

## The Determination of the Potassium Nitrate, Sodium Hydroxide and Boric Acid Molar Ratio in the Synthesis of Potassium Borates via Hydrothermal Method

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**Abstract :** Potassium borates, which are widely used in welding and metal refining industry, as a lubricating oil additive, cement additive, fiberglass additive and insulation compound, are one of the important groups of borate minerals. In this study the production of a potassium borate mineral via hydrothermal method is aimed. The potassium source of potassium nitrate (KNO<sub>3</sub>) was used along with a sodium source of sodium hydroxide (NaOH) and boron source of boric acid (H<sub>3</sub>BO<sub>3</sub>). The constant parameters of reaction temperature and reaction time were determined as 80°C and 1 h, respectively. The molar ratios of 1:1:3 (as KNO<sub>3</sub>:NaOH:H<sub>3</sub>BO<sub>3</sub>), 1:1:4, 1:1:5, 1:1:6 and 1:1:7 were used. Following the synthesis the identifications of the produced products were conducted by X-Ray Diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR). The results of the experiments and analysis showed in the ratio of 1:1:6, the Santite mineral with powder diffraction file number (pdf no.) of 01-072-1688, which is known as potassium pentaborate (KB<sub>5</sub>O<sub>8</sub>•4H<sub>2</sub>O) was synthesized as best.

**Keywords :** hydrothermal synthesis, potassium borate, potassium nitrate, santite

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