Pages 21-22. The last paragraph on page 21. The comment about recycling the heptane/propanol output from the washer is wrong. Recycling is both possible and effective. Change the paragraph as follows:

Solid/liquid separation followed by washing should work. The process can be improved further by recycling the n-heptane/i-propanol effluent from the washer to the 90% heptane/10% propanol stream. Note that the n-heptane/i-propanol effluent from the washer cannot be recycled to the stream entering the washer. This would not allow the propanol to leave the washer-melter loop, except by a purge stream on the recycle. The purge would have the same flow rate of i-propanol as the stream leaving the washer in the above design.

Page 30. The charge on the oxygen atoms in reactions (2.17) and (2.18) should be 2\textasciicircum , not 3\textasciicircum . Reactions (2.17) and (2.18) should be corrected as follows:

\[
\begin{align*}
O_2 + 4e^- & \rightarrow 2O^{2-} & \quad (2.17) \\
4H^+ + 2O^{2-} & \rightarrow 2H_2O_{(liquid)} & \quad (2.18)
\end{align*}
\]

Page 33. In footnote 2, the publication year should be 1900, not 1990.

Page 44, exercise 2.10. Ernst Solvay should be Ernest Solvay.

Page 46, exercise 2.12. In the paragraph just above the five reactions, the nomenclature suggested is potentially confusing. It is suggested that styrene \equiv S \ldots and steam \equiv S. Delete “steam = S” and use only superheated steam (SHS) in your process.

Page 49. In the table at the top of the page, the boiling point of O_2 should be –183 \degree C, not –182 \degree C.

Page 52. The melting point of SO_3 should be +17 \degree C, not –17 \degree C.

Page 54. The heading in the 6th column in the table of physical parameters should be “Market price”

Page 83. In Eq. (3.71), replace \( F_{T,1c} \) with \( F_{T,1a} \) as follows:

\[
q_{\text{freezer}} = \phi F_{T,1a} \Delta H_{\text{fusion,water}} = 0.53 \left( \frac{100 \text{ kg}}{\text{min}} \right) \left( \frac{334 \text{ kJ}}{\text{kg}} \right) = 1.8 \times 10^4 \text{ kJ/min} \quad (3.71)
\]
Page 97. In Eq. (3.92), replace 13,000 $/month with 13,500 $/month, as follows:

\[
\text{operating costs} = \text{electricity} + \text{rent} + \text{labor} \\
= \left(\frac{13,500 \text{ $}}{\text{month}}\right) \left(\frac{12 \text{ months}}{\text{year}}\right) + \left(\frac{2,400 \text{ $}}{\text{month}}\right) \left(\frac{12 \text{ months}}{\text{year}}\right) \\
+ \left(\frac{3 \text{ shifts}}{\text{day}}\right) \left(\frac{9 \text{ hours}}{\text{shift}}\right) \left(\frac{10.50 \text{ $}}{\text{hour}}\right) \left(\frac{7 \text{ days}}{\text{week}}\right) \left(\frac{52 \text{ weeks}}{\text{year}}\right)
\]

(3.91)

Page 110. exercise 3.8. In the figure for parts (B) and (C), the stream labeled “7” should be labeled “3”.
That is, the figure should look like this:

Page 111. exercise 3.11. The compositions for stream 4 are incorrect. The correct compositions are 13.3 wt % benzene, 74.1 wt % ethylbenzene, 12.6 wt % styrene. The label floating to the right of distillation column 2 that reads

benzene  
ethylbenzene  
styrene

should be deleted. That is, the figure should look like this:

Page 112. exercise 3.13. The composition for stream 6 in part (C) is incorrect. The correct composition is 50.3 wt% water.

Page 114. exercise 3.18, parts (A) and (B) should read

(A) Calculate the flow rate (in kg/min) of stream 7.
(B) Calculate the flow rate (in kg/min) of the recycle, stream 4.

**Page 116.** exercise 3.20, part (D) should read

"Stream 7 contains solid $E$ and $E$ in solution."

**Page 119.** exercise 3.27, part (B) Delete the sentence “The flow rates in streams 3 and 4 are equal.” Use the flow rates indicated on the process flowsheet.

**Page 127.** exercise 3.31.

The last sentence on page 127 should read “The lake water would then be returned to Cayuga Lake at 55°F.” The temperature in the text should agree with the temperature in the drawing.

On page 128, Part (C) should read: “Use the flow rate of chilled water calculated in (B) to calculate the flow rate of water from Cayuga Lake, in gal/hr.”

The credit for the figure at the bottom of the page was improperly displaced to the end of exercise 3.31. The *Cornell Chronicle* should be credited for the picture only, not for exercise 3.31.

**Page 133.** exercise 3.45. The ROI in parts (A) and (B) is given with incorrect units. The ROI should be 20%/year.

**Pages 133-4.** exercise 3.46. The ROI in part (B) is given with incorrect units. The ROI should be 20%/year.

**Page 134.** exercise 3.47. Replace the last sentence in the exercise as follows:

Assume a 30-year lifetime for the refrigerators and a 75-year lifetime for the lake source cooling equipment. The electricity cost for the present refrigerators is $1.9 \times 10^6$ $$/\text{year}$. Calculate the operating costs for both options.

**Page 138.** Table of Thermodynamic properties for compounds at 1 atm.

The heat capacity for Air is incorrect. The correct value is 29 joules $\degree C^{-1}$ mol$^{-1}$.

**Page 150.** Figure 4.20. The scale on the pressure axis is incorrect. A corrected plot is shown below.

![Diagram](image)

**Page 160.** The text below figure 4.39 should read:

But what is the initial point for the second bubbler? We need two coordinates: the concentration of benzene in the air entering bubbler #2 (which is given by the outlet from bubbler #1) and the concentration
of benzene in the oil entering bubbler #2 (which is zero).

**Page 174.** The text at the top of the page should read:

… and at the maximum concentration, the flow rate of the vapor distillate is nearly zero.

**Page 189.** exercise 4.4. The scale on the pressure axis is incorrect. A corrected plot, which also plots the entire process, is shown below.

Also, the starting point on the pressure-volume phase diagram should be closer to the border between the vapor region and the two-phase region, as shown below.

**Page 190.** exercise 4.5. The starting point for on the pressure/volume phase diagram should be closer to the border, as shown in the corrected figure for exercise 4.4 (above). Also, the scale on the pressure axis is incorrect. A corrected plot is shown below.
Page 204, exercise 4.17  The temperature in the flash drum should be 73°C, not 37°C, as follows:

30. mol% M
70. mol% K
100. mol/min

1.0 atm
56°C

1 ➔ heater ➔ flash drum

1.0 atm
73°C

3 ➔ vapor

4 ➔ liquid

Page 206, exercise 4.19, after part (F). The statement should read:

Assume now that the equimolar product is leaving via stream 4 (liquid). Assume further that the vapor flow rate (stream 3) is 190. mol/min.


Change the second sentence to read "The input to the distillation column is a liquid-vapor mixture with an overall composition of 30. mol % DCE."

The labels on the y axis of the graph are out of order. Switch 0.6 and 0.7.

Pages 217-8, exercise 4.32  The two lines of text that precede (A) on page 217 should be deleted. The text repeats the last two lines on page 216.

Add part (D) to the top of page 218, as follows:

(D) Complete the following table for a mixture of 0.65 mol butanol and 0.35 mol water. If only one phase is present, leave the last three columns blank.

Pages 231, exercise 4.40  The specification on stream 4 should be less than 2% MCH, not less than 3% MCH, as follows.

4.40 The process below treats a mixture of methylcyclohexane (MCH) and aniline (A) by liquid-liquid extraction with n-heptane (H), and then distillation to remove the H, to produce A with less than 2% MCH.
Page 264, equation (5.88). The density in the equation for the Reynolds number is the fluid density, not the sphere density. The calculation should be as follows.

$$\text{Re} = \frac{Dv \rho}{\mu} = \frac{(1 \times 10^{-6} \text{ m})(6 \times 10^{-4} \text{ m/s})(1.3 \text{ kg/m}^3)}{1.8 \times 10^{-6} \text{ Pa \cdot s}} = 4 \times 10^{-4} \quad (5.88)$$

Change the paragraph after equation (5.88) as follows:

The Reynolds number is less than one, so it was legitimate to apply Stokes's law. Likewise the Reynolds number for a 10 \( \mu \text{m} \) particle is less than one. However, for a particle of diameter 1 mm, \( \text{Re} = 400 \). This lies outside the valid range of Stokes's law. So, will a 1 mm particle fall faster or slower than predicted by Stokes's law?

Page 265, in the sentence that precedes equation (5.89), the flow should be \( 4.3 \times 10^5 \) barrels/day.

Page 269, equation (5.113). Change the flow rate to \( 4.3 \times 10^5 \) barrels/day, which changes the result to \( 0.8 \) m\(^3\)/s, as follows.

$$\left( \frac{4.3 \times 10^5 \text{ bbl}}{\text{day}} \right) \left( \frac{0.159 \text{ m}^3}{1 \text{ bbl}} \right) \left( \frac{1 \text{ day}}{24 \text{ hr}} \right) \left( \frac{1 \text{ hr}}{60 \text{ min}} \right) \left( \frac{1 \text{ min}}{60 \text{ s}} \right) = 0.8 \text{ m}^3/\text{s} \quad (5.113)$$

Page 275. In the equation for the Stanton Number, eqn 5.135, \( \rho \) should be variable in the denominator, not a subscript to \( v \). The correct equation is as follows:

$$\frac{h}{C_{\rho \nu \rho}} = \text{St} = \text{Stanton number} = \frac{\text{heat transferred}}{\text{thermal heat capacity}} \quad (5.135)$$

Page 343, exercise 6.2(B). Delete the minus sign in the expression for the rate of decomposition:

$$\text{rate of decomposition of pollutant} = \kappa[X] .$$

Page 364. The parenthetical sentence below Figure D.7 should read:

(We calculate that the line corresponds to \( y = 100(10^{-2x/7}) \), or \( y = 100e^{-0.66x} \).)