CHEM 1105 TEST#3

NAME: **Date: July 15, 2015**
Student Number:

1. Consider the following two-step mechanism for a reaction:

1. $Cl_2 + H_2S \rightarrow HCl + Cl^+ + HS^-$
2. $Cl^+ + HS^- \rightarrow HCl + S$

a) What is the overall reaction?

b) Identify the intermediates in the mechanism.

2. Consider the following data showing the initial rate of a reaction(C $\rightarrow$ products) at several different concentrations of C. What is the order of the reaction.? Write a rate law for the reaction. Determine the value of the rate constant, k, with the proper units. Show all work.

Trial	[C](M)	Initial Rate(M/s)
1	0.100	0.053
2	0.200	0.210
3	0.300	0.473

3. A reaction has a rate constant of 0.000122 /s at 27°C and 0.228 /s at 77°C. Determine the activation energy for this reaction. Show work.

Some Useful Data or Not!!

R = 0.0821 L·atm/K·mole

R = 8.314 J/K·mole

T(K) = T(°C) + 273.15

$$\ln \frac{k_2}{k_1} = \frac{E_A}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

Answer Set for CHEM 1105 TEST#3

1. $Cl_2 + H_2S \rightarrow 2HCl + S$, intermediates: Cl^+, HS^-

2. second order, rate = $k[C]^2$, k = 5.3 $M^{-1} \cdot s^{-1}$

3. 131 kJ/mole