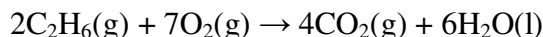


Chemistry 225 Semester 01-2012

Homework for Submission #1

Answer the following questions and submit them for marking on or before 2 pm on the 23rd January 2012 in the chemistry drop box. Only answers showing full working can attract full marks. Careless and sloppy work will be penalised. Express your answer to the correct number of significant figures. *Submissions showing evidence of copying will attract zero marks.*

- 1) Ethane is slowly oxidised in a plentiful supply of air at a constant temperature according to the following equation:



The rate of reaction with respect to ethane is measured at a certain time as $3.7 \times 10^{-4} \text{ M s}^{-1}$. Calculate:

- The rate of reaction with respect to oxygen.
 - The rate of reaction with respect to carbon dioxide.
 - The general rate of reaction.
 - Sketch¹ graphs (use one pair of axes) of the concentrations of ethane and carbon dioxide against time.
 - If the concentration of oxygen falls from 0.00100 M to 0.000980 M during the course of 135 s, what is the rate of reaction with respect to oxygen?
- 2) The alkaline hydrolysis of chlorine dioxide proceeds in aqueous solution according to the following equation:



Experiments to determine the initial rate of reaction at various concentrations of reactants gave results as follows:

Run #	[ClO ₂] / M	[OH ⁻] / M	Rate / M s ⁻¹
1	0.060	0.030	0.0248
2	0.020	0.030	0.00276
3	0.020	0.090	0.00828

- Determine the rate law for the reaction, indicating how you arrive at your answer.
- Calculate the rate constant.
- Calculate the rate of reaction when [ClO₂] = 0.010 M and [OH⁻] = 0.025 M. Is this an average or an instantaneous rate? Explain.

¹ A sketch graph has labeled axes but, apart from the origin, no values are indicated. However, relative values are shown correctly. (See question 14.2 on page 617 in the 10th edition of your textbook.)