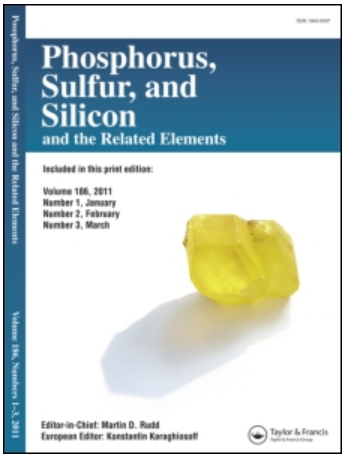

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Synthesis of Phosphorus Containing Polymers by Phase Transfer Catalysis (PTC). I. Comparative Study between Liquid-Liquid and Liquid-Vapor Systems

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Synthesis of Phosphorus Containing Polymers by Phase Transfer Catalysis (PTC). I. Comparative Study between Liquid-Liquid and Liquid-Vapor Systems

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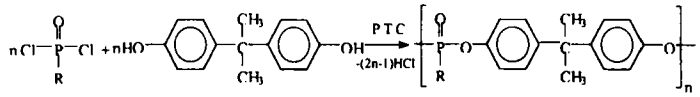
Polyphosphonates were synthesized by interfacial alkaline polycondensation of bisphenol A (BA) with phenyldichlorophosphonate (PPD) and cyclohexyl-dichlorophosphonate (CPD) in liquid-liquid[1] (l-l) and liquid-vapor[2] (l-v) systems.



Different base concentrations, molar ratios (PPD/BA or CPD/BA) and temperatures were applied and the yield (η) and inherent viscosity (η_{iv}) of the products were determined. In both systems the best results were obtained with 1-2 M aqueous solutions NaOH (i.e. with 1.5 M NaOH, for R=C_6H_5, in l-l, η=60% and η_{inh}=0.80 dl/g, in l-v, η=65%, η_{inh}=0.95dl/g; and for R=C_6H_{11}, in l-l, η=55%, η_{inh}=0.72dl/g; in l-v, η=60%, η_{inh}=0.90dl/g).

Concerning to the molar ratios (varied in either direction from unity) better results were found with an exces of phosphonic dichloride (with PPD:BA=0.75, in l-l, η=45% and η_{inh}=0.58 dl/g, in l-v, η=48%, η_{inh}=0.62dl/g; with PPD:BA=1.30, in l-l, η=65%, η_{inh}=0.78dl/g; in l-v, η=70%, η_{inh}=0.95dl/g; with CPD:BA=0.75, in l-l, η=40% and η_{inh}=0.57 dl/g, in l-v, η=52%, η_{inh}=0.65dl/g; with CPD:BA=1.30, in l-l, η=65%, η_{inh}=0.75dl/g; in l-v, η=68%, η_{inh}=0.94dl/g)

The influence of the temperature are as fallows: in l-l, the yields and inherent viscosities increase with decrease of the temperature, whereas, in l-v will show an increase in yield and inherent visosity as the temperature is increased. (i.e., at T=0^0C, for R=C_6H_5, in l-l, η=72% and η_{inh}=0.85 dl/g,; and for R=C_6H_{11}, in l-l, η=70%, η_{inh}=0.82dl/g; at T=25^0C, for R=C_6H_5, in l-l, η=40% and η_{inh}=0.48 dl/g,; and for R=C_6H_{11}, in l-l, η=32%, η_{inh}=0.30dl/g; at T=35^0C, for R=C_6H_5, in l-v, η=30% and η_{inh}=0.42 dl/g,; and for R=C_6H_{11}, in l-v, η=25%, η_{inh}=0.38dl/g; at T=60^0C, for R=C_6H_5, in l-v, η=75% and η_{inh}=0.72 dl/g,; and for R=C_6H_{11}, in l-v, η=70%, η_{inh}=0.70dl/g).

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