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

Zn(*s*) + 2 HCl(*aq*) 🡪 ZnCl2(*aq*) + H2 (*g*)

Step 2) Add given information to equation

Zn(*s*) + 2 HCl(*aq*) 🡪 ZnCl2(*aq*) + H2 (*g*)

 “excess” x mL of 0.5 *M* 98.5 L @ STP

Step 3) Solve for number of moles of HCl needed



Step 3) Solve for volume of HCl



***An alternative method to solve for moles of HCl***

Zn(*s*) + 2 HCl(*aq*) 🡪 ZnCl2(*aq*) + H2 (*g*)

 “excess” x mL of 0.5 *M* 98.5 L @ STP

HCl : H2

8.8 mol HCl

2 : 1

/ 22.4 L/mol

4.4 mol H2