

Look over the following quantitative Sample Problem. Notice how the four-step approach is used, and then apply the approach yourself in solving the practice problems that follow.

SAMPLE PROBLEM F

Calculate the volume of a sample of aluminum that has a mass of 3.057 kg. The density of aluminum is 2.70 g/cm³.

SOLUTION

1 ANALYZE

Given: mass = 3.057 kg, density = 2.70 g/cm³

Unknown: volume of aluminum

2 PLAN

The density unit in the problem is g/cm³, and the mass given in the problem is expressed in kg. Therefore, in addition to using the density equation, you will need a conversion factor representing the relationship between grams and kilograms.

$$1000 \text{ g} = 1 \text{ kg}$$

Also, rearrange the density equation to solve for volume.

$$\text{density} = \frac{\text{mass}}{\text{volume}} \quad \text{or} \quad D = \frac{m}{V}$$

$$V = \frac{m}{D}$$

3 COMPUTE

$$V = \frac{3.057 \text{ kg}}{2.70 \text{ g/cm}^3} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 1132.222 \dots \text{ cm}^3 \text{ (calculator answer)}$$

The answer should be rounded to three significant figures.

$$V = 1.13 \times 10^3 \text{ cm}^3$$

4 EVALUATE

The unit of volume, cm³, is correct. An order-of-magnitude estimate would put the answer at over 1000 cm³.

$$\frac{3}{2} \times 1000$$

The correct number of significant figures is three, which matches that in 2.70 g/cm³.

PRACTICE

Answers in Appendix E

1. What is the volume, in milliliters, of a sample of helium that has a mass of 1.73×10^{-3} g, given that the density is 0.178 47 g/L?
2. What is the density of a piece of metal that has a mass of 6.25×10^5 g and is 92.5 cm × 47.3 cm × 85.4 cm?
3. How many millimeters are there in 5.12×10^5 kilometers?
4. A clock gains 0.020 second per minute. How many seconds will the clock gain in exactly six months, assuming exactly 30 days per month?

extension

Go to **go.hrw.com** for more practice problems that ask you to calculate using scientific notation.



Keyword: HC6MEAX