**TRAPPING OF XENON UPON EVAPORATION-CONDENSATION OF ORGANIC MATTER UNDER UV IRRADIATION: ISOTOPIC FRACTIONATION AND ELECTRON PARAMAGNETIC RESONANCE ANALYSIS**

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**Introduction:** Meteoritic noble gases are mainly hosted by two carbon-rich phases that are left after demineralization of bulk meteorite by HF and HCl: nanodiamonds and an enigmatic phase labeled as phase Q [1]. Phase Q is the carrier of P1 noble gases often refered to as 'planetary' and represents the majority of Ar, Kr and Xe trapped in primitive meteorites [1]. The mechanism leading to the trapping of P1 is poorly understood but may represent 2D trapping on surfaces. Here we report an experiment designed to study the trapping of Xe by sublimation - condensation process of anthracite. This experiment allowed us to probe the influence of irradiation on: (i) the trapping of Xe onto organic matter, (ii) the EPR signal of organic matter synthesized by evaporation-condensation.

**Experimental method:** Anthracite was loaded in a crucible surround by a W filament [2]. UV light was located above the crucible. Air-like Xe was introduced in the system at a pressure of about 0.1 mbar and ionized with an energy of $\approx$ 0.1 MeV by high frequency discharge. The crucible was heated at 1200°C for 5 min and cooled down to room temperature immediately. Organic matter was condensed on the different glass parts of the apparatus with two kinds of samples recovered, corresponding to ionized xenon or neutral xenon.

**Results:** The amount of Xe trapped in ionized samples is about one order of magnitude higher than the one trapped in neutral samples. Neutral samples show the same xenon isotopic composition as the one of starting Xe. In contrast, ionized samples present an important isotopic fractionation of 1%/amu. The EPR spectra as a function of temperature allow the spin concentration to be estimated. Both samples present the same trend characterized by a decrease of spin concentration with increasing temperature. No significant difference was observed between neutral and ionized samples despite the drastic difference in condensation conditions.

**Discussion:** The isotopic fractionation observed could be induced by a charge exchange accompanied by an isotopic exchange: $mXe + nXe^{+} \Leftrightarrow mXe^{+} + nXe$. Apparently, the organic matter during its condensation is able to realize a selection between neutral and ions Xe with a slight enhancement for trapping ions. The isotopic fractionation reproduces well the one observed for P1 noble gases relative to solar composition [1]. This result is consistent with previous works in which isotopic fractionation was observed only during experiments involving irradiation [3]. The decrease of spins concentration upon temperature determined for both samples is at odds with spins increasing upon temperature obtained for Orgueil and Murchison [4]. The present results suggest that condensation alone does not allow the diradicaloids of IOM to be produced. Interstellar chemistry seems to be the most promising process to reproduce the EPR characteristics. These results do not exclude a solar origin for P1 noble gases.

[1] Lewis R.S. *et al*. (1975) *Science 190,* 1251-1262. [2] Tissandier L. *et al*. (2002) *Meteoritics 37,* 1377-1390. [3] Hohenberg C.M. *et al.* (2002) *MPS* 37, 257-267. [4] Binet L. *et al.* (2004) *GCA 68*, 881-891.