

SETTLING

U16.2: Approximately spherical particles with diameter of 1 mm and density of 400 kg/m^3 settle in air at normal pressure and temperature of 20°C . Calculate the settling velocity.

Result: *The settling velocity of given particles is 2.18 m/s.*

U 16.3: Determine the diameter of a cylindrical settler for continuous settling of floated whiting. The settler is to process 120 tons/hour of a suspension that contains 6,5 wt. % of CaCO_3 . The diameter of particles is $40 \mu\text{m}$ and their density 2700 kg/m^3 . The sludge contains 65 wt. % of water. The temperature is 15°C . The actual diameter of the settler is $1/3$ larger than the calculated one.

Result: *The actual diameter of the settler is 6.9 m.*

FLUIDIZATION:

U17.1 What is the pressure drop in a layer of CuSO_4 crystals in fluidized drying with air with temperature of 260°C and pressure of 98 kPa. The column has a diameter of 100 mm and is filled with a) 350 g and b) 650 g of CuSO_4 . The density of CuSO_4 is 3610 kg m^{-3} .

Result: *The pressure drop is 437 Pa.*

U17.2 Calculate the threshold velocity of fluidization for spherical particles with diameter of 4 mm and density 1280 kg m^{-3} in using air with temperature of 25°C and pressure of 735 Torr (1 Torr equals 133,32 Pa).

Result: *The threshold velocity of fluidization of given particles is $1,17 \text{ ms}^{-1}$.*

U17.3 Granulated urea is dried in a fluidized drier with air at temperature of 50°C and pressure of 101325 Pa. The superficial velocity of air in the drier (column) is 2.1 ms^{-1} . The urea has density of 1390 kgm^{-3} and the diameter of granules is 1.9 mm. Calculate the voidage of the fluidized bed.

Result: *The voidage of the fluidized bed is 0.6.*