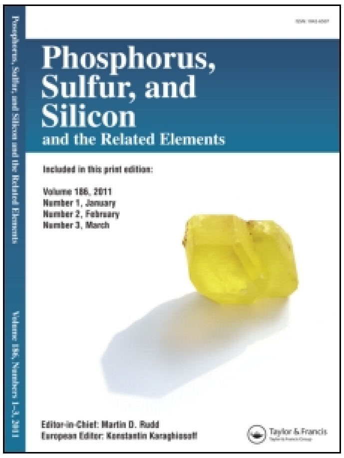

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Electrosynthesis from White Phosphorus in Alcohol-Water Solutions

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Electrosynthesis from White Phosphorus in Alcohol-Water Solutions

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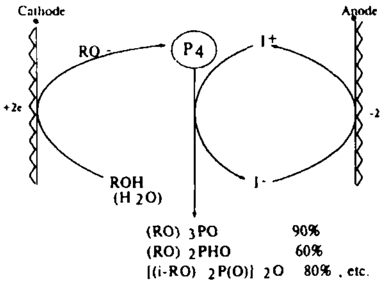
An attempt was made to synthesize organophosphorus compounds by a combination of homogeneous chemical reactions in the volume of the solution with heterogeneous electrochemical reactions taking place at the electrodes. It was found that opening of the strained P_4 ring and formation of the whole product occurs as the result of sequential attack of nucleophilic and electrophilic components, formed respectively at the cathode and anode in undivided electrochemical cell.



It has been established that the process of splitting of the P-P bonds of white phosphorus molecules is initiated by cathode-generated nucleophiles (OH^-, RO^-), while functionnalization of the P-H bonds occurs under the action only of alcohol. The primary product after splitting of all the P-P bonds is dialkylphosphite (in alcohol-water media), or trialkyl phosphite (in absolute alcohol), in the course of electrolysis being transformed into trialkyl phosphate. Formation of esters of pyrophosphoric acid with reduced protogenic character of the medium was examined. The investigation performed makes possible a more deeply understanding the mechanism of reaction of electrolysis of alcohol-water solutions in aprotic solvents on the background of Et_4NI, and also provides the possibility to controll this complicated process.