NOVALEK, INC.

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PRODUCT DATA SHEET
Malachite Green
Disease Treatment

PRODUCT DESCRIPTION:
Kordon's Malachite Green is an effective medication used for the control of various external parasites of freshwater and marine fishes. When used as directed the medication will control or prevent the following common protozoan parasites: Ichthyophthinus (freshwater Ich), Costra, Chilodonella, Ambiphyra, Cryptocaryon (marine Ich), Epistylis, Oodinium and Trichodina. Kordon's Malachite Green is also effective against common external fungal infections of fishes and eggs which include Achlya and Saprolegnia. An extensive body of literature supports its use as an effective agent in the control of fungus on fish eggs.

GENERAL DIAGNOSIS OF PARASITIC DISEASES OF FISHES
The following brief summary of clinical signs often associated with the parasitic protozoans discussed above is intended only as an aid for the beginning aquarist. It is not to be thought of as a definitive diagnostic key. It is also important that the aquarist or pond keeper consult appropriate, accurate references for more specific information regarding disease problems of fishes. In addition, if possible, skin and/or gill smears should be made and examined by a qualified fish diagnostician. Microscopic examination is recommended and is always essential for confirmation of a particular disease. In the clinical signs indicated below, a particular description may be followed by a specific disease causing organism in brackets. It should be qualified that different clinical signs can be seen during the disease process and that these can occur as the result of more than one disease causing organism.

CLINICAL SIGNS
Increased respiration; loss of normal body color; presence of discrete white spots (freshwater or marine Ich); white areas on the body with circumscribed red perimeter [Epistylis]; scratching on tank bottom or on objects; lethargic behavior; white tufts or strands on body [Fungus]; dust like "peppered" spots on body surface, having a yellowish cast [Oodinium]. For detailed information on fresh water ich, click here : LIFE CYCLE OF ICH

SPECIFICATIONS
Contains zinc free, chloride salt of malachite green. Provided as a 0.038% solution.

DIRECTIONS FOR USE
Use 1 teaspoon (approximately 6 ml) per 10 gallons of water for most treatments. This produces a concentration of 0.05 ppm (see Toxicity and Suggested Treatment Procedures for qualifying information). At this concentration, 4 ounces of Malachite Green will treat 240 gallons of water.

SUGGESTED TREATMENT PROCEDURES
The following procedures are suggested for both freshwater and marine systems, unless otherwise noted. Remove any activated carbon filter material from the system as it will lower the treatment concentration. The drug will bind with certain materials such as silicone sealants, porous rocks, gravel and coral; hence, exposure to these can effectively reduce the therapeutic dosage as well as cause unsightly stains. If used in new aquariums, the dye can permanently color the silicone sealant. It is also recommended that excessively porous materials be removed prior to treatment, since they will become permanently colored. In established aquaria and outdoor ponds, the buildup of excessive debris and organics can reduce the therapeutic dosage of Malachite Green. Making the recommended water changes outlined in the treatment schedules will reduce the possible removal of the drug from solution by organics.

Prevention or treatment of fungus on fish eggs:

Method 1 (Short Term Bath):
(a) Change the carbon in the outside filter or add an outside filter with fresh carbon to the hatchery tank. Use a high quality liquid phase activated carbon.
(b) Start the filter.
(c) Add 10 teaspoons of 0.038% Kordon Malachite Green per gallon of water. This produces 5 ppm activity

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of the drug.
(d) Allow filter to run and allow it to remove the Malachite Green from the water for one hour. Note: If any color remains in the water after 1 hour, perform a partial water change of at least 25% change filter carbon and allow it to remove any additional Malachite Green.
(e) Repeat treatment once a day prior to the hatching of the eggs. Discontinue after the eggs hatch.

Method 2 (Dip)
(a) To a clean, non-metallic container, add 1 gallon of aged hatchery water, or water treated with NovAqua.
(b) Add 5 fl. oz. of 0.038% Kordon Malachite Green (approximately 149 ml). This produces a concentration of 1500 ppm.
(c) Agitate the solution with an airstone and adjust for a moderately strong flow of air.
(d) Collect eggs in a net or grasp the object on which eggs are attached and dip them for not more than 10 seconds. Immediately replace the eggs into the original hatchery tank. Note: This is a one time treatment only. Do not repeat. The dip solution may be kept for future use. Keep container tightly capped when not in use.

Treatment for fungus on fishes
(a) Transfer fishes to a separate quarantine tank, if possible.
(b) Remove carbon, clean outside filter and return to use with clean mechanical filter media.
(c) Calculate the actual volume of water to be treated, taking into consideration the displacement of water by sand and rock.
(d) Add 1 teaspoon of Malachite Green per 10 gallons of water to the tank. This will produce a concentration of 0.05 ppm.
(e) Make a partial water change of at least 25% every 24 hours and re-treat. Superficial fungal infections will respond to a single treatment, while more advanced, deep seated mycosis will require additional prolonged therapy. The disappearance of the strands (fungal hyphae) from the affected areas signals a successful treatment.
(f) Upon completion of the treatment, return fishes to the original aquarium (if moved) and add Kordon's NovAqua or PolyAqua.

Treatment of ectoparasites:
The following procedure is applicable for control of ectoparasites in established aquaria, quarantine tanks, and outside ornamental ponds.
(a) Transfer fish to a separate quarantine tank, if the treatment is to be used as a preventative measure. Note: while the fish may be treated in an established aquarium or moved to a quarantine tank, certain parasitic life cycles will require treatment in the aquarium or pond where the outbreak occurred, rather than movement of those fishes which have been clearly affected.
(b) Remove carbon and clean outside filter. Replace filter media and return to use without the carbon.
(c) If the treatment is being performed in an established aquarium or ornamental pond, it is recommended that a 25 to 50% water change be performed before treatment. Add Kordon's NovAqua when making water changes.
(d) Calculate the actual volume of water to be treated, taking into consideration the displacement of water by sand and rock. (To calculate the aquarium's capacity measure its length, height and width in inches, multiply these dimensions together and divide the result by 232. Your answer will be the amount of water in gallons.)
(e) Add 1 teaspoon of 0.038% Kordon Malachite Green per 10 gallons of water. This produces a concentration of 0.05 ppm. For treatment of Ichthyophthirius the dosage can be increased to within a range of 0.10-0.15 ppm. However, this is not advisable for use when used with delicate fishes (see Toxicity). Whenever possible, temporarily increase the water temperature during treatment with Malachite Green. An increase in temperature is beneficial since it speeds up the parasites' life cycle and decreases the required treatment period. The required total treatment period of any parasite must take into consideration the prevailing ambient water temperature and the parasites' life cycle.
(f) Repeat the treatment with a partial water change of at least 25% daily. Add Kordon's NovAqua before replacing new water.
(g) Upon completion of the treatment, return the fish to the original aquarium or pond (if transferred to a quarantine tank) and add Kordon's NovAqua or PolyAqua. If the treatment took place in the original aquarium or pond, change 40% of the water and replace the activated carbon in the filter.

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MODE OF ACTION
Malachite Green is believed to bind strongly with the internal cytoplasmic structures of parasites and interfere in normal metabolism.

CONTRAINDICATIONS
Kordon's Malachite Green is not indicated for the treatment of bacterial diseases with the exception of columnaris disease (Hexibacter columnaris), which has been demonstrated to show sensitivity to the drug. The drug is not recommended for use with fry and "scaleless" fishes (see Toxicity). This drug is primarily intended for the control of external parasites and fungi in freshwater and marine fishes. it is a drug of choice for common Ich (Ichthyophthirius).

STABILITY
Kordon's Malachite Green is stable indefinitely in the 0.038% solution.

COMPATIBILITIES
Kordon's Malachite Green is compatible when used in combination with formalin or Trichlorfon. The product is safe for use in recirculation systems with biological filtration when the concentration of Malachite Green does not exceed 0.10 ppm. Malachite Green is also compatible with Kordon's **NovAqua** ® and **PolyAqua** ® . Kordon's **AmQuel** ® will reduce or eliminate Malachite Green depending upon the amounts in the water.

TOXICITY
The toxicity of Malachite Green varies with a number of factors including species of fish and its size, and less with prevailing water conditions. Malachite Green can be used at concentrations of 0.05-0.15 ppm. Used at 0.05 ppm, most species can be treated with little if any toxicity problems. However, care must be exercised when treating known sensitive fishes such as dwarf cichlids, barbs, tetras, gouramis, livebearers, catfish, loaches, mormyrids and scaleless fishes. Keep the fishes being treated under close observation and stop treatment, filter the water with activated carbon and perform a water change if any undue signs of stress are noted. AmQuel can be used to reduce treatment concentrations. Caution must always be exercised when using this product at dosages higher than 0.05 ppm. It is recommended that the literature be consulted in such cases for additional information on treatments.

Water conditions in general do not significantly influence the toxicity of the drug and therefore are not prime considerations for altering treatment procedures. When the drug is used in short term exposures, Malachite Green may tend to be more toxic to some species in warm water than in cold water. Preliminary experiments have demonstrated that hardness or pH of the water has a negligible effect on increasing or decreasing the toxicity of the drug.

The effect on marine invertebrates is presently unclear and is not recommended. Until such information is available, use extreme caution if using Malachite Green in aquariums with invertebrates .