**Dopant assisted Photoionization Ion Mobility Spectrometry (IMS) for Determination of PAH in Aqueous Samples**

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The supplies of clean drinking water is a basic need of each society. Therefore, water suppliers are obliged to control the quality of their product continuously. According to the Drinking Water Ordinance (TrinkwV 2011), this includes the monitoring of the polyaromatic hydrocarbons (PAHs). Additionally, the single substances anthracene, fluoranthene and naphthalene, as well as PAHs as group of substances, are listed as “priority” substances in the EU Water Framework Directive (WFD) to the quality of surface waters. Despite the fact that numbers of sensitive chromatographic and mass spectrometric methods with suitable sample preparation steps already exist, the sensitive on-site/on-line methods for monitoring are required.

Ion mobility spectrometry (IMS), originally used to detect gaseous organic contaminants (e.g. chemical warfare agents, explosives and illicit drugs) in air, combined with a suitable sample introduction system is a promising technique for analyzing aqueous samples. This technique fullfills the requirements of short analysis time, high selectivity and sensitivity.

In this work, the coupling of a home built APPI-IMS with a laser induced fluorescence (LIF) detection unit was realized. The sample preparation includes stir bar sorptive extraction (SBSE) and subsequent thermal desorption of the analytes. The PAHs are selectively ionized via a photo-ionization (PID lamp 116,5nm + 123,6nm). A research grade IMS with pulsed ion injection [Bradbury and Nielson gating (BNG)] was designed in order to allow the efficient separation of the analyte ions. Mobility analysis of PAHs was performed at elevated temperatures (up to 250-300°C). To achieve the required sensitivity and selectivity, electric field strengths within the range of 150-350 V/cm and variable shutter electronics (pulse width, duty cycle, applied voltage) were examined. The ion mobility spectra of selected PAHs measured with the developed APPI-IMS will be shown. It is demonstrated that addition of the appropriate amount of volatile organic compounds (modifiers) to the transport gas can significantly enhance the sensitivity of IMS. For the investigation of the APPI-IMS performance an electrometer was used as detector. In order to increase the selectivity and sensitivity of the analytical system a LIF cell was designed and integrated into the IMS unit as a second detector. Gas phase fluorescence spectra of selected PAHs will be presented.