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DEPT: Chemical Engineering

soln

600 ft³/min

fresh air →

20000

ft³

of air

→ 600 ft³/min

$$\frac{dy}{dt} = y_{in} - y_{out}$$

$$y_{in} = 600$$

$$y_{out} = \frac{600}{200} = 0.03y$$

$$\frac{dy}{dt} = 600 - 0.03y$$

$$\frac{dy}{dt} = -0.03(y - 20000)$$

$$\int \frac{dy}{(y-20000)} = \int -0.03 dt$$

$$\ln(y-20000) = -0.03t + c$$

$$y - 20000 = e^{-0.03t + c}$$

$$y - 20000 = e^{-0.03t} \cdot e^c$$

let

$$e^c = y_0$$

$$y - 20000 = y_0 e^{-0.03t}$$

$$y = y_0 e^{-0.03t} + 20000$$