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The impact of insecticide for domestic use on drinking water

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Summary: This work aims, studying the impact of water in the presence of the insecticide domestic use that is classified as an organic micro pollutant, the impact tests were performed in the laboratory on a household insecticide dissolved in water. The aim of the tests is to estimate the micro pollutant impact for a reagent dose. Quantitative and qualitative analysis methods, namely (pH-metry, conductimetry, turbidity; hardness dissolved oxygen, BDO5), and antibacterial activity are used in answer of a polluted water analysis.

Keywords: Water, Insecticide; Impact, bacterial antiactivity.

Introduction

The consumption of the water by the man ceaselessly to grow, nevertheless their consequence screw-à-saw the health, human being remains hypothetical by the negative impact of organic micro pollutants marked by insecticides [1]. The scale and the importance of these effects will be the environmental, morphological hydro, and so climatic. Several authors echo on socioeconomic, landed the theme of the impact of micro pollutants in the water on the environment, the microorganisms, the water of the river, plants [2], and fishes [3]. The objective of this work is to try to detect the impact of a domestic use organic micro pollutant on the consumable water, the disturbances in the characteristics of the water will be estimated by the chemical and microbiological analysis, the values registered before and after the impact will be illustrated in the graphs. This study is an angle of access on the impact of micro pollutants of the put into service water, we think that this access will give good results if it is applied to other cases, with values of concentration calculated affectedly, and for longer durations

Experimental

Our work concerns the chemical and antibacterial activity behavior of potable water polluted by an insecticide. For it we added 250 milligrams of a domestic use insecticide to a 1000 ml drinking water to be able to discover the peculiarities by physic - chemical and bacteriological methods of analysis.The measures of the absorbance by UV, the temperature, the pH, the total hardness, electric conductivity, turbidity, the dissolved oxygen, BDO5 and the activity anti bacteriology was realized in the laboratory of hydraulics. The absorbance was measured by a spectrophotometer of mark Shimizu (UV- 2401PC). The pH and the conductivity of the water polluted and not polluted were measured by means of a pH - Conductimetry of mark (brand) HANNA. The turbidity was measured by a Nephleo Turbidimetry of mark HANNAHI88703-01,the oxygenated dissolves by multi - spectrophotometers parameterizes, and the biochemical demand in oxygen (BDO5) was measured by an oximeter OXITOP. The microbiological tests were realized

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on bétri dish in the presence of a nutrient culture medium (nutrient agar).

Results and Discussion

The effect of the concentration

To know the effect of the concentration in the water, we used a domestic use insecticide. The qualitative analysis by spectrophotometer measures strengthened us determined the concentration of this chemical species [4]. The absorption peak at a value of 320 nm is in the ultra-violet region, and so there would be no visible sign of any light being absorbed making insecticide colorless. The wavelength that corresponds to the highest absorption is usually referred to as "lambda-max" (λmax). The specter of absorbance is drawn below

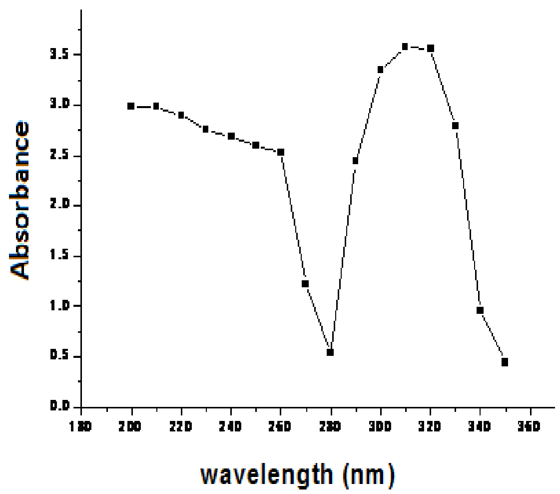

Fig 1: Specter of absorbance of an insecticide

The effect of the pH according to the temperature

The acidity indicates the potential of the hydrogen represented under shape H^+, its domain is between 7 < pH < 14. The water has an acid pH, by consequence under the influence of a micro pollutant and the temperature, the pH values causing a modification [5].To get a better idea on the behavior of the insecticide on the pH of the drinking water according to the temperature, we studied the evolution of the pH of the water according to an interval of temperature enter 16°C and 35°C (Fig 2).

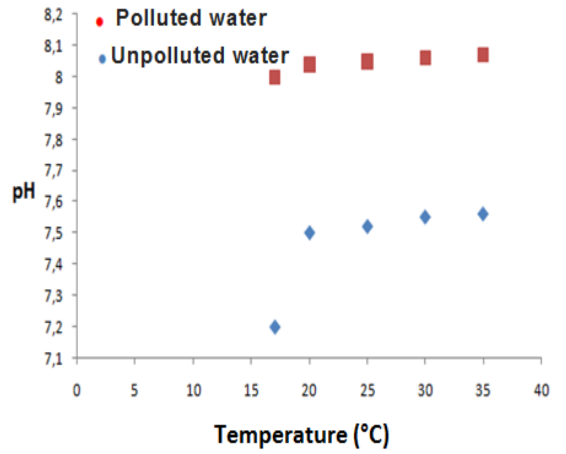

Fig 2: The influence of the pH according to the temperature

The electric conductivity

The electric conductivity characterizes the situation of a material or a solution to let electrical charges move freely and thus allow the passage of an electric current, and it is determined by the content in dissolved substances, the ionic load, and the capacity of ionization, the mobility and the temperature of the water[6] .Through the curve (Fig 3), we observe that the conductivity of the not polluted water to increase with the temperature, on the other hand the polluted water the value of the conductivity begins to decrease from 25 °C ' in the 3.68 ms/cm value .We conclude that when the insecticide penetrates into the water, he affects mineral elements spread in the water and thus the water becomes not transportable of electrical charge and rules out the conductivity of the water.

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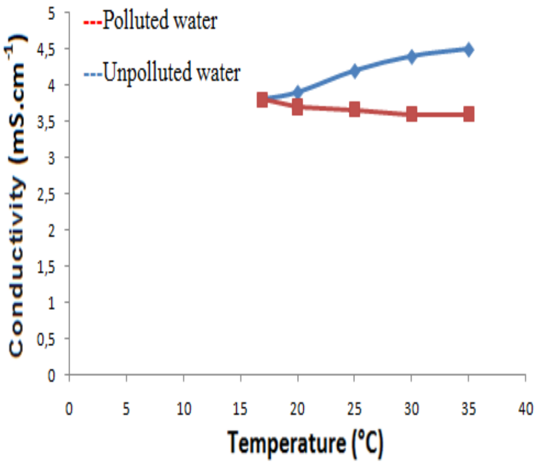

Fig 3: The influence of the temperature on the conductivity of the water

Effects of total hardness

The total hardness of a water is defined by the quantity of ions calcium Ca^{2+}(calcic hardness) and magnesium Mg^{2+}(magnesian hardness) presents in this water. She is expressed milli moles (moles/l) there or in milligrams (or mg / l) or in French degrees (°f). To determine the total hardness of the polluted and not polluted water we proceeded to a dosage complexométrique by the EDTA [7] .The value to calculate in hydrotimetric degree some drinking water costs 22.2°f, Thus the water has a moderate hardness, it is intended for human consumption, and on the other hand the polluted water gives us a hydrotimetric degree of 50°f, therefore the insecticide is a source of contamination.

Turbidity

It is the property of a water to be shady. The measure of the turbidity gives an indication to the content in solid materials in suspension .She can be determined by a measure of the absorption of the light by solids in suspension; she confronts in NTU (Nephelometric Turbidity Unit). We have followed the evolution of the turbidity as a function of time (Fig 4), the graph shows that the turbidity decreases with time, and after a long period of sedimentation, the water does not come close to the value visible to the eye. A turbidity superior to 5 UNT is generally visible in the eye, [8]. The turbidity can have important effects on the microbial quality of the drinking water. Indeed, the growth

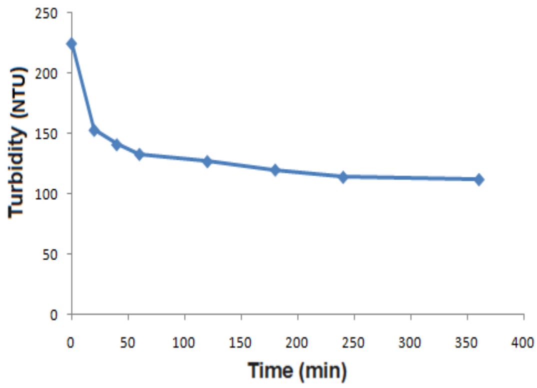

Fig 4: Turbidity of the water according to time

The dissolved oxygen

The oxygen is the manometer on the degree of the water pollution, the dissolved oxygen measures the concentration of the oxygen dissolved in the water and it is expressed mg / l or in percentage of saturation there. It contributes to the chemical and biological processes in aquatic environment. According to (Fig 5), the solubility of the oxygen decreases according to the factor of dilution, this modification is a dominating influence by organic matters reveal in the insecticide that prevent the oxygen from dissolving it in the water, besides they cause the decrease of the oxygen in every dilution [9] . The average content in waters of not polluted surface is 8 mg /l in 20°C and exceeds hardly 10 mg / l.

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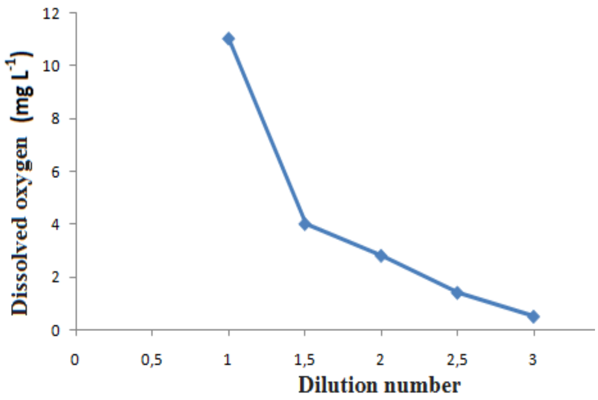

Fig 5: The impact of oxygen dissolved according to the number of dilution

The biochemical demand in oxygen

The biochemical demand in oxygen corresponds to the quantity of dioxygen necessary for the aerobic microorganisms in the water to oxidize organic, dissolved matters or in suspension in the water, hang an incubation time of 5 days to 20°C. It is thus about a potential consumption of dioxygen by biological way [10], the BDO5 of natural waters is lower than 2 mg / l. Waters receiving domestic rejections (discharges) present concentrations superior to 10 mg / l. The studied water showed values relatively high in BDO5 (Fig 6). These strong values would be connected to a strong oxidation of the oxidizible organic compounds [11] .Therefore our found values they are directly attributed to the organic micro pollutant which contaminates our potable water.

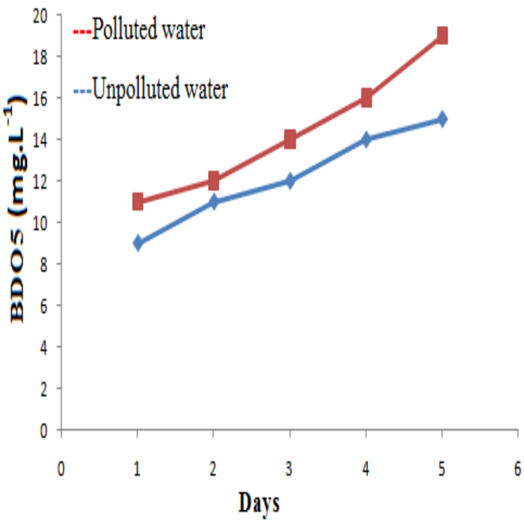

Fig 6: The water, hang an incubation time of 5 days to 20 °C

Antibacterial activity

The objective of the microbiological examination of the water is to supply information on drinkability some water that is without ingestion dared by microorganisms which cause diseases, resulting (coming) generally of one pair of contamination of the human feces [12], these pathogenic microorganisms include in particular the viruses, the bacteria, the protozoons and the helminthes [13]. In our case common sense is experienced polluted water that is contaminated by four strains of bacteria (Pseudomonas Aeruginosa, Klebsiella pneumonia, Escherichia coli, and Staphylococcus aureus). The reading of four betri disk incubated in 37°C during 48 hours informs us that the drinking water contaminated by the insecticide has domestic use, possess an antibacterial activity perceived by the rings which locks the bacterial strains of a visible diameter (Fig7).

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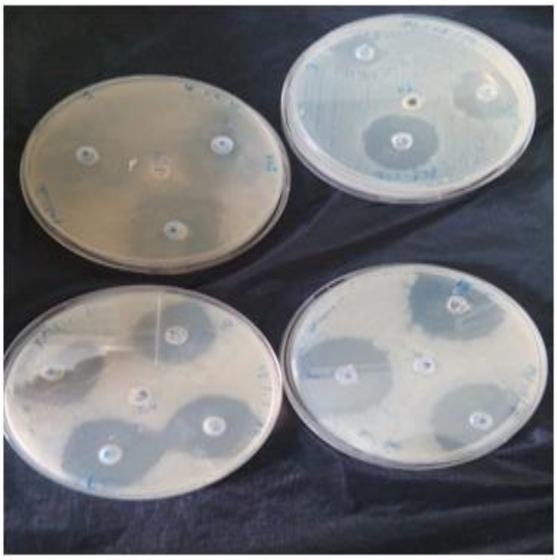

Fig 7**:** Antibacterial activity

Conclusions

The various analyses made on the potable water and the polluted water, allowed to reveal the behavior of certain descriptive parameters of the physico-chemical quality of waters. A comparison of the contents of elements measured in the water shows a difference in the concentration between these various waters. This difference is characterized by high values between both waters. The values of the pH and the conductance according to the temperature show will the impact of the insecticide, what let's say that the water is not consumable seen has basic conditions.

The measures of the hardness and the evolution of the turbidity according to time showed brought up values exceeding the norms of the quality of the water, further to organic micro pollutant exist in insecticide. The measures of the dissolved oxygen el the BDO5 showed values of the solubility of the oxygen decrease according to factor of dilution, and an increase of the biochemical demand in oxygen, this modification and a direct influence of organic matters reveal in the insecticide which prevents the oxygen from dissolving in the water, and increases her biochemical demand. It is based on the values of the turbidity which informs us about the microbial quality of the drinking water. In this consequence we preceded has a microbiological behavior, the used bacteria present well the microbial growth in the polluted water, what means that domestic use insecticides are microbial source.

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