TECHNICAL BULLETIN

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COPPER SULFATE

Pool Magic, Copper Sulfate solution, Copper sulfate solid

MATERIAL & FUNCTION

Copper comes in several readily water soluble forms, the cheapest and most commonly used is copper sulfate ($CuSO4.5H_2O$ - cupric sulfate pentahydrate). This form is available as either a crystal or a powder and is known as "bluestone" or "powder blue." The blue colour is also imparted to aqueous solutions (eg "Pool Magic")

Copper sulfate based swimming pool algaecides may be used to: control algae, improve water clarity and reduce the amount of chlorine or bromine based products required. It does not control microorganisms such as bacteria and viruses, nor does it eliminate the need for sanitizers such as chlorine or bromine based pool products

The use of copper sulfate based algaecides in swimming pools poses no significant hazard to swimmers. When used according to the label directions, copper sulfate algaecide should not cause skin irritation for bathers. Label directions should be carefully followed when handling undiluted copper sulfate based product to reduce the potential for skin irritation, so you should always:
READ THE LABEL BEFORE USING THE PRODUCT

APPLICATIONS

POOLS – POOL MAGIC

Test Pool Water Regularly
Water balance (adequate sanitizer levels, pH, total alkalinity, and calcium hardness) and an appropriate concentration of copper sulfate based algaecide must be maintained to prevent staining of pool surfaces. Water testing can be done using good quality test kits or by bringing water samples to your swimming pool dealer. Only regular testing can determine if the level of sanitizer in your pool is adequate to protect swimmers from disease causing microorganisms.

The recommended dosage rates are written on the label. The dosage rates are prescribed by the APVMA

Copper is normally added to pools during periods of low or minimal usage – eg in winter. Copper in water acts as a catalyst to reduce the activity of chlorine and bromine. The chlorine or bromine dosage rates may have to be increased in order to maintain the appropriate concentration.

Excessive dosing of copper in pools may results in staining of hair and swimwear, and staining of some pool surfaces. Aged marble pools in water that has a pH greater than 7.8 and a high calcium hardness are particularly prone to staining.

POND USE OF COPPER SULFATE

Copper has been used for many years as an effective algaecide in farm ponds and in aquaculture operations. But with its use only a thin line separates effective algae-treatment levels from lethal overdoses to fish. And not all fish are equally tolerant of copper sulfate: for example, the compound is highly toxic to salmonoids (trout and salmon).

Copper can be used to control pond algae, including filamentous algae—*Spirogyra spp*., *Pithophora*

spp., and *Cladophora spp*.—and higher algae—*Chara spp*.

Several companies market copper in chelated liquid and crystal forms. Chelated copper compounds stay in solution longer than copper sulfate does, tend to control algae better, and seem safer to fish. Chelated copper compounds do involve, however, higher initial costs than copper sulfate does.

Dosage rates of copper compounds depend upon both manufacturer instructions and chemical type (liquid or granular).

Determination of Dosage Rates for Ponds
Determine dosage rates before using any type of copper treatment. First, measure the total alkalinity, (**Not** the hardness of your water), in parts per million (ppm), and the pH, since the toxicity of copper to fish increases as the total alkalinity and pH decrease. Dosage rates for copper sulfate are listed below, by alkalinity level:

0-40 ppm .....**Do not use**
40-60 ppm .....0.33 ppm
60-90 ppm .....0.5 ppm
90-200 ppm .....1.0 ppm
Above 200 ppm .....2.0 ppm
The maximum copper sulfate dosage rate is 2.0 ppm.

One (1.0) ppm equivalencies are as follows:
• 0.001 grams per litre,
• 1.0 milligrams per litre,

If total alkalinity is less than 40 ppm, copper treatments are not recommended because of the risk to fish. Algae control in waters with high alkalinity levels (greater than 250-300 ppm) can be improved by use of chelated copper compounds. Copper sulfate in waters with high total alkalinity levels will settle before algae is completely controlled. Alkalinity in water is variable, so if you do not know the concentration, find out before treating with copper

Chemical Application in Ponds
After the amount of copper sulfate needed to treat the volume of water is determined and weighed out, the compound should be thoroughly dissolved in the water. Copper sulfate is much heavier than water, and if crystals or powder is simply thrown into the pond, it will sink to the bottom, where pond muds will chemically bind with it and lock it up. Copper sulfate should be as diluted where possible, and great care should be taken in its distribution, so as to avoid the creation of "hot spots," or areas with high copper concentrations. Compounds also can be placed in a porous burlap bag and pulled behind a boat so that they gradually dissolve. When using a commercially formulated copper, such as any of the chelated compounds, follow the label instructions for dosage rates. Liquid forms can be applied directly to the water, but they should first be mixed with the water in order to be dilute. As with copper sulfate, great care should be taken to disperse commercial formulations evenly over the entire pond area, thereby avoiding the creation of hot spots.
Precautions when using in Ponds

Copper compounds are extremely corrosive to steel containers; thus, be sure to rinse steel containers out well after using them to store this chemical. Contact with skin and eyes may be irritating. Be wary, too, of treating ponds from which sheep drink: sheep are noted for having a low tolerance of copper components, and overexposure may be fatal. In a pond with algae, copper treatments may cause oxygen concentrations to drop and may thus result in fish kills. Pond algae is a major source of oxygen and when this algae is removed, the source of oxygen is also removed. Additionally, oxygen will be consumed as the algae decompose. If you are treating your pond with copper, either treat in a series of small doses over time or have emergency aeration available. One method is to treat one fourth to one third of the area at a time, wait 10-14 days, treat again, and repeat until desired dosage rates are obtained. A degree of algae control should be evident within the first week after the initial application.

Copper also is toxic to most pond zooplankton (for example, daphnia and rotifers). If you are relying on the zooplankton as a food source, e.g. in fish fry culture ponds, you may not want to use copper, which does not break down in the environment but forms insoluble compounds with other elements. Although copper rapidly disappears from water after application as an algaecide, it can accumulate in bottom sediment after repeated high rates of application.

As long as water pipes are not galvanized, copper can by used in backyard pools containing ornamental fish. But the combination of copper and galvanized pipes can yield chemical compounds fatal to your fish. Keep in mind that limited information exists regarding effects of copper on different ornamental fish; so use caution when first using copper compounds. Moreover, you still need an accurate measure of total alkalinity and pH before safe treatment can be assured.

Algae problems in your pond are ultimately controlled by addressing the causes and **not** just the symptoms. The influx of watershed nutrients needs to be regulated if satisfactory control of algae is to be achieved in the long term. In conclusion, copper treatments are quite effective algaecides in certain situations and are inexpensive compared with other treatments. Yet caution must be exercised as a result of the effects of such treatment son fish and other aquatic life. If your water is low in alkalinity or pH, or if you have heavy algae bloom and no aeration, copper treatments are **not** recommended. Finally, as with any chemical application, you as the end user are responsible for reading and following all labelled instructions

CAUTION
Avoid contact with skin and eyes and avoid breathing vapour or spray mist.
In Case of Accidental Poisoning
Seek medical attention or call a poison control centre immediately.
In case of accidental poisoning of pets seek veterinary attention immediately.
Disposal
Do not reuse the empty containers. Dispose of them in household garbage.
Unused or partially used products should be disposed of at provincially or municipally designated household hazardous waste disposal sites.
Before Purchasing this Product
Read the label directions and safety precautions before buying the product.
Purchase only the quantity of product needed for the treatment.

When Using this Product
Carefully read all label instructions and precautions before using this product.
Do not smoke, drink, or eat while applying this product.

After Using this Product
Always wash your hands thoroughly after using this product.
Wipe clean all surfaces that come in direct contact with food, such as counters, tables and stovetops.
Always store this product out of reach of children and pets and away from food and beverages.
Please note that these are general precautions. You should consult the label of the product for clarification and additional information.

PACKAGING

Pool Magic - 1 Litre, 5 Litre, 15 Litre containers
Copper sulfate solution – 15 Litre
Copper sulfate (solid) – 5, 20 kg

IMPORTANT NOTICE TO CUSTOMER

Since the use of this product is beyond the control of either seller or manufacturer, their only obligation shall be to replace any quantity of product which is proven defective. They cannot assume any risk or

liability in excess of the purchase price of the product itself, which does not include labour or any consequential damages resulting from the use of this product. Determining the suitability of this product for any intended use shall be solely the responsibility of the user. **ALWAYS TEST FIRST.**