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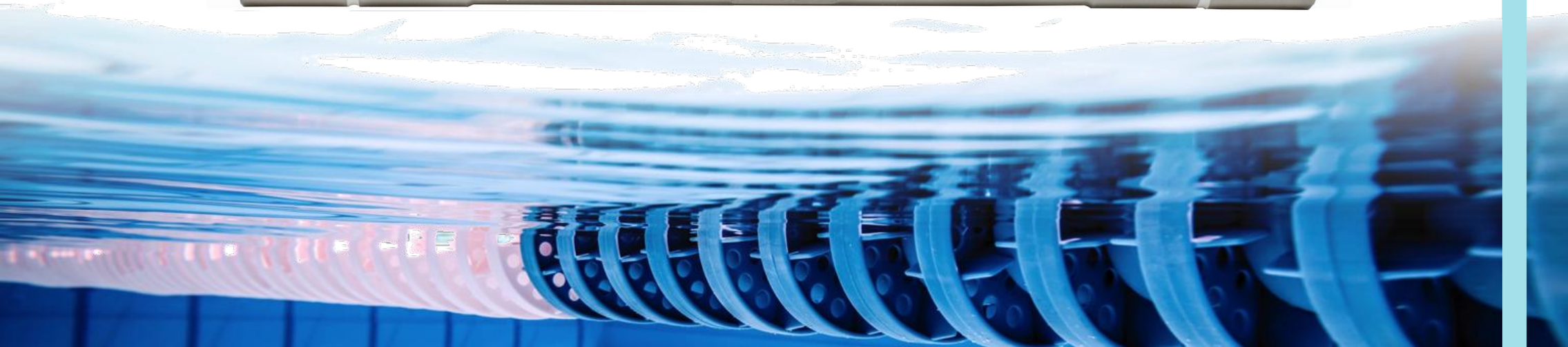
T-Sonik PW



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T-Sonik PW is a device that works on the principle of Hydrodynamic activation and is particularly suitable for public and private swimming pools, and spas. It can eliminate bacteria, allowing the reduction or in some cases the total elimination of the use of chemicals for the disinfection of water.
The passage of the fluid inside of the activator, thanks to the new geometry and the delivery pressure, generates high frequency mechanical oscillations thus producing ultrasounds.
The particular frequency generated, has a direct effect on the water providing the following benefits:

1
DIRECT BACTERIAL INHIBITION

2
REDUCTION OF BACTERIAL PROLIFERATION

3
LOWER WATER VISCOSITY

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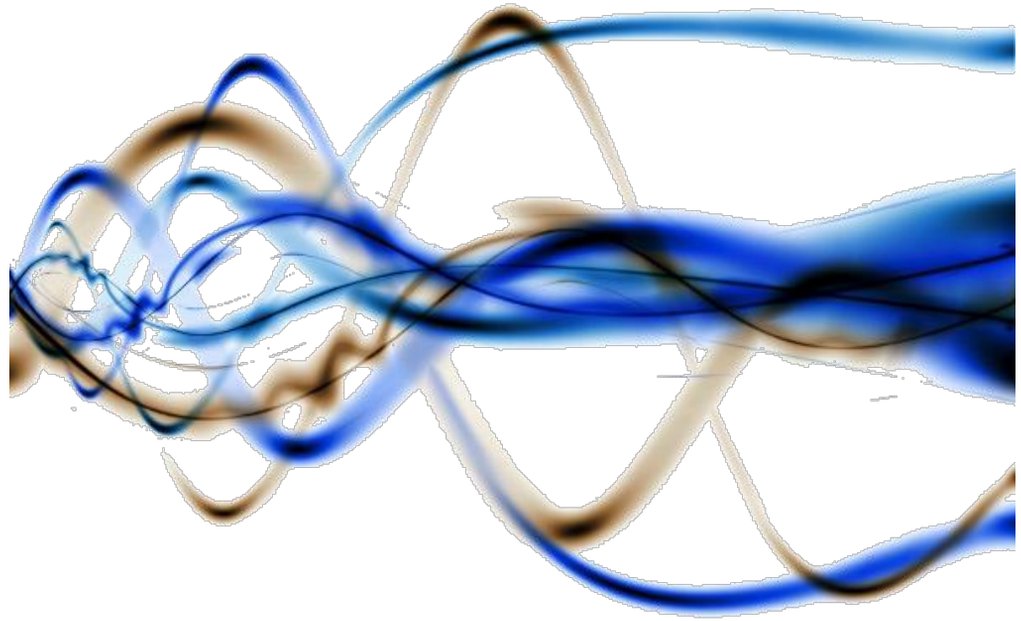
1

DIRECT BACTERIAL INHIBITION

Sound is a compression and expansion wave produced within gaseous, liquid or solid matter. We can perceive these waves directly with our hearing if they have frequencies from about 20 Hertz to 16 kHz (the Hertz unit is the number of compression and expansion cycles of per second; the kilocycle, abbreviated kHz, is thousands of cycles per second).

Sound waves with a frequency higher than the one normally detected by the human ear are called ultrasonic waves or ultrasounds. The ultrasonic irradiation of liquids produces a phenomenon called cavitation.



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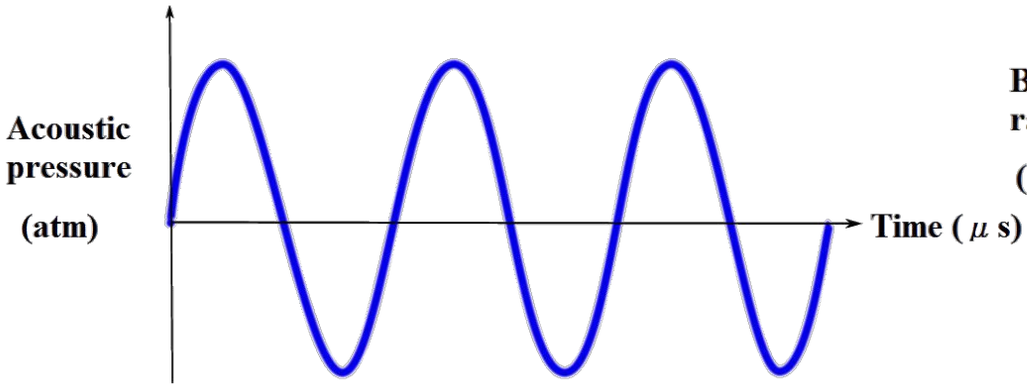
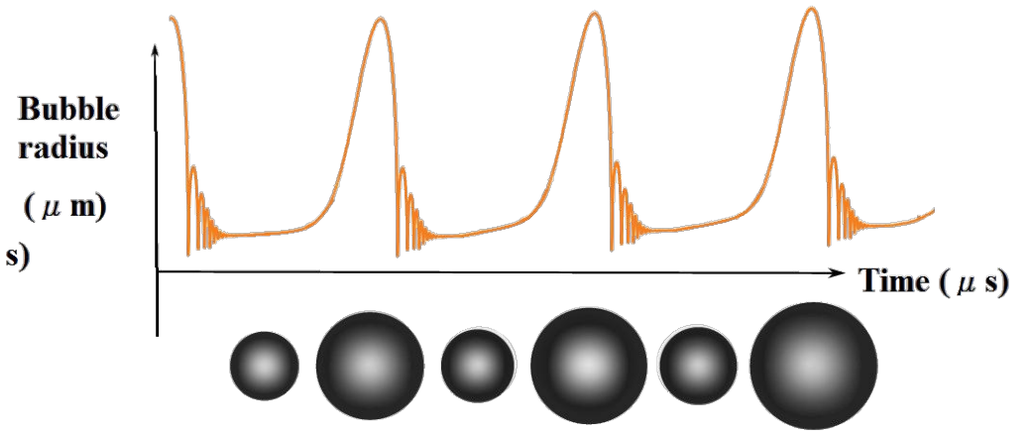
1

DIRECT BACTERIAL INHIBITION

Cavitation is the repeated creation of micro-bubbles within a liquid, then followed by their implosion. When a wave meets a liquid medium there is the formation of areas of high and low pressure among which appear gas bubbles whose volume progressively increases up to a point where they implode. The development of the cavities depends on the intensity of the sound.





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1

DIRECT BACTERIAL INHIBITION

When the cavitation bubbles implode in irradiated liquids their compression is so rapid that a small amount of heat is dissipated from the cavity during its collapse. The surrounding liquid, which is still cold, promptly quenches the heated cavity producing a hot spot of brief duration. The approximate temperature of this hot spot is 5000ºC.

Hence the bactericidal effect which consists of:

- a thinning of the cell membranes
- local heating
- production of free radicals

The efficiency of the treatment depends on:

- type of bacteria treated
- amplitude of the ultrasonic waves
- time exposure / contact

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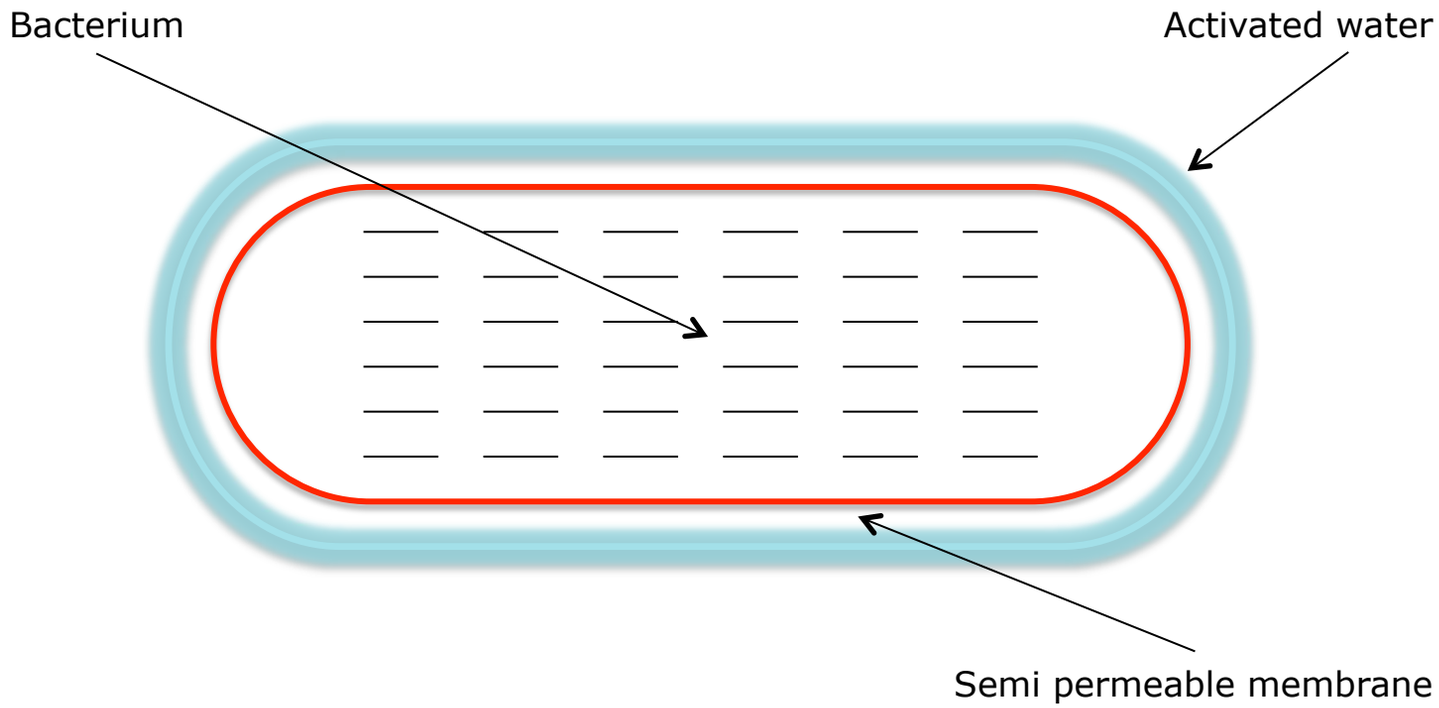
2
REDUCTION OF BACTERIAL PROLIFERATION

At the moment in which the water is activated, the clusters with a low number of molecules are able to surround a bacterial cell with a certain stability in time. The research on the effects of the activated water confirm the possibility of preventing the vital osmotic processes that allow bacterial cells to live.



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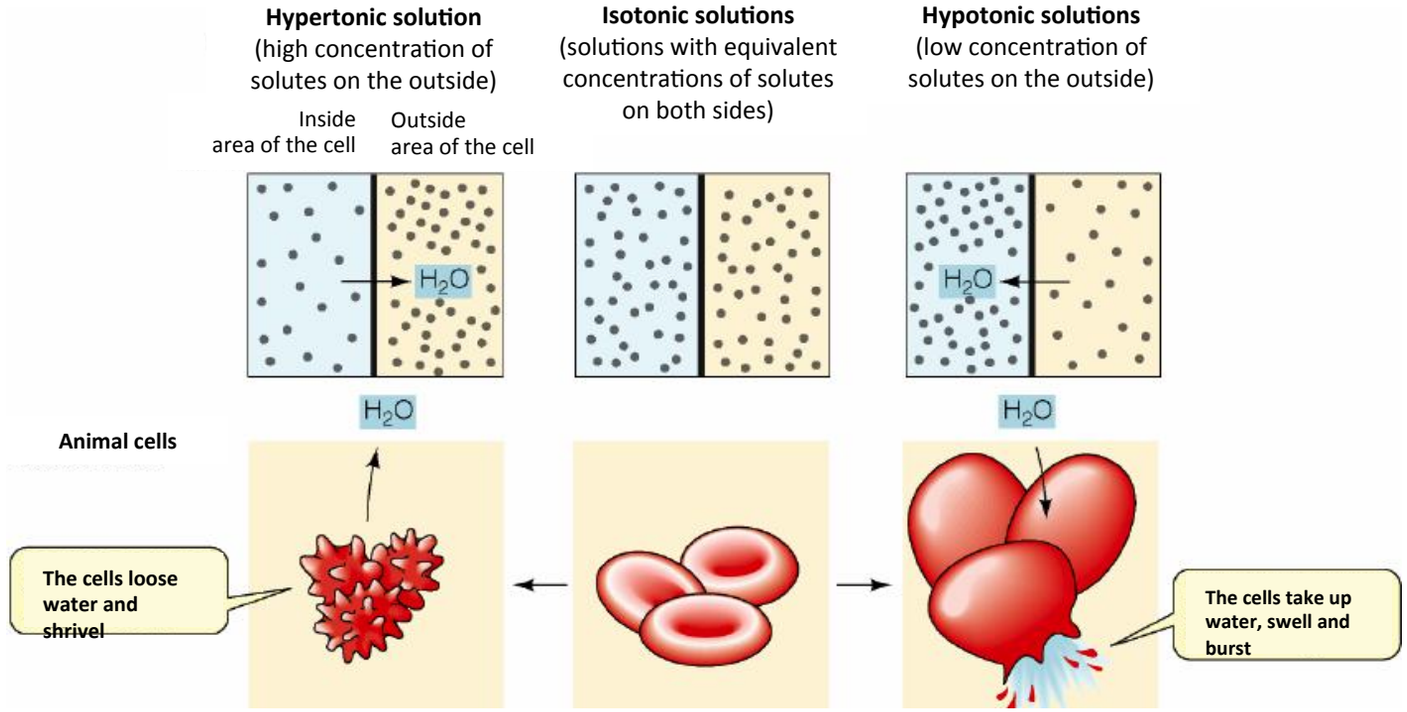
2 REDUCTION OF BACTERIAL PROLIFERATION

These layers of pure water behave like a solvent in contact with a semi-permeable membrane containing solvent and solute: due to the osmotic pressure the solvent penetrates and passes the membrane to dilute the solution contained within. What then occurs is a mechanical swelling of the cell that causes it to burst (this mechanism happens more easily with gram-negative bacteria).



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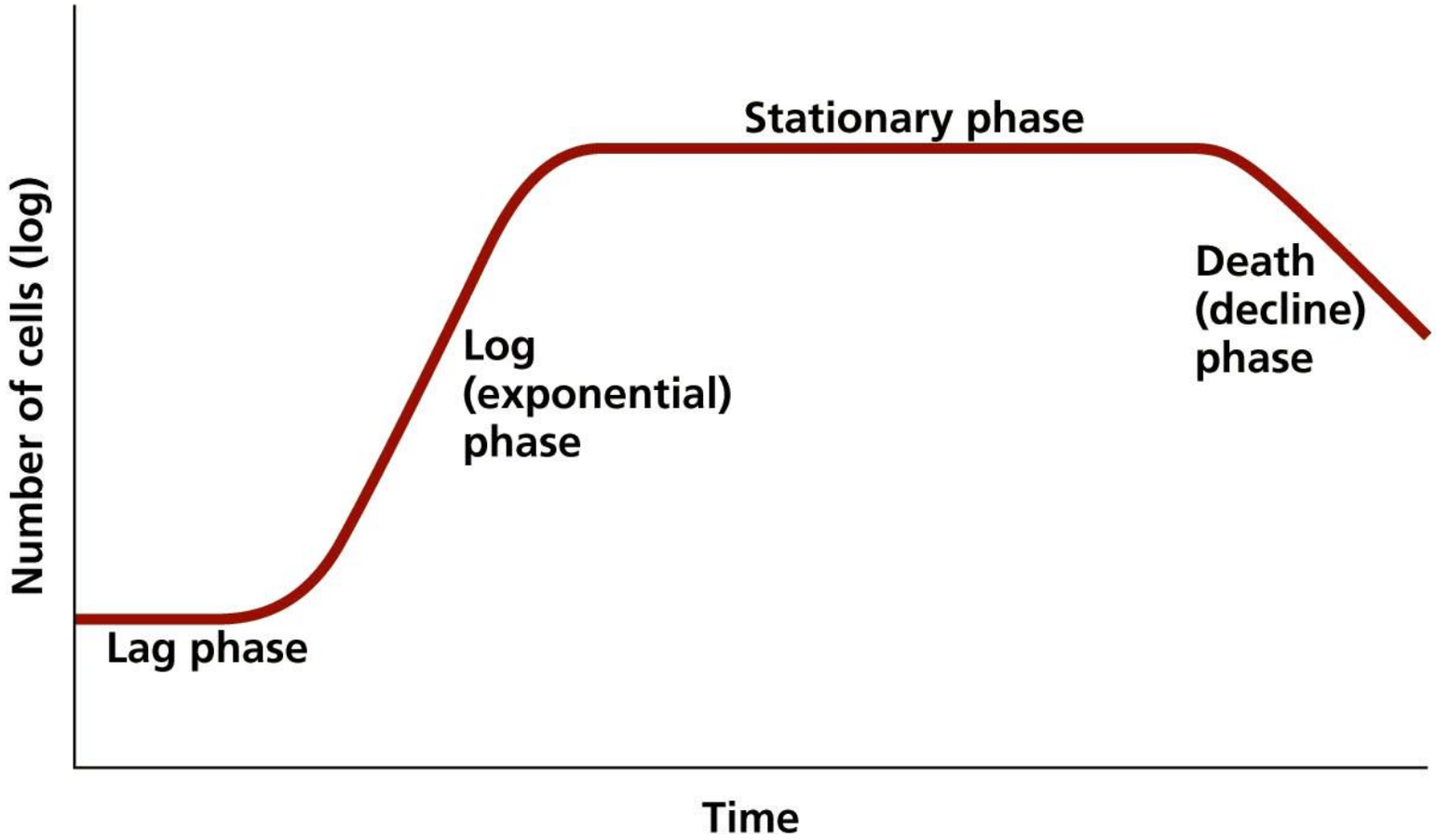
BACTERIAL GROWTH



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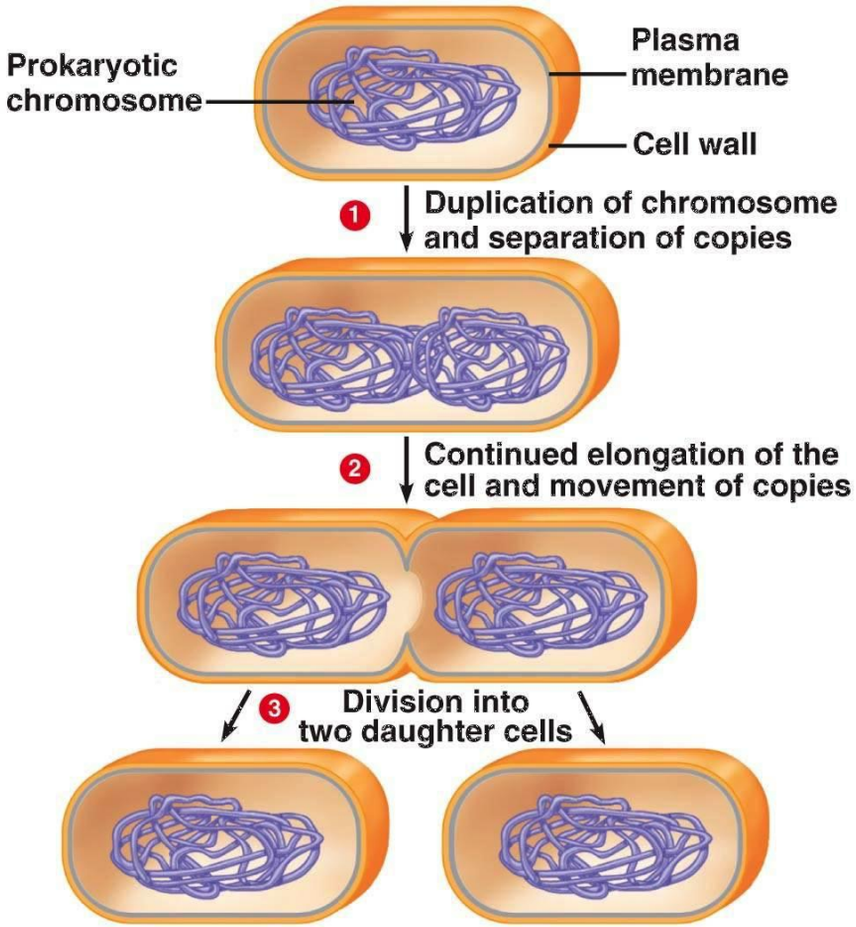
BACTERIAL GROWTH



The time interval necessary for the bacterium to reproduce is called generation time (or doubling time) and it varies among the different micro-organisms and depending on the growth conditions.

The Escherichia coli and most of bacteria have, under optimal (lab created) environmental conditions, a generation time of 20-30 minutes. In this case 12 hours (35 generations) are enough to obtain billions of bacteria from a single cell.

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ANALYTICAL RESULTS
T-SONIK PW

DIRECT BACTERIAL INHIBITION: total bacterial count at 22 °C and 36°C

Sample	Concentration Cfu / mL 22°C	Concentration Cfu / mL 36°C	% reduction	
Water as is	100,000	51,200	-	-
1 pass	16,200	4,600	83.80	91.01
2 passes	1,770	1,740	98.23	96.60

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ANALYTICAL RESULTS
T-SONIK PW

REDUCTION OF BACTERIAL PROLIFERATION

Pseudomonas aeruginosaa

Sample	Concentration Cfu/ 100 mL Initial	% reduction
Initial additivated Water	100,000	-
1 passage	20,000	80
2 passages	11,000	89
72 hours after treatment	4,600	95,40

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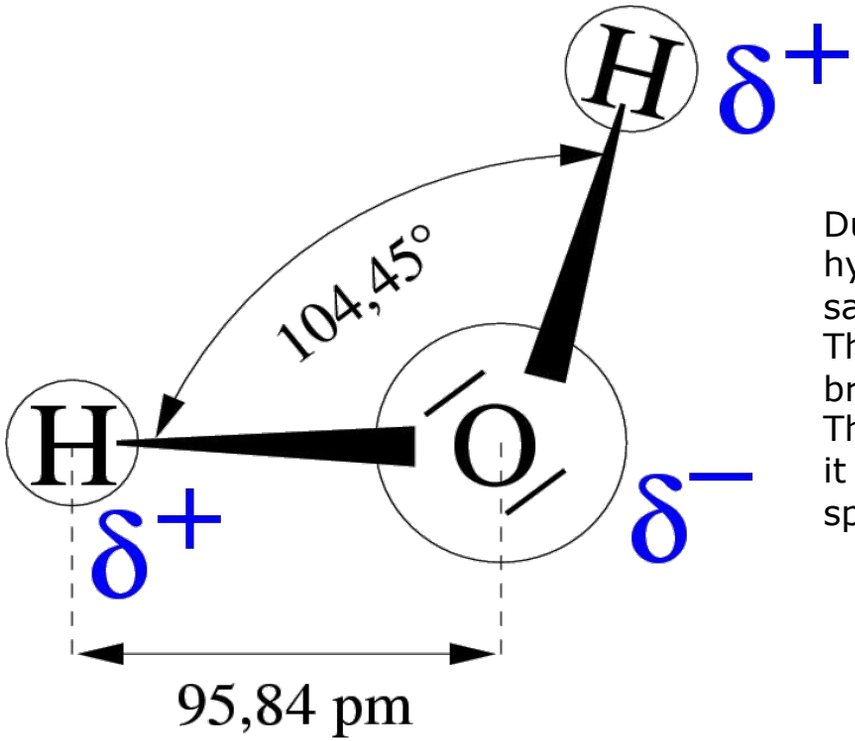
3
LOWER WATER VISCOSITY

A water molecule is an electric dipole. This electric dipole is large enough to allow water to orientate itself in an external electric field. For reasons linked to the distribution of electrons around the atom of oxygen, a water molecule cannot have a linear form.



Due to the polarity, water molecules tend to unite through so called hydrogen bridges with the possibility of forming 4 bonds with the same number of water molecules.
These form "groups" which can rotate between them around the bridge bonds, determining various spatial configurations.
The phenomena and the characteristic properties of water, that make it so different from other existing liquids in nature, can be explained specifically because of the hydrogen bridges.

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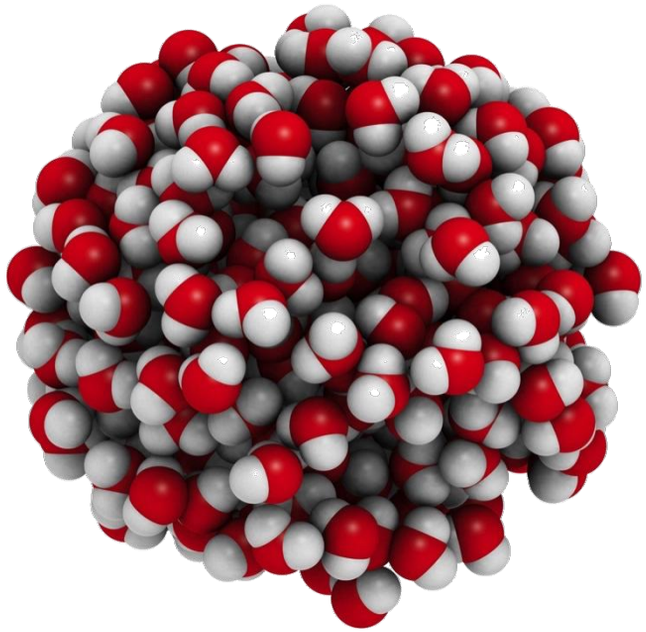
3
LOWER WATER VISCOSITY

A hydrogen bond is weaker than a covalent one but it allows to join together more water molecules through dipole-dipole interactions. This phenomenon, through an extensive network of bonds, generates different crystalline forms called **CLUSTERS**.



This cluster structure is the main cause of the physical characteristics of water such as viscosity and surface tension.
The activation determines the breaking of the crystalline form, thus simplifying the structure and thereby reducing the forces responsible for the physical parameters.

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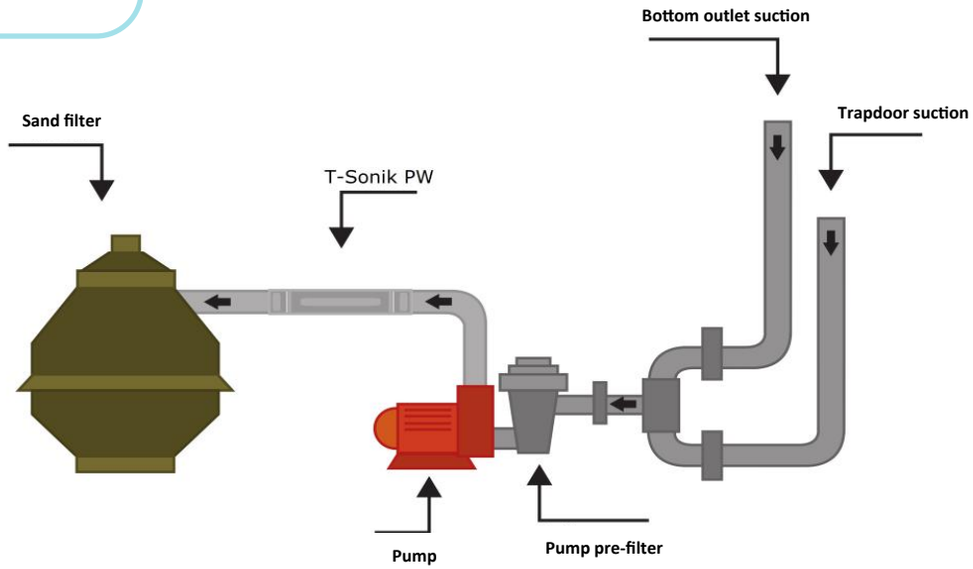
INSTALLATION AND MAINTENANCE

T-SONIK PW must be placed before the sand filters (an activator for each filter) or on a dedicated line which always ensures the recirculation of water.



It does not require any regular maintenance or replacement of parts.
T-SONIK PW does not in any way alter the chemical properties of water and is therefore still necessary to continue using pH stabilizers and anti-algae products for the maintenance of swimming pools.

More information about the correct installation is given in the installation and maintenance manual

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T-SONIK PW DEVICES

Type	L (mm)	D (mm)	G (inches)	Weight (kg)	Min flow request (l/min)	Max flow pressure (bar)
PW 1”	290	39	1	1.462	9	50
PW 1” ¼	355	53	1 ¼	3.148	11.5	50
PW 1” ½	375	63	1 ½	4.136	14	50
PW 2”	470	69	2	6.932	19	50

The minimum flow value required is the needed condition to ensure the activation of the water.

All the T-Sonik PW devices are made of stainless steel AISI 304.

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KEY BENEFITS
T-SONIK PW

1 DIRECT BACTERIAL INHIBITION

Rapid bacterial inhibition at least 70-80% in a single pass and up to 95-98% in the next steps.

2 REDUCTION OF BACTERIAL PROLIFERATION

Maintenance of a water basin in optimal hygienic conditions for several days after the water passage inside the T-Sonik PW.

3 LOWER WATER VISCOSITY

Lower water viscosity allows to swim with less resistance by increasing the well-being of users during the swimming activity.

These conditions allow to reduce or even in some cases totally cancel the use of chemical products for water disinfection.

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T-Sonik PW is a product patented by TREELIUM SA and certified by internationally accredited laboratories.

TREELIUM continues to invest in Research & Development both in terms of human and economic resources to find new areas of application for existing products and develop new ones for the future.

The Mission is to increase productivity by optimizing processes, reducing consumption and protecting the environment.

TREELIUM is on the market as an ideal partner for the supply of systems and applications in a global market where continuous technological innovation is the basis for Sustainable Economic Development.

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"A chlorine free pool is the dream of thousands of users all around the world."