Answer on Question #64490, Physics / Other

A lump of gold is suspected to contain some quantity of aluminium. If the gold sample has mass 500g and is found to have a relative density of 5.2, find what mass of gold is present if the relative densities of gold and aluminium are respectively 19.3 and 2.6

Solution:

We'll assume that the densities of metals are grams per cubic centimeter.

Relative density, or specific gravity, is the ratio of the density of a substance to the density of a given reference material.

Let x equal the fraction of gold, and 1-x the fraction of aluminium, and use this to write an algebraic expression.

$$2.6(1-x) + 19.3x = 5.2$$
$$2.6 - 2.6x + 19.3x - 5.2 = 0$$
$$16.7x = 2.6$$
$$x = 0.1557$$

The mass of gold is

$$m_{Au} = 0.1557 \times 500\ \text{g} = 77.8\ \text{g} \approx 78\ \text{g}$$

Answer: 78 g