

**A Novel “Ionic Liquid” Electrolyte:
Synthesis and X-Ray Structure Studies of Bis(1,3-Dimethyl-1,2,3-benzotriazolium)
Triiodoargentate**

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Abstract

A novel bis(1,3-dimethyl-1,2,3-benzotriazolium) triiodoargentate $[(\text{CH}_3)_2\text{Bz}]_2 [\text{AgI}_3]$ has been synthesized and structurally characterized by single-crystal X-ray diffraction. This “ionic liquid” is expected to take the advantage of electrolyte materials. $[(\text{CH}_3)_2\text{Bz}]_2 [\text{AgI}_3]$ was obtained from mixtures of 1,3-dimethyl-1,2,3-benzotriazolium iodide and silver iodide in acetonitrile solution. Thermal analyses of this very stable salt included the determination of melting point (192 – 193 °C) and decomposition temperature (up to 250 °C). It is crystallized in the monoclinic unit cell and space group C2/c. The structure is consisting of discrete 1,3-dimethyl-1,2,3-benzotriazolium cation and negative charge triiodoargentat. The Triiodoargentate anion AgI_3^{2-} almost trigonal planar with I-Ag-I bond angles are $118.909(7)^\circ$ to $122.183(14)^\circ$. This Anion is encapsulated between laminar layers of the 1,3-dimethyl-1,2,3-benzotriazolium cations. The composition of the AgI_3^{2-} anion reveals that iodide ions seem to prefer silver ions as Lewis acids to iodine molecules, since triiodide ions (I_3^-) should else be formed.

Keywords: Ionic Liquid, Electrolyte, Benzotriazolium, Iodide, Silver, Thermal Analysis, and Crystal Structure