

1. For a certain first order reaction, it is found that it takes 156 seconds for the concentration of reactant to fall from 0.100 M to 0.0500 M. How much time would it take for the concentration of reactant to fall from 0.0500 M to 0.0250 M?

- a. 165 seconds b 76 seconds c. 156 seconds d 98 seconds

2. The thermal decomposition of ammonium nitrite (NH_4NO_2) into molecular nitrogen and water is a first-order process. $\text{NH}_4\text{NO}_2(\text{g}) = 2\text{H}_2\text{O}(\text{g}) + \text{N}_2(\text{g})$, at 680°C the rate constant for this reaction is 0.0198 s^{-1} . How long will it take for an initial concentration of 0.57 M to fall to 0.013 M?

- a. 191 s b. 183 s c. 57 s d. 83 s

3. A catalyst functions by:

- a lowering the energy of the reactants.
- b. lowering the energy of the products.
- c. decreasing the rate of the reverse reaction.
- d. providing a reaction path with a lower activation energy

4. The rate of a reaction doubles when the concentration of one of the reactants is doubled. In terms of the concentration of this reactant, the reaction is:

- a. Zeroth-order
- b. First-order
- c. Second-order
- d. Third-order

5. Catalyzed reactions are faster because:

- a. The concentrations are higher
- b. The temperature is higher
- c. The mechanism is different
- d. None of the above

6. For a first-order reaction, a plot is made of $\ln([A]/[A]_0)$ versus time in seconds. The slope of the line is equal to....., and will have the units of.....:

- a. The rate constant, $\text{mol L}^{-1}\text{ s}^{-1}$
- b. The rate constant, s
- c. The rate constant, s^{-1}
- d. None of the above

7. A reaction involving two different reactants can never be

- a. First-order reaction

- b. Bimolecular reaction
- c. Second-order reaction
- d. Unimolecular reaction

8. The reaction: $A \rightarrow B$ follows first-order kinetics. The time taken for 0.8 mol of A to produce 0.6 mol of B is 1 hour. What is the time taken for conversion of 0.9 mol of A to produce 0.675 mol of B?

- a. 0.5 h b. 1 h c. 2 h d. 0.25 h

9. Which of the following statements is true about ORDER of a reaction?

- a. It is obtained from a single balanced equation
- b. It is always a whole number
- c. It cannot be obtained from a balanced chemical equation
- d. It reveals some basic facts about reaction mechanism

10. One of the following statements is not true about the MOLECULARITY of a reaction

- a. It is always a whole number
- b. It is generally not exceeding three and never zero.
- c. It reveals some basic facts about reaction mechanism
- d. It does not reveal anything about the mechanism of the reaction

11. The rate constant of a zero-order reaction is $0.2 \text{ (mol/L) hour}^{-1}$. What will be the initial concentration of the reactant if after an hour its concentration is 0.089 mol/L ?

- a. 0.28 mol/L b. 0.15 mol/L c. 0.58 mol/L d. 0.189 mol/L

12. A first-order reaction is 60% complete at the end of 90 min, what is the value of rate constant in sec^{-1} ?

- a. $1.69 \times 10^{-4} \text{ s}^{-1}$ b. $1.98 \times 10^{-4} \text{ s}^{-1}$ c. $1.75 \times 10^{-4} \text{ s}^{-1}$ d. $1.70 \times 10^{-3} \text{ s}^{-1}$.

13. The half-life for the first-order decomposition of N_2O_5 is $2.05 \times 10^4 \text{ s}$. How long will it take for a sample of this compound to decay to 80% of its initial value?

- a. $8.97 \times 10^7 \text{ s}$ b. $1.51 \times 10^6 \text{ s}$ c. $6.60 \times 10^7 \text{ s}$ d. $1.48 \times 10^7 \text{ s}$

14. Which of the following statements is TRUE about a first-order reaction?

- a. Its half-life varies inversely as the initial concentration
- b. Its half-life does not depend on the initial concentration of the reactants
- c. Its rates does not depend on the nature of the reactants
- d. It is not a fast reaction

15. The optical rotations of sucrose in 0.5 M HCl measured in seconds at 0, 20 and ∞ are $+32.4$, $+25.5$ and -11.1 respectively. Determine the order of the reaction.

- a. 3 b. 2 c. 1 d. 0

16. A first-order reaction is 40% complete at the end of 50 min, in how many minutes will the reaction be 80% complete?

a. 169 min b. 198 min c. 158 min d 178 min.

17. The first-order decomposition of H_2O_2 was studied by titrating it at different time with KMnO_4 . Calculate the velocity constant; if at $t = 0$, the volume of KMnO_4 used was 25 ml and at 30 minutes the volume of KMnO_4 used was 12.5 ml.

a. 0.00228 s^{-1} b. 0.0232 s^{-1} c. 0.232 s^{-1} d. 0.222 s^{-1} .

18. A reaction has the energy of activation of 84 kJ mol^{-1} , what is the effect on the rate (other things being equal) of raising the temperature from $100 \text{ }^\circ\text{C}$ to $110 \text{ }^\circ\text{C}$ ($R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)?

a. No effect on the rate of the reaction

b. The rate of the reaction increases

c. The rate of the reaction decreases

d. The rate of the reaction is doubled

19. After 300 seconds, half of nitrogen (IV) oxide gas has reacted. How much of the gas will react after 900 second if the reaction is first-order?

a. 66.7% b. 87.5% c. 99.9% d. 78.5%.

20. The half-life of a radioactive element with mass number 234 g is 2.5×10^5 years. How long after the isolation of a sample of this isotope will only one-six of the original mass be left?

a. 4.87×10^5 years b. 6.47×10^5 years c. 8.47×10^5 years d 7.48×10^5 years.