Your names_____

October 17, 2003

Workshop 3

1. The rate for the oxidation of iron(II) by cerium(IV)

$$Ce^{4+}(aq) + Fe^{2+}(aq) \rightarrow Ce^{3+}(aq) + Fe^{3+}(aq)$$

is measured at several different initial concentrations of the two reactants:

$[Ce^{4+}]$ (mol L^{-1})	$[Fe^{2+}]$ (mol L^{-1})	Rate (mol L^{-1} s^{-1})
1.1×10^{-5}	1.8×10^{-5}	2.0×10^{-7}
1.1×10^{-5}	2.8×10^{-5}	3.1×10^{-7}
3.4×10^{-5}	2.8×10^{-5}	9.5×10^{-7}

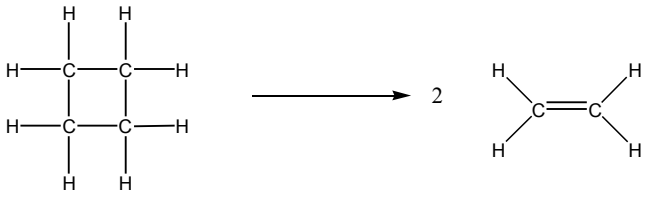
(a) Write the rate expression for this reaction.

(b) Calculate the rate constant k, and give its units.

(c) Predict the initial reaction rate for a solution in which $[Ce^{4+}]$ is 2.6×10^{-5} M and $[Fe^{2+}]$ is 1.3×10^{-5} M.

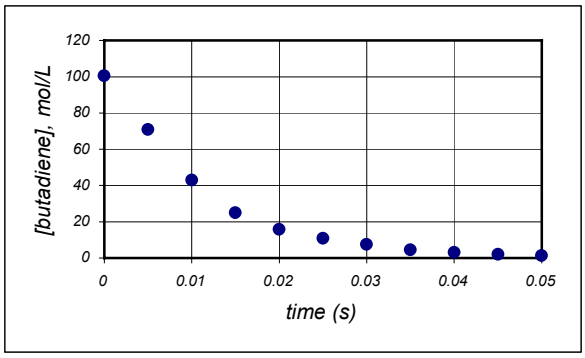
Your names_____

2. Cyclobutane decomposes to ethylene at elevated temperatures according to the reaction

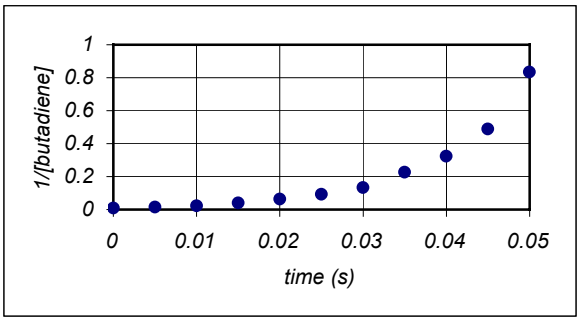


The decomposition was followed at 1273 K as a function of time, and the following data were obtained:

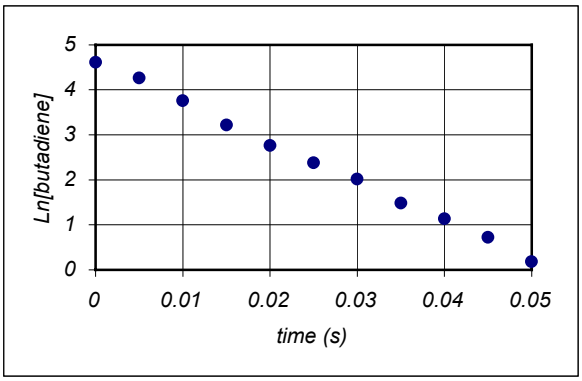
a)



b)



c)



a) From the graphs, determine whether the reaction follows first or second order kinetics. Justify your answer.

b) Using the appropriate plot (specify which one), determine the rate constant of this reaction. Give the units of the rate constant.

Your names_____

c) Upon decreasing the temperature to 1223 K, the rate of the reaction drops by a factor of 10 (compared to the first measurement at 1273 K – see your answer to b). Calculate the activation energy of this reaction.