

1.6 CHEMICAL EQUILIBRIA, LE CHATELIER'S PRINCIPLE AND KC

Compromise conditions used for reversible reactions in industrial processes

E.g. Haber Process: $N_2 + 3H_2 \rightleftharpoons 2NH_3$
Compromise conditions of $450^\circ C$ and 200 atm

Increase in temperature
Higher rate but favours backward reaction

Favours the forward reaction but dangerous and expensive if too high
Increase in pressure

Le Chatelier's Principle

Predicts how changes in temperature, pressure and concentration affect equilibrium position

E.g. if the temperature is increased, the position of equilibrium will shift to try to cool the reaction down again

Reversible reactions

Denoted by:
 \rightleftharpoons

Dynamic Equilibrium

Rate of forward reaction equals to rate of the backward reaction

Concentration of the reactants and products remains constant

Occurs in a closed system

Nothing can get in or out

Effect of Catalyst

Allows equilibrium to be reached faster

No effect on the position of equilibrium

Rate of the forwards and backwards reactions are increased by equal amounts

AQA

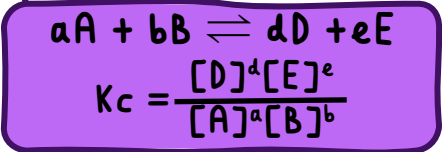


Reactants in the same phase (same state) as the products

Homogeneous Systems

Concentration of a species in mol dm⁻³ is represented by square brackets: [X]

Units of K_c found by substituting the concentration units into the equation for K_c and cancelling down



1.6 CHEMICAL EQUILIBRIA, LE CHATELIER'S PRINCIPLE AND K_c: EQUILIBRIUM CONSTANT, K_c

Reversible Reactions

Use Le Chatelier's principle to deduce how temperature affects equilibrium position

Not affected by changes in concentration of a reactant or product

Not affected by catalyst

The value of K_c is only valid for a certain temperature

The value of K_c is only valid for a certain temperature

E.g. If the temperature change means that the concentration of products increases then K_c increases

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