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VABILO NA PREDAVANJE V OKVIRU DOKTORSKEGA ŠTUDIJA KEMIJSKE ZNANOSTI / INVITATION TO THE LECTURE WITHIN DOCTORAL PROGRAMME IN CHEMICAL SCIENCES

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z naslovom / title:

Evolved Gas Analysis. Differences and complementarity of two TGA-μGC-MS and TGA-STI16-GC-MS couplings. Examples on different materials

v sredo, 24. 4. 2024 ob 15. uri /
on Wednesday, 24. 4. 2024 at 15.00
v predavalnici 1 v 1. nadstropju Fakultete za kemijo in kemijsko tehnologijo, Večna pot 113 **/ in lecture room 1,** 1st floor at the Faculty of Chemistry and Chemical Technology, Večna pot 113

Vljudno vabljeni! / Kindly invited!

Abstract:

The coupling of thermogravimetry (TGA) with mass spectrometry (MS), Fourier-transformed infrared spectroscopy (FTIR), gas chromatography-mass spectrometry (GC-MS) or micro gas chromatography-mass spectrometry (µGC-MS) instruments clearly enhances the basic information provided by TGA alone.
The composition of emitted gases obtained by evolved gas analysis (EGA) provides a detailed insight into the mechanisms of decomposition/degradation of materials as well as information on the toxicity of the material during heating. EGA also enables the de-formulation of a material to understand its physico-chemical behavior during heating.
The above couplings are powerful techniques that provide both quantitative (mass loss) and qualitative (identification) information about the gaseous products released during a TGA measurement. Each coupling has its own specificity. The interpretation of infrared spectra or mass spectra becomes more complicated when many unknown gases are released simultaneously. In this case, a separation step becomes necessary. This can be solved by coupling TGA with a separative analytical technique such as gas chromatography.
An interesting coupling such as the TGA storage interface-GC-MS can therefore be used for analyzing very complex gaseous mixtures coming from plastics, bitumen, resins, silicones, waxes, etc. Another useful coupling that enables the separation of small molecules such as permanent gases, light solvents, light and medium VOCs is the TGA-µGC-MS. With these two couplings, the emitted gases can not only be separated and identified, but also quantified. The first is an offline coupling (a storage step takes place between the TGA and GC-MS analyses), the second is an online coupling. These 2 couplings differ in terms of the analysis time, verification and cleaning of certain coupling parts (TGA furnace, transfer lines, storage loops…), the number of samplings that can be done during the TGA, the number and nature of VOCs separated and the more or less simple type of calibration. In some cases, the 2 couplings become complementary.
To illustrate all this, various examples will be shown on materials such as plastics, bitumen, biomass (see figure below), hydrogen-based chemical compounds and petroleum coke.