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Title: Combustion, crude oil, coffee roasting and aerosols: Analysis of complex materials and thermal processes by Photo-Ionisation Mass Spectrometry

Abstract: Mass Spectrometry with soft Photo-Ionisation (PIMS, Anal. Chem. 81, 2009, 4147f) enables the direct detection of trace molecules in complex organic vapours as well as in pyrolysis or combustion off-gases. This renders PIMS as a well suited tool for Evolved Gas Analysis (EGA) in Thermal Analysis (TA) in order to determine molecular organic signatures of desorption, pyrolysis and combustion processes as well as for applied and fundamental combustion research. In the lecture a brief explanation of the principles of the used photo-ionisation mass spectrometry approaches is given (multi- and single-photon ionisation). In the following, different experimental constellations for the hyphenation of TA-devices to PIMS analysers are presented (e.g. thermogravimetry-PIMS or differential scanning calorimetry-PIMS) and applications such as crude oil- or polymer-analysis are discussed.

PIMS also allow the direct monitoring of combustion and pyrolysis processes, e.g. for industrial process monitoring purposes or more fundamental combustion studies. For example the formation of flavour compounds during the coffee roasting process or combustion-processes e.g. in combustion engines, log wood ovens or in a cigarettes can be addressed. In summary the potential of soft photo-ionisation mass spectrometry for applied industrial- as well as fundamental-research is demonstrated and discussed.