Preparation and Crystal Structures of $(Hg_3)(PO_4)Cl$, $(Hg_3)(AsO_4)Cl$ and $(Hg_3)(AsO_4)Br$ – Mercury Compounds with the Triangular Hg_3^{4+} Cluster

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The compounds $(Hg_3)(PO_4)Cl$, $(Hg_3)(AsO_4)Cl$ and $(Hg_3)(AsO_4)Br$ have been prepared under hydrothermal conditions at 200 °C, starting from stoichiometric mixtures of the corresponding mercury halides and mercury phosphates or arsenates, respectively. The formula $(Hg_3)(AsO_4)Cl$ is identical with that of the mineral *kuznetsovite*. All compounds are isotypic and crystallize with four formula units in the space group $P2_13$ [$(Hg_3)(PO_4)Cl$: a = 8.2912(5) Å; $(Hg_3)(AsO_4)Cl$: a = 8.3983(6) Å; $(Hg_3)(AsO_4)Br$: a = 8.4611(5) Å]. All crystal structures have been refined from single crystal diffractometer data sets under consideration of merohedral twinning according to a diagonal mirror plane as twin element. The structures comprise of equilateral mercury triangles with mean distances $\overline{d}$(Hg-Hg) = 2.659 Å, which are bonded to halogen and oxygen atoms of nearly perfect PO_4 or AsO_4 tetrahedra, respectively.