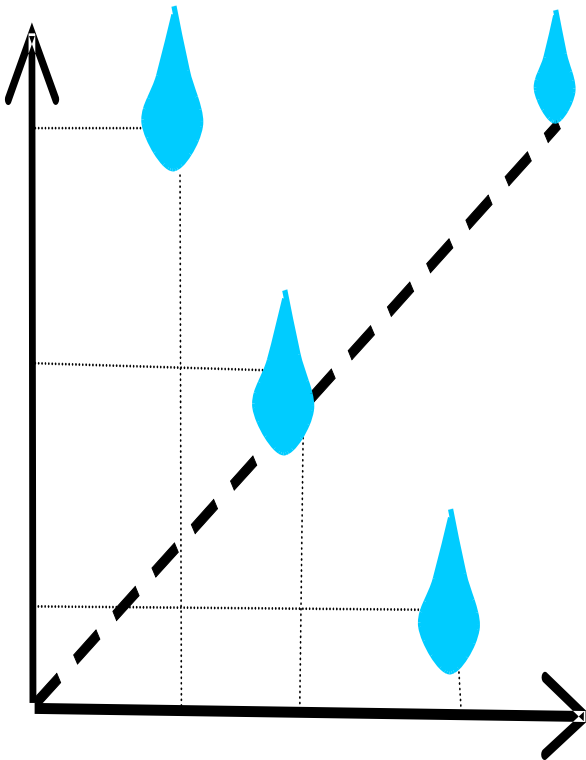


# HOMEOPATHY AND WATER

volume 3  
1<sup>ST</sup> Edition



Federal University of Viçosa  
Viçosa-MG. Brazil

Vicente Wagner Dias Casali  
2012

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Fernanda Maria Coutinho de Andrade

# **HOMEOPATHY AND WATER**

Volume 3

Experimental results on water treatment with high dilutions

Federal University of Viçosa  
Center for Agricultural Sciences  
Department of Plant Science

**Viçosa – MG**  
**Brazil**  
**2012**

# HOMEOPATHY AND WATER

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Federal University of Viçosa  
Center for Agricultural Sciences  
Department of Plant Science

# HOMEOPATHY AND WATER

Volume 3

Experimental results on water treatment with high dilutions

Interpretation on the effects of high dilutions according to the principles of Homeopathy.

This book is part of the Extension Program at UFV - "Disclosure of Medicinal Plants, Homeopathy and Organic Foods Production", and is distributed to Libraries, Family Agricultural Schools and Organizations (Non-Government and government).

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# HOMEOPATHY AND WATER

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# **HOMEOPATHY AND WATER**

## **GRATEFULNESS**

To God, present at all times.

To Hahnemann, for the valuable science of Homeopathy.

To Agricultural Family, for the wisdom and simplicity.

To the students of Homeopathy for their dedication.

To Federal University of Viçosa and Department of Plant Science, for their support.

To Family relatives for their love.

To friends for their confidence.

## **HONORABLE MENTION**

CNPq (Brazilian Council for Scientific and Technological Development).

CONAHOM (National Council of Homeopathy)

UNESCO and Brazil Bank Foundation

## **DEDICATION**

The agricultural families.

To Earth.

To Water.

# HOMEOPATHY AND WATER

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# HOMEOPATHY AND WATER

## Preface

The vehicle or solvent, water plus ethanol, is the most known concerning adequacy in the preparation of homeopathic solutions. Pure water has been shown in research to be unable to maintain the effectiveness of homeopathic preparations for a long time. Studies on water technology in Homeopathy are being required. Some water behaviors are not supported by currently theories in physics and chemistry. In addition, several of the properties of water conflict with the basic knowledge and theories of this universal solvent.

For these reasons Yuan Lee, Nobel Prize of Chemistry in 1986, described the water as odd, arguing that it should be gas, that expands when it should contract, but that nevertheless the Earth would be ice without such oddities.

The effort of the last 50 years was not satisfactory for identifying structural models of water, while the consumer society has demonstrated the incompetence in using water.

Thus, the biological value of water is being lost and being replaced by marketing value.

The water is influenced by the electric field and magnetic field generated by Earth. Although considered of low intensity, the Earth magnetic field varies as the location on the planet, with oscillations, periodicities, from secular to every hour. The variation intensity is proportional to the frequency of occurrence. The data of these variations are

computed and submitted to mathematical modeling, every five years, enabling the geomagnetic map, current and past. Most studies published on the effect of magnetic fields show the magnitude of the fluctuations that are statistically significant in the variables, making experiments difficult to be repeated.

This book contains the results of two dissertations and a thesis of the Graduate Program, Department of Plant Science at UFV. The young researchers defended their research on the activity of homeopathic preparations (high dilutions) in water and were approved. These results will contribute to technological proposals for water treatment in the future.

## CHAPTER 1

# Physical and Chemical Properties of Water with Homeopathic Preparations

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Keywords: High Dilutions. Homeopathy. Water Treatment.

## Introduction

Homeopathy is based on the law or the Principle of Similarity, enunciated by Hahnemann in 1796. According to this principle the homeopathic preparations are chosen if the signs which they generate in healthy organisms are similar to symptoms of the organism not healthy.

The systematic procedure to test homeopathic solutions in healthy organisms to generate signs is named

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experimentation. Hahnemann developed specific rules for experimentation. The experimental signs characterizes the pathogenesis and the biological use of homeopathic preparations (CASALI et al, 2006).

The reasoning about doses (in the chemical sense) is valid up to 11CH. The concept of dose changes after 11CH. Information is delivered by the process of succussion. The information is stored by the water used in the preparation of the homeopathic solution (SUKUL & SUKUL, 2004).

Being an alive and complex biological system with dynamic structure and behavior, the water reflects through some variables the complexity of responses to stimuli (BELLAVITE, 2002).

The physico-chemical properties of the water and of the aqueous solutions are important and have been the subject of studies. The main motivation is the understanding of mechanisms of action of homeopathic preparations. Some physico-chemical properties of the water and aqueous solutions remain obscure, particularly the succussed and ultra diluted solutions. According to Bastide (2006), diluted and succussed substances in aqueous solutions can cause abnormalities in the behavior of water. Changes in electrical conductivity, pH and fluorescence spectrum, are subjected to anomalies.

The hydrogen ion in water is responsible for adverse effects and the pH value is regarded as a measure of the potential hydrogen of water. The pH is closely related to the concentration of many substances in water (ESTEVES, 1998).

Electrical conductivity is the ability of water to

conduct electrical current and is associated with the presence of ions dissolved in water, which are electrically charged particles. The greater the quantity of ions dissolved, the greater the water electrical conductivity (ESTEVEZ, 1998).

The turbidity of the water is the change in light penetration due to suspended particles (PINTO, 2003). The presence of particles causes light scattering and absorption giving a cloudy appearance. In water for consumption turbidity should be below 5 NTU (Nephelometric Turbidity Unit) (PINTO, 2003).

The objective of this study was to quantify physico-chemical variables of water after treatment with homeopathic preparations.

## **Material and Methods**

The experiments were carried out at the Laboratory of Homeopathy, Department of Plant Science, Federal University of Viçosa, UFV (Brazil), from September to October, 2008.

In polystyrene containers (small pots) with 80 ml of distilled water, 2 drops of homeopathic solutions were applied. The control was the distilled water and spring water. The mine water (spring water) was introduced in the experiment with the goal of being the reference of well balanced water, drinking water and of normal level of minerals.

The homeopathic preparations of potency 4CH were purchased in homeopathic pharmacy. They were used to

prepare the homeopathic solutions in accordance with the Brazilian Homeopathic Pharmacopeia (BRAZIL, 1977). As the standard procedure 2/3 of the vial with distilled water was the succussed volume. One drop of homeopathic preparation 4CH and 99 drops of the solvent (distilled water) was the proportional scale (ratio). The mechanical arm machine performed 100 succussions.

The experimental design was a split plot in randomized blocks being the treatments in the plot and the times in the subplot, under double blind procedure, and five replicates. The treatments were the homeopathic preparations and Distilled Water 5CH. Distilled water was the control 1 and the mine water was the control 2. The data were processed statistically by analysis of variance in the program SAEG 9.1 (2007). The means were compared to control by Dunnett test at 5% probability. The variables were: pH, dissolved oxygen and turbidity.

## **Experiment 1**

The variables were measured every two hours, in the same order: dissolved oxygen, pH and turbidity. The treatments in potency 5CH were: *Apis mellifica*, *Antimonium crudum*, *Lycopodium clavatum*, *Rhus toxicodendron*, *Nux vomica*, *Nitricum acidum*, *Phosphorus*, *Sulphur*, *Zincum*, *Bryonia alba*, *Calcarea phosphorica*, *Calcarea carbonica*, *Crataegus*, Distilled Water 5CH, mine water (spring water) and distilled water (Control).

## **Experiment 2**

The variables were measured every 12 hours in the same order: dissolved oxygen, pH and turbidity. The treatments in potency 5CH were: *Apis mellifica*, *Antimonium crudum*, *Lycopodium clavatum*, *Rhus toxicodendron*, *Nux vomica*, *Nitricum acidum*, *Phosphorus*, *Sulphur*, *Zincum*, *Bryonia alba*, *Calcarea phosphorica*, *Calcarea carbonica*, *Crataegus*, Distilled Water 5CH, mine water (control) and distilled water (control).

## **Experiment 3**

There were 11 treatments: *Rhus toxicodendron* from 5CH to 12CH, Distilled Water 5CH, mine water (control), and distilled water (control), and 55 experimental plots. Five measurements per plot were taken every 12 h after the applications.

## **Analyzed Variables**

Measurements were performed at the Laboratory of Homeopathy Department of Plant Science at UFV. After the reading of each sample, the electrode was washed off with distilled water.

1. Dissolved oxygen - It was used the oximeter DM 4P. The electrode was immersed directly into the sample (experimental plot) and the reading was in mg / L.

2. Temperature - The temperature was measured by a thermometer coupled to the oximeter. The data were expressed in °C.

3. pH – It was used the potentiometer DM 23 (measuring range pH 2-20), whose electrode was immersed directly into the sample (experimental plot).

4. Turbidity – It was used the turbidimeter, portable, digital TU DM (measurement range 0 to 1000 NTU).

## **Results and Discussion**

### **Experiment 1**

According to analysis of variance (Table 1) there were statistically significant interactions, but they were not considered in the interpretations.

The time, phenomenom related to the effects of homeopathic preparations have been approached by Elia (2008), therefore, it is not surprising the significant interaction of time with treatment. The understanding of the time process involves the possibility of bottle components to cause changes in the solution, as evidenced by Elia (2004), Anick and Ives (2007). In the solution, no data were taken concerning the presence of carbon, for example, and other possible components of the polystyrene container. It was not found references or any work about the influence of polystyrene components in solutions.

The interpretation of interaction treatment x time would considered environmental conditions, especially light and temperature, which may affect the dissipation of energy coming from the physical and chemical activities of homeopathic preparations. Elia (2007) confirms that dissipative structures, out of equilibrium, are present in this type of hight dilution. Thus, specific approaches on this

interaction are valid but with different criteria. Pathogenesis of homeopathic preparations of this experiment have already been published in scientific journals and books of Homeopathic Acology or Acognosy.

Table 1 - Analysis of variance of Dissolved Oxygen (DO), Temperature (TEMP), Potential Hydrogen (pH) and Turbidity (TURB) data, of distilled water, after treatment application. Experiment 1. Viçosa-MG. 2008.

Source of Variation	DF	Mean Square			
		OD	TEMP	pH	TURB
Treatment (T)	15	32.67*	0.49	0.09	5.39*
Block	4	2.12	0.08	0.15	2.06
Res (A)	60	1.76	0.02	0.14	0.51
Time	5	124.47*	6.56*	1.03*	1.02*
Time X T	75	11.01*	0.35*	1.50*	0.13ns
Residue	320	1.33	0.02	0.12	0.09
VC (%) Plot		21.43	0.86	5.68	44.50
VC (%) Sub Plot		18.69	0.82	6.64	19.32

\* significant at 5% probability

VC-Variation Coefficient

DF- Degrees of freedom

The responses of the distilled water to treatments were differentiated, according to principle of action specificity, what means, each high dilution (homeopathic preparation) expressed the individuality of its own (Table 2).

The dynamization of distilled water did not affect the variables compared to control. Therefore, the succussion process alone was not enough to modify the physico-chemical properties of distilled water. It was evident that addition of kinetic energy in distilled water caused no detectable change in those physico-chemical properties. The temperature should be considered in more detail in future experiments due to interactions with time factor and to the low coefficient of variation (CV) (Table 2).

Table 2 - Mean values of Dissolved Oxygen (DO) in mg / L, Temperature (TEMP) in °C, Potential Hydrogen (pH) and Turbidity (TURB) in NTU, after treatment of distilled water. Experiment 1. Viçosa - MG. 2008.

<b>Treatment</b>	<b>DO</b>	<b>TEMP</b>	<b>pH</b>	<b>TURB</b>
<i>Apis mellifica</i> 5CH	7.76	19.26	6.66	1.95*
<i>Antimonium crudum</i> 5CH	7.87	19.26	6.65	1.92*
<i>Lycopodium clavatum</i> 5CH	3.97	19.36	6.64	1.79*
<i>Rhus toxicodendron</i> 5CH	3.79	19.37	6.64	1.60*
<i>Nux vomica</i> 5CH	5.23	19.30	6.74	2.40*
<i>Nitricum acidum</i> 5CH	5.21	19.21	6.62	2.37*
<i>Phosphorus</i> 5CH	4.01	19.42	6.69	1.76*
<i>Sulphur</i> 5CH	5.85	19.45	6.61	1.96*
<i>Zincum</i> 5CH	5.85	19.45	6.61	1.96*
<i>Bryonia alba</i> 5CH	6.92	19.8*	6.81	1.65*
<i>Calcarea phosphorica</i> 5CH	7.03	19.60	6.61	1.55
<i>Calcarea carbonica</i> 5CH	6.95	19.59	6.60	1.92*
<i>Crataegus</i> 5CH	7.96	19.61	6.59	1.40
Distilled Water 5CH	6.71	19.52	6.50	0.26
Mine water	5.95	19.22	6.74	1.45
Distilled water (control)	5.53	19.45	6.51	0.27

Means followed by \* are statistically different from control, by Dunnett test, at 5% probability.

NTU = Nephelometric Turbidity Unit.

## **Dissolved Oxygen (DO)**

The interpretations of the statistically significant effect of *Zincum* (*Zincum metallicum*) (Table 2), are limited because *Zincum* generate large number of pathogenesis signs (CASALI, 2009). The increase in DO after homeopathic treatment was due to insufficient oxygen in the system. The lack of oxygen is relevant in the case of distilled water to be interpreted as a living system under extreme imbalance.

The amount of Dissolved Oxygen (DO) is highly variable even along with the day. The dissolution of oxygen is dependent on many process and it is influenced by the water molecule itself.

## **Temperature (TEMP)**

From the pathogenesis results, *Bryonia* and *Rhus* increase the temperature. Only *Bryonia* significantly increased the temperature compared to distilled water (Table 2).

In this experiment, the pH corresponding to *Zincum* treatment was not statistically significant. In all other treatments it was apparent because there was no significant effect of temperature and pH.

## **Potential Hydrogen (pH)**

The treatment means did not differ significantly from the mean of distilled water (Table 2). The variable pH was

not sufficiently responsive to the activity of homeopathic solutions.

### **Turbidity (TURB)**

It was recognized that particles under suspension caused refraction. But in the distilled water also was admitted that the new organization of water molecules could be responsible for the phenomenon of refraction in the samples. No bibliographical reference on this subject of refraction was found. According to Technical Report CNPq (2007), the data on turbidity of water confirmed the results of this experiment. Another possibility is that the dissolved oxygen, for some property, have caused refraction of the light.

Increased turbidity of distilled water, as an effect of high dilutions, would be based on alteration of the physical structure of water that would absorb light by some physical mechanism.

The homeopathic principle of similarity and of experimentation allow the hypothesis of any high dilution that increases turbidity may reduce the turbidity in turbid water.

Anick and Ives (2007) reported the possibility of silica residues detached from the vial, to exert influence on the composition and organization of homeopathic preparations. Even if the residual amount is very small, Anick and Ives (2007) discussed the probability of forming silicic acid, which would polymerize water molecules. This experiment was conducted inside polystyrene containers so there is the possibility that polymer residues having

participated in the dynamics of treatment. What distinguishes the hypothesis Anick and Ives (2007) from the hypothesis of Experiment 1 is that the succussion was not conducted in polystyrene containers. Also the distilled water is at the ratio of 80 ml of water for two drops of the homeopathic preparation.

## **Experiment 2**

Like in Experiment 1, the interpretation of significant interactions (Table 3) were not considered here.

All homeopathic preparations statistically increased the turbidity and pH of the water (Table 5).

*Calcareo carbonica* and *Zincum* increased dissolved oxygen concentration of the solution. The longer time (60h) promoted greater activity of homeopathic preparations compared to Experiment 1 (11 hours).

Table 3 - Analysis of variance of Dissolved Oxygen (DO) in mg / L, temperature (TEMP) in °C, Hydrogen Potential (pH) and Turbidity (TURB) in NTU data, after treatment of distilled water. Experiment 2. Viçosa-MG. 2008.

Source of Variation	DF	Mean Square			
		DO	TEMP	pH	TURB
Treatment (T)	15	56.14*	0.18	2.05*	29.08*
Block	4	3.34	0.01	0.04	0.09
Res (A)	60	1.93	0.00	0.03	0.14
Time	5	67.46*	47.49*	27.78*	38.83*
T xTime	75	8.215*	0.04	0.12	0.74
Residual	320	1.03	0.00	0.02	0.16
VC (%) Plot		25.20	0.22	2.57	14.59
VC (%) Sub Plot		18.46	0.25	2.12	15.59

\*Significant at 1% probability

VC-Variation Coefficient

DF- Degrees of freedom

Table 4 - Mean values of Dissolved Oxygen (DO) in mg / L, temperature (TEMP) in °C, Potential Hydrogen (pH) and Turbidity (TURB) in NTU after 60 hours of distilled water treatment. Experiment 2. Viçosa-MG. 2008.

<b>Treatment</b>	<b>DO</b>	<b>TEMP</b>	<b>pH</b>	<b>TURB</b>
<i>Apis mellifica</i> 5CH	3.99	18.91*	7.51*	2.21*
<i>Antimonium crudum</i> 5CH	3.84	18.92*	7.50*	2.26*
<i>Lycopodium clavatum</i> 5CH	4.41	19.00*	7.44*	2.66*
<i>Rhus toxicodendron</i> 5CH	5.64	19.04	7.35*	2.53*
<i>Nux vomica</i> 5CH	5.88	19.05	7.49*	2.64*
<i>Nitricum acidum</i> 5CH	4.64	19.05	7.50*	2.44*
<i>Phosphorus</i> 5CH	4.33	19.07	7.40*	3.14*
<i>Sulphur</i> 5CH	4.87	19.15	7.41*	3.24*
<i>Zincum</i> 5CH	7.66*	19.14	7.47*	3.30*
<i>Bryonia alba</i> 5CH	7.32	19.10	7.40*	3.31*
<i>Calcarea phosphorica</i> 5CH	6.55	19.06	7.46*	3.54*
<i>Calcarea carbonica</i> 5CH	7.53*	19.08	7.45*	3.43*
<i>Crataegus</i> 5 CH	7.28	19.07	7.43*	3.08*
Distilled Water 5CH	5.44	19.05	6.83	0.29
Mine water	3.96	18.88*	7.65*	2.71*
Distilled water (control)	4.83	19.09	6.63	0.28

Means followed by \* differ statistically from control by Dunnett test at 5% probability

NTU = Nephelometric Turbidity Unit

## **Dissolved Oxygen (DO)**

*Zincum* repeated (Table 4) the effects of Experiment 1 (Table 2). It means that the activity of the homeopathic preparation was kept for 60 hours. By the Homeopathic Acology, *Zincum* activity is for 30 days in the living system of humans.

The statistical significance of *Calcarea carbonica* could be explained by its slow activity. Variation Coefficient of DO could be holding any kind of experimental error. The control of some environmental influences perhaps was less effective. It may be supposed that five replicates is not enough for this variable.

## **Temperature (TEMP)**

*Apis mellifica*, *Lycopodium clavatum* and *Antimonium crudum* decreased the temperature (Table 5). The fact that the temperature of mine water (control) is the lowest lacks experimental results in the bibliography. Elia (2008) confirmed experimentally that there is "new behavior along the time" what means that some physico-chemical parameters of water evolve over time.

## **Potential Hydrogen (pH)**

There was a statistically significant increase of the water pH after all treatments of homeopathic preparations as compared to the control by Dunnett test. The hydrogen potential of water is 7.00 and the electric current H<sup>+</sup> and OH is measured by the conductivimeter (HENEINE, 2005). The dissociation of water is very limited being two

molecules per 1 billion. The water is regarded as a highly concentrated liquid. There are 55.5 mol.L<sup>-1</sup> while in biological solutions is ranging from 0.1 to 0.3 mol. L<sup>-1</sup>. Because it is almost constant, the high concentration is included in the equilibrium constant (K).

Because of the probability of having polystyrene residues in the water (Experiment 1) it is essential to consider the possibility of interaction between treated water and surface of the container. In this interaction H<sup>+</sup> and OH<sup>-</sup> that determine the pH would be involved. The pH of distilled water (control) was 6.63. The pH of distilled water treated with Distilled Water 5CH was 6.83. In the distilled water, treated with any of the homeopathic preparations, pH is above 7.0. This increase was due to chemically donation of OH<sup>-</sup> after activity of the homeopathic preparations. It is possible to interpret that homeopathic preparations changed pH of distilled water. So, the structure was fixed and the water returned to its working order. As a reference of well balanced water the pH of mine water was 7.65.

### **Turbidity (TURB)**

There was statistically significant effect of 13 homeopathic preparations on turbidity of distilled water, compared to controls (Table 4).

Assuming that there was no polystyrene residue influencing the turbidity then the effect of homeopathic preparation would be identical to the effect of distilled water (control) according to Elia (2004). The aggregates of water molecules formed along with the succussion should

be sufficient to impose restrictions on the passage of the light beam of the turbidimeter.

Based on principles of Homeopathy the high dilutions that increase turbidity are potential reducers of turbidity in turbid waters.

The turbidity measured in NTU strictly is a physical phenomenon. But turbidity is based on chemical hydrogen bonds that are between parts of the polar molecules of water. Elia (2008) states that the water, a complex system, is capable of self-organization. But self-organization without polystyrene residues would mean that by 60h (Table 4) distilled water reached the structure such as the natural mine water. The assertions of Elia (2008) add that there are water properties that respond to small perturbations. The supposed residues of polystyrene can be understood as small perturbations but they were not enough to change turbidity of the distilled water treated by Distilled Water 5CH (Table 4).

### **Experiment 3**

The interaction treatment x time (Table 5) is not discussed. The treatment means (60 hours) after applications and the statistical significance are in Table 6.

The homeopathic preparations of *Rhus toxicodendron* (potency 5CH to 12CH) did not affect the pH of distilled water (Table 5). The potencies of *Rhus toxicodendron* from 5CH to 12CH confirm that the presence of the solute is not determinant of homeopathic activity. Preparations more succussed (lower presence of solute) caused changes in the physico-chemical properties of distilled water.

It was confirmed the individuality of responses, what means, there were differences in effects among potencies of the same solute. This wave phenomenon is common in nature and is found in the electromagnetic spectrum of living organisms (KENT, 1996). The more the variations, the greater the stability of the body (CAPRA 1982). It is often accepted that a homeopathic preparation causes the same effects in different organisms, depending on the applied potency. In some potencies promote stimulus, and in others, inhibition.

The increasing of the stimulation was not followed by progressive increase of the variable means. Experimentation with high dilutions disagrees of the "principle of doses" of conventional pharmacology as stated by Sukul and Sukul (2004).

Table 5 - Analysis of variance of Dissolved Oxygen (DO) in mg / L, Temperature (TEMP) in °C, Hydrogen Potential (pH) and Turbidity (TURB) in NTU data, after 60 hours of distilled water treatment. Experiment 3. Viçosa-MG. 2008.

Source of variation	DF	Mean Square			
		DO	TEMP	pH	TURB
<b>Treatment (T)</b>	10	45.48*	0.23	0.46	14.05*
<b>Block</b>	4	2.26	0.00	0.01	0.23
<b>Res (A)</b>	40	0.55	0.00	0.08	0.22
<b>Time</b>	4	26.30*	8.40*	4.15*	2.08*
<b>T x Time</b>	40	1.41*	0.03	0.28	0.27
<b>Residue</b>	176	0.26	0.00	0.06	0.03
<b>VC (%) Plot</b>		13.37	0.20	3.94	28.75
<b>VC (%) Sub Plot</b>		9.33	0.22	3.45	11.69

\* - Significant at 1% probability

DF- Degrees of freedom

VC- Variation coefficient

Table 6 – Means of Dissolved Oxygen (DO) in mg / L, Temperature (TEMP) in °C, Potential Hydrogen (pH) in unit and Turbidity (TURB) in NTU after treatment of distilled water. Experiment 3. Viçosa-MG. 2008.

<b>Treatment</b>	<b>DO</b>	<b>TEMP</b>	<b>pH</b>	<b>TURB</b>
<i>Rhus toxicodendron</i> 5CH	4.93	20.18*	7.19	1.61
<i>Rhus toxicodendron</i> 6CH	5.61	20.22*	7.37	2.12
<i>Rhus toxicodendron</i> 7CH	5.33	20.28*	7.40	1.97
<i>Rhus toxicodendron</i> 8CH	5.04	20.26*	7.06	2.34
<i>Rhus toxicodendron</i> 9CH	7.29*	20.31*	7.37	1.97
<i>Rhus toxicodendron</i> 10CH	7.02*	20.30*	7.40	2.30
<i>Rhus toxicodendron</i> 11CH	6.81*	20.31*	7.43	1.99
<i>Rhus toxicodendron</i> 12CH	7.12*	20.34*	7.41	1.89
Distilled Water 5CH	4.12	20.132	7.45	0.21
Mine water	3.34	20.05	7.53	1.59
Distilled water (control)	4.42	20.09	7.22	0.22

Means followed by \* differ statistically from control by Dunnett test at 5% probability

NTU = Nephelometric Turbidity Unit

## **Dissolved Oxygen (DO)**

The concentration of DO in distilled water was increased by *Rhus toxicodendron* from 9 CH to 12CH (Table 6).

The Coefficient of Variation of DO data in Experiment 3 was lower, compared with Experiments 1 and 2, meaning better experimental precision. But, still in Experiments 1 and 2 there was no significant effect of *Rhus toxicodendron* 5CH compared to control (distilled water).

The concentration of DO usually is variable because the dissolution of oxygen is dependent on many processes. Oxygen contents were low (Table 6), although it is known that the solubility of oxygen is influenced by the polar characteristics of the water molecule. Another argument of low levels (Table 6) is that there is no other source, except the oxygen from atmosphere. After distillation of the water there is no possibility of photosynthetic process to contribute to the DO in short time (MCKEE e WOLF, 1971).

## **Temperature (TEMP)**

The treatment means were significant in relation to distilled water. The homeopathic preparations, with progressively increasing potentiation (5CH to 12CH), exerted influence from potency 9CH on. It is possible that heat energy of some source was liberated from the solution (Table 6). Some information of the potency 9CH ahead may have been passed to the distilled water because the activity of *Rhus toxicodendron* is related to the heat of

living systems as it is recorded in the Homeopathic Acology.

It was not repeated the association between mean temperature and mean pH, as in Experiment 1. The coefficient of variation was smaller allowing the significance of means compared to control distilled water.

### **Potential Hydrogen (pH)**

The treatment means were not significant compared to the mean of distilled water (control).

In Experiment 2, with coefficient of variation (2.12%) close to Experiment 3 (3.45), *Rhus toxicodendron* 5 CH effects were significant compared to control (distilled water), whereas in Experiment 1 the coefficient of variation (6.64) was higher and there was no significance.

After application of *Rhus toxicodendron* 5 CH the pH did not increased numerically, compared to control. In Experiment 3, the pH decreased while in experiment 2 was increased by treatments.

Holandino et al. (2008), as in experiment 3 (also 1 and 2), included as a control the distilled water used in the preparation of the high dilutions. Furthermore, as in Experiment 3 (1 and 2), Holandino (2008) evaluated the electric conductivity and compared high dilutions of vincristine sulfate potency 1CH to 15CH. The conclusion is that distilled water was out of equilibrium and the treatments of high dilutions of vincristine sulphate restored the stability of the water.

## **Turbidity (TURB)**

The mean values of potencies 5CH to 12CH were not significant compared to the mean value of distilled water. In Experiments 1 and 2 the effects of *Rhus toxicodendron* 5CH were significant on turbidity of distilled water, and the coefficient of variation was higher than in Experiment 3. Because of experimental precision, the hypothesis of the polystyrene residues effects on turbidity was not confirmed in Experiment 3. The turbidity means of the three experiments are very close (E3 / 1.61, E2 / 1.60, E1 / 2.53) as close as the turbidity means of distilled water (E3 / 0.22-E2 / 0.27-E1 / 0.28).

Turbidity is not being measured after homeopathic treatments but it must be considered because turbidity could be well seen even by naked eyes of land men or agricultural families.

## **Conclusion**

The homeopathic preparations significantly changed some physico-chemical properties of distilled water.

The activity of the homeopathic preparation is variable in each physico-chemical property.

The distilled water really might be regarded as a diseased living system.

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## CHAPTER 2

# Electrical conductivity, pH and Turbidity of Water Treated with Homeopathic Preparations

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## Introduction

The supply of water on Earth is closely related to: food safety, life style, industrial growth, agricultural development and environmental sustainability (BEEKMAN, 1996).

According to WMO (1997), the water consumption increased more than six times between 1900 and 1995, more than the double rate of population growth.

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A survey by World Meteorological Organization of United Nations (WMO) pointed out that one third of world population lives in regions with consumption more than 20% of its water availability. The WMO analysis call attention that over the next 30 years, the overall situation of water resources tends to become worse if actions are not taken to improve the management of supply and demand for water.

Looking forward the relationship between water and food shortage, it was figured out that by 2025 water scarcity on Earth will be responsible for annual losses of 350 million tonnes of food production (IFPRI and IWMI, 2002). The increasing demand will severely limit the availability of water for irrigation.

The activity of irrigation is the largest consumer of water among the uses of this natural resource. About 250 million hectares are irrigated around the earth, almost five times more than in the early twentieth century. Irrigation has helped to increase production and to stabilize food prices (WMO, 1997).

In addition to water limitations, which is severe in many regions, there is concentrated and diffuse pollution of waters. Processes of eutrophication, heavy metals, acidification, organic pollutants and other toxic effluents degrade the waters of densely populated areas, thus compromising the quality of water (GUIDOLIN, 2000).

Those countries where water demand is a limiting factor for plant growth they are dependent on foreign agricultural products such as grains, for example, of high water requirement. Importing food has become a way of

saving water.

The World Health Organisation (WHO) established in 1990, sanitary guidelines on the use of urban wastewater in irrigation, in view of the rapid expansion of this activity in many countries. In the organic system, irrigation water must be free of contamination to maintain soils healthy. When soil is irrigated, the water evaporates and salts of this water will accumulate over the soil. Depending on the compositions of water and salt concentrations there will be soils sterility.

Water shortages is a reality in several regions of Brazil, also problems associated with water quality. Alternatively, homeopathic treatment of water is promising.

The use of homeopathic solutions in agriculture was initiated in Koberwitz, Germany, in 1924, with the guidance the philosopher Rudolf Steiner in a cycle of lectures to farmers (CASTRO et al., 2001). The application in animals, plants, soil and water have allowed stability in animal production and in systems of plant cultivation (CASALI, 2004). The potential of Homeopathy in agriculture has been recognized. The homeopathic solutions provides constructive and defensive uses by living organisms and are regarded as an ecological source of natural resources for alive systems. Homeopathic preparations are the alternative way to the development of sustainable agriculture and resource management to meet human needs and at the same time, maintain the quality of the environment and conserves natural resources (LISBOA et al., 2005). All these at low cost. It was formalized as an agricultural input by the Ministry of Agriculture, in

Instruction 7, published in 19/05/1999 (BRAZIL, 1999). In 2003, UNESCO and Brazil Bank Foundation certified Homeopathy in agriculture as social technology.

The application of the principles of Homeopathy in animals, plants, soil and water treatments have enabled to the family farm, healthy animal production and safety plant cultivation.

The objective of this study was to evaluate the activity of homeopathic preparations in physico-chemical properties of water.

## **Materials e Methods**

The experiments were carried out at the Laboratory of Homeopathy, Department of Plant Science, Federal University of Viçosa, Brazil.

Borosilicate vials were filled with 80 mL of water to be treated (from lake, spring water and after distillation). Two drops of treatments were applied per vial.

The mine water (spring water) was collected in a water head located on the campus of UFV using a PVC pipe, attached directly at the source. The lake water was collected from the pond located on the campus of UFV. The distilled water originated from the Water Treatment Plant at UFV. The saline water was prepared in the Laboratory of Homeopathy by adding 2.922 g/L of NaCl in distilled water.

The homeopathic solutions prepared in Ethanol 20%, were purchased in a commercial homeopathic laboratory. The Mine Water 7CH, Distilled Water 7CH and Lake Water

7CH were manipulated in the Laboratory of Homeopathy by standards techniques of Brazilian Homeopathic Pharmacopoeia (BRASIL, 1977). The mechanical arm machine performed 100 succussions.

After reading each sample, the electrodes were washed off with distilled water and dried before the following sample.

Potential Hydrogen (pH) was measured with the potentiometer DM 23, measuring range pH 2-20, calibrated with two standard solutions. The first solution of pH 7, prepared from dibasic potassium phosphate BP ( $K_2HPO_4$ ) and 0.025 M potassium phosphate PA monobasic ( $KH_2PO_4$ ) to 0.025 M. The second solution pH 4 prepared with potassium biphthalate PA, ( $HOCOC_6H_4COOK$ ) to 0.05 M. The electrode was immersed directly into the vessel containing the sample.

The electrical conductivity (CE) was measured by the conductivimeter DM 32. The calibration was by the standard solution (10.2 mL / L) prepared with deionized water and potassium chloride (KCl). The electrode was immersed directly into the vessel containing the sample and the values expressed in  $\mu S/cm$ .

Turbidity was measured by the digital portable turbidimeter DM TU, already calibrated at the manufacturing industry, measuring range from 0 to 1000 NTU.

The experiments were carried out in split plot scheme and randomized block design, the homeopathic treatments in the plots and the time of evaluation in sub-plots, under double-blind procedure. The data were processed

statistically by analysis of variance in the program SAEG 9.1 (2007). The means were compared by Dunnett test at 5% probability. The experiments were carried out in four replicates except the experiment 7.

## **Experiment 1**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Distilled Water 7CH and distilled water as control.

From 7 AM to 2 PM measures of pH and EC were taken after applications of two drops of treatment. Measurements were after the first application, after 24 hours, 48 hours and 72 hours of the first treatment application.

## **Experiment 2**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Mine Water 7CH and mine water as control.

From 7 AM to 2 PM after applications of two drops of treatment measures were taken for pH and EC. Measurements were after the first application, after 24 hours, after 48 hours and after 72 hours of the first

treatment application.

### **Experiment 3**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Lake Water 7CH and lake water as control.

From 7 AM to 2 PM after application of two drops of the treatment, measurements of pH and CE were taken. Measurements were after the first application, after 24 hours, 48 hours and 72 hours of the first treatment application.

### **Experiment 4**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Distilled Water 7CH and distilled water as the control.

From 7 AM to 2 PM, measures of turbidity were taken after application of two drops of the treatment. Measurements were after the first application, after 24 hours and after 48 hours of the first treatment application.

## **Experiment 5**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Mine Water 7CH and mine water as control.

From 7 AM to 2 PM measures of turbidity were taken after application of two drops of the treatment. Measurements were after the first application, after 24 hours and after 48 hours of the first treatment application.

## **Experiment 6**

The treatments were: *Calcarea carbonica* 7CH, *Calcarea sulphurica* 7CH, *Calcarea phosphorica* 7CH, *Carbo vegetabilis* 7CH, *Natrum carbonicum* 7CH, *Natrum muriaticum* 7CH, *Natrum sulphuricum* 7CH, *Pyrogenium* 7CH, *Sulphur* 7CH, *Nux vomica* 7CH, Lake Water 7CH and lake water as control.

From 7 AM to 2 PM measures of turbidity were done. Two drops of the treatment were applied. Measurements were after the first application, after 24 hours and after 48 hours of the first treatment application.

## **Experiment 7**

In this experiment, in 6 replicates, the saline water was treated by *Natrum muriaticum* potencies 1CH, 3CH, 5CH, 7CH, 12CH, 30CH and Saline Distilled Water 7CH,

Ethanol 70% 7CH and salinity water as control.

From 7 AM to 2 PM measures of electrical conductivity were after applications of two drops of treatment. Measurements were after the first application, after 24 hours, 48 hours, 72 hours and 96 hours of the first treatment application.

## **Results and Discussion**

The significant interactions were not considered in the discussion.

### **Experiment 1**

There was significant statistical effects of treatments on pH and CE of distilled water (Table 1)

Table 1 - Analysis of variance of the hydrogen potential (pH) and electrical conductivity (CE) of distilled water data after the effect of treatments. Viçosa / MG. 2010.

Source of Variation	DF	Mean Square	
		pH	CE
Replication	3	10.30165	0.63694
Treatment (T)	11	0.47045**	4.07808**
Res. (a)	33	0.07954	1.01613
Time	3	4.37939	17.70431**
T x Time	33	0.14996 <sup>ns</sup>	0.91305**
Res.(b)	108	0.34916	0.21313
VC (%) Plot		10.66	67.80
VC (%)Sub-Plot		8.45	20.88

\*\* Significant at 1% probability by the F test

ns-not significant.

VC-Variation Coefficient

DF- Degrees of freedom

### Hydrogen Potential (pH)

There was increase in pH of treated distilled water when compared to the control (distilled water) (Table 2).

Table 2 - Mean values of the hydrogen potential (pH) of distilled water, measured after the effect of treatments. Viçosa/MG. 2010.

<b>Treatment</b>	<b>pH</b>
<i>Calcarea carbonica</i> 7CH	7.176*
<i>Calcarea sulphurica</i> 7CH	7.181*
<i>Calcarea phosphorica</i> 7CH	7.126*
<i>Carbo vegetabilis</i> 7CH	7.197*
<i>Natrum carbonicum</i> 7CH	7.181*
<i>Natrum muriaticum</i> 7CH	6.956
<i>Natrum sulphuricum</i> 7CH	6.910
<i>Pyrogenium</i> 7CH	6.822
<i>Sulphur</i> 7CH	6.831
<i>Nux vomica</i> 7CH	6.891
Distilled Water 7CH	6.772
Distilled water	6.801

Means followed by\* (column) are significant compared to control by Dunnett test at 5% probability.

The pH is related to the activity of H<sup>+</sup> ions (protons) in water, which is influenced by water organization of magnetic fields and other factors. The homeopathic preparations influenced the activity of these ions.

### **Electrical Conductivity (CE)**

There was increase in CE of distilled water after application of *Calcarea carbonica* (A24, A48 and A72) and *Nux vomica* (A72) (Table 3) compared to the control

distilled water.

*Calcareo carbonica* activity is slow in living organisms. In this experiment, the effect was only observed after 24h (A24) of applications and was persistent (A48 and in A72). Figueiredo (2009) observed a significant effect of *Calcareo carbonica* after 60 hours of treatment.

The increase of CE in distilled water after *Calcareo carbonica* and *Nux vomica* applications are in agreement to the principle of specificity of action. This result also proved again that the effects on living organisms (human, animal, plants), according to homeopathic acology (CASALI, 2009), are repeated in living systems (water) or complex systems (soils) as reported by Casali (2009).

Table 3 - Mean values of electrical conductivity (CE,  $\mu\text{S}/\text{cm}$ ) of distilled water, after first application (A0), after 24 hours (A24), after 48 hours (A48) and after 72 hours (A72) of the effect of treatments. Viçosa/MG. 2010.

<b>Treatment</b>	<b>A0</b>	<b>A24</b>	<b>A48</b>	<b>A72</b>
<i>Calcarea carbonica</i> 7CH	1.484	3.358*	4.999*	4.565*
<i>Calcarea sulphurica</i> 7CH	1.669	2.109	2.512	2.445
<i>Calcarea phosphorica</i> 7CH	1.617	1.728	3.206	2.622
<i>Carbo vegetabilis</i> 7CH	1.651	1.951	2.621	2.816
<i>Natrum carbonicum</i> 7CH	1.735	1.893	2.619	2.449
<i>Natrum muriaticum</i> 7CH	1.721	1.758	2.098	2.425
<i>Natrum sulphuricum</i> 7CH	1.350	1.639	2.225	2.48
<i>Pyrogenium</i> 7CH	1.538	1.764	2.419	2.515
<i>Sulphur</i> 7CH	1.604	1.621	2.533	2.792
<i>Nux vomica</i> 7CH	1.331	1.356	3.229	4.318*
Distilled Water 7CH	1.354	1.295	1.801	2.009
Distilled water	1.535	1.624	2.005	1.935

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

## **Experiment 2**

There was statistical significant effects of treatments and time of measures in mine water (Table 4).

Table 4 - Analysis of variance of the hydrogen potential (pH) and electrical conductivity (CE) of mine water data after the effect of treatments. Viçosa / MG. 2010.

<b>Source of Variation</b>	<b>DF</b>	<b>Mean Square</b>	
		<b>pH</b>	<b>CE</b>
<b>Replication</b>	3	0.72244	80.24453
<b>Treatment (T)</b>	11	0.37507**	18.30617**
<b>Res (a)</b>	33	0.03360	7.02885
<b>Time</b>	3	2.95720**	1086.307**
<b>T x Time</b>	33	0.12360**	9.11583**
<b>Res. (b)</b>	108	0.033794	3.61118
<b>VC (%) Plot</b>		7.10	26.85
<b>VC (%) Sub-plot</b>		2.92	1.94

\*\* - Significant at 1% probability by F test

VC-Variation Coefficient

DF- Degrees of freedom

Table 5 - Mean values of hydrogen potential (pH) of mine water, after the first application (A0), after 24 hours (A24), 48 hours (A48) and after 72 hours (A72) of the effect of treatments. Viçosa / MG. 2010.

<b>Treatment</b>	<b>A0</b>	<b>A24</b>	<b>A48</b>	<b>A72</b>
<i>Calcareo carbonica</i> 7CH	6.197	6.572	5.807*	6.405
<i>Calcareo sulphurica</i> 7CH	6.220	6.740	6.795	6.290
<i>Calcareo phosphorica</i> 7CH	6.282	6.782	6.992	6.502
<i>Carbo vegetabilis</i> 7CH	6.325	6.837	7.030*	6.520
<i>Natrum carbonicum</i> 7CH	6.347	6.810	7.142*	6.540
<i>Natrum muriaticum</i> 7CH	6.367	6.855	7.070*	6.572
<i>Natrum sulphuricum</i> 7CH	6.380	6.860	7.187*	6.592
<i>Pyrogenium</i> 7CH	6.442	6.890	7.320*	6.627
<i>Sulphur</i> 7CH	6.450	6.880	6.905	6.635
<i>Nux vomica</i> 7CH	6.485	6.852	6.920	6.592
Mine Water 7CH	6.447	6.827	7.187*	6.700
Mine water	6.497	6.835	6.635	6.655

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

Table 6 – Means values of electrical conductivity (CE,  $\mu\text{S}/\text{cm}$ ) of mine water, after first application (A0), after 24 hours (A24), after 48 hours (A48) and after 72 hours (A72), of the effect of treatments. Viçosa / MG. 2010.

<b>Treatment</b>	<b>A0</b>	<b>A24</b>	<b>A48</b>	<b>A72</b>
<i>Calcareo carbonica</i> 7CH	105.04*	95.34*	96.87*	93.45
<i>Calcareo sulphurica</i> 7CH	102.83	96.11	94.39	94.42
<i>Calcareo phosphorica</i> 7CH	104.97*	98.01	96.45	94.13
<i>Carbo vegetabilis</i> 7CH	105.76*	96.41	95.24	94.24
<i>Natrum carbonicum</i> 7CH	106.13*	97.03	96.29	91.57
<i>Natrum muriaticum</i> 7CH	106.01*	99.73	98.27	95.97
<i>Natrum sulphuricum</i> 7CH	104.45*	95.67	95.83	91.73
<i>Pyrogenium</i> 7CH	104.46*	96.71	93.69	90.78*
<i>Sulphur</i> 7CH	105.34*	96.59	94.71	91.26*
<i>Nux vomica</i> 7CH	104.56*	97.48	95.82	92.94
Mine Water 7CH	100.33	97.18	95.59	89.84*
Mine water	99.785	98.97	94.88	95.58

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

## Hydrogen Potential (pH)

*Carbo vegetabilis*, *Natrum muriaticum*, *Natrum carbonicum*, *Natrum sulphuricum*, *Pyrogenium* and Mine Water increased the pH compared to control after 48 hours of treatment (Table 5), while *Calcareo carbonica* decreased the pH after 48 hours of treatment (Table 5).

Treatments did not affect the pH after first application and after 24h or 72h of treatment. The decrease in pH by *Calcareo carbonica* is consistent with the Principle of Similarity. The pH response to *Calcareo carbonica* also was observed in Experiment 1.

### **Electrical Conductivity (CE)**

The CE was significantly increased after first application of: *Calcareo carbonica*, *Calcareo phosphorica*, *Carbo vegetabilis*, *Natrum carbonicum*, *Natrum muriaticum*, *Natrum sulphuricum*, *Pyrogenium*, *Sulphur* and *Nux vomica* when compared to control mine water (Table 6). There was no response in the CE of mine water after 24h or 48h of treatments.

Distilled water was of greater resistance to conduction of electricity (experiment 1), *Calcareo carbonica* broke this resistance and CE was decreased. In mine water, the resistance was lower, because the CE was changed after the first application (A0) by *Calcareo carbonica* and the majority of homeopathic preparations.

The mine water (spring water) is supposed to be as the natural state of water. The electrical conductivity is intrinsic to the water, however, depends on, or is a function of its organization (ELIA, 2008). *Calcareo carbonica*, in experiment 1 possibly changed the structure, so that the distilled water again expressed electrical conductivity to the same degree of mine water (considered a living system and balanced water).

According to Bastide (1997), the organism works as

an open system, it is resonant with environmental events. This communication by resonance signalize the body to change the meaning of information, by passive mimesis or by regulation, but in a corresponding way to the activity of the high dilution. Bastide (1997) and Lagache (1997) proposed that these system of communication work as the minimum information system including the active molecule, what means the raw mater of information. Thus, the sensitive receiver can read and process this information, which is represented by the succussed high dilutions. Therefore, about the result of electrical conductivity it may be admitted that the information of homeopathic preparations reached the self regulation. The mine water is under equilibrium and their variables represent the water condition of “state of order” or “healthy state” (FIGUEIREDO, 2009).

*Nux vomica* and *Carbo vegetabilis* are widely used by farmers for general detoxification and water purification, as stated in the Homeopathic Acology (CASALI et al., 2009). The statistical significance of the effects of *Nux vomica* and *Carbo vegetabilis* was probably due to the presence of any contaminant.

As in the variable pH, the statistical significance of *Calcarea carbonica*, *Carbo vegetabilis*, *Natrum carbonicum*, *Natrum muriaticum*, *Natrum sulphuricum* and *Pyrogenium* also was based on the principle of similarity.

After 72 hours of treatment *Pyrogenium* 7CH, *Sulphur* 7CH, Mine Water 7CH modified the CE. *Pyrogenium*, *Sulphur* is used for human and animal therapy as antiseptic and it is important in industry and in

agricultural production, being used in cases of: contaminations in water, soil, food processing wastes and in sewage (CASALI et al., 2009). There was response to the first application (A0) of *Sulphur* and *Pyrogenium*. The result was repeated after 72 hours of treatment by that time there was response also to Mine Water 7CH. The fact of substances had been dynamized to 7CH means that still there are molecules in solution, even in very small quantities, and this must be taken in account to understand some results.

### **Experiment 3**

The variance analysis of physico-chemical data of the lake water after treatment effects, as a function of time after the first application is in the Table 7.

Table 7 - Analysis of variance of the hydrogen potential (pH) and electrical conductivity (CE) of lake water data, after the effect of treatments. Viçosa/MG. 2010.

Source of Variation	DF	Mean Square	
		pH	CE
Replication	3	0.052455	1.37257
Treatment (T)	11	0.09262**	3.53809**
Res (A)	33	0.01652	1.00048
Time	3	1.51864**	152.4712**
T x Time	33	0.10430**	1.52439 <sup>ns</sup>
Res. (B)	108	0.02450	1.38831
VC (%) Plot		4.92	13.28
VC (%) Sub-plot		2.29	2.07

\*\* Significant at 1% probability by F test  
<sup>ns</sup> not significant.

VC-Variation Coefficient

DF- Degrees of freedom

The treatment means of pH and Electrical Conductivity after the first application (A0) and after 24, 48, 72 hours of treatments effect are in Tables 8 and 9.

Table 8 - Mean values of hydrogen potential (pH), of lake water, after the first application (A0), after 24 hours (A24), after 48 hours (A48) and after 72 hours (A72), of the effect of treatments. Viçosa / MG. 2010.

<b>Treatment</b>	<b>A0</b>	<b>A24</b>	<b>A48</b>	<b>A72</b>
<i>Calcarea carbonica</i> 7CH	6.778	7.023	6.743	6.485
<i>Calcarea sulphurica</i> 7CH	6.800	7.048	6.713	6.443
<i>Calcarea phosphorica</i> 7CH	6.803	7.058	6.705	7.055*
<i>Carbo vegetabilis</i> 7CH	6.823	7.030	6.650	7.388*
<i>Natrum carbonicum</i> 7CH	6.828	7.048	6.673	7.008*
<i>Natrum muriaticum</i> 7CH	6.813	7.075	6.770	6.673
<i>Natrum sulphuricum</i> 7CH	6.818	7.098	6.698	6.483
<i>Pyrogenium</i> 7CH	6.848	7.093	6.638	6.615
<i>Sulphur</i> 7CH	6.838	7.073	6.765	6.795*
<i>Nux vomica</i> 7CH	6.838	7.133	6.748	6.483
Lake Water 7CH	6.845	7.078	6.503	6.423
Control (lake water)	6.830	7.083	6.683	6.483

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

Table 9 - Mean values of electrical conductivity (CE  $\mu\text{S}/\text{cm}$ ), in the lake water, after the effect of treatments. Viçosa/MG. 2010.

<b>Treatment</b>	<b>CE</b>
<i>Calcarea carbonica</i> 7CH	56.60
<i>Calcarea sulphurica</i> 7CH	56.19
<i>Calcarea phosphorica</i> 7CH	56.98
<i>Carbo vegetabilis</i> 7CH	55.90*
<i>Natrum carbonicum</i> 7CH	56.84
<i>Natrum muriaticum</i> 7CH	56.77
<i>Natrum sulphuricum</i> 7CH	57.05
<i>Pyrogenium</i> 7CH	56.42
<i>Sulphur</i> 7CH	56.05*
<i>Nux vomica</i> 7CH	57.10
Lake Water 7CH	56.73
Control (lake water)	57.50

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

## Hydrogen Potential (pH)

The treatments were not significant compared to control at 5% probability concerning the mean values of A0, A24 and A48 (Table 8).

The pH of lake water was increased significantly after 72 hours of treatment by *Calcarea phosphorica*, *Carbo vegetabilis*, *Sulphur* and *Natrum carbonicum* applications

probably due to the longer period for activity. According to Lisboa et al. (2005) the time of treatment is proportional to the time that symptoms are in the organism, what justifies the increase in pH only after 72 hours of applications.

The possibility of contamination in lake water was higher. So, the response to *Sulphur* and *Carbo vegetabilis* was expected since both have the potential activity to reduce contaminations in living organisms (CASALI, 2009).

### **Electrical conductivity (CE)**

The mean values of CE in lake water differed significantly after treatment with *Carbo vegetabilis*, and *Sulphur* compared to control (Table 9).

Being in coherence, pH, *Carbo vegetabilis* and *Sulphur* decreased the CE because of the therapeutic potential, and also because they are widely used by organic farmers and farm families for water purification (CASALI et al., 2009). The contamination of the lake water was expected so, the reaction of the variable CE was evident.

### **Experiment 4**

The analysis of variance of turbidity data after treatment of distilled water as a function of time is in the table 10. There was significant effects of the treatments and of the times when variables were measured. But according to Dunnet test the means of turbidity were not differentiated among treatments as compared to control (Table 11).

Table 10 - Analysis of variance of turbidity data of distilled water, after the effect of treatments. Viçosa / MG. 2010.

<b>Source of Variation</b>	<b>DF</b>	<b>Mean Square</b>
		<b>Turbidity</b>
<b>Replication</b>	3	0.00041
<b>Treatment (T)</b>	11	0.04202**
<b>Res (A)</b>	33	0.01125
<b>Time</b>	2	0.09354**
<b>T X Time</b>	22	0.01344 <sup>ns</sup>
<b>Res. (B)</b>	72	0.00765
<b>VC (%) Plot</b>		17.71
<b>VC (%) Sub-plot</b>		24.40

\*\* Significant at 1% probability by F test;

<sup>ns</sup> - not significant

VC-Variation Coefficient

DF- Degrees of freedom

Table 11 - Mean values of turbidity (NTU) of distilled water after first application (A0), after 24 hours (A24), after 48 hours (A48) and after 72 hours (A72) of the effects of treatments. Viçosa / MG. 2010.

<b>Treatment</b>	<b>Turbidity</b>
<i>Calcarea carbonica</i> 7CH	0.381
<i>Calcarea sulphurica</i> 7CH	0.425
<i>Calcarea phosphorica</i> 7CH	0.322
<i>Carbo vegetabilis</i> 7CH	0.380
<i>Natrum carbonicum</i> 7CH	0.430
<i>Natrum muriaticum</i> 7CH	0.271
<i>Natrum sulphuricum</i> 7CH	0.340
<i>Pyrogenium</i> 7CH	0.452
<i>Sulphur</i> 7CH	0.330
<i>Nux vomica</i> 7CH	0.393
Distilled Water 7CH	0.290
Control (distilled water)	0.310

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

NTU = nephelometric turbidity units.

## **Experiment 5**

The analysis of variance of turbidity data after treatment of mine water, as a function of time, is in the Table 12. There was significant effects of treatments and of the times when the variables were measured.

The turbidity of the mine water was increased

significantly by *Natrum carbonicum*, *Nux vomica* and Mine Water 7CH (Table 13).

Turbidity is measured by the refraction of light in nephelometric method. It was admitted that a new organization of water molecules is related to that refraction, although no published reference was found.

Table 12 - Analysis of variance of the turbidity data of mine water, after the effect of treatments. Viçosa / MG. 2010.

Source of Variation	DF	Mean Square
		Turbidity
Replication	3	9,81516
Treatment (T)	11	3,54291***
Res. (A)	33	1,84559
Time	2	83,87255**
T x Time	22	1,11153 <sup>ns</sup>
Res. (B)	72	0,93609
VC (%) Plot		85,18
VC (%) Sub-plot		38,03

\*\* Significant at 1% probability by F test; \*\*\* Significant at 10% probability by F test

<sup>ns</sup> - not significant

VC-Variation Coefficient

DF- Degrees of freedom

Table 13 - Mean value of turbidity (NTU) of mine water, after the effect of treatments. Viçosa / MG. 2010.

<b>Treatment</b>	<b>Turbidity</b>
<i>Calcarea carbonica</i> 7CH	2.27
<i>Calcarea sulphurica</i> 7CH	2.48
<i>Calcarea phosphorica</i> 7CH	2.55
<i>Carbo vegetabilis</i> 7CH	2.21
<i>Natrum carbonicum</i> 7CH	2.99*
<i>Natrum muriaticum</i> 7CH	2.26
<i>Natrum sulphuricum</i> 7CH	2.23
<i>Pyrogenium</i> 7CH	2.81
<i>Sulphur</i> 7CH	2.91
<i>Nux vomica</i> 7CH	3.34*
Mine Water 7CH	3.14*
Control (Mine Water)	1.33

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

NTU = nephelometric turbidity units.

Anick and Ives (2007) reported the possibility of the residues of silica, detached from the bottle to influence the composition and organization of High Dilutions. Even if the residual amount is very small, Anick and Ives (2007) discussed the probability of forming silicic acid which would cause polymerization of the water molecules. If so, turbidity may have been influenced by this new organization of water molecules.

## Experiment 6

The analysis of variance of turbidity data after treatment of pond water as a function of time, is in the table 14. There was no significant effects of treatments.

Table 14 - Analysis of variance of the turbidity data, of lake water, after the effect of treatments. Viçosa / MG. 2010.

Source of Variation	DF	Mean Square
		Turbidity
Replication	3	0,65311
Treatment (T)	11	0,49462 <sup>ns</sup>
Res. (A)	33	0,39157
Time	2	18,85156**
T x Time	22	0,24735**
Res. (B)	72	0,11642
VC (%) Plot		44,45
VC (%) Sub-plot		17,21

\*\* Significant at 1% probability by F test

<sup>ns</sup> - not significant

VC-Variation Coefficient

DF- Degrees of freedom

Assuming the lake water with a higher possibility of contamination and the shortest time (48 hours) of activity it was not possible the effect of information carried on by homeopathic preparations and the subsequent responses of the variable turbidity.

## Experiment 7

The analysis of variance of electrical conductivity data of saline water, as a function of time, is in the Table 15. There was significant effects of treatments (Table 15).

Tabela 15 - Analysis of variance of electrical conductivity (CE) data of saline water after the effect of treatment with *Natrum muriaticum*. Viçosa/MG. 2010.

Source of Variation	DF	Mean Square
		CE
Replication	5	0.02776
Treatment (T)	8	104.1583**
Res. (A)	40	0.10545
Time	4	7.36128**
T x Time	32	7.92009**
Res. (B)	180	0.01462
VC (%) Plot		5.98
VC (%) Sub-plot		2.79

\*\* Significant at 1% probability by F test

<sup>ns</sup> - not significant

VC-Variation Coefficient

DF- Degrees of freedom

*Natrum muriaticum* and Saline Distilled Water 7CH reduced the CE except the potency 30CH that caused increase in CE.

Tabela 16 - Mean values of electrical conductivity ( $\mu\text{S}/\text{cm}$ ) of saline water after first application (A0), after 24 hours (A24), after 48 hours (A48), after 72 hours (A72) and after 96 hours (A96), of the effects of *Natrum muriaticum*. Viçosa/MG. 2010.

<b>Treatment</b>	<b>A0</b>	<b>A24</b>	<b>A48</b>	<b>A72</b>
<i>Natrum muriaticum</i> 1CH	4.913	4.946	4.991	4.984
<i>Natrum muriaticum</i> 3CH	4.885*	1.059*	1.104*	1.105*
<i>Natrum muriaticum</i> 5CH	4.935	4.964	4.959	4.968
<i>Natrum muriaticum</i> 7CH	4.927	4.957	4.991	4.986
<i>Natrum muriaticum</i> 12CH	4.953	4.986	1.011*	1.018*
<i>Natrum muriaticum</i> 30CH	4.934	8.369*	7.852*	8.348*
Saline Distilled Water 7CH	4.416*	1.187*	1.267*	1.296*
Ethanol 70% 7CH	4.968	4.984	5.001	9.992
Saline Distilled Water	5.082	4.958	4.991	5.102

Means followed by\* (column) are significant compared to control at 5% probability by Dunnett test.

The means of CE after the applications of the homeopathic preparation Saline Distilled Water 7CH were statistically different from control. This result followed the principle of equality. The preparation Ethanol 7CH did not influence the electrical conductivity. There was no resemblance of saline water to distilled water. This result is an evidence of the information effect that come from the substance (raw material) so, there was no solvent effect.

*Natrum muriaticum* 3CH and 12CH, also the

homeopathic preparation Saline Distilled Water 7CH reduced the CE. The observed values are close to CE values of distilled water (control) of experiment 1.

The potencies 3CH (*Natrum muriaticum*) and 7CH (Saline Distilled Water) are widely used by farmers and homeopaths. In this experiment they changed the CE at all times of evaluation, proving their efficiency.

Except for 12CH and 30CH, the tested homeopathic preparations contain molecules, even in small quantities. There is remote possibility of having influenced the values of CE. From 12CH ahead there is no probability of molecules of the original substance as expected by the Avogadro Principle (LISBOA, 2005). It was observed the reduction of CE by 12 CH but 30CH increased the CE. It has been shown that even under absence of solute there are effects because water recorded the structure of the solute due to changes in network connections of hydrogen. The dynamization 30CH caused higher CE after 24 hours (A24) remaining until the last evaluated time (A96). So, in addition to information it increased the CE as it was present the sodium chloride in distilled water.

The results confirmed the individuality of responses indicating that there are differences between the effects of potencies of the same solute.

Castro (2000) noted that the same homeopathic preparation which causes an increase by any particular potency, also may decrease or may be nil. This alternation, due to increasing potencies, was observed in many experiments (KOLISKO et al., 1978).

## **Conclusion**

The physico-chemical properties of water are effect markers of the homeopathic solutions activity.

The principle of similarity also is applied to the choice of homeopathic preparations for water.

The state of vitality of the water interferes with the responses.

The homeopathic preparation of the own water changes the physico-chemical properties of the water.

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## CHAPTER 3

# Homeopathic preparations of Sodium Chloride and Physical Properties of Water

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## Introduction

Water, a natural resource, is essential for sustaining life, for the environment and for the processes of economic and social development. Fresh water is a finite natural resource and its quality is decreasing due to increase in

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population and due to the lack of public policies for preservation. The water used in irrigation has been claimed for industrial and public supply. Water quality is a consequence of uses and occupation of land (DONEEN, 1975).

Water in nature is a biological system, also a complex organization of dynamic replies. Despite the simplicity of the molecule, there is complexity in the water transition phases and multiplicity of manifestations. The variables of the water and their interactions among own molecules reflect the complexity of the responses (BELLAVITE, 2002).

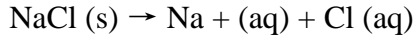
As indicators of water quality, some parameters (pH, electrical conductivity and dissolved oxygen) are important. They measure the physical and chemical states of solutions, (SUTCLIFFE, 1980; CASALI, 2000), even after the dilutions and succussions (FIGUEIREDO, 2009).

The salts increase the osmotic potential of soil solution, so they directly influence the dynamic of the water and indirectly affect plant development. Some plants are relatively tolerant to salinity (LIMA, 1997), but even so, soils are disturbed by high contents of salts. Sodium chloride in nature is pure and crystalline and may be transparent, translucent. The primary source is the seawater.

The electrical conductivity is the standard indicator for expressing the total concentrations of salts in the diagnosis and classification of water for irrigation. The presence of high salt levels in water is a limitation to the development of crops and negatively influence the chemical characteristics of soils (McKEE, 1971).

Sodium chloride contains positive ions and negative ions. When the salt is dissolved in water there is a dissociation of the ions so, they are separated, but they stay surrounded by solvent molecules.

Sodium chloride  $\rightarrow$  sodium ions (aq) + chloride ions (aq)



The table salt is composed of 99% (by weight) of sodium chloride. Sodium chloride is the salt most important in the process of water salinization, it is very frequent in sewage and in some soils. The excess of salts in water prevent the growth of plants (PORTO, 2004).

### **Potential Hydrogen (pH)**

The potential hydrogen represent the intensity of acid or alkaline conditions of the liquid through the measurement of hydrogen ions (H). Measurements of pH are extremely useful because they provide chemical and physico-chemical informations on water quality.

The pH should be regarded as the most important environmental variable, and the most difficult to be interpreted due to the great number of factors that may influence on its measurement (ESTEVES, 1998).

### **Electrical Conductivity (CE)**

The electrical conductivity of the water represent the potential to carry the electrical current by anions and cations. The higher the electrical conductivity the greater

the electrolytic activity. There is no direct relationship between electrical conductivity and total dissolved solids concentration, because natural waters are not simple solutions (SUTCLIFFE, 1980).

The total concentration of salts in irrigation water is usually assigned in terms of electrical conductivity (CE) and may be determined very accurately and quickly (DONEEN, 1975).

### **Dissolved Oxygen (DO)**

Dissolved oxygen in water mainly come away from the atmosphere. Another oxygen source of surface waters is the photosynthetic process of aquatic organisms, especially algae, which may overgrowth and generate conditions of oxygen oversaturation (MCKEE and WOLF, 1971). Dissolved oxygen is of significance for the characterization of the water (HADDAD and REGINA, 1993).

The objective of this research was to quantify some physical and chemical parameters of water affected by homeopathic solutions of sodium chloride.

### **Materials and Methods**

The experiments were carried out at the Laboratory of Homeopathy, Department of Plant Science (DFT), Federal University of Viçosa (UFV), in february 2010.

The basic tincture (BT) was prepared at the Laboratory of Homeopathy with the Sodium Chloride (NaCl), PA Crystal, MM=58.44 g/mol. From the BT the

potencies 1CH to 12CH were prepared. The solvent was Ethanol 70% and the 100 succussions were performed by mechanical arm machine. Thus, by this way it was obtained the dynamizations (dilution plus succussion) which are represented by CH.

In each of 70 transparent borosilicate vials containing 40 mL of distilled water 10 drops of the treatments were applied under the double-blind procedure. After the physico-chemical determinations, all vials were top sealed with plastic film.

The variables were: potential hydrogen (pH), electrical conductivity (CE) and dissolved oxygen (DO). The data were processed statistically by analysis of variance in the program SAEG 9.1 (2007). The means were compared by Tukey test at 5% probability.

The electrode was immersed directly into the vessel containing the sample. After the reading of each sample, the electrode was washed off with distilled water and dried.

The pH was measured by the potentiometer DM 23, pH range 2-20 and the values were designed as units of pH.

The dissolved oxygen (DO) was measured by the Oximeter DM 4P and the values were expressed in mg / L.

The electrical conductivity (EC) was measured by the conductivimeter DM 32 and the values were expressed in  $\mu\text{S}/\text{cm}$  (microsiemens per centimeter).

## **Experiment 1 - Distilled Water**

The experiment was carried out in a factorial arrangement in the split plot scheme, in randomized block design of 14 treatments in the plot (12 potencies of sodium chloride plus two controls, Ethanol 70% and distilled water) and the 5 times of measurements in the subplot (one hour prior to application, after 2 hours, 24 hours, 48 hours and 72 hours of applications) and 5 replicates.

## **Experiment 2 - Mine Water (Spring water)**

The mine water originated from the spring or source (waterhead) located at the Federal University of Viçosa. With the help of PVC pipe, attached directly to the source, it was collected the water. The mine water was collected ten days before the first reading and was stored in a polystyrene container.

The experiment was carried out in a factorial (14x5) arrangement in the randomized blocks design of 14 treatments (12 potencies of sodium chloride, two controls, Ethanol 70% and distilled water), 5 measurement times (one hour prior to application, after 2 hours, 24 hours, 48 hours and 72 hours of applications) and 5 replicates.

## **Results and Discussion**

### **Experiment - 1 (Distilled Water)**

The effects of homeopathic preparations of sodium chloride on the physico-chemical properties of water were statistically significant (Table 1).

Table 1 - Analysis of variance of the Hydrogen Potential (pH), Electrical Conductivity (CE) and Dissolved Oxygen (DO) data, before applications and after applications of homeopathic preparations of sodium chloride in distilled water. Viçosa / MG. 2010.

Source of Variation	DF	Mean Square		
		pH	CE	DO
<b>Blocks (Replications)</b>	4	0.358	5.016	1.388
<b>Treatments (T)</b>	13	8.516**	1682.86**	4.173**
<b>Res (A)</b>	52	0.082	11.013	1.868
<b>Time (TE)</b>	4	5.576**	185.863**	64.585**
<b>TE x T</b>	52	0.373**	112.031**	1.012**
<b>Residue (B)</b>	224	0.042	0.583	0.451
<b>VC% Subplot</b>		2.76	16.11	11.16
<b>VC% Plot</b>		3.84	20.90	22.72
<b>Mean</b>		7.45	4.74	6.01

\*\* Significant at 1% probability by F test

VC-Variation Coefficient

DF- Degrees of freedom

The pH mean values of the distilled water before applications (Time 1) were very similar. Conclusively, there was great uniformity among the samples. After application, (Time 2), there was an effect of homeopathic preparations. The pH means were differentiated by Tukey test. The homeopathic preparations of sodium chloride, influenced on the pH of distilled water. Along with increasing

potencies, pH tended to be reduced.

Table 2 - Mean values of potential hydrogen (pH) of distilled water subjected to homeopathic preparations of sodium chloride in 12 potencies at Time 1 (before application), Time 2 (after application), Time 24 (after 24 hours of application), Time 48 (after 48 hours of application), Time 72 (after 72 hours of application). Viçosa / MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control (no treatment)	6.86 a	6.94 f	6.94h	6.94 f	6.72 gh
Ethanol 70%	7.18 a	6.76 f	6.96gh	7.00 f	6.62 h
1CH	7.22 a	9.24 a	9.04 a	9.40 a	9.30 a
2CH	7.22 a	8.16bc	7.58 def	8.34 bc	8.18 b
3CH	7.16 a	8.40 b	8.42 b	8.58 b	8.28 b
4CH	7.00 a	8.14bc	8.06 bc	8.24 bc	7.86 bc
5CH	7.04 a	7.92 c	7.86 cd	8.04 cd	7.66 cd
6CH	6.92 a	7.72cd	7.66 cde	7.88 cd	7.50cde
7CH	6.98 a	7.42de	7.42 defg	7.66 de	7.34def
8CH	6.90 a	7.42de	7.36 efgh	7.30 ef	6.94 fgh
9CH	6.76 a	7.20ef	7.14 fgh	7.32 ef	7.12efg
10CH	6.82 a	7.10ef	7.02 gh	7.02 f	6.76 gh
11CH	6.86 a	7.02ef	7.04 gh	7.14 f	6.98 fgh
12CH	6.86a	6.98ef	7.10gh	7.16f	7.02fgh

Means followed by at least the same letter (column) do not differ at 5% probability by Tukey test.

At Time 2 (Table 2), after applications, the potencies from 1CH to 8CH differ from controls. Along the Time 2 to time 72, the potencies 1CH to 6CH also differ from controls. So, the changes in distilled water were differentiated based on potencies.

The pure water, in the liquid state, is of low electrical conductivity at 25°C. The conductivity of strong electrolytes in concentrations as low as 0.1 mol/liter, is at least 100,000 times greater than pure water. Ionic compounds of solid phase are strong electrolytes, as example, NaCl (Na<sup>+</sup>, Cl<sup>-</sup>). Few substances are completely ionized when added to water, such as hydrochloric acid (HCl). In distilled water (control) of this experiment apparently ions were increased as shown in Table 3 (comparison of time 1 with time 2).

Table 3 - Mean values of Electrical Conductivity (CE) in  $\mu\text{S}/\text{cm}$  of distilled water after applications of homeopathic preparations of sodium chloride in 12 potencies at Time 1 (before application), Time 2 (after application), Time 24 (after 24 hours of application), Time 48 (after 48 hours of application), Time 72 (after 72 hours of application). Viçosa / MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control (no treatment)	1.47 a	2.10 b	2.13 b	2.25 b	2.57 b
Ethanol 70%	2.31 a	3.32 b	3.62 b	3.95 b	5.04 b
1CH	1.78 a	48.07 a	39.11 a	38.57 a	38.38 a
2CH	1.45 a	2.23 b	2.44 b	2.54 b	2.88 b
3CH	1.87 a	2.43 b	2.65 b	2.76 b	3.42 b
4CH	1.54 a	1.93 b	2.12 b	2.16 b	2.48 b
5CH	1.61 a	1.95 b	2.08 b	2.22 b	2.29 b
6CH	1.97 a	2.41 b	2.69 b	2.61 b	2.93 b
7CH	1.51 a	1.92 b	2.28 b	2.65 b	3.23 b
8CH	2.40 a	2.94 b	3.08 b	2.95 b	3.18 b
9CH	2.76 a	3.18 b	3.49 b	3.96 b	4.53 b
10CH	2.11 a	2.74 b	2.86 b	2.91 b	3.06 b
11CH	1.56 a	1.99 b	2.06 b	2.12 b	2.33 b
12CH	1.51 a	1.90 b	2.15 b	2.55 b	3.22 b

Means followed by at least one letter (column) do not differ at 5% probability by Tukey test.

Table 4 - Mean values of Dissolved Oxygen (DO) in mg/L, of distilled water treated by homeopathic preparations of sodium chloride in 12 potencies at Time 1 (before application), Time 2 (after application), Time 24 (after 24 hours of application), Time 48 (after 48 hours of application), Time 72 (after 72 hours of application). Viçosa / MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control	7.08 abc	5.12 abc	5.12 a	5.70 ab	5.46 a
Ethanol 70%	8.22 ab	6.34 ab	6.00 a	6.10 ab	5.70 a
1CH	7.58 abc	6.58 a	5.08 a	5.82 ab	5.50 a
2CH	8.62 a	5.88 abc	5.30 a	5.76 ab	5.50 a
3CH	8.76 a	5.94 abc	5.72 a	6.64 ab	5.26 a
4CH	7.78 abc	5.26 abc	5.08 a	7.16 ab	5.26 a
5CH	7.76 abc	5.74 abc	5.48 a	5.68 ab	5.22 a
6CH	7.68 abc	6.26 abc	5.48 a	6.28 ab	5.60 a
7CH	7.68 abc	4.98 abc	5.10 a	5.88 ab	5.28 a
8CH	8.20 ab	6.48 ab	5.00 a	6.12 ab	6.02 a
9CH	8.56a	5.58 abc	5.22 a	6.88 ab	6.44 a
10CH	6.34 c	4.48 c	4.78 a	6.00 ab	5.54 a
11CH	6.38 c	4.94 abc	4.98 a	5.26 b	5.18 a
12CH	6.54 bc	4.72 bc	5.12 a	5.40 ab	5.54 a

Means followed by at least one letter (column) do not differ at 5% probability by Tukey test.

At Time 1, before application of homeopathic preparations, the electrical conductivity in distilled water was uniform. After application (Time 2) and after 72 hours of application, only 1CH increased the CE, with statistical significance (Table 3).

At Time 1, before application of homeopathic preparation the values of dissolved oxygen were variable among samples (Table 4). At time 2, after application and after 72 hours of applications the dissolved oxygen was stable among treatments (Table 4). The dissolved oxygen content in water is transient because it depends on environmental conditions, especially light and temperature (HADDAD and REGINA, 1994).

At Time 1 significant differences were not caused by controlled factors so they were at random. Before the application of homeopathic preparations, in variable DO there was no uniformity. After additions of homeopathic preparations there was DO stability along with the time.

There was a decrease of the numerical DO values, from Time 1 to Time 72. The means were statistically equal by the Time 72. There was no consistent difference as compared to controls. In agreement with these findings it is viable the hypothesis of environmental effect (the place where the experiment was conducted) to have overcome the effect of treatments.

There was linear response after application of potency 10CH but there was no effect of remaining potencies over the time.

Table 1 - Adjusted regression equations of potential hydrogen (pH) over the time (TE), of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa / MG. 2010.

Treatments	Adjusted equations	$r^2$
Control	$\hat{Y}=6.810 + 0.0134 TE - 0.00022 TE^2$	0.8778
Etanol 70%	$\hat{Y}=8.83$	-
1CH	$\hat{Y}=7.89$	-
2CH	$\hat{Y}=8.18$	-
3CH	$\hat{Y}=7.89$	-
4CH	$\hat{Y}=7.69$	-
5CH	$\hat{Y}=7.56$	-
6CH	$\hat{Y}=7.35$	-
7CH	$\hat{Y}=7.20$	-
8CH	$\hat{Y}=7.13$	-
9CH	$\hat{Y}=6.93$	-
10CH	$\hat{Y}=6.916 + 0.0097 TE$	0.6106
11CH	$\hat{Y}=6.922 + 0.0113 TE - 0.00013 TE^2$	0.8818
12CH	$\hat{Y}=6.897 + 0.0056 TE - 0.00011 TE^2$	0.8784

The regression equations of CE indicate that all treatments caused effects that were similar to controls, excepted 1CH. The response was linear and of decreasing CE. The time of activity, between 48 and 72 hours (Table 3), reduced the electrical conductivity. The components of the water were removed by the distillation process. Surely

they are responsible for the lower electrical conductivity of the distilled water.

Table 2 - Adjusted Regression Equations of Electric Conductivity (CE) as a function of time (TE) of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa/MG. 2010.

Treatments	Adjusted equations	$r^2$
Control	$\hat{Y}=0.018 + 0.010 \text{ TE}$	0.6891
Ethanol 70%	$\hat{Y}=2.822 + 0.028 \text{ TE}$	0.8536
1CH	$\hat{Y}=33.18$	-
2CH	$\hat{Y}=1.911 + 0.014 \text{ TE}$	0.6967
3CH	$\hat{Y}=2.161 + 0.016 \text{ TE}$	0.8413
4CH	$\hat{Y}=1.771 + 0.009 \text{ TE}$	0.8002
5CH	$\hat{Y}=1.823 + 0.007 \text{ TE}$	0.7513
6CH	$\hat{Y}=2.251 + 0.009 \text{ TE}$	0.7003
7CH	$\hat{Y}=1.738 + 0.020 \text{ TE}$	0.9527
8CH	$\hat{Y}=2.730 + 0.006 \text{ TE}$	0.4602
9CH	$\hat{Y}=2.978 + 0.021 \text{ TE}$	0.9567
10CH	$\hat{Y}=2.489 + 0.008 \text{ TE}$	0.5707
11CH	$\hat{Y}=1.799 + 0.007 \text{ TE}$	0.7005
12CH	$\hat{Y}=1.681 + 0.021 \text{ TE}$	0.9427

As for Dissolved Oxygen only 1CH caused a quadratic response differing from potencies of 5CH and 8CH and from controls (with linear response similar to

ethanol). There was no effect of the remaining potencies along with the time. The solubility of oxygen is influenced by the polar character of the water molecule (ESTEVEZ, 1998). Dissolved oxygen is variable due to dependence on dissolution of several factors. Therefore, environmental conditions and time of activity of homeopathic preparations may interfere with the quantification of DO.

Table 3 - Adjusted Regression equations of the Dissolved Oxygen (DO) as a function of time (TE) of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa / MG. 2010.

<b>Treatments</b>	<b>Adjusted equations</b>	<b><math>r^2</math></b>
Control	$\hat{Y}=5.69$	-
Ethanol 70%	$\hat{Y}=7.094 - 0.02176 TE$	0.4672
1CH	$\hat{Y}=56.958 - 0.0735 TE + 0.00077 TE^2$	0.7036
2CH	$\hat{Y}=6.21$	-
3CH	$\hat{Y}=6.46$	-
4CH	$\hat{Y}=6.10$	-
5CH	$\hat{Y}=6.568 - 0.0207 TE$	0.4114
6CH	$\hat{Y}=6.26$	-
7CH	$\hat{Y}=5.78$	-
8CH	$\hat{Y}=7.347 - 0.7766 TE$	0.6222
9CH	$\hat{Y}=6.53$	-
10CH	$\hat{Y}=5.42$	-
11CH	$\hat{Y}=5.34$	-
12CH	$\hat{Y}=5.46$	-

## Experiment - 2 (Mine Water)

By the analysis of variance of the physico-chemical data of the mine water (Table 5) the effects of homeopathic preparations of sodium chloride on the properties of mine water as a function of time, were statistically significant and there was significant interaction time x treatment. The mean values of potencies effects differed significantly in each time (Table 6).

Table 5 - Analysis of variance of Potential Hydrogen (pH), Electrical Conductivity (CE) and Dissolved Oxygen (DO) data after applications of homeopathic preparations of sodium chloride along with the time in mine water. Viçosa / MG. 2010

Source of Variation	DF	Mean Square		
		pH	CE	DO
Block	4	0.040	23.562	1.391
Treatments (T)	13	0.318**	1512.181**	5.739**
Residual (a)	52	0.026	14.917	1.650
Time (TE)	4	2.661**	1049.516**	71.447**
T x TE	52	0.050**	107.649**	2.186**
Residual (b)	224	0.010	8.796	0.999
VC% sub-plots		1.37	2.94	18.02
VC% plots		2.16	3.84	23.10
Mean		7.45	100.58	5.54

\*\* Significant at 1% probability by F test

Table 6 - Mean values of potential hydrogen (pH) of mine water after applications of homeopathic preparations of sodium chloride in 12 potencies at Time 1(before application), Time 2 (after application), Time 24 (after 24 of hours of application), Time 48 (after 48 hours of application), Time 72 (after 72 hours of application).Viçosa / MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control	7.50 a	7.62 b	7.52 bc	7.40 ab	7.02 efg
Ethanol 70%	7.68 a	8.14 a	7.88 a	7.54 a	7.76 a
1CH	7.50 a	7.50 b	7.64 abc	7.68 abc	7.40 b
2CH	7.48 a	7.64 b	7.68 abc	7.30 abc	7.46 b
3CH	7.46 a	7.62 b	7.72 ab	7.26 bc	7.40 b
4CH	7.44 a	7.58 b	7.68 abc	7.20 bc	7.38 bc
5CH	7.50 a	7.68 b	7.60 bc	7.24 bc	7.30 bcd
6CH	7.50 a	7.70 b	7.60 bc	7.28 bc	7.24 bcde
7CH	7.46 a	7.64 b	7.52 bc	7.16 bc	6.96 fg
8CH	7.50 a	7.70 b	7.48 bc	7.16 bc	7.28 bcd
9CH	7.50 a	7.56 b	7.46 c	7.14 c	7.10 def
10CH	7.52 a	7.60 b	7.60 bc	7.30 abc	7.12 def
11CH	7.50 a	7.62 b	7.56 bc	7.26 bc	7.14 cdef
12CH	7.50 a	7.60 b	7.62 bc	7.18 bc	6.82 g

Means followed by at least one letter (column) do not differ at 5% probability by Tukey test.

Prior to application of homeopathic preparations (Table 6) there was pH stability in all samples. By the criteria of Esteves (1998) samples are of normality since pH of mine water at ambient conditions varies between 5.5 and 8.5. In these experiments the pH ranged between 7.44 and 7.68.

After application of homeopathic preparations (Time 2), all treatments differed in pH from control Ethanol (Table 6). After 24 hours and 48 hours of applications there was statistically significant difference of 9CH compared to control Ethanol. After 72 hours of applications there was significant reduction of means compared to Ethanol and to control (without application) (Table 6).

The Electrical Conductivity of the mine water after application of the potency 1CH was statistically different from two controls and from remaining potencies at all times. There was a decrease in electrical conductivity by 1CH and remaining potencies. The pH of the water can influence the CE (ESTEVEES, 1998). Thus, increased pH (Table 6) resulted in lower CE, which was also confirmed by Gomes (2009).

But the Time 2 the mean values of potencies were quite different statistically. Comparing treatments with controls, there was stability of CE as a function of time.

Dissolved oxygen was not affected by potencies at the Times 1, 2 and after 24 hours of applications. But some means were different statistically. The dissolved oxygen (DO) in water is highly variable, even along with the day. The dissolution of oxygen in water depends on some factors and, moreover, it is very influenced by the water

molecule and its polarity. This variability increases the error in the determinations and decreases the precision of the experiments.

By regression equations of the variable pH, the treatments (1CH, 2CH, 3CH, 4CH, 5CH, 6CH, CH 7, 9CH, 10CH, 11CH and 12CH) caused linear decrease along with the time. Compared to control the time trend is to reduce the pH. However 8CH caused the quadratic pH response (Table 4).

According to regression equation of the electrical conductivity, the treatments (1CH, 3CH, 9CH, 11CH and 12CH) and the control decreased linearly. After 24 and 72 hours of application there was a reduction of electrical conductivity, this response was not repeated in control (ethanol) and 2CH, 4CH, 5CH, 6CH, 7CH, 8CH and 10CH (Table 5).

Table 7 - Mean values of electrical conductivity (CE) in  $\mu\text{S} / \text{cm}$ , of mine water as a function of applications of homeopathic preparations of sodium chloride in 12 potencies at Time 1 (before application), Time 2 (after application), Time 24 (after 24 hours application), Time 48 (after 48 hours application), Time 72 (after 72 hours of application). Viçosa/MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control	101.76 a	103.71 b	104.34 b	96.17 b	96.02 b
Ethanol 70%	99.73 a	101.38 bc	100.81 b	100.81 b	92.69 b
1CH	99.66 a	140.87 a	137.39 a	134.67 a	124.41 a
2CH	102.06 a	98.45 bc	100.68 b	96.84 b	92.63 b
3CH	99.14 a	100.82 bc	101.39 b	98.25 b	91.38 b
4CH	99.97 a	102.19 bc	100.59 b	99.96 b	91.90 b
5CH	92.27 a	99.17 bc	102.28 b	100.59 b	93.45 b
6CH	101.64 a	99.92 bc	99.84 b	99.84 b	91.18 b
7CH	100.11 a	104.14 b	101.75 b	99.99 b	92.54 b
8CH	98.52 ab	103.29 b	103.07 b	99.26 b	92.03 b
9CH	100.28 a	103.30 b	98.98 b	98.27 b	91.39b
10CH	98.09 ab	96.43 c	99.93 b	98.64 b	91.33 b
11CH	98.55 ab	102.27 bc	100.00 b	98.78 b	91.98 b
12CH	96.97 ab	101.37 bc	99.38 b	96.87 b	91.44 b

Means followed by at least one letter (column) do not differ at 5% probability by Tukey test.

Table 8 - Mean values of Dissolved Oxygen (DO) in mg/L, of mine water as a function of applications of homeopathic preparations of sodium chloride in 12 potencies at Time 1 (before application), Time 2 (after application), Time 24 (after 24 hours application), Time 48 (after 48 hours application), Time 72 (after 72 hours of application). Viçosa/MG. 2010.

Treatments	Time				
	1	2	24	48	72
Control	778 ab	4.82 a	5.08 ab	4.86 abc	5.52 abc
Ethanol 70%	7.12 ab	5.38 a	5.30 ab	4.14 c	3.72 c
1CH	6.14 b	5.52 a	5.36 ab	4.22 c	3.70 c
2CH	7.36 ab	6.40 a	5.82 ab	5.10 abc	4.64 abc
3CH	7.74 ab	5.50 a	5.18 ab	5.10 abc	6.84 a
4CH	6.74 ab	5.04 a	4.96 ab	4.12 c	5.22 abc
5CH	6.86 ab	5.48 a	5.74 ab	5.36 abc	6.14 ab
6CH	8.46 a	5.24 a	5.02 ab	6.70 ab	6.18 ab
7CH	6.70 ab	5.16 a	4.92 ab	4.42 c	4.86 abc
8CH	8.22 ab	5.02 a	6.02 ab	6.96 a	5.06 abc
9CH	7.90 ab	4.84 a	7.12 a	4.74 abc	4.16 bc
10CH	6.80 ab	5.08 a	4.90 ab	5.08 abc	3.82 c
11CH	7.16 ab	4.80 a	4.80 b	4.46 bc	3.76 c
12CH	7.54 ab	5.10 a	4.20 b	4.36 c	4.62 abc

Means followed by at least the same letter (column) do not differ at 5% probability by Tukey test.

Table 9 - Adjusted Regression Equations of potential hydrogen (pH) as a function of time (TE) of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa/MG. 2010.

<b>Treatments</b>	<b>Adjusted Equations</b>	<b><math>r^2</math></b>
Mine water	$\hat{Y}=7.678 - 0.008 \text{ TE}$	0.8912
Ethanol 70%	$\hat{Y}= 8.172 - 0.02116\text{TE}+0.0002083\text{TE}^2$	0.8908
1CH	$\hat{Y}=7.67 - 0.0044 \text{ TE}$	0.6479
2CH	$\hat{Y}=7.64 - 0.0036 \text{ TE}$	0.4815
3CH	$\hat{Y}=7.66 - 0.0046 \text{ TE}$	0.4809
4CH	$\hat{Y}=7.62 - 0.0045 \text{ TE}$	0.4263
5CH	$\hat{Y}=7.68 - 0.0062 \text{ TE}$	0.7928
6CH	$\hat{Y}=7.71 - 0.0070 \text{ TE}$	0.9151
7CH	$\hat{Y}=7.68 - 0.0100 \text{ TE}$	0.9677
8CH	$\hat{Y}=7.72 - 0.0172 \text{ TE} + 0.0001475\text{TE}^2$	0.9133
9CH	$\hat{Y}=7.57 - 0.0070 \text{ TE}$	0.9151
10CH	$\hat{Y}=7.66 - 0.0072 \text{ TE}$	0.8994
11CH	$\hat{Y}=7.65 - 0.0072 \text{ TE}$	0.9396
12CH	$\hat{Y}=7.72 - 0.0115 \text{ TE}$	0.8840

Table 10 - Adjusted Regression Equations of Electric Conductivity (CE) as a function of time (TE) of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa / MG. 2010.

<b>Treatments</b>	<b>Adjusted Equations</b>	<b><math>r^2</math></b>
Control	$\hat{Y}=104.75 - 0.13016 \text{ TE}$	0.7738
Ethanol 70%	$\hat{Y}=100.94 + 0.1272\text{TE} - 0.003275\text{TE}^2$	0.9273
1CH	$\hat{Y}=142.15 - 0.21715 \text{ TE}$	0.9008
2CH	$\hat{Y}=98.73 + 0.11263 \text{ TE} - 0.002796\text{TE}^2$	0.9530
3CH	$\hat{Y}=102.68 - 0.13101 \text{ TE}$	0.7812
4CH	$\hat{Y}=101.77 - 0.07034 \text{ TE} - 0.00281\text{TE}^2$	0.9446
5CH	$\hat{Y}=99.137 + 0.2422\text{TE} - 0.004454 \text{ TE}^2$	0.9995
6CH	$\hat{Y}=99.486 + 0.15891\text{TE} - 0.00372 \text{ TE}^2$	0.9325
7CH	$\hat{Y}=103.82 - 0.00592\text{TE} - 0.00219 \text{ TE}^2$	0.9733
8CH	$\hat{Y}=103.30 - 0,0624\text{TE} - 0,003043 \text{ TE}^2$	0.9999
9CH	$\hat{Y}=103.45 - 0.151842 \text{ TE}$	0.9116
10CH	$\hat{Y}=96.37 + 0.26868\text{TE} - 0.004691 \text{ TE}^2$	0.8994
11CH	$\hat{Y}=103.07 - 0.1336 \text{ TE}$	0.8756
12CH	$\hat{Y}=102.29 - 0.1364 \text{ TE}$	0.9331

Table 11 - Adjusted Regression Equations of Dissolved Oxygen (DO) as a function of time (TE) of each homeopathic preparation of sodium chloride and the coefficient of determination ( $r^2$ ). Viçosa / MG. 2010.

Treatments	Adjusted Equations	$r^2$
Control	$\hat{Y}=4.88 - 0.00466TE - 0.000173 TE^2$	0.7009
Ethanol 70%	$\hat{Y}=5.55 - 0.0255 TE$	0.9064
1CH	$\hat{Y}=5.69 - 0.0275 TE$	0.9314
2CH	$\hat{Y}=6.39 - 0.0250 TE$	0.9935
3CH	$\hat{Y}=5.57 - 0.0479 TE - 0.000894 TE^2$	0.9363
4CH	$\hat{Y}=4.83$	-
5CH	$\hat{Y}=5.44 - 0.0066 TE$	0.3579
6CH	$\hat{Y}=5.11 - 0.0187 TE$	0.5398
7CH	$\hat{Y}=5.22 - 0.02708TE - 0.0002951 TE^2$	0.7478
8CH	$\hat{Y}=4.88 - 0.09504TE - 0.001258 TE^2$	0.8481
9CH	$\hat{Y}=4.89 + 1.0274 TE^{1/2} - 0.13607 TE$	0.8275
10CH	$\hat{Y}=4.99 - 0.01875TE - 0.000468 TE^2$	0.8529
11CH	$\hat{Y}=4.79 - 0.007458TE - 0.000303 TE^2$	0.9999
12CH	$\hat{Y}=5.05 - 0.0415TE - 0.0005034 TE^2$	0.9007

The response of the variable DO as a function of time was quadratic for control (mine water) and 3CH, 7CH, 8CH, 9CH, 10CH, 11CH, 12CH. There was a linear decreasing of the effects of the treatments, control, ethanol and potencies: 1CH, 2CH, 5CH, 6CH. There was no effect

along with time by treatment 4CH.

## **Final Approaches**

The relationship of the sodium chloride with water is well evident by the percentage of salty water of sea compared to unsalted water of rivers and lakes which are used in agriculture.

The experiment 1 (distilled water) and experiment 2 (mine water) revealed some degree of complexity and difficulties for interpretation of the effects within the scientific thinking. So, another reasoning in the high dilutions (homeopathic preparations) must be experienced. Although only three physico-chemical variables were analyzed the data of experiments 1 and 2 already demand concepts beyond the current theories with chemical interactions relevant to aqueous solutions. The homeopathic preparation 12CH is the absolute indicator of the effects with solute absence (sodium chloride in this experiment). The gradient of potencies 1CH-12CH experimentally was implemented for understanding the progressive reduction of sodium chloride and the increase of informational activity, or energy activity.

The data of Experiments 1 and 2 are not conclusive in a sense that allow extensive discussions or deep interpretations of the phenomenon of Homeopathy. The experimental design was a proper procedure but monitoring may failed somehow in part as pointed out by arguments that were inserted after the charts and tables.

It is timely to draw up different points of view, even if

they are exercises or an exhaustive cohesion of many ideas available in the bibliography of high dilutions. The experimental data are limited but the society is facing the poverty of attention to facts beyond the molecular model. So, new thoughts could contribute with tiny parts of future theories about the discoveries in homeopathy.

Some approaches can be recorded in this research work, starting with understandings of Bellavite (2003), in which, high dilution is a complex phenomenon.

### **First approach: Complexity (BELLAVITE, 2003)**

The three most important properties of any complex system are: non-linearity, ability to self-organize and dynamicity (BELLAVITE, 2003). The effects of homeopathic preparations in humans are based on the body. In water the base is the polymer (H<sub>2</sub>O)<sub>n</sub>. The data of Experiments 1 and 2 revealed the presence of properties: non-linearity and dynamicity. Regarding the potential for self-organizing, some questions arose. In the variable DO, a doubt was caused by the incessant, development and loss of oxygen by factors not monitored. Figueiredo (1996) monitored the temperature that allowed some arguments about this change in the DO. In the variable electrical conductivity the doubt was caused by lower content of carriers that conduct electrons in distilled water, especially minerals salts.

## **Second approach: Alchemy (HAAG, 2008)**

The transmutation process was focused by the alchemists that were studied by Claes, a disciple of Lavoisier. There is parallel between the search for technology of transmuting and the technology of high dilutions, since homeopathic preparations cause effects without the presence of solute. It is assumed that the solute finally became energy or information, in such way, similar to the alchemical process of transmutation. In experiment 2 the mine water containing salts from the soil should have lower electrical conductivity (CE) as an effect of 10 drops of the homeopathic preparation of sodium chloride, according to the principles of Hahnemann and Hering. But there was no decrease of CE (Table 7). The differences in CE were caused by the introduction of ions together with 10 drops of homeopathic preparation 10CH of sodium chloride. However, in Table 7 there are the effects of 2CH to 12CH. It is known that 2CH contains ions which were introduced. But 12CH do not contain ions (as Avogadro Law). Thus, the CE was not reduced and did not differ in CE, despite 2CH having much more ions than 12CH. The phenomenon of homeopathic preparations can still be seen as a source of some alchemical transmutation currently interpreted as a phenomenon of information.

Water as universal chemical solvent appears in the science of high dilutions (homeopathy) as “universal alchemical solvent”, as stated by Haag (2008). The Homeopathic procedure of trituration and succussion make possible to obtain from gold, iron and many metals, the homeopathic preparations although they are insoluble in water. The preparations affect the presence of the own

solute in the own solution. In these preparations, the metals are present or represented by some physical phenomenon still little understood.

Thus, the water, by homeopathic preparations, is the solvent, named "alkahest" (HAAG, 2008), well know in alchemy and physico-chemistry, simultaneously. The interpretation of data from experiments 1 and 2 also imply in "continuing the alchemical thought" (FAPESP thematic project, Goldtarb MA, PUC-SP).

### **Third approach: Hypothesis of Intelligent Body (HYLAND e LEWITH, 2002)**

In order to understand the activity of homeopathic preparations there is the theory of "intelligent body". By this hypothesis of Hyland and Lewith (2002) homeopathic preparations are not the only agent who triggers the process. There is the active body. The intelligent body, through some kind of network, is mobilized as a real complex system. In the case of mine water in Experiment 2 and distilled water of Experiment 1, both have in common, their bodies of hypothetical network in the form of polymer molecules ( $H_2O$ ) n. In Experiment 2 it was clarified that the water body is healthy because it was obtained in a natural way. In experiment 1, the body would be disordered after the distillation process. Holandino (2008), states in his research that conclusively water after distillation is considered imbalanced or disordered which was confirmed by data of electrical conductivity. The author found that the dynamizations give rise to bubbles in the solution, by same way those bubbles are generated in the water during

distillation. In experiment 1, distilled water (with bubbles) was treated by the homeopathic solution (with bubbles). It is clear that there was greater similarity between the treatment and the water. In the experiment 2 there were bubbles only in the homeopathic preparation. By this approach of intelligent body and the disordered water body, the polymer (H<sub>2</sub>O) n would be in an imbalanced state. The analysis of the homeopathic phenomenon beyond vitalism vision was facilitated by the theory of the intelligent body. It was feasible to accept in these Experiments 1 and 2, wherein the polymer (H<sub>2</sub>O) n is the base of the body that there were: intelligent body (the homeopathic preparation) and disordered body (the distilled water).

#### **Fourth approach: Time and Electrical Conductivity (ELIA et. al., 2008)**

The electrical conductivity CE and the structure of the water are changed by homeopathic preparations prepared in centesimal scale and in demineralized water (ELIA, 2008). These aqueous solutions dissipate heat but when there are difficulties for dissipation the system returns to the initial conditions of equilibrium (ELIA, 2008). Tables 3 and 7 indicate that the electrical conductivity mean values of mine water, after application of homeopathic preparations 1CH, were closer to the remaining means and to the controls, both in Time 1 and Time 72. Because there was no quantification of the temperature no connection with the work of Elia (2008) could be possible. But, the time of data collecting was shorter than in the research of Elia (2008).

In this approach it was found consistency in the balance starting in Time 2 to Time 72. In Experiments 1 and 2, the heat expected to dissipate was not prevented. Therefore, some factor allowed the uniformity of the means in time 72. The time, in accordance with the arguments generated experimentally by Elia et al. (2008), do not break the evolution of electrical conductivity to equilibrium, whereas that electrical conductivity has variations that reach a peak and then tend to equilibrium.

### **Fifth approach: Dissipative Structures or Solutions of NaCl (ELIA, 2008)**

One of the arguments of Elia et al (2008) as studying saline solutions of NaCl is the increase of the electrical conductivity in demineralized water along with the time in samples that are temporarily away from the thermodynamic equilibrium because they generate dissipative structures. In experiment 1, with distilled water treated with homeopathic preparations of NaCl it is possible to assume that dissipative structures are still present at time 72, because, no changes occurred in the mean of electrical conductivity beyond 1CH. Moreover, there is variability of numerical values of electrical conductivity although there was no statistical significance between means.

The dissipative structure needs to evolve heat (which was not measured) and in experiment 1, for reasons unknown, the treated samples "maintained the initial state" (based on the theory of dissipative structures). The samples solutions of distilled water (experiment 1) then would have been "informed" by homeopathic preparations of NaCl on

dissipating their physico-chemical structures. It remains unclear the fact that the means have not reflected the diversity of effects caused by the gradient 1CH to 12CH.

In later experiments Elia et. al. (2008) examined homeopathic solutions of NaCl activity by the index of ions what provided him the assumptions: 1) Distilled water has conductivity arising from variations in the structures of (H<sub>2</sub>O) n in the condition of solvent. 2) Water in the temporal evolution has variations because the number, shape and dimension of dissipative structures generated, also have too much variations. This variation is there, clearly seen, in experiment 1 after treatment with homeopathic solutions of NaCl.

### **Sixty approach: Energy Transfer (TORRES, 2002)**

The mathematical-physic Torres (2002) examined the hypothesis of physical effect of succussion of diluted solutions. The velocity vector of succussion was analyzed with a view of releasing heat in the solution being provided for chemical work. In experiment 1, on treatment of distilled water, immediately after the application of homeopathic preparations of Sodium Chloride the physico-chemical changes, hypothetically, were due to the similarity and to the introduction of energy originated from the succussion.

According to Torres (2002), the turbulence of the solution as a result of the succussion movement, causes the transfer of mechanical energy to the molecular level where it is available to carry out changes in the chemical level. In the case of Experiments 1 and 2 there would be changes in

the treated water.

The changes caused by succussion, as occurring at the molecular level, require some energy source and also require some mechanism of energy transfer. This mechanism is especially the turbulence. Some dissipated heat may be risen from changes in the viscosity (TORRES, 2002). In experiment 2 (Table 6), at time 72, pH means were significantly different as much as in experiment 1 (Table 2) implying that there was diversity leaving from the introduction of energy in potencies between 1CH and 12CH. No quantified viscosity or temperature is available, however, as Torres (2002), these changes of the solution could be related to changes in pH, measured in experiments 1 and 2.

### **Seventh approach: Mimic of Native Molecules (DAVENAS and BENVENISTE, 1988)**

Benveniste (1988) studied the degranulation of basophils and introduced the affirmative: "transmission of information inducing submolecular organization of water that work as a template, with activity that can mimic the native molecules". Subsequently, it was synthesized (by the press) the phenomenon and termed "water memory," although some other polymers also manifest memory, for example, lactose, sucrose, in homeopathic solutions.

In Experiments 1 and 2 the transmission of information was by water, and from water to water (distilled and mine water). In these experiments, few doubts might arise in the cause-effect relationship (cause: homeopathic sodium chloride, effects: changes in pH,

dissolved oxygen and electrical conductivity).

Benveniste (1988) stated that "there is no physical basis for the activity of recording information." In Experiments 1 and 2 there was no intention to track the physical basis via physico-chemical parameters, but only generate the phenomenon, since, as stated by Benveniste, "the first obligation of the scientist is to check experimentally." The phenomenon revealed by the three physico-chemical variables lacks theory, and the hypothesis of "mimic of native molecules" is valid in this approach.

In Tables 1 and 5 (Analysis of Variance) it was statistically proved the effect of homeopathic preparations of NaCl, then, solutions kept information of solute after subsequent dilutions plus succussions. This confirmation mean that some treatments differ among them and from the control. The tables of mean values confirmed some differences by Tukey test, after some time of application (significant interaction). Therefore, the effects caused by high dilution (homeopathic solutions) are theoretically due to information that remained inside the water after successive dilutions and succussions. The homeopathic solutions of NaCl were effective due to capability to mimic the molecules. Interpreting reports of Elia (2007) the electrical conductivity in experiments 1 and 2 had evolution in time that were dependent on the initial state because the system owned the memory of initial substance, ie, the sodium chloride.

## **Eighth approach: Spectrum of potencies (LENGER, 2006)**

In addition to characterize experimentally some homeopathic preparations Lenger (2006) also characterized the potencies based on the generation of photons by succussions. The resonance frequency was the parameter that Lenger (2006) measured the physical characteristics in microvolts. So Lenger (2006) hold arguments to state that each “homeopathic potency has specific energy and that each homeopathic preparation has its own information.” In Experiments 1 and 2, for each potency, there was specific effect. The Lenger theory (2006) was developed from experimental data and confirmed that the principle of similarity is based on the similar resonant frequency of the homeopathic preparation and the receiver (plant, animal, soil, water). The similarity between the homeopathic preparation and treated solution of Experiments 1 and 2 are well defined by the sodium chloride solution and the homeopathic preparation of the solute.

Applying the theory of Lenger (2006) to data of Experiments 1 and 2 it may be observed that the differences between potencies were significant because there was specific effect of each treatment. A statistically significant difference confirms that those mean values did not vary randomly, but because of the individuality of the potency as well as the resonant frequency.

## **Ninth approach: Epitaxy and structure of water (RAO, 2007)**

Epitaxy means information transfer (immaterial) from surface of the solid to a liquid. This transfer occurs in microtransistores and integrated circuits as well. The epitaxy in agreement with Rao (2007) is present along with the preparation of homeopathic solutions and of course, the phenomenon occurred in Experiments 1 and 2. For understanding the effect of homeopathic preparation of sodium chloride in Experiments 1 and 2 it is reasonable to admit the arguments of Rao (2007), ie, the spatial structure of water is influenced by succussion and by the specificities of the solute. The progressive dilution of the sodium chloride followed by succussion, applied in Experiment 1 and 2, did not destroy the water system. The organization of water allows the replacement of the molecule of the solute left (for dilution) by water molecules, thus keeping its network structure well organized as it was at the first dilution, according to Rao (2007).

The influence of the time, from 1 to 72 hours (Experiment 1 and 2) in the theory of Rao (2007) is supported by both calorimetric and thermoluminescence effects, since both are changed along with the time, in the interval between preparation of the solution and its use. This change is of unpredictable direction and intensity and causes variable data. But this change is of small error in the tests. When the number of replications is increased the experimental error is lower.

## **Finals Conclusions**

Low potencies of the homeopathic preparation of sodium chloride changed the electrical conductivity of the water. Each potency has its specific effect.

The homeopathic preparations of sodium chloride introduced changes in the physico-chemical properties of mine water or distilled water because of the similarity and the energy originated of succussions.

There was stability of dissolved oxygen in distilled water along with the time.

The homeopathic preparations caused specific responses to the variables.

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