

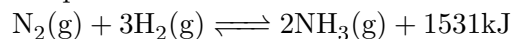
Name: \_\_\_\_\_

Date: \_\_\_\_\_

[3 pt] 1. Define the term equilibrium. Write a reaction illustrating your definition. What is equal and what is not equal?

[2 pt] 2. Sketch a picture illustrating what happens to the rate of the forward and reverse reactions as they approach equilibrium. Be sure to label the x and y axis.

[10 pt] 3. Consider the following system 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 <sub>2</sub> ]	[H <sub>2</sub> ]	[NH <sub>3</sub> ]
Add N <sub>2</sub>				
Add NH <sub>3</sub>				
Decrease Volume				
Increase Temperature				
Add a catalyst				

**CHE 101 - Homework - Ch 11a**

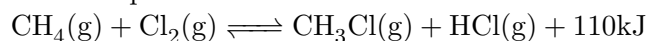
[10 pt] 4. Consider the following system at equilibrium:



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	[O <sub>2</sub> ]	[O <sub>3</sub> ]
Add O <sub>2</sub>			
Remove O <sub>3</sub>			
Increase Volume			
Decrease Temperature			
Increase Pressure			

[10 pt] 5. Consider the following system 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	[CH <sub>4</sub> ]	[Cl <sub>2</sub> ]	[CH <sub>3</sub> Cl]	[HCl]
Remove Cl <sub>2</sub>					
Add HCl					
Increase Pressure					
Decrease Temperature					
Add a catalyst					

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[2 pt] 6. In order for a reaction to occur what two things must occur?

[3 pt] 7. What are 4 factors that effect the rate of a chemical reaction? Briefly describe how each controls the rate or a reaction

[10 pt] 8. Draw an Energy Diagram for an **ENDOTHERMIC** reaction for an Uncatalyzed and Catalyzed reaction. Be sure to label:

- (a) x-axis
- (b) y-axis
- (c) Reactants (R)
- (d) Products (P)
- (e) Transition State (TS)
- (f) Activation Energy (AE)
- (g) Catalyzed Activation Energy (CAE)
- (h) Change in Energy in the reaction ( $\Delta E$ )