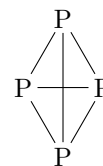


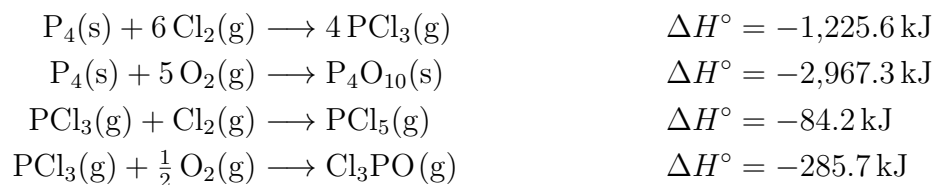
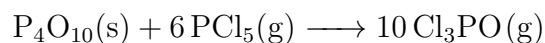
1. What is the P–P bond enthalpy in  $P_4(s)$  given the following facts:

- (a) The Cl–Cl bond enthalpy is  $338 \frac{\text{kJ}}{\text{mol}}$   
 (b) The P–Cl bond enthalpy is  $326 \frac{\text{kJ}}{\text{mol}}$   
 (c)  $\Delta H_f^\circ(PCl_3(g))$  is  $-306.4 \frac{\text{kJ}}{\text{mol}}$



$P_4(s)$  at SATP

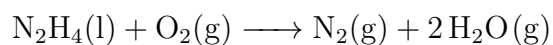
2. Calculate  $\Delta H_{\text{rxn}}^\circ$  for the following reaction using the given equations:



3. Find the  $\Delta H_f^\circ$  of  $\text{ClO}(\text{g})$  given the following facts:

- (a) When one mole of oxygen atoms in the gas phase is added to one mole of  $\text{ClO}(\text{g})$ , one mole of  $\text{ClO}_2(\text{g})$  is formed and 243 kJ of heat is released
- (b)  $\text{O}=\text{O}$  bond enthalpy is  $498 \frac{\text{kJ}}{\text{mol}}$
- (c)  $\Delta H_f^\circ(\text{ClO}_2(\text{g}))$  is  $102 \frac{\text{kJ}}{\text{mol}}$

4. Find the  $\Delta H_{\text{rxn}}^\circ$  of this reaction given the following facts:



- (a)  $\Delta H_f^\circ(\text{H}_2\text{O}(\text{g})) = -241.82 \frac{\text{kJ}}{\text{mol}}$
- (b)  $\Delta H_f^\circ(\text{N}_2\text{H}_4(\text{l})) = 50.63 \frac{\text{kJ}}{\text{mol}}$

**Homework Problem 15**

1. Find the bond enthalpy of an bond given the following facts:

(a)  $\Delta H_f^\circ(\text{H}_2\text{O}(\text{g})) = -241.8 \frac{\text{kJ}}{\text{mol}}$

(b)  $\Delta H_f^\circ(\text{O}(\text{g})) = 249.2 \frac{\text{kJ}}{\text{mol}}$

(c) H-H bond enthalpy is  $435 \frac{\text{kJ}}{\text{mol}}$