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THE $(P)_6^3$ RING ACID, $H_6P_6O_{12}$ AND $(-P-P-O-)_2^{4\ 4}$ RING ACID,
 $H_4P_4O_{10}$ AND THEIR SALTS

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Abstract The hydrated salts of the acid $H_6P_6O_{12}$, $Rb_6P_6O \cdot aq$ and $M_3P_6O_{12} \cdot aq$ ($M = Ca, Sr, Ba$), that have so far been unknown, have been prepared and studied by X-ray methods, thermal analysis and molecular spectroscopy. It has been found that the anion structure exhibits a chair form with the D_{3d} symmetry. All the salts are stable at laboratory temperature and are completely decomposed on prolonged heating to $80^\circ C$ prior to complete dehydration. The newly prepared salts of the acid $H_4P_4O_{10}$ involve $Cs_4P_4O_{10} \cdot 1.5 H_2O$, $Tl_4P_4O_{10}$, $M_2P_4O_{10} \cdot x H_2O$ ($M = Cu, Ni, Co$; $x = 10, 2, 6$, respectively), $Na_2MP_4O_{10} \cdot x H_2O$ ($M = Cu, Ni, Co$; $x = 8, 8, 4$, respectively). They have been studied using X-ray methods, thermal analysis, molecular and reflectance spectra and the magnetic susceptibility. The dehydration of the salts starts at 30 to $40^\circ C$ and ends by complete decomposition before the completion of dehydration at $150^\circ C$. The anion structure for the salt $Cs_4P_4O_{10}$ in the crystalline state has a chair form with C_{2h} symmetry. However, the anion structure in aqueous solutions approaches a planar arrangement with the D_{2h} symmetry.