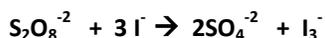


## D15 Rates CW and HW

Ch. 13 #31 The rate of the following reaction in aqueous solution is monitored by measuring the rate of formation of  $I_3^-$ . Data obtained are listed in the table.



Experiment	Initial Concentration of $S_2O_8^{2-}$ (mol/L)	Initial Concentration of $I^-$ (mol/L)	Initial Rate of (mol L <sup>-1</sup> s <sup>-1</sup> )
1	0.038	0.0600	$1.4 \times 10^{-5}$
2	0.076	0.0600	$2.8 \times 10^{-5}$
3	0.076	0.1200	$5.6 \times 10^{-5}$

- Determine the order of the reaction with respect to each of the following reactants. Give the overall reaction order.  
 (i)  $S_2O_8^{2-}$       (ii)  $I^-$
- Write the expression for the rate law for the reaction as determined from the experimental data.
- Determine the value of the rate constant for the reaction, clearly indicating the units.
- What would be the initial rate of reaction if  $[S_2O_8^{2-}] = 0.083M$  and  $[I^-] = 1.115M$ ?

Ch. 13 #32 The rate of the following reaction in aqueous solution is monitored by measuring the moles of  $Hg_2Cl_2$  that precipitate per liter per minute. Data obtained are listed in the table.



Experiment	Initial Concentration of $HgCl_2$ (mol/L)	Initial Concentration of $C_2O_4^{2-}$ (mol/L)	Initial Rate of (mol/L <sup>-1</sup> s <sup>-1</sup> )
1	0.105	0.15	$1.8 \times 10^{-5}$
2	0.105	0.30	$7.1 \times 10^{-5}$
3	0.052	0.30	$3.5 \times 10^{-5}$
4	0.052	0.15	$8.9 \times 10^{-6}$

- Determine the order of the reaction with respect to  $HgCl_2$ , with respect to  $C_2O_4^{2-}$ , and overall.
- Determine the value of the rate constant for the reaction, clearly indicating the units.
- Write the expression for the rate law for the reaction as determined from the experimental data.
- What would be the initial rate of reaction if  $[HgCl_2] = 0.094M$  and  $[C_2O_4^{2-}] = 0.19M$ ?

**The following are from CH 13 pp 567-568**

#1 State two quantities that must be measured to establish the rate of a chemical reaction and cite several factors that affect the rate of a chemical reaction.

#2 Explain why the rate of disappearance of NO and the rate of formation of  $N_2$  are not the same in the reaction  $2CO(g) + 2NO(g) \rightarrow 2CO_2(g) + N_2(g)$ .

#4 How does the rate of a reaction differ from the rate constant of the reaction. Can they ever be the same? Explain.

#7 The reaction  $2A + B \rightarrow C + 2D$  is first order in A and first order in B. For this reaction

- Rate of reaction =  $k[A]^2[B]$
- Rate of reaction =  $k[A][B]$
- Rate of disappearance of A = rate of disappearance of B
- Rate of formation of C = - (rate of disappearance of B)

#25a&b In the reaction  $A + 2B \rightarrow C + 3D$ , the rate of disappearance of B is  $-6.2 \times 10^{-4}M/s$ .

What is a. the rate of disappearance of A?      b. the rate of formation of D?

#26a&b In the reaction  $2A + 2B \rightarrow C + 2D$ , the rate of disappearance of A is  $-2.2 \times 10^{-4}M/s$ .

What is a. the rate of disappearance of B?      b. the rate of formation of C?

# Think Pair Share: Rates

1. What two things must be measured to be able to calculate the rate of a reaction?

2. What factors might increase the rate of a reaction?

3. Write the general rates for each species in the reaction below:



4. How are rates of reactants and products different?

5. What is a rate law?

6. What is the order of a reactant in a reaction?

7. What is overall order?