No paper available

GP-9 - General Poster

Determination of Thermal Degradation Behavior of Oligo/Poly(Ethyl-2-Cyanoacrylate) Using DSC/TGA

Sandra Guns, TNO - sandra.guns@tno.nl
Wim de Klerk, TNO - wim.deklerk@tno.nl
Gino Groeneveld, NFI - g.groeneveld@nfi.minvenj.nl
Antoine van der Heijden, TNO - antoine.vanderheijden@tno.nl
Marcel de Puit, NFI - m.de.puit@nfi.minvenj.nl

The use of cyanoacrylate (CA) and sequential treatment with fluorescent dyes (such as Basic Yellow) for the visual enhancement of latent fingerprints is well described and commonly used. Due to the dye-treatment for visualization and mandatory washing step, loss of DNA is inherent, but highly unwanted. Synthesis of oligo/poly(ethyl-2-cyanoacrylates) with additional co-fumed dye made the washing step obsolete and results in preservation of the DNA material for further forensic research. PolyCyano UV is a commercial available ethyl-2-cyanoacrylate-polymer that contains less than 5% dimethylamino benzaldehyde (DMAB) fluorophore. Standard procedure to visualize fingerprints is to place a small amount of PolyCyano UV into a foil dish and fume it in a fuming chamber at 230 °C and 80% humidity level.

At the Netherlands Forensic Institute (NFI) efforts were made to synthesize equivalents of PolyCyano with and without the presence of the fluorophore p-DMAB. Their thermal degradation was studied with the help of Differential Scanning Calorimetry (DSC) and Thermal Gravimetric Analysis (TGA). Additionally the pure fluorophore p-DMAB, the commercially available PolyCyano UV and physical mixtures thereof were analyzed as reference material.

Thermal characterization of the reference material PolyCyano UV could not define whether the fluorophore was chemically linked to the oligomer or not. The degradation temperature of the synthesized oligomer was much higher, but this could be allocated to the influence of the fluorophore that was lacking in this sample. The fluorophore clearly influenced the degradation temperature of the oligomer and this was in a concentration dependent manner. Two samples were analyzed whereby attempts were made to chemically link the fluorophore to the oligomer during synthesis ("Oligocyano + p-DMAB reacted in EtOH" and "Oligocyano + p-DMAB reacted in acetone"). Degradation temperatures were comparable to the commercial PolyCyano UV and no presence of a separate crystalline fraction of the fluorophore could be detected. Clear is that the standard procedure (fuming at 230 °C) should work for all synthesized oligomers.