EngineeringRise

Chemical equilibrium and the equilibrium constant

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Equilibrium constant (concentrations)	K_c = [C]^c [D]^d/([A]^a [B]^b) Valid when: Gaseous or dissolved species at equilibrium; pure solids and liquids left out	(mol/L)^(delta n)
Equilibrium constant (pressures)	K_p = (p_C)^c (p_D)^d/((p_A)^a (p_B)^b) Valid when: Gaseous species at equilibrium, partial pressures in the same units	atm^(delta n)
K_p and K_c	K_p = K_c (RT)^(delta n) Valid when: Ideal gases; T in kelvin; R matched to pressure and concentration units	R = 0.0821 L atm/(mol K) for atm
Reverse and scale	reverse: 1/K; multiply equation by n: K^n; add reactions: K_1 K_2 Valid when: Same temperature; applied to the equation as written	dimensionless rule
Reaction quotient	Q < K forward; Q = K at equilibrium; Q > K backward	same as K
Dissociation A = B + C	K_p = a^2 P/(1 - a^2) Valid when: One mole of A giving B + C, ideal gases; a is degree of dissociation; P is total pressure	atm
Dissociation A = 2B (N2O4)	K_p = 4 a^2 P/(1 - a^2) Valid when: One mole of A giving 2B (as N2O4), ideal gases; P is total pressure	atm
Link to Gibbs energy	delta G(standard) = -RT ln K; delta G = RT ln(Q/K) Valid when: Standard state at the given temperature; K is thermodynamic constant	J/mol
Heterogeneous equilibrium	pure solids and liquids omitted from K	none

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/equilibrium/chemical-equilibrium-and-the-equilibrium-constant

EngineeringRise is an unofficial study site. It is not affiliated with NTA, the IITs, BITS, VIT, SRM or any exam body.