Ethene-*trans*-1,2-bis(4-pyridinium) Dihydrogenphosphite and Dihydrogenphosphate Compounds Exhibiting Cooperative and Directed Hydrogen Bonds between Cations and Anions: $H_2bpe(H_2PO_3)_2$ and $H_2bpe(H_2PO_4)_2 \cdot H_2O$

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$H_2bpe(H_2PO_3)_2$ (**1**) and $H_2bpe(H_2PO_4)_2 \cdot H_2O$ (**2**) (H_2bpe = ethene-*trans*-1,2-bis(4-pyridinium), H_2PO_3 = dihydrogenphosphite, and H_2PO_4 = dihydrogenphosphate) have been prepared and structurally characterized. In compound **1**, the dihydrogenphosphite anions form dimers, with a P···P distance of 4.2073(7) Å, by two O–H···H hydrogen bonds, and the dimeric dihydrogenphosphite units interact with the H_2bpe cations by way of N–H···O and O–H···O hydrogen bonds, resulting in a one-dimensional chain. The chains are held together by C–H···O interactions. In compound **2**, the phosphate ions are connected by O–H···O hydrogen bonds into an unusual 2D square grid-type framework with P···P separations ranging from 4.7533(7) to 4.9506(8) Å. The H_2bpe cations crosslink the dihydrogen phosphate layers by N–H···O hydrogen bonds, forming a three-dimensional supramolecular network with channels. The water molecules in compound **2** occupy these channels and make O–H···O bonds to adjacent phosphate O atoms and also O–H···O bonds to the next water O atom in the channel.

Key words: Dihydrogenphosphites, Dihydrogenphosphates, Ethene-*trans*-1,2-bis(4-pyridinium) Cations, Hydrogen Bonds, Crystal Structure