

PRETREATMENT EFFECTS WITH ULTRASOUND OVER PURIFIED WATER DISINFECTION



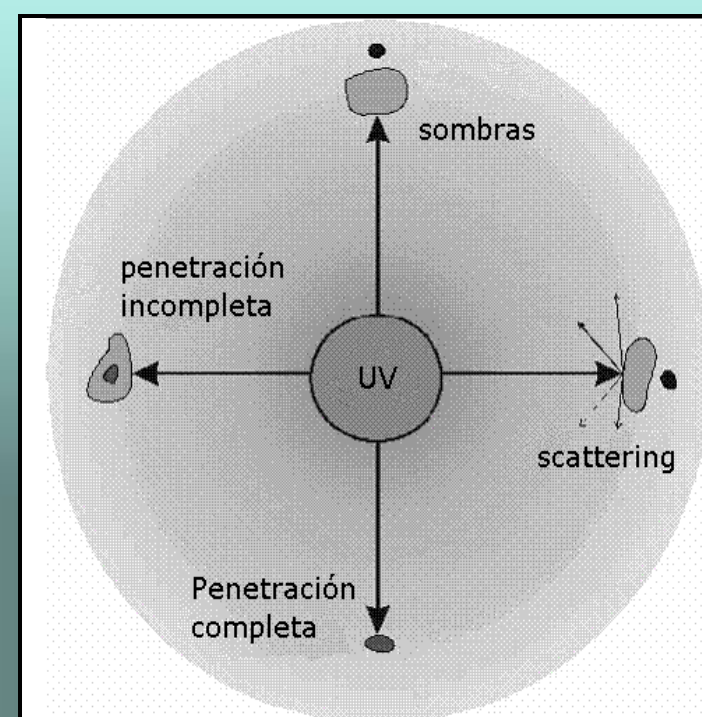
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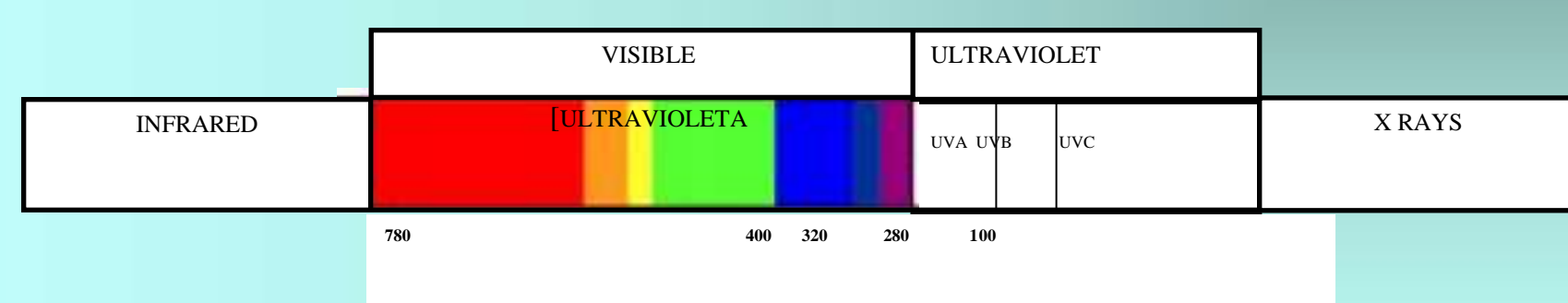
INTRODUCTION

A lot of studies have proved that efficiency of disinfection method by ultraviolet radiation is highly dependent on suspended solids concentration, due to the fact that those suspended solids can protect bacteria and viruses from being destroyed by disinfectants. A lot of those little particles tend to scatter UV light, others block UV rays and, for last some even incorporate inside, through formation of flocs, matter to treat.

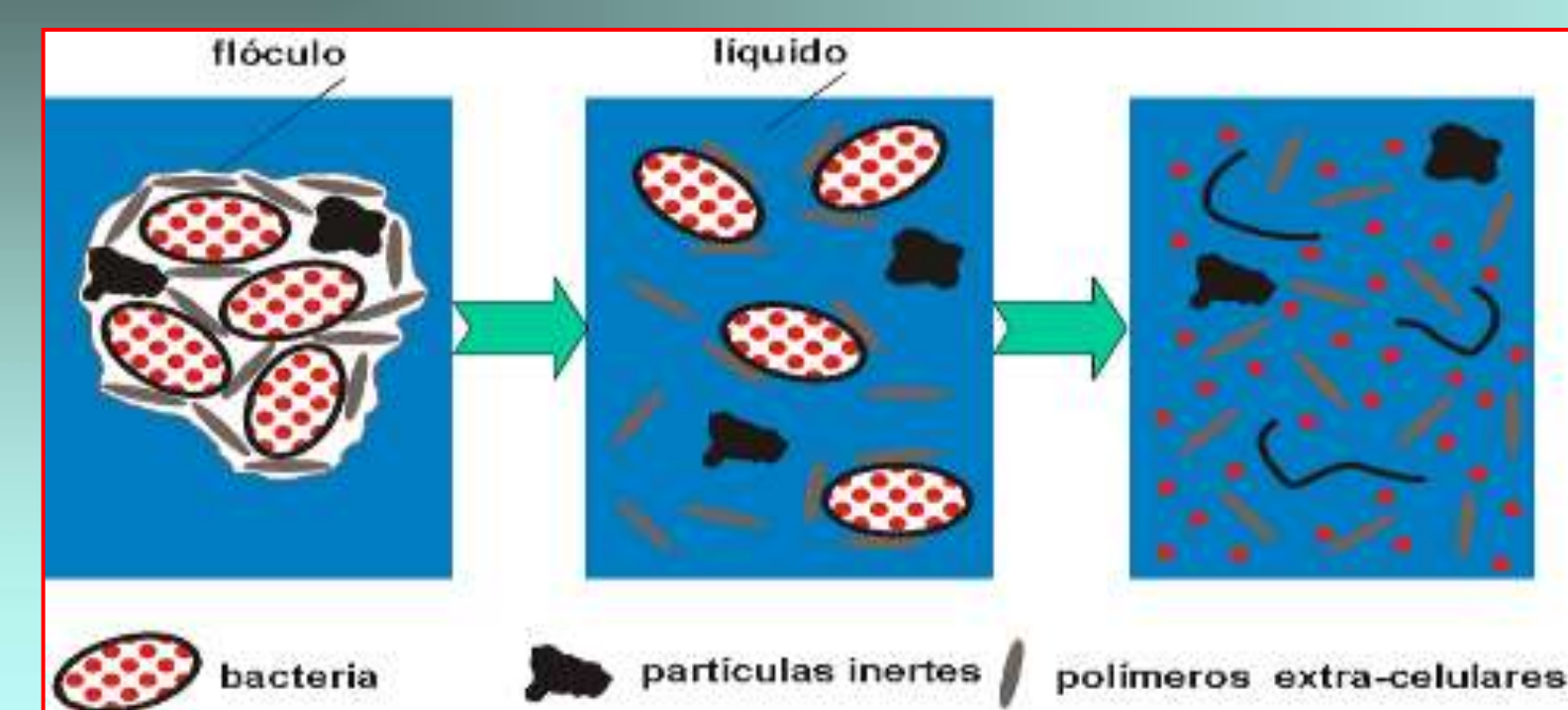


Effect that UV light produces over microorganisms for eliminating them is as follows: Penetration capacity of UV radiation allows to cross through microorganisms cells nucleus, where we can find nucleic acid that suffers photochemical damage and has a cellular restructuring, thus preventing reproductive capacity of the pathogen and, by this, its elimination.

Use of ultrasound in waste water treatment, can improve disinfectant properties of ultraviolet light. Ultrasounds breaks external cell structure and UV light can easily reach biological cell.



Level for cell damage depends of UV absorbed energy dose by microorganisms and of UV radiation resistance. Most viruses and bacteria require relatively low doses for their inactivation. Parameters that affect to UV disinfection are: Dose and intensity of UV radiation. And wastewater parameters that affect to intensity of UV radiation are: UV transmittance (%T), Total Suspended Solids (TSS), Particle Size Distribution (PSD) and total hardness.



RESULTS

METHODS

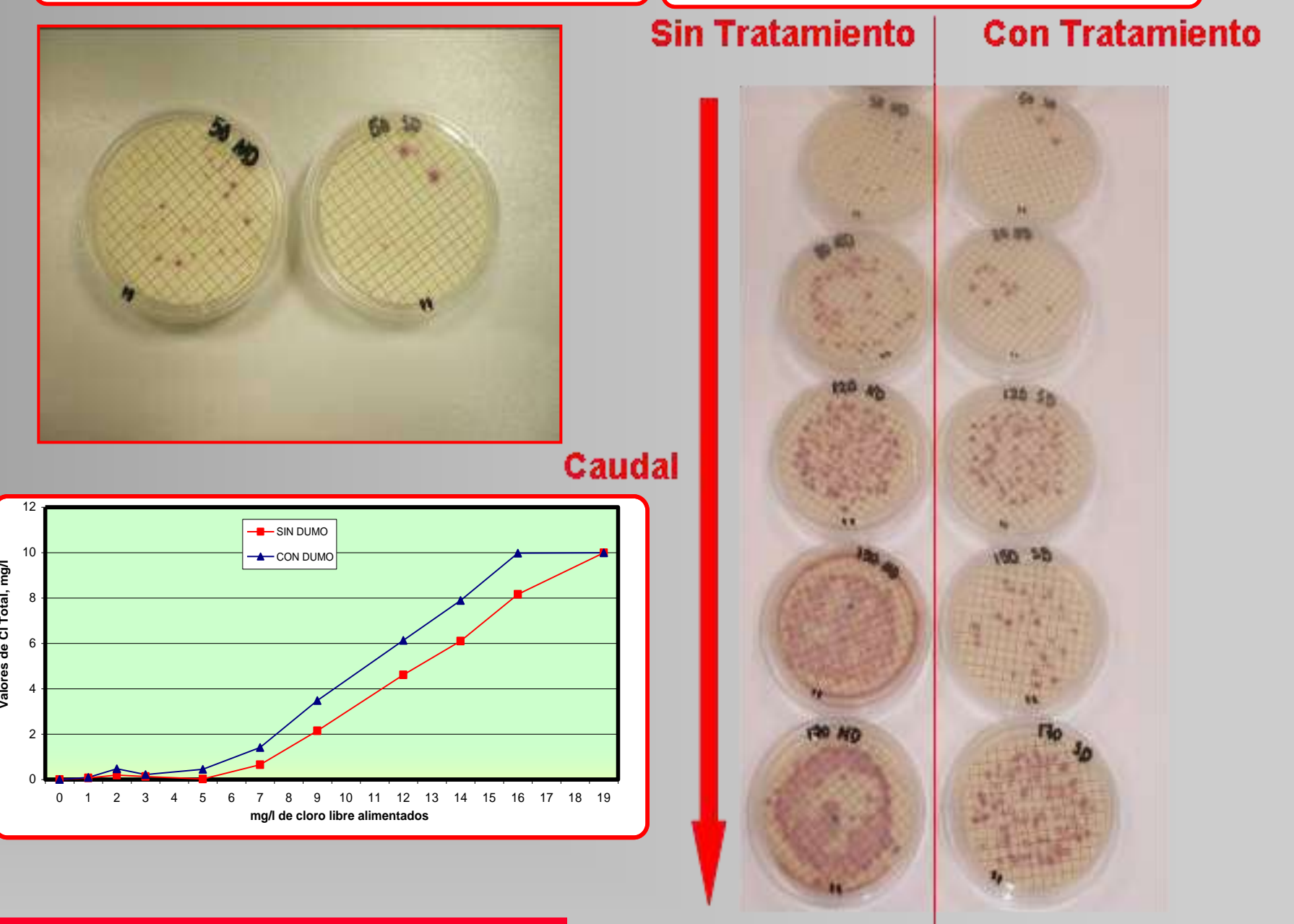
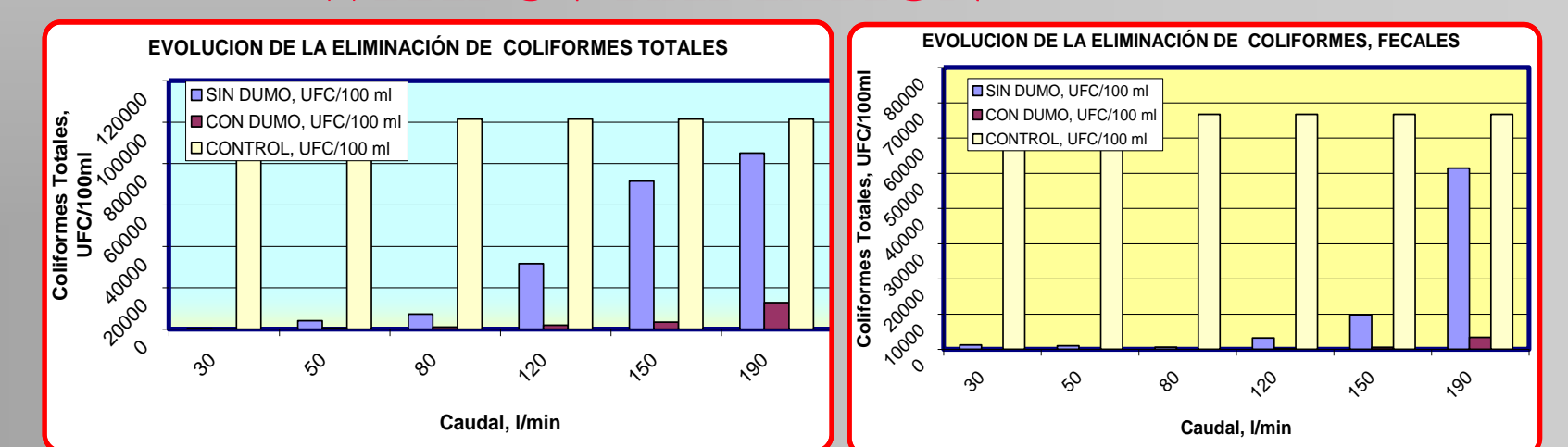


EFFECT OF ULTRASOUNDS IN THE DISTRIBUTION OF THE SIZE OF PARTICLE AND DISINFECTION CAPACITY

Tamaño Partícula, µm	Sin Tratamiento	Con tratamiento	Diferencia	% de disminución
1-10	93.143,10	56.114,65	37.028,45	39,75
10-20	2.597,35	1.639,95	957,40	36,86
20-30	341,05	162,40	178,65	52,38
30-40	117,40	59,70	57,70	49,15
40-50	41,15	14,98	26,18	63,61
50-60	18,50	6,90	11,60	62,70
60-70	6,55	2,55	4,00	61,07
70-80	4,50	1,23	3,28	72,78
80-90	2,10	0,00	2,10	100,00
90-99	1,20	0,00	1,20	100,00
99-150	3,30	0,00	3,30	100,00
TOTAL	96.276,20	58.002,35	38.273,85	39,75

In the previous information, there is revealed the technical viability of the combination of the pretreatment by ultrasounds and the disinfection by ultraviolet radiation to realize the disinfection of a residual treated water, provided that it is possible to observe that on having combined both processes the degree of decontamination increases of a valuable form obtained bacteriology.

EFFECT OF THE TREATMENT WITH ULTRASOUNDS ON THE DISINFECTION WITH UV RADIATION



CONCLUSIONS

- I. Application of ultrasound treatment, combined with other disinfection techniques, as UV radiation and sodium hypochlorite dosage, causes particles breakage, leaving them suitable for later disinfection treatment, at the same time ultrasound has slow disinfection capacity.
- II. Ultrasound pretreatment increases efficiency of UV radiation in one logarithmic unit, possibly because of decreasing size particle.
- III. Economic balance (with only direct operating costs) does not justify neither warranty combination of both processes, although hydraulic system in installation does not allow to expand disinfection channels, a ultrasound pretreatment can act as element for expansion capacity.
- IV. Chlorine demand of outlet water from filters of Treatment Plant in Lorquí decreases in 15-20% by using Ultrasound Pretreatment
- V. System economic balance does not recommend combination of ultrasound and chlorine treatment.

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