

DETECTION OF POLYAROMATIC HYDROCARBONS BY TLC-SERS TECHNIQUE

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Abstract

Polyaromatic hydrocarbons are water and food pollutants of high concern. They are formed during incomplete oxidation of organic matter, and usually comprise the complex mixture of isomers. Rapid and reliable detection of polyaromatic hydrocarbons is needed to ensure the water and food safety.

Mixtures of polyaromatic hydrocarbons can be separated by thin layer chromatography – a cheap and robust analytical method. However, even if all the required standards are available, identification of different polyaromatic analytes only by their R_f values may be erroneous. Recently, hybrid thin layer chromatography – surface enhanced Raman spectroscopy (TLC-SERS) approach was successfully employed for the detection of ephedrine (DOI:10.1007/s00216-014-8380-9), Sudan I (DOI:10.1016/j.talanta.2015.05.003), and pesticides (DOI: 10.1016/j.talanta.2014.03.075). SERS fingerprints allow to identify the pollutants without the external or internal standards, thus improving the reliability of detection and excluding the need to keep highly toxic compounds at hand to perform the analysis.

In our work we obtain normal Raman and SERS spectra of polyaromatic hydrocarbons, either on reference aluminum foil substrates or directly on TLC plates. Relative simplicity of polyaromatic hydrocarbons opens the possibility to assign the bands in SERS spectra, and to discriminate analytes not only by known fingerprints, but by SERS spectra-based guesses for the unknown compounds.

Keywords: Polyaromatic compounds, thin-layer chromatography, surface-enhanced Raman spectroscopy

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