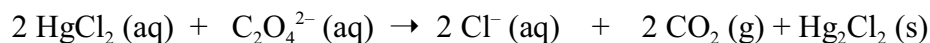


Worksheet 7

1. Consider the following reaction between mercury(II) chloride and oxalate ion:



The initial rate of this reaction was determined for several concentrations of HgCl_2 and $\text{C}_2\text{O}_4^{2-}$, and the following rate data were obtained for the rate of disappearance of $\text{C}_2\text{O}_4^{2-}$:

Experiment	$[\text{HgCl}_2]$ (M)	$[\text{C}_2\text{O}_4^{2-}]$ (M)	Rate (M/s)
1	0.164	0.15	3.2×10^{-3}
2	0.164	0.45	2.9×10^{-4}
3	0.082	0.45	1.4×10^{-4}
4	0.246	0.15	4.8×10^{-5}

a) What is the rate law for this reaction? b) What is the value of the rate constant? c) What is the reaction rate when the concentration of HgCl_2 is 0.050 M and that of $\text{C}_2\text{O}_4^{2-}$ is 0.10 M, if the temperature is the same as that used to obtain the data shown?

2. The first-order rate constant for the decomposition of N_2O_5 , $2 \text{N}_2\text{O}_5 (\text{g}) \rightarrow 4 \text{NO}_2 (\text{g}) + \text{O}_2 (\text{g})$, at 70°C is $6.82 \times 10^{-3} \text{ s}^{-1}$. Suppose we start with 0.0250 mol of $\text{N}_2\text{O}_5 (\text{g})$ in a volume of 2.0 L. a) How many moles of N_2O_5 will remain after 2.5 min? b) How many minutes will it take for the quantity of N_2O_5 to drop to 0.010 mol? c) What is the half-life of N_2O_5 at 70°C ?
3. $\text{Cl} (\text{g}) + \text{HBr} (\text{g}) \rightarrow \text{HCl} (\text{g}) + \text{Br} (\text{g})$ has an overall enthalpy change of -66 kJ . The activation energy for the reaction is 7 kJ . a) Sketch the energy profile for the reaction, and label E_a and ΔH . b) What is the activation energy for the reverse reaction?