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POSSIBLE EVIDENCE FOR TRANSFORMATION OF CHEMICAL ELEMENTS IN CAVITATED WATER

Fabio Cardone[1] and Roberto Mignani[2]
[1]Istituto di Radiologia, Facolta' di Medicina, Universita' "La Sapienza", p.le A.Moro, 2, 00186 Roma, Italy
[2]Dipartimento di Fisica "E.Amaldi", Universita' "Roma Tre", via della Vasca Navale, 84,00146 Roma, Italy, and INFN, Sezione di Roma III

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Abstract

We review the results obtained in two experiments of cavitating water. In the first experiment, we observed relevant changes in the concentration of the stable chemical elements in cavitated water. In particular, a huge concentration of uranium was found. In the second one, we restricted our analysis to the transuranic region, and found an excess of masses in this range. Our results are probably connected to those recently obtained by Urutskoev and coworkers in the electric explosion of metal foils in water.

1 Introduction

Acoustic cavitation of gaseous liquids consists in subjecting them to elastic waves of suitable power and frequency (in particular to ultrasounds). The main physical phenomena occurring in a cavitated liquid (e.g. sonoluminescence) can be accounted for in terms of a hydrodynamic model based on the formation and the collapse of gas bubbles in the liquid (Brennen[1)]). There is up to now no evidence for changes in the chemical composition of cavitated liquids. Two cavitation experiments we carried out recently (Campanella & al:[2)]; Cardone & Mignani[3)]) by two different sonotrodes seem however to provide evidence for a significant variation of chemical elements in the cavitated water.

2 Experimental results and discussion

2.1 First experiment

The original aim of our first experimental work was to test the performance of a new type of sonotrode ("cavitator") with a very long working time (> 30 minutes), developed by G. Giannini and P. Diodati at Perugia University in the 90s. The experiment was carried out at Perugia University.

We subjected to cavitation by the cavitator a sample of the bidistilled and dejonized water. The water sample was cavitated without stopping for a total time of 210 minutes at the constant power of 630 *watt* and the frequency of 20 KHz.

After cavitation, we analyzed the cavitated water sample, confining our analysis to stable chemical elements (from $Z = 1$ to $Z = 92$), and compared the results with those of a uncavitated water. Very surprisingly, we found relevant changes in the concentrations of the elements in the cavitated sample (despite very low original concentrations). The analysis of water both before and after cavitation was carried out by three different procedures reaching the precision of one *p.p.b.* and with a SD on concentrations $\sigma = 10^{-5}\mu g/L$, namely:

1 - mass atomic absorption (ICP);
2 - cyclotron spectrometry (ICR);
3 - mass spectrometry (MS).