Errata to Post
Updated August 23, 2007

p. xxix
Material Balance Equation, differential form, total moles:

$$\frac{dn_{sys}}{dt} = \sum_{\text{all } j \text{ in}} n_j - \sum_{\text{all } j \text{ out}} n_j + \sum_{\substack{\text{all } k \\ \text{reactions}}} \sum_{\substack{\text{all } i \\ \text{compounds}}} \nu_{ik}\xi_k$$

p. 44
P1.18 H2O should be H_2O

p. 48
P1.30 "from ammonia and oxygen with generation or consumption of NO" should read "from ammonia and oxygen with *no net* generation or consumption of NO"

p. 52
P1.39 top line p. 52, "oxidized" not "oxided"
Problem should state "Compare the economics of producing 1000 kg of ethylene oxide *by direct oxidation* versus 1000 kg of propylene oxide *by the new process*."(italics are additions for clarification).

p. 65 first full paragraph. Should say "Molar density is the inverse of the molar *volume*"

p. 67 In illustration, units are L/s, not cm^3/s

p. 95 Subscript in heading of 7th column is incorrect (2 tables), should be n_{Hi}, not n_{Oi}.

p. 109 Total should be 5, not 6.

p. 145
P2.23. 5 g gold per 10^{12} g seawater, not 5 g gold per 10.2 g seawater

p. 146
P2.27 delete "plus gases recovered from the low-pressure separator"
Change "The liquid stream… is further separated into components by distillation" to "The liquid stream… is further separated into 3 product streams by distillation"
Change "distillation column reflux drum" to "distillation column".
P2.28 replace dichloroethylene $C_2H_2Cl_2$ with dichloroethane $C_2H_4Cl_2$ (3 places).

p. 149
P2.37 1 ton/day, not 1 ton/yr

p. 158

P2.65 Change "(such as SiO_2 or $CaCO_3$)" to "(NaCl, SiO_2, or $CaCO_3$)".

p. 163

P2.70 Sketch should show "M E P B I", not "M E P E I" in stream 1.

p. 164

P2.71 Last sentence should read "Calculate the flow rate of raw sugar crystals and molasses, the *flow rate* of water added to the cane fed to the mill, and the *flow rate* of juice leaving the first evaporator."(italics show changes)

p. 202 above Quick Quiz, should read " we multiply", not 'we multiple"

p. 234 Case Study is written twice, second one should be deleted.

p. 252

P3.21 Problem should state that elimination rate is in units of mg/h.

p. 2 53

P3.24 21.05 kgmol/h O_2 fed, not 20 kgmol/h.

p. 255

P3.33 exit solution leaves at 12 lb/min, not 10 lb/min

P3.37 last reaction should be

$$O_2 + H_2 + CO \rightarrow CO_2 + H_2O$$

p. 261 In the second reaction, diglycol is $(C_2H_4OH)_2O$, not $(C_2H_4OH)_2$

p. 303 Next to equation $a_i = x_i$, should read "if *i* is in the liquid phase"

p. 310 change subscript, should be $K_{a,353}$, not $K_{a,353K}$

p. 313 I found some better data for dimethyl carbonate Gibbs energy and enthalpy. Replace tables with

Reaction	ln $K_{a,T}$ (T in K)
R1	-8.55 + 15970/T
R2	-32.5 + 36000/T
R3	-6.77 + 3010/T
R4	-22.0 + 1990/T

Reaction	K_a at 100*C (373 K)	K_a at 500*C (773 K)
R1	7.5×10^{14}	1.8×10^{5}
R2	7×10^{27}	1.4×10^{6}

R3	3.7	0.057
R4	5.6×10^{-8}	3.6×10^{-9}

p. 335 minus sign is missing in definition of fractional conversion, should be

$$f_{Ci} = -\frac{\sum_{\substack{\text{all } k \\ \text{reactions}}} \nu_{ik} \xi_k}{n_{i,in}}$$

p. 341

P4.6 should be f_{CB}, not f_{CC}.

P4.8 Citric acid is $HOC(CH_2COOH)_2COOH$.

p. 342

P4.10 hyphenation should be isobutyl-acetophenone

p. 345

P4.20 “handyman proposal” should be ‘handyman’s proposal”

p. 348

P4.26 process stream flow rate is 100 gmol/h, not 100 gmol.

p. 352

P4.38 In table heading, delete “fractional”

P4.40 process “includes”, not process “operates”

p. 354

P4.45 “Isobutane (C_4H_{10})”, not “isobutene (C_4H_{10})”

p. 355

P4.49 Delete “and 20% excess air is bubbled through the mixture.”

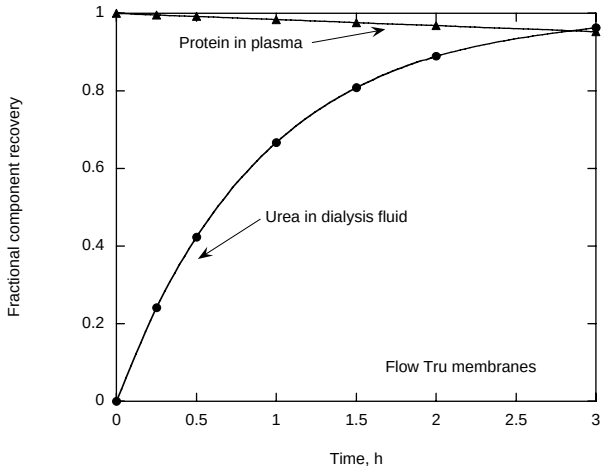
p. 357

P4.50 omit “and” before “(c)”

P4.51 change “43 mol% HCHO” to “30.3 mol% HCHO”

P4.53 (R2) should be $C_3H_6 + Cl_2 \rightarrow C_3H_6Cl_2$

p. 394 Flow Tru membrane drawing is incorrect, should be



p. 452 In flow diagram, sour gas stream should be 98 mol% H_2, 2 mol% H_2S (% sign missing)

p. 463

P5.4 "What is the temperature..", not "What is the pressure…"

p. 468

P5.27 add "at 2 bar" to parts (a) and (c)

P5.30 Insert "(a)" before "Assume that the flash tank…", insert "(b)" before "Suppose the tank pressure…,", insert "(c)" before "Suppose the tank temperature…"

p. 471

P5.41 Graph should have y-axis label of mmol/g, not mmol.

p. 475 In flow diagram at bottom of page, arrowhead is missing on feed stream to mixer

p. 477

P5.54 "economical", not "economical"

p. 479

P5.58 Solubility limit is 17.7 lb/100 lb, not 1.17 lb

P5.59 "naphthalene", not "naphthalene" (two times)

p. 482

P5.66 "humidifying", not "humidifying"

p. 483

P5.69 Product requirements should read

Product 1: 98% ethylbenzene
Product 2: 95% *p*-xylene
Product 3: 90% *m*-xylene
Product 4: 95% *o*-xylene

p. 488 Data are in moles CO_2/mole MEA, not moles CO_2/mole solution

p. 489

P5.80 $K_D = 4$, not $K_D = 0.25$

P5.81 Elixer should be solvent phase II and water should be solvent phase I.

p. 528 Second illustration, a minus sign is missing, should be "-890.6 kJ/gmol"

p. 557 T_{ref} and $T_{reactor}$ are switched, should be

$$\sum_{input} n_i C_{pi}\left(T_{ref} - T_{reactor}\right) + \dot{\xi}_1 \Delta\hat{H}^\circ_{r1} + \dot{\xi}_3 \Delta\hat{H}^\circ_{r3} + \sum_{output} n_i C_{pi}\left(T_{reactor} - T_{ref}\right)$$

p. 601

P6.38, after ADP reaction, should read, "… for every mole of oxygen consumed by aerobic metabolism of glucose"
"beaker containing 100 mL water"

p. 603

P6.54. Delete "Calculate the cooling required in the condenser."

p. 604

P6.55 Change "superheated liquid" to "subcooled liquid".

p. 607

P6.66 150 psig steam, not 15 psig

p. 610

P6.74 (aq), not (ag). http://www.milleniumcell.com/solutions/white.html

p. 612

P6.80 insert "and reactants are fed at 25°C."at end of sentence that begins "first, calculate the temperature…."

p. 617

P6.89 subscript required, should be C_p, not Cp., in table heading

p. 647 There should be no "°" on $\Delta\hat{G}_T$

Ammonium nitrate values should be

(s) $\Delta\hat{G}^\circ_f = -184$ kJ/gmol, $\Delta\hat{H}^\circ_f = -365.56$ kJ/gmol,

(aq) $\Delta\hat{G}^\circ_f = -190.7$ kJ/gmol, $\Delta\hat{H}^\circ_f = -340$ kJ/gmol,

p. 648 Dimethyl carbonate values should be

(g) $\Delta\hat{G}_f^\circ = -452.4$ kJ/gmol, $\Delta\hat{H}_f^\circ = -570.1$ kJ/gmol,
Ethylene glycol is $C_2H_6O_2$ (subscript on H is missing)

p. 649 add –518.7 for ΔH_c of hydrogen sulfide
Naphthalene is $C_{10}H_8$, not C_8H_{10}
Hydrazine: ΔH_c = -534, not –5342.

p. 650 change ΔH_f to –371.1 for nitroglycerin

p. 653 *o*-xylene, not *n*-xylene

p. 664 Ethane (l), not ethane (e)
Ethylene glycol is $C_2H_6O_2$ (subscript on H is missing)

p. 665 Values for polynomial expression for oxygen should be:

28.11	-3.68×10^{-6}	1.746×10^{-5}	-1.065×10^{-8}

p. 666 Value for "B" in polynomial expression for water vapor should be 0.001924, not 0.01924

p. 669 add methanol $\Delta\hat{H}_v = 37.8$ kJ/gmol

p. 671 Note Table B.21 and B.22 have different definitions for the sign of the enthalpy change. Change all "-" to "+" and "+" to "-" in Table B.21 (including footnote) to be consistent with B.22

p. 673 P1.27 solution: ~1/3 consumed in yeast production.
P1.29 solution: (a) lose $0.17/kg, (b) make $0.15/kg

p. 674 P2.3 solution: 76.8 wt%, not 76.6 wt%
P2.5 solution: 45.4 g, not 48.8 g
P2.9 solution: 4.44×10^{-3} kg, not 1.5×10^{-4} kg

p. 675 P2.57 solution: 0.5 oz NaCN, not 0.05 oz.
P2.59 solution: 180 h, not 18 h; 8.57 g nitrates/L, not 60 g nitrates/L
P2.65 solution: 7%, not 9%
P2.67 solution: 3.8 tons millscale, 79.3 tons limestone, 29.1 tons clay, 41.1 tons oyster, $105/ton
P2.71 solution: 2500 lb/h water added, not 2560 lb/h, 2325 lb/h leaves evaporator
P3.31 solution, $2433(0.9)^{d-1}$, not $2413.6(0.9)^{d-1}$

p. 676 P3.41 solution: 5.1 kg, not 6.28 kg
P3.43 solution: 15.8 h, not 15.35 h
P3.45 solution: 590 kg/day, not 349 kg/day

P4.21 solution: 954, not 1077, kgmol waste
P4.39 solution: “purge gas” not “pure gas”

p. 677 P5.9 solution: numbers given are mass fraction, not mole fraction.
In mole fractions, $x_{SO2} = 0.0032$, $x_{SO2} = 0.0166$

P5.19(a) solution: 2696, not 2969
P5.21 solution: 105,000 L/h, not 123,805 L/h
P5.37 (b) solution: 1.82×10^5, not 1.58×10^5 kmol/h
P5.51 solution: Scheme A is better.
P5.55 solution: Separation factor is ~86,500.
P5.63 solution: 15.9°C, not 17.8°C; 0,.0043 not 0.0048
P5.75 solution: change “Zooey” to “Frannie”

p. 679 P6.13 solution: 2.5°C, not 2.39°C
P6.19(b) solution: $W_s > 0$
P6.29 solution: 506 kJ/s (approximate C_p), 938 kJ/s (polynomial C_p)
P6.25 solution: $7.78/metric ton, $13.38/metric ton
P6.31 solution: ethanol: 25,680 kJ/kg. Hydrazine: 20,850 kJ/kg.
P6.39 solution: 90% vapor
P6.53 solution: change 2180 kJ/s to 1870 kJ/s
P6.59 solution: change 8.35 to 9130 kJ/min
P6.37 solution: change “to 63°C” to “by 65°C”.
P6.45 solution: 5.6 kg/min (rule of thumb); 6.36 kg/min (accurate)
P6.53 solution: 1868 kJ/s
P6.59 solution: 10.77 kJ/min
P6.67 solution: maximum T reached is about 140*F, so drugs are not OK

p. 680 P6.87 solution: (a) 800,000 Btu/h, 193°F, 430 ft^2