

# NCERT/CBSE PHYSICS CLASS 11 textbook

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Solutions/Answers to NCERT/CBSE CHEMISTRY Class 12 (Class XII) textbook

## CHAPTER FOUR

### CHEMICAL KINETICS

#### EXERCISES

4.23

The rate constant for the decomposition of hydrocarbons is  $2.418 \times 10^{-5} \text{ s}^{-1}$  at 546 K. If the energy of activation is 179.9 kJ/mol, what will be the value of pre-exponential factor.

$$E_a = 179.9 \text{ kJ mol}^{-1}$$

$$T = 546 \text{ K}$$

$$k = 2.418 \times 10^{-5} \text{ s}^{-1}$$

$$k = A e^{-E_a/RT}$$

$$\log k = \log A - \frac{E_a}{2.303RT}$$

$$\log A = \log k + \frac{E_a}{2.303RT}$$

$$= \log(2.418 \times 10^{-5} \text{ s}^{-1}) + \frac{179.9 \text{ kJ mol}^{-1}}{2.303 \times 8.314 \times 10^{-3} \times 546}$$

Solving we get

$$\log A = 12.5924 \text{ s}^{-1}$$

$$A = \text{Anti-log}(12.5924) = 3.912 \times 10^{12} \text{ s}^{-1}$$

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