ITERATIVE PROCEDURES TO HIGHLIGHT THE FORMATION OF MOLECULAR AGGREGATES OF WATER MOLECULES IN PURE PERTURBED WATER

The Iteratively Cellulosated Water

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We studied the effect of natural hydrophilic polymers, cellulose derivatives, on water, when using an iterative procedure of hydration and drying. The procedure consists of immerging a cellulose-derived material in water for several minutes, then extracting it and drying it at room conditions. These two steps are iterated several tens of times. The used materials were Whatman and Millipore cellulose filters, Paper filters and Cotton wool, i.e. all cellulose derivatives.
Several years ago, we have studied an iterative filtering procedure using the same Millipore filters. In that case, the experimental results obtained with the cellulose filters were similar to the ones obtained with sintered glass filters, IFW (Iteratively Filtered Water). The hydrophilic nature of the filter depends on the chemical nature of the regenerated cellulose. The iterative procedure of drying and rehydrating produces large variations of the electrical specific conductivity χ and small variations of pH. We denote this new perturbed water: Iteratively Cellulosated Water, ICW, and their conductivity as χ_{ICW}. Differently from INW, ICW yield very large increases of conductivity but low increases of pH. As for INW, we measured the physical chemical parameters of ICW after removing the used cellulosic polymer, evidencing the linear correlations between the physico-chemical properties of ICW. Therefore, we have introduced a new method of perturbing water. The iterative procedure is very similar to the one used for INW i.e. without filtration. The only difference is due to the impossibility to use mechanical or manual stirring for some of the used materials. Therefore, in this case the procedure is limited to the iteration of these two basic steps for all the used materials: hydration and drying, without stirring. For all the used materials, a linear correlation between pH and $\log(\chi_{ICW})$ resulted. The slopes of the linear interpolating lines are positive and very small. Hence, they indicate a small variation of the pH parameter while the χ_{ICW} exhibits an extraordinary increase of three orders of magnitude or higher (when using cotton wool). The cotton wool, due to its nature, has a very large surface in contact with water compared to Whatman, Millipore or paper filters. Therefore, the number of iteration steps and consequently the time required to obtain the same conductivity variation is lower than for the other filters. It must be underlined that we avoided the filtration procedure, and we only performed the steps of hydration and drying of the materials. The linear trend of the pH as a function of the log of conductivity is a common behavior of all the iterative procedures used in these fields of research. These behaviors indicate a fractal nature of the modification of the supramolecular structure of water. Taking into account previous experimental results regarding the use of iterative procedures, we have obtained overall at least three different kinds of water molecule aggregates. Therefore, we have discovered that iterative procedures are a very efficient mean to highlight the subtle variations of the supramolecular structure of water as a consequence of physical perturbations of low intensity. The iterated procedure induces an increment of the concentration of water aggregates, which are responsible for the changed physical chemical parameters. The physical-chemical parameters of perturbed water studied so far, induce to hypothesize three different kind of aggregates. Hahnemann was the first who discovered the iterative procedure. In fact, the protocol for preparing the EDS (Extremely Diluted Solutions) of Homeopathic Medicine consists in a double iterative procedure of dilution and violent agitation (succussion). Probably his method is the first one to use the iterative procedure to perturb water. We added at least three new iterative procedures to perturb pure water: INW, IFW and now ICW.