1. Calculate the standard state molar enthalpy change of sublimation for sulfur trioxide.

$$SO_3(s) \rightarrow SO_3(g); \Delta H = (-395.72) - (-454.51) = +58.79 \text{ kJ/mole}$$

2. Calculate the enthalpy change (heat) required to boil 100.0 g of water (MW = 18.015 g/mole) under standard conditions.

$$100.0 \text{ g (1 mol/18.015 g/mol)} = 5.551 \text{ moles boiled}$$

$$\Delta H = n \times \text{ molar } \Delta H = (5.551 \text{ mole}) \times [(-241.82) - (-285.83)] = +244.3 \text{ kJ}$$

3. Calculate the standard molar enthalpy change of reaction for:

$$2 \text{ N}_2\text{H}_4(l) + \text{N}_2\text{O}_4(g) \rightarrow 3 \text{ N}_2(g) + 4 \text{ H}_2\text{O}(l)$$

$$\Delta H = \sum 3(\Delta H_f^\circ \text{N}_2) + 4(\Delta H_f^\circ \text{H}_2\text{O}(l)) - \sum 2(\Delta H_f^\circ \text{N}_2\text{H}_4) + \Delta H_f^\circ \text{N}_2\text{O}_4$$

$$\Delta H = [3(0) + 4(-285.83)] - [2(50.63) + (9.16)] =$$

$$= -1143.32 - [110.42] = -1253.74 \text{ kJ/mole}$$