

34. (a) We find the volume in cubic centimeters

$$(193 \text{ gal}) \left(\frac{231 \text{ in}^3}{1 \text{ gal}} \right) \left(\frac{2.54 \text{ cm}}{1 \text{ in}} \right)^3 = 7.31 \times 10^5 \text{ cm}^3$$

and subtract this from $1 \times 10^6 \text{ cm}^3$ to obtain $2.69 \times 10^5 \text{ cm}^3$. The conversion $\text{gal} \rightarrow \text{in}^3$ is given in Appendix D (immediately below the table of Volume conversions).

- (b) The volume found in part (a) is converted (by dividing by $(100 \text{ cm/m})^3$) to 0.731 m^3 , which corresponds to a mass of

$$(1000 \text{ kg/m}^3) (0.731 \text{ m}^3) = 731 \text{ kg}$$

using the density given in the problem statement. At a rate of 0.0018 kg/min , this can be filled in

$$\frac{731 \text{ kg}}{0.0018 \text{ kg/min}} = 4.06 \times 10^5 \text{ min}$$

which we convert to 0.77 y , by dividing by the number of minutes in a year $(365 \text{ days})(24 \text{ h/day})(60 \text{ min/h})$.