

INDUSTRIAL WATER and WASTEWATER TREATMENT

Fall 2015

Sludge Volume

Coagulation of an industrial wastewater using aluminum sulfate (alum) produces 4550 kg of dry solids per day, of which 20 % are volatile. The settled sludge from the clarifier is concentrated in a clarifier-thickener to a solids density of 2.5 % from an initial clarifier underflow sludge density of 1.2%. Centrifugation is then used to increase the 2.5 % concentration to 20 %.

Assume a specific gravity of NVSS and VSS of 2.3 and 1.2, respectively. Estimate the specific gravity of the dry solids, wet clarifier underflow solids, wet thickened sludge, and wet centrifuge concentrated solids. Calculate the daily sludge volume from each process (m³/d) and overall percent (%) reduction in sludge volume from initial settled sludge solids concentration to final centrifuge sludge cake solids concentration.

see significant
reduction

$$\frac{W_d}{S_d \gamma} = \frac{W_f}{S_f \gamma} + \frac{W_v}{S_v \gamma}$$