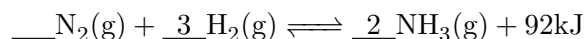


Name: _____ Class: _____ Date: _____

Instructions: Answer the following questions. Show ALL work for problems to receive full credit. Make sure to include proper units and significant figures for all answers.

F21 - first year for this practice, probably lots of typos and mistakes, EC for the first person to find them!

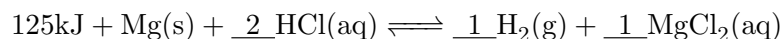
- [5 pt] 1. Answer the following questions about the reaction below. The reaction is endothermic. Assume the system is at equilibrium.



Complete the following table. Indicate changes in concentration of each product and reactant by entering (I)ncrease, (D)ecrease, (N)o change, or a ? for insufficient information to determine.

Stress Applied:	Direction Reaction Shifted	[N ₂]	[H ₂]	[NH ₃]
Add NH ₃	←	I	I	I
Remove H ₂	←	I	D	D
Increase Pressure	→	D	D	I
Decrease Temperature	→	D	D	I
Increase Volume	←	I	I	D

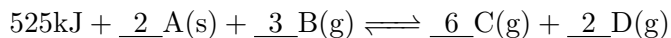
- [10 pt] 2. Consider the following system at equilibrium:



- (a) Should you add or remove HCl to increase the production of hydrogen gas? 2(a) Add
Explain.
Adding HCl will shift the equilibrium to the right to decrease the HCl, therefore increasing H₂.
- (b) Should you increase or decrease the temperature to increase the production of hydrogen gas? 2(b) Increase
Explain.
Increasing the temperature will shift the equilibrium to the right increasing the amount of H₂
- (c) Should you increase or decrease the pressure to increase the production of hydrogen gas? 2(c) Decrease
Explain.
The reaction will seek to increase the pressure by producing more H₂ (g).
- (d) Is the reaction shown an exothermic or endothermic reaction? Explain. 2(d) Endothermic

Energy is a reactant.

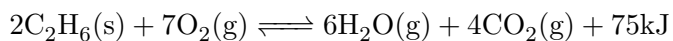
- [20 pt] 3. Answer the following questions about the reaction below. The reaction is endothermic. Assume the system is at equilibrium.



Complete the following table. Indicate changes in concentration of each product and reactant by entering (I)ncrease, (D)ecrease, (N)o change, or a ? for insufficient information to determine.

Stress Applied:	Direction Reaction Shifted	[2A(s)]	[3B(g)]	[6C(g)]	[2D(g)]
Add C	←	I	I	I	D
Remove B	←	I	D	D	D
Increase Volume	→	D	D	I	I
Increase Pressure	←	I	I	D	D
Increase Temperature	→	D	D	I	I
Add A	→	I	D	I	I
Remove D	→	D	D	I	D
Decrease Temperature	←	I	I	D	D
Decrease Pressure	→	D	D	I	I
Decrease Volume	←	I	I	D	D
Add a Catalyst	No Change	N	N	N	N

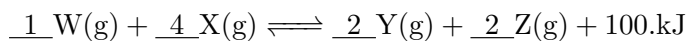
- [20 pt] 4. Answer the following questions about the reaction below. The reaction is endothermic. Assume the system is at equilibrium.



Complete the following table. Indicate changes in concentration of each product and reactant by entering (I)ncrease, (D)ecrease, (N)o change, or a ? for insufficient information to determine.

Stress Applied:	Direction Reaction Shifted	[C ₂ H ₆]	[O ₂]	[H ₂ O]	[CO ₂]
Add O ₂	→	D	I	I	I
Remove CO ₂	→	D	D	I	D
Increase Volume	→	D	D	I	I
Decrease Pressure	→	D	D	I	I
Increase Temperature	←	I	I	D	D
Lower the Activation Energy	No effect	N	N	N	N
Remove C ₂ H ₆	←	D	I	D	D
Add H ₂ O	←	I	I	I	D
Decrease Volume	←	I	I	D	D
Increase Pressure	←	I	I	D	D
Decrease Temperature	→	D	D	I	I

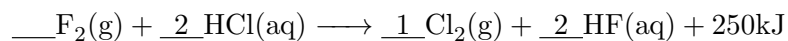
- [20 pt] 5. Answer the following questions about the reaction below. The reaction is endothermic. Assume the system is at equilibrium.



Complete the following table. Indicate changes in concentration of each product and reactant by entering (I)ncrease, (D)ecrease, (N)o change, or a ? for insufficient information to determine.

Stress Applied:	Direction Reaction Shifted	[W(s)]	[X(g)]	[Y(g)]	[Z(g)]
Add Z	←	I	I	I	D
Add a Catalyst	No Change	N	N	N	N
Remove X	←	I	D	D	D
Increase Pressure	→	D	D	I	I
Decrease Pressure	←	I	I	D	D
Decrease Temperature	→	D	D	I	I
Add W	→	I	D	I	I
Increase Volume	←	I	I	D	D
Increase Temperature	←	I	I	D	D
Decrease Volume	→	D	D	I	I
Remove Y	→	D	D	D	I

- [20 pt] 6. Answer the following questions about the reaction below. The reaction is endothermic. Assume the system is at equilibrium.



Complete the following table. Indicate changes in concentration of each product and reactant by entering (I)ncrease, (D)ecrease, (N)o change, or a ? for insufficient information to determine.

Stress Applied:	Direction Reaction Shifted	[F ₂ (g)]	[HCl(aq)]	[Cl ₂ (g)]	[HF(aq)]
Add Cl ₂	←	I	I	D	I
Remove HCl	←	I	D	D	D
Increase Volume	no effect	N	N	N	N
Decrease Pressure	no effect	N	N	N	N
Increase Temperature	←	I	I	D	D
Remove F ₂	←	D	I	D	D
Add HCl	→	I	D	I	I
Decrease Volume	no effect	N	N	N	N
Increase Pressure	no effect	N	N	N	N
Decrease Temperature	→	D	D	I	I