Contribution ID: **39** Type: **Študenti fyzika**

Determination of Biogenic Carbon Fraction in Liquid Fuels by Accelerator Mass Spectrometry

Wednesday, November 26, 2025 11:09 AM (1 minute)

Reliable quantification of the biogenic carbon content in liquid fuels is needed to satisfy EU renewable-fuel requirements (Directive (EU) 2018/2001). Accelerator-mass spectrometry (AMS) provides a fast, self-consistent, and well-validated approach to distinguishing fossil from biogenic carbon, fully in accordance with ASTM D6866-2024 Rev A and EN 16640 standards.
In this study, we employ a sealed-tube oxidation procedure in which samples are heated to 550℃ in a muffle furnace for 12 hours in the presence of MnO_2, oxidising all presented carbon to CO_2. The produced CO_2 is then cryogenically purified (a water trap cooled to -30℃, followed by a liquid nitrogen trap) while graphite is converted in a catalysed graphitisation reactor.
Our liquid test matrix comprises alcohol (e.g., ethanol and isopropyl alcohol with their blends) for verification of our method. Liquids of purely fossil and purely biogenic origin were used to prepare additional samples with varying proportions of the biogenic component. The samples included commercially available diesel (B7) and petrol (E10), representing different fractions of biogenic carbon content. Biogenic fractions were determined with respect to a constant-contamination model, and the associated standard deviation was evaluated. The biogenic carbon content in analysed samples ranged from 4.5 ± 0.2 % to 5.7 ± 0.3 %.
The obtained results demonstrate that the sealed-tube MnO_2 combustion method coupled with ^{14}C and ^{13}C AMS analyses delivers a reliable, precision experimental approach for routine certification of biofuel blends, thereby supporting the regulatory compliance and sustainability initiatives in the automotive sector.

Keywords: AMS; ^{14}C; Biofuels; Combustion; MnO_2; Blend-Ratio Determination

Pracovisko fakulty (katedra)/ Department of Faculty

Katedra jadrovej fyziky a biofyziky

Tlač postru/ Print poster

Nebudem požadovať tlač posteru / I don't require to print the poster

Author: BOBAL, Boris

Co-authors: KONTUL, Ivan; KAIZER, Jakub (Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava); ZEMAN, Jakub; JESKOVSKY, Miroslav; POVINEC, Pavel P.

Presenter: BOBAL, Boris

Session Classification: Poster session + káva: prezentácie študentov Fyzika

Track Classification: Poster session + káva: prezentácie študentov: Poster session + káva: prezentácie študentov Fyzika