

Integrated Design of Froth Flotation Process in Sludge Oil Recovery Using Cavitation Nanobubbles for Increase the Efficiency and High Viscose Compatibility

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Abstract : Oily sludge wastes always fill in upstream and downstream petroleum industry process. Sludge still contains oil that can use for energy storage. Recycling sludge is a method to handling it for reduce the toxicity and very probable to get the remaining oil around 20% from its volume. Froth flotation, a common method based on chemical unit for separate fine solid particles from an aqueous suspension. The basic composition of froth flotation is the capture of oil droplets or small solids by air bubbles in an aqueous slurry, followed by their levitation and collection in a froth layer. This method has been known as no intensive energy requirement and easy to apply. But the low efficiency and unable treat the high viscosity become the biggest problem in froth flotation unit. This study give the design to manage the high viscosity of sludge first and then entering the froth flotation including cavitation tube on it to change the bubbles into nano particles. The recovery in flotation starts with the collision and adhesion of hydrophobic particles to the air bubbles followed by transportation of the hydrophobic particle-bubble aggregate from the collection zone to the froth zone, drainage and enrichment of the froth, and finally by its overflow removal from the cell top. The effective particle separation by froth flotation relies on the efficient capture of hydrophobic particles by air bubbles in three steps. The important step is collision. Decreasing the bubble particles will increasing the collision effect. It cause the process more efficient. The pre-treatment, froth flotation, and cavitation tube integrated each other. The design shows the integrated unit and its process.

Keywords : sludge oil recovery, froth flotation, cavitation tube, nanobubbles, high viscosity

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