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Gesellschaft für Anlagensicherheit
Höchst zuverlässig.

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Identifying very low vapor pressure (e.g. of solids)

No data, no market: That's what it says in Article 5 of the General obligation to register and inform requirements for chemicals covered by the new REACH Regulation, which are currently being introduced incrementally. Because of this, determination of vapor pressure will soon play a larger role in the chemical industry. Based on REACH, determining vapor pressure falls under the standard requirements for physiochemical studies (see REACH Regulation Annex VII 7.5) and is therefore required for each registration of a substance.

Vapor pressure can be determined using the various methods described in the OECD Guideline 104. With the effusion method/vapor pressure balance, vapor pressure can be determined from solid and liquid substances in a pressure range from 10^{-3} to 1 Pa (or 10^{-5} – 10^{-2} mbar). This range is especially important for medium- to low-volatile substances.

The principle of the effusion method is based on a molecular beam that is emitted through the defined opening of a Knudsen effusion cell and that condenses on a target plate cooled with liquid nitrogen. The vapor pressure of the test substance can be computed with the Knudsen effusion equation from the increase in weight of the target plate, which is measured using a highly sensitive microbalance (see Figure 1). In Figure 2, the vapor pressures of benzoic acid measured at various temperatures are plotted over the inverse temperature. The Antoine parameters can be determined from the straight lines formed in the semi-logarithmic diagram, with which the vapor pressure at other temperatures can be extrapolated. The unique aspect here is that substances with a very low vapor pressure (e.g. solids) can be reliably measured this way.

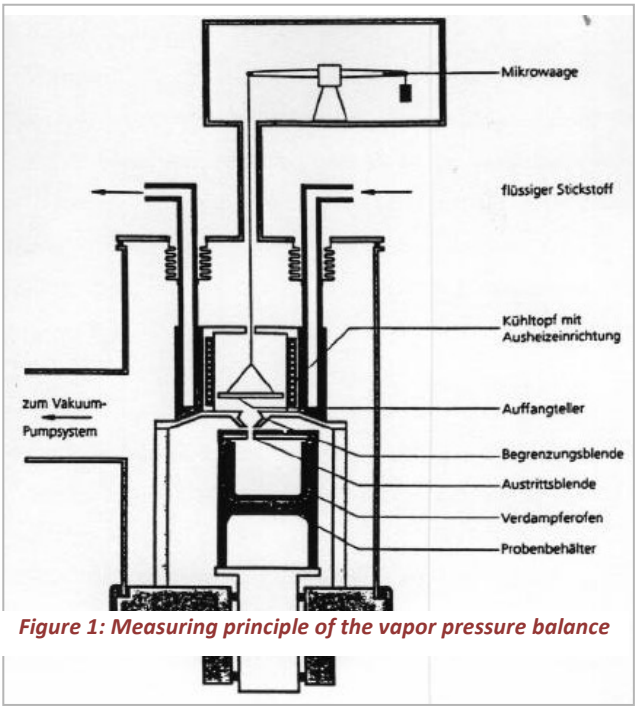

Figure 1: Measuring principle of the vapor pressure balance

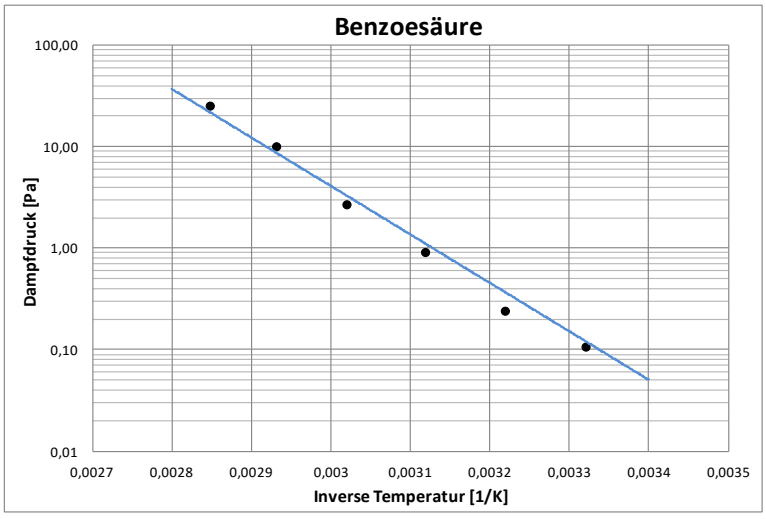

Figure 2: Vapor pressure depending on the inverse temperature

In addition to the described vapor pressure balance, the consilab laboratory features a second device that determines vapor pressure from the loss of mass caused by the effusion (recommended measuring range according to OECD 104: 10^{-10} to 1 Pa).

As a certified GLP testing facility, consilab naturally also offers determination of vapor pressure in the form of a GLP study. In addition, our laboratory is equipped with all other physiochemical methods required for the new approval of substances.

If we can assist you with an issue related to determining vapor pressure, please contact us. Our experts will be happy to help you.

Your contact: Dr. Jürgen Franke, tel.: +49(0)69-305-16658, fax: +49(0)69-305-30014, email: juergen.franke@consilab.de
consilab Gesellschaft für Anlagensicherheit mbH, Industriepark Höchst, G830, 65926 Frankfurt a. M., Germany, www.consilab.de