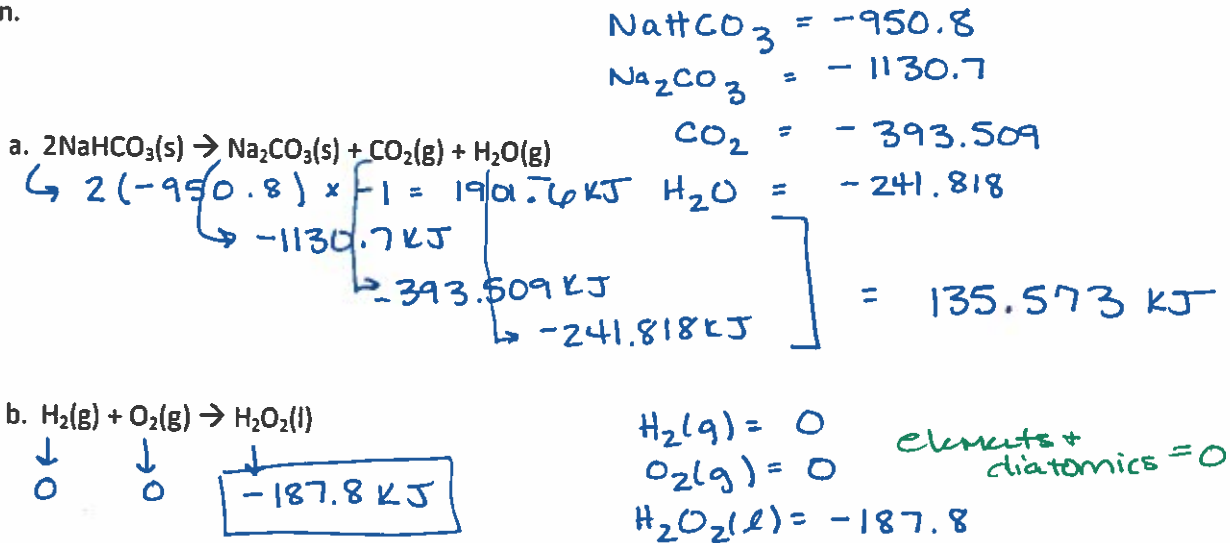


## 16.4 Continued

2. Use standard enthalpies of formation from Table C-13 in Appendix C to calculate  $H_{rxn}$  for each reaction.



## 16.5

1. Calculate the  $G_{system}$  for each process and state if the process is spontaneous or nonspontaneous

$$\Delta G_{system} = \Delta H_{system} - T\Delta S_{system}$$

a.  $\Delta H_{system} = 145 \text{ kJ}$   $T = 293 \text{ K}$ ,  $S_{system} = 195 \text{ J/K}$

$$\Delta G_{syst} = \frac{145,000 \text{ J}}{145,000} - 293 \left( \frac{195 \text{ J}}{\text{K}} \right) = 87,865 \text{ J} \quad \text{Nonspontaneous}$$

b.  $\Delta H_{system} = -232 \text{ kJ}$   $T = 273 \text{ K}$ ,  $S_{system} = 138 \text{ J/K}$

$$\Delta G_{syst} = \frac{-232,000 \text{ J}}{-232,000} - 273 \left( \frac{138 \text{ J}}{\text{K}} \right) = -269,674 \text{ J} \quad \text{Spontaneous}$$

2. Calculate the temperature at which the following would occur:

$$\Delta G_{sys} = \Delta H_{syst} - T\Delta S$$

$G_{system} = -34.7 \text{ kJ}$   $T = ? \text{ K}$ ,  $H_{system} = -28.8 \text{ kJ}$   $S_{system} = 22.2 \text{ J/K}$

$$-34,700 \text{ J} = -28,800 \text{ J} - T \left( \frac{22.2 \text{ J}}{\text{K}} \right)$$

$$-34,700 \text{ J} = \frac{-28,800 \text{ J} - 22.2 T}{+28,800}$$

$$\frac{-5900 \text{ J}}{-22.2} = \frac{-22.2 T}{22.2} \quad T = 265.77 \text{ K}$$

