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N-1-ALKYLITACONAMIC ACIDS-CO-STYRENE COPOLYMERS, SURFACE CHARACTERIZATION

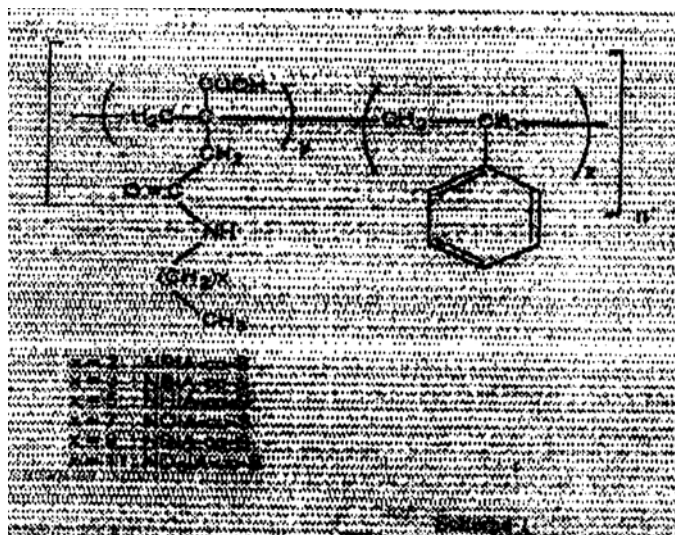
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A serie of six N-1-alkyl itaconamic acids-co-styrene copolymers with alkyl groups varying in lateral chain length from 3 to 12 was used in this study. (Scheme 1)

Composition of the copolymers were determined by elementary analysis measurements following the nitrogen content in the copolymer¹. The molecular weight of the polymers was in the range 60.000-80.000 and the molecular weight polydispersity (MWD) was about 1.8



The surface behavior of the copolymers has been studied as function of the side chain length. Contact angle data for two of these copolymer surfaces were obtained in water and several liquids.

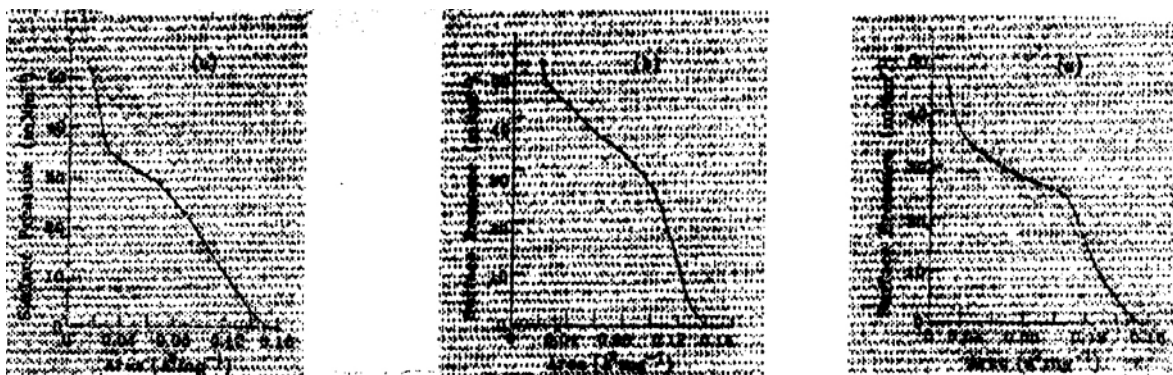


Figure I. Isotherms π -A of spreading of copolymers. a) N-1- Propylitaconamic acid-co-Styrene (NPiA-co-S); b) N-1-Octylitaconamic acid-co-Styrene (NOiA-co.S); and c) N-1-Dodecylitaconamic acid-co-Styrene (NdoiA-co-S) at 80/20% composition (20% S) and water subphase pH 5.6.

From this information the surface energy was determined. Differences in the wettability of N-1-alkylitaconamic acid-co-styrene are found. The results are discussed in terms of hydrophobic and polar effect of the copolymers. Results on spread monolayers characteristics of these copolymers on water surfaces are also reported and compared with another polymers². Surface-pressure area (π -A) isotherms on a pure water subphase exhibit a transition region depending on the length of the alkyl side chain of the itaconamic acid moiety (Figure 1).

It was also analyzed the phase transition in the monolayer at the air/water interface with the technique of Brewster Angle Microscopy (BAM). Molecular mechanics approach was used to obtain predictions about the local interaction energies between segments. It was possible to conclude that the local interaction energies of propyl and decyl derivatives are quite similar while the hexyl derivative has higher interaction energy. The analysis of the coulombic energies together with the dispersion van der Waals energies (VDW) would be indicate, in first approximation, that carbonyl groups are more exposed in the case of propyl than in the others copolymers studied.

- (1) Urzúa, M. Gatica, N, Gargallo, L. Radic. D, J. Macromol. Sci. Pure Appl., Chem., A37, 37 (2000)
- (2) Gargallo L., Miranda B., Ríos H., Radic D., Polym Intern. 50, 858 (2001).

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