Chapter 8 − Problem 36
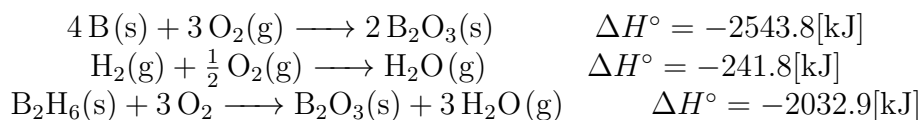
Michael Brodskiy

Instructor: Mr. Morgan

January 12, 2020

36. Given the following thermochemical equations, calculate $\Delta H°$ for the decomposition of B_2H_6 into its elements:

$$4\,B\,(s) + 3\,O_2(g) \longrightarrow 2\,B_2O_3(s) \qquad \Delta H° = -2543.8[\text{kJ}]$$
$$H_2(g) + \tfrac{1}{2}\,O_2(g) \longrightarrow H_2O\,(g) \qquad \Delta H° = -241.8[\text{kJ}]$$
$$B_2H_6(s) + 3\,O_2 \longrightarrow B_2O_3(s) + 3\,H_2O\,(g) \qquad \Delta H° = -2032.9[\text{kJ}]$$

$$2(B_2H_6(s) + 3\,O_2 \longrightarrow B_2O_3(s) + 3\,H_2O\,(g))$$
$$\underline{+\ 2\,B_2O_3(s) \longrightarrow 4\,B\,(s) + 3\,O_2(g)}$$

$$.2(-2032.9) + 2543.8 = -1522[\text{kJ}]$$
$$2\,B_2H_6(s) + 3\,O_2 \longrightarrow 4\,B\,(s) + 6\,H_2O\,(g)$$
$$\underline{+\ 6\,H_2O\,(g) \longrightarrow 3\,O_2(g) + 6\,H_2(g)} \tag{1}$$

$$-1522 + 6(241.8) = -71.2[\text{kJ}]$$
$$2\,B_2H_6(s) \longrightarrow 4\,B\,(s) + 6\,H_2(g)$$
$$B_2H_6(s) \longrightarrow 2\,B\,(s) + 3\,H_2(g)$$
$$-71.2 \cdot .5 = -35.6[\text{kJ}]$$