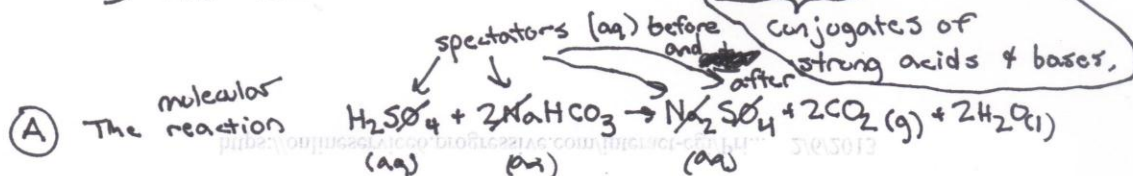


16.93 2.500g KCl AND  $\text{NaH}_2\text{CO}_3$  mixed in UNKNOWN ratios.

- Acid is added to the solid 2.500g mixture. The acid will react with the  $\text{HCO}_3^-$ .
- We said acids react with carbonates to make  $\text{CO}_2$ .
- The acid will not react with  $\text{K}^+$  or  $\text{Cl}^-$ .



- (B) The  $\text{H}_2\text{SO}_4$  added is 25.00mL of .437M  $\text{H}_2\text{SO}_4$
- This is more acid than needed (excess).
  - We add excess because we do not know how much carbonate is in the 2.500g mixture.

Total moles of  $\text{H}^+$  added

$$\text{moles} = M \cdot V = .437\text{M} \times .025\text{L } \text{H}_2\text{SO}_4 \text{ (this was given)}$$

$$= .010925 \text{ moles } \text{H}_2\text{SO}_4$$

$\text{H}_2\text{SO}_4$  has 2:1 mole ratio of  $\text{H}^+$

$$.010925 \text{ mol } \text{H}_2\text{SO}_4 \times \frac{2 \text{ mol } \text{H}^+}{1 \text{ mol } \text{H}_2\text{SO}_4} = \boxed{.02185 \text{ moles } \text{H}^+}$$

\* We add NaOH to mixture to find out how much extra acid was added. Using an indicator the NaOH is added until it is basic. The amount of NaOH reacted with  $\text{H}^+$  subtracted from the total amount of  $\text{H}^+$  moles ~~with~~ will give us  $\text{H}^+$  reacted with carbonate.

the key use the wrong volume

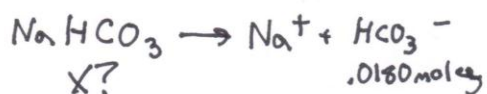
$$\text{Moles NaOH} = M \cdot V = .0354\text{L} \times 0.108\text{M NaOH} = \boxed{.003823 \text{ moles NaOH}}$$

$$\text{Total } \text{H}^+ - \text{Moles } \text{OH}^- \text{ (used to react)} = \text{moles } \text{H}^+ \text{ reacted with } \text{HCO}_3^-$$

$$.02185 - .003823 = \boxed{.0180 \text{ moles } \text{H}^+ \text{ react with } \text{HCO}_3^-}$$

from Net Ionic 1:1 ratio  $\therefore$  = moles  $\text{HCO}_3^-$

This is equal to excess moles of acid!



1:1 ratio.  $\therefore \text{NaHCO}_3 = .0180 \text{ moles}$ .

(C) TAKE moles of  $\text{NaHCO}_3 \rightarrow \text{g}$ , then divide by initial total.

$$.01803 \text{ mol} \times \frac{84.01 \text{ g NaHCO}_3}{1 \text{ mol NaHCO}_3} = 1.514 \text{ g NaHCO}_3$$

$$\frac{\text{mass of NaHCO}_3}{\text{Total Mass}} \times 100\% = \text{percent NaHCO}_3$$

$$\frac{1.514 \text{ g}}{2.500 \text{ g}} \times 100 = 60.6\% \text{ NaHCO}_3$$

$$100\% - 60.6\% = 39.4\% \text{ KCl}$$