KINETICS II: DETERMINATION OF ACTIVATION ENERGY SMART WORKSHEET

PART A: DETERMINATION OF THE ORDER OF THE REACTION IN CV^+ AND OF THE RATE CONSTANT (RUN 1, AT ROOM TEMPERATURE)

GRAPH DATA FROM LABQUEST

			Value
Absolute value of the correlatio	n factor from graph of A vs. tim	e (from LabQuest, $oldsymbol{A}$ is absorbance	e) 0.99823 ~
Absolute value of the correlatio absorbance)	0.99989		
Absolute value of the correlatio absorbance)	0.99647		
rder of the reaction in CV^+ :	<u>1</u> (
ALCULATING THE RATE CONS	TANT, $k^{\prime\prime}$		
For the slope,	record the value from the labQu	est screen, do not worry about sig	nificant figures.
	Unrounded	Rounded	Units
Slope of straight line from grap of $\ln(A)$ vs. time	h	<u> </u>	s ⁻¹
1. Rate constant, $k^{\prime\prime}$	0.19711	0.197	<u>s-1</u>
Quality of data Well	done, k'' is positive 5		
	Value	Unit	
Mean temperature of run 1	23.0	<u> </u>	
OUR PROGRESS ON 'PART A: I		er of the reaction in CV^+	AND OF THE RATE CONSTANT
CORRECT 7/7	POINTS AWARDED26 / 26	AUTOSOLVED 0/7	NOT FINISHED 0 / 12
ART B			
AILI			
EMPERATURE CALCULATIONS			
	• Temperature $(K) = Te$	$^{ m emperature}(^{\circ}{ m C}) + 273.15$	
	ullet The gas constant, R is 8.3	14 $ m Jmol^{-1}K^{-1}$	

(°C)

Unrounded

Rounded

Unrounded

Rounded

range ($^{\circ}\mathrm{C}$)

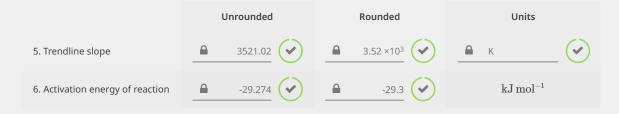
5 to 10	8.5	281.65	281.7	0.0035505	0.003551
15 to 20	16.0	289.15	289.2	0.0034584	0.003458
25 to 30	29.3	302.45	302.5	0.0033063	0.003306
35 to 40	41.5	314.65	314.7	0.0031781	0.003178
45 to 50	43.6	316.75	316.8	0.0031571	0.003157

RATE CONSTANT CALCULATIONS

Temperature range (˚C)	Mean slope	3. $k^{\prime\prime}$ value		4. ln(<i>k</i> ")	
	value (LabQuest)	Unrounded	Rounded	Unrounded	Rounded
5 to 10	-0.888415	0.888415	0.888	-0.118316	0.118
15 to 20	-0.2705975	0.2705975	0.271	1.3071	1.307
25 to 30	-0.110749	0.110749	0.111	-2.2005	-2.201
35 to 40	-0.64862	0.64862	0.649	-0.4329	0.433
45 to 50	-0.05770383	0.05770383	0.0577	-2.8524	-2.852

CALCULATING THE ACTIVATION ENERGY OF REACTION

- Now graph (with Excel) $\ln(k'')$ vs $1/T({
 m K}^{-1})$. Graph must be properly done and labelled.
- ullet Graph must display fitted trendline, end equation of the line. Slope and intercept must both be \geq 6 significant



YOUR PROGRESS ON 'PART B'

CORRECT

45 / 45

POINTS AWARDED3 / 223

AUTOSOLVED

0 / 45 NOT FINISHED

0/55

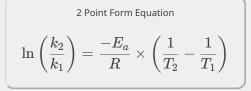
PART C: ADDITIONAL QUESTIONS

QUESTION 1

1. The overall order of the reaction between CV^{+} and OH^{-} is

QUESTION 2

2. For a certain reaction, k= 0.0253 $m s^{-1}$ at 25.0 $m ^{\circ}C$ and $E_a=$ 123 $m kJ\,mol^{-1}$. Use the 2 point form of the Arrhenius equation to calculate k at 80.0 $^{\circ}\mathrm{C}.$



Unrounded

Rounded

Units

k at 80.0 $^{\circ}\mathrm{C}$







