Question #46953 – Chemistry – Inorganic Chemistry

Question:

Calculate the number of moles (of molecules) in the following samples.(Avogadro's # = 6.02 x 10^{23} molecules per mole)

(A) 9.93 g H2O

Answer:

The mass of one atom of hydrogen is 1.67×10^{-24} g, the mass of one atom of oxygen is 26.72×10^{-24} g. Hence, the mass of one H_2O molecule is:

$m(H_2O) = 2\times(1.67 \times 10^{-24}\ g) + 26.72 \times 10^{-24}\ g = 30.06 \times 10^{-24}$ g.

One mole contains 6.02×10^{23} molecules of water, therefore the mass of one mole is:

$M(H_2O) = 30.06 \times 10^{-24}\ g \times 6.02 \times 10^{23} mol^{-1} = 18.096$ g/mole

We have 9.93 g, so corresponding the number of moles can be estimated:

$N(H_2O) = m_x(H_2O)/M(H_2O) = 9.93g/18.096$ g/mole = 0.55 moles