

# Synthesis of Isomeric Bromo(diethoxyphosphorylmethyl)furans

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**Abstract**—Series of the previously unknown bromo(diethoxyphosphorylmethyl)furans including four of six possible regioisomers is synthesized. The target products were obtained by bromination of the corresponding (diethoxyphosphorylmethyl)furans or by a four-step synthesis including bromination of isomeric methyl-furan-carboxylates, reduction of the products formed to the corresponding alcohols, substitution of hydroxy group with halogen and phosphorylation by the Michaelis–Becker reaction. It was established for the first time that in the course of bromination of alkyl carboxylates and phosphonates of the furan series under the typical conditions of electrophilic reaction ( $\text{Br}_2 + 10\%$  molar of  $\text{AlCl}_3$ , chloroform) the substituent enters not only into the heteroring, but also into the side chain. In the case of 5-methyl-2-(diethoxyphosphorylmethyl)furan only the last reaction pathway is observed. It is shown that bromo(chloromethyl)furans react with sodium diethyl phosphite not only according to the Michaelis–Becker scheme leading to phosphonates, but also by the pathway of debromination of the furan ring. The last unexpected reaction may acquire a practical use for removing a substituent protecting the  $\alpha$ -position of the furan ring under mild conditions.

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