Question:

A gold bullion dealer advertised a bar of pure gold for sale. The gold bar had a mass of 3300g and measured 2.00cm x 15.0 cm x 6.00cm. Was the bar pure gold?

Solution:

We can verify that by comparing the density of true gold (which is 19.3g/cm^3 at room temperature) to the density of a bar.

First, let's compute the volume of a bar:

$$V = a{\times}b{\times}c = 2{\times}15{\times}6 = 180 \ (cm^3).$$

Second, let's compute the density of a bar:

$$\rho = \frac{m}{V} = \frac{3300}{180} \approx 18.33 \ \left(\frac{g}{cm^3}\right).$$

This is much smaller than expected, the difference is almost 1g/cm^3. Thus, we can conclude that the bar wasn't of a pure gold.

Answer:

No.