

This article was downloaded by:

On: 30 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>

### Reactions with Hydrophosphoryl Halides

N. A. Kardanov<sup>a</sup>; A. M. Timofeev<sup>a</sup>; G. A. Kvashnina<sup>a</sup>; L. V. Ermanson<sup>a</sup>; N. N. Godovikov<sup>a</sup>; M. I. Kabachnik<sup>a</sup>

<sup>a</sup> A. N. Nesmeyanov Institute of Organo-Element Compounds, USSR Academy of Sciences, Moscow, USSR

**To cite this Article** Kardanov, N. A. , Timofeev, A. M. , Kvashnina, G. A. , Ermanson, L. V. , Godovikov, N. N. and Kabachnik, M. I.(1987) 'Reactions with Hydrophosphoryl Halides', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 30: 3, 690

**To link to this Article: DOI:** 10.1080/03086648708079184

**URL:** <http://dx.doi.org/10.1080/03086648708079184>

PLEASE SCROLL DOWN FOR ARTICLE

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

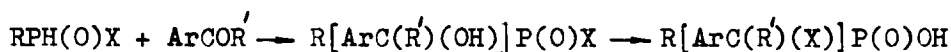
This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

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.

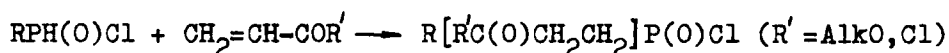
## Reactions with Hydrophosphoryl Halides

N.A.Kardanov,<sup>\*</sup> A.M.Timofeev, G.A.Kvashnina, L.V.Ermanson,  
N.N.Godovikov and M.I.Kabachnik  
A.N.Nesmeyanov Institute of Organo-Element Compounds,  
USSR Academy of Sciences, Vavilov str. 28, Moscow, USSR.

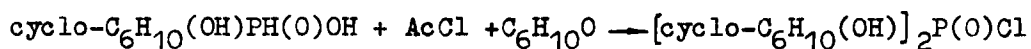
In the systems  $\text{RPH}_2 + \text{H}_2\text{O}$ ,  $\text{RPH}_2 + \text{RCOOH}$ ,  $\text{RPH}_2 + \text{RPH}(\text{O})\text{OH}$  and  $\text{RPH}(\text{O})\text{OH} + \text{RCOX}$  the formation of hydrophosphoryl halides  $\text{RPH}(\text{O})\text{X}$  ( $\text{X}=\text{Cl}, \text{Br}, \text{I}$ ;  $\text{R}=\text{H}, \text{OH}, \text{Hal}, \text{Alk}, \text{AlkO}, \text{Ar}$ ) was proved by spectral and chemical methods. Hydrophosphoryl halides react with alyphatic ketones  $\text{R}'_2\text{CO}$  yielding phosphinic halides  $\text{R}[\text{R}'_2\text{C}(\text{OH})]\text{P}(\text{O})\text{X}$  (X-ray analysis). In case of aromatic aldehydes and ketones containing electron donor substituents, the addition products are rearranged into  $\alpha$ -halogenalkylphosphinic acids.



Hydrophosphoryl halides readily add to the activated double bond  $\text{C}=\text{C}$  of various unsaturated compounds.



In the reaction with  $\text{AcCl}$   $\alpha$ -hydroxyalkylphosphonous acids yield  $\alpha$ -hydroxyalkylhydrophosphoryl chlorides which add cyclic ketones to form di- $\alpha$ -hydroxyalkylphosphinic chlorides, for instance:



The substance was recrystallized from acetone (m.p.  $103-105^\circ$ ); being hydrolyzed it is converted into phosphinic acid  $[\text{cyclo-C}_6\text{H}_{10}(\text{OH})]_2\text{P}(\text{O})\text{OH}$  (m.p.  $199-200^\circ$ ), whose physico-chemical characteristics coincide with those of the specimen obtained by addition of  $\alpha$ -hydroxycyclohexylphosphonous acid to cyclohexanone.