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FUNDAMENTAL RESEARCH

In search of a technique for identifying potentised homoeopathic medicines beyond Avogadro limit

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Avogadro Number puts 12th as the potency limit (in the centesimal scale) beyond which a homoeopathic medicine can not even theoretically contain any atom/molecule of the original substance with which potentisation starts. This raises two most fundamental questions: (1) Wherein lies their medicinal value? (2) How do they effect cures? The first question can also be put as – How one of such medicines differs from another? This paper addresses the first question in this form and tries to identify these medicines through a technique called Dielectric Dispersion. The basic idea is that potentisation induces ordered macromolecules of the vehicle, the structures of these molecules being specific to the original medicinal substance and the degree of potentisation. When such structures are excited by high frequency electric field, then anomalous dielectric dispersion occurs around their electrical resonance frequencies. That is reflected in sharp changes of real and imaginary parts of dielectric function. For three dimensional structures one gets not just a single resonance frequency but a set of such resonance frequencies for each sample. A medicine may thus be characterized through such sets. Experimental results seem to support the point. The set-up with which the authors worked is given in this paper. Identification of a potentised homoeopathic medicine seems to be a possibility through its dielectric-dispersion-resonance-frequency-set.

Keywords: homoeopathy; Avogadro number; dielectric dispersion; resonance frequency; identification

Introduction

Absence of any active ingredient in homoeopathic medicines above 12th potency is the reason for skeptics' denial of cures by such medicines and advancing placebo-cure hypothesis. It is regrettable that they overlook certain fundamental and logical inconsistencies in advancing their placebo-cure hypothesis. They are as follows:–

(1) Mind, to which they attribute cures, does not have any quantifiable active ingredient. So, bringing mind to explain cures turns out to be a self-defeating argument for them. (2) Homoeopathy benefits not only ordinary mortals, but also celebrities, babies, animals and plants. Cures in all these cases can not be attributed to power of mind. (3) Cures by power of mind are stray intrusions into our day-to-day life giving us a glimpse of mind-matter duality realized by yogis and saints. Even accepting mental cures it is unreasonable to say that only the patients cured by homoeopathic medicines (and not by main stream medicines) had the capability to invoke this duality principle. (4) Skeptics argue that a patient thinks that homoeopathic pills will be curative and that thinking cures him/her. The point is, such an effect was expected to be much stronger for pills of mainstream medicines. For, qualification of doctors, glamour of testing gadgets, medicines etc. all go in favor of the main stream. So, diagnosis, prescription etc. would have been irrelevant issues. But, the reality is different. (5) Nobody depends on placebo for curing his/her own illness. It implies that nobody 'really' believes in placebo-cure.

We appreciate the limit posed by Avogadro number. But, we are not in favour of bluntly denying the two-century old homoeopathic system of medicine. So, we proceeded with serious investigation on the first fundamental question of Homoeopathy: Wherein lies

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the medicinal value of potentised homoeopathic medicines? In other words, how one of such medicines differs from another?

Review of present status of Fundamental Research on Homoeopathy

A concept of 'water polymer' was proposed by Barnard in[1] where he stated that a large number of water molecules can apparently join up to form a long molecular chain, which may be called as water polymer. In a review paper John R. Benneth[2] gives a list representing some of the better known scientific research in Homoeopathy outside of the clinical setting under seven basic modalities: Bacteriology, Botany, Biochemistry, Physiology, Zoology, Molecular etiology and Physics. The seventh area (of physics) is concerned with fundamental research. Important publications in this area are enlisted in ref [3 to 29] These studies are related to (i) Dielectric indices which differ from their liquid vehicles and are specific both for the substances in dilution as well as for the degree of dilution. (ii) Nuclear Magnetic Resonance (NMR) (iii) Electron microscope study (transmission type) (iv) Scattering of a laser to reveal the size and distribution of the dissolved particles. A scanning electron microscope was used to photograph films of the solutions spread over slides. (v) Transverse relaxation time of water protons (T2) (vi) An Electric Measurement Device (EMD) where Ultra High Succussed Dilutions (UHSD) can be distinguished from control solutions. (vii) Thermo-luminescence. (viii) REDEM Technology (a measuring technology for resonance damping and undamping).

Following these studies, a consensus seems to be emerging in favour of the idea that in potentised medicine molecules of the potentising-vehicle (i.e. water) carry some kind of information/impression of the original medicinal substance and its degree of potentisation. It prompted 'Homeopathy' to bring out a special issue on 'water memory' in July 2007 containing 12 papers.[30-41] Subject-matter wise they are: Overview – 3; Experimental – 4; Theoretical – 3; Other Hypotheses – 2 papers. It all kicks off with a characteristically metered editorial from Peter Fisher–"among those hypotheses which accept that there is something to explain about the properties of homeopathic ultramolecular dilutions, the largest group involve what can be broadly described as 'memory of water' effects. … The work collected in this special issue reflects convergent views from widely different perspectives that water can display memory effects and that homeopathic production methods might induce them. These findings represent a fundamental challenge to the complacent view which refuses even to think seriously about homeopathy. It may develop to the point at which, after over two centuries of controversy, there is finally consensus about the key to understanding mode of action of homeopathic high dilutions."

Given this platform, finding a technique for identifying potentised homoeopathic medicines beyond Avogadro limit becomes the next job of a researcher related to fundamental problems of homoeopathy.

Dielectric dispersion seems to be a technique for studying orderliness of molecular clusters of non-homoeopathic substances.[42-57] Maity, Ghosh and Mahata performed dielectric dispersion studies on potentised homoeo-medicines.[58-63] They have identified some potentised medicines by their characteristic frequency-sets.

Basic theory of Dielectric Dispersion

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 Fig.1. As per the Lorentz model, the atoms (each of mass m and charge q) are considered to be connected by (conceptual) springs.

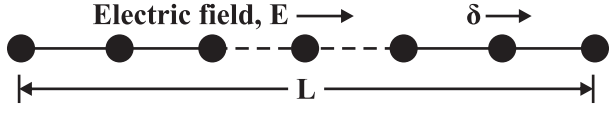

Fig. 1 : Linear chain of identical atoms

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

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

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where δ is the displacement of an oscillator atom, 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,

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

The dipole moment is given by the product of charge and displacement. Hence the 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 $\varepsilon(\omega)E = \varepsilon_0 E + P(\omega)$, where, $\varepsilon(\omega)$ is the complex dielectric function of medium $[\varepsilon(\omega) = \varepsilon'(\omega) + j\varepsilon''(\omega)]$ and ε_0 is dielectric constant of the vacuum. Finally we get,

$$\varepsilon'(\omega) = \varepsilon_0 + \frac{q^2}{m} \cdot \frac{(\omega_p^2 - \omega^2)}{(\omega^2 - \omega^2)^2 + \gamma^2\omega^2}$$

and

$$\varepsilon''(\omega) = \frac{q^2}{m} \cdot \frac{\gamma\omega}{(\omega_p^2 - {}_p\omega^2)^2 + \gamma^2\omega^2}$$

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.[65]

When the electric field is assumed to be time harmonic with frequency ω, then the plot of ε' and ε'' (along y-axis) as a function of frequency (along x-axis) becomes as given in Fig.2. It indicates sharp change of dielectric function of ordered molecular group around the resonance frequency.

The clue taken from this analysis is: For a linear chain we may have only one fundamental resonance frequency related to its length and velocity of sound in the chain, but for a three dimensional case (of medicine structure) there will be multiple resonance frequencies forming a frequency-set related to its shape and size. Around each resonance there will be abrupt change of the dielectric function, which is electrically detectable. An ordered molecular group will be identifiable through the frequency-set so detected. Focusing attention on these frequency-sets (and not on the actual value of the dielectric constant or its derivative with respect to frequency) a medicine will become identifiable through its characteristic frequency-set.

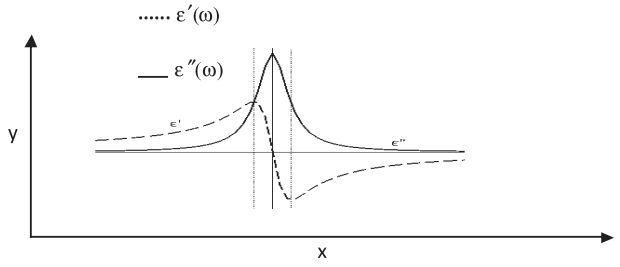

Fig.2: Plot of ε' and ε'' (along y-axis) as a function of frequency (along x-axis)

Material and Methods

The basis of experimental verification is: if a capacitor, formed with a dielectric material of some kind of ordered molecular group like potentised homoeopathic medicine is excited by a variable frequency alternating electric field, then the current drawn from a constant voltage source by such a capacitor will undergo sharp changes around the resonance frequencies of the ordered molecular group. Experimental arrangement shown in Fig.3(a) converts these changes through sensing block, differential amplifier, processing circuit and instrumentation amplifier to changes in D.C. output voltage, which is fed to the data acquisition unit.

The sensing block is shown in Fig.3(b). It comprises of a pair of capacitors. One contains the sample as its dielectric material, which is prepared by soaking powder form of sugar of milk i.e. lactose with potentised medicine in liquid form plus distilled water in the ratio of 1:10 and subsequently drying it up at room temperature. This is called the test or sample cell. The other cell contains sugar of milk soaked with only distilled water and dried up at room temperature. This is called the reference cell. The two outputs of the sensing block are fed to a Differential Amplifier. This arrangement continuously compares the output of the test or sample cell with that of reference cell used as a control.

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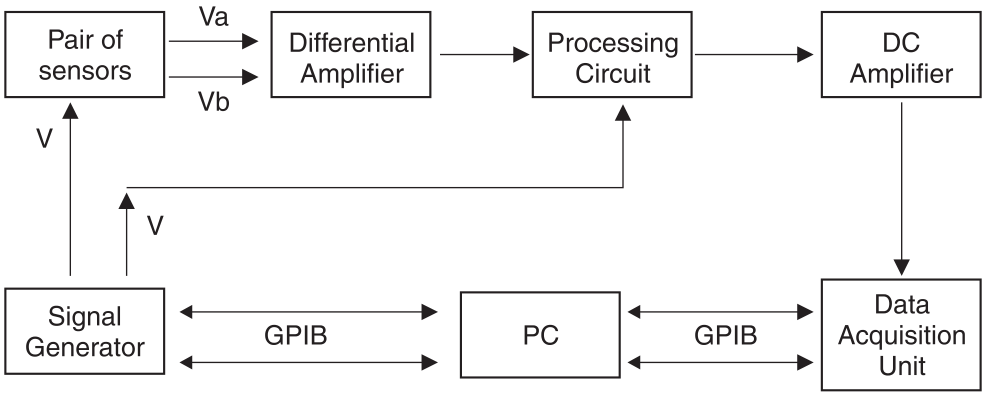

Fig. 3 (a): Block diagram of the experimental arrangement

The Processing circuit comprises of three stages of A.C. amplifier, an analog multiplier, two passive low pass filters and a two-input instrumentation amplifier. A D.C. amplifier is employed at the last stage for increasing the overall gain of the system and serving as a buffer between the instrumentation amplifier and the Data Acquisition unit following it. The circuit as a whole amplifies the weak output of the differential amplifier, improves the signal to noise ratio and gives the final output as a D.C. voltage, which is fed to the Data Acquisition Unit for getting a continuous strip-chart type record. It may be mentioned here that the lower three blocks of Fig. 3(a) are branded instruments, whereas the upper four blocks are fabricated in our laboratory.

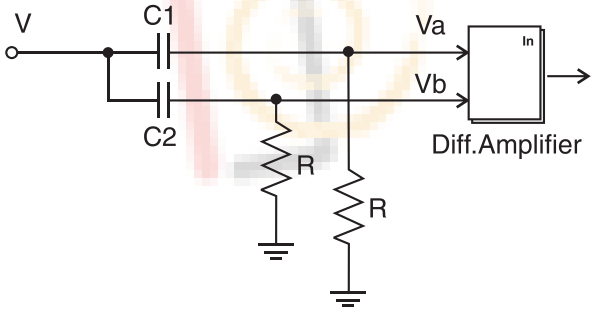

Fig. 3 (b): Sensing Block V= variable freq. a.c. excitation; C1 = sample cell containing medicine-soaked lactose as its dielectric; C2 = reference cell containing un-medicated lactose as its dielectric; Va & Vb are useful signals fed to differential amplifier

Results

Up till now, experimental investigations are carried out by us for (a) *Sulphur*-30, 200, 1M, (b) *Phosphorus*-30, 200, 1M and (c) *Cuprum met*-30, 200, 1M, all the potencies being in the centesimal scale. Numerical values of resonance frequencies are presented in Table-I on the next page.

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Table 1: Numerical values of resonance frequencies

Medicines								
S-30	S-200	S-1M	P-30	P-200	P-1M	Cu-30	Cu-200	Cu-1M
Resonance frequencies in kilo-Hertz								
173.5	150.2	489.6	187.9	334.9	350.0	172.6	246.5	571.5
219.1	180.1	498.5	456.3	364.5	351.5	224.1	329.0	883.6
238.2	256.7	586.5	517.5	395.6	353.0	403.5	544.8	
266.9	347.5	591.5	534.8	429.7	360.1	465.0	619.5	
292.5	385.0	601.2	593.6	548.3	948.8	658.8	724.5	
365.2	502.2	705.2	606.9	567.1	976.8	741.8	914.3	
446.2	536.5	712.5	630.2	614.0		756.3		
552.5		764.3	823.6	633.1				
			960.0	664.0				
				708.2				

This data is plotted in the following three Figures as the spectral signatures of *Sulphur, Phosphorus* and *Cuprum met* respectively.

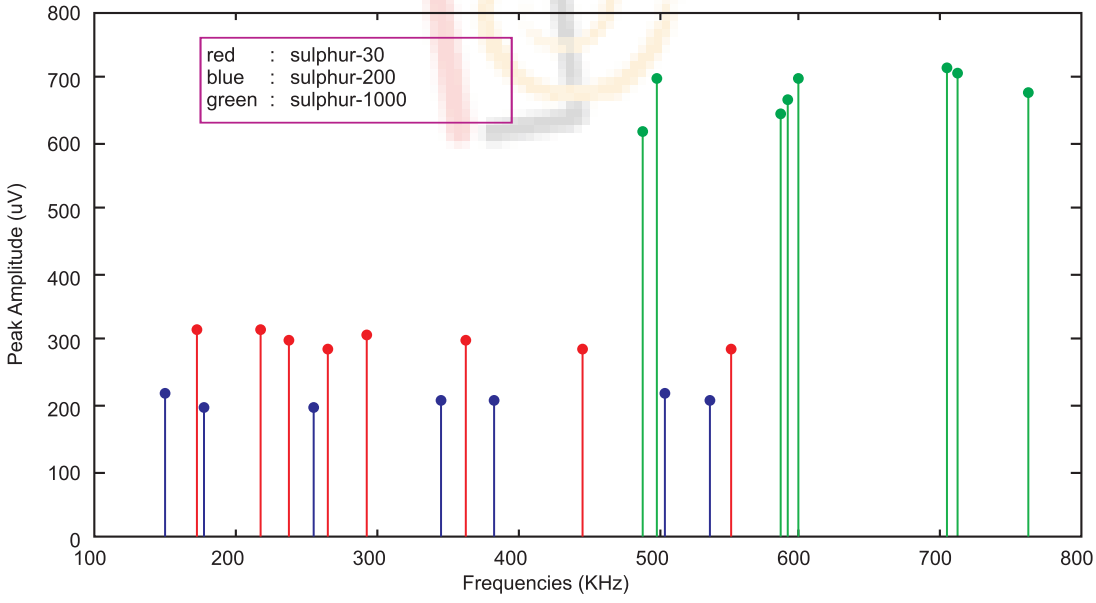

Fig.4: Spectral signatures of Sulphur-30, 200, 1M

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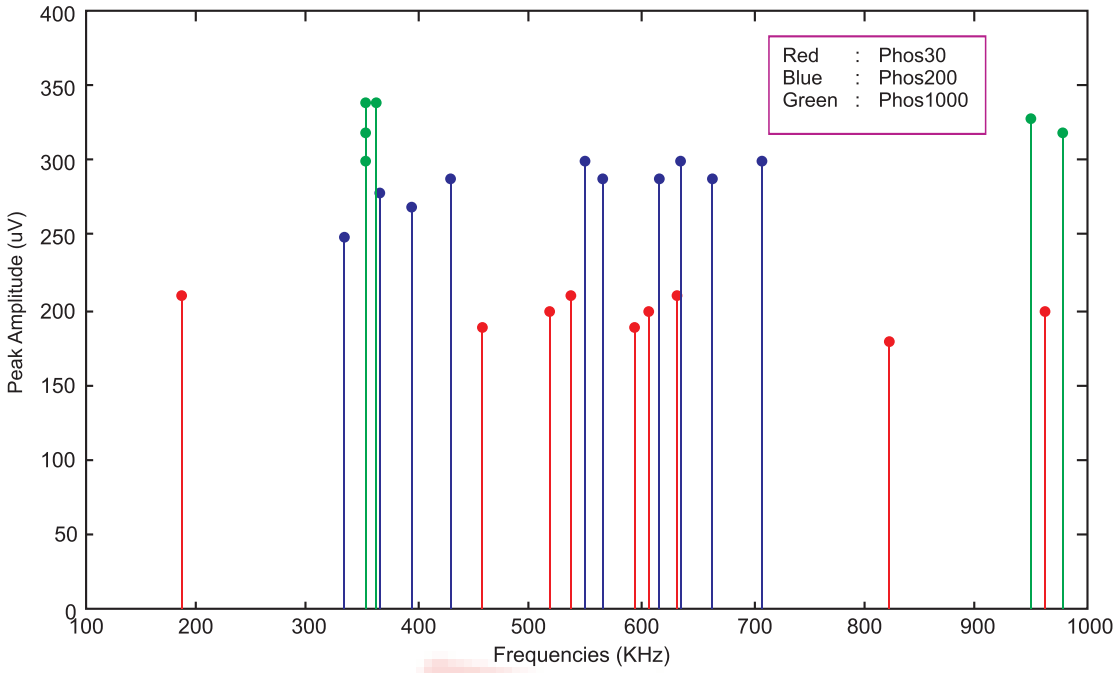

Fig.5: Spectral signatures of Phosphorus-30, 200, 1M

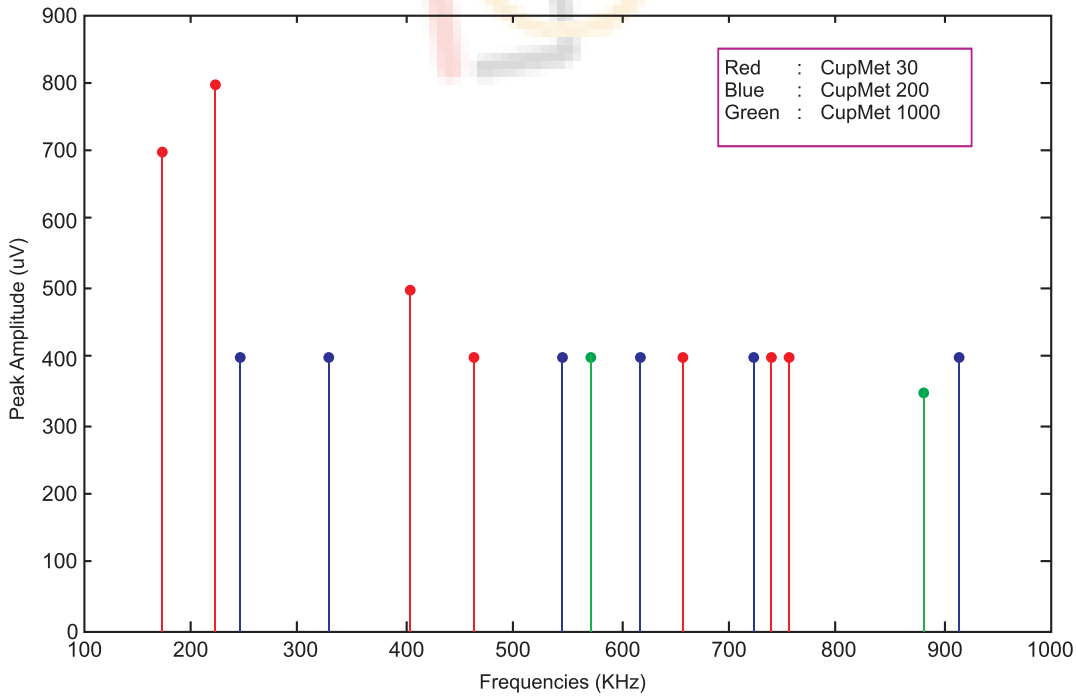

Fig.6: Spectral signatures of Cuprum met-30, 200, 1M

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Discussion and Conclusion

The investigation reported in this paper is for potencies above the Avogadro limit. As such, chemical presence of the original medicinal substance (with which potentisation starts) is ruled out. Chemical test for identifying these drugs will be of no avail. Hence, whatever results are obtained here must be due to change in molecular ordering of sugar of milk caused by ordered molecular groups of the vehicle of potentisation, that is, water. What we have been able to demonstrate in this paper is that both medicine and potency factors cause changes in the resonance frequencies of dielectric dispersion of the vehicle. The results are observed repeatedly. This technique is, therefore, expected to be useful in identifying different homoeopathic medicines and also be useful in detecting spurious homoeopathic drugs.

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