

**At the end of the table, there is more material both in way of corrections and additional explanations.**

Page	Change from	to
23,92	LHS of eqs.(2.2): $\int_{V_s(t)} \phi(\mathbf{x}, t)$	$\int_{V_s(t)} \phi(\mathbf{x}, t) dV$
25,26	LHS of eqs. (2.4), (2.5), (2.6): $\int_{V_s(t)} \phi(\mathbf{x}, t)$	$\int_{V_s(t)} \phi(\mathbf{x}, t) dV$
45	Line 2 below eq.(3.10): leaving	crossing
51	3 <sup>rd</sup> line below the heading 'Beyond Unit Operations': Masehlkar	Mashelkar
51	Reference 3: Pres	Press
84	Problem 4.2, second line: analysis,	analysis in section 4.1.6,
85	Problem 4.6, 4 <sup>th</sup> line below figure: $\hat{q}_G$	$\dot{Q}_v$
88	Problem 4.11, first line: A water	A stationary water
88	Problem 4.11, fourth line: is given	can be approximated
88	Problem 4.12, 1 <sup>st</sup> line: for when	for laminar flow in a pipe
88	Problem 4.13, 1 <sup>st</sup> line: equation	when equation for laminar flow in a pipe
89	Problem 4.19: $\kappa - 1/\kappa$	$\kappa - 1/\kappa$
89	Problem 4.19, 2 <sup>nd</sup> line below equation: condition. The ... by	condition.
98	Last un-numbered equation: $\rho \hat{C}_p$	$2\rho \bar{V} \hat{C}_p$
99	Second line in para starting with "By now ...": turn out	turn our
140	Problem 5.13: $T_2$ (on y faces)	$T_o$
143	Problem 5.18, fourth line: fluid and solid,	fluid and solid, but not close to the plates,
155	Last line: $[f''(0)]$	$f''(0)$
163	second line of section 6.4.2: linear in $x$	linear in $y$
163	first equation of section 6.4.2: $\frac{x+b}{2b}$	$\frac{y+b}{2b}$
163	second equation of section 6.4.2: $-\frac{x}{2b}$	$-\frac{y}{2b}$
164	In section titled <b>Velocity profile</b> , lines 5 and 6: $x$	$y$
164	n section titled <b>Velocity profile</b> : $\frac{d^2 v_y}{dx^2}$	$\frac{d^2 v_x}{dy^2}$

Page	Change from	to
164	In the equation in section titled <b>Scaling</b> : $\frac{d^2 \tilde{v}}{d\tilde{x}^2} - \frac{1}{2} \tilde{x}$	$\frac{d^2 \tilde{v}}{d\tilde{y}^2} - \frac{1}{2} \tilde{y}$
164	In the equation in section 6.4.3 titled <b>Velocity profile</b> : $v_y$	$v_x$
164	In the equation in section 6.4.3 titled <b>Velocity profile</b> : $\tilde{x}^3 - \tilde{x}$	$\tilde{y}^3 - \tilde{y}$
164	In the first two lines of section 6.4.4: $\tilde{x}$	$\tilde{y}$
165	In the equation in section titled <b>Grashof number</b> : $(\tilde{x}^3 - \tilde{x})$	$(\tilde{y}^3 - \tilde{y})$
177	Second equation from bottom: $\theta(\eta) = 0$	$\theta(0) = 0$
213	Second un-numbered equation: $\rho \int_A$	$\int_A$
239	In equation in 'How is $B$ stagnant?': $(1 - y_B)N_{Az}$	$y_B N_{Az}$
239	Last but one line in the para under 'Mass transfer coefficient': use $N_{Az}$ and not $J_{Az}$	use $J_{Az}$
239	After $k_{C,A}^\bullet =$ , eq.(8.9) should read	$\frac{J_{Az}}{C \Delta y_A} = \frac{\frac{D_{AB}}{L}}{\frac{1 - (1 - y_{Ao})}{\ln\left((1 - y_{Ao}) \frac{1}{1 - y_{Ao}}\right)}} =$
240	RHS of equation below 'It is easily worked out'	$(1 - y_{Ao}) \frac{\ln(1 - y_{Ao})}{y_{Ao}} = 1 - \frac{y_{Ao}}{2} \dots$
240	Below above correction: $\mathcal{E} > 1$	$\mathcal{E} < 1$
	'flux is more'	'flux is less'
	'Hence, $A$ must diffuse faster'	Hence, $A$ will diffuse slower. However, $N_{Az}$ is greater
241	Equation below figure: $\dot{R}_s$	$\dot{\mathcal{R}}_s$
242	Last un-numbered equation: $+\alpha_i^s$	$-\alpha_i^s$
243	First un-numbered equation: $-2 \dot{\mathcal{R}}_s$	$2 \dot{\mathcal{R}}_s$
243	First un-numbered equation: $-2k''C y_A$	$2k''C y_A$
243	First un-numbered equation: $+\dot{\mathcal{R}}^s$	$-\dot{\mathcal{R}}_s$
243	First un-numbered equation: $k''C y_A$	$-k''C y_A$
256	Figure for problem 8.10: $S_1$ containing $B$	$S_2$ containing $B$
264	Line beginning 'The driving force': gradient	negative gradient
264	In eq.(9.6) and the last equation: $p$	$P$
265	In the un-numbered equation: $D_{ij} C D_{ij}$	
300	In the section <b>Current density</b> , equation below 'Thus, if $\mathbf{I} \dots$ ': $(N_A^N z_A N_B^N z_B)$	$(N_A^N z_A + N_B^N z_B)$

Page	Change from	to
301	Just above eq.(9.35). In the denominator of the first term $\mathcal{F}C_B z_B^2 \mathcal{D}_{BN}$	$C_B z_B^2 \mathcal{D}_{BN}$
305	Last equation of section 9.11.4. $2(C_o - C(0))$	$2C_o - C(0)$
305	At the end of section 9.11.4 add the following sentence. Kinetics of the reaction are needed to calculate the potential difference between electrodes.	
309	Last but one line of problem 9.2: $x_A(z)$	$N_{A,z}(0)$
319	Reference 3:	3 edition
339	Replace the first sentence starting 'Thermodynamics ...'	Thermodynamics offers quantitative description of only reversible processes, though it does place restrictions on the outcomes of irreversible processes.
361	Line just above figure: from a coordinate system	from a stationary coordinate system
361	Line just above figure: solidification front.	solidification front <sup>19</sup>
361	Add at the end of caption of Figure 10.17	$-\Gamma$ is the slope of the upper line.
361	2nd line of section titled 'Mass balance of dopant': coordinate system located	stationary coordinate system located
361	2nd line of section titled 'Mass balance of dopant': To an observer in	In
364	Both equations in the section on Instability	Multiply right hand side by $\Gamma$
365	Footnote 19: melt.	melt at the speed of the fall of melt level in the crucible, which is very small compared to pulling velocity, and is neglected here.
366	Reference 11:	3 edition
431	Reference 5: Malasekera	Malalasekera

### Additional notes & material on laws of multicomponent diffusion

This material may be added after the first paragraph under Fick's law form on page 263.

That there is no general inverse and a component has to be chosen to be the  $N^{th}$  for exclusion appears as a hindrance to use of the more convenient Fick's law form after obtaining it from the more exact Stefan Maxwell equations. However, there is another way of looking at the inversion, and this is outlined in a very nice paper by Bird and Curtiss. They could find a way of *converting* Stefan Maxwell equations into a form as convenient as Fick's law:

$$\mathbf{J}_i^* = -C y_i \sum_j^N \bar{D}_{ij} \mathbf{d}_j \quad i, j = 1, 2, \dots, N$$

after placing the following  $N$  restrictions on the diffusion coefficients:

$$\sum_i^N y_i \bar{D}_{ij} = 0, \quad j = 1, 2, \dots, N$$

They further required that the diffusion coefficients be symmetric. This leaves only  $N(N - 1)/2$  diffusion coefficients to be independent as required. Bird and Curtiss give the equations that relate the Stefan Maxwell coefficients  $\mathbf{D}_{ij}$  to the Fick's law coefficients as defined above. These have to be solved to find  $\bar{D}_{ij}$  in terms of  $\mathbf{D}_{ij}$ , but only once for each  $N$ , and Bird and Curtiss give the relationship up to  $N = 4$ . Thus, the advantages of using Fick's law form can be always utilized if one knows the Stefan Maxwell coefficients. I refer you shamelessly to a paper of mine for more detailed discussion of these aspects!

Multicomponent diffusion: R.B. Bird and C.F. Curtiss, *Ind. Engg Chem. Res.*, **38**, 2515-2522, (1999).

Use of Fick's Law and Maxwell–Stefan Equations in Computation of Multicomponent Diffusion: K.S. Gandhi, *A.I.Ch.E. Journal*, **58**, 3601-05, (2012)