Question #84463, Chemistry / General Chemistry

How many molecules of hydrogen gas are formed when 24.6 g of sodium are added to water. Show your work.

2 Na + 2H2O --> 2NaOH + H2

Solution

According to the reaction equation 1 mole of hydrogen releases when 2 moles of sodium react with 2 moles of water. Find the amount of sodium given in the task:

$\nu(Na) = \frac{m}{M} = \frac{24.6}{23} = 1.07$ (mol)

Thus the amount of hydrogen is:

$\nu(H_2) = \frac{1.07}{2} = 0.535$ (mol)

According to Avogadro Law 1 mole of any gas contains 6.022×10^{23} particles, so find the number of particles in the given amount of hydrogen:

$N = 0.535 \times 6.022 \times 10^{23} =$ **3.22×10^{23} (m.)**

Answer

3.22×10^{23} molecules of hydrogen gas are formed when 24.6 g of sodium are added to water.