

AQUARIUM Solutions

Stress-X™

PROFESSIONAL WATER CONDITIONER

PURPOSE AND BENEFITS

Stress-X™ is a liquid, professional water conditioner that has been scientifically formulated for use in freshwater and saltwater aquariums and garden ponds. **Stress-X™** should be used (1) when conditioning new water for aquariums or ponds, (2) after or during water additions, (3) before adding new plants, invertebrates fishes or amphibians, (4) as a bag additive for transporting fishes and aquatic invertebrates for short distances (in transit less than 24 hours), and (5) as a pre-transportation dip additive for shipping aquatic plants.

WATER CONDITIONING; GENERAL CONSIDERATIONS

Water conditioning is the process of altering water so that aquarium and pond life can survive and thrive in it. Municipal water sources are treated so that the water delivered to the tap is free of viable disease-causing bacteria, viruses and other organisms as well as appearing clean and clear and being free of disagreeable odors and flavors. While such water is typically suitable for human consumption with no further treatment it is almost always quite deadly to aquatic life. In broad terms, a water conditioner must remove or mitigate those substances which are toxic to aquatic life and add those substances which promote the health and well being of aquatic life. **Stress-X™** is just such a water conditioner and continues the long tradition of powerful and safe water conditioners developed and distributed by AquaScience Research Group, Inc..

WATER CONDITIONING; SPECIFIC CONSIDERATIONS

Water from different sources will have different problems which need to be corrected before it can be safely used for aquariums and ponds.

CHLORINE: This is the most commonly used disinfectant substance found in tap water in the world. This is because it is highly effective and inexpensive and the technology, in water treatment, is well documented and understood. The chlorine content of any water sample can be easily determined with available chlorine test kits. The best kind of kit is one which will give two different, but related, measurements: (1) "free, available chlorine" and (2) "combined available chlorine".

In the United States the federal Environmental Protection Agency (EPA) and various federal, state and local public health agencies have required that for overall human health that the amount of trihalomethanes (mostly as chloroform, CHCl_3) be significantly reduced or totally eliminated from drinking water. The source of trihalomethanes in drinking water comes mainly from the reaction of "free, available chlorine" with low levels of dissolved organic substances in the treated water.

The obvious problem with reducing "free, available chlorine" is that disease-causing organisms (e.g. polio virus, typhoid fever bacteria, and fecal coliform bacteria) would likely make it through the water treatment process and arrive at the customers' taps.

"Free, available chlorine" is known, chemically, as "hypochlorite". The hypochlorite ion, OCl^- , is the same ion that is found in common, household bleach products. As every homemaker knows, bleach is one of the best disinfectants available. Some small water treatment companies even "batch treat" their water supplies by adding the required amount of industrial bleach solution to a large tank of water before it gets distributed through the water supply system. The larger water treatment companies simply add chlorine gas directly

to the water treatment stream and thereby produce the hypochlorite *in situ*.

The actual concentration of hypochlorite in the delivered water will vary from day to day and from season to season depending upon the conditions of the feed water and how the chlorine is added to the water.

The removal of chlorine, called "dechlorination", with **Stress-X™** is extremely effective and very fast. **Stress-X™** will completely dechlorinate even the most strongly chlorinated water from most domestic water treatment plants.

As natural water sources around the US and, indeed, around the world became more and more polluted it became necessary to more aggressively treat water to insure a healthy product. This also meant adding increasing amounts of chlorine so that the water treatment agencies could insure that the chlorine residual being delivered to the customer was sufficient to maintain safe water throughout the ever aging distribution systems.

As chlorine content (as "free, available chlorine") increased so did the trihalomethane content. Trihalomethanes are known cancer-causing agents (carcinogens). To counteract the trihalomethane threat and still provide safe water it was known that by increasing the "combined, available chlorine" content one could both make the water safe and eliminate the carcinogens. "Combined, available chlorine" is better known as "chloramines".

CHLORAMINES: These substances are formed from the reaction between chlorine (or hypochlorite) and ammonia or ammonium compounds in water. There are three substances which can be called chloramines. These are (1) monochloramine, NH_2Cl , (2) dichloramine, NHCl_2 , and (3) trichloramine, or nitrogen trichloride, NCl_3 . The formation of these compounds are relatively easy to understand if one looks at the ammonia molecule, NH_3 , which consists of a central nitrogen atom, N, with three hydrogen atoms, H, attached. Any or all three of the hydrogens can be removed in a chemical reaction and each can be replaced by a chlorine atom, Cl.

In water treatment the first such compound, monochloramine, is the most desirable due to its stability in solution and its ability to kill viruses, bacteria and other microorganisms. In actual practice, there is always a small percentage of the total chloramine content present as dichloramine, but never any trichloramine. The trichloramine is very unstable and rapidly decomposes to free nitrogen and chlorine (that's why one should never mix bleach and household ammonia (or ammonia-containing cleaners)).

When chloramine-containing water is dechlorinated with **Stress-X™** the chloramines release the bound ammonia into the water. Since chloramine-treated water is the standard around the U.S. and elsewhere it may be necessary to use our **Liquid Buffered ClorAm-X®** to remove the residual ammonia from the treated water. In general practice, the **Stress-X™** and **Liquid Buffered ClorAm-X®** should be used concurrently.

IODINE: Some well waters are treated with iodine crystals as a suitable replacement for chlorine treatment. Iodine is a highly effective antimicrobial and renders the treated water safe for human and animal consumption. However, the dissolved iodine can be very toxic to fishes and aquatic invertebrates. Additionally, it may be detrimental to nitrifying bacteria that are necessary for a healthy, functioning aquarium or pond.

Stress-X™ will rapidly react with dissolved iodine to convert it to nontoxic iodide ion, I⁻, thereby rendering the treated water instantly safe for aquarium and pond use. The iodide ion will, in fact, be available for use by those plants and animals (e.g. marine algae and corals) that often require an iodide (iodine) additive.

HEAVY METALS: Depending upon the source some tap waters contain copper and lead and other heavy metals. The various public health agencies have very strict regulations on heavy metal content and these are constantly monitored in most public water supplies. Interestingly, the concentrations of certain heavy metals which can be tolerated by humans and other mammals is often much greater than what can be tolerated by aquatic organisms.

Copper, for instance, is often added to water sources (prior to treatment for human consumption) to control algae and other organisms. Some of the copper is removed during the treatment process. However, in some supplies the concentration which flows from the tap is great enough to be deadly to fishes and invertebrates. **Stress-X™** deals with heavy metals through chelation and/or precipitation so that detoxification is achieved.

OTHER SALTS: Osmotic stress in aquarium and pond fishes is of concern when placing them in new water. This is because the "osmotic pressure" of new water is often less than that of natural waters and even of old aquarium or pond water. The effects of osmotic stress are typically small and can usually be ignored. Some aquarium authorities recommend, however, the addition of varying amounts of ordinary salt, sodium chloride, NaCl, to aid in the osmotic "balance" of aquarium and pond waters.

The problem with adding salt is that for many aquarists and pondkeepers the amount added is much more than necessary and often so much so that the fishes and plants suffer from increased osmotic pressure and too high of a chloride, Cl⁻, content. In practical applications the amount of salt needed for freshwater fishes should be related to the actual or expected concentration of nitrite, NO₂⁻; which is encountered in new systems as the biological filtration becomes established.

Nitrite is the intermediate step in nitrification as ammonia excreted from the gills of the fishes is converted to essentially nontoxic nitrate ion, NO₃⁻. It is known from research that a chloride ion content of about 30 times the nitrite ion content will help protect freshwater fishes from the toxic effects of the nitrite. It does this by "swamping" the nitrite and preventing its uptake into the blood of the fishes where it would irreversibly tie up the hemoglobin and cause asphyxiation. Since nitrite rarely reaches levels of more than 1.0 mg/L (as NO₂⁻) then little more than 30 mg/L chloride is needed to protect the fishes. Marine fishes do not usually suffer nitrite poisoning due to the extremely high levels (> 19,000 mg/L) of chloride in saltwater. **Stress-X™** adds the necessary chloride to the treated water so that additional salt application is rarely needed.

pH AND ALKALINITY: The pH of most tap water is usually greater than 7.0, sometimes greatly so, and as such usually doesn't need to be buffered higher for freshwater use. In saltwater systems the synthetic sea salts do the job of buffering the water and no water conditioner can significantly increase or decrease the pH as a result. In ponds the pH changes diurnally (from day to night) and will be different depending upon the time of day it is measured. This happens primarily because of photosynthesis of the plants and algae in the ponds.

In aquariums the pH tends to remain stable throughout the day and night with little or no variation. In heavily planted tanks, with little or no active filtration and with suitable lighting, the pH can behave as in an outdoor pond. It is desirable to prevent great pH swings as much as possible. In an outdoor pond there is little the pondkeeper can do to control these diurnal swings, but the fishes and plants adapt and can easily handle these natural changes.

Where photosynthesis is not a major factor the pH will typically decline with time as nitrification consumes the alkalinity (usually as bicarbonate, HCO₃⁻) and releases hydrogen ions, H⁺, into the water. Hydrogen ions cause the pH to drop and loss of alkalinity ("acid-neutralizing capacity") causes the pH to drop much sooner. **Stress-X™** adds buffering agents which boost the alkalinity without causing the pH to rise significantly in freshwater. **Stress-X™** helps stabilize the pH.

SPECIFICATIONS

Stress-X™ adds a buffering system (to boost alkalinity without significantly affecting the pH), sodium thiosulfate, a dechlorinating agent (to react chemically with chlorine, chloramines and iodine),

physiologically active electrolytes, a tertiary polymer system (for skin-slime replacement and protection) and product stabilizers.

Dosage: use 1 teaspoon (~ 5 mL) per 10 gallons of water.

CONTRAINDICATIONS

Stress-X™ is not a medication, chemotherapeutic agent nor an economic poison and is not indicated for the treatment or control of any specific or general disease condition in aquarium organisms nor for the control of any pests. **Stress-X™** is intended for use as a multipurpose aquarium and garden pond water conditioner.

STABILITY

Stress-X™ is stable for an indefinite period if kept in its original container and stored away from heat and sunlight. When not in use store at room temperature (above 60° F and below 100° F) out of direct sunlight. Do not return unused portions to the original container; do not introduce any water or other chemicals into the container. A slight haziness to the liquid and/or the presence of a slight precipitate does not affect the efficacy of the product.

COMPATIBILITIES

WITH OTHER WATER ADDITIVES: **Stress-X™** is compatible with **ULTIMATE®** and **Liquid Buffered ClorAm-X®** and with most other water conditioners. However, care should be taken when using **Stress-X™** water conditioners containing hydroxymethanesulfonates, hydrosulfites, or formaldehydesulfoxylates; these products may be recognized by their characteristic sulfurous or sewage-like odor. It is incompatible with strong oxidizing agents such as potassium permanganate. Do not use with unchelated ("free") copper medications since the metal will be precipitated and/or chelated and thereby wholly or partially inactivated. **Stress-X™** can be safely used with treatments containing malachite green or methylene blue or related dyes. **Stress-X™** is compatible with most antibiotics. **Stress-X™** can be added directly to aquariums or ponds utilizing biological filtration, and it will not interfere in the nitrification process.

WITH TEST KITS: **Stress-X™** is compatible with all known aquarium and pond test kits (including Nessler's total ammonia and Winkler dissolved oxygen).

TOXICITIES

ULTIMATE® is not known to be toxic to any commonly kept aquarium or garden pond plants and animals.

PACKAGING

Stress-X™ is packaged for (1) freshwater aquarium use, (2) saltwater aquarium use, and (3) water garden and pond use in convenient 1 fl.oz., 4 fl.oz., 32 fl.oz., 1 gallon and 5 gallon containers. All containers are recyclable.

ULTIMATE® and **ClorAm-X®** are registered trademarks of AquaScience Research Group, Inc.

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