Dimensionless Numbers in Chemical Engineering

Number	Description / Significance	Formula
Reynolds (Re)	Inertial vs. viscous forces; flow regime indicator	$Re = \frac{\rho u L}{\mu}$
Péclet (Pe)	Convective vs. diffusive transport	$Pe = \frac{uL}{D}$
Schmidt (Sc)	Momentum vs. mass diffusivity	$Sc = \frac{\nu}{D}$
Prandtl (Pr)	Momentum vs. thermal diffusivity	$Pr = \frac{\nu}{\alpha}$
Lewis (Le)	Thermal vs. mass diffusivity	$Le = \frac{\alpha}{D}$
Nusselt (Nu)	Convective vs. conductive heat transfer	$Nu = \frac{hL}{k}$
Sherwood (Sh)	Convective vs. diffusive mass transfer	$Sh = \frac{k_c L}{D}$
Damköhler (Da)	Reaction vs. transport (varies by context)	$Da = \frac{kC^{n-1}L}{u}$
Biot (Bi)	Internal vs. external resistance in heat transfer	$Bi = \frac{hL}{k}$
Froude (Fr)	Inertial vs. gravitational forces	$Fr = \frac{u}{\sqrt{gL}}$
Weber (We)	Inertial vs. surface tension forces	$We = \frac{\rho u^2 L}{\sigma}$
Capillary (Ca)	Viscous vs. surface tension forces	$Ca = \frac{\mu u}{\sigma}$
Knudsen (Kn)	Mean free path vs. length scale	$Kn = \frac{\lambda}{L}$
Fourier (Fo)	Heat conduction vs. time (transient conduction)	$Fo = \frac{\alpha t}{L^2}$
Graetz (Gz)	Convective transport vs. diffusion in ducts	$Gz = \frac{Re\,Pr\,d}{L}$
Thiele Modulus (ϕ)	Reaction vs. diffusion in porous catalysts	$\phi = L\sqrt{\frac{k}{D}}$