CHE 112 - Homework - Ch 13c
Arrhenius Equation and Collision Theory

Name: _____ Date: _____

Show any required calculations on the back of the page

1. Why don't all collisions between reactant molecules lead to a chemical equation (2 answers)?

2. For the reaction $H_2(g) + CO_2(g) \longrightarrow H_2O(g) + CO(g)$, the Activation Energy is 248 kJ/mol and the overall change in energy is 41 kJ/mol. Sketch the potential energy profile for the reaction. Label the axis, the location of the Reactants, Products, and Transition state, along with the values of E_a and ΔE. Is the reaction exothermic or endothermic?

3. Graph the following data for the reaction: $2NO_2(g) \longrightarrow 2NO(g) + O_2(g)$, and using the graph, calculate the Activation Energy for the reaction (in kJ/mol). Attach the graph to the back of your homework

Temp (℃)	330.	354	378	383
k ($M^{-1}s^{-1}$)	0.77	1.8	4.1	4.7

4. A certain first-order reaction has a rate constant of $1.0 \times 10^{-3} s^{-1}$ at 25℃. If the reaction rate triples when the temperature is increased to 35℃, what is the activation energy (in kJ/mol)?

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5. Rate constants for the reaction $NO_2(g) + CO(g) \longrightarrow NO(g) + CO_2(g)$ are 1.30 $M^{-1}s^{-1}$ at 700. K and 23.0 $M^{-1}s^{-1}$ at 800. K.

   5(a) What is the value of the Activation Energy in kJ/mol?

   5(b) What is the rate constant at 750.K?