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A study the Effect of Magnetic Field on the Absorption spectrum of Distilled Water

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Abstract

The search including studying the effects of magnetic field on distilled water by using spectrophotometer (340nm -1000nm). The spectrum of distilled water studied after 24 hours of exposure to (0.1) tesla of both kinds of magnetic field. The study reaches to there is an opposite effect for each pole of magnetic field to another one as follow- :

1. The absorption spectrum of distilled water was increased after exposure to north- pole magnetic field.
2. The absorption spectrum of distilled water was decreased after exposure to south pole magnetic field with the same quantity and same period of the north – pole field.

الخلاصة

يتضمن البحث دراسة تأثير المجال المغناطيسي على طيف الامتصاص للماء المقطر باستخدام مطياف الامتصاص(٣٤٠نانوميتر -١٠٠٠ نانوميتر) ، حيث تمت دراسة طيف الامتصاص للماء المقطر بعد ٢٤ ساعة من تعرضه لمجال مغناطيسي بقوة (٠.١ تيسلا) ولكلا القطبين ، وتوصلت الدراسة إلى وجود تأثير معاكس لكل قطب على طيف الامتصاص للماء وكالأتي:-

- يرتفع طيف الامتصاص للماء المسلط عليه مجال مغناطيسي للقطب الشمالي.
- ينخفض طيف امتصاص الماء المسلط عليه مجال مغناطيسي للقطب الجنوبي بنفس القوة والفترة الزمنية للقطب الشمالي.

Introduction

The properties of liquids are of paramount importance to the biologist and the medical scientists. The most common of all liquids –

water is absolutely indispensable for life as we know it. All living organisms originated is an aqueous environment and they have through the evolutionary process become dependent on water in many ways. Water is a very unusual liquid with unique physical properties that depend on the fact its molecules from strong bonds with one another, so that they exist in a partially orderd state that has certain crystalline properties [1]. Experiments have shown that the absorption of radiation is linked to the amount of water in the tissue and that heat producing interaction occurs between the electric field in the radiation and electrical dipole moment of the water molecules in the body [2]. The water molecule has a permanent electric dipole because the center of the net positive charges in nuclei of the three atoms that form the molecule is not in the same place as the center of the net negative charge [3].

The slight displacement of the center of charge in the molecule results in a permanent electric dipole in the water. The electric field from the microwave tries to align the electric dipole of water molecule with it in the ligament process work is done and energy is absorbed by the tissue [4].

Lower magnetic field (0.2T) have been shown, in simulation, to increase the number of monomer water molecule [5] but, rather surprisingly, they increase the tetrahedrality at the same time. They may also assist clathrate formation [6]. The increase in refractive index with magnetic field has been attributed to increase hydrogen bond strength [7]. These effects are consistent with magnetic fields weaking the Van der weals bonding between the water molecules .The water molecules being more tightly bound, due to magnetic field reducing the thermal motion of the inherent charges by generated dampening forces [8]. Static magnetic effects have been shown to cause an increase in the ordered structure of water formed around hydrophobic molecules and colloids [9], as shown by increase in fluorescence of dissolved probes [10].

Water is the main absorber of the sunlight, mainly in the infrared region where water shows strong absorption [11]. The water molecule may vibrate in a number of ways [12] involve combinations of symmetric stretch (V1), asymmetric stretch (V3) and bending [13]. The strength of the hydrogen bonding depends on the cooperative / anticooperative nature of the surrounding hydrogen bonds with the strongest hydrogen bonds giving lowest vibrational frequencies [14].

In liquid water the molecular stretch vibrations shift to higher frequency, on raising the temperature in the range 2c – 85c (as hydrogen bonding weakens, the covalent O-H bonds strengthen causing them to vibrate at higher frequencies) where as the intermolecular vibrations shift to lower frequencies and the molecular bend vibration peak both shift to lower frequencies and become narrower [15] .The overtone combination of symmetric and asymmetric stretching show a shift from strongly hydrogen- bonded structures to weakly hydrogen bonded structures with increasing temperature [13], and the combination band at about $5200cm^{-1}$ (V1,V2,V3) shifts to slightly higher wave numbers with reduced hydrogen bond strength [16]. The second overtone (V1,V3) of thetretching band gives rise to a significant peak in the near – infrared spectrum (λ 970 nm) [17] .

Theory

If monochromatic radiation of intensity I is allowed to fall on an absorbing medium of small thickness χ it is found that the loss of intensity in passing through the medium is proporational to I and $\Delta\chi$ Thus

$$- \quad \Delta I = \mu I \Delta\chi$$

Where μ is called the absorption coefficient of the material, if $\Delta\chi$ becomes smaller and smaller, in the limit the equation may be written as;-

$$\frac{dI}{dx} = -\mu I$$

Whence integration leads to

$$I = I_{\circ}\, e^{-\mu\chi}$$

In practice it is customary to measure the optical density D, defined as-:

$$D = \log \frac{I_{\circ}}{I}$$

D vary from absorber to absorber but also vary for one absorber with wavelength [1]

Materials and Methods

PD-303 Spectrophotometer(340 nm – 1000 nm) made by APEI Company, Japan.

1. Magnet bar produces (0.1) tesla.

Distilled water (D. W) exposed to North- pole magnetic field during 24 hours. Absorption spectra of non exposed and exposed water to magnetic field wear measured in each wavelength (nm) valid in the spectrophotometer , then the spectra of both (exposed and non exposed water)Compared (fig 1).

These producers were repeated with south-pole magnetic field.

Results and Discussion

Absorption spectrum(340 nm -1000 nm) is shown in fig. 1 for water and water exposed to North Pole magnetic field.

Fig. 2 shows the absorption spectrum for(340 nm – 1000 nm) water and water exposed to south- pole magnetic field

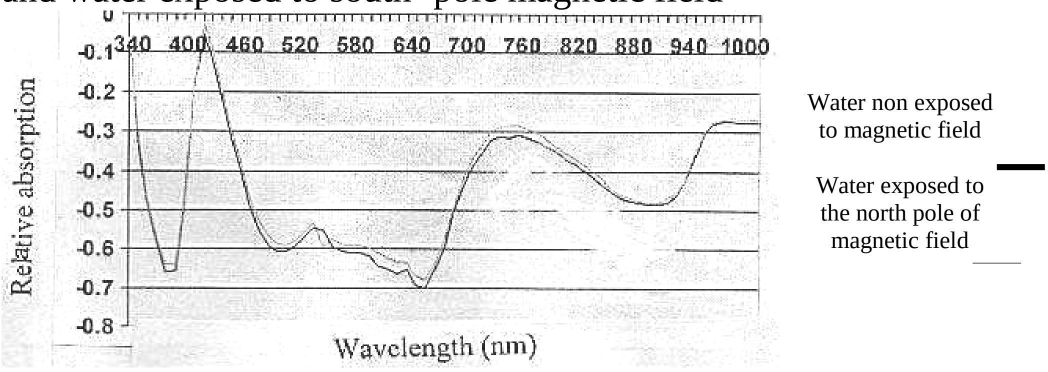

Fig. (1) The absorption spectrum of water exposed to north- pole

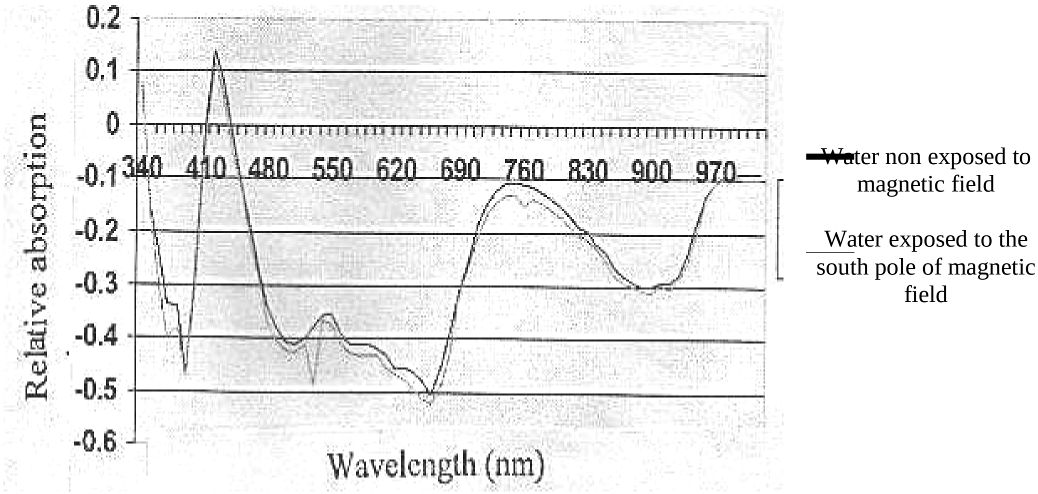

Fig. (2) the absorption spectrum of water exposed to south-pole

1. Fig. (1) shows the absorption spectrum of water exposed to North Pole more than the absorption spectrum of water. Changes in the O-H bond length have the major effects on the density [18]. The density increase due to packing the hydrogen bonded network [19].
2. Fig (2) shows the absorption spectrum of water exposed to south pole lower than the absorption spectrum of water .The density decrease due to the disruption of the network at low density as the no stretched hydrogen bonds are broken [20].
3. Absorption shifted due to local hydrogen bonding arrangement [21]. IN fig.(2) the peak is shifted from (542 to 544)nm. This shifting including few nm to longer wavelength due to the shift from high-density water to low density water. South-pole magnetic force appeared to make water molecules bind to each other more weakly than normal.
4. In fig. (1) the peak is shifted from (548-544) nm. The shifting a few nm to shorter wavelength due to shift from low-density water to high-density water [22].

Conclusion

The lower density of water is more fluid and has greater biological activity than ordinary water .The experimental results show the magnetic field changes the density of water.

1- North pole – magnetic field increases the density of water due to increasing the absorption spectrum.
2- South pole- magnetic field decreases the density of water due to lowering the absorption spectrum .
   South pole –magnetic force appeared to make water molecules bind to each other more weakly than normal, thus giving it lower density than normal.

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