

Dimensional Analysis

1. Convert 318 μs to seconds.

$$318 \mu\text{s} \times \frac{1 \times 10^{-6} \text{ s}}{1 \mu\text{s}} = \mathbf{3.18 \times 10^{-4} \text{ s}}$$

2. The estimated amount of recoverable oil from the field at Prudhoe Bay in Alaska is 9.6×10^9 barrels. What is this amount of oil in cubic meters? One barrel = 42 gal (exact), 1 gal = 4 qt, and 1 qt = $9.46 \times 10^{-4} \text{ m}^3$.

$$9.6 \times 10^9 \text{ barrels} \times \frac{42 \text{ gal}}{1 \text{ barrel}} \times \frac{4 \text{ qts}}{1 \text{ gal}} \times \frac{9.46 \times 10^{-4} \text{ m}^3}{1 \text{ qt}} = \mathbf{1.5 \times 10^{10} \text{ m}^3}$$

3. The world's oceans contain approximately $1.35 \times 10^9 \text{ km}^3$ of water. What is this volume in liters?

$$1.35 \times 10^9 \text{ km}^3 \times \left(\frac{1000 \text{ m}}{1 \text{ km}}\right)^3 \times \left(\frac{1 \text{ cm}}{0.01 \text{ m}}\right)^3 \times \frac{1 \text{ L}}{1000 \text{ cm}^3} = \mathbf{1.35 \times 10^{21} \text{ L}}$$