$Cs_2K_2[Pt_{12}O_8(SO_4)_{12}]$: A New Oxide-Sulfate with the Cluster Anion $[Pt_{12}O_8(SO_4)_{12}]^{4-}$

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Single crystals of $Cs_2K_2[Pt_{12}O_8(SO_4)_{12}]$ ($R\bar{3}$, $Z = 3$, $a = 1198.9(3)$, $c = 2768.9(9)$ pm, $R_{all} = 0.1154$) were obtained by the reaction of $Cs_2[Pt(NO_2)_4]$, $K_2[Pt(NO_2)_4]$ and conc. sulfuric acid at 400 °C in a sealed glass ampoule. The compound contains the cluster anion $[Pt_{12}O_8(SO_4)_{12}]^{4-}$. It consists of six Pt_2^{6+} dumbbell shaped cations that are linked by eight oxide ions and twelve sulfate anions to form a distorted Pt_{12} icosahedron. The arrangement of the cluster anions in the crystal structure provides two voids for the cations. The larger one is occupied by the Cs^+ ions while the K^+ ions reside in the smaller one. For the Cs^+ ions the coordination number is 15 while the K^+ ions have a coordination number of 13.

Key words: Platinum, Sulfates, Cluster, Crystal Structure, Solvothermal Reactions