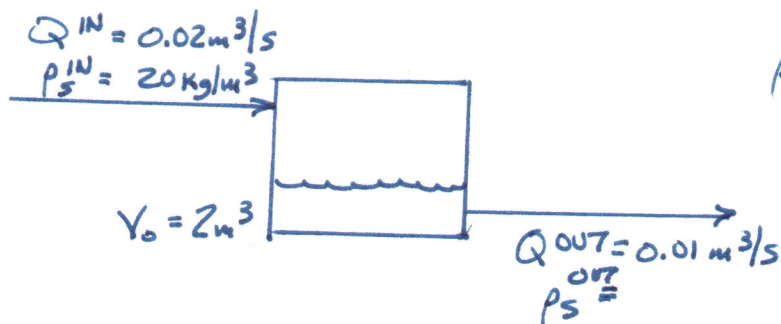


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$\rho_s = \text{CONC. OF SALT}$
 (NOT DENSITY!)

i) OVERALL BALANCE

~~ACC~~ ACC = IN - OUT

$$\frac{d(V\rho)}{dt} = \rho^{IN} Q^{IN} - \rho^{OUT} Q^{OUT}$$

NOTE: $\rho^{IN} = \rho^{OUT} = \rho$ THESE ARE DENSITIES
 OF STREAMS & SYSTEM.

$$\frac{dV}{dt} = 0.02 - 0.01$$

$$\boxed{\frac{dV}{dt} = 0.01}$$

ii) $\int_2^V dV = 0.01 \int_0^t dt$

$$V - 2 = 0.01t$$

$$\boxed{V = 0.01t + 2}$$

$$4 = 0.01t + 2$$

$$\underline{\underline{t = 200 \text{ s}}}$$

iii) SALT MASS BALANCE

$$ACC = IN - OUT + GEN$$

$$\frac{d}{dt}(V_{ps}) = (20)(0.02) - p_s(0.01)$$

$$p_s \frac{dV}{dt} + V \frac{dp_s}{dt} = 0.40 - 0.01 p_s$$

$$0.01 p_s + (2 + 0.01t) \frac{dp_s}{dt} = 0.40 - 0.01 p_s$$

$$\int_0^{p_s^f} \frac{dp_s}{0.40 - 0.02 p_s} = \int_0^t \frac{dt}{2 + 0.01t}$$

$$-50 \ln \left[\frac{0.40 - 0.02 p_s^f}{0.40} \right] = 100 \ln \left[\frac{2 + 0.01t}{2} \right]$$

$$\ln \left[1 - 0.05 p_s^f \right] = \ln \left[1 + 0.005t \right]^{-2}$$

$$\boxed{1 - 0.05 p_s^f = \frac{1}{(1 + 0.005t)^2}}$$

iv)

$$V = 4 \text{ m}^3$$

$$t = 200 \text{ s}$$

$$1 - 0.05 p_s^f = \frac{1}{(1 + (0.005)(200))^2}$$

$$\underline{\underline{p_s^f = 15 \text{ Kg/m}^3}}$$