

## Editorial corner – a personal view

### Investigating thermal degradation kinetics of polymers: Does it have practical significance?

A.S. Luyt\*

Department of Chemistry, University of the Free State (Qwaqwa Campus), Private Bag X13, Phuthaditjhaba, South Africa

Menczel and Prime, in an introduction to a section describing thermal degradation kinetics of polymers by using thermogravimetric analysis, state that kinetic information is crucial for evaluating the times and temperatures associated with the processing, service lifetimes, and storage of materials [Thermal Analysis of Polymers – Fundamentals and Applications, ISBN 978-0-471-76917-0]. As most of us know, these kinds of kinetic analysis may be divided into isothermal and non-isothermal methods, of which the most controversial, but also most used, is the non-isothermal method. This method is based on a relationship between heating rate, extent of conversion and temperature, and there are a number of models derived over the past 40–50 years that may be used to calculate activation energies, preexponential factors, lifetime estimates, etc.

If different models are applied to the same set of data, different kinetic parameters may be obtained. The reliability of these parameters depends very much on the actual processes occurring during the thermal degradation of a polymer, and the assumptions made when applying these models. During the four years of existence of this journal only two papers were published on the thermal degradation kinetics of different polymers obtained through TGA analysis at different heating rates [Express Polymer Letters, **1**, 208–216 (2007); Express Polymer Letters, **2**, 133–146 (2008)], but I think they are very good papers that provide more information on the polymer degradation mechanisms than just cranking data through complex mathematical procedures.

I recently assisted someone in the submission of a manuscript describing the degradation kinetics of a novel polyester prepared in their laboratories. One of the reviewers commented that the TGA community is addicted to these complex analyses of their data and fitting to models, and that this sort of analysis does not give any real insight into what is really happening.

It seems as if there are different viewpoints on the usefulness of non-isothermal degradation kinetic investigations, especially on polymers. How realistic are the estimated lifetimes determined from kinetic analyses on the very small samples normally used for TGA analysis? How applicable are these data to larger polymer samples used in real life? Whatever the answer may be, I think that degradation kinetic analysis serves a purpose, even if it is only to compare the thermal behaviour of newly synthesised polymers with that of known polymers, or the influence of (especially nano-sized) additives on the thermal behaviour of selected polymers. Eventually this information will add to the bigger picture painted through the efforts of all polymer scientists.



Prof. Dr. Adriaan Stephanus Luyt  
Member of International Advisory Board

\*Corresponding author, e-mail: [LuytAS@qwa.ufs.ac.za](mailto:LuytAS@qwa.ufs.ac.za)  
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