

### ❖ The Comparison of Collision and Activated Complex Theory

After studying the collision as well as the transition state theories in detail, it is time to highlight the key points of similarities and differences between the two. A comparative analysis of both theories is quite beneficial as far as the practicality is concerned.

Table 1. The side-by-side comparison between the collision theory and transition state theory.

Collision Theory	Activated Complex Theory
1. According to the collision theory, the chemical reactions occur when the reactant molecules collide with a sufficient amount of kinetic energy.	1. According to the transition state theory, the primary cause of the reaction is actually the formation of an activated complex or the transition state, which in turn, converts to the final product.
2. It is based upon the kinetic theory of gases.	2. It is derived from the fundamentals of thermodynamics.
3. This theory considers the activation energy as the minimum energy required to make the collision effective.	3. This theory assumes the activation energy as the difference between the energy of the reacting molecules and the energy of the activated complex.
4. This theory tells nothing about the entropy of activation.	4. The transition state theory enables us to measure the entropy of activation.
5. Collision theory is applicable to simple chemical reactions and large deviations with experimental results are observed as the complexity increases.	5. This theory provided reasonable predictions even for the complex reactions.
6. The incorporation of the correction factor in modified collision theory was arbitrary.	6. The incorporation of correction factor was justified in terms of entropy of activation i.e. $\Delta S^\ddagger$ .
7. This theory tells nothing about the mechanism involved.	7. The formation of the activated complex is very much correlated with the actual mechanism going on.

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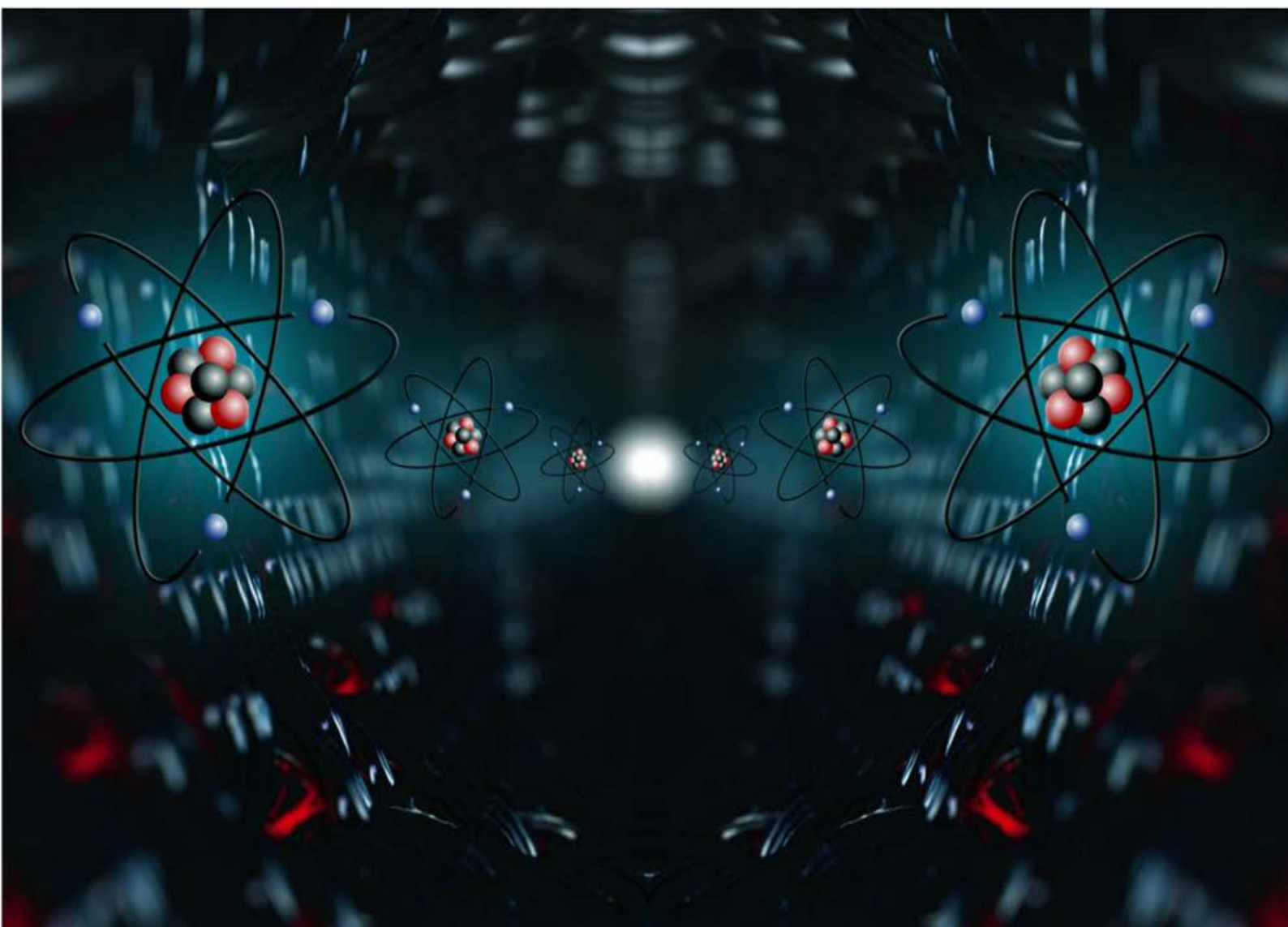
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# A TEXTBOOK OF PHYSICAL CHEMISTRY

**Volume I**

**MANDEEP DALAL**



*First Edition*

**DALAL INSTITUTE**

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*Mandeep Dalal*

*(M.Sc, Ph.D, CSIR UGC - NET JRF, IIT - GATE)*

*Founder & Director, Dalal Institute*

*Contact No: +91-9802825820*

*Homepage: [www.mandeepdalal.com](http://www.mandeepdalal.com)*

*E-Mail: [dr.mandeep.dalal@gmail.com](mailto:dr.mandeep.dalal@gmail.com)*

Mandeep Dalal is an Indian research scholar who is primarily working in the field of Science and Philosophy. He received his Ph.D in Chemistry from Maharshi Dayanand University, Rohtak, in 2018. He is also the Founder and Director of "Dalal Institute", an India-based educational organization which is trying to revolutionize the mode of higher education in Chemistry across the globe. He has published more than 40 research papers in various international scientific journals, including mostly from Elsevier (USA), IOP (UK) and Springer (Netherlands).

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