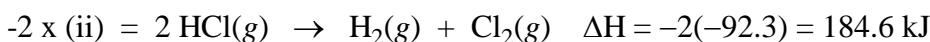
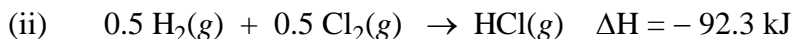
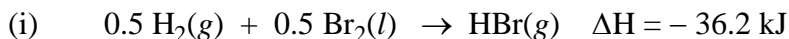
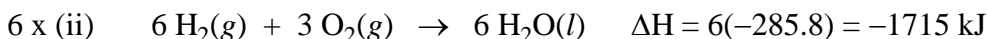
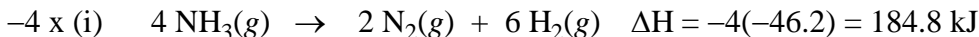
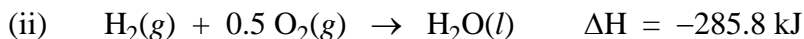
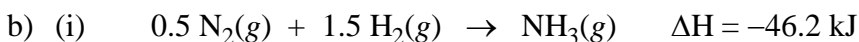


Answers to More Chapter 6 Study Questions

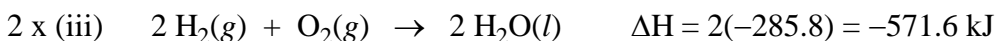
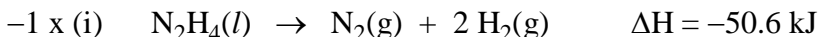
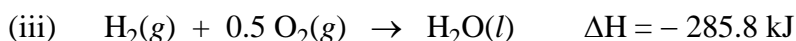
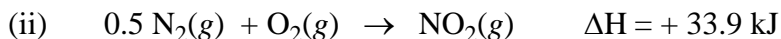
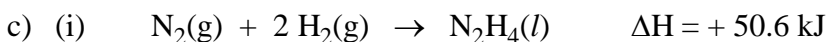
1. a) From the ΔH_f° Table:



overall reaction: $2 \text{ HCl}(g) + \text{Br}_2(l) \rightarrow 2 \text{ HBr}(g) + \text{Cl}_2(g) \quad \Delta H = -72.4 + 184.6 = 112.2 \text{ kJ}$
endothermic



overall reaction: $4 \text{ NH}_3(g) + 3 \text{ O}_2(g) \rightarrow 2 \text{ N}_2(g) + 6 \text{ H}_2\text{O}(l) \quad \Delta H = 184.8 - 1715 = -1530 \text{ kJ}$
exothermic



overall reaction: $\text{N}_2\text{H}_4(g) + 3 \text{ O}_2(g) \rightarrow 2 \text{ NO}_2(g) + 2 \text{ H}_2\text{O}(l) \quad \Delta H = -554.4 \text{ kJ}$
exothermic

$$2. \text{ a) } 488 \text{ kJ} \times \frac{2 \text{ mol P}}{574 \text{ kJ}} = 1.70 \text{ moles P}$$

$$b) 122 \text{ g PCl}_3 \times \frac{1 \text{ mol PCl}_3}{137.3 \text{ g PCl}_3} \times \frac{574 \text{ kJ}}{2 \text{ mol PCl}_3} = 255 \text{ kJ}$$

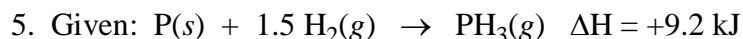
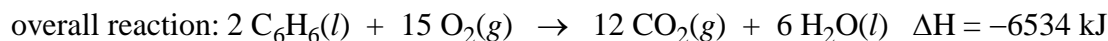
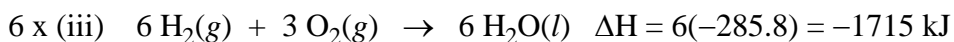
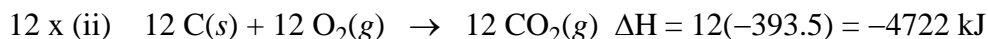
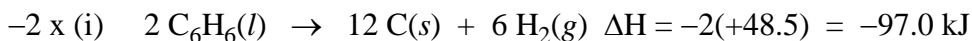
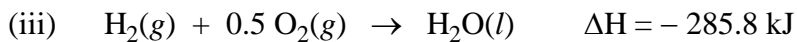
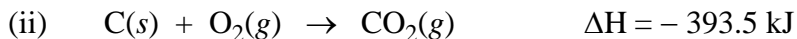
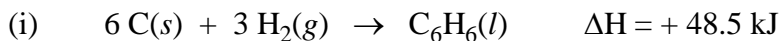
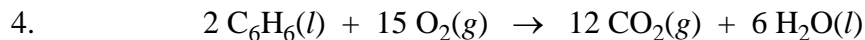
$$c) 27.0 \text{ kJ} \times \frac{3 \text{ mol Cl}_2}{574 \text{ kJ}} \times \frac{70.9 \text{ g Cl}_2}{1 \text{ mol Cl}_2} = 10.0 \text{ g Cl}_2$$

3. $Q \text{ (J)} = \text{specific heat (J/g } ^\circ\text{C)} \times \text{mass (g)} \times \Delta T \text{ (} ^\circ\text{C)}$; $\Delta T = 23.36 - 25.00 = -1.64^\circ\text{C}$.

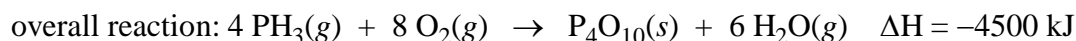
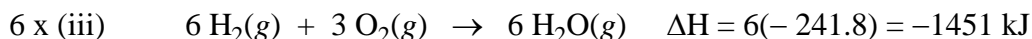
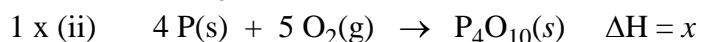
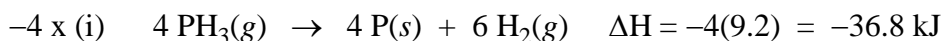
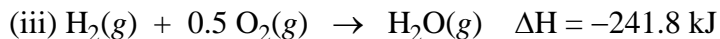
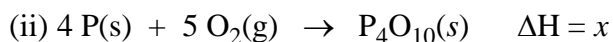
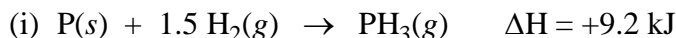
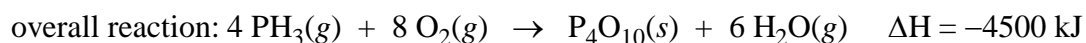
$$Q = 4.18 \text{ J/g } ^\circ\text{C} \times 50.0 \text{ g} \times (-1.64^\circ\text{C}) = -343 \text{ joules}$$

$$1 \text{ mole KClO}_3 \times \frac{122.6 \text{ g KClO}_3}{1 \text{ mol KClO}_3} \times \frac{343 \text{ joules}}{1.00 \text{ g KClO}_3} = 42,100 \text{ joules} = 42.1 \text{ kJ}$$

$$\Delta H = +42.1 \text{ kJ}$$



Find $\Delta H_f^\circ(\text{P}_4\text{H}_{10}) = x$



$-4500 \text{ kJ} = (-36.8 + x + -1451) \text{ kJ}; \quad x = -4500 + 36.8 + 1451 \text{ kJ} = -3012 \text{ kJ}$

$\Delta H_f^\circ(\text{P}_4\text{H}_{10}) = -3012 \text{ kJ}$