1. For the reaction , the rate constant at 215 °C is and the rate constant at 452°C is .
   1. What is the activation energy in kJ/mol?
   2. What is the rate constant at 100 °C?
2. The first-order decomposition of cyclopropane has a rate constant of . If the initial concentration of cyclopropane is 1.33 M, what is the concentration of cyclopropane after 644 s.
3. The decomposition of was monitored over time, and the following data were obtained

|  |  |
| --- | --- |
| Time (sec) |  |
| 0.00 | 12.18 |
| 1.00 | 7.389 |
| 2.00 | 4.482 |

1. Is the reaction zero, first, or second order?
2. What is the value of the rate constant, k, of the reaction?
3. What is the concentration of A remaining after 3.50 s in the reaction?
4. What is the half-life of the reaction?
5. The mechanism of a reaction is shown below.
   * 1. (slow)
     2. (fast)
     3. (fast)
6. What is the overall reaction?
7. What is the rate limiting step?
8. What is the molecularity of the rate limiting step?
9. Which compounds are intermediates?
10. Predict the rate law based on this mechanism.
11. What is the overall order of the reaction?
12. Given the following two reactions:

What is the equilibrium constant for the following reaction?

1. The reaction below has a value of 61. What is the value of for this reaction at 500 K?
2. Determine the value of for the following reaction if the equilibrium concentrations are as follows:
3. Consider the reaction below. Calculate the value of .

The initial [] was 0.020 M. At equilibrium the [] was

1. There is 1.00 mol each of and in a 1.00 L flask. The for thisreaction is 55.3. Determine the equilibrium concentrations of all chemical species at room temperature.
2. For the reaction below the = 255 at 1000K.

If the reaction mixture initially contains a CO concentration of 0.150 M and a concentration of 0.175 M, what are the equilibrium concentrations of CO, , and

1. Calculate the pH of a 0.00100 M solution.
2. is a weak base. A 0.150 M solution of has a pH =10.5. What is the of ?
3. Determine the pH of a solution of if the concentration is 0.350 M. For , .
4. Calculate the percent ionization of 0.100 M formic acid, , solution. For HCHO2, .
5. Determine the pH of a 0.85 M (methylamine) solution. For , .