

Fast scanning calorimetry for vapor pressure determination above solids and liquids

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Recently, a thermogravimetric method, based on fast scanning calorimetry (FSC) and a laminar purge gas flow above the sample, was applied to measure the vapor pressures of several ionic liquids and heterocyclic compounds. Compared to conventional techniques, the FSC method utilizes micrometer-sized samples with a high surface-area-to-volume ratio allowing for increasing evaporation rates and avoiding decomposition at elevated temperatures. In the presented work, an adaption of the basic ideas of the original FSC method to a situation with a stagnant purge gas phase is described. Such experimental conditions can be realized with the widely available commercial fast scanning chip calorimeters Flash DSC 1 and Flash DSC 2+ (Mettler Toledo, Switzerland). The validity of the developed procedure was checked by comparing the vapor pressures determined in this work for several polyaromatic, heteroaromatic, and long-chain compounds with reliable vapor pressure data available in the literature. The results of the comparison show that the commercial instruments can be used without additional technical changes as a source of comprehensive and internally consistent information about the energy of phase transitions.