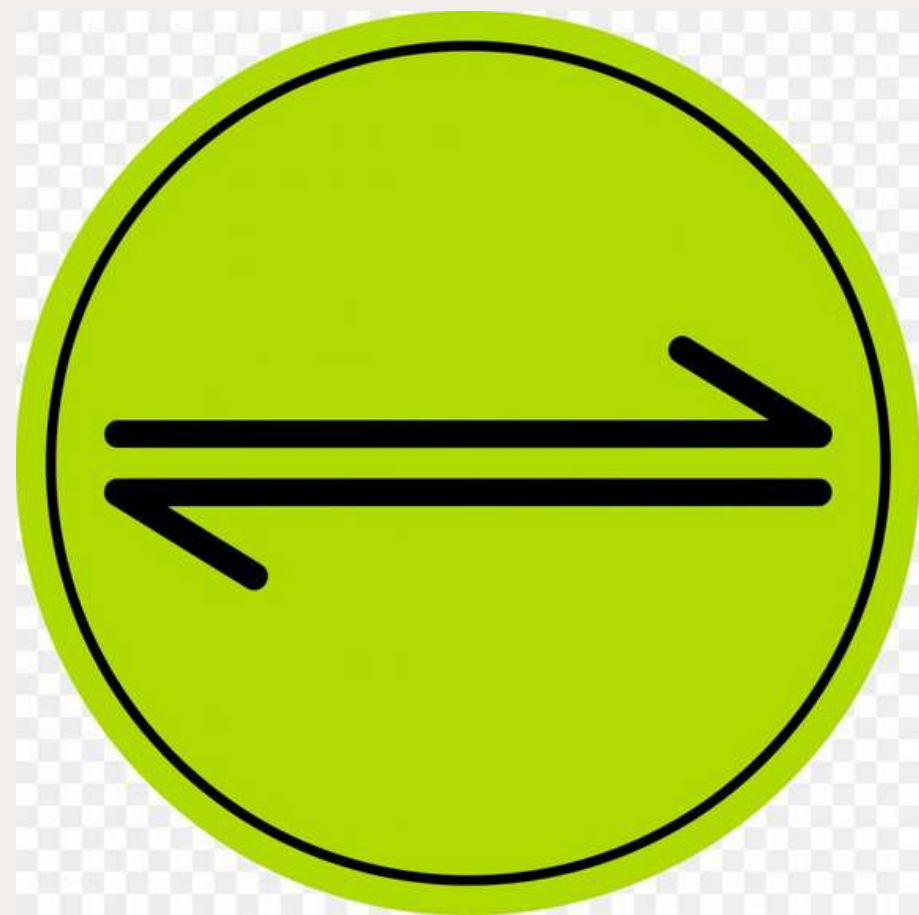


Chemical Equilibrium

Part I



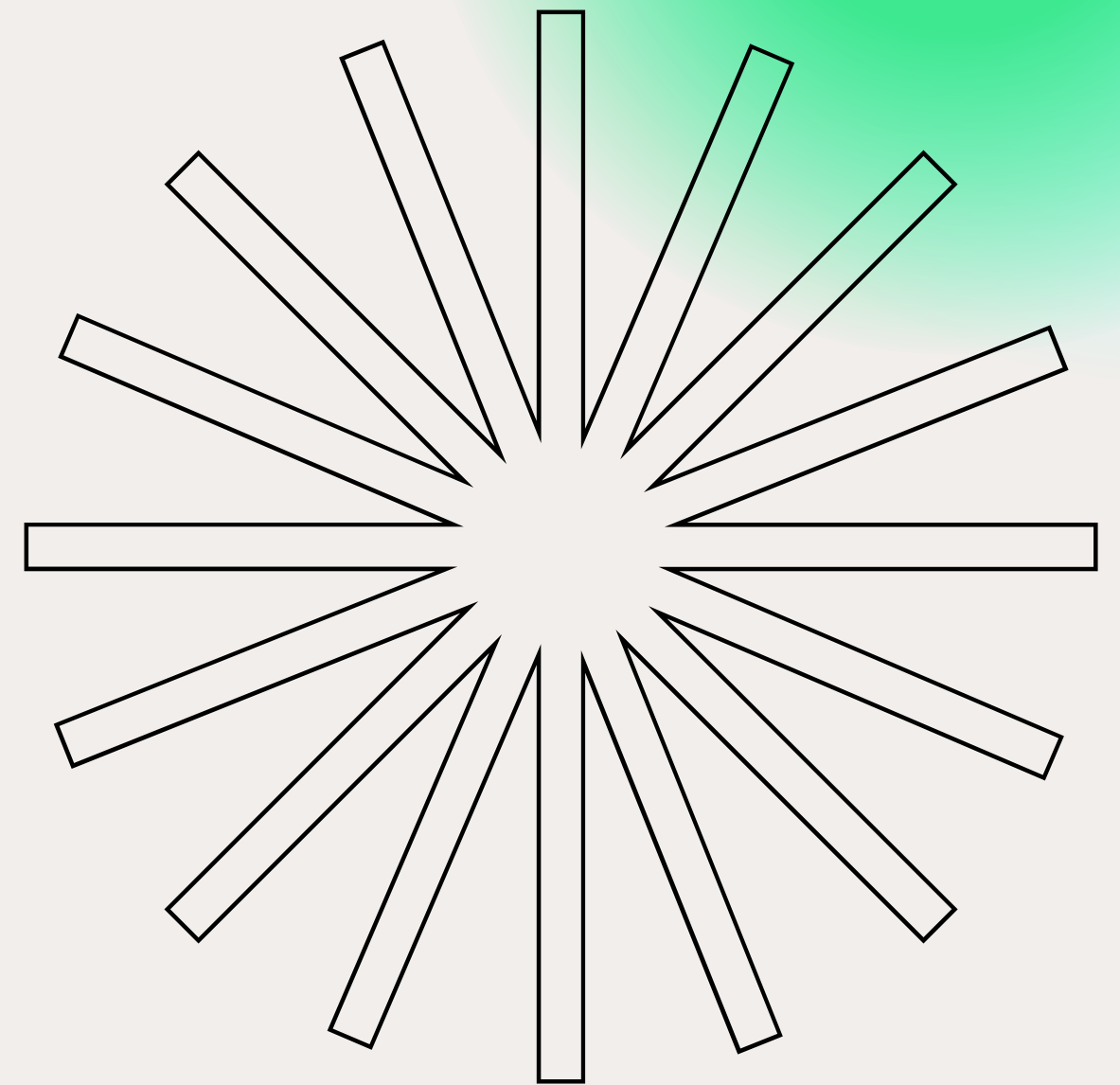
By
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Department of Chemistry
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BSc 2nd Semester (Honours)
Physical Chemistry
Course No. : CHEMISTRY-C-202
Unit : III

Welcome to class!

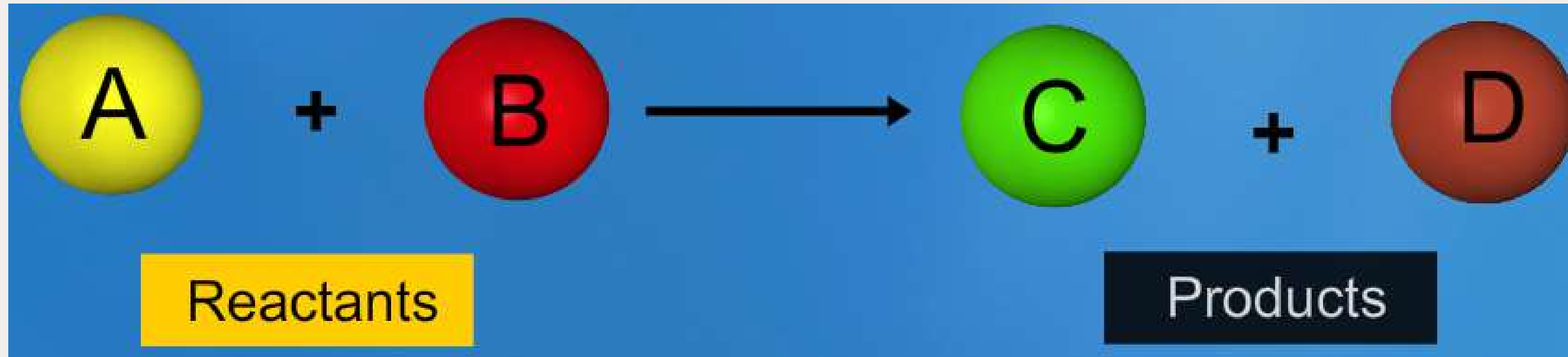
TODAY'S AGENDA

- * **Introduction to equilibrium**
- * **types of reactions**
- * **types of equilibrium**
- * **Characteristics of chemical equilibrium**
- * **Activity**



Irreversible Reactions

UNIDIRECTIONAL



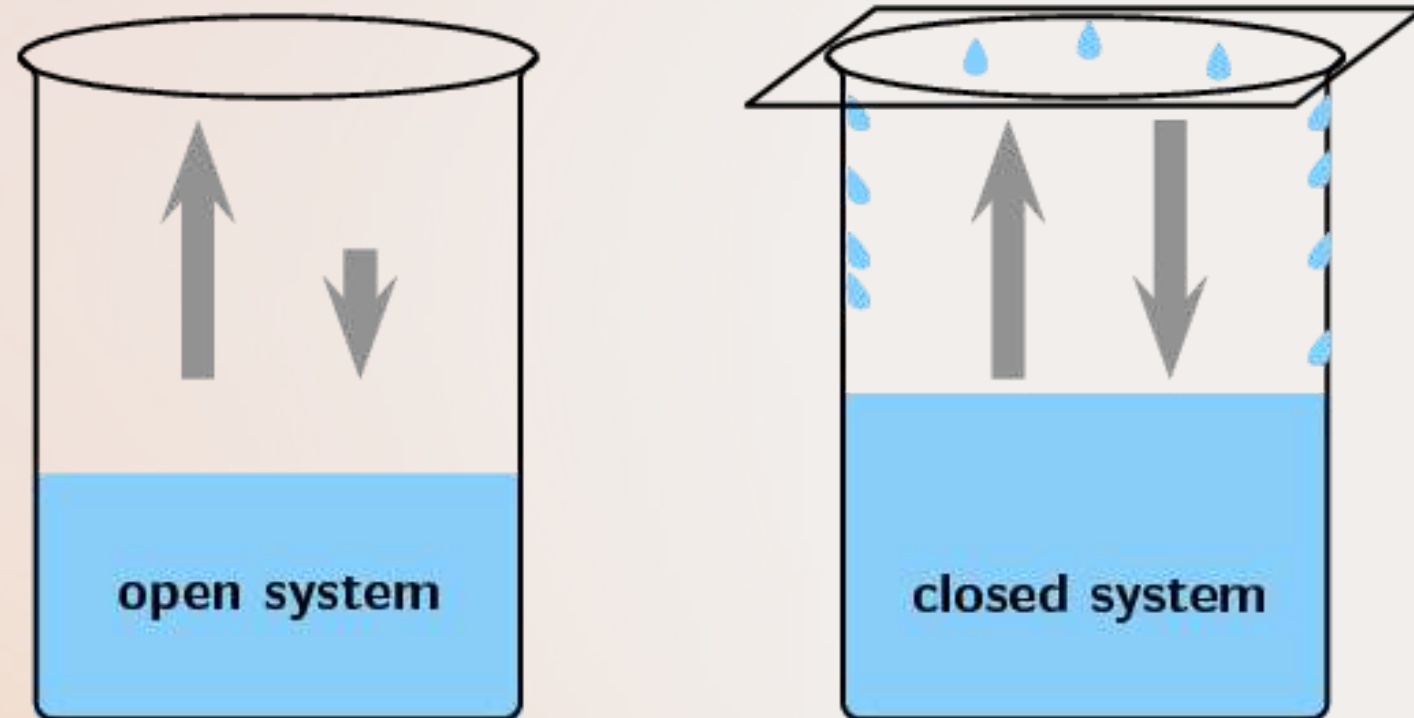
BIDIRECTIONAL

Reversible Reactions



Physical Equilibrium

↓ = condensation
↑ = evaporation



Reversible and Irreversible Changes

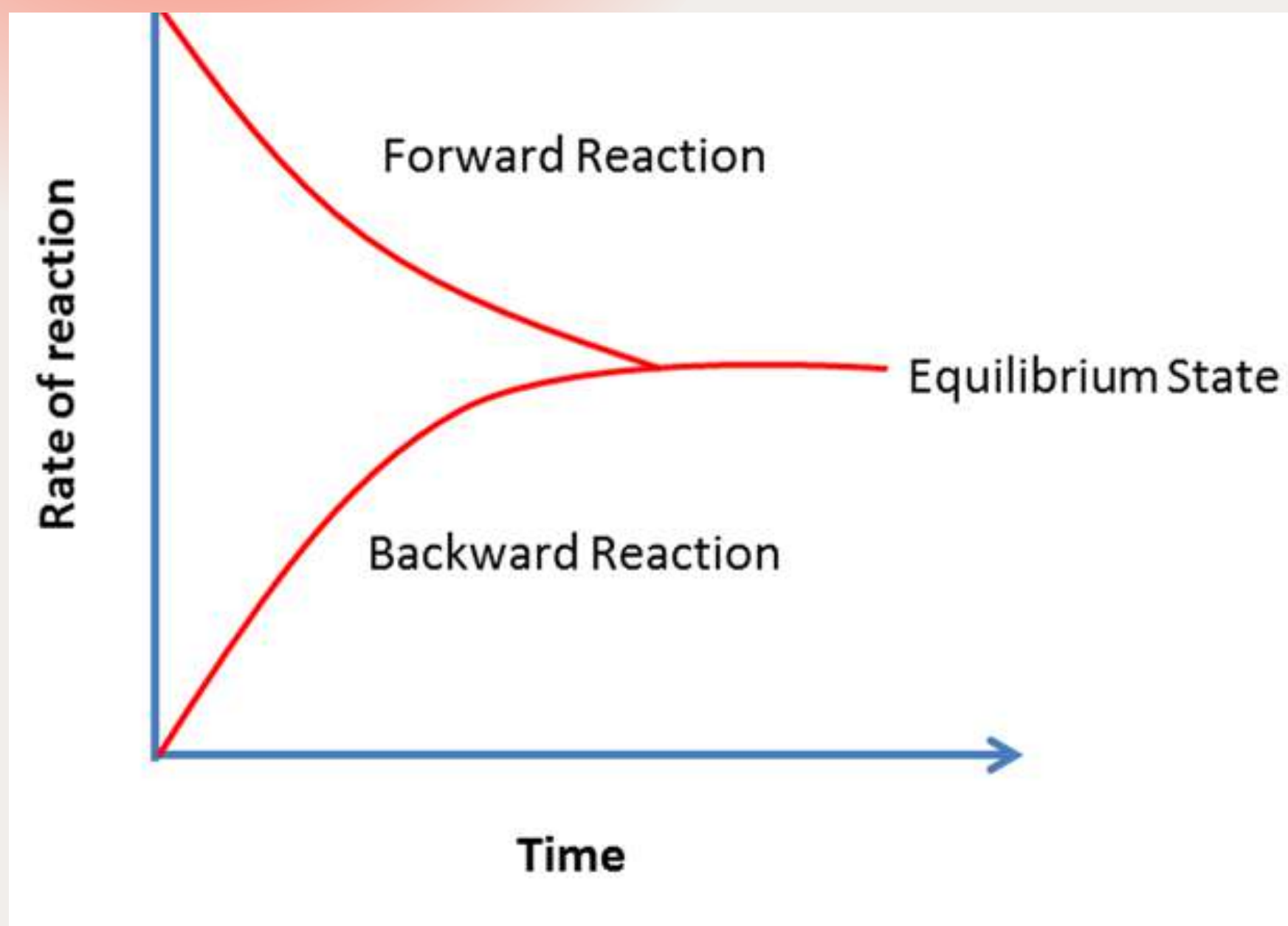
The diagram illustrates two types of changes. The top part shows a reversible change: an orange popsicle on the left is transformed into an orange juice glass on the right. A red arrow labeled "Heat" points from the popsicle to the juice, and a blue arrow labeled "Cool" points from the juice back to the popsicle. The bottom part shows an irreversible change: a fried egg on the left is transformed into a fried egg on the right. A red arrow points from the fried egg on the right back to the fried egg on the left, indicating that the reverse process is not possible.

Physical equilibrium is defined as the equilibrium which develops between different phases or physical properties. In these processes, there is no change in chemical composition.

Chemical Equilibrium

Definition

The state in which the rate of the forward reaction equals the rate of the backward reaction.

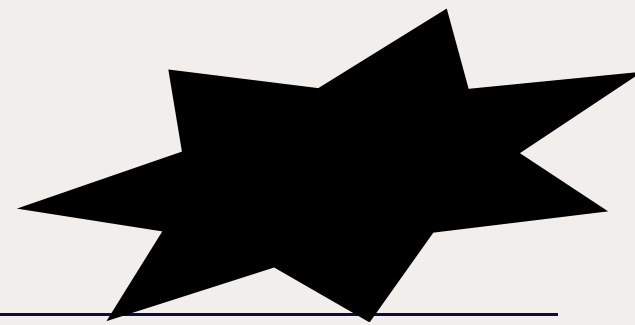


Chemical Equilibrium

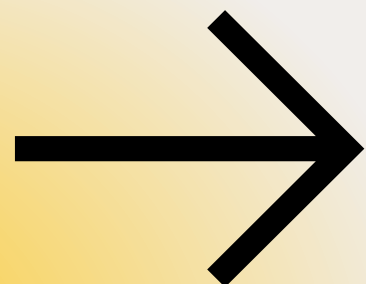
For example, the Haber process for producing ammonia from N₂ and H₂ does not go to completion.



- It establishes an equilibrium state where all three species are present.



Characteristics of Chemical Equilibrium



- **Dynamic in nature**

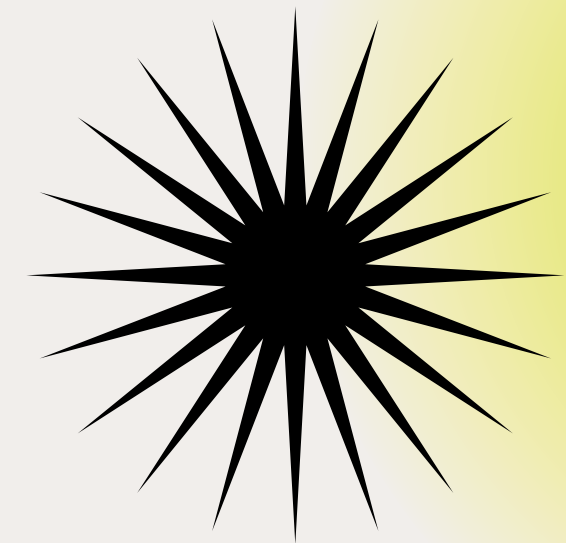
- **$R_f = R_b$**

- **Effect of Catalyst**

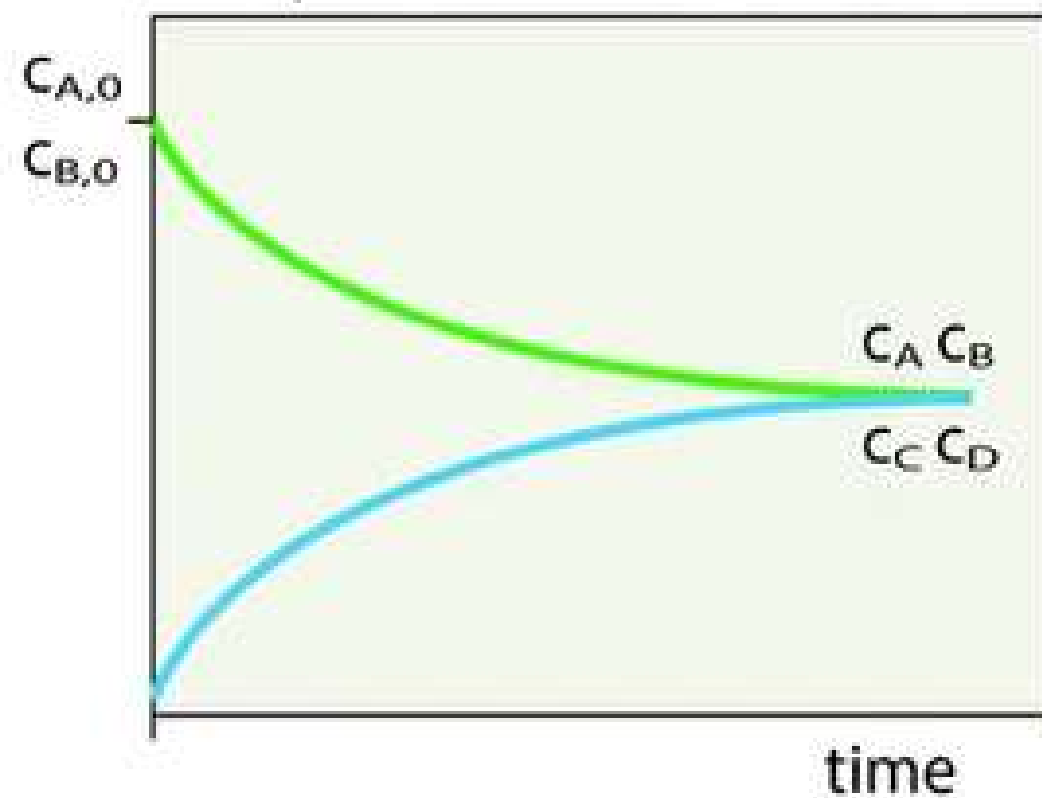
No change in the position of equilibrium
Just lower the activation energy

- **Concentrations of reactant and products are constant at equilibrium**

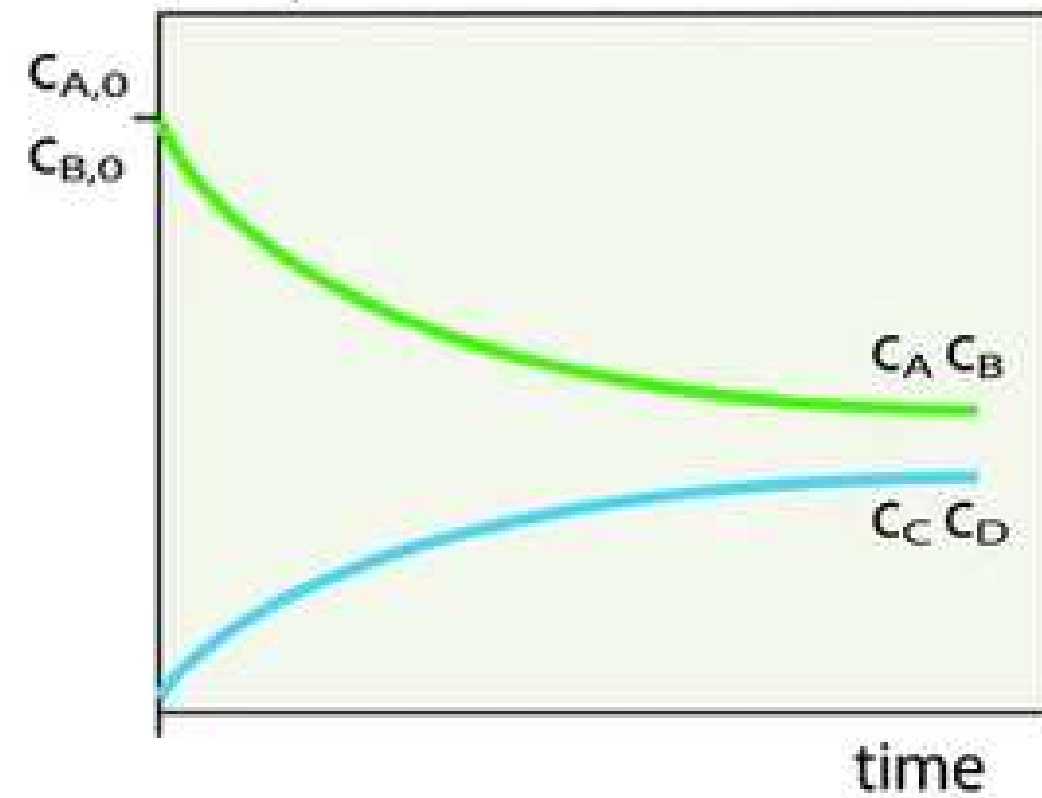
Let's Discuss and Analyze



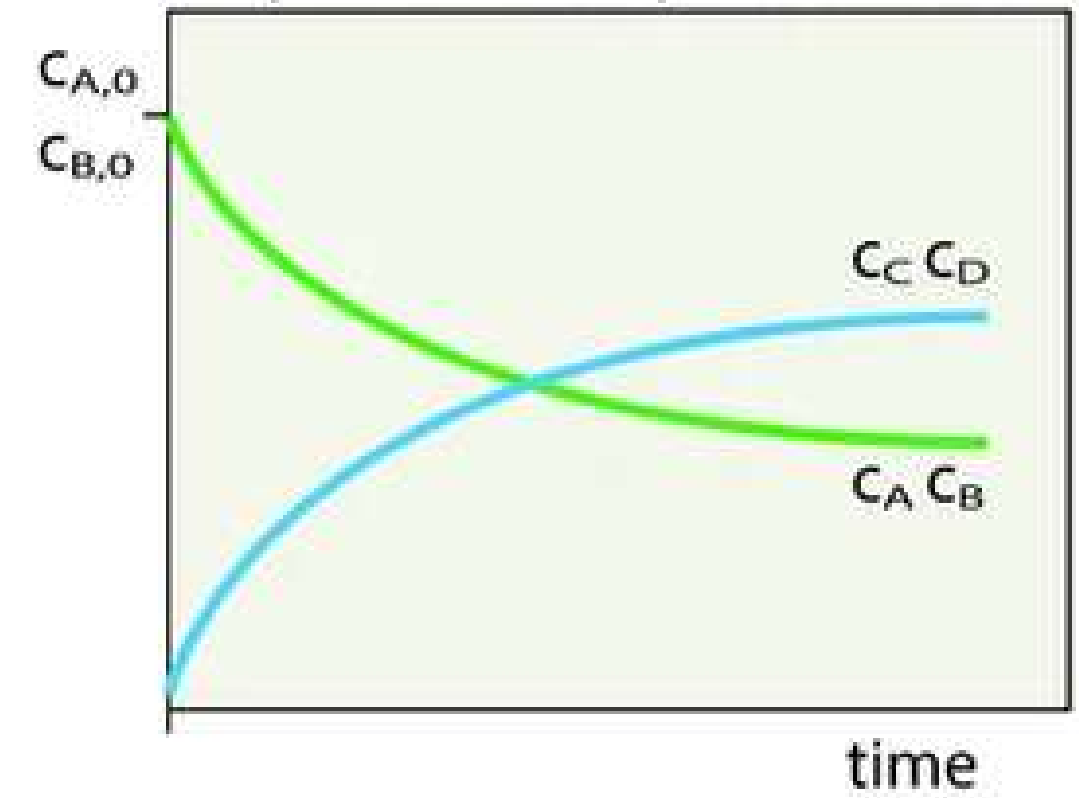
equilibrium in the middle



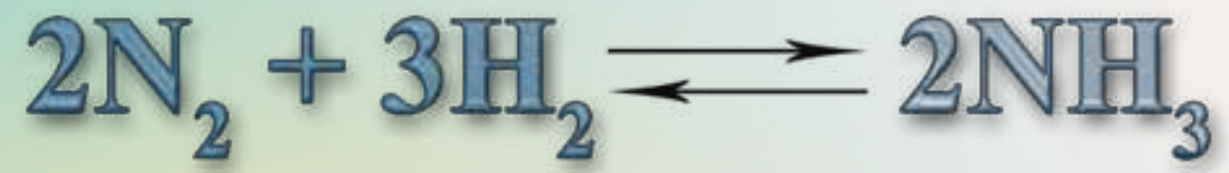
equilibrium on educt side



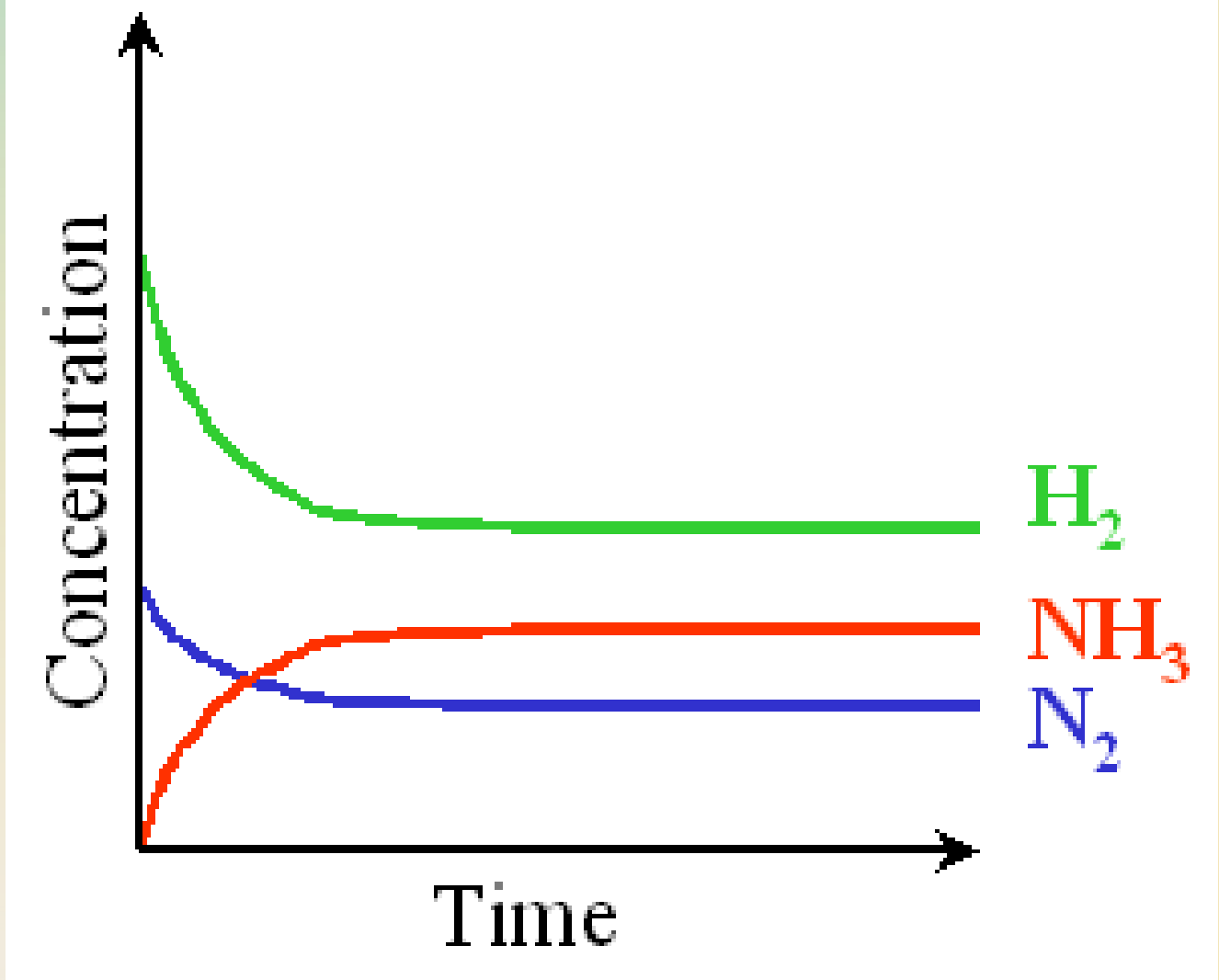
equilibrium on product side



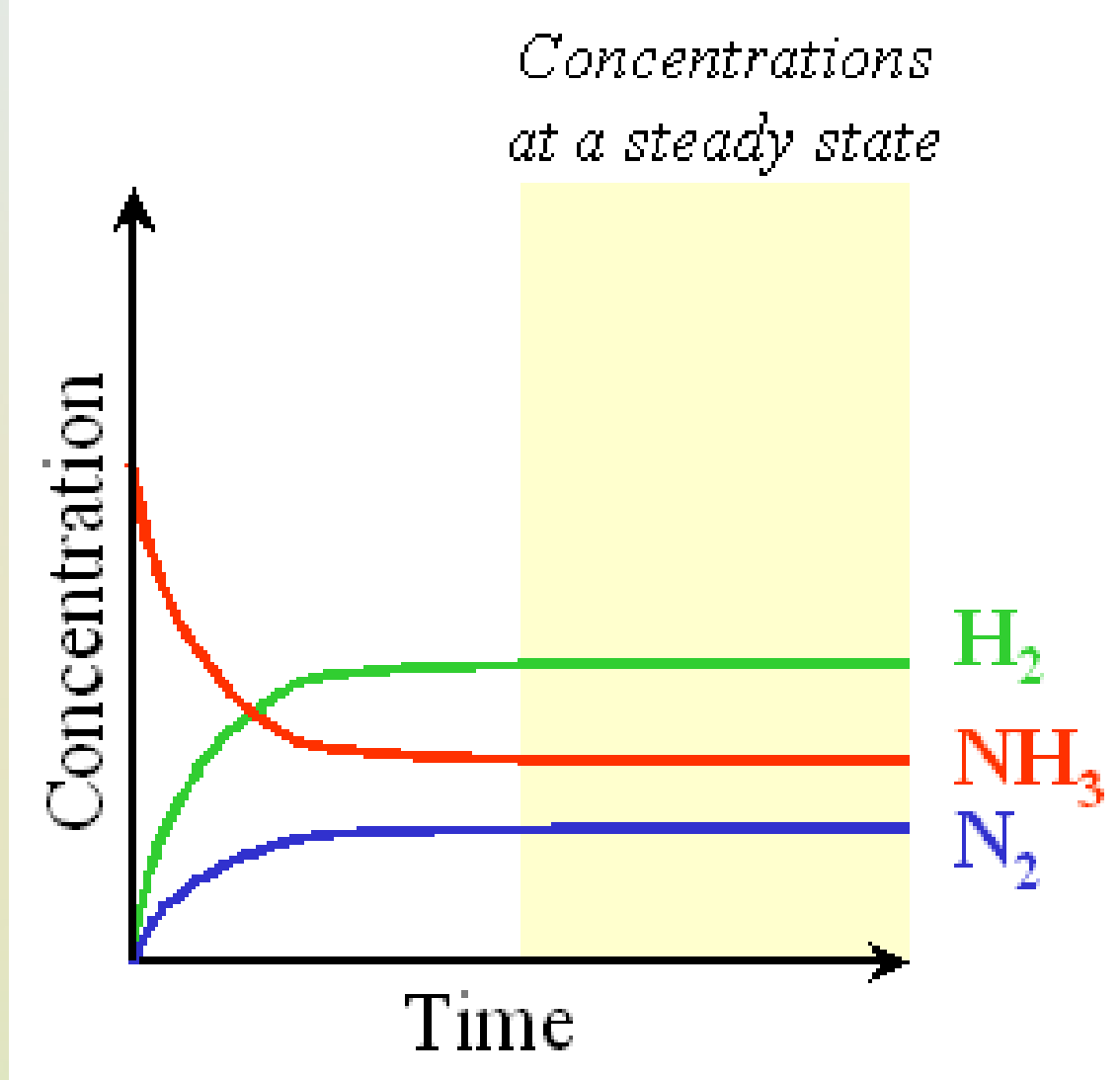
Haber's Process



Nitrogen Hydrogen Ammonia



Equilibrium at forward direction



Equilibrium at backward direction

Try and Learn

ACTIVITY

**Write some examples of
Reversible and
irreversible reactions.**

