

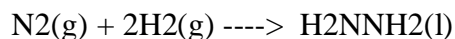
For answers, send email to: [admin@tutor-homework.com](mailto:admin@tutor-homework.com).

**Include file name:** Chemistry\_Worksheet\_0020

Price: \$3

(c) 2012 [www.tutor-homework.com](http://www.tutor-homework.com): Tutoring, homework help, help with online classes.

1. Hydrazine,  $\text{H}_2\text{NNH}_2$ , is used as a rocket fuel. For liquid hydrazine at  $25^\circ\text{C}$ ,  $\Delta H^\circ_f = 50.63 \text{ kJ/mol}$  and  $S^\circ$  is  $121.2 \text{ J/K}\cdot\text{mol}$ . Can hydrazine be prepared from the reaction?



At  $25^\circ\text{C}$ ,  $S^\circ$  for  $\text{N}_2(\text{g}) = 0.192 \text{ J/K}\cdot\text{mol}$  and  $S^\circ$  for  $\text{H}_2(\text{g}) = 130.68 \text{ J/K}\cdot\text{mol}$ .

-----

2. Use the data that is provided below to calculate the standard free-energy change for the thermal decomposition of calcium carbonate at  $25^\circ\text{C}$ . Is the reaction spontaneous under these conditions? Explain your answer.



$\Delta H^\circ_f(\text{kJ/mol})$	-1206.9	-635.1	-393.5
$S^\circ(\text{J/K}\cdot\text{mol})$	92.9	39.7	213.6

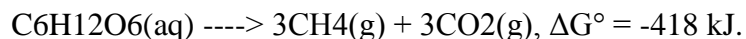
-----

3. Calculate the free energy change,  $\Delta G$ , for the formation of ethylene ( $\text{C}_2\text{H}_4$ ) from carbon and hydrogen at  $25^\circ\text{C}$  when the partial pressures are 10 atm  $\text{H}_2$  and 2.0 atm  $\text{C}_2\text{H}_4$ , then tell whether the reaction is spontaneous in the forward direction or not.



-----

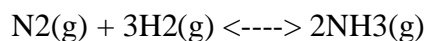
4. Consider the following anaerobic fermentation reaction of glucose:



If  $\Delta G^\circ$  for  $\text{CH}_4$  is  $-50.8 \text{ kJ/mol}$  and  $-394.2 \text{ kJ/mol}$  for  $\text{CO}_2$ , what is  $\Delta G^\circ$  for  $\text{C}_6\text{H}_{12}\text{O}_6$ ?

-----

5. Calculate  $\Delta G^\circ_f$  and  $K_p$  for  $\text{NH}_3$  at  $25^\circ\text{C}$  given that for  $\Delta G^\circ$  for the reaction is  $-31.0 \text{ kJ}$ :



[www.tutor-homework.com](http://www.tutor-homework.com)