

This article was downloaded by:

On: 29 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>

Structure and Mobility Pattern of Proton-Containing Groups in Hydrates of Titanium, Zirconium and Tin Acid Phosphates; Their Conducting and Ion Exchanging Properties

Z. N. Prozorovskaya^a; A. B. Yaroslavl'tsev^a; V. F. Chuvayev^a; V. V. Parshutkin^a

^a Moscow State University, Moscow, USSR

To cite this Article Prozorovskaya, Z. N. , Yaroslavl'tsev, A. B. , Chuvayev, V. F. and Parshutkin, V. V. (1990) 'Structure and Mobility Pattern of Proton-Containing Groups in Hydrates of Titanium, Zirconium and Tin Acid Phosphates; Their Conducting and Ion Exchanging Properties', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 51: 1, 427

To link to this Article: DOI: 10.1080/10426509008040951

URL: <http://dx.doi.org/10.1080/10426509008040951>

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.

STRUCTURE AND MOBILITY PATTERN OF PROTON-CONTAINING
GROUPS IN HYDRATES OF TITANIUM, ZIRCONIUM AND TIN ACID
PHOSPHATES; THEIR CONDUCTING AND ION EXCHANGING
PROPERTIES

Z.N.PROZOROVSKAYA, A.B.YAROSLAVTSEV, V.F.CHUVAYEV, and
V.V.PARSHUTKIN
Moscow State University, Lenin Hills, Moscow 119899,
USSR

Phosphates of tetravalent elements are practically important for ion exchange, catalysis and conductivity. This study deals with a number of hydrates of titanium, tin and zirconium phosphates. PMR data show that the structure of water molecules in hydrates is slightly distorted, and at temperatures higher than 160 K water has high translation mobility. NMR ^{31}P proves HPO_4^{2-} dissociation to be growing with increase of temperature. Energetic parameters of this process are determined. Close values of anion dissociation enthalpy (0,16/2/ev) and obtained activation energy of conductivity for di- and monohydrates (0,17/2/ev) show tunnel pattern of proton transfer along H-bond direction. This type of correlation was not observed in anhydrous compounds. That can be explained by impossibility of anion proton tunneling because of H-bond weakening. Proton conductivity of acid phosphates was studied. Ten-fold decrease of conductivity at room temperature with the loss of each water molecule proves H_2O participation in proton transport. Mechanism of this process is discussed with the use of NMR data. Dependence of water mobility and conductivity level on the degree of crystallinity is also discussed. With the help of NMR-data processes of ion exchange in tin and zirconium acid phosphates, as well as the state of developed salt forms were studied. Presence of lithium with high mobility in $\text{Li}_2\text{Sn}(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ was established.