Answer on Question #63762 - Chemistry - General Chemistry

Task:

How many atoms of mercury are present in 2.1 cubic centimeters of liquid mercury? The density of mercury is 13.55 g/cm³. Answer in units atoms.

Solution:

Convert volume to mass:

$$2.1\,cm^3 \times \frac{13.55\,g}{cm^3} = 28.455\,g$$

We find the amount substances of mercury:

$$n(Hg) = \frac{m(Hg)}{M(Hg)}\,\frac{28.455\,g}{200.59\,{g}/{mol}} = 0.14185\,mol$$

$Number\,of\,atoms\,of\,mercury\,in\,one\,mole\,of\,Hg = 6.022 \times 10^{23}.$

Then,

$Number\,of\,atoms\,of\,mercury\,contained\,by\,0.14185\,moles\,of\,Hg = 0.14185 \times 6.022 \times 10^{23};$
$Number\,of\,atoms\,of\,mercury\,in\,0.14185\,moles\,of\,Hg \approx 8.54 \times 10^{22}.$

Answer: 8.54*10²² atoms of mercury.