Honors Chemistry

More Chapter 6 Study Questions

1. Use Hess' Law to calculate $\Delta H°$ for each of the following reactions and indicate whether the reaction is endothermic or exothermic. (Use the $\Delta H_f°$ Table as needed below.)

   a) $2\ HCl(g) + Br_2(l) \rightarrow 2\ HBr(g) + Cl_2(g)$

   b) $4\ NH_3(g) + 3\ O_2(g) \rightarrow 2\ N_2(g) + 6\ H_2O(l)$

   c) $N_2H_4(g) + 3\ O_2(g) \rightarrow 2\ NO_2(g) + 2\ H_2O(l)$; $\Delta H_f°(N_2H_4) = +50.6$ kJ

2. Given the following reaction: $2\ P(s) + 3\ Cl_2(g) \rightarrow 2\ PCl_3(g)\ \Delta H = -574$ kJ
   a) How many moles of phosphorus are needed to produce 488 kJ?
   b) How much heat is released when 122 g of PCl_3 are produced?
   c) How many grams of Cl_2 are needed to produce 27.0 kJ?

3. When 1.00 g of $KClO_3$ is dissolved in 50.0 g of water in a coffee-cup calorimeter, the temperature drops from 25.00 to 23.36°C. Calculate ΔH for the process
   $$KClO_3(s) \rightarrow KClO_3(aq)$$

4. Write a balanced chemical equation for the complete combustion of liquid benzene, C_6H_6. Then use Hess' Law to calculate ΔH for this reaction. $\Delta H_f°(C_6H_6) = +48.5$ kJ

5. Given the reaction: $4\ PH_3(g) + 8\ O_2(g) \rightarrow P_4O_{10}(s) + 6\ H_2O(g)\ \Delta H = -4500$ kJ. The heat of formation of phosphine, PH_3, is +9.2 kJ/mole. Calculate the heat of formation of P_4O_{10}.