

Date: $\qquad$

## Neutralization Reactions Worksheet

1. Write the balanced chemical equations for the neutralization reactions between:
a) HI and NaOH

$$
\mathrm{HI}+\mathrm{NaOH} \rightarrow \mathrm{H}_{2} \mathrm{O}+\mathrm{NaI}
$$

b) $\mathrm{H}_{2} \mathrm{CO}_{3}$ and $\mathrm{Sr}(\mathrm{OH})_{2}$

$$
\mathrm{H}_{2} \mathrm{CO}_{3}+\mathrm{Sr}(\mathrm{OH})_{2} \rightarrow 2 \mathrm{H}_{2} \mathrm{O}+\mathrm{SrCO}_{3}
$$

c) $\mathrm{Ca}(\mathrm{OH})_{2}$ and $\mathrm{H}_{3} \mathrm{PO}_{4}$

$$
3 \mathrm{Ca}(\mathrm{OH})_{2}+2 \mathrm{H}_{3} \mathrm{PO}_{4} \rightarrow 6 \mathrm{H}_{2} \mathrm{O}+\mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2}
$$

d) hydrobromic acid and barium hydroxide

$$
2 \mathrm{HBr}+\mathrm{Ba}(\mathrm{OH})_{2} \rightarrow 2 \mathrm{H}_{2} \mathrm{O}+\mathrm{BaBr}_{2}
$$

e) zinc hydroxide and nitric acid

$$
\mathrm{Zn}(\mathrm{OH})_{2}+2 \mathrm{HNO}_{3} \rightarrow 2 \mathrm{H}_{2} \mathrm{O}+\mathrm{Zn}\left(\mathrm{NO}_{3}\right)_{2}
$$

f) aluminum hydroxide and hydrochloric acid

$$
\mathrm{Al}(\mathrm{OH})_{3}+\mathbf{3} \mathrm{HCl} \rightarrow \mathbf{3} \mathrm{H}_{2} \mathrm{O}+\mathrm{AlCl}_{3}
$$

2. Complete and balance the following equations representing neutralization reactions:

| a) | 2 CsOH | + | $\mathrm{H}_{2} \mathrm{CO}_{3}$ | $\rightarrow$ | $2 \mathrm{H}_{2} \mathrm{O}$ | + | $\mathrm{Cs}_{2} \mathrm{CO}_{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| b) | 2 HF | + | $\mathrm{Mg}(\mathrm{OH})_{2}$ | $\rightarrow$ | $2 \mathrm{H}_{2} \mathrm{O}$ | + | $\mathbf{M g F}$ |
| c) | $3 \mathrm{HNO}_{3}$ | + | $\mathrm{Al}(\mathrm{OH})_{3}$ | $\rightarrow$ | $3 \mathrm{H}_{2} \mathrm{O}$ | + | $\mathrm{Al}\left(\mathrm{NO}_{3}\right)_{3}$ |
| d) | HCl | + | KOH | $\rightarrow$ | $\mathrm{H}_{2} \mathrm{O}$ | + | KCl |
| e) | $\mathrm{HBrO}_{3}$ | + | $\mathbf{L i O H}$ | $\rightarrow$ | $\mathrm{H}_{2} \mathrm{O}$ | + | $\mathrm{LiBrO}_{3}$ |

3. Give the name and the formula of the ionic compound produced by neutralization reactions between the following acids and bases:

| Acid and Base reactants | Formula |  |
| :--- | :--- | :---: |
| a) | nitric acid <br> and sodium hydroxide | $\mathbf{N a N O}_{3}$ |
| b) | hydroiodic acid <br> and calcium hydroxide | $\mathbf{C a I}_{\mathbf{2}}$ |
| c) | magnesium hydroxide <br> and hydrosulfuric acid | $\mathbf{M g S}$ |
| d) | ammonium hydroxide <br> and hydrofluoric acid | $\mathbf{N H}_{4} \mathbf{F}$ |
| e) | barium hydroxide <br> and sulfuric acid | $\mathbf{B a S O}_{\mathbf{4}}$ |
| f) | chloric acid <br> and rubidium hydroxide | $\mathbf{R b C l O}_{\mathbf{3}}$ |
| g) | calcium hydroxide <br> and carbonic acid | $\mathbf{C a C O}_{\mathbf{3}}$ |

4. For each of the following ionic compounds, identify the acid and base that reacted to form them.

| Salt | Acid | Base |  |
| :--- | :--- | :--- | :--- |
| a) | NaCl | $\mathbf{H C l}$ | $\mathbf{N a O H}$ |
| b) | $\mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2}$ | $\mathbf{H}_{3} \mathbf{P O}_{4}$ | $\mathbf{C a}(\mathbf{O H})_{2}$ |
| c) | $\mathrm{Zn}\left(\mathrm{NO}_{3}\right)_{2}$ | $\mathbf{H N O}_{3}$ | $\mathbf{Z n}(\mathbf{O H})_{2}$ |
| d) | $\mathrm{Al}(\mathrm{ClO})_{3}$ | $\mathbf{H C l O}_{3}$ | $\mathbf{A l}(\mathbf{O H})_{3}$ |
| e) | $\mathrm{NH}_{4} \mathrm{I}$ | $\mathbf{H I}$ | $\mathbf{N H} \mathbf{4} \mathbf{O H}$ |

