Chemistry Revision Test 4

Time: 1 hr

Max Marks: 30

Q1.

(a) From reaction below determine the order of reaction and the dimensions of the rate constants.

3 NO(g) → N_2O (g) Rate = $k[NO]^2$
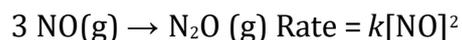
(b) The decomposition of NH_3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4}$ $mol^{-1} L$ s^{-1}?

(c) Mention the factors that affect the rate of a chemical reaction.

(d) A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is doubled.

4 marks

Q2. What is the effect of temperature on the rate constant of a reaction? How can this temperature effect on rate constant be represented quantitatively?

4 marks

Q3.

A). A reaction is first order in A and second order in B.

(i) Write the differential rate equation.

(ii) How is the rate affected on increasing the concentration of B three times?

(iii) How is the rate affected when the concentrations of both A and B are doubled?

3 marks

B) Calculate the half-life of a first order reaction if the rate constants is 200 s^{-1}.

3 marks

C) The rate constant for a first order reaction is 60 s^{-1}. How much time will it take to reduce the initial concentration of the reactant to its $1/16^{th}$ value?(take log16 = 1.2)

3 marks

Q4 A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2}$.

(Take log(10/7) as 0.155).

3 marks

Q5 The decomposition of hydrocarbon follows the equation.

$k = (4.5 \times 10^{11}\,s^{-1})\, e^{-28000\,K/T}$

5 marks

Q6. The decomposition of A into product has value of k as $4.5 \times 10^3\,s^{-1}$ at 10°C and energy of activation 60 kJ mol^{-1}. At what temperature would k be $1.5 \times 10^4\,s^{-1}$?

(Take log3.33 = 0.5229)

5 marks