# Common Acid Reactions 

Section 9.7

## Acids and Hydroxide Bases

- Neutralization reaction
- Products are water and ionic salt

$$
\mathrm{HA}(\mathrm{aq})+\mathrm{MOH}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{MA}(\mathrm{aq})
$$

- Where $M$ is some metal, and $A$ is some anion


## Example \#1

Determine the products of the reaction between NaOH and HBr .

## Example \#1

- Metal is $\mathrm{Na}^{+}$
- Anion is Br
$\mathrm{HBr}(\mathrm{aq})+\mathrm{NaOH}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{NaBr}(\mathrm{aq})$


# Acids and Carbonate or Bicarbonate 

- Products are water and carbon dioxide and ionic salt
$\mathrm{HA}(\mathrm{aq})+\mathrm{MCO}_{3}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{MA}(\mathrm{aq})$
$\mathrm{HA}(\mathrm{aq})+\mathrm{MHCO}_{3}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{MA}(\mathrm{aq})$
- Where $M$ is some metal, and $A$ is some anion


## Example \#2

Write a balanced equation for the reaction of nitric acid $\left(\mathrm{HNO}_{3}\right)$ with each compound:
a. $\mathrm{NaHCO}_{3}$
b. $\mathrm{MgCO}_{3}$

## Example \#2 Solved

a. $\mathrm{NaHCO}_{3}: \mathrm{Na}^{+}$is $\mathrm{M}, \mathrm{NO}_{3}{ }^{-}$is A
$\mathrm{HNO}_{3}(\mathrm{aq})+\mathrm{NaHCO}_{3}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{NaNO}_{3}(\mathrm{aq})$
b. $\mathrm{MgCO}_{3}: \mathrm{Mg}^{2+}$ is $\mathrm{M}, \mathrm{NO}_{3}{ }^{-}$is A
$2 \mathrm{HNO}_{3}(\mathrm{aq})+\mathrm{MgCO}_{3}(\mathrm{aq}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l})+\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{Mg}\left(\mathrm{NO}_{3}\right)_{2}(\mathrm{aq})$

## Acids and Metals

- Products are hydrogen gas and ionic salt

$$
\mathrm{HA}(\mathrm{aq})+\mathrm{M}(\mathrm{~s}) \rightarrow \mathrm{H}_{2}(\mathrm{~g})+\mathrm{MA}(\mathrm{aq})
$$

- Where $M$ is some metal, and $A$ is some anion


## Example \#3

Write a balanced equation for the reaction of sulfuric acid $\left(\mathrm{H}_{2} \mathrm{SO}_{4}\right)$ with each metal:
a. Na
b. Ca
c. Sr

## Example \#3 Solved

a. Na

$$
\mathrm{H}_{2} \mathrm{SO}_{4}(\mathrm{aq})+2 \mathrm{Na}(\mathrm{~s}) \rightarrow \mathrm{H}_{2}(\mathrm{~g})+\mathrm{Na}_{2} \mathrm{SO}_{4}(\mathrm{aq})
$$

b. Ca

$$
\mathrm{H}_{2} \mathrm{SO}_{4}(\mathrm{aq})+\mathrm{Ca}(\mathrm{~s}) \rightarrow \mathrm{H}_{2}(\mathrm{~g})+\mathrm{CaSO}_{4}(\mathrm{aq})
$$

C. Sr

$$
\mathrm{H}_{2} \mathrm{SO}_{4}(\mathrm{aq})+\mathrm{Sr}(\mathrm{~s}) \rightarrow \mathrm{H}_{2}(\mathrm{~g})+\mathrm{SrSO}_{4}(\mathrm{aq})
$$

## Example \#4

Write a balanced equation for the reaction of hydrochloric acid $(\mathrm{HCl})$ with each compound:
a. LiOH
b. $\mathrm{Na}_{2} \mathrm{CO}_{3}$
c. Mg

