Investigation of the Drug Substance Torasemide Using Coupled Thermoanalytical Methods (TG-FTIR, TG-MS)

Zsuzsanna Éhen, Judith M. Rollinger[#], Csaba Novák, Katalin Marthi

Institute of General and Analytical Chemistry
Budapest University of Technology and Economics and
Research Group for Technical Analytical Chemistry of Hungarian Academy of Sciences
H-1111 Szent Gellert ter 4, Budapest, Hungary
e-mail: ehen_zs@tki.aak.bme.hu

[#]Institute of Pharmacy
Department of Pharmacognosy, University of Innsbruck
Innrain 52, Josef-Moeller-Haus, A-6020 Innsbruck, Austria

The application of different thermoanalytical methods in pharmaceutical areas is commonly known. Despite of their simplicity, their main disadvantage is the lack of any structural information with regard to the composition of evolved gaseous products. However, the determination of evolved gases using coupled techniques e.g. TG-MS and TG-FTIR is a well established and successfully applied method in the analysis of inorganic and organic substances. The application of these simultaneous techniques allows the identification of the composition of gaseous products during desolvation and degradation.

The compound investigated in this study is Torasemide which is used as potential loop diuretic and antihypertensive agent. It is marketed as Demadex®, Toradiur®, Torem®, and Unat® in different European countries. The different crystal forms of Torasemide have been investigated in details and reported [1].

The aim of the present study was to identify the decomposition products of Torasemide Form A crystallized from a mixture of water and ethanol (1:2 v/v). TA Instruments STA – Balzers Thermostar TG-MS and TA Instruments TG – BioRad Excalibur FTIR couplings were used for the above mentioned purpose. Complementary investigations have been done on the samples using hot-stage-, FTIR- and scanning electron microscopy.

The thermal behavior of Torasemide Form A could be classified into five steps. At first the evaporation of the applied solvent(s) could be observed. Then, the desolvation of Torasemide Form A, the solid-solid transformation into the anhydrate Mod. II and its melting were elucidated using thermal analysis and microscopic observations (FTIR and hot-stage microscopy). On further heating the thermal degradation of the substance took place. The chemical identification of evolved gases was done up to 340°C as it has been discussed in details in [2].

References:

[1] J. M. Rollinger, E. M. Gstrein and A. Burger, Eur. J. Pharm. Biopharm., 53 (2002) 75.
[2] J. Rollinger, Cs. Novak, Zs. Ehen and K. Marthi: J. Therm. Anal. Cal., 73 (2003) 519.