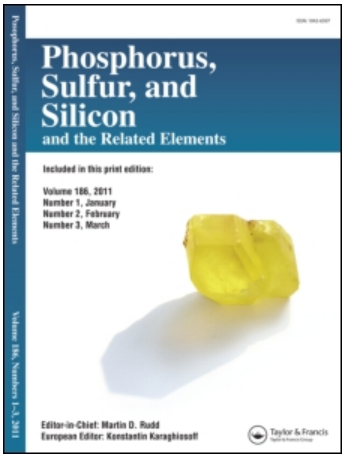

Phosphorus, Sulfur, and Silicon and the Related Elements
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

Catalytic Activity of Calcium-Deficient Hydroxyl-Apatites

A. S. Dykman[a]; O. Ye. Batalin[a]; V. M. Yevgrashin[a]; E. I. Rubinstein[a]
[a] NPO "Lenneftekhim", Leningrad, ESR

To cite this Article Dykman, A. S. , Batalin, O. Ye. , Yevgrashin, V. M. and Rubinstein, E. I.(1990) 'Catalytic Activity of Calcium-Deficient Hydroxyl-Apatites', Phosphorus, Sulfur, and Silicon and the Related Elements, 51: 1, 433
To link to this Article: DOI: 10.1080/10426509008040957
URL: http://dx.doi.org/10.1080/10426509008040957

Phosphorus, Sulfur, and Silicon, 1990, Vols. 51/52, p. 433
Reprints available directly from the publisher
Photocopying permitted by license only

CATALYTIC ACTIVITY OF CALCIUM-DEFICIENT HYDROXYLAPATITES

A.S.DYKMAN, O.Ye.BATALIN, V.M.YEVGRASHIN, and E.I.RUBINSTEIN
NPO "Lenneftekhim", Zheleznodorozhny Pr. 40, Leningrad 193148, USSR

Calcium-deficient hydroxylapatites (CDHA) of the composition $Ca_{10-x}(HPO_4)_x(PO_4)_{6-x}(OH)_{2-x}$, where $0 \leqslant x \leqslant 2$ are widely used as catalysts in processes like alcohol dehydration, decomposition of acetals, etc.

CDHA catalytic activity is attributed to the presence of HPO_4^{-2} group. However, after being used for 2 hours in the reaction of acetal decomposition, all the HPO_4^{-2} groups in CDHA were condensed forming polyphosphate ions of the composition P_nO_{3n+1}. The catalyst characteristics remained unchanged during further operation. Thus, the HPO_4^{-2} groups are not the origin of the CDHA catalytic activity.

CDHA catalytic activity is suggested to be due to the presence of phosphoric acid being formed during interaction of polyphosphate ions with water vapor at elevated temperatures. CDHA catalytic activity in the mentioned reactions increases with Ca-deficiency of the sample and hence with the portion of polyphosphate. High and long-term catalytic activity of CDHA seems to be dependent on even formation of phosphoric acid in the course of operation. Other Ca-phosphates produce major part of the acid at the beginning of the operation which leads to sharp decrease in the catalyst activity. It has been shown that the main cause of catalyst aging is the destruction of the apatite structure with condensed neutral phosphate formation.

CDHA thermal stability was found to grow with increaseing calcium deficiency. The principles of choice and operation of hydroxylapatite catalysts in various processes are discussed.