NOMENCLATURE

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QUANTITY	SYMBOL	COHERENT SI UNIT
Absorptivity (radiation)	α	—
Absorption Coefficient (radiation)	κ	m^{-1}
Activation Energy of a Reaction	ΔE	J/kg
Amount-of-Substance molar flow rate molar 'mass velocity' $(= \dot{N} / A_c)$	N $\dot{N}$ $\dot{n}$	kmol kmol/s $kmol/m^2s$
Angle plane solid of contact	 $\alpha, \beta, \gamma, \theta, \phi$ Ω, ω θ	 rad sr rad
Area cross-sectional surface	 A_c , S A , A_s	 m^2 m^2
Coefficient of Volume Expansion	$\beta = (1/\upsilon) (\partial\upsilon/\partial T)_p$	K^{-1}
Compressibility Factor $(= p\bar{v} / \bar{R}T)$	Z	—
Complex Refractive Index	$m = n - ik$	—
Concentration mass $(= M/V)$ molar $(= N/V)$	 c_i, ρ_i $\bar{c}_i , \bar{\rho}_i$	 kg/m^3 $kmol/m^3$
Coordinates Cartesian cylindrical spherical	 x, y, z r, ϕ, z r, θ, ϕ	 m, m, m m, rad, m m, rad, rad
Density mass $(= M/V)$ molar $(= N/V)$	 ρ $\bar{\rho}$	 kg/m^3 $kmol/m^3$
Diffusion Coefficient	D	m^2/s
Diffusivity, Thermal $(= k/\rho c_p)$	α	m^2/s
Dryness Fraction (quality) of flow	x x^*	— —
Emissive Power (radiation)	E	W/m^2
Emissivity (radiation)	ε	—
Energy kinetic potential transfer per unit time (power)	E E_k E_p $\dot{W}, \dot{Q}$	J =Nm J = Nm J = Nm $W= Nm/s=kg\ m^2/s^3$
Enthalpy $(= U + pV)$ specific, molar of reaction	H $h, \bar{h}$ ΔH^0	J J/kg, J/kmol J
Entropy specific, molar	S $s, \bar{s}$	J/K J/kg K, J/kmol K
Equilibrium (dissociation) constant	K	—
Extinction coefficient	$\beta = \kappa + \sigma_s$	m^{-1}
Force weight (force of gravity)	F Mg	$N = kg\ m/s^2$ $N = kg\ m/s^2$
Fraction mass, of species i mole, of species i void of volume flow	 x_i, y_i $\bar{x}_i , \bar{y}_i$ ε ε^*	 — — — —

QUANTITY	SYMBOL	COHERENT SI UNIT
Frequency circular	ν, f ω	Hz = s^{-1} rad/s
Gas Constant molar (universal) specific, of species *i*	 $\overline{R}$ R_i	 J/kmol K J/kg K
Gibbs Function (= *H* - *TS*) specific (= *h* - *Ts*) molar $(= \overline{h} - T\overline{s})$	G g $\overline{g}$	J J/kg J/kmol
Gravitational Acceleration standard	g g_n	m/s^2 m/s^2
Heat quantity of rate (power) flux $(\dot{Q} / A)$ rate per unit volume	 Q $\dot{Q}, q$ $\dot{q}, q''$ $\dot{S}, \dot{q}'''$	J W = J/s W/m^2 W/m^3
Heat Capacity specific (constant *v* or *p*) molar (constant *v* or *p*) ratio c_p/c_v	C c_v, c_p $\overline{c}_v, \overline{c}_p$ γ	J/K J/kg K J/kmol K —
Heat Transfer Coefficient	h	W/m^2 K
Helmholtz Function (= *U* - *TS*) specific (= *u* - *T s*) molar $(= \overline{u} - T\overline{s})$	F f $\overline{f}$	J J/kg J/kmol
Intensity (radiation)	I	W/m^2sr
Internal Energy specific, molar	U $u, \overline{u}$	J J/kg, J/kmol
Joule – Thomson Coefficient	$\mu_{JT}=(\partial T/\partial p)_h$	K/Pa = m^2 K/N
Length width height diameter radius distance along path film thickness thickness	L W H D R s δ δ, Δ	m m m m m m m m
Mass flow rate velocity of flux (flowrate per unit area = $\dot{M}$ $/A_c$)	M $\dot{M}$ $\dot{m}, \rho u$	kg kg/s kg/m^2s
Mass Transfer Coefficient	h_m , k_m	m/s
Molar Mass	$\overline{M}$	kg/kmol
Mean Free Path	$\overline{\lambda}$, l	m
Optical Thickness	τ	—
Phase Function (radiation)	Φ	—
Pressure drop partial	p Δp p_i	Pa = N/ m^2 Pa Pa
Reflectivity (radiation)	ρ	—
Scattering Albedo	$\omega = \sigma_s/(\sigma_s + \kappa)$	—
Scattering Coefficient (radiation)	σ_s	m^{-1}

QUANTITY	SYMBOL	COHERENT SI UNIT
Shear Stress	τ	Pa = N/m^2 = kg/m s^2
Stoichiometric Coefficient	ν	—
Surface Tension	σ	N/m = kg/s^2
Temperature absolute	 T	 K
Thermal Conductivity	k	W/mK
Time	t	s
Velocity components in Cartesian coordinates x, y, z	u u, v, w	m/s m/s
View Factor (geometric or configuration factor)	F_{ij}	—
Viscosity dynamic (absolute) kinematic (= μ/ρ)	 μ ν	 Pa s=N s/m^2 = kg/m s m^2/s
Volume flow rate specific, molar	V $\dot{V}$ $v, \bar{v}$	m^3 m^3/s m^3/kg, m^3/kmol
Work rate (power)	W $\dot{W}$	J = Nm W = J/s=Nm/s
Wavelength	λ	m

SUBSCRIPTS AND SUPERSCRIPTS

QUANTITY	SYMBOL
Bulk	b
Critical State	c
Fluid	f
Gas or Saturated Vapour	g
Liquid or Saturated Liquid	l
Change of Phase fusion sublimation evaporation	 ls sg lg
Mass transfer quantity	m
Solid or Saturated Solid	s
Wall	w
Free-stream	∞
Inlet	in, 1
Outlet	out, 2
At Constant Value of Property	p, v, T, etc
Molar (per unit of amount-of-substance)	— (overbar)
Stagnation (subscript)	0

DIMENSIONLESS GROUPS*

QUANTITY	SYMBOL
Biot Number	Bi = hL / k
Bond Number	Bo = $g(\rho_l - \rho_v)L^2 / \sigma$
Dean Number	(Re) $(r_{in}/R_{coil})^{1/2}$ (r_{in} = tube inner radius; R_{coil} = coil mean radius)
Eckert Number	Ec = $u^2/c_p\Delta T$
Euler Number	Eu = $\Delta p / \left(\frac{1}{2}\rho u^2\right)$
Fourier Number	Fo = $\alpha\, t/L^2$
Friction Factor	f = $\tau_w / \left(\frac{1}{2}\rho u^2\right)$
Froude Number	Fr = u^2/gl
Galileo Number	Ga = L^3g/ν^2
Grashof Number	Gr = $\beta g L^3 \Delta T / \nu^2$
Graetz Number	Gz = (Re)(Pr) D/L
Knudsen Number ($\bar{\lambda}$ = mean free path)	Kn = $\bar{\lambda} / L$
Lewis Number	Le = (Sc)/(Pr)=α/D
Mach Number	M = u / u_{sound} $= u / (\gamma \bar{R} T / \bar{M})^{1/2}$ for perfect gas
Marangoni Number	Ma = $(\partial\sigma / \partial T)\ R\Delta T / (\alpha\mu)$
Nusselt Number	Nu = hL/k_f
Péclet Number	Pe = (Re)(Pr)
Prandtl Number	Pr = $c_p\mu/k$
Rayleigh Number	Ra=(Gr)(Pr)
Reynolds Number	Re $= uL / \nu = \rho uL / \mu = \dot{m}L / \mu$
Schmidt Number	Sc=$\nu/D=\mu/\rho D$
Sherwood Number	Sh=h_mL/D
Stanton Number	St=(Nu)/(Re)(Pr)=$h/\rho c_p u$
Stefan or Jakob Number	Ste or Ja = $c_p\Delta T/\Delta h$
Strouhal Number	Sr = $\nu L/u$
Weber Number	We=$u^2\rho L/\sigma$

* The symbol *L* in the dimensionless groups stands for a generic length, and is defined according to the particular geometry being described; *i.e.*, it may be diameter, hydraulic diameter, plate length, etc.

PHYSICAL CONSTANTS

QUANTITY	SYMBOL
Avogadro's Number	N_A = 6.0225x10^{26} $kmol^{-1}$
Boltzmann's Constant	k = 1.38066 x 10^{-23} J/K
Planck's Constant	h = 6.62608 x 10^{-34} Js
Stefan-Boltzmann Constant	σ = 5.67051x10^{-8} W/(m^2K^4)
Speed of Light in Vacuum	c = 2.99792 x 10^8 m/s
Universal Gas Constant	$\bar{R}$ = 8.31441x10^3J/kmol·K