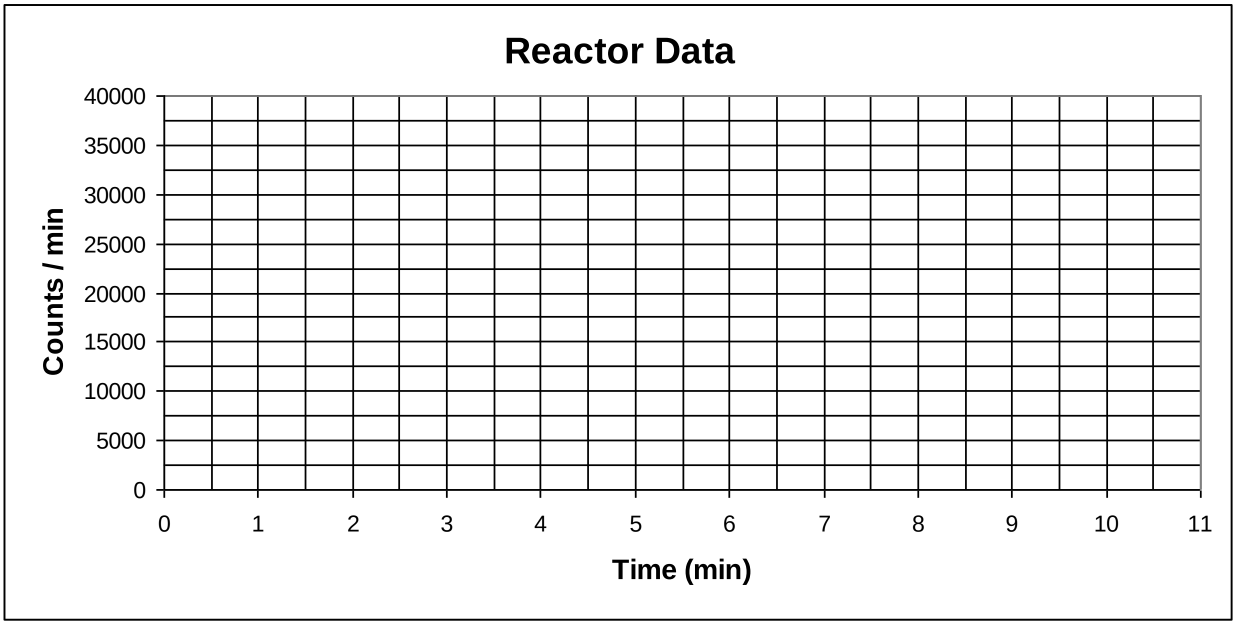
Name:____ **Section#:** _________

Reactor Postlab for Chem 2 – Spring 2014

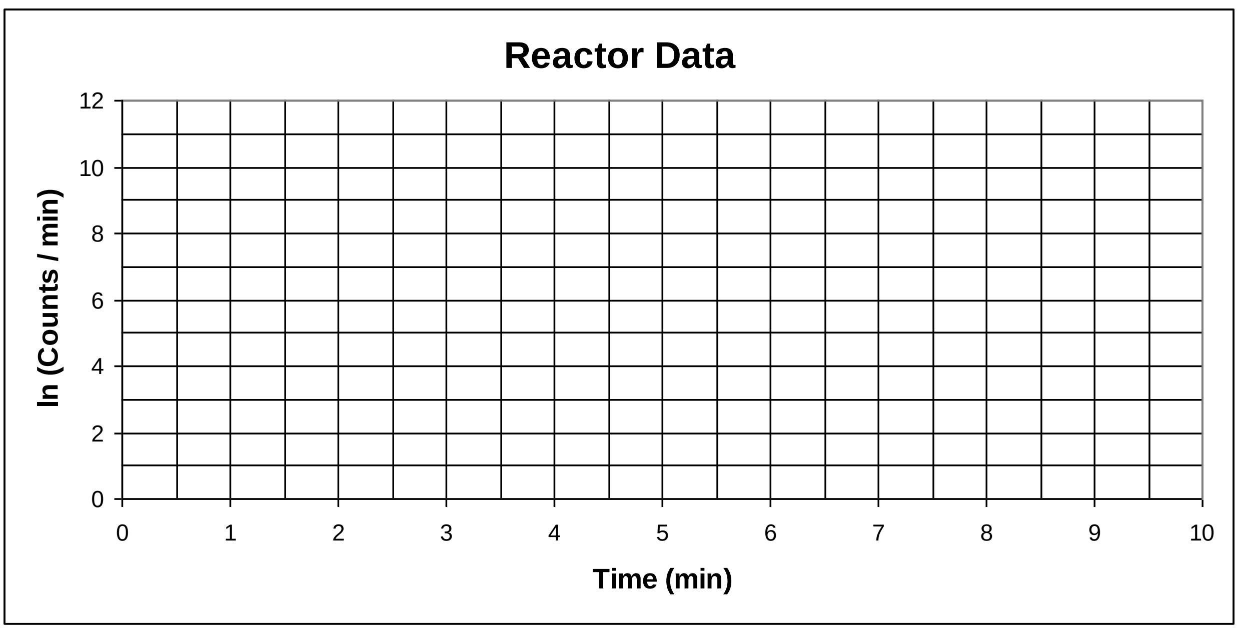
For the Reactor data, we will be graphing it by hand. We will also be determining the decay constant (k), the initial counts (A_o) and half-life ($t_{1/2}$) for the data. You will still need to record these values (k, A_o & $t_{1/2}$) on **page 29** and answer the questions on that page as well.

(*Pages 27-32 + 4 computer generated graphs for the simulation data + this handout will be due at your class time* ***April 21-24.***)

1. On the chart below, graph time (min) vs. counts /min. This should result in an exponential decay curve. Connect the datapoints with a curved line.



2. On the chart below graph time (min) vs. ln (counts / min). This should result in a reasonably straight line. Connect the datapoints with a straight line.



3. Calculate the slope of the line for the linear plot. Where slope is rise over run or

$$\mathbf{m = (y_2 - y_1) / (x_2 - x_1).}$$

For x_1 & x_2, use the first value & the last value collected. These are usually at 2 minutes and 10 minutes.
For y_1 & y_2, use the actual data that you calculated for ln (cts/min).
Do not try and determine points from the graph.

4. Determine your initial (zero) values for counts / min, $\mathbf{A_o}$, and ln (counts / min), **ln** $\mathbf{A_o}$. Since **ln** $\mathbf{A_o}$ **is equal to the y-intercept** for the linear plot. Then we can use the equation for a line:

$\mathbf{y = mx + b}$ $\mathbf{b = y - mx}$ $\mathbf{\ln A_o = b}$

5. Determine the initial number of counts, $\mathbf{A_o}$, where $\mathbf{A_o = e^{(\ln Ao)}}$

6. Determine the specific decay constant, **k** $\mathbf{(min^{-1})}$, where **k = - m**.

7. Estimate the half-life, $\mathbf{t_{1/2}}$, of the aluminum. On your exponential graph, draw horizontal lines at <u>10,000 and 5,000 counts / min</u>. Whereever these lines cross the data, drop a vertical line. The distance between these two lines is the half-life. What is your estimated half-life in minutes?

8. Determine the actual half-life, $\mathbf{t_{1/2}}$, of the aluminum, where $\mathbf{t_{½} = \ln 2 / k}$ **&** $\mathbf{\ln 2 = 0.693.}$

(Note: Don't forget to record values on <u>page 29</u>.)