

## HIDEX BIOFUEL METHOD – A NOVEL DIRECT LSC METHOD TO DETECT BIOGENIC C-% IN FUELS

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Fossil based fuels are increasingly replaced by fuels of biologic origin, such as hydrotreated vegetable oil (HVO). Percentage of biogenic carbon component in fuel can be determined with accelerator mass spectrometry (AMS) and LSC preceded by benzene synthesis (ASTM D6866 and EN 16640 guidelines). The methods are based on  $^{14}\text{C}$  dating principle and provide accurate results but require costly, complex, and time-consuming sample preparation prior the measurement. Such service is often available by third-party laboratories only.

Direct detection by LSC is an attractive alternative as an “in-house” method. Liquid fuel samples can be measured directly after mixing with scintillation cocktail (DIN 51637 guidelines and Hurt et.al., *Energy Fuels*, 35, 2, 1503–1510, 2021). The main limitation of the direct method is the requirement of a fossil-carbon based background calibration sample similar by volume and quench level as the unknown samples. Such a sample is often difficult to find as fuels, especially mixtures, vary by color and by the content of aliphatic hydrocarbons. This is affecting both in background CPM and counting efficiency.



Typical fuel samples mixed with scintillation cocktail.

Hidex biofuel method overcomes the main limitation of the DIN 51637 method – i.e. problem on background calibration. Background count rate (and efficiency) is obtained from the samples themselves. Separate background sample or efficiency calibrator is not needed. The method involves Patent pending algorithm for finding the CPM of background and counting efficiencies. This is obtained by using a unique combination of TDCR and conventional External standard quench parameters, allowing to measure fuel mixtures with different colors. The method has been implemented successfully to many kinds of fuel types, such as HVO, kerosine and gasoline at range of 1 % to 100 % biogenic carbon content.

Same principle could be applicable also to other sample types with similar issues, e.g. urine samples.

In the presentation we'll present the principle of the method, example data and limitations.