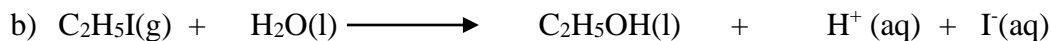
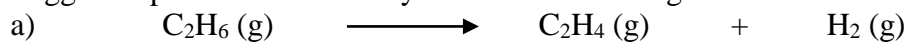
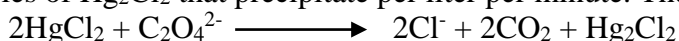


1) Suggest experimental means by which the following reactions can be monitored for rate. (B)



2) The initial concentration of H_2O_2 is 0.1108 M and 12 s later the concentration is 0.1060 M. what is the initial rate of this reaction expressed in M s^{-1} . (ans: $4.0 \times 10^{-4} \text{ M/s}$)

3) The rate of the following reaction in aqueous solution is monitored by measuring the number of moles of Hg_2Cl_2 that precipitate per liter per minute. The data obtained are listed in the table.



Exp	$[\text{HgCl}_2], \text{M}$	$[\text{C}_2\text{O}_4^{2-}], \text{M}$	Initial rate M min^{-1}
1	0.105	0.15	1.8×10^{-5}
2	0.105	0.30	7.1×10^{-5}
3	0.052	0.30	3.5×10^{-5}
4	0.052	0.15	8.9×10^{-6}

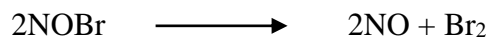
- a) Determine the order of reaction with respect to HgCl_2 and $\text{C}_2\text{O}_4^{2-}$ and overall. (ans: 1,2,3)
 b) What is the value of the rate constant, k? (ans: $7.6 \times 10^{-3} \text{ M}^{-2} \text{ min}^{-1}$)
 c) What would be the initial rate of reaction if $[\text{HgCl}_2] = 0.094 \text{ M}$ and $[\text{C}_2\text{O}_4^{2-}] = 0.19 \text{ M}$? (ans: $2.6 \times 10^{-5} \text{ M/min}$)
 d) Are all four experiments necessary to answer parts a through c?

4) A first order reaction $A \longrightarrow$ products, has a rate of reaction of 0.0025 M s^{-1} , when $[A] = 0.484 \text{ M}$.

a) What is the rate constant, k , for this reaction? (ans: $5.17 \times 10^{-3}/\text{s}$)

b) Does $t_{3/4}$ depend on the initial concentration? Does $t_{4/5}$? Explain?

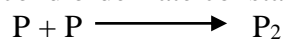
5) The rate constant for the second order reaction is $0.80 \text{ M}^{-1}\text{s}^{-1}$ at 10°C .



a) Starting with a concentration of 0.086 M , calculate the concentration of NOBr after 22 s . (ans: 0.034M)

b) Calculate the half lifes when $[\text{NOBr}] = 0.072 \text{ M}$ and $[\text{NOBr}]_0 = 0.054 \text{ M}$. (ans: $17\text{s}, 23\text{s}$)

- 6) The second order rate constant of the dimerization of protein P is $6.2 \times 10^{-3} \text{ M}^{-1}\text{s}^{-1}$ at 25°C .



If the concentration of the protein is $2.7 \times 10^{-4} \text{ M}$, calculate the initial rate (M/s) of the formation of P_2 . How long in seconds, will it take to decrease the concentration of P to $2.7 \times 10^{-5} \text{ M}$? ((B)ans: $4.5 \times 10^{-10} \text{ M/s}$)

- 7) For the reaction given below the frequency factor A is $8.7 \times 10^{12} \text{ s}^{-1}$ and the activation energy is 63 KJ/mol. What is the rate constant for the reaction at 75°C ? ((B)ans: $3.0 \times 10^3/\text{s}$)

