

ORIGINAL PAPER

Dielectric dispersion studies of some potentised homeopathic medicines reveal structured vehicle

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Background: Avogadro's Number gives 12c as the limit beyond which no original substance can be present in a highly diluted and succussed (potentised) homeopathic medicine, implying that chemically such dilutions consist of nothing but the vehicle. But there is evidence that living systems react to homeopathic medicines diluted even above 12c. To explain how such medicines differ from another I hypothesise that altered structure may cause the difference, such as that between diamond and amorphous carbon. Some scientists have argued that dilution followed by succussion may lead to altered structural arrangement of water molecules. This concept may be termed 'Induced Molecular Structure'.

Methods: Dielectric dispersion studies were conducted in a broad range with potencies below and above the Avogadro limit by taking 6c and 30c potencies of *Graphites* and *Cuprum Metallicum* in liquid form. Measurements were made with an Anomalous Dielectric Dispersion Detector (A3D), an instrument developed by the author.

Results: Experiments were carried out in a frequency range of 100 kHz to 50 MHz. Shifting of resonance frequencies as a function of medicine and potency, with potencies below and above the Avogadro limit, was observed.

Conclusion: The range of resonance frequencies suggest that the phenomenon might originate from oscillation of dipoles caused by electric field in variously structured and polarised water. Also, there is reasonable evidence that frequencies change with materials and potency. *Homeopathy* (2013) 102, 262–267.

Keywords: Induced Molecular Structure; Dielectric dispersion; Resonance

Introduction

This paper explores the hypothesis of 'Induced Molecular Structure' which may be stated as: 'The medicinal effect of a highly diluted homeopathic medicine owes its origin not to chemical presence of the original substance with which dilution starts but to structural coding of the atoms and molecules of the vehicle and creating specific type of macromolecules peculiar to the original substance as well as the degree of dilution' [1]. The idea of structural change of vehicle in potentised substances has the theoretical support in the work of G. O. Barnard in his water poly-

mer model [2], of G.S. Anagnostatos in his Clathrate model [3], of C.R. Mahata in his induced and coded molecular concept [1,4,5] and of Rustum Roy's water structure [6]. Similar concepts have been proposed as 'water memory' by J. Benveniste [7] and as 'Vehicle storing information' by Louis Rey [8]. The focus of the current paper is on experimental work using dielectric dispersion.

Materials and method

Materials

Materials used for the study were *Graphites* 6c, 30c and *Cuprum metallicum* 6c, 30c. Potencies were below as well as above the Avogadro limit. The validity of the concept was not arbitrarily ruled out even for low potencies. Medicines in liquid form in ethanol were procured from M/S Hahnemann Publishing Co. Pvt. Ltd, Kolkata a reputable

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Received 4 October 2012; revised 12 July 2013; accepted 19 July 2013

manufacturer of homeopathic medicines in India. They were prepared specially for these tests on request. Distilled water (CVS Pharmacy, USA) was used as the vehicle for these tests.

Method

A differential method was used to observe indirect structural change, namely, change of real part (ϵ') and imaginary part (ϵ'') of dielectric function of water. A capacitor type 'sensor cell' (for un-medicated and then medicated distilled water as its dielectric) and another 'reference' capacitor were used for this purpose as described below. An instrument developed by the author (Anomalous Dielectric Dispersion Detector (A3D)) made use of the sensor cell and the reference to give two outputs representing ϵ' and ϵ'' as shown in Figure 1 and Figure 2. The quadrature excitations $A \sin \omega t$ and $A \cos \omega t$ were derived from Agilent make Evaluation Board, serving as Signal Generator, with Quadrature Direct Digital Synthesiser (DDS) IC Chip AD 9854. Graphical plots of ϵ' and ϵ'' were obtained from a Data Acquisition Unit DI-149 made by M/s Dataq Instrument. Both of them were driven by appropriate software supplied by the manufacturers. A physical sketch of the experimental arrangement is shown in Figure 3.

Basic theory of dielectric dispersion

This research used an experimental technique based on dielectric dispersion. The basic theory of dielectric dispersion is given here to clarify what is anomalous and how it occurs. In dielectric dispersion one studies the dependence of permittivity of a dielectric material as a function of frequency of applied electric field. Dielectric dispersion in its simplest form can be explained by taking a finite linear chain of identical lattice atoms as shown in Figure 4. As per the Lorentz model, the atoms (each of mass m and charge q) are considered to be connected by (conceptual) springs.

When subjected to alternating electric field alternating dipoles are produced and the atoms are forced to oscillate. The motion of charge q is affected by friction in the guise of a damping force. The equation of motion becomes,

$$\frac{d^2 \delta}{dt^2} + \gamma \frac{d\delta}{dt} + \omega_p^2 \delta = \frac{q}{m} E \quad (1)$$

where δ is the displacement of an oscillator charge, γ is the damping coefficient, ω_p is the natural frequency for chain of atoms and E is the alternating electric field incident on the material. The solution of the above equation becomes,

$$\vec{\delta} = \frac{q}{m} \cdot \frac{\vec{E}}{(\omega_p^2 - \omega^2) + j\gamma\omega} \quad (2)$$

The displacement of positive charge associated with nucleus will be small. So, the dipole moment is given by the

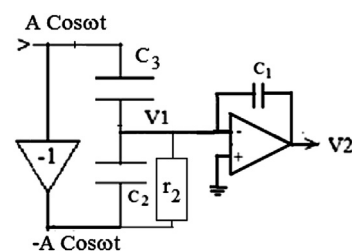


Figure 1 Sensing arrangement: C_2 in parallel with r_2 represents the Sensor Cell as an imperfect capacitor, C_3 is the reference and C_1 is an air capacitor.

product of electronic charge and its displacement. Total dipole moment of the chain consisting of N atoms is,

$$\vec{P}(\omega) = \sum_{n=1}^N q \vec{\delta} = \left[\frac{q^2}{m} \cdot \frac{1}{(\omega_p^2 - \omega^2) + j\gamma\omega} \right] \cdot \sum_{n=1}^N E_n$$

Here, E_n = electric field on the n th atom. Now, the total dipole moment is related to dielectric function as $\epsilon(\omega) E = \epsilon_0 E + P(\omega)$, where, $\epsilon(\omega)$ is the complex dielectric function of the medium, $[\epsilon(\omega) = \epsilon'(\omega) + j\epsilon''(\omega)]$ and ϵ_0 is dielectric constant of vacuum. Finally we get, $\epsilon'(\omega) = \epsilon_0 + \frac{q^2}{m} \cdot \frac{(\omega_p^2 - \omega^2)}{(\omega_p^2 - \omega^2)^2 + \gamma^2 \omega^2}$ and $\epsilon''(\omega) = \frac{q^2}{m} \cdot \frac{\gamma \omega}{(\omega_p^2 - \omega^2)^2 + \gamma^2 \omega^2}$ as the real and imaginary parts of the complex dielectric function respectively.

For natural frequencies of vibration the length of chain, L is integral multiples of the half-wavelength, $\lambda/2$. The wavelength, λ and frequency, f_0 ($= \omega_p/2\pi$) are related by $\lambda f_0 = c$ = velocity of sound in the media [9]. When the electric field is time harmonic with frequency ω , then the plots of ϵ' and ϵ'' (plotted along y-axis) as functions of frequency (plotted along x-axis) become as given in Figure 5. It indicates sharp change of dielectric function of ordered molecular group around the resonance frequency. Normal Dispersion is related to an increase of the real part of dielectric function with frequency whereas in Anomalous Dispersion it is the opposite. Also, since Normal Dispersion is dominant at most frequencies, except at the neighbourhood of a resonance point, the imaginary part is appreciable only when Anomalous Dispersion occurs.

The key to this analysis is that around each resonance frequency there will be abrupt change of the dielectric function, which is electrically detectable. Ordered molecular groups will be identifiable through the frequencies so detected. Focussing attention on these frequencies (and not on the actual value of the dielectric constant or its derivative with respect to frequency) medicines will become identifiable through their characteristic frequencies.

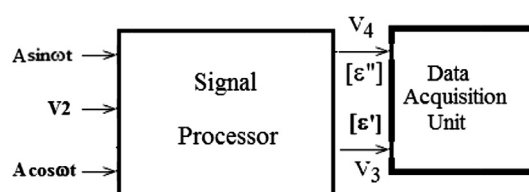


Figure 2 Signal processor and Data Acquisition Unit.

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