

## Activity 33: Identifying Acids and Bases

### *Learning Objectives*

Part 1     *Identify the six strong acids*

*Identify a strong base*

Part 2     *Characterize a neutralization reaction*

*Predict the products and balance the chemical equation for a neutralization reaction*

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**Estimated Completion Time**     45 Minutes

### **Instructor Information**

Part 1 is fairly straightforward; appropriate time should be allocated for balancing neutralization reactions in Part 2.

### **ANSWERS TO QUESTIONS**

#### **Part 1. Strong Acids and Bases**

1. Strong acids are a., d., and f.
2. Because the most common isotope of the hydrogen ion ( $\text{H}^+$ ) contains a single proton, no neutrons, and no electrons,  $\text{H}^+$  contains only one subatomic particle and one proton.
3. Because a positive proton cannot exist in isolation in solution, it is most commonly associated with the solvent,  $\text{H}_2\text{O}$ , which when an  $\text{H}^+$  is present would be  $\text{H}_3\text{O}^+$ .  
$$\text{H}_3\text{O}^+ = \text{H}_2\text{O} + \text{H}^+$$

## Part 2. Neutralization Reactions

1. The anion  $\text{OH}^-$  is found in a base, not a salt.
2.
  - a.  $\text{HNO}_3(aq) + \text{KOH}(s) \rightarrow \text{KNO}_3(aq) + \text{H}_2\text{O}(l)$
  - b.  $2\text{HBr}(aq) + \text{Ca}(\text{OH})_2(s) \rightarrow \text{CaBr}_2(aq) + 2\text{H}_2\text{O}(l)$
  - c.  $\text{H}_2\text{SO}_4(aq) + \text{Mg}(\text{OH})_2(s) \rightarrow \text{MgSO}_4(aq) + 2\text{H}_2\text{O}(l)$

### Activity 33: Skill Development

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1.
  - a.  $\text{HNO}_3(aq) + \text{NaOH}(s) \rightarrow \text{NaNO}_3(aq) + \text{H}_2\text{O}(l)$
  - b.  $\text{H}_2\text{SO}_4(aq) + 2\text{KOH}(s) \rightarrow \text{K}_2\text{SO}_4(aq) + 2\text{H}_2\text{O}(l)$
  - c.  $2\text{HBr}(aq) + \text{Ba}(\text{OH})_2(s) \rightarrow \text{BaBr}_2(aq) + \text{H}_2\text{O}(l)$
  - d.  $2\text{HCl}(aq) + \text{Mg}(\text{OH})_2(s) \rightarrow \text{MgCl}_2(aq) + \text{H}_2\text{O}(l)$