

## Application of $^{14}\text{C}$ method for biogenic component determination in waste and liquid fuels

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Increase of  $\text{CO}_2$  concentration in the atmosphere during 20<sup>th</sup> century is a consequence of intensive use of fossil fuels. The increase of  $\text{CO}_2$  concentration can be slowed down by the use of biogenic materials for energy production and/or transport.

One of the method for determination of the fraction of the biogenic component in any type of fuel or waste is the  $^{14}\text{C}$  method, which is based on different content of  $^{14}\text{C}$  in biogenic (reflects the modern atmospheric  $^{14}\text{C}$  activity) and in fossil component (no  $^{14}\text{C}$  present). The method can be applied to various types of fuels used in waste-to-energy plants (such as solid communal waste, used car tyres), to liquid fuels, even to the  $\text{CO}_2$  produced by combustion of various fuels. Any measuring technique used in  $^{14}\text{C}$  dating laboratories could be used. Here we present comparison of characteristics (precision, complexity, price) of various techniques (sample preparation and measurement) for biogenic fraction determination by the  $^{14}\text{C}$  method.

A case of liquid fuels will be specially discussed. According to the EU Directive 2009/28/EC all (liquid) fuels have to contain at least 10 % of bio-fuel, i.e., blend of biogenic origin, by 2020. A technique of direct measurement in liquid scintillation counters of the  $^{14}\text{C}$  content in liquid fuel is simple and fast but has a main disadvantage: different liquid colours cause different quenching and thus changes in the measurement efficiency. We propose a new data evaluation technique that uses liquids of different colours to construct calibration curves for modern and background samples [1]. The technique depends neither on the fossil matrix or the biogenic additive type. Lowest detectable biogenic fraction is 0.5 %.

- [1] Krajcar Bronić I, Barešić J, Horvatinčić N, Krištof R, Kožar-Logar J. In: Proc. 10th symposium of the Croatian Radiation Protection Association, Šibenik, 15 – 17 April 2015. CRPA, Zagreb, 2015. p. 360-365.