Examrace

Competitive Exams: Chemistry MCQs (Practice_Test 8 of 31)

1. Consider the following reaction in aqueous solution, 5Br- (aq) + BrO3- (aq) + 6H + (aq) → 3Br2 (aq) + 3H2O (l) If the rate of appearance of Br2 at a particular moment during the reaction is 0.025 M s – 1, what is the rate of disappearance (in M s – 1) of Br-at that moment?

2. Consider the following reaction at 25oC (CH3) , 3COH (l) + HCl (aq) → (CH3) 3CCl (l) + H2O (l) The experimentally determined rate law for this reaction indicates that the reaction is first-order in (CH3) 3COH and that the reaction is first-order overall. Which of the following would produce an increase in the rate of this reaction?

   a. increasing the concentration of (CH3) 3COH

   b. increasing the concentration of HCl

   c. decreasing the concentration of HCl

   d. decreasing the concentration of (CH3) 3CCl

   e. It is impossible to tell.

3. A certain first-order reaction has a rate constant, k, equal to 2.1 × 10 – 5 s – 1 at 355 K. If the activation energy for this reaction is 135 kJ/mol, calculate the value of the rate constant (in s – 1) at 550 K.

4. Which of the following influences the rate of a chemical reaction performed in solution?

   a. temperature

   b. activation energy

   c. presence of a catalyst

   d. concentrations of reactants

   e. All of the above influence the rate.

5. Laughing gas, N2O, can be prepared (ha, ha!) from H2 and NO: H2 (g) + 2 NO (g) → N2O (g) + H2O (g) A study of initial concentration (ha, ha!) versus initial rate at a certain temperature yields the following data for this reaction (ha, ha!) : [H2] , M [NO] , Minitial rate, M s – 1 0.10000. 50002.560 × 10 – 6 0.20000. 30001.843 × 10 – 6

0.10000. 30009.216 × 10 − 7 0.20000. 60007.373 × 10 − 6 Which of the following is the correct rate law for this reaction (ha, ha!) ?

a. Rate = k [H2] [NO] 2

b. Rate = k [H2] [NO]

c. Rate = k [NO] 2

d. Rate = k [H2] 2

e. Rate = k

6. Iodine-131, a radioactive isotope of iodine, is used medicinally as a radiotracer for the diagnosis and treatment of illnesses associated with the thyroid gland. The half-life of iodine-131 is 7 × 105 seconds. If a patient is given 0.45 g of iodine-131, calculate how long it would take (in seconds) for 90.0 % of the iodine-131 to decay. Recall: Radioactive decay is a first-order process.

   a. N/A

   b. N/A

   c. N/A

   d. N/A

7. Consider a reaction which is first-order in A and first-order in B

   a. N/A

   b. N/A

   c. N/A

   d. N/A

8. The complex ion, [Cr (NH3) 5Cl] 2 + , reacts with OH-ion in aqueous solution, [Cr (NH3) 5Cl] 2 + (aq) + OH- (aq) → [Cr (NH3) 5 (OH)] 2 + (aq) + Cl- (aq) The following data were obtained for this reaction at 25oC [Cr (NH3) 5Cl] 2 + concentration (M)

   - 01.00
   - 60.657
   - 120.432
   - 180.284
   - 240.186
   - 300.122
   - 360.0805

   The order of the reaction with respect to the [Cr (NH3) 5Cl] 2 + ion is:

a. zero order

b. first order

c. second order

d. third order

e. fourth order

9. A student determined the value of the rate constant, k, for a chemical reaction at several different temperatures. Which of the following graphs of the student's data would give a straight line?

a. k versus T

b. k versus (1/T)

c. ln k versus (1/T)

d. ln k versus T

e. ln k versus Ea

10. In the experiment, "How Can Spectrophotometric Methods Be Used to Determine the Order of a Chemical Reaction" it is necessary to remove invalid data points towards the end of the reaction. Which of the following statements best explains why this is necessary?

a. The Spectronic 20 becomes unstable towards the end of the reaction.

b. Towards the end of the reaction, the temperature of the solution is significantly different than the initial temperature of the solution.

c. Towards the end of the reaction, the concentrations of the reactants are so high that it is difficult to measure them accurately.

d. Towards the end of the reaction, the concentrations of the products are sufficiently high that the reverse reaction competes with the forward reaction.

e. None of these.

11. The next two questions are about this reaction: $2N_2O_5\ (g) \Leftrightarrow 4NO_2\ (g) + O_2\ (g)$ The rate law for the above reaction is:

a. rate = k $[N_2O_5]$ 2

b. rate = $[N_2O_5]$ 2

c. rate = k $[N_2O_5]$ 2/ $[NO_2]$ 4 $[O_2]$ 1

d. rate = k $[N_2O_5]$ x

e. rate = $[N_2O_5]$ x

12. The next two questions are about this reaction: $2N_2O_5$ (g) ⇔ $4NO_2$ (g) + O_2 (g) If the instantaneous rate of appearance of NO_2 (g) is 0.0400 M/s at some moment in time, what is the rate of disappearance of N_2O_5 (g) in M/s?
    a. N/A
    b. N/A
    c. N/A
    d. N/A
13. The rate laws for certain enzyme-activated reactions in your body have a specific rate constant k, with units of M/s. What is the overall order of these reactions?
    a. 0
    b. 1
    c. 2
    d. 3
    e. Cannot be determined.
14. The next two questions are about this reaction: 2NO (g) + Cl_2 (g) ⇔ 2NOCl (g) The rate law for the above reaction has been determined to be rate = k [NO] [Cl_2] . What is the overall order of the reaction?
    a. 0
    b. 1
    c. 2
    d. 3
    e. Cannot be determined.
15. The next two questions are about this reaction: 2NO (g) + Cl_2 (g) ⇔ 2NOCl (g) A mechanism involving the following steps has been proposed for the above reaction:
    a. NO (g) + Cl_2 (g) → $NOCl_2$ (g)
    b. $NOCl_2$ (g) + NO (g) → 2NOCl (g)
        i. N/A
        ii. N/A
        iii. N/A
        iv. N/A