

Influence of crucible construction material on the thermal stability as measured by DSC

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Thermoanalytical techniques, such as differential scanning calorimetry (DSC), are routinely applied to determine basic safety data for process risk assessments (PRA) in the chemical industry as well as for storage and transport of bulk chemicals [1]. Since DSC measurements are performed with sample materials in amounts of milligrams, the legitimate question is always, whether the measured data is representative for the large scale unit operation or not (scale-up problem). One aspect which has to be considered in this context is the interaction of the sample with the crucible construction material.

During the many years of practical experience in the field of calorimetry for PRAs, many examples of critical material combinations were observed at the SWISSI. In this presentation some examples are given, where the interaction between sample and crucible construction material was significant and therefore the measured data was not representative for the process of concern and thus could not be used for scale-up purposes.

These observations demonstrate again the possible lack of information when only a single method is applied for safety data evaluation and the need for complementary, alternative testing methods respectively [2]. It also highlights the necessity for information exchange between plant (process owner) and safety lab, to define testing conditions as representative as possible.

References:

[1] Stoessel F., Thermal Safety of Chemical Processes, Wiley-VCH, 2008

[2] Grewer T., Thermal Hazards of Chemical Reactions, Volume 4, Elsevier, 1994