## **ENDOTHERMIC VS. EXOTHERMIC WORKSHEET**

Identify the following reactions as endothermic or exothermic.

1. 
$$C_2H_4 \rightarrow 2C + 2H_2 + 52.3 \text{ kJ}$$

2. 
$$B_2H_6 + 6H_2O \rightarrow 2H_3BO_3 + 6H_2 + 493.4 \text{ kJ}$$

3. 
$$2\text{Fe} + 3\text{CO}_2 + 26.8 \text{ kJ} \rightarrow \text{Fe}_2\text{O}_3 + 3\text{CO}$$

4. 
$$Br_2 + Cl_2 + 29.4 \text{ kJ} \rightarrow 2BrCl$$

5. 
$$BCl_3 + 3H_2O \rightarrow HBO_3 + 3HCl$$
  $\Delta H = -112 \text{ kJ}$ 

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6. 
$$2HgO \rightarrow 2Hg + O_2$$

$$\Delta H = + 181 \text{ kJ}$$

7. 
$$S_2Cl_2 + CCl_4 \rightarrow SC_2 + 3Cl_2$$

$$\Delta H = +112 \text{ kJ}$$

8. 
$$CaCO_3 + 2NH_3 \rightarrow CaCN_2 + 2H_2O \quad \Delta H = +90.1 \text{ kJ}$$

Thermochemical equations can be written 2 ways; with the heat written on the reactant side (endothermic) or product side (exothermic) or written to the right of the reaction as  $\Delta H$  with the appropriates sign to indicate positive (endothermic) or negative reaction (exothermic). For the following thermochemical reactions, rewrite the reaction the second way.

9. 
$$26.0 \text{ kJ} + \text{NH}_4 \text{NO}_3 \rightarrow \text{NH}_4^+ + \text{NO}_3^-$$

10. 
$$P_4 + 5O_2 \rightarrow P_4O_{10} + 3010 \text{ kJ}$$

11. 
$$Si + 2Cl_2 \rightarrow SiCl_4$$
  $\Delta H = -657 \text{ kJ}$ 

12. 
$$2MnO_2 + 264 \text{ kJ} \rightarrow 2MnO + O_2$$