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# $SbF^{2+}$ AS LEWIS ACID IN $Na(SbF)PO_4 \cdot nH_2O$ (n = 1–2) AND $NH_4(SbF)PO_4 \cdot H_2O$

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$SbF_3$ is a strong acceptor to fluoride ions and oxoanions like sulfate or nitrate [1,2]. Recently complexes of the composition $M(SbF_2)SO_4$ (M=Rb,Cs) [2] and $K(SbF_2)HPO_4$ [3] have been described. Here the $SbF_2^+$ group is linked to different oxoanions through 2 short (~217pm) Sb-O bonds. The new compounds $Na(SbF)PO_4 \cdot nH_2O$ (n=1-2) (I) and $NH_4(SbF)PO_4 \cdot H_2O$ (II) have been prepared by reaction of $SbF_3$ and $Na_2HPO_4$ or $(NH_4)_2HPO_4$ in water. Their structures have been determined by single crystal X-ray diffraction. I: monoclinic, a= 656.2(1), b=654.1(1), c=867.9(1) pm; $\beta$=92.43(2)°; space group $P2_1/m$, Z=2; R=0.044 ($R_w$=0.064) for 884 reflections. II: tetragonal, a=656.5(2), c=1439.8(5) pm; space group I4, Z=4; R=0.025 ($R_w$=0.035) for 646 reflections. I and II contain the so far unknown $SbF^{2+}$ group, which originates from $SbF_3$ by fluoride ion abstraction. The structures consist of layers with the overall composition $[SbFPO_4]^-$. The $SbF^{2+}$-group is a strong acceptor towards the oxygen atoms of 4 different $PO_4^{3-}$-ions. Its strong Lewis acidity is shown by the rather short Sb-O bonds of 216-222 pm length. Sb(III) is coordinated pseudooctahedrally by the stereochemically active lone pair, by one fluorine atom trans to the lone pair (Sb-F: 193 pm) and by 4 oxygen atoms in the equatorial plane. The layers represent a rare example of a simple planar net of tetrahedra and (pseudo)octahedra which both share 4 vertices. Between the layers, which are stacked differently in I and II, the cations and water molecules are situated. The structure is also reflected in the vibrational spectra and 121-Sb Mössbauer data. The isomer shift is less negative than in $SbF_3$, the quadrupole coupling constant smaller. This is due to the more regular environment of Sb(III) in I and II compared to $SbF_3$.

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