

CONTINUOUS RECOVERY OF PHOSPHORIC ACID AND RARE-EARTHS CONTAINING PARTICLES FROM PHOSPHORIC ACID SLUDGE USING A DECANter CENTRIFUGE

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Continuous separation of phosphoric acid and particles containing rare earth elements (REEs) from phosphoric acid sludge has been demonstrated using a decanter centrifuge in an effort to develop a profitable process for REEs recovery. Phosphoric acid sludge contains valuable phosphoric acid and solid particles with relatively high concentrations of REEs at >2,200 ppm. However, due to the high viscosity and large solids content (e.g., 20–40%), traditional separation technologies (e.g., filtration) require additional pre- and post-treatment processes that add complexity and cost. A decanter centrifuge, instead, was proven effective in separating solid particles from phosphoric acid sludge containing up to 35 wt.% solids without additional processing steps. Simultaneous recovery of phosphoric acid liquid at ~95% efficiency and REEs-containing particles at ~90% efficiency in a continuous mode has been achieved in a single pass. Based on separation via centrifugal acceleration up to 1500 G, the decanter centrifuge increases the settling rate of micron-size particles, significantly reducing their settling time in the viscous sludge, thus yielding rapid and effective solid/liquid separation. A force balance model developed for the decanter operation showed good agreement with experimental data.

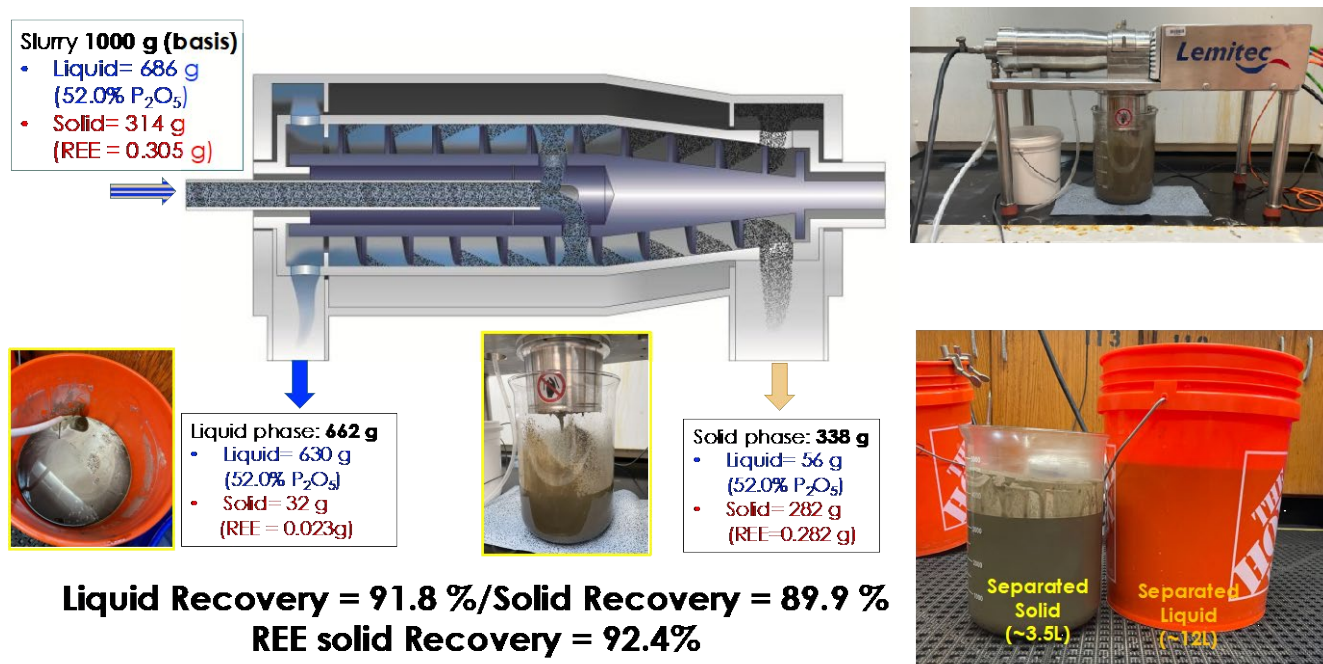


Figure 1 – Continuous-flow centrifugal decanter for solid/liquid separation of the phosphoric acid sludge