

CHEMICAL EQUILIBRIUM

The state of a reversible reaction when the two opposing reactions occur at the same rate and the concentration of reactants and products do not change with time is known as chemical equilibrium.

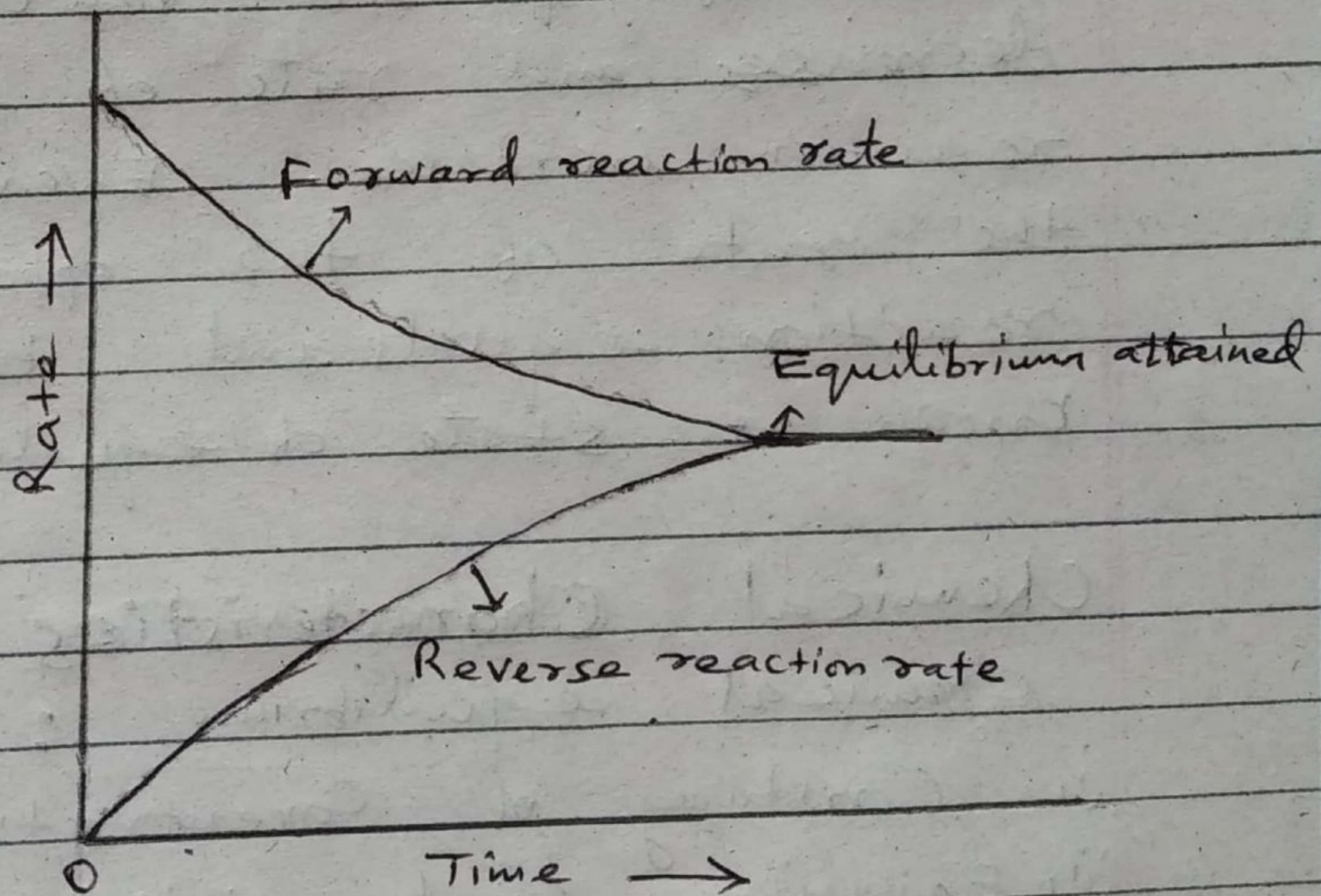
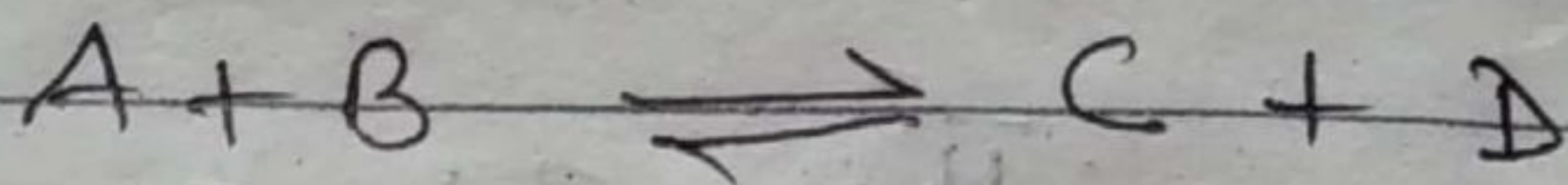


Fig: At equilibrium the forward reaction rate equals the reverse reaction rate.

Consider
Reaction,



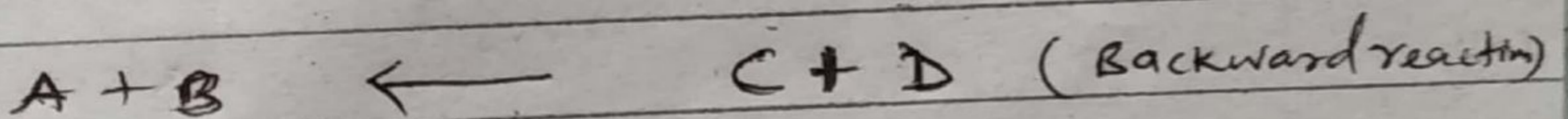
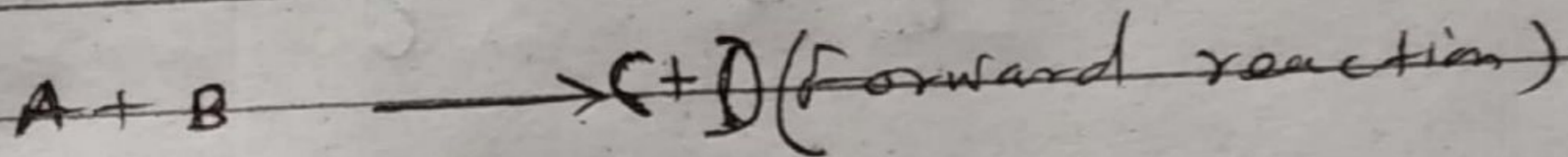
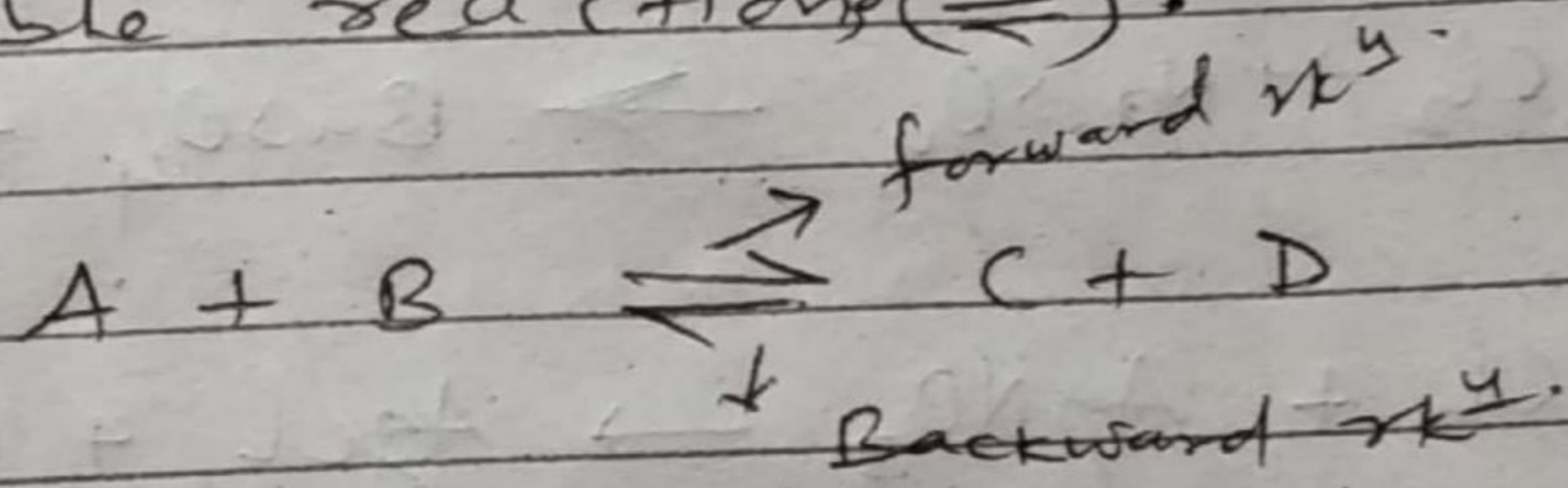
A and B in closed vessel, the forward reaction proceeds to form C and D. Concentration of A and B decrease and of C and D increase continuously. Rate of forward reaction also decreases and rate of reverse reaction increases. Eventually the rate of two opposing reaction equals and the system known as state of equilibrium.

Chemical Characteristics of
chemical equilibrium :

- i) Constancy of concentrations
- ii) Equilibrium can be initiated from either side
- iii) Equilibrium cannot be attained in an open vessel
- iv) A catalyst cannot change the equilibrium point.
- v) Value of equilibrium constant does not depend upon the initial concentration of reactants.
- vi) At equilibrium $\Delta G = 0$.

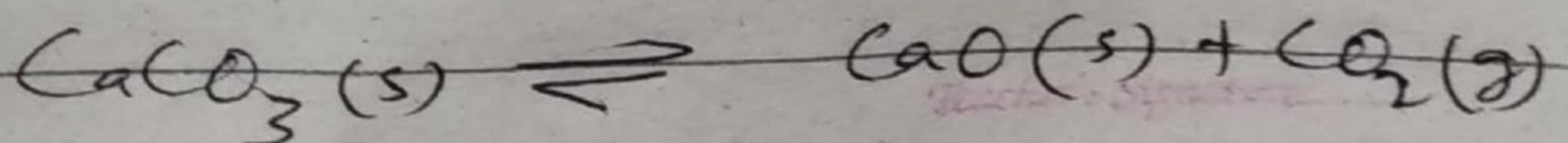
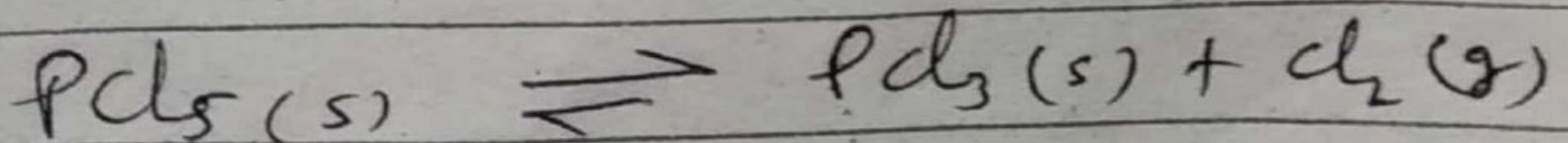
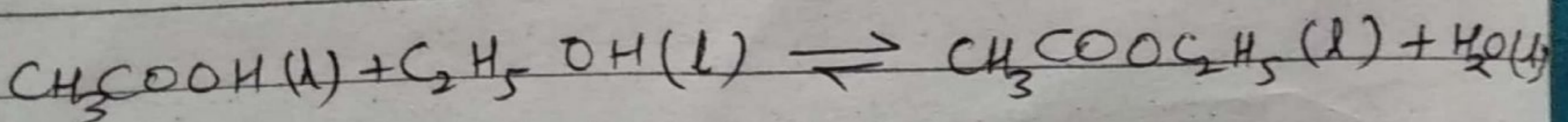
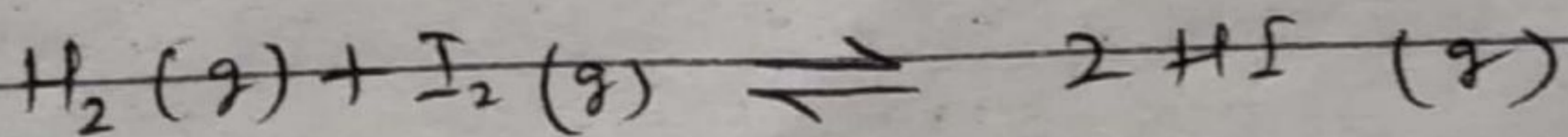
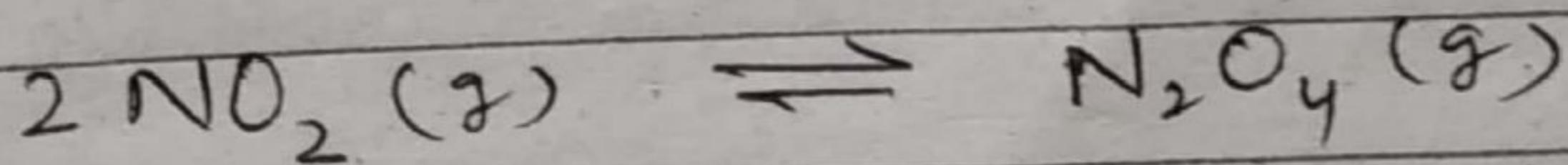
Reversible and Irreversible reactions :

A reaction which can go in the forward and backward direction simultaneously is called reversible reactions (\rightleftharpoons).



A and B react to form C and D which react together to reform A and B.

Examples.



The reactions which proceed only in one direction are known as irreversible reactions (\rightarrow).

Examples:

