

This article was downloaded by:

On: 28 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713618290>

### Synthesis of Phosphorus Containing Polymers by Phase Transfer Catalysis (PTC). II. Experimental Design for Polycondensation in Liquid-Vapor System

Smaranda Iliescu<sup>a</sup>; Ludovic Kurunczi<sup>ab</sup>; Gheorghe Ilia<sup>a</sup>; Gheorghe Dehelean<sup>a</sup>; Lavinia Macarie<sup>a</sup>

<sup>a</sup> Romanian Academy, Institute of Chemistry, Timisoara, Romania <sup>b</sup> University of Medicine and Pharmacy Timisoara, Timisoara, Romania

**To cite this Article** Iliescu, Smaranda , Kurunczi, Ludovic , Ilia, Gheorghe , Dehelean, Gheorghe and Macarie, Lavinia(1999) 'Synthesis of Phosphorus Containing Polymers by Phase Transfer Catalysis (PTC). II. Experimental Design for Polycondensation in Liquid-Vapor System', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 147: 1, 189

**To link to this Article:** DOI: 10.1080/10426509908053575

**URL:** <http://dx.doi.org/10.1080/10426509908053575>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

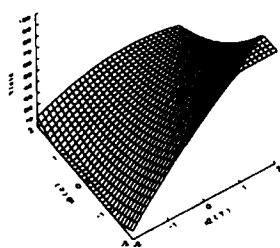
## Synthesis of Phosphorus Containing Polymers by Phase Transfer Catalysis (PTC). II. Experimental Design for Polycondensation in Liquid-Vapor System

SMARANDA ILIESCU<sup>a</sup>, LUDOVIC KURUNCZI<sup>ab</sup>,  
 GHEORGHE ILIA<sup>a</sup>, GHEORGHE DEHELEAN<sup>a</sup> and  
 LAVINIA MACARIE<sup>a</sup>

<sup>a</sup>Romanian Academy, Institute of Chemistry, 1900 Timisoara, Romania and

<sup>b</sup>University of Medicine and Pharmacy Timisoara, 1900 Timisoara, Romania

The simultaneous influence of four factors [reaction time ( $t$ ), temperature ( $T$ ), base concentration ( $c$ ), molar ratio of the reagents ( $r$ )] on the yield ( $\eta$ ) and on the inherent viscosity ( $\eta_{iv}$ ) of the product has been studied for the liquid-vapor system polycondensation of cyclohexyldichlorophosphonate (CDP) with bisphenol A (BA) by second order central composite circumscribed design. For a reasonable domain of the parameters, [ $t = 30 \div 70$  min.,  $T = 20 \div 60$  °C,  $c = 1 \div 5$  mol/l,  $r = 1 \div 3.5$  mol(CDP)/mol(BA)], designing the experiments, the  $\eta$  and  $\eta_{iv}$  values were determined in 31 synthesis (7 center points were used). In order to model the



response (hyper)surfaces for  $\eta$  and  $\eta_{iv}$ , second order equations with interaction terms were used. Analyzing these model equations,  $T$  and  $c$  appear to be the most important factors, but acting in opposite way. Higher  $T$  resulted in greater yield and inherent viscosity. In the above defined domain the hypersurface of  $\eta$  presents a saddle point. From the sequential inspection of the dependence of  $\eta$  and  $\eta_{iv}$  on the different

parameter pairs, using contour plots and 3D-plots [see for example the attached figure for the yield function of factors  $x_2$  ( $T$ ) and  $x_3$  ( $c$ )] optimum conditions can be deduced for the desired good yield and great inherent viscosity. These are: long reaction time (70 min), high temperature (60 °C), low base concentration (1 mol/l) and high to moderate CDP excess.