

Law of mass Action

The rate with which a substance reacts is proportional to its active mass and the rate of a chemical reaction is proportional to ~~its active mass~~ and the product of the active masses of the reacting substances.

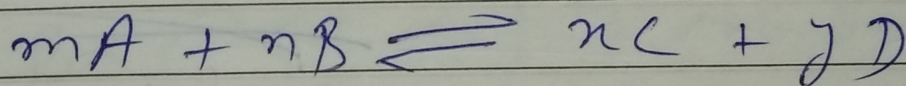
Active Mass — Amount of a substance taking part in a reaction for the formation of products ~~it~~ is called active mass.

Explanation of the law of mass action:—

The law of mass action can be applied to a reversible reaction at equilibrium.

for example —

In a general reaction:—



The rate of forward reaction $\propto [A]^m [B]^n$

$$= K_f [A]^m [B]^n$$

where K_f is known as forward reaction rate constant.

Similarly

$$\text{Rate of backward reaction} \propto [C]^n [D]^y$$
$$= k_b [C]^n [D]^y$$

Where k_b is known as backward reaction rate constant.

At equilibrium —

Rate of forward reaction = Rate of Backward reaction

$$k_f [A]^m [B]^n = k_b [C]^n [D]^y$$

$$\text{or, } \frac{k_f}{k_b} = \frac{[C]^n [D]^y}{[A]^m [B]^n} \quad \left[\text{Here } \frac{k_f}{k_b} = k_e \right]$$

$$k_e = \frac{[C]^n [D]^y}{[A]^m [B]^n}$$

Where k_e is known as equilibrium state constant.

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