

## CHAPTER 4 BLM ANSWER KEY

### BLM 4-1: Balancing Chemical Equations

#### Answers

##### Sample Reaction

- Hydrogen + oxygen  $\rightarrow$  water
- $\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\ell)$
- $\bullet\bullet + \bullet\bullet \rightarrow$
- $\bullet\bullet + \bullet\bullet \rightarrow \bullet\bullet\bullet$
- An oxygen atom remains.
- The atom of oxygen can be reacted with a second hydrogen molecule to form another molecule of water.
- $\bullet\bullet \bullet\bullet + \bullet\bullet \rightarrow \bullet\bullet\bullet \bullet\bullet\bullet$   
 $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\ell)$

##### Practice Reactions

- $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$
- $2\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$

### BLM 4-4: Chapter 4 Test

#### Answers

- zinc + acetic acid solution  $\rightarrow$   
zinc acetate solution + hydrogen gas  
 $\text{Zn}(\text{s}) + \text{HC}_2\text{H}_3\text{O}_2(\text{aq}) \rightarrow \text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2(\text{aq}) + \text{H}_2(\text{g})$   
 $\text{Zn}(\text{s}) + 2\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) \rightarrow \text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2(\text{aq}) + \text{H}_2(\text{g})$
- Balance the following equations and state the type of reaction in each case.
  - $2\text{C}_4\text{H}_{10}(\text{g}) + 13\text{O}_2(\text{g}) \rightarrow 8\text{CO}_2(\text{g}) + 10\text{H}_2\text{O}(\ell)$   
combustion reaction
  - $\text{CaCO}_3(\text{s}) + 2\text{HNO}_3(\text{aq}) \rightarrow$   
 $\text{Ca}(\text{NO}_3)_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\ell)$   
double decomposition reaction followed by  
a decomposition reaction
  - $2\text{Al}(\text{OH})_3(\text{s}) \rightarrow \text{Al}_2\text{O}_3(\text{s}) + 3\text{H}_2\text{O}(\ell)$   
decomposition reaction
  - $2\text{Al}(\text{s}) + 3\text{CuCl}_2(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{Cu}(\text{s})$   
single displacement reaction
  - $\text{K}_2\text{O}(\text{s}) + \text{H}_2\text{O}(\ell) \rightarrow 2\text{KOH}(\text{aq})$   
synthesis reaction

- $4\text{K}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{K}_2\text{O}(\text{s})$
  - $\text{Al}(\text{s}) + 3\text{AgNO}_3(\text{aq}) \rightarrow \text{Al}(\text{NO}_3)_3(\text{aq}) + 3\text{Ag}(\text{s})$
  - $\text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{MgSO}_4(\text{aq}) \rightarrow$   
 $\text{Mg}(\text{NO}_3)_2(\text{aq}) + \text{PbSO}_4(\text{s})$
  - $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
  - $\text{C}_6\text{H}_{12}\text{O}_6(\text{s}) + 6\text{O}_2(\text{g}) \rightarrow 6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\ell)$
- $\text{C}_2\text{H}_6\text{O}(\ell) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\ell)$   
complete combustion
  - $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KCl}(\text{aq}) \rightarrow \text{PbCl}_2(\text{s}) + 2\text{KNO}_3(\text{aq})$   
double displacement
  - $\text{Mg}(\text{s}) + \text{Zn}(\text{NO}_3)_2(\text{aq}) \rightarrow \text{Zn}(\text{s}) + \text{Mg}(\text{NO}_3)_2(\text{aq})$   
single displacement
  - $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{O}_2(\text{g})$   
decomposition
  - $2\text{C}_3\text{H}_8(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 6\text{CO}(\text{g}) + 8\text{H}_2\text{O}(\ell)$   
complete combustion
  - $\text{SO}_3(\text{g}) + \text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{SO}_4(\text{aq})$   
synthesis
- ${}^{210}_{83}\text{Bi} \rightarrow {}^{206}_{81}\text{Tl} + {}^4_2\text{He}$   
alpha decay
  - ${}^{233}_{91}\text{Pa} \rightarrow {}^{233}_{92}\text{U} + {}^0_{-1}\text{e}$   
beta decay
  - ${}^{236}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{18}\text{Sr} + {}^{141}_{54}\text{Xe} + 3 {}^1_0\text{n}$   
nuclear fission
  - ${}^6_3\text{Li} + {}^2_1\text{H} \rightarrow 2 {}^4_2\text{He}$   
nuclear fusion