CH1011 Tutorial 5

Name:

1. The variation in initial rate of reaction of nitrogen dioxide with fluorine is given in the following table. What is the overall order of the reaction? Write out a **general rate law** for this reaction.

Experiment	Initial $[NO_2]$	Initial $[F_2]$	Initial rate
1	0.10	0.10	0.005
2	0.20	0.10	0.010
3	0.10	0.20	0.010

2. Dinitrogen pentoxide (N_2O_5) decomposes by a uni-molecular **first order process**. If the rate constant is 5.00×10^{-4} s^{-1} how long will it take (s) for an initial concentration of N_2O_5 of 0.0400 mol dm^{-3} to fall to a value of 0.0200 mol dm^{-3}?

3. What is the difference between a **heterogeneous** and a **homogeneous** catalyst? Give an example of a catalyst and explain why it is used.

4. Using the nuclide $^{232}_{90}Th$ illustrate the processes of **alpha decay** and with the nuclide ^{14}C the process of **beta decay**.

5. **Enzymes** function as biological catalysts. Describe the function of a typical enzyme including the enzyme-substrate complex, active site, turnover rate.

6. Stable isotope measurements are used in many areas of the biological and earth sciences. Explain the difference between **kinetic fractionation** and **equilibrium fraction** as it applies to stable isotope ratios. Illustrate your answer using $\delta^{18}O$ ratios