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Aminophosphonates: Synthesis and practical application

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Abstract

There is an increasing interest in amine derivatives of phosphonic acids. The α-aminophosphonates, organophosphorus analogs of natural amino acids are most studied and attracted for the specialists in various branches of chemistry - biochemists, pharmacologists and synthetic chemists. Phosphonates containing the amine group in the β-position are less studied but recent studies suggest they may be useful as bioactive species and receptor compounds. Phosphonic acid derivatives are not only biologically active compounds but also effective extractants and membrane carriers for various substrates (metal ions, organic and inorganic acids, etc.). Many of these advantages are due to the combination of several different binding sites, namely, proton donating (NH) and two proton accepting groups (P=O and a lone electron pair of the nitrogen atom), as well as the possibility of varying the lipophilicity and sterical loading of the binding site. The acceptor phosphoryl group of the β-aminophosphonates is farther away from the nitrogen than that of the α-aminophosphonates. Hence the increased basicity of the nitrogen atom leads to the peculiar transport properties of these compounds. This chapter discusses the main methods for synthesizing α- and β-amine derivatives of phosphonic acids, their biological activity and the application of these compounds as extractants and membrane carriers.

Keywords

Chemistry of organophosphorus compounds, Drug delivery, Membrane technology