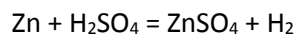


Chapter 13 (13.110)

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:



$$n_{(\text{gas})} = V/22.4$$

$$n = m/M$$

$$n = C_M \cdot V$$

$$M(\text{Zn}) = 65.38 \text{ g/mol}$$

$$M(\text{H}_2\text{SO}_4) = 98.074 \text{ g/mol}$$

$$n(\text{Zn}) = 2.050/65.38 = 0.031 \text{ mol}$$

$$n(\text{H}_2\text{SO}_4) = 1.00 \cdot (19.0/1000) = 0.019 \text{ mol}$$

Therefore, in this process H_2SO_4 is the limiting reactant. That is why:

$$n(\text{H}_2) = n(\text{H}_2\text{SO}_4) = 0.019 \text{ mol}$$

$$V(\text{H}_2) = n(\text{H}_2) \cdot 22.4 = 0.019 \cdot 22.4 = 0.426 \text{ l} = 426 \text{ ml}$$

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