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Water Treated with Permanent Magnetic Field. Effects of Potassium Carbonate

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Abstract

Scientific studies indicate that the quality of milk and dairy products from cows, sheep, and goats can be enhanced by improving the properties of water. The author introduces a plastic container holding 1000 liters or 1 ton of water subjected to a constant magnetic field. Additionally, potassium carbonate is dissolved in the container. The alkaline environment affects the acidity of the animals' stomachs and provides protection against diseases.

Studies and analyses have been conducted on the effects on water using potassium carbonate and a constant magnetic field. The spectral methods Non-equilibrium Energy Spectrum (NES), Differential Non-equilibrium Energy Spectrum (DNES), and Infrared Fourier Spectral Analysis were applied for the studies.

Deionized water with a volume of 1 liter was used as the model system. The results are extrapolated for a volume of 1000 liters or 1 ton of drinking water.

The obtained water complies with Ordinance No 9/2001, Official State Gazette, issue 30, and Decree No 178/23.07.2004 of Council of Ministers, Bulgaria. The two documents are connected with the quality of water for drinking and household purposes.

Potassium, carbonate, and bicarbonate ions are not included in the regulation. They are not subject to any limit or restriction.

Keywords: magnetic water, potassium carbonate, water, domestic animals.

1. Introduction

Both activated water with permanent magnets (Ignatov, Mosin, 2014) and solenoids (Liu et al., 2022) are applied in agriculture. Results have been obtained with magnetic induction parameters of B=500 and 1000 Gauss. The results, conducted on sheep, have demonstrated changes in daily and total milk production. The milk composition was improved. The ewes and lambs have improvement of hematological and biochemical parameters (Shamsaldain, 2012). The magnetic field exposure increases the shelf life of goat milk (Wei et al., 2022). Scientific studies show that adding potassium carbonate to the diet increases the synthesis of milk fats in cows (Alfonso-Aliva et al., 2017). Carbohydrates provided can lead to fermentation, acidification, and a decrease in pH in the digestive system of domestic animals (Krause, Oetzel, 2006; Emery, Brown, 1961). An alkaline environment improves the alkaline balance in the digestive system and reduces inflammatory diseases (Jenkins et al., 2014). In 2015, the possibility of combining water with potassium carbonate was indicated (Fraley et al., 2015). The studies and analyses aim to demonstrate the spectral parameters of potassium carbonate and water activated with a magnetic field. Based on the spectral peaks, the corresponding bio-effects of the obtained results are illustrated.

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2. Materials and Methods

2.1. Spectral Methods

2.1.1. Non-equilibrium Energy Spectrum (NES) and Differential Non-equilibrium Energy Spectrum (DNES)

Antonov and co-authors created a device for the research with NES and DNES spectral methods (Antonov et al., 1989; Todorova, Antonov, 2000; Ignatov, Mosin, 2014). In the hermetical camera, the water evaporated. Antonov described the effect of discreet evaporations of water drops. The device studies the wetting angle θ of the water drops.

During the process of the evaporation of the water drops, the wetting angle changes discreetly. The dependence between the wetting angle and the average energy of the hydrogen bonds is the following:

$\Theta = \arccos(-1+bE)$, where $b = I(1+\cos\theta_o)/C\gamma o$ (1)

The range of the parameters of the hydrogen bonds is the following:

E=(-0.0912)-(-0.1387) eV; 736-1117 cm^{-1}; $\lambda = 8.9 - 13.6$ μm

In (1) θ is the wetting angle, and b is a temperature-dependent parameter. E is the energy of hydrogen bonds between the oxygen atom of one water molecule and the hydrogen of another (Gramatikov et al., 1992; Kumbhakkhane et al., 2013).

The function f(E)is estimate as *energy distribution spectrum*. A non-equilibrium process of evaporation of water droplets is energy spectrum of water. The value of NES and DNES is eV^{-1}. (Antonov, 1995; Todorova, Antonov, 2000).

DNES is the difference between the NES spectrum of water sample and NES of control water sample.

Δf(E)=f(water sample)-f(control water sample) (2)

DNES is studied in eV^{-1}

DNES is measured in eV^{-1}, f(*) marks the evaluated energy

The methods NES and DNES were applied for the investigations of natural water (Todorov et al., 2010; Ignatov, Valcheva, 2023) and solutions of plants (Ignatov, Popova, 2021; Ignatov et al., 2022).

2.1.2. Fourier transform infrared spectroscopy

Fourier-IR spectrometer Brucker Vertex was used for the research of IR-spectra of potassium carbonate.

Thermo Nicolet Avatar 360 Fourier-transform IR has the following parameters: average spectral range: 370-7800 cm^{-1}; visible spectral range 2500-8000 cm^{-1}; permission: 0.5 cm^{-1}; accuracy of wave number: 0.1 on 2000 cm^{-1}

2.2. Scheme for 1000 L water influenced with permanent magnetic field and dissolve potassium

Figure 1 illustrates a scheme for 1000 L water influenced by a permanent magnetic field and dissolved potassium carbonate

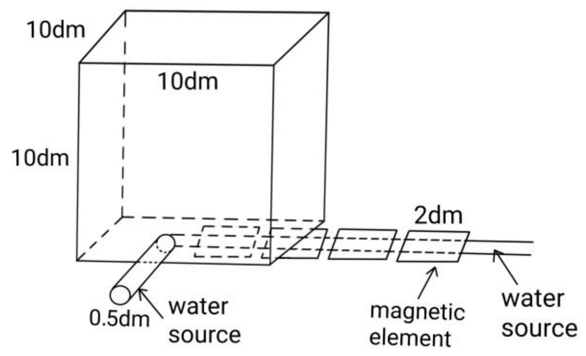

Fig. 1. Scheme for 1000 L water influenced by a permanent magnetic field and dissolved potassium carbonate

Drinking water comes from a water source located where flocks of sheep and goats are raised. The water pipe is placed in permanent magnets. Each magnet has a length of 20 cm. The magnetically activated water flows through the source with a diameter of 5 cm into the troughs for the domestic animals to drink. Sheep and goats drink 7-10 L per day. One container for a day can provide fresh water for 100-140 animals. It is constantly replenished, allowing the water to be influenced by magnetic field.

2.3. Parameters of the magnetic field for influence on water

The induction B of 1 cm from the surface of one element from Figure 1 is 1000 Gauss with a magnetic moment of 0.002 A.m^2.

3. Results and Discussion

3.1. Results with Potassium Carbonate

3.1.1. Research of water solution of K_2CO_3

Potassium carbonate dissociates into K^+ and CO_3^{2-} ions in solution:

$K_2CO_3 \rightarrow 2K^+ + CO_3^{2-}$

CO_3^{2-} reacts with water (H_2O) to form carbonic acid (H_2CO_3)

$CO_3^{2-} + H_2O \rightarrow HCO_3^- + OH^-$

HCO_3^- can react again with water:

$HCO_3^- + H_2O \rightarrow H_2CO_3 + OH^-$

Potassium carbonate with a molar concentration of 0.1 M or concentration of 13.82 g.L^{-1} has pH=11.5

With 0.1 M or 13.82 g.L^{-1}, the concentration of the hydroxide ions (OH^-) is 3.16.10^{-3} M:

pOH=-log(3.16.10^{-3})=2.5

pH=14-pOH=11.5

With 0.01 M or 1.382 g.L^{-1}, the concentration of the hydroxide ions (OH^-) is 3.16.10^{-4} M:

pOH=-log(3.16.10^{-4})=3.5

pH=14-pOH=10.5

With 0.001 M or 0.1382 g.L^{-1}, the concentration of the hydroxide ions (OH^-) is 3.16.10^{-5} M:

pOH=-log(3.16.10^{-5})=4.5

pH=14-pOH=9.5

With 0.0001 M or 0.01382 g.L^{-1}, the concentration of the hydroxide ions (OH^-) is 3.16.10^{-6} M:

pOH=-log(3.16.10^{-6})=5.5

pH=14-pOH=8.5

For the volume 1000 L with 13.8 g, the pH=8.5

3.1.2. IR Fourier Spectral Analysis of K_2CO_3

Figure 2 shows the results with IR Fourier Spectral Analysis of K_2CO_3.

Figure 2 has the following spectral peaks in the range of NES spectrums.

(-E) of 0.1049 eV or (λ=11.82 μm; ṽ=846 cm^{-1})

(-E) of 0.1095 eV or (λ=11.33 μm; ṽ=883 cm^{-1})

(-E) of 0.1312 eV or (λ=9.45 μm; ṽ=1058 cm^{-1})

3.2. Spectral Analysis of Water Influenced with Permanent Magnetic Field

Water samples were used as an object of this influence for the research on the effects of permanent magnetic field. The control samples were with the same deionized water without the influence of the magnetic field.

The mathematical model was created for the percent distribution of water molecules according to the parameters of the energies (-E) of hydrogen bonds (Ignatov, Mosin, 2014) (Ignatov, Gluhchev, 2021).

Table 1 and Figure 3 illustrate the results.

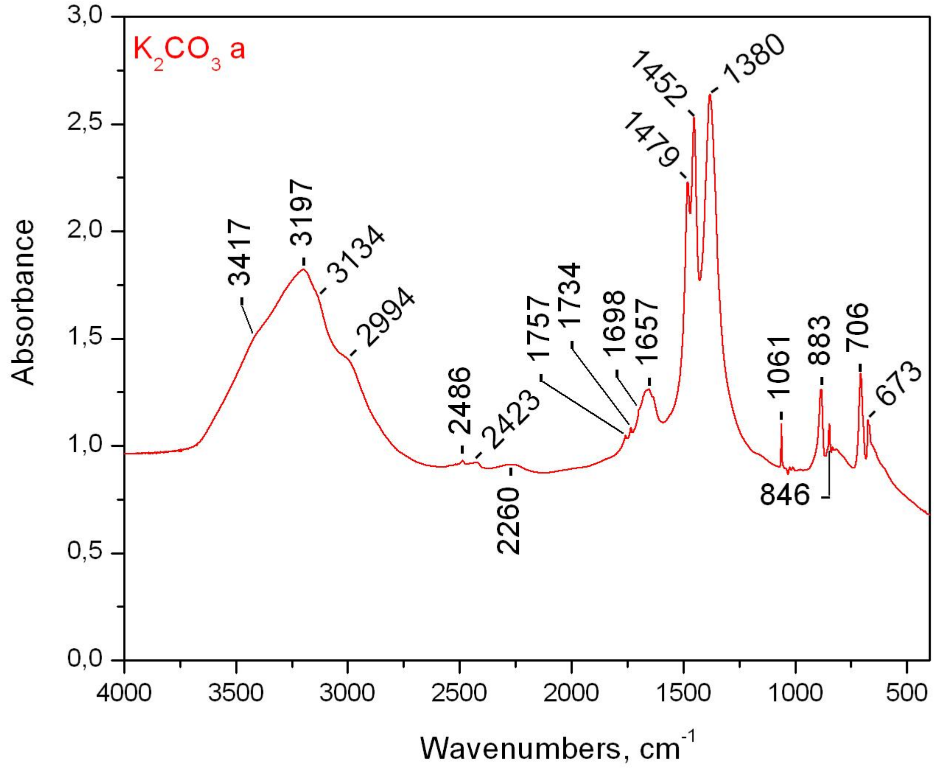

Fig. 2. Results with IR Fourier Spectral Analysis of K_2CO_3

Table 1. Mathematical models of samples influenced with magnetic field with 1000 G and control samples

-E(eV) x-axis	Deionized Water Influenced by Magnetic Field (%((-E_{value})/ (-$E_{total\ value}$)	Deionized Water Control sample (%((-E_{value})/(-$E_{total\ value}$)
0.0937	0	0
0.0962	4.5	6.3
0.0987	9.1	6.3
0.1012	4.5	6.3
0.1037	4.5	3.2
0.1062	0	3.2
0.1087	0	10.7
0.1112	18.2	0
0.1137	13.7	4.3
0.1162	0	0
0.1187	0	6.3
0.1212	4.5	6.3
0.1237	0	6.3
0.1262	0	10.7
0.1287	13.7	8.7
0.1312	0	0
0.1337	9.1	10.7
0.1362	4.5	10.7
0.1387	13.7	0

With t-test of Student for 10 samples and 10 control samples the result is statistically relable for $p<0.05$

In the NES spectrum of water treated with a permanent magnetic field with induction B=1000 Gauss, there are the following peaks:

(-E) of 0.1112 eV or (λ=11.15 μm; ṽ=897 cm^{-1})

(-E) of 0.1137 eV or (λ=10.91 μm; ṽ=917 cm^{-1})

(-E) of 0.1287 eV or (λ= 9.63 μm; ṽ= 1038 cm^{-1})

(-E) of 0.1387 eV or (λ=8.95 μm; ṽ=1117 cm^{-1})

Notes:

E=-0.1112 eV; λ=11.15 μm; 897 cm^{-1} is the local extremum for the conductivity of calcium (Ca^{2+}) ions (Zhang et al., 2018; Ignatov et al., 2023).

E= -0.1387 eV; λ=8.95 μm; 1117 cm^{-1} is the local extremum for the restructuring of water molecules with the highest energies of hydrogen bonds for the configurations of water clusters from 16 to 24 water molecules (Neshev et al., 2022).

There are wavenumbers of hexagonal water clusters with different positions of water molecules for n=6. The basic wavenumber is 1117 cm^{-1} (Heine et al., 2013).

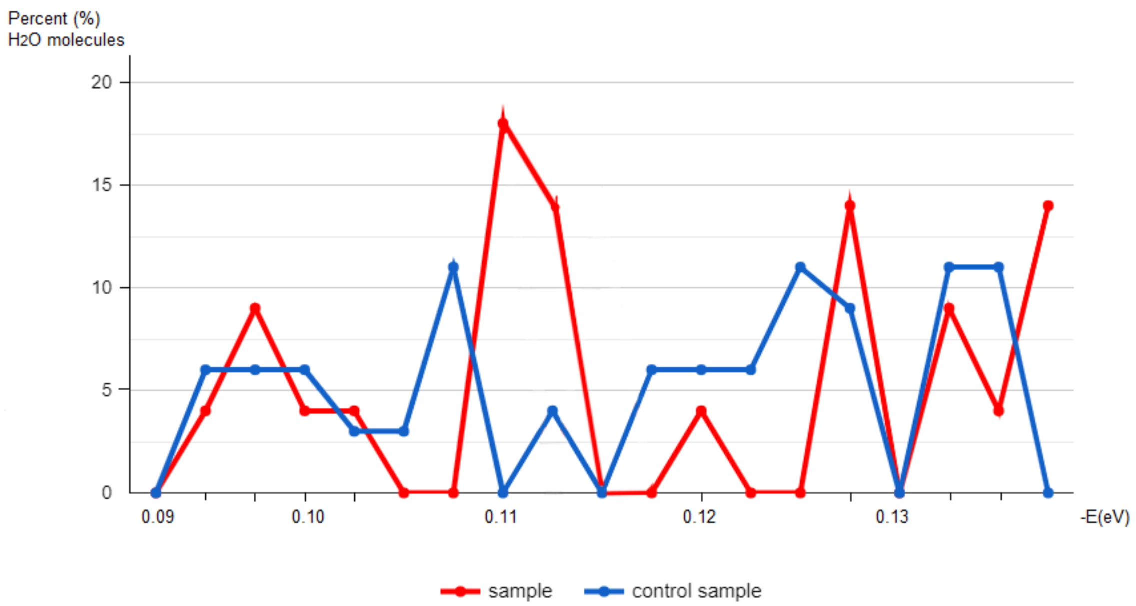

Fig. 3. Percent distribution of water molecules according to the values of (-E) of hydrogen bonds

A scientific team headed by Mehandjiev showed theoretically with calculations with Gaussian distribution that the maximal number of water clusters must have averge energy of hydrogen bonds between water molecules of (-E) of 0.1137 eV or (λ=10.91 μm; ṽ=917 cm-1) (Mehandjiev et al., 2022). The research shows that ṽ =917 for the hydrogen-bonded molecules (Brooker et al., 2022).

The obtained water meets the standards set forth in Ordinance No 9/2001, Official State Gazette, issue 30, and Decree No 178/23.07.2004 of Council of Ministers, Bulgaria. Notably, regulations do not encompass potassium, carbonate, and hydrogencarbonate ions. These ions are not governed by any specific limits or restrictions. (Ignatov, 2020).

4. Conclusion

The research provides compelling evidence that enhancing water properties through exposure to a permanent magnetic field and introducing potassium carbonate leads to notable improvements in the quality of milk and dairy products sourced from cows, sheep, and goats.

This novel approach, involving a 1000-liter plastic container treated with a permanent magnetic field and dissolved potassium carbonate, creates an alkaline environment within the container. One of the effects is on the gastric acidity of animals and conferring protection against various diseases.

Employing advanced spectral methods, including Non-equilibrium Energy Spectrum (NES), Differential Non-equilibrium Energy Spectrum (DNES), and Infrared (IR) Fourier Spectral Analysis, the investigations were carried out on deionized water, serving as a representative model system.

The spectral results show that the joint effect of the magnetic field and potassium carbonate is connected with the following peaks for the wave numbers

$\tilde{\nu}$=846; 883; 897; 917; 1038; 1058; 1117 cm^{-1}

The extrapolated results, encompassing a volume of 1000 liters or 1 ton of drinking water, demonstrated compliance with relevant regulations regarding drinking water quality.

Notably, potassium, carbonate, and hydrogencarbonate ions were found to be exempt from a regulatory limit of reactions. Furthermore, the studies of different authors established significant alterations in key parameters for sheep, goats, and cows. The parameters were daily and total milk production, milk composition, and hematological and biochemical factors. The scientists were proved the effects on ewes and growth.

The extension of the shelf life of goat milk under the influence of the magnetic field is an intriguing discovery with potential implications for dairy production.

Additional investigations revealed that that incorporating potassium carbonate into the cows, goat, and sheep diet fosters increased synthesis of milk fats.

However, it is essential to note that introduction of carbohydrates may lead to process such as fermentation, acidification, and pH reduction within the digestive systems of domestic animals. Creating an alkaline environment is beneficial in maintaining an alkaline balance and mitigating inflammatory conditions.

In summary, this research underscores the potential of magnetic field-activated water and potassium carbonate as influential factors in enhancing agricultural and animal husbandry practices and dairy production quality.

The combination of the spectral analyses for the quality of water for cows, sheep, and goats and practical applications holds promise for future advancements in the field of animal husbandry.

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