

Application of Calorimetry to the Safety of Industrial Processes From Incidents to a Mature Science

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Process safety is often perceived as a constraint hindering the performance of an economically viable process. Using the historical development of calorimetric methods in the field of process safety, it is shown that this apparent opposition, in fact allows synergies, leading to technical and economical optimised processes.

During the seventies, a fast development took place, promoting the use of scientific methods applied to the solution of safety problems, which previously were studied only empirically. Many major chemical companies in the world developed their own instruments or adapted existing laboratory equipment to safety studies.

In Basel, the former Ciba learned the lessons from a severe explosion at the end of 1969 and developed the application of thermal analysis (DSC) for studying thermal stabilities of chemical compound, and reaction masses [1].

At the same time a reaction calorimeter was developed [2], which turned out to be a powerful for the study of the thermal course of a chemical reaction. This was the beginning of a path leading to strategies allowing mastering exothermal reactions and optimizing them in an economical viewpoint.

These methods were arranged in a systematic frame and made available to a large range of non specialists [3]. Some of the most recent developments concerning the application of calorimetric methods to process development and optimisation are shown on examples stemming from the industrial practice as well as from research work [4-6].

- [1] Brogli F., R. Gygax, and M.W. Meyer, *Sixth international conference on thermal analysis*, Bayreuth, 1980, Birkhäuser Verlag, Basel.
- [2] Regenass W., *Chimia*, (1997). **51**, 189-200.
- [3] Stoessel F., *Chemical Engineering Progress*, **10** (1993) 68-75.
- [4] Ubrich O., *et al.*, *Chemical Engineering Science*, **56** 17 (2001) 5147-5156.
- [5] Schneider M.A. and F. Stoessel, *Chemical Engineering Journal*, **115** (2005) 73-83.
- [6] Zufferey B. and F. Stoessel, *12th International Symposium Loss Prevention and Safety, Promotion in the Process Industries* (2007). Edinburgh: IChemE..