

Journal of Thermal Analysis and Calorimetry 2012 vol.110 N3, pages 1309-1313

Thermal analysis of charge-transfer complex formed by nitrogen dioxide and substituted calix[4]arene: Characterization of complexation reversibility

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Abstract

Simultaneous thermal analysis with evolved gas analysis (STA-EGA) was used to study the ability of 1,3-alternate conformer of tert-butylcalix[4]arene with four n-propoxy substituents (1) to be applied for detection of nitrogen dioxide in reversible sensors. Solid calixarene 1 forms an intensively colored charge-transfer complex (CTC) with gaseous NO₂/N₂O₄. Using the STA-EGA method, the nature and conditions of CTC bleaching were characterized, including the conditions of its reversible change of color from white to dark blue and back at CTC formation and decomposition. For this, the thermal stability of CTC and its regeneration products were studied. This, together with the ion thermograms for evolved gases, gives the information on the oxidation of 1 by nitrogen dioxide if present. © Akadémiai Kiadó, Budapest, Hungary 2011.

<http://dx.doi.org/10.1007/s10973-011-2105-5>

Keywords

Calixarene, Charge-transfer complex, Nitrogen dioxide detection, STA-EGA analysis