3,4-Bis(diethoxyphosphorylmethyl)furan in Electrophilic Substitution Reactions

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Abstract—Procedure for preparation of 3,4-bis(diethoxyphosphorylmethyl)furan is developed and its behavior in the electrophilic substitution reactions is studied. Formylation according to Vilsmeier and acetylation with acetic anhydride in the presence of phosphoric acid lead to the formation of the corresponding 2-formyl and 2-acetyl derivatives. In the reaction with dimethylmethylenammonium chloride in acetonitrile 2-dimethylaminomethyl derivative is formed. The reaction with paraforemaldehyde and hydrogen chloride in the presence of zinc chloride gives exclusively 2,5-bis(chloromethyl)-3,4-bis(diethoxyphosphorylmethyl)furan. From this compound by means of the Michaelis–Becker reaction 2,3,4,5-tetrakis(diethoxyphosphorylmethyl)furan was synthesized. Coupling constants between phosphorus atoms in polyphosphonates obtained are evaluated.

Keywords: diphosphonates, furans, formylation, acetylation, aminomethylation, chloromethylation, Michaelis–Becker reaction

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