



New methods to determine the acid-base and surface properties of polymers: Application to poly (α -n-alkyl) methacrylates

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Abstract

The determination of the superficial characteristics of solid substrates and more particularly of polymers or polymers adsorbed on oxides is of capital importance to the comprehension and the forecast of their behaviors in many applications. These solid surfaces are generally in contact with gas, liquids or other solids, such as for example association polymer/metallic oxides for the coatings of paintings or industrial packing. Acrylate polymers as poly methyl methacrylate (PMMA) or poly (α -n-alkyl) methacrylate are preferentially used in various fields such as architecture, aeronautics, urban furniture, electronics, etc.

In this paper, inverse gas chromatography (IGC) at infinite dilution was applied in order to determine the change, as related to temperature, of the properties and the second order transitions of some polymers adsorbed on oxides, and particularly to study the transition phenomena of poly (α -n-alkyl) methacrylate adsorbed on silica or alumina. The study of the evolution of $RT\ln V_n$, as a function of $1/T$ for different n-alkanes adsorbed on poly (α -n-alkyl) methacrylates, allowed to an accurate determination of their transition temperature (T_g). The dispersive energy and the acid base properties in the Lewis terms of poly (α -n-alkyl) methacrylates were determined. The acid base constants K_A and K_D of various polymers were calculated by testing both the classical and Hamieh models. It was proved an important effect of the length of alkyl group in side chain of poly (α -n-alkyl) methacrylates on the surface properties of such polymers and especially on the acid base constants and the transition phenomena. It was also proved an excellent linear correlation between the specific enthalpy of adsorption, the acid base constants, the carbon atom number in the side chain of poly(α -n-alkyl) methacrylates and the acceptor AN and donor DN numbers of electrons of polar organic molecules.

Biography

Hamieh T completed his first PhD in Physical Chemistry (1985), his HDR (1996) and obtained in 2001 his second Ph.D. in Mathematics from the University of Haute-Alsace. He is the Director of MCEMA Laboratory at Lebanese University since 2000. He was invited researcher at SATIE-IFSTTAR, University Gustave Eiffel (2018-2020), He was the Dean of the Faculty of Agriculture (2008-2014). He was Professor at the University of Haute-Alsace until 2002, invited professor (1998) at University of Alberta, Canada and Visiting Professor (2003 and 2017) at the University of Poitiers. He published over 240 publications that have been cited over 2757 times, his publication H-index is 26 and has been serving as an editorial board member and reviewer of reputed Journals, chairman and editor of many conferences on Materials Sciences, He was editor of four Volumes of international journals.



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