

# Research in physical and chemical characterization of Biofuels



## PROJECT DETAILS

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## PROJECT DESCRIPTION

In order to validate chemical procedures for biofuels there is a need for certified calibrants. Gas Chromatography (GC) is the separation technique of choice to resolve mixtures of thermally stable volatile or semi-volatile compounds (such as those found in biofuels) and is an essential tool in research. However, the rapid development of the energy, pharmaceutical and pesticide industries etc. has led to an exponential growth in the amount of compounds requiring analysis by GC and for which pure or certified standards may not be available. Compound independent calibration, avoiding the need for specific standards, has therefore become a desirable target in modern analytical chemistry research. But, GC compound-independent calibration procedures for the determination of carbon-containing compounds do not yet exist.

Recently, the concept of a new quantitative detection system in gas chromatography, based on post-column  $^{13}\text{C}$ -isotope dilution analysis using electron ionization has been described. This concept is based on a procedure in which organic compounds separated by liquid or gas chromatography are converted quantitatively into carbon dioxide by an oxidation or combustion reaction and then mixed with a post-column flow of enriched  $^{13}\text{CO}_2$  and should provide quantitative information of every single compound previously separated in the chromatograph without the need for individual standards.

In order to address these issues, a procedure is needed for the certification of the purity of calibrants in an absolute mode and a complementary procedure for the determination of the chemical parameters of biofuels (a general procedure not requiring calibrants). Therefore, REG(UNIOVI) will develop two types of procedures:

- Analytical procedures based on Liquid Chromatography-Oxidation-isotope ratio mass spectrometry (LC-Oxidation-IRMS) with on-line carbon isotope dilution analysis (IDA) for the purity assessment of glycerol calibrant standards and
- Absolute determination procedures for the chemical characterization of crude biofuels based on Gas Chromatography-Combustion-Isotope Ratio Mass Spectrometry (GC-C-IRMS) with post-column carbon IDA.

## PROJECT PARTNERS

**Project Coordinator**  
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