Solutions to LM and Atkins problems – part 3 –

---- Solutions to problems from parts 7 to 10 ----

Comments: (i) Typos and errors are always possible – please point out any issues and errors, so that I can fix them! (ii) I have copied the answers from the Laidler/ Meiser and Atkins solution manuals, respectively, and I may have not always paid full attention to the proper number of significant figures. (iii) Error in LM33 corrected Mar. 8, 11. (iv) Solutions to parts 6, 7 originally posted Mar. 7; part 8 added Mar. 16, 11.

A01 (a) C = 2 (H_2O; NaH_2PO_4); (b) C=3

A02 P = 2, C = 2 *(since there is equilibrium between the two mixed solids and the vapor.)*

A03 (a) P=2, C=1 *(equilibrium between NH_4Cl and its decomposition products)* (b) C=2, P=2

A04 (a) C=2, P=3; (b) F = 1 – either T or P.

A05 (a) C=2, P=2; (b) F = 2: T and P.

LM37 $\Delta P = 3.61$ kPa

LM38 $\Delta H_m(vap) = 42.7$ kJ mol^{-1}

LM39 P = 0.7303 atm

LM40 $\Delta H_m(vap) = 46.8$ kJ mol^{-1}

LM41 $\Delta H_m(vap) = 55.1$ kJ mol^{-1}

LM42 $P_{tol} = 0.111$ bar; $P_{ben} = 0.205$ bar; total 0.316 bar.

LM43 $x_{tol}(vap) = 0.357$.

LM44 MW = 118.54 g mol^{-1} tin.

LM45 (a) $x(N_2) = 1.06 \times 10^{-5}$; $x(O_2) = 5.15 \times 10^{-5}$;
(b) N_2: 5.88×10^{-4} mol L^{-1}; O_2: 5.88×10^{-4} mol L^{-1}

LM46 181.4 g mol^{-1} *(The correct value is 182.18 g mol^{-1}.)*

LM47 160 g mol^{-1}

LM48 0.602 L to 1.00 L or approx. 3:5. B.P.: 378.6 K or 105ºC ($\Delta T = 5.48$ K)

LM49 *NaCl completely dissociates. Hence, for 1.0 mol of solid NaCl, we have 2.0 mol of particles. Calculating the freezing point depression for 2.0 mol kg^{-1} results in the value given.*

LM50 $\pi = 249.6$ kPa.

LM51 *The Laidler solution manual suggests using a plot, to get:* 310 g mol^{-1}. Error: 9%.

LM52 36.2 g mol^{-1}.

LM53 (a) AH_2 is oxidized; (b) 0.44 V; (c) no effect

LM54 -0.90 V

LM55 (a) Fe^{3+} (aq) | Fe^{2+} (aq) || Ce^{4+} (aq) | Ce^{3+} (aq) $E^0 = 0.67$ V
(b) Ag (s) | AgCl(s) | Cl^- (aq) || Ag^+ (aq) | Ag (s) $E^0 = 0.5777$ V
(c) Pt | H_2O (l) | H_2 (g) | OH^- (aq) || OH^- (aq), H_2O | HgO(s) | Hg (l) $E^0 = 0.9254$ V
Comment: I would not wrroy too much about subtle details of cell notation …

LM56 $9.10 * 10^7$ *(The solution manual adds units of L^2 mol^{-2}; I am not entirely sure about that right now.)*

LM57 $5.312 * 10^{-11}$

LM58 -237.4 kJ mol^{-1}

LM59 (a) -0.0365 V; (b) -0.16 V

A08 (b) $E^0_{cell} = 1.0304$ V (c) $\Delta G_R = -236.8$ kJ mol^{-1}; $\Delta G_R{}^0 = -198.8$ kJ mol^{-1}; $K = 6.84 * 10^{34}$

A09 (a) 1.56 V; (b) 0.40 V; (c) -1.10 V; (d) -0.91 V; (e) -0.62 V; (f) 0.89 V

A10 (a) $6.5 * 10^9$; (b) $1.5 * 10^{12}$