Nomenclature

My notation:

a_i		activity of species i
a_v		external catalyst particle surface area per unit reactor volume
A_i		representation of species i
A_C		cross sectional area of tubular reactor
A_C^P		cross sectional area of a pore
A_H		heat transfer area
$\overline{A}$		pre-exponential factor
Bo_a		dimensionless group analogous to the axial Peclet number for the energy balance
C_i or $[A_i]$		concentration of species i
C_{iB}		concentration of species i in the bulk fluid
C_{iS}		concentration of species i at the solid surface
C_p		heat capacity per mole
$\overline{C}_p$		heat capacity per unit mass
d_e		effective diameter
d_p		particle diameter
d_t		diameter of tube
D_a		axial dispersion coefficient
D^e		effective diffusivity
D_{ij}		molecular diffusion coefficient
D_{Ki}		Knudsen diffusivity of species i
D_r		radial dispersion coefficient
D_{TA}		transition diffusivity from the Bosanquet equation
Da	Da_1	Damkohler number
$\overline{Da}$		dimensionless group
E		activation energy
E_D		activation energy for diffusion
$E(t)$		$E(t)$-curve; residence time distribution
$\overline{E}$		total energy in closed system
f_f		friction factor in Ergun equation and modified Ergun equation
f_i	X_i	fractional conversion based on species i
f_i^{eq}	$X_{i,eq}$	fractional conversion at equilibrium

$\bar{f}_i$	fugacity of species i
$\bar{f}_i^0$	fugacity at standard state of pure species i
ff	frictional force
F_i $\dot{N}_i$	molar flow rate of species i (per volume)
g	gravitational acceleration
$(g/g_c)\bar{z}$	gravitational potential energy per unit mass
g_c	gravitational constant
gm	mass of catalyst
ΔG	change in Gibbs function ("free energy")
h	Planck's constant
h_i	enthalpy per mass of stream i
h_t	heat transfer coefficient
H	enthalpy
ΔH	change in enthalpy
ΔH_r	enthalpy of the reaction (often called heat of reaction)
H_w	dimensionless group
$\overline{H}_w$	dimensionless group
$\bar{I}$	ionic strength
J	Colburn J factor
$\bar{J}_i$	flux of species i with respect to a coordinate system
k	rate constant
$\bar{k}$	Boltzmann's constant
$\bar{k}_c$	mass transfer coefficient
K_a	equilibrium constant expressed in terms of activities
K_C	portion of equilibrium constant involving concentration
K_P	portion of equilibrium constant involving total pressure
K_X	portion of equilibrium constant involving mole fractions
$K_{\bar{\phi}}$	portion of equilibrium constant involving activity coefficients
L	length of tubular reactor
L_c	length of microcavity in Vignette 6.4.2
L_p	generalized length parameter
$\overline{L}$	length in a catalyst particle
$\overline{m}_i$	mass of stream i
$\dot{m}_i$	mass flow rate of stream i
M_i	molecular weight of species i
$\overline{M}$	ratio of concentrations or moles of two species
$\overline{MS}$	total mass of system
n_i	number of moles of species i

N_i	$\dot{n}_i$	flux of species i (per area)
$NCOMP$		number of components
$NRXN$		number of independent reactions
P		pressure
Pe_a		axial Peclet number
Pe_r		radial Peclet number
PP		probability
q		heat flux
Q		heat transferred
$\dot{Q}$		rate of heat transfer
r		reaction rate
r_t		turnover frequency or rate of turnover
$\bar{r}$		radial coordinate
$\bar{r}_t$		radius of tubular reactor
R		recycle ratio
R_g		universal gas constant
R_p		radius of pellet
R_{pore}		radius of pore
$\bar{R}$		dimensionless radial coordinate in tubular reactor
$\bar{R}_{cc}$		correlation coefficient
Re		Reynolds number
s_i		instantaneous selectivity to species i
ΔS		change in entropy
S_c		sticking coefficient
S_i		overall selectivity to species i
S_p		surface area of catalyst particle
$\bar{S}$		number of active sites on catalyst
SA		surface area
Sc		Schmidt number
SE		standard error on parameters
Sh		Sherwood number
t		time
$\langle t \rangle$	$\bar{t}$	mean residence time
$\bar{t}^*$		student t-test value
T		temperature
T_B		temperature of bulk fluid
T_S		temperature of solid surface
TB		third body in a collision process
u		linear fluid velocity (superficial velocity)

$\bar{u}(\bar{r})$		laminar flow velocity profile
U		overall heat transfer coefficient
$\overline{U}_i$		internal energy
v	$\dot{V}$	volumetric flow rate
V		volume
V_i		mean velocity of gas-phase species i
V_p		volume of catalyst particle
V_R		volume of reactor
V_{total}		average velocity of all gas-phase species
W_c		width of microcavity in Vignette 6.4.2
x		length variable
x_p		half the thickness of a slab catalyst particle
X_i	x_i	mole fraction of species i
$\overline{X}^2$		defined by Equation (B.1.5)
y	C'	dimensionless concentration
Y_i		yield of species i
z		axial coordinate
$\bar{z}$		height above a reference point
Z		dimensionless axial coordinate
$\overline{Z}_i$		charge of species i
α_i		when used as a superscript is the order of reaction with respect to species i
$\overline{\alpha}_i$		coefficients; from linear regression analysis, from integration, etc.
$\alpha\alpha_1$		parameter groupings in Section 9.6
$\alpha\alpha_2$		parameter groupings in Section 9.6
β		Prater number
β_T		dimensionless group
$\beta\beta_i$		dimensionless groups
γ		Arrhenius number
$\overline{\gamma}_i$		activity coefficient of species i
Γ		dimensionless temperature in catalyst particle
$\overline{\Gamma}$		dimensionless temperature
$\delta(t)$		Dirac delta function
$\overline{\delta}$		thickness of boundary layer
ε_i		molar expansion factor based on species i
$\overline{\varepsilon}$		deviation of concentration from steady-state value
$\overline{\varepsilon}_B$		porosity of bed
$\overline{\varepsilon}_p$		porosity of catalyst pellet

η	intraphase effectiveness factor
η_o	overall effectiveness factor
$\overline{\eta}$	interphase effectiveness factor
θ	dimensionless time
θ_i	fractional surface coverage of species i
$\overline{\theta}$	dimensionless temperature
λ	universal frequency factor
λ^e	effective thermal conductivity in catalyst particle
λ_λ	parameter groupings in Section 9.6
$\overline{\lambda}_r$	effective thermal conductivity in the radial direction
μ_i	chemical potential of species i
$\overline{\mu}$	viscosity
ξ	number of moles of species reacted
ρ	density (either mass or mole basis)
ρ_B	bed density
ρ_p	density of catalyst pellet
σ_i	standard deviation
$\overline{\sigma}_i$	stoichiometric number of elementary step i
τ	space time
$\overline{\tau}$	tortuosity
υ_i	stoichiometric coefficient of species i
ϕ	Thiele modulus
ϕ_0	Thiele modulus based on generalized length parameter
$\overline{\phi}_i$	fugacity coefficient of species i
Φ	extent of reaction
χ	dimensionless length variable in catalyst particle
ψ C'	dimensionless concentration in catalyst particle for irreversible reaction
$\overline{\psi}$ $\overline{C}'$	dimensionless concentration in catalyst particle for reversible reaction
Ψ	dimensionless concentration
ω	dimensionless distance in catalyst particle

Notation used for stoichiometric reactions and elementary steps

	Stoichiometric reaction	Elementary step
Irreversible (one-way)	$\Rightarrow$	$\longrightarrow$
Reversible (two-way)	$=\!\!=$	$\rightleftharpoons$
Equilibrated	$\Leftrightarrow$	$\Leftrightarrow$
Rate-determining		$\overset{\wedge}{\longrightarrow}$ or $\overset{\wedge}{\rightleftharpoons}$