Poster Presentation

Production of Mono-Potassium Phosphate

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Abstract

Crystalline monopotassium phosphate is one of the crucial fertilizers that plants need at early growing stages to establish their root system. Its high purity and solubility in water make it a highly efficient source of phosphorous and potassium for plants. In this project, an experimental work has been carried out to find the best operating conditions to produce monopotassium phosphate by reacting commercial potassium hydroxide with white phosphoric acid. Five operating variables were studied, these variables include the: reaction temperature, reaction time, crystallization temperature, crystallization time, and H_3PO_4 to KOH molar ratio. The size of the obtained crystals in addition to the yield were used as main factors that been used to decide the best operating conditions. It has been found that a reaction temperature of 50^{o}C, a reaction time of 60 minutes, a crystallization temperature of 10^{o}C, a crystallization time of 30 minutes, and a molar ratio of 1 H_3PO_4 to 1 KOH are the best operating conditions that gave a reasonable yield and a satisfactory monopotassium phosphate crystal size. Depending on the obtained experimental work results, a detailed material and energy balances were performed, followed by a comprehensive equipment's design. A feasibility study for this project reveals that a profit of $1,601,458 can be achieved annually and a payback period of 3 years is expected.

Crystalline Structure of MKP.

MKP has a crystalline structure as shown in the following photograph: