

Chemical Kinetics Worksheet

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Complete the following table.

Data Table A: Determination of Rate Law: $2 \text{I}^- + \text{S}_2\text{O}_8^{2-} \rightarrow \text{I}_2 + 2 \text{SO}_4^{2-}$

run #	mL of 0.200 M KI	mL of 0.100 M (NH ₄) ₂ S ₂ O ₈	mL of 0.0050 M Na ₂ S ₂ O ₃	mL of 0.2 M KCl	mL of 0.100 M (NH ₄) ₂ SO ₄	elapsed time (sec)
1	20.0	20.0	10.0	0.0	0.0	
2	10.0	20.0	10.0	10.0	0.0	
3	5.00	20.0	10.0	15.0	0.0	
4	20.0	10.0	10.0	0.0	10.0	
5	20.0	5.00	10.0	0.0	15.0	

Complete the following table.

Data Table B: Calculations for Determination of Rate Law

run #	initial $[I^-]$ (M)	initial $[S_2O_8^{2-}]$ (M)	initial $[S_2O_3^{2-}]$ (M)	Rate (M/s)	k
1					
2					
3					
4					
5					

Select all of the following that are true about the rate of the reaction and $[I^-]$ based on your data from Data Table B. (Select all that apply. *Note: The order of these options may be different in the WebAssign question.*)

- As the $[I^-]$ is decreased by one-half, the rate decreases by one-half.
- As the $[I^-]$ is decreased by one-quarter, the rate decreases by one-twenty-seventh.
- As the $[I^-]$ is decreased by one-quarter, the rate increases by a factor of four.
- As the $[I^-]$ is decreased by one-quarter, the rate decreases by one-sixteenth.
- As the $[I^-]$ is decreased by one-half, the rate decreases by one-eighth.
- As the $[I^-]$ is decreased by one-half, the rate decreases by one-quarter.
- As the $[I^-]$ is decreased by one-half, the rate increases by a factor of two.
- As the $[I^-]$ is decreased by one-half or one-quarter, the rate stays the same.
- As the $[I^-]$ is decreased by one-quarter, the rate decreases by one-quarter.

Inspect the data in Data Table B. What is the order of the reaction with respect to iodide ions, I^- ?

Select all of the following that are true about the rate of the reaction and $[S_2O_8^{2-}]$ based on your data from Data Table B. (Select all that apply. *Note: The order of these options may be different in the WebAssign question.*)

- As the $[S_2O_8^{2-}]$ is decreased by one-half, the rate increases by a factor of two.
- As the $[S_2O_8^{2-}]$ is decreased by one-half, the rate decreases by one-quarter.
- As the $[S_2O_8^{2-}]$ is decreased by one-half, the rate decreases by one-eighth.
- As the $[S_2O_8^{2-}]$ is decreased by one-quarter, the rate decreases by one-twenty-seventh.
- As the $[S_2O_8^{2-}]$ is decreased by one-quarter, the rate decreases by one-quarter.
- As the $[S_2O_8^{2-}]$ is decreased by one-half, the rate decreases by one-half.
- As the $[S_2O_8^{2-}]$ is decreased by one-quarter, the rate decreases by one-sixteenth.
- As the $[S_2O_8^{2-}]$ is decreased by one-quarter, the rate increases by a factor of four.
- As the $[S_2O_8^{2-}]$ is decreased by one-half or one-quarter, the rate stays the same.

Inspect the data in Data Table B. What is the order of the reaction with respect to persulfate ions, $S_2O_8^{2-}$?

Write out the rate law for the reaction $2 I^- + S_2O_8^{2-} \rightarrow I_2 + 2 SO_4^{2-}$. (Rate expressions take the general form: $\text{rate} = k \cdot [H_2] \cdot [Cl_2]$.)