*Environmental Engineering and Management Journal*

*November 2012, Vol.11, No. 11, 1945-1952*
*http://omicron.ch.tuiasi.ro/EEMJ/*

*"Gheorghe Asachi" Technical University of Iasi, Romania*

# KINETICS OF THERMAL DEGRADATION OF SOME FERROCENE DERIVATIVES

**Gabriela Lisa[1*], Daniela Apreutesei Wilson[1,2], Natalia Hurduc[3], Nita Tudorache[4], Dan Scutaru[1]**

[1] *"Gheorghe Asachi" Tehnical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 73 Prof.dr.doc D. Mangeron Street, 700050 Iasi, Romania*
[2] *Institute for Molecules and Materials (IMM), Radboud University Nijmegen Heyendaalseweg 135, 6525 AJ Nijmegen, The Netherlands*
[3] *,,Al. I. Cuza" University, Iaşi, Faculty of Chemsitry, 11 Carol I Blvd., 700506 Iasi Romania*
[4] *"Petru Poni" Institute of Macromolecular Chemistry, 41A Gr. Ghica Voda Avenue, 700487 Iasi, Romania*

## Abstract

The thermogravimetric study of some ferrocene derivatives with liquid crystalline properties was conducted on a Mettler Toledo TGA-SDTA851e derivatograph. The data were recorded in 20 ml/min outflow nitrogen and air, within the 25 - 900 °C temperature range and at heating rates of: 7, 10, 13, 16 and 19°C/min. The curves were processed in order to detect the thermal and kinetic characteristics by means of STAR software, more precisely on the "Kinetics n$^{th}$ order" module from Mettler Toledo. The thermogravimetric and kinetic studies revealed that the **S2** ferrocene derivative presents a better thermal stability than the **S1** derivative, regardless of the working atmosphere. The shape of the curves of apparent activation energies variation with the conversion degree, determined by means of the ASTM–E1641 method, provided data about the degradation mechanism. The TG-MS-FTIR study conducted on the sample **S1** revealed a higher ionic current intensity for the m/z=28 ionic fragment in the first stage, which means that thermal degradation begins in the –N=N- group and continues by splitting the aromatic rings, the other linkage groups and the cholesteryl ending groups. The TG-MS-FTIR study carried out on the sample **S1** also revealed the highest amount of $CO_2$ in the gases resulting from thermal decomposition. Therefore, this suggests its harmful effects on the environment, which consist of greenhouse effect enhancement, should there occur fires or should household waste be disposed of by incineration, considering the applications that these materials may have in displays technology.

*Key words:* degradation mechanism, ferrocene derivatives, kinetics of thermal degradation, TG-MS-FTIR

*Received: July 2012, Revised final: October 2012, Accepted: November 2012*

[*] Author to whom all correspondence should be addressed: e-mail: gapreot@yahoo.com