Solution Stoichiometry – solid/liquid ①

① In a reaction of $CaCO_3$ with HCl, how many grams of $CaCO_3$ are consumed in a reaction with 225mL of 3.25 M HCl?

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$$

? g — 225mL $\times 10^{-3}$ = 0.225L — 3.25M

Strategy: mol HCl → mol $CaCO_3$ → g $CaCO_3$

$$0.225\,L \times \frac{3.25\,mol\,HCl}{L} \times \frac{1\,mol\,CaCO_3}{2\,mol\,HCl} \times \frac{100.1\,g\,CaCO_3}{1\,mol\,CaCO_3}$$

(mol HCl)

$$= \boxed{36.6\,g\,CaCO_3}$$

② How many mL of 3.84 M HCl are required to consume 4.12g Zn?

$$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$$

4.12g — 3.84 M — ? mL

Strategy: g Zn → mol Zn → mol HCl → L HCl → mL HCl.
(mol ratio; using molarity)

$$4.12\,g\,Zn \times \frac{1\,mol\,Zn}{65.39\,g} \times \frac{2\,mol\,HCl}{1\,mol\,Zn} \times \frac{1\,L\,HCl}{3.84\,mol\,HCl} \times \frac{1000\,mL}{1\,L}$$

$$= \boxed{32.8\,mL}$$

$M = \frac{mol}{L}$ ∴ $L = \frac{mol}{M}$