EngineeringRise

Surface tension and capillarity

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

Result	Formula	Units or note
Surface tension	T = F/l = energy/area Valid when: liquid surface; force acts along the surface, per unit length	N/m = J/m^2
Surface energy	U = T x area (2 surfaces for a film or bubble) Valid when: film or bubble has two surfaces; a drop has one	J
Force on a film wire	F = 2 T l Valid when: soap film on a frame, two free surfaces	N
Excess pressure, drop	2T/R Valid when: spherical drop with one liquid surface	Pa
Excess pressure, soap bubble	4T/R Valid when: soap bubble with two surfaces, in air	Pa
Excess pressure, air bubble in liquid	2T/R Valid when: air bubble inside a liquid, one surface	Pa
Capillary rise	h = 2 T cos(theta)/(r rho g) Valid when: narrow tube; theta is the contact angle; r is tube radius	m
Meniscus radius	R = r/cos(theta) Valid when: narrow tube, spherical meniscus, r tube radius	m
Merging n drops	R = n^(1/3) r; energy released = 4 pi T (n r^2 - R^2) Valid when: volume conserved; temperature constant	J
Splitting into n drops	work = 4 pi T R^2 (n^(1/3) - 1) Valid when: one drop split into n equal drops, volume conserved	J

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/properties-of-solids-and-liquids/surface-tension-and-capillarity

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