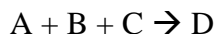


**Biophysical Chemistry – CH 4404 01**  
**Assignment 7**

**Due Friday, November 1 at 5:00 pm**

Please complete the answers to this assignment on a separate page (or pages), showing your work and sources (if you referred elsewhere for constants, enthalpies, etc.).

1. Consider the following stoichiometric equation:



By measuring the initial rate of the formation of D, you obtain the following table.

Initial [A] (mM)	Initial [B] (mM)	Initial [C] (mM)	Initial Rate (mM s <sup>-1</sup> )
10.0	10.0	10.0	0.100
20.0	10.0	10.0	0.141
20.0	30.0	10.0	0.423
20.0	20.0	20.0	1.131

- (a) Give the reaction order with respect to A, B, and C. What is the overall reaction order? (10 points)
- (b) Write a differential equation for the appearance of D. (2 points)
- (c) Calculate the rate constant  $k$  for this reaction, including units (3 points)
2. You are performing experiments on liver alcohol dehydrogenase (LADH), which can oxidize ethanol (EtOH) to acetic acid according to a zero-order rate law under certain conditions. If your sample contains 50 mM EtOH, how long would it take for you to have 25 mM EtOH if LADH has a  $k$  of 2 mM min<sup>-1</sup>? (5 points)
3. Radioactivity is frequently measured in disintegrations per minute (dpm) – where a disintegration represents a single radioactive decay event. In the familiar ticking of a Geiger counter, each “tick” represents a certain number of disintegrations, and therefore many ticks per unit time corresponds to a high *rate* for dpm. You measure a sample having  $1.0 \times 10^5$  dpm, and two days later you measure the same sample and read  $0.5 \times 10^4$  dpm. Given that one day is 1,440 minutes:
- (a) What is the half-life of the isotope in minutes? (5 points)
- (b) How many radioactive atoms were in the sample when you started (when the *rate* was  $1.0 \times 10^5$  dpm)? (5 points)
4. Tinoco Chapter 7, question #8 (10 points)