

## CHEM 321: LAB REPORT GRADING RUBRIC - SOLVOLYSIS

COMPONENT	BELOW STANDARD (score 0)	MEETS STANDARD (score 1)	EXCEEDS STANDARD (score 2)
<b>PROSE</b> – scientific logic errors (S)	3 or more	0 - 2	----
grammatical errors (G)	2 or more	0 - 1	----
improper word choice (W)	3 or more	0 - 2	----
awkward or verbose (A or V)	3 or more	1 or 2	none
<b>ORGANIZATION</b> – required info	some in wrong sections	all in proper sections	----
flow of ideas within sections	choppy or illogical	mostly smooth & logical	reader guided clearly
<b>CONTENT</b> – descriptive title	missing or vague	present & appropriate	----
protocol source citation	missing or inaccurate	present & accurate	----
<b>(INTRO)</b> validity of mech. can be assessed <i>via</i> its accurate/inaccurate prediction of rate change upon change of conditions	missing or vague	present & accurate	----
refer to balanced rxn <i>via</i> both S <sub>N</sub> 1 and S <sub>N</sub> 2 mechanisms (with slow steps clearly indicated) somewhere in report	missing/misunderstood (format or science)	shows the two reaction mechanisms and indicates slow steps for each	shows correct figures / arrows / slow steps drawn using a chemistry drawing program
discuss <i>expected effects</i> of [RCI] and solvent polarity on reaction rate separately for S <sub>N</sub> 1 and S <sub>N</sub> 2	at least one mechanism not addressed or incorrect discussion	discussion correct for both mechanisms	"meets" + connects concepts
[H <sup>+</sup> ] directly proport. to [RCI] consumed; meas. by titration w/ NaOH	missing or vague	present & accurate	----
develop mathematical connection between rate law and plotting method to be used	missing or incorrect	present & accurate	"meets" + connects concepts
<b>(EXPERIMENTAL)</b> equipment/reaction conditions/operations	recipe format or 1 <sup>st</sup> person account	narrative format (3 <sup>rd</sup> person passive)	"meets", plus offers insightful observations
reaction temperature	not evident	evident	----
solvent composition	not given	given in proper format	----
final [t-bu-Cl] (after dilution)	not specified	given in proper format	----
sampling interval	not given	given in proper format	----
endpoint detection method	not indicated	explained	----
<b>(RESULTS - Data presentation)</b> Figure introduction	missing or after presentation	prior to presentation	properly introduced & scientific signif. noted
1 fig. containing 2 lines (ln[V <sub>∞</sub> -V <sub>t</sub> ] vs. sec) for reaction in each solvent	data not presented as specified	data presented as specified	----
values of <i>k</i> reported after Figure and with proper units	improperly placed / lack units	correct placement and units	----
<b>(RESULTS - Figure formatting)</b> Title and axis labels	not scientifically descriptive / lack units	scientifically descriptive and have correct units	----
** <i>expected format</i> : data points not connected, trendlines imposed, no title above chart, no symbol ID to right of chart, and chart background color = none	2 or more formatting flaws**	1 formatting flaw**	Correctly displays the figure
Legend beneath Figure; has solvent composition + names of students who generated the 2nd set of data	lacking	present	----
Slopes of trendlines printed to 3 significant figures	missing / not to 3 sig. fig.	properly printed	----

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<b>(DISCUSSION) –</b>			
<b>Objective 1</b>			
Explain why $S_N1$ & $S_N2$ are not distinguishable using [RCI] effect on rate	missing or vague	present & accurate but little connection made with other parts of course	theory & purpose clearly grasped; makes connections to other parts of course
Explain why log plot was chosen	missing or vague	present & accurate	----
Assess how well data fit 1 <sup>st</sup> order prediction (use of $R^2$ )	missing or superficial	done logically	----
<b>Objective 2</b>			
Explain effect of changing solvent polarity on rate in $S_N1$ and $S_N2$	missing or superficial	present & accurate but little connection made with other parts of course	theory clearly explained; makes connections to other parts of course
Discuss the possible role that water plays in the relative rates for $S_N1$ and $S_N2$	missing or superficial	present & accurate but little connection made with other parts of course	theory clearly explained; makes connections to other parts of course
Logical connection of relative magnitude of $k$ values to solvent polarity and theory	missing or superficial	present & accurate but little connection made with other parts of course	theory clearly explained; makes connections to other parts of course
<b>Objective 3</b>			
Explicit conclusions about support for both $S_N1$ and $S_N2$ mechanisms with results from this experiment.	missing or vague	stated clearly & accurately	----
Decision that one or both mech. can or cannot be rejected on the basis of these results	missing or vague	present & accurate but little connection made with other parts of course	theory clearly explained; makes connections to other parts of course
<b>Summary Statement</b>	missing	states whether or not purpose was met	----
<b>Objective 4 (Extra credit) (2 points possible TOTAL)</b>			
Workable additional experimentation proposed, with expected outcomes and correct interp	not present	offered but not well-thought out	Offered and workable

Column totals \_\_\_\_\_

Questions at end of protocol (add 1 point per correctly answered question) (2) \_\_\_\_\_ Lab report journal (1 pt) \_\_\_\_\_

("MEETS STD" raw score is 38) Your Raw Score \_\_\_\_\_ \* Norm. Factor 0.3947 = Norm. Score \_\_\_\_\_ /15

Student/instructor conference needed?		
<input type="radio"/> No, only minor flaws seen	<input type="radio"/> Student choice, some conceptual flaws seen	<input type="radio"/> Definitely, too many flaws seen