

Abstract

The dependence of the homogeneous nucleation rates of *n*-propanol on the carrier gas pressure has been investigated in the Nucleation Pulse Chamber (NPC) and the Laminar Flow Diffusion Chamber (LFDC).

Given the differences in the measurement principles and the data evaluation methods used in both experimental setups, the nucleation rates as a function of supersaturation are in good agreement. For the LFDC it turned out that only a small temperature range is appropriate for determining a pressure dependence of the nucleation rates of *n*-propanol. A weak positive pressure effect was observed. However contrary to previous assumptions, a significant dependence of the nucleation rates on carrier gas pressure was observed in the NPC over the entire accessible temperature range. Measurements of the isothermal nucleation rates at constant saturation ratio revealed a continuous increase of the rates with increasing carrier gas pressure. Based on the obtained data, a correction was derived for the *n*-propanol nucleation rates. By this correction, experimental nucleation rates measured in the conventional way with variations in the carrier gas pressure can be determined relative to a reference pressure. In previous measurements, a scatter in experimental nucleation rates of one order of magnitude was assumed. By considering the pressure dependence in the NPC, this error is reduced to one third of the original magnitude.

As demonstrated in the present work, the now known pressure dependence can be used to reevaluate all previously published results measured in the NPC, where different carrier gas pressures were involved.