

SPECIAL FEATURE SECTION: SAFETY OF CHEMICAL PROCESSES

Editorial

This special supplement contains contributions which deal with the thermal and other hazards of the scale-up of chemical processes and the instrumentation, particularly calorimetry, which helps to characterize the process and define its safe operating limits. Many manuscripts were submitted for this issue, and I am grateful to all the authors for spending the time to describe their work in detail. Unfortunately, several papers were received late and will not appear in this issue—however, they will be published in subsequent issues of *Organic Process Research & Development*.

This topic is very dear to my heart. As a young scientist at ICI in the 1970s, I became part-time safety advisor for their corporate research laboratory, which experimented on topics as varied as homogeneous catalysis, organic semiconductors, and genetic engineering. I learned a lot in those days, which was valuable, since safety is not a topic given much time in undergraduate and postgraduate chemistry courses. At ICI, the concept of thermal hazards testing was being established, and a new laboratory devoted to examining testing methodologies was set up in Blackley in the 1970s. Similar laboratories were established in other companies at the same time, partly as a response to a series of accidents, mostly involving runaway reactions of nitro compounds.

In my SmithKline days, this emphasis on safety was continued; even so, I had a runaway reaction with a sodium hydride and DMF mixture on 2500-L scale. Although there had previously been many runaway reactions with this mixture, none had been reported until we published the findings of our runaway in the early 1980s. Then we received letters from other companies who had previously had runaways under similar circumstances with NaH–DMF reagents. It is vital that all near misses and runaways are published to alert others to the dangers, but this is often not carried out, owing to company pressure to keep things secret. When I founded Scientific Update in 1989, the first courses on Chemical Development and Scale Up had a separate

safety section, often taught by experts in the area. I felt it was vital that chemists and chemical engineers new to the industry should be taught the basics of chemical safety and hazards of scale-up early in their careers so that hazards are not “designed” into the process through ignorance.

In 2002, new chemists are still entering the profession with little or no knowledge of the subject of thermal hazards of scale-up, whilst older chemists with wide experience of the subject are being released or retired early as companies merge or downsize. The fast-tracking of chemical projects creates a situation where safety issues can potentially be overlooked in some organisations.

I hope that this special issue will help increase the awareness of the potential of many organic reactions to be hazardous if carried out in an incorrect manner. The knowledge gained by an expert safety evaluation leads to a better understanding of the chemical process, which often results in a better process, often with cost savings, and is therefore an essential part of the development process. However, knowledge of hazards is not enough to prevent accidents. The management systems must also be in place; I quote Trevor Kletz,¹ “It might seem to an outsider that industrial accidents occur because we do not know how to prevent them. In fact they occur because we do not *USE* the knowledge that is available. Organisations do not learn from the past or rather, individuals learn but leave the organisations, taking their knowledge with them, and the organisation as a whole forgets.”

Trevor Laird

Editor

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(1) I am indebted to the IChemE Safety and Loss Prevention Group 2002 summer newsletter for reminding me of one of the quotations from Kletz's excellent books on safety.