather than adding it all at once. Do not use salt that has binding agents or any type of iodized salt. Use pure pond or aquarium salt preferably from a known source that certifies it for aquaculture use.

When using salt in ponds or aquariums, it is important to monitor the concentration. Salt



does not leave the water during normal evaporation. The floating hydrometers that are used to measure the salinity of salt water aquariums are difficult to read, and, therefore, not fully reliable. For maximum safety and accuracy, test your water at regular intervals. Most aquarium stores provide this service for a nominal charge. You can also purchase an AquaLife Temperature Compensated Refractometer. This is a relatively inexpensive but reliable unit to have on hand to accurately determine salt concentration.

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