Question #64726, Chemistry / Other

How many O atoms are present in a 7.07 ng sample of quinine, $C_{20}H_{24}O_2N_2$? Note: 1 ng is one nanogram.

Answer*:*
1 ng = 10^{-9} g
7.07 ng = 7.07 x 10^{-9} g

$$n(\text{quinine}) = \frac{m(\text{quinine})}{M(\text{quinine})}$$

$$n(\text{quinine}) = \frac{7.07 \times 10^{-9} g}{324.42 \ g/mol} = 2.17 \times 10^{-11} mol$$

$$N(\text{quinine}) = 2.17 \times 10^{-11} mol \times 6.02 \times 10^{23} mol^{-1} = 1.312 \times 10^{13} \ molecules$$

Each quinine molecule contains 2 O atoms. Thus:

$$N(O) = 1.312 \times 10^{13} \times 2 = \mathbf{2.624 \times 10^{13} \ atoms}$$

Answer provided by https://www.AssignmentExpert.com