

Neutralization / Titration

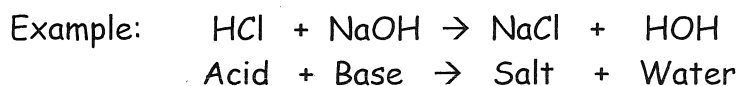
One definition of acids and bases says ...

Acids = H^+ donors

Bases = OH^- donors

Neutralization ...

when an acid and a base react to form a salt and water (neutral pH)



Solve each of the following:

- (1) In the above reaction between HCl and NaOH, if 34.2 mL of 3.00 M HCl neutralizes 24.8 mL of NaOH, what is the molarity of the base?

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

$$1 HCl + 1 NaOH \rightarrow NaCl + H_2O$$

3.00 M ?
 34.2 mL 24.8 mL

$$\frac{3.00 \text{ mol HCl}}{L} \times \frac{34.2 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol HCl}} \times \frac{1000 \text{ mL}}{24.8 \text{ mL}} = 4.14 \frac{\text{mol}}{L} \text{ or } M \text{ NaOH}$$

- (2) Using the same reaction again, if 67.3 mL of 6.00 M HCl reacts with 81.4 mL of 4.25 M NaOH, how many grams of $NaCl_{(s)}$ form?

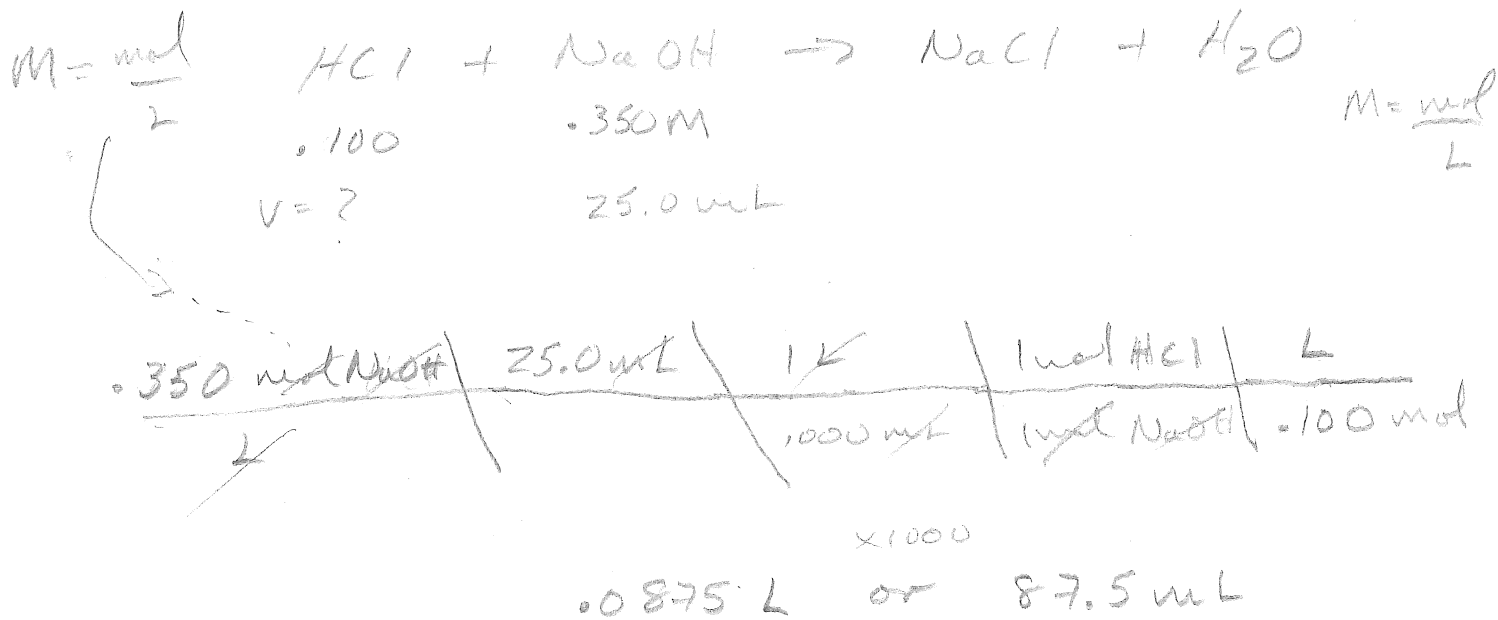
$$\frac{6.00 \text{ mol HCl}}{L} \times \frac{67.3 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ mol NaCl}}{1 \text{ mol HCl}} = 0.4038 \text{ mol NaCl}$$

23.6 g NaCl
 ↓
 smallest amount

$$\frac{4.25 \text{ mol NaOH}}{L} \times \frac{81.4 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ mol NaCl}}{1 \text{ mol NaOH}} = 0.346 \text{ mol NaCl}$$

20.2 g NaCl

- (3) What volume of 0.100 M HCl is needed to neutralize 25.0 mL of a 0.350 M NaOH solution?



SHORT CUT! (Because

$\text{HCl} : \text{NaOH}$
is $1:1$)

M_1	NaOH	V_1	
$.350\text{ M}$	25.0 mL		
$.100\text{ M}$			

$= 87.5\text{ mL}$
of $.100\text{ M HCl}$

M_2

Be careful using this!!