#63252 Chemistry, General Chemistry

Chapter 13 (13.110)

A sample of hydrogen gas is generated in a closed container by reacting 2.050 g of zinc metal with 19.0 mL of 1.00 M sulfuric acid. Write the balanced equation for the reaction.

Answer:

$Zn + H_2SO_4 = ZnSO_4 + H_2$
$n_{(gas)} = V/22.4$
$n = m/M$
$n = C_M \cdot V$
$M (Zn) = 65.38$ g/mol
$M (H_2SO_4) = 98.074$ g/mol
$n (Zn) = 2.050/65.38 = 0.031$ mol
$n (H_2SO_4) = 1.00 \cdot (19.0/1000) = 0.019$ mol
Therefore, in this process H_2SO_4 is the limiting reactant. That is why:
$n (H_2) = n (H_2SO_4) = 0.019$ mol
$V (H_2) = n (H_2) \cdot 22.4 = 0.019 \cdot 22.4 = 0.426$ l = 426 ml