Practice for Proficiency

Gibbs Free Energy and Spontaneity

There are 2 ways to calculate Gibbs Free Energy… Am I aware and can I do?

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

1. Gather the data from the enthalpy tables.
   a. Calculate the ΔG at 25°C.
   b. What is the driving force in this reaction (Enthalpy, Entropy, Both, Neither)
   c. This reaction is more thermodynamically favorable at the following condition (high temp, low temp, all temps, No temps)

$NH_3(g) \rightarrow N_2(g) + H_2(g)$

2. Gather the data from the enthalpy tables.
   a. Calculate the ΔG at 25°C.
   b. What is the driving force in this reaction (Enthalpy, Entropy, Both, Neither)
   c. This reaction is more thermodynamically favorable at the following condition (high temp, low temp, all temps, No temps)

Alternate method for calculation of ΔG.

$H_2O(l) \rightarrow H_2O(g)$ ΔH = +44KJ/mol ΔS = ±119 J/mol K

3. Answer the following questions about the reaction above.
   a. Is this reaction is (exothermic, endothermic)
   b. Above you will find a blank in front of the entropy. Add the sign (- or +) based upon the reaction.
   c. Calculate ΔG for the reaction above using the values above.
   d. What is the driving force in this reaction (Enthalpy, Entropy, Both, Neither)
   e. This reaction is more thermodynamically favorable at the following condition (high temp, low temp, all temps, No temps)