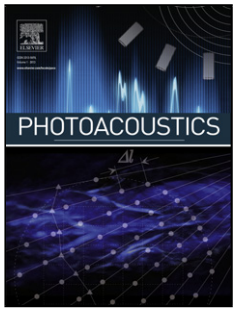

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Photoacoustic Detection Based Permeation Measurements; Case Study for Separation of the Instrument Response from the Measured Physical Process

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Abstract

In a carrier flow based permeation system the measured permeation curve is the convolution of two processes: the intrinsic permeation process and the transfer of the permeated molecules through the measuring system. The latter one is quantified by the instrument response function (IRF). The possibility of calculating the IRF from permeation curves measured at various volumetric flow rates of the carrier gas is examined. The results are in partial agreement with preliminary expectations: the dependency of the calculated IRF on the volumetric flow rate of the carrier gas indeed follows roughly the expected tendency; however it is not completely independent from the physical properties of the measured membrane sample. This discrepancy can most probably be attributed to the imperfect design of the applied permeation cell. Overall it is expected that the proposed method for determining the instrument transfer function is a valuable tool for improving the design of permeation measuring systems.

Keywords: membrane permeability; instrument response function; residence time distribution analysis; photoacoustic detection