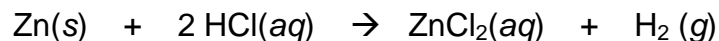
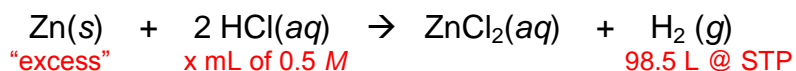


How many milliliters of 0.5 M hydrochloric acid is required to react with an excess of zinc metal to produce 98.5 L of hydrogen gas @ STP. [Assume 100% yield]

Step 1) Write a balanced chemical equation



Step 2) Add given information to equation



Step 3) Solve for number of moles of HCl needed

$$x \text{ mol HCl} = 98.5 \text{ L H}_2 \left(\frac{1 \text{ mol H}_2}{22.4 \text{ L H}_2} \right) \left(\frac{2 \text{ mol HCl}}{1 \text{ mol H}_2} \right) = 8.8 \text{ mol HCl}$$

Step 3) Solve for volume of HCl

$$M = \frac{\text{mol}}{\text{L}} \Rightarrow 0.5 \text{ M} = \frac{8.8 \text{ mol HCl}}{x \text{ L}}$$

$$x = 17.6 \text{ L} \left(\frac{1000 \text{ mL}}{1 \text{ L}} \right) \Rightarrow 17,600 \text{ mL of } 0.5 \text{ M HCl}$$

An alternative method to solve for moles of HCl

