Answer on Question #80689, Chemistry / General Chemistry

Gold (19.3 g/cm3) and copper (8.96 g/cm3) can be blended to form an alloy called rose gold. Suppose a rose gold bar has a mass of 117 g and a volume of 7.00 cm3 . Calculate the mass percent of gold in the bar.

Solution

Let mass of gold to be x g, mass of copper to me y g.

Then x+y=117

Volume of gold is V=m/d = x/19.3

Volume of copper is V=m/d = y/8.96, then V(Au) + V(Cu)= V (alloy), i.e., x/19.3 +y/8.96 = 7

We have the system of two equations:

$$\begin{cases} x + y = 117 \\ \dfrac{x}{19.3} + \dfrac{y}{8.96} = 7 \end{cases}$$

$$\begin{cases} x = 117 - y \\ \frac{(117-y)}{19.3} + \frac{y}{8.96} = 7 \end{cases}$$

$$\begin{cases} x = 117 - y \\ 8.96 \times (117 - y) + 19.3 \times y = 7 \times 19.3 \times 8.96 \end{cases}$$

$$\begin{cases} x = 117 - y \\ 1048.32 - 8.96y + 19.3y = 1210.50 \end{cases}$$

$$\begin{cases} x = 117 - y \\ 10.34y = 162.18 \end{cases}$$

$$\begin{cases} x = 117 - 15.68 \\ y = 15.68 \end{cases}$$

$$\begin{cases} x = 101.32 \\ y = 15.68 \end{cases}$$

So, m(Au) = 101.32 g, m(Cu) = 15.68 g

$$w(Au) = \frac{m(Au)}{m_{alloy}} \times 100\% = \frac{101.32}{117} \times 100\% = 86.6\%$$

Answer: 86.6%