DETERMINATION OF THE SUBLIMATION VAPOR PRESSURE OF THERMALLY LABILE COMPOUNDS WITH FAST SCANNING CALORIMETRY

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The determination of vapor pressure and corresponding enthalpy of sublimation lay within focus of many scientific fields and industrial applications. These values directly connected to the intermolecular forces in crystal state, provides the lattice energy and change in ordering by going from crystal to gas phase. In the present study, the fast scanning calorimetry was successfully applied for determination of vapor pressure and enthalpies of sublimation of low volatile organic substances.

In many cases, investigation of thermally labile systems e.g. biomolecules are accomplished with low thermal stability of them and application of classic techniques often fails by determining the decomposition rate of the system. Our technique is based on the determination of the mass loss rate of the sample from the experimental total heat capacity and preliminary determined specific heat capacity of the compound under study. Sublimation of the sample is carried out during repeated isotherms of pre-defined duration and at selected temperatures. Sample is heated to needed temperatures using high heating rates accessible by this technique, which allows reaching the sublimation temperatures without any mass loss during the heating time. From the other side in the proposed technique, the surface to volume ratio of the sample is so high, that sublimation mass loss rate is incomparably higher that decomposition rate. Thus, the sample of a few nano-grams sublimes without any thermal degradation.