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Le Chatelier principle and reaction quotient

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

Result	Formula	Units or note
Reaction quotient	Q = [C]^c [D]^d/([A]^a [B]^b) with present values Valid when: Any reaction mixture, using the present concentrations or pressures	same as K, (mol/L)^(delta n)
Direction rule	Q < K forward; Q = K equilibrium; Q > K backward Valid when: Compare Q with K at the same temperature	dimensionless comparison
Volume change by factor f (V to fV)	Q_new/Q_old = (1/f)^(delta n) Valid when: Sudden volume change of gases at constant temperature	dimensionless
Temperature effect on K	delta H positive: K increases with T; delta H negative: K decreases with T; delta G standard = -RT ln K Valid when: K depends on temperature only; delta H taken as constant over the range	qualitative; delta G in J/mol with R = 8.314 J/(mol K)
Gibbs energy link	delta G = RT ln(Q/K); delta G(standard) = -RT ln K Valid when: Standard state; K is thermodynamic constant at the given temperature	J/mol
Inert gas at constant total pressure	K_p = (product of x^coefficient) P^(delta n) with total moles including the inert gas Valid when: Ideal gases at constant total pressure with an inert gas added	atm^(delta n)
Effect summary	reactant added: forward; endothermic and T up: forward, K up; exothermic and T up: backward, K down	n/a (qualitative)
No-shift cases	catalyst; inert gas at constant volume; pure solid or liquid added; pressure change when delta n = 0	none

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/equilibrium/le-chatelier-principle-and-reaction-quotient

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