

Preparation and Crystal Structures of $M[(\text{UO}_2)(\text{SeO}_4)_2(\text{H}_2\text{O})](\text{H}_2\text{O})_4$ ($M = \text{Mg}, \text{Zn}$)

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The crystals of two isostructural uranyl selenates, $M[(\text{UO}_2)(\text{SeO}_4)_2(\text{H}_2\text{O})](\text{H}_2\text{O})_4$ ($M = \text{Mg}, \text{Zn}$), have been prepared by water evaporation from aqueous solutions. The structures have been solved by direct methods ($M = \text{Mg}$: $P2_1/c$, $a = 8.4666(8)$, $b = 11.6306(14)$, $c = 13.1669(12)$ Å, $\beta = 90.959(7)^\circ$, $V = 1296.4(2)$ Å³, $R_1 = 0.061$; $M = \text{Zn}$: $P2_1/c$, $a = 8.4492(18)$, $b = 11.5860(17)$, $c = 13.240(3)$ Å, $\beta = 92.382(18)^\circ$, $V = 1294.9(4)$ Å³, $R_1 = 0.074$). The structures are based upon $[(\text{UO}_2)(\text{SeO}_4)_2(\text{H}_2\text{O})]^{2-}$ chains running parallel to the b axis and consisting of corner-sharing $[\text{UO}_6(\text{H}_2\text{O})]^{6-}$ pentagonal bipyramids and $[\text{SeO}_4]^{2-}$ tetrahedra. The equatorial planes of the uranyl pentagonal bipyramids are oriented approximately parallel to (001). The uranyl selenate chains are linked into sheets parallel to (010) by $[M(\text{H}_2\text{O})_6]^{2+}$ octahedra which share common H_2O molecules with the $[\text{UO}_6(\text{H}_2\text{O})]^{6-}$ pentagonal bipyramids.

Key words: Uranyl Selenate, Magnesium, Zinc, Crystal Structure