Answer on Question #71906, Physics / Other

Question. The density of gold is $19.32\ kg/L$. A gold colored piece of metal was massed out to be about $5{,}230\ mg$. The volume of the metal measured by placing it in $14.6\ cL$ of water and the water level rose to $17.2\ cL$. Is this piece of metal gold?

Given.

$\rho_0 = 19.32\ kg/L;$

$m = 5{,}230\ mg = 5{,}230 \cdot 10^{-3}\ g = 5{,}230 \cdot 10^{-6}\ kg;$

$V_1 = 14.6\ cL = 14.6\ \cdot 10^{-2}\ L;$

$V_2 = 17.2\ cL = 17.2\ \cdot 10^{-2}\ L.$

Find.

$\rho - ?.$

Solution.

The volume of the metal is

$$\Delta V = V_2 - V_1 = 17.2\ \cdot 10^{-2} - 14.6\ \cdot 10^{-2} = 2.6\ \cdot 10^{-2}\ L$$

Hence

$$\rho = \frac{m}{\Delta V} = \frac{5{,}230 \cdot 10^{-6}}{2.6 \cdot 10^{-2}} = 2011 \cdot 10^{-4}\ kg/L = 0.2011\ kg/L$$

$$\rho \neq \rho_0$$

Answer. it's not gold