Errata

Corrections to the book "Molecular Theory of solutions"
By Arieh Ben-Naim

Chapter 1

Page 13, Equation (1.6.2): Revise the right hand side to ($\bar{p}$ on the first line should be bold).

$$= \left[h^{-3} \int_{-\infty}^{\infty} d\bar{p} \exp\left[-\beta \bar{p}^2 / 2m \right] \right]^N$$

$$= \left[h^{-1} \int_{-\infty}^{\infty} dp_x \exp\left[-\beta p_x^2 / 2m \right] \right]^{3N}$$

$$= \left[2h^{-1} \int_{0}^{\infty} dp_x \exp\left[-\beta p_x^2 / 2m \right] \right]^{3N}$$

$$= \left[\frac{\left(2\pi mkT \right)^{1/2}}{h} \right]^{3N} = \Lambda^{-3N}$$

Page 14, Equation (1.69): all "V" should not be in bold rendition;

Chapter 2

Page 24, 2nd line above Equation (2.13): Delete "at", i.e., revised line should be "…in the element of volume…"

Page 52, Equation (2.92): Replace C_I by C_i.

Chapter 3

Page 83, Line before Equation (3.28): Insert "function", thus "partition function".

Page 84, Equation (3.36): R_{ij} should not be bold.

Page 85, Line 5, section 3.4.1: It should be "generalize" not generalized".

Page 95, Line 2: It should be "integrating (3.78)".

Page 96, Line 3 after Equation (3.83): First X' should be X'' (bold and double tags).

Page 103, eq. 3.122 replace the upper limit of the integral by R_M and add the sentence: We assume for simplicity that the macroscopic system is spherical and has radius R_M . The integral should be $\rho\int_0^{R_M}\cdots$

Chapter 4

Page 116, Line after Equation (4.17): Delete "a", i.e., "…in open and closed systems…"

Page 132, Equation (4.127): The "B" should be in bold rendition.

Chapter 5

Page 141, Last line: The X'' should be bold.

Page 142, First two lines: All the X' , etc., should be bold.

Chapter 6

Page 166, Figure 6.1: The vertical axes should go from 0 to 1, replace figure, refer to attachment.

Chapter 7

Page 221, Line 6, section 7.7: It should be "components" and not "component".

Page 229, Equation (7.145): The exponentials on the rhs of equation should contain a minus sign, i.e., $\langle\exp[-\beta B_s(R_1)]\rangle_0$.

Page 231, Line 3: The letter "P" in P_s should be bold.

Page 234, Line 2: Swap comma and full stop, i.e., "…at a *specific* confirmation, P_s".

Page 242, Equations (7.198) and (7.199): "Lib" should be the same in rendition, i.e., same as that in (7.1.99) which is in italics.

Page 245, Line 2: "…structure of water (SOW) has been identified…", i.e., delete spelled out words inside the parenthesis and replace with SOW.

Two lines below Equation (7.226): Delete "half", i.e., "…liquid water is simply the average binding…"

Page 251 equation (7.225) should be revised to (all $\overline{X}$ bold)

$$\langle U_N \rangle_W = \frac{\int d\overline{X}^N P(\overline{X}^N, \overline{X}_W) U_N}{P(\overline{X}_W)} = \frac{\int d\overline{X}^W P(\overline{X}^N, \overline{X}_W) U_N}{8\pi^2 / V}$$
$$= \int d\overline{X}_W d\overline{X}^N P(\overline{X}^N, \overline{X}_W) U_N = \langle U_N \rangle_0 \qquad (7.225)$$

Page 251, Equation (7.226): Revise to "$\Delta E_W^* = \langle B_W \rangle_W = \langle B_W \rangle_0$".

Page 251 lines 1 & 2 after equation 7.226 revise to:

"… is simply the average binding energy…"

Page 253, Line before Equation (7.235): It should read H_2O and D_2O and not H_2o and D_2o.

Page 254, Line before Equation (7.237): It should be ΔA_s^* and not ΔA_S^*, i.e., not a capital letter s" for the subscript but a small letter "s".

Page 256, six lines before the end should read "…such a relation is unknown…".

Page 259, Line 15 and Equation (7.250): It should read R_{CAV} and not $R_{c\alpha v}$;

Chapter 8

Page 286, Figure 8.8: Replace figure (see attachment).

Appendices

Page 303, Appendix B, two lines after Equation (B.12): It should be "$\partial f / \partial x_j$" and not $\partial x_i / \partial x_j$.

Page 307, Final line: It should be "$\ln \Xi$" not "$\mathrm{In}\,\Xi$".

Page 326, Eq. G.13 and G.14 the upper limit of the integration should be replaced by R_M instead of infinity. The equations should be replaced by:

$$\rho G_C = \rho \int_0^{R_M} [g_C(R) - 1)] 4\pi R^2 dR = -1 \qquad (G.13)$$

$$\rho G_O = \rho \int_0^{R_M} [(g_O(R) - 1)] 4\pi R^2 dR = -1 + kT\rho\kappa_T \qquad (G.14)$$

Page 326, line 3 after (G.14), change $(0, \infty)$ to $(0, R_M)$

Add after equation G.14 the sentence: We assume for simplicity that the macroscopic system is spherical and has radius R_M

On page 327, Eq. G.15 and G.17 should be replaced by:

$$\rho G_C = \rho \int_0^{R_{COR}} [(g_C(LC)-1)]4\pi R^2 dR + \rho \int_{R_{COR}}^{R_M} [(g_C(CC)-1)]4\pi R^2 dR = -1 \tag{G.15}$$

$$\rho \int_{R_{COR}}^{R_M} [(g_C(CC)-1)]4\pi R^2 dR = -1-(-1+kT\rho\kappa_T) = -kT\rho\kappa_T \tag{G.17}$$

Page 330, Eq. G.29 and G.31 should be replaced by:

$$G_{C,\alpha\beta} = \int_0^{R_{COR}} [g_{C,\alpha\beta}(LC)-1]4\pi R^2 dR + \int_{R_{COR}}^{R_M} [g_{C,\alpha\beta}(CC)-1]4\pi R^2 dR = \frac{-\delta_{\alpha\beta}}{\rho_\alpha} \tag{G.29}$$

$$\int_{R_{COR}}^{R_M} [g_{C,\alpha\beta}(CC)-1]4\pi R^2 dR = -kT\kappa_T - \frac{kT(1-\rho_\alpha \overline{V}_\alpha)(1-\rho_\beta \overline{V}_\beta)}{V\rho_\alpha\rho_\beta\mu_{\alpha\beta}} \tag{G.31}$$

Page 331, Eq. G.38, G.39, and G.40 should be replaced by:

$$g_{C,AA}(CC) = 1 - \frac{kT\kappa_T}{V} - \frac{\rho_T \overline{V}_B^2 \rho_B}{V\rho_A} \tag{G.38}$$

$$g_{C,AB}(CC) = 1 - \frac{kT\kappa_T}{V} + \frac{\rho_T \overline{V_A}\,\overline{V_B}}{V} \tag{G.39}$$

$$g_{C,BB}(CC) = 1 - \frac{kT\kappa_T}{V} - \frac{\rho_T \overline{V}_A^2 \rho_A}{V\rho_B} \tag{G.40}$$

Page 369, Eq. P.3 add dx'_B to the integrand

$$\mu_A = \mu_A^P + kT\ln x_A + kT\int_0^{x_B} dx'_B \frac{\rho x'_B \Delta_{AB}}{1+\rho x'_A x'_B \Delta_{AB}} = \mu_A^P + kT\ln x_A + \mu_A^{EX,SI} \tag{P.3}$$

Page 370, Eq. P.4 add dx'_B to the integrand

$$P_A / P_A^0 = x_A \exp\left[\int_0^{x_B} dx'_B \frac{\rho x'_B \Delta_{AB}}{1+\rho x'_A x'_B \Delta_{AB}}\right] \qquad \text{(P.4)}$$

On page 371, Eq. P.6 add kT to the numerator (instead of “1”)

$$\left(\frac{\partial \mu_A}{\partial x_A}\right)_{P,T} = kT\left(\frac{\partial \ln x_A \gamma_A^{SI}}{\partial x_A}\right)_{P,T} = \frac{kT}{x_A(1+\rho x_A x_B \Delta_{AB})} \qquad \text{(P.6)}$$

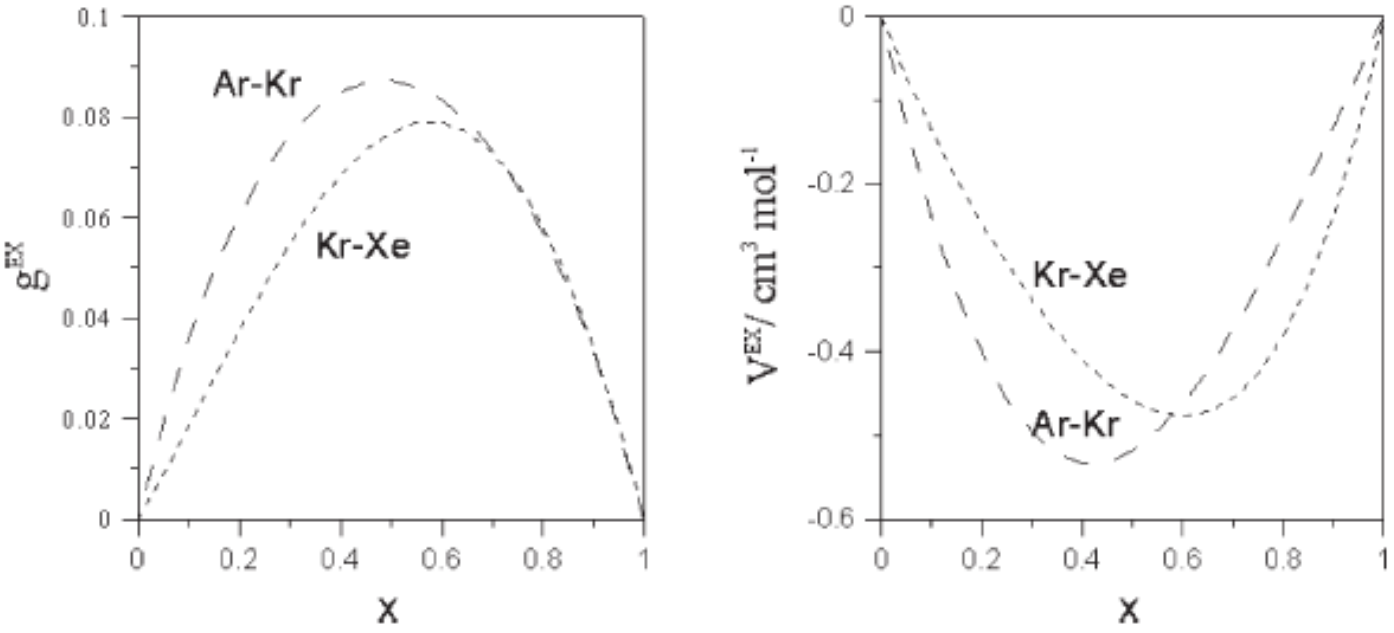
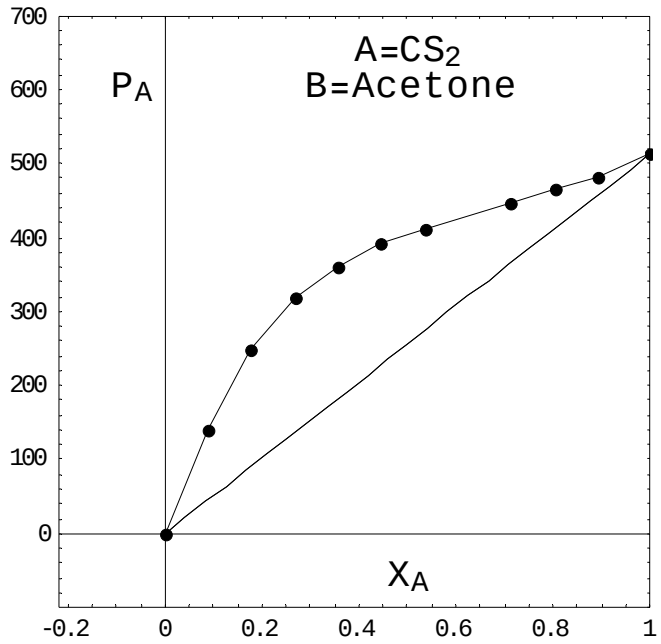


Figure 8.8 page 286



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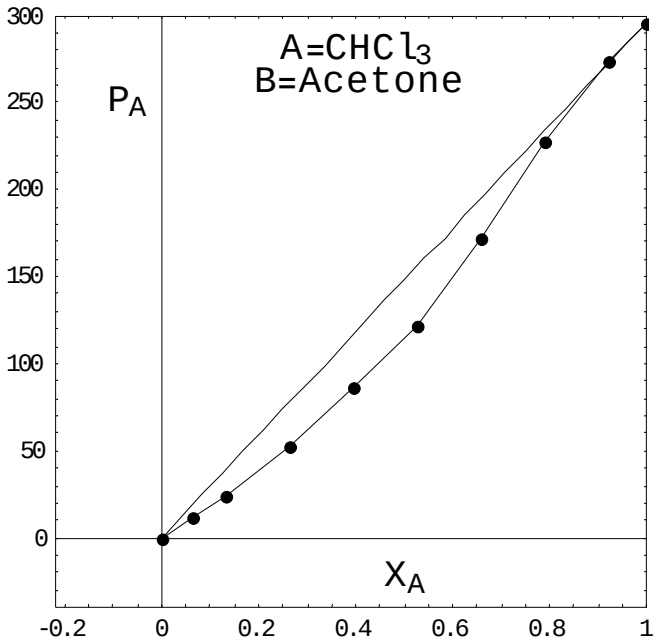

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Figure 6.1 page 166