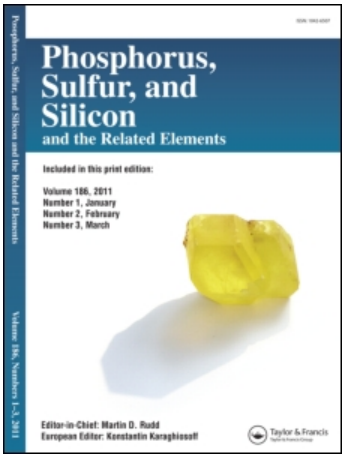

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Electrochemical Generation of Diisopropyl 1,1 - Dichloromethylphosphonate Anion. Application to an Efficient Synthesis of Various Cycloalkylphosphonates

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ELECTROCHEMICAL GENERATION OFDIISOPROPYL 1,1-DICHLOROMETHYLPHOSPHONATE ANION. APPLICATION TO AN EFFICIENT SYNTHESIS OF VARIOUS CYCLOALKYLPHOSPHONATES

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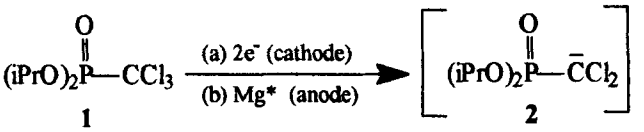
Key Words: Cycloalkylphosphonates, Electrosynthesis, Electrochemical activation of magnesium.

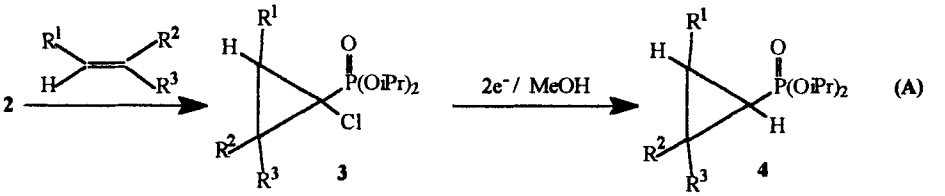
The electrochemical reduction of phosphonate **1**, in DMF, in a one-compartment electrolysis cell equipped with a felt carbon cathode and a sacrificial anode of magnesium gave the carbanion **2** according to an unusual mechanism, involving two simultaneous phenomena: (a) a bielectronic process at the cathode, (b) a direct reduction of phosphonate **1** by the magnesium rod, activated on its surface by the anodic process:



1 **2**

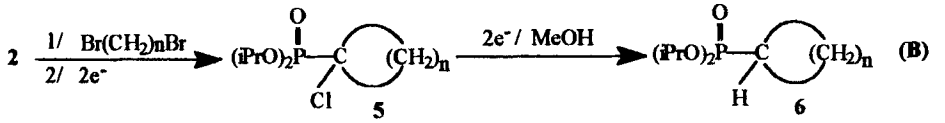
The electrogenerated carbanion **2** was reacted:

(A) with Michael acceptors giving α-chloro cyclopropylphosphonates **3** (64-85 % yield):



(A)

(B) with ω,ω-dibromoalcanes leading to monoalkylated intermediates, which after electrochemical reduction, followed by cyclisation gave α-chloro cycloalkylphosphonates **5** (64 - 72 % yield):



(B)

Moreover, the further electrochemical reduction of **3** or **5** in the presence of a protic agent, led to cycloalkylphosphonates **4** or **6** respectively, in a one-pot operation starting from **1** (50 - 58 % overall yield).