Chemical Kenetics 2

1. Now consider the following reaction and data:

H 2 +2BrCl→2HCl+Br 2 \rm H_2 + 2BrCl \rightarrow 2HCl + Br_2

|  |  |
| --- | --- |
| **Time** (s \rm s) | Br 2 \rm Br_2**concentration** (M M) |
| 5 | 1.35 |
| 15 | 1.65 |

Part A

What is the average rate of formation of Br 2 \rm Br_2?Express your answer to three decimal places and include the appropriate units.

1. Consider the reaction: A(g)+1 2 B(g)→2C(g) {\rm{A(}}g)\; + \;{\textstyle{1 \over 2}}{\rm{B(}}g)\; \rightarrow \;2{\rm{ C(}}g).

Part A

When C {\rm C}is increasing at a rate of 4.0×10−2M⋅s −1 M \cdot s^{-1}, how fast is B {\rm B}decreasing?

Express your answer using two significant figures.

Part B

How fast is A {\rm A}decreasing? Express your answer using two significant figures.

1. Which of the following are correct for zero-order reactions? Check all that apply.

|  |  |
| --- | --- |
|  | The rate of reaction does not equal the rate constant. |
|  | The units for the rate constant and the rate of reaction are the same. |
|  | A zero-order reaction slows down as the reaction proceeds. |
|  | A higher concentration of reactants will not speed up the reaction. |
|  | The concentration of the reactants changes nonlinearly. |

1. In the hydrogenation of ethylene using a nickel catalyst, the initial concentration of ethylene is 1.90mol⋅L −1 mol \cdot L^{-1}and its rate constant (kk) is 0.0013mol⋅L −1 ⋅s −1 mol \cdot L^{-1}\cdot s^{-1}. Determine the rate of reaction if it follows a zero-order reaction mechanism.Express your answer to two significant figures and include the appropriate units.
2. The rate of the reaction in terms of the "disappearance of reactant" includes the change in the concentration of the reactant, the time interval, and the coefficient of the reactant.

Consider the following reaction:

1. 2A+3B→3C+2D \rm 2A + 3B\rightarrow 3C + 2D

The concentrations of reactant A at three different time intervals are given. Use the following data to determine the average rate of reaction in terms of the disappearance of reactant A\rm Abetween time = 0 s\rm sand time = 20 s \rm s.

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** (s \rm s) | 0 | 20 | 40 |
| [A](M) {\rm [A]}(M) | 0.0400 | 0.0240 | 0.0180 |

Express your answer in molar concentration per second to three significant figures.

1. The rate of the reaction in terms of the "appearance of product" includes the change in the concentration of the product, the time interval, and the coefficient of the product.

Consider the following reaction:

2A+3B→3C+2D \rm 2A + 3B\rightarrow 3C + 2D

The concentrations of product C \rm Cat three different time intervals are given. Use the following data to determine the rate of reaction in terms of the appearance of product C \rm Cbetween time = 0 s \rm sand time = 20 s \rm s.

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** (s \rm s) | 0 | 20 | 40 |
| [C](M) {\rm [C]}(M) | 0.000 | 0.0240 | 0.0480 |

Express your answer in molar concentration per second to three significant figures.

1. Consider the following reaction:

NO+O 3 →NO 2 +O 2 \rm NO + O_3 \rightarrow NO_2 + O_2, rate=k[NO][O 3 ] {\rm rate} = k[{\rm NO}][{\rm O_3}]

Part A

What is the overall reaction order? Express your answer as an integer.

Part B

What are the units of the rate constant k kfor this reaction?

Part C

What would happen to the rate if [NO] \rm [NO]were doubled?

Part D

1. What would happen to the rate if [O 3 ] \rm [O_3]were doubled? Consider the following elementary steps that make up the mechanism of a certain reaction:
2. 3A→B+C \rm 3A \rightarrow B + C
3. B+2D→C+F \rm B + 2D\rightarrow C + F

What is the overall reaction? Express your answer as a chemical equation.