KINETICS I: DETERMINATION OF A RATE LAW SMART WORKSHEET

PART A: CONCENTRATIONS OF STOCK SOLUTIONS

	Concentration	Units
H_2O_2 stock solution = $[H_2O_2]_{BM}$	0.880	mol L^{-1}
KI stock solution = $[KI]_{BM}$	0.500	mol L^{-1}

RUNS 1 TO 3

	Run 1	Run 2	Run 3	Units
Volume of H_2O_2 stock solution	10.00	15.00	20.00	mL
Data check (H_2O_2 volume)	Hydrogen peroxide volumes for runs 1 to 3 are different as expected			
Volume of KI stock solution	5.00	5.00	5.00	mL
Volume of H_2O	45.00	40.00	35.00	mL
1. $[H_2O_2]_{AM}$ unrounded	0.146667	0.220000	0.293333	mol L^{-1}
$[H_2O_2]_{AM}$ rounded	0.147	0.220	0.293	
2. $[KI]_{AM}$ unrounded	0.0416667	0.0416667	0.0416667	mol L^{-1}
$[KI]_{AM}$ rounded	0.0417	0.0417	0.0417	
3. $\ln([H_2O_2]_{AM})$ unrounded	-1.91959	-1.51413	-1.22645	unitless
$\ln([H_2O_2]_{AM})$ rounded	-1.920	-1.514	-1.226	
4. $\ln([KI]_{AM})$ unrounded	-3.17805	-3.17805	-3.17805	unitless
$\ln([KI]_{AM})$ rounded	-3.178	-3.178	-3.178	
Reaction rate (slope from LabQuest)	0.043560	0.142610	0.14542	kPa s^{-1}
5. $\ln(\text{rate})$ unrounded	-3.13362	-1.94764	-1.92813	unitless
$\ln(\text{rate})$ rounded	-3.134	-1.948	-1.928	

RUNS 4 TO 7

	Run 4	Run 5	Run 6	Run 7	Units
Volume of H_2O_2 stock solution	5.00	5.00	5.00	10.00	mL
Volume of KI stock solution	10.00	15.00	20.00	5.00	mL

Data check (KI volume)	Potassium iodide volumes for runs 4 to 6 are different as expected				
Volume of H_2O	45.00	40.00	35.00	44.00	mL
Volume $FeCl_3\,(aq)$ in mL (20 drops = 1.00 mL)				1.00	
6. $[H_2O_2]_{AM}$ unrounded	0.0733333	0.0733333	0.0733333	0.146667	mol L^{-1}
$[H_2O_2]_{AM}$ rounded	0.0733	0.0733	0.0733	0.147	
7. $[KI]_{AM}$ unrounded	0.0833333	0.125000	0.166667	0.0416667	mol L^{-1}
$[KI]_{AM}$ rounded	0.0833	0.125	0.167	0.0417	
8. $\ln([H_2O_2]_{AM})$ unrounded	-2.61274	-2.61274	-2.61274	-1.91959	unitless
$\ln([H_2O_2]_{AM})$ rounded	-2.613	-2.613	-2.613	-1.920	
9. $\ln([KI]_{AM})$ unrounded	-2.48490	-2.07944	-1.79176	-3.17805	
$\ln([KI]_{AM})$ rounded	-2.485	-2.079	-1.792	-3.178	
Reaction rate (slope from LabQuest)	0.063789	0.092874	0.114750	0.21274	kPa s^{-1}
10. $\ln(rate)$ unrounded	-2.75217	-2.37651	-2.16499	-1.54768	unitless
$\ln(rate)$ rounded	-2.752	-2.377	-2.165	-1.548	

YOUR PROGRESS ON 'PART A: CONCENTRATIONS OF STOCK SOLUTIONS'

CORRECT	POINTS AWARDED	AUTOSOLVED	NOT FINISHED
89 / 89	407 / 407	0 / 89	0 / 120

PART B: ANALYSIS OF REACTION ORDERS

	Value	Units
11. Runs 1 to 3: slope of excel graph of $\ln(rate)$ (*y* axis) vs. $\ln([H_2O_2]_{AM})$ (*x* axis)	1.81698	unitless
Round to nearest integer	2	
Quality of data	Slope rounded to the nearest integer is expected to equal 1	0
12. Runs 4 to 6: slope of excel graph of $\ln(rate)$ (*y* axis) vs. $\ln([KI]_{AM})$ (*x* axis)	0.852325	unitless
Round to nearest integer	1	

Quality of data	Slope rounded to the nearest integer is equal to 1	3

YOUR PROGRESS ON 'PART B: ANALYSIS OF REACTION ORDERS'

CORRECT	POINTS AWARDED	AUTOSOLVED	NOT FINISHED
8 / 8	29 / 32	0 / 8	0 / 8

PART C: CALCULATION OF THE RATE CONSTANT k

	Run 1	Run 2	Run 3
13. k (assume both reaction orders = 1), unrounded	7.12798	15.5574	11.8980
k (assume both reaction orders = 1), rounded	7.13	15.6	11.9

	Run 4	Run 5	Run 6
14. k (assume both reaction orders = 1), unrounded	10.4382	10.1317	9.38862
k (assume both reaction orders = 1), rounded	10.4	10.1	9.39

	Unrounded	Rounded
15. Average value of k (runs 1 to 6)	10.75698	10.8

YOUR PROGRESS ON 'PART C: CALCULATION OF THE RATE CONSTANT k'

CORRECT	POINTS AWARDED	AUTOSOLVED	NOT FINISHED
14 / 14	70 / 70	0 / 14	0 / 14

PART D: EFFECT OF $FeCl_3$ CATALYST

Ratio of Rate 7 to Rate 1, unrounded	4.88384
Ratio of Rate 7 to Rate 1, rounded	4.88
Quality of data	Ratio of run 7 rate to run 1 rate is equal to or above 1 — 2

YOUR PROGRESS ON 'PART D: EFFECT OF $FeCl_3$ CATALYST'

CORRECT	POINTS AWARDED	AUTOSOLVED	NOT FINISHED
3 / 3	12 / 12	0 / 3	0 / 3

YOUR OVERALL PROGRESS

Visual status toggles for statistics by question type

☐ Units ☐ Calculations ☐ Rounding ☐ Quality of data

CORRECT ANSWERS	POINTS AWARDED	AUTOSOLVED	NOT FINISHED
114 / 114	518 / 521	0 / 114	0 / 114