Neue Tetraaminophosphonium-Salze durch Anionenaustausch in flüssigem Ammoniak

Novel Tetraaminophosphonium Salts by Anion Exchange in Liquid Ammonia

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Phosphorus, Ion Exchange, Liquid Ammonia, Crystal Structure

[P(NH₂)₄]Br and [P(NH₂)₄][NO₃] have been prepared by anion exchange in liquid ammonia. Single crystals of [P(NH₂)₄]Br were obtained from an acetonitrile solution in a temperature gradient between 60 °C and room temperature while attempts to grow single crystals of [P(NH₂)₄][NO₃] yielded [P(NH₂)₄][NO₃](OP(NH₂)₃). Both crystal structures were determined by single crystal X-ray methods at room temperature ([P(NH₂)₄]Br: P4/nbm, \( a = 809.2(1) \), \( c = 468.1(1) \) pm, \( Z = 2 \), \( R_1 = 0.042 \), \( wR_2 = 0.077 \); [P(NH₂)₄][NO₃](OP(NH₂)₃): Pna2₁, \( Z = 4 \), \( a = 1023.4(1) \), \( b = 1704.7(1) \), \( c = 618.0(1) \) pm, \( R_1 = 0.025 \), \( wR_2 = 0.067 \). In the solid [P(NH₂)₄]Br forms a tetragonally distorted variant of the CsCl type of structure. [P(NH₂)₄][NO₃](OP(NH₂)₃) consists of \([P(NH₂)₄]⁺\) cations, \([NO₃]⁻\) anions, and OP(NH₂)₃ molecules which are interconnected by a complex system of hydrogen bonds.