### Assignment 8

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

Due on 2021-03-17, 23:59 IST.

1) The 1st order rate constant of a gaseous unimolecular reaction (A → B) is \( k^1 \). But this unimolecular reaction happens through Lindemann mechanism, which is given below:

\[
\begin{align*}
2A & \rightarrow A + A^* \quad \text{rate constant} = k_1 \\
A^* + A & \rightarrow 2A \quad \text{rate constant} = k_2 \\
A^* & \rightarrow B \quad \text{rate constant} = k_2 
\end{align*}
\]

If we assume the ideal gas behaviour, the concentration of \( A \) is proportional to the pressure of \( A \). The plot of \( \frac{1}{k} \) vs \( \frac{1}{T} \) gives slope of \( 4 \times 10^8 \text{ L mol}^{-1} \text{s}^{-1} \), and intercept of \( 8 \times 10^{11} \text{ s}^{-1} \). The value of \( k_2 \) is \( 1 \times 10^{7} \text{ L mol}^{-1} \).

No, the answer is incorrect.

Score: 0
Accepted Answers:
(Type: Range) 1.3

2) The order of a unimolecular reaction if it follows the above mentioned Lindemann mechanism under high pressure will be:

- 0th order
- 1st order
- 2nd order
- 3rd order

No, the answer is incorrect.

Score: 0
Accepted Answers:
1st order

3) True or false: The overall rate of the reaction \( k^1 \) is independent of concentration of \( [A] \).

- True
- False

No, the answer is incorrect.

Score: 0
Accepted Answers:
False

4) Cyclopropane isomerization reaction is an unimolecular reaction. Experimental value of \( E^* \) for this reaction is 19.5kJ/mol and the experimental activation energy \( (E_a) \) for the 1st activation step is 12kJ/mol. If the relation between \( E^* \) and \( E_a \) obtained from the previous question holds true, then the number of vibrational degrees of freedom that are not participating in the vibrational energy redistribution is ________.

No, the answer is incorrect.

Score: 0
Accepted Answers:
(Type: Numeral) 12

5) True or False: \( A^* \) is the same as transition state.

- True
- False

No, the answer is incorrect.

Score: 0
Accepted Answers:
False

6) In the Lindemann mechanism, the rate of change of \( [A] \) is:

- \( \frac{d[A]}{dt} = - k_1 [A]^2 + k_2 [A^*][A] \)
- \( \frac{d[A]}{dt} = - 1/2 k_1 [A]^2 - k_2 [A^*][A] \)
- \( \frac{d[A]}{dt} = - 1/2 k_1 [A]^2 + 1/2 k_2 [A^*][A] \)
- \( \frac{d[A]}{dt} = - k_1 [A]^2 - 1/2 k_2 [A^*][A] \)

No, the answer is incorrect.

Score: 0
Accepted Answers:
\( \frac{d[A]}{dt} = - k_1 [A]^2 + k_2 [A^*][A] \)