

Practice Problem on Slurry Transport:

(a) For a settling slurry transport through horizontal pipe, plot pressure drop (ΔP) across pipe as a function of average velocity (\bar{V}). Explain the curve qualitatively.

(b) Calculate the power consumption for horizontal pneumatic transport (dilute phase) of ore particles (density, $\rho_s = 1200 \text{ Kg/m}^3$) across a pipe of length 50m. The mass flow rate of solid particles is 30kg/min. Air to solid ratio mass wise in inlet stream is 1:5. (You have to use bulk density and overall mass flow rate of slurry for power calculation).

Other important data are following:

Diameter of pipe (D) = 0.07 m

Mean particle diameter (d) = 0.45 m

Viscosity of air (μ_g) = $0.018 \times 10^{-3} \text{ Pa.s}$

Density of air (ρ_g) = 0.0013

Roughness of pipe = 0.0112,

Mechanical efficiency of power source (motor/pump) = 0.7.

