

The Determination of the Zinc Sulfate, Sodium Hydroxide and Boric Acid Molar Ratio on the Production of Zinc Borates

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Abstract : Zinc borate is an important boron compound that can be used as multi-functional flame retardant additive due to its high dehydration temperature property. In this study, the raw materials of $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, NaOH and H_3BO_3 were characterized by X-Ray Diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR) and used in the synthesis of zinc borates. The synthesis parameters were set to 100°C reaction temperature and 120 minutes of reaction time, with different molar ratio of starting materials ($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}:\text{NaOH}:\text{H}_3\text{BO}_3$). After the zinc borate synthesis, the identifications of the products were conducted by XRD and FT-IR. As a result, Zinc Oxide Borate Hydrate [$\text{Zn}_3\text{B}_6\text{O}_{12} \cdot 3.5\text{H}_2\text{O}$], were synthesized at the molar ratios of 1:1:3, 1:1:4, 1:2:5 and 1:2:6. Among these ratios 1:2:6 had the best results.

Keywords : Zinc borate, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, NaOH, H_3BO_3 , XRD, FT-IR

Conference Title : ICMMP 2014 : International Conference on Materials and Materials Processing

Conference Location : Prague, Czechia

Conference Dates : July 10-11, 2014