

Home Work No. 5

- (1) A water purification plant is treating an average flow of 115,000 m³/day of surface water with a suspended solids (SS) concentration of about 25 mg/L and an alkalinity of 20 mg/L as CaCO₃. The coagulation-flocculation process requires 60 mg/L of alum to reduce the SS to undetectable level.
 - (a) How many tones of alum are needed monthly?
 - (b) What dose of lime (80% CaO) is needed to react with alum after the natural alkalinity is exhausted?
 - (c) What is the volume of sludge produced daily if the solids concentration in sludge is expected to be around 0.15%?

- (2) A surface water is coagulated with a dosage of 27 mg/L of ferrous sulfate and an equivalent dosage of lime.
 - (a) How many kilograms of ferrous sulfate are required per 1000 m³ of water?
 - (b) How many kilograms of hydrated lime are needed per 1000 m³ of water assuming a purity of 65% CaO?
 - (c) How many kilograms of Fe(OH)₃ sludge are produced per 1000 m³ of water?

- (3) Calculate the detention time and overflow rate for a sedimentation basin with a volume of 1.0 mil gal and surface area of 1160 m² treating 30,280 m³/day.

- (4) Based on laboratory testing, the settling velocity of an alum floc is 0.0004 m/s in water at 10 °C. Convert this settling velocity to units of overflow rate in cubic meter per square meter per day. What is the detention time in quiescent water in hours for the alum floc to settle from the surface of the water to a depth of 3 m?