

# Two New Polyiodides in the 4,4'-Bipyridinium Diiodide/Iodine System

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The reaction of bipyridine with hydroiodic acid in the presence of iodine gave two new polyiodide-containing salts best described as 4,4'-bipyridinium bis(triiodide),  $C_{10}H_{10}N_2[I_3]_2$ , **1**, and bis(4,4'-bipyridinium) diiodide bis(triiodide) tris(diiodine) solvate dihydrate,  $(C_{10}H_{10}N_2)_2I_2[I_3]_2 \cdot 3 I_2 \cdot 2 H_2O$ , **2**. Both compounds have been structurally characterized by crystallographic and spectroscopic methods (Raman and IR). Compound **1** is composed of  $I_3^-$  anions forming one-dimensional polymers connected by interionic halogen bonds. These chains run along [101] with one crystallographically independent triiodide anion aligned and the other triiodide anion perpendicular to the chain direction. There are no classical hydrogen bonds present in **1**. The structure of **2** consists of a complex  $I_{14}^{4-}$  anion, 4,4'-bipyridinium dication and hydrogen-bonded water molecules in the ratio of 1 : 2 : 2. The  $I_{14}^{4-}$  polyiodide anion is best described as an adduct of two iodide and two triiodide anions and three diiodine molecules. Two 4,4'-bipyridinium cations and two water molecules form a cyclic dimer through N–H···O hydrogen bonds. Only weak hydrogen bonding is found between these cyclic dimers and the polyiodide anions.

*Key words:* Polyiodide, 4,4'-Bipyridine, Triiodide, Crystal Structure, Raman Spectroscopy