

## **Contribution of elemental analysis and an UV-VIS spectrophotometry in the understanding of E-OBT elimination stage.**

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Tritium occurs in biological samples in three forms: (i) in the free water (TFWT - Tissue Free Water Tritium) associated with the matter; associated to the organic matter (OBT) under two forms (ii) bound to oxygen and nitrogen atoms in compounds of the material as exchangeable OBT (E – OBT); (iii) bound to carbon atoms in the material as non exchangeable OBT (NE-OBT). In the past a lot of problems have been encountered to analyse the various tritium fractions especially for environmental samples with low tritium content leading to tremendous efforts to improve analytical procedure. Nowadays, through intercomparison exercises TFWT determination is established and OBT analysis slowly becomes mature <sup>(1)</sup>.

However, when dealing with NE-OBT determination, a critical point remains *i.e.* the elimination of the exchangeable fraction (E-OBT) even if this analysis is carried out within several labs. Indeed, after immersion of the dry grass or leaves a green coloration of the exchange water which is not fully understood yet appears. In a first step, different solutions were tried to hamper this coloration. First the exchange water volume was decreased by a factor of three, and second vapour was used to realise this stage without any change. Therefore, experimental work was undertaken to determine if the green coloration mentioned here before is accompanied by solid's modification and also which organic molecule(s) governs this coloration.

To reach this objective, new analytical capabilities were used to follow either the evolution of the solid sample or to investigate the composition of the exchange water. Thanks to the use of a CHNS/O analyser the elemental distribution was determined on the solid sample before and after the exchange stage to see whether or not the coloration is associated to a detectable (within analytical uncertainties) modification of its composition. Thanks to the use of an UV-VIS spectrophotometer the organic molecules which cause the green coloration of the exchange water were investigated for identification and quantification purposes.

Apart these results, the way to realise (almost) non-intrusive analysis of NE-OBT avoiding any modification of the sample is determined and validated.

(1) N. Baglan et al; Assessment and interpretation of a Round Robin exercise for Organically Bound Tritium determination; Proceedings of the 2008 international Liquid Scintillation Conference; Edited by J. Eikenberg, M. Jäggi, H. Beer, H. Baehrle; Radiocarbon, The university of Arizona, Tucson, Arizona, USA.