WATER TREATMENT FAQ

WHAT IS *MICRODOS OXY*?

Microdos Oxy is a water-disinfection system comprising a box carrying electrodes, which is fitted inside a pipe by-pass, also a control unit.

This system is based on an ecological approach to water-treatment, based on ABOT (Advanced Bipolar Oxidation Technology), which is a patent-protected treatment process. This technology is the outcome of more than 15 years' research. It is used in water hydrolysis and copper ionisation to provide ecological water disinfection.

Microdos Oxy is intended primarily for swimming pools, but as it's an extremely effective water-disinfection system, it can be used for other applications:

- Potable water, tap water or well water.
- Treatment of the Legionella's bacterium.
- Irrigation and agriculture.
- Cooling towers, etc.

WHAT IS HYDROLYSIS?

Hydrolysis is the process whereby a water molecule separates out into different strains by passing an electric current through it.

The main reaction of the hydrolysis process is as follows:

$2\ H2O \text{ ——–> } OH^- + H3O$

Hydroxyl ion (OH^-) is a powerful disinfectant that will recombine in water in approximately 32 minutes if it does not meet any organic matter, so that the water is neither corrosive nor harmful to health or living creatures and can be drunk. By virtue of the technical features of this process, there will never be excessive hydroxyl that could be harmful to health or the environment.

WHAT IS COPPER IONIZATION?

Copper ionization is a process whereby a compact block of copper is broken up in a controlled manner by applying an electric current to it.

Pure copper ions are produced by this process (Cu^{++}) just as they occur in nature. A recommended concentration in a swimming pool is in the region of 0.5 mg/l (ppm). Such levels of copper will not affect the health since, according to the WHO (World Health Organization), water is potable with up to 2 mg/l copper.

IS IT POSSIBLE WITH *MICRODOS OXY* TO GET AN OVERDOSE IN MY SWIMMING POOL THAT IS HAZARDOUS TO HEALTH?

No. The maximum hydroxyl-producing capacity of *Microdos Oxy* is determined by the relationship between the number of plates in the electrodes installed and the electric current applied. The level of those parameters never varies; the maximum power delivered cannot be increased, either intentionally or by accident. Nor is it possible to get an overdose through faulty installation or programming. Apart from the technical safety hard-wired into the design, no overdosing is possible with this clean hydrolysis process. This is because hydroxyl ion has a short half-life providing it does not meet organic matter, bacteria or viruses. This characteristic means the water is non-corrosive and non-harmful to health, even if drunk.

Regarding copper, what *Microdos Oxy* produces is ion Cu^{++}, pure copper, which itself occurs in nature. The human body requires this type of metal (1000 µg daily is the total daily amount recommended by the EU), the same as for iron, potassium, vitamins, etc.

It is advisable to maintain a constant concentration of 0.5 mg/l copper in the water. This level is not harmful to health, nor to any material. The standard for potable water states that water is potable and can be drunk if its copper content is below 2 mg/l.

HOW LARGE A FLOW CAN BE TREATED WITH *MICRODOS OXY*?

The same flow can pass through an electrode-carrying box as can pass through a 75 mm PVC pipe. The flow that can pass through a pipe will depend on the water flow's speed and pressure. A key feature of our system is that by equalising speed, pressure and the flow that passes through the box, the production of hydroxyl will not be affected.

IS THERE ANY LIMIT TO THE SIZE OF SWIMMING-POOL THAT CAN BE TREATED WITH *MICRODOS OXY*?

It is possible to treat a volume of approximately 175 m3 for a pool per day using one box.

We can expand the system by deploying as many boxes as necessary, and thus treat any volume of water. The hydroxyl produced by each box will accumulate to disinfect the entire volume of the pool.

HOW MUCH PRESSURE IS THE ELECTRODE-CARRYING BOX ABLE TO WITHSTAND?

The box is designed to withstand pressure of 20 bar. There can never be any problem, given that PVC pipes cannot tolerate more than 16 bar.

HOW DOES THE *MICRODOS OXY* SYSTEM AFFECT ALKALINITY?

Alkalinity is an essential parameter that must be set when starting up a swimming-pool. The *Microdos Oxy* system will not affect alkalinity; however, low alkalinity can cause problems in adjusting the pH, greenish water pipe, and compromise the effectiveness of the purification system.

An appropriate setting is between 100 and 175 mg/l. It is often necessary to increase it. To do this, use an alkalinity booster (bicarbonate of soda or carbonate). Once set, it is not usual to amend it greatly subsequently.

DO I NEED TO CARRY OUT RAPID-IMPACT CHLORINATION WHEN STARTING UP THE POOL?

Rapid-impact treatment should be administered to ensure proper operation of the system, even though we use fresh mains or well water, and all appears to be in order. Yet we cannot know whether there might be algae, spores, bacteria, etc. In view of this uncertainty, it is best to do it.

IS *MICRODOS OXY* COMPATIBLE WITH OTHER DISINFECTION SYSTEMS?

Microdos Oxy is compatible with any other treatment system and with any chemical product you may wish to use.

In some instances, the *Microdos Oxy* pool disinfection system fails to maintain the water correctly at the standard number of hours and calls for additional hours of operation.

This can come about through various factors, which need to be examined on a case-by-case basis (age of the water, alkalinity, method of constructing the pool, number of bathers, water temperature, the environment, etc).

In some cases, this may not be practicable in the interests of economy and energy-saving, or the customer may be unwilling/unable to keep the pump running for the length of time required (over 16 hours in some circumstances).

In either or both situations, we can reduce the hours of operation and use chemical products to counteract the shortfall of hours.

CAN I USE AN ALGICIDE WITH *MICRODOS OXY*?

You can use a special anti-algae based on Cationic Polymer for pools with treatment without chlorine. DO NOT USE ANTI-ALGAE TREATMENTS THAT CONTAIN COPPER SULPHATE.

CAN I USE MULTIPLE-ACTION CAPSULES?

Yes: however, you must be sure NOT TO USE CAPSULES THAT CONTAIN COPPER SULPHATE.

CAN I USE LIQUID OXYGEN?

Yes: fit a dosing pump to inject hydrogen peroxide (liquid oxygen), controlled automatically by *Microdos Oxy*.

Procedure: You must, eliminate copper (no ionization), connect the pump to a timer output and programme the minutes to the time of day at which you wish the pump to release a dose, to hold the residual concentration at around 5-10 mg/l peroxide in the water.

A simple and automatic way is connecting a dosing pump to an output of Microdos Oxy configurated in MICRODOSE type dosing. Please contact Microdos customer care for further explanation.

CAN I USE LIQUID CHLORINE?

Yes: fit a dosing pump to inject liquid sodium hypochlorite, controlled automatically by *Microdos Oxy*.

Procedure: There are three ways of doing this:

- **Dosing by time:** Remove the copper and programme the minutes to the time of day at which you wish the pump to release a dose, to hold the residual concentration at around 0.3-0.5 mg/l chlorine. The minutes can be adjusted in accordance with measurements taken at the vessel.
- **Dosing by using Redox measure:** Install the dosing pump and redox probe, activate the channel, and take the desired set-point. Change that set point in accordance with the measurements taken in the vessel until the system is set correctly.
- **Dosing by using Chlorine measure:** Install the dosing pump and chlorine probe, activate the channel, and take the desired set-point. Change that set point in accordance with the measurements taken in the vessel until the system is set correctly.

In the case of public swimming-baths that need residual dosing to satisfy official requirements, we use this system with -chlorine. Please contact Microdos customer care for further explanation

WHAT DO I NEED TO THINK ABOUT, CHECK AND CORRECT IN A POOL WHEN INSTALLING *MICRODOS OXY*?

- Check the existing recirculation system, type of water, the age of the water and filter: the efficiency of any disinfection system depends on these factors.
- Temperature that the water may reach in the summer: to calculate *Microdos Oxy*'s hours of operation.
- Total salinity: to ascertain and adjust the equipment voltage.
- Alkalinity: Check the pH and eliminate any algae or murkiness.
- Copper: Program the system and avoid any overdosing.
- pH: must always be properly adjusted.

HOW DO I INSTALL *MICRODOS OXY* WITH TWO OR MORE BOXES IN ONE POOL, AS A LINE OR IN PARALLEL?

For the SMART PRO 400 models, which provide two electrode-carrying boxes.

What needs to be kept firmly in mind is that the recirculation flow must not decrease.

It is essential to consider the diameter of the recirculation pipe in relation to the time required for complete recirculation. We must install the number of chambers required in order that all pool-water will pass through the chambers, and so that the circulation flow shall not fall below <10%, as a by-pass and in parallel.

For example, we recommend using PVC pipes:

- Pipe ≤ 75 mm 1 chamber or 2, in line
- Pipe 90 to 140 mm minimum 2 chambers in parallel
- Pipe 140 ≤ 225 mm minimum 3 chambers in parallel
- Pipe 225 ≤ 300 mm minimum 4 chambers in parallel

HOW DO I RENDER RAPID-IMPACT CHLORINATION EFFECTIVE?

Use rapid-impact granulated chlorine for chlorination (we recommend dichloro or trichloro).

- Pour in using enough in accordance with the instructions on the tin, to raise the chlorine to 10 mg/l (ppm). As an indication, fill 2-3 kg dichloro for every 50 m3 water in practice.
- With recirculation running, pour half into the skimmers and distribute the remainder in the vessel. It is not necessary to dilute it.
- Leave filtration in place during complete replacement of the water. This will depend on the flow from the pump, but the normal time is 4-5 hours.
- Shut off the pump and wait 8 hours (till next day).
- If there are algae, rub the walls and base down with a brush.
- Take the base cleaner and clear any residues of algae and dirt out of the pool (so that it does not pass through the filter, nor run back into the pool).
- Carry out washing of the filter and rinse.
- Start up the system as normal. Once the chlorine concentration falls below 2 mg/l (ppm) you can use the pool. If you use dichloro, this will be within approximately 48 hours or, with trichloro, from 2 to 3 days.

HOW DO I ADJUST AND CHECK THE COPPER IN A SWIMMING-POOL?

We recommend that copper in the pool should be held at around 0.5 mg/l. To achieve this, you should check the program and verify water's copper content when starting up, and for the first few weeks.

Follow the steps below to do this.

- Measure the copper in the water when full. If there is copper, we need to take this into account when carrying out programming.
- You need to program ionization by steps continuously checking the measure of copper in the water.

Ionization time may need to be increased or decreased. It is not possible to define a standard ionization schedule because each pool is different in terms of water quality, climatic conditions, temperature, and number of bathers.

PROBLEMS WITH EXCESSIVE COPPER: THE SOLUTION

An excess of copper: with our technology, this can only come about through faulty installation, programming, or control. If we find there are yellowy-green or bluish stains at the joints of the Gresite or in the Liner, there could be an excess of copper in the water – or there has been an increase in pH and temperature, which was not checked.

Solution:

1. The first thing we need to do is measure the copper in the water several times, and at different locations. If there is copper, we need to detect and correct the problem. This could be due to:
    a. Faulty installation: Cables changed (OXY – ION)
    b. Incorrect programming: Too many minutes each day
2. Reduce the copper in the pool. This can be done in two ways:
    a. Renovate part of the pool, wash out, etc. Check and carry out daily measurements. The copper will gradually disappear.
    b. Use a metal flocculant or special copper remover.

A level of copper up to 2 ppm is not harmful to health but can cause stains.

WATER TEMPERATURE AND PURIFICATION SYSTEM'S HOURS OF OPERATION

In order that your *Microdos Oxy* system will function effectively, we need to remember that the daily hours of operation are directly dependent on water temperature. The higher the temperature, the greater the number of hours of operation required.

Hours of operation will normally be as follows:

- Water 15º-20ºC = 4 hours continuously – 10.00 to 14.00
- Water 20ºC = 6-8 hours continuously – 10.00 to 17.00
- Water 25ºC = 8-10 hours continuously – 08.00 to 18.00
- Water 28ºC = 10-12 hours continuously – 08.00 to 20.00
- Water 29ºC = 12-14 hours continuously – 06.00 to 20.00
- Water >30ºC = consult beforehand.

From 29°C or more, it is possible you may occasionally need to use a disinfectant (anti-algae, hydrogen peroxide, multiple-action capsules, chlorine, etc). "Consult the manufacturers on a case-by-case basis".

WHAT SHOULD I DO IF THE POOL HAS TURNED MURKY/GREEN, OR HAS ALGAE?

This is caused by a lack of disinfection, which can come about through various causes.

Identify the problem, carry out rapid-impact chlorination and remedy the problem. To do this we need to check the equipment, electrodes, voltage, etc. to verify that everything is in order.

If we find that all equipment is in order, there could be one or more causes:

- Hours of treatment are not commensurate with the water temperature. Hours of treatment need to be continuous.
- Alkalinity is too low: the correct parameters are between 80 and 175 mg/l.
- Poor pump recirculation and 'dead' areas.
- Old and/or poorly blended water.

THE ALARM AT THE CONTROL UNIT HAS BEEN TRIGGERED. WHAT SHOULD I DO?

Press the bell button to turn off the buzzer.

In HOME page of Microdos Oxy you can read the type of alarm so that you can proceed correcting the problem and controlling the plant.

If you have registered an email address on "add new device" form on Pooltec-pro.com platform, you will receive an email every time an alarm occurs.

HOW DO I CHANGE THE *MICRODOS OXY* PROGRAM IN ORDER TO USE A PH BOOSTER INSTEAD OF REDUCER?

To do this, you need to change 0% and 100% settings for pH measure.

WHAT IS THE IDEAL TOTAL WATER SALINITY?

For the system to function correctly, total salinity of the water must be greater than 600 mg/l.

To raise the salinity of the water by 100 mg/l, you need to pour 1.5 kg table salt for every 10 m3 of pool and allow it to dissolve. In practice, a 25 Kg bag of table salt for every 50 m3 volume of water will be sufficient. If it fails to rise, continue pouring until the correct strength is reached. Once the salinity is set correctly, there is no need to repeat.

ARE HYDROXYL IONS OR *MICRODOS OXY* CORROSIVE?

The hydroxyl ion prevents corrosion of pipes, metal materials, stone, marble etc… and is totally harmless to health, hair, clothing, metals, etc… and do not generate oxidizing vapours for covers.

CAN I INSTALL *MICRODOS OXY* IN A SPA, IN AN INDOOR POOL OR IN A POOL WITH WARM WATER?

Yes, and one of the benefits is that it does not corrode the metal parts, does not generate toxic vapours and with the *Microdos Oxy* system, indoor pools will smell good.

CAN IT BE USED WITH HARD WATER WITH ENCRUSTATIONS PROBLEMS?

Yes, although the electrodes are self-cleaning, when the water is very hard scale problems can appear, but much less than with any other system, since the ABOT technology has a certain descaling power in the water.

CAN IT BE INSTALLED IN A POOL WITH SEA WATER?

Yes, *Microdos Oxy* disinfects any type of water, including sea water.