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|  | APPROVED BY  Director  “Alterhim-Pro” LLC  А.А.Orlov  12th April 2021 Dzerzhinsk |
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**Instructions for Use   
of “April” PHMG for Waste Water Treatment and Prevention of Biological Growth, Corrosion and Scaling on Equipment**

**1. General Information**

1.1. “April” PHMG is solid polyhexamethylene guanidine hydrochloride, transparent to light-yellow crystals of different size.

1.2. “April” PHMG is an antimicrobial agent killing bacteria, fungi and algae.

1.3. By its acute toxicity parameters, “April” PHMG is classified as a class 3 moderately hazardous substance per GOST 12.1.007-76 if ingested, and class 4 low-hazardous substance in contact with the skin. If inhaled in saturating concentrations, the vapours are low toxic and classified as hazard class 4 by their volatility. “April” PGMH has prominent local irritating effect. The threshold of one-time local irritating effect of the agent solution is above 20% concentration, and the threshold of repeated local irritating effect on the skin is at 1% concentration. In case of contact with eyes, the agent has distinct irritating effect on the mucous membrane, involving the cornea, which may pose a risk of vision loss.

1.4. The maximum permissible concentration (MPC) of polyhexamethylene guanidine hydrochloride (PHMG-HC) in air in working zones is 2.0 mg/m3 (in spray); and MPC of the substance in waste water drained to water bodies is no more than 0.5-1.0 mg/L.

1.5. The agent can be stored in sealed original packaging during 3 years; freezing and defrosting has no effect on properties of the active substance. The agent should be kept away from children.

1.6. Before use PHMG crystals should be completely dissolved in water.

**2. Instructions for Use**

**2.1**.**Water treatment to remove lubricants and coolants:**

PHMG chloride in concentration 0.5 to 4.0 /L (for waste emulsion containing ionic surfactants) or 3.5 to 4.0 g/L (for non-ionic surfactants) facilitates phase separation making the phase separation degree 2-3 times higher. It also has comprehensive effect of water acting as an antiseptic. At the same time, PHMG-chloride concentrations in water do not exceed 0.2 to 0.4 mg/L.

**2.2 Water treatment to remove heavy metal salts:**

9% PHMG-chloride solution in concentration 1.5 to 2.0 mg of dry substance per liter of waste water should be mixed with aluminum sulfate (in concentration 150 to 200 mg/L). In 15 to 20 minutes after treatment chrome concentrations in waste water will not exceed MPC.

**2.3 Protection of cooling and recycling water supply systems against biological growth, corrosion and scaling:**In order to prevent biological growth in a recycling water supply system (swimming-pool), the system should be filled with water mixed with PHMG in concentration 0.2 to 1.0 m/L (0.002 to 0.01%). Such treatment reduces bacteria count from 8\*109 to 102 CFU/mL and protects the system against biological growth for up to 36 days, after which the system (swimming-pool) should be refilled. Such treated water is safe to be drained to sewage systems and causes no harm for the environment.

**2.4 Water treatment in recycling water supply systems and pools (at paper and cardboard facilities):**

Use of PHMG-chloride at paper production facilities helps to save a considerable amount of raw materials and ensures 5-time reduction in pollution of industrial waste water. Such effect is provided by interaction of PHMG-chloride polycation with negatively charged cellulose fibers and, first of all, with small fibers with the largest specific surface area.

By reducing the negative charge of such small fibers, PHMG biocide facilitates their sedimentation on meshes of paper-making machines.

In order to remove biological growth from recycling water supply systems, PHMG is used in concentration 0.1 to 0.5%. Such concentration will kill algae in the system within 7 days. The double concentration will accelerate the process, killing algae within 3 days.

For example,

For a 60 cub m pool with water makeup of 3 m3 per shift:

The initial treatment should be 12 kg of solid PHMG, which will result in PHMG concentration in water of 0.2 kg per cub m.

With each water makeup, 150 g of the agent should be added to water, which will result in concentration of 0.05 kg per cub m.

In this concentration, PHMG:

- Fights biological growth;

- Removes odour;

- Kills bacteria.

The effect will persist for up to 36 days, after which the pool should be refilled.

**2.5 Waste water treatment at leather-making and textile production facilities:**

PHMG-chloride added to waste water results in 2-3 times decrease in sulfite concentrations in water. In mixtures with coagulants (aluminum sulfate or iron sulfate) PHMG-chloride can decrease sulfate concentrations 24-100 times (the exact decrease can be calculated on the basis of actual reagent concentrations).

PHMG-chloride is most effective in combination with high-basic abrasive-grade chromium oxide (in concentration 2-3 m/L); polyelectrolyte VPK-402 (ВПК-402) (3-4 mg/L); and hydrolyzed polyacrylonitrile (hypane) (1.5-2.0 m/L). Such treatment results in decrease in sulfite concentrations in water from 6.54 to 0.8 mg/L and triggers inhibition of *Thiobacilli.*

**2.6 Water treatment to remove petroleum products**

PHMG-HC concentration optimal for industrial waste water recycling is 2 m/L. In order to improve performance parameters of mechanical filters, PHMG should be additionally introduced upstream in concentration 0.3 mg/L. At the same time, at the flocculation stage the PHMG concentration can be reduced to 1.5 mg/L. Such treatment results in decrease in petroleum product concentrations in waste water from 180 to 2 mg/L. At the same time, residual concentrations in water will not exceed 0.3 to 0.5 mg/L.

**3. Safety Measures and First Aid in Case of Poisoning**

3.1. Pregnant women, breast-feeding mothers, and minors (younger than 18) must not be engaged in disinfection with the agent. It is prohibited to smoke, drink and eat in the process of disinfection.

3.2. In case of accidental leakage or spill of the agent, it should be diluted or washed away with plenty of water.

3.3. When handling the concentrate, avoid its direct contact with skin and eyes. After handling the concentrate, wash your hands and face with soap thoroughly. In case of contact with eyes, keep washing them with tap water during 10 to 15 min. If hyperemia develops, use 30% sulfacyl sodium eye drops. Call a doctor, as appropriate.

3.4. Inhalation toxicity (with vapours) is unlikely, since the agent is low volatile.

**4. Transportation, Storage, and Packaging**

4.1. The “April” disinfectant can be transported by any mode of transport as provided by relevant transport regulations.

4.2. The agent should be stored in warehouses away from heaters and open fire at temperatures from 0°C to + 55°C. Defrosting does not affect application characteristics of the agent.

4.3. The agent is delivered in polyethylene containers of different capacity.

**5. Environmental Protection Measures**

5.1. Prevent penetration of undiluted product into waste, surface and subterranean waters and into sewage.

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