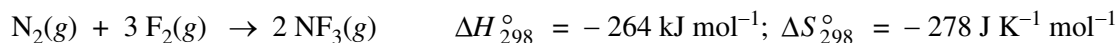


2007 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS

2. The following questions relate to the synthesis reaction represented by the chemical equation in the box above.

- (a) Calculate the value of the standard free energy change, ΔG_{298}° , for the reaction.
- (b) Determine the temperature at which the equilibrium constant, K_{eq} , for the reaction is equal to 1.00.
(Assume that ΔH° and ΔS° are independent of temperature.)
- (c) Calculate the standard enthalpy change, ΔH° , that occurs when a 0.256 mol sample of $\text{NF}_3(g)$ is formed from $\text{N}_2(g)$ and $\text{F}_2(g)$ at 1.00 atm and 298 K.

The enthalpy change in a chemical reaction is the difference between energy absorbed in breaking bonds in the reactants and energy released by bond formation in the products.

- (d) How many bonds are formed when two molecules of NF_3 are produced according to the equation in the box above?
- (e) Use both the information in the box above and the table of average bond enthalpies below to calculate the average enthalpy of the F – F bond.

Bond	Average Bond Enthalpy (kJ mol ⁻¹)
N≡N	946
N–F	272
F–F	?