CAPILANO UNIVERSITY

Department of Chemistry

LAST NAME: _____ SEC # _____ LOCKER # _____

FIRST NAME: _____ DATE: _____

Record all data in ink (blue or black only) at the appropriate location on this report sheet. All entries must be original and legible, and all corrections must be made in the acceptable way, with your lab supervisor's initials. Do not drop "leading zeroes". Show all calculations clearly and neatly. Failure to comply with these conditions will result in a loss of marks.

Name of Partner: _____ **MeasureNet® workstation #:** ___

Raw Data

	Trial #1 *RT*	**Trial #2** *hot*	**Trial #3** *cold*
Temperature (°C) *at t ≅ 62 s*			

The rest of the report can be completed after the lab session.

1. In Trial #1, what is the initial concentration of tBuCl when all reactants have just been combined?
   Use the correct number of significant figures in your final answer.

   _____mol tBuCl / L

2. Is the reaction-profile shown on Graphs p.2 that of a zero-order reaction?
   Explain why, or why not:

3. Comparison of the R^2 values for the two plots on Graphs p.3 indicates that, by the method of integrated rate laws, the hydrolysis of tBuCl is of what order wrt [tBuCl]?   (circle answer)

   first-order   *or*   **second-order**

Rate-Constants & Half-Lives

Trial #	Rate constant k (s^{-1}) obtain from graph #4 slopes	Half-Lives (t$_{1/2}$) give to nearest 1 second		% Difference for t$_{1/2}$ (no decimals)
		from Graph	Calculated	
1 *RT*		not required for online lab	not required for online lab	not required for online lab
2 *hot*		not required for online lab	not required for online lab	not required for online lab
3 *cold*		not required for online lab	not required for online lab	not required for online lab

- use the slopes for the three first-order plots shown on Graphs p.4 to obtain rate constants, k, as per the discussion in the lab manual; ensure the correct sign is given.
- measure each t$_{1/2}$ (nearest 1 s) using Graphs p.5, as discussed on the printed graph.
- calculate each half-life (t$_{1/2}$) to the nearest 1 second, as per the Treatment of Results.
- using the equation in the lab manual, determine each % difference to 0 decimal places.

Temperature Dependence

Trial #	Temp (K) report to 5 sf	1 / Temp (K^{-1}) report to 5 sig figs	ln k report to 3 decimals	Arrhenius Plot from eqn of best-fit line
1 *RT*				**slope =**
2 *hot*				**Kelvins**
3 *cold*				**R^2 =**

- fill out the Temp, 1 / Temp, and ln k (the rate constant) columns as per the Treatment of Results.
- record the slope (to 0 decimals) and R^2 values (to 4 decimals) from the Arrhenius Plot.

Calculate the activation energy (E$_a$) for the hydrolysis of tBuCl using the slope of the Arrhenius plot and the method discussed in the Introduction. Give your answer in decimal format with the correct number of significant figures.

E$_a$ = _____ **kJ / mol**