Errata—Modern Nuclear Chemistry

p7 Sample Problem $^{60}Co^{m}$ not $^{60}C^{m}$
p31 line 4 position -> positron
p 36 line 5 no -> few
p 37 equation 2.1 and associated text.
The Coulomb energy (cgs system)…where $(1/4\pi\varepsilon_0) = 1$
p 49 9 lines fb 3.6->3.8
p50. in eqn 2.21 $\delta \longrightarrow \ell$, and in fig 2.14 $l \rightarrow \ell$
p 50 center of the charge object -> center of the charged object
p 64 10 line from the top tritium -> tritium (^{3}H)
p 66 line 6 the radionuclides (B and C)
p 66 last two lines
$t_{1/2}$ (B)=8.0 h A_0(B)=80 cpm
$t_{1/2}$ (C)=0.8 h A_0(C)=190 cpm
p 68 eqn 3.20 $(e^{(\lambda^2-\lambda_1)t})$-> $(e^{(\lambda_2-\lambda_1)t})$
p 68 Fig 3.6 A_r->A_p
p 70 Fig 3.7 caption period-> half-life
p 70 line 9 transient equilibrium (Fig 3.8b and 3.9a)
p 71 Figure 3.8 all A_r -> A_p
p 72 secular equilibrium (Figs. 3.8c and d; and Fig. 3.9b).
p78 fig 3.11 $^{210}Po \rightarrow ^{206}Pb$, not ^{208}Pb
p 110 watercolor ->water color
p 133 Table 5.1 The second ^{23}Na -> ^{23}Mg.
p 133 taget -> target
p 141 for the isotropic harmonic oscillator, the number of nucleons needed to fill each orbital is 2(N+1)(N+2)/2 = 2,6,12… rather than 2(2N+1)=2, 6, 10 …
p143 Figure 6.3 labels for $2p_{3/2}$ and $1g_{9/2}$ levels are given incorrectly
p146 BB R1 $j_2 = \ell_2 \mp 1/2$; BB R3 $J=j_1+j_2-1$
p147 $g_\ell = 1\mu_0$
p 156 line 16 moment of inertial -> moment of inertia
p 157 Fig 6.11 energy units are MeV
p 162 Fig 6.17 total angular momentum I
p 180 line 1 mass defect -> mass excess
p 182 Solution Using the tabulated mass excesses

$$V_C = \frac{(2)(82)(1.440)}{1.2(208^{1/3} + 4^{1/3})} \approx 26$$

$$T_\alpha = \frac{208}{212} 6.339 = 6.22$$

P183 Figure 7.4 ordinate is Mass Excess
P 184 line 7 the barrier plus -> the potential well
P 185 abscissa of Figure 7.6 really is $(Q_\alpha)^{1/2}$.
p185 eqn 7.7 should include the line "where A(Z) = 1.40Z + 1710/Z – 47.7"
P 185 line 6 from bottom "194 =" -> "194"
P 190 Fig 7.8 centrifugal potential should that from eqn 7.21

p192 Figure 7.9 caption, diamonds→circles; The estimate from the one-body model of alpha decay is shown by the dashed line.
p195 Fig 7.11 neutron and proton drip-line legends are reversed.
p197, problem 10,the nucleus is ^{243}Bk, it decays to ^{239}Am
p 203 line 9 from bottom mass defec -> mass excess
pp 205-213 The matrix elements should be written as $\left|M_{fi}\right|^2$
p 207 Fig 8.2 arrows should be where curve hits abcissa
p 213 1's →1s
p 222 $t_{1/2}$ of $^{69}Zn^m$ is 13.76 h
p 220 Reniies →Reines
p 223 $T_r = E_\gamma^2 / 2M_0c^2$
p 223 line 18
Solution Using the mass excess of -68.418 MeV found in the Wallet Cards (see Appendix B), the mass of ^{69}Zn is 68.927 amu (not 68.297). [This is obtained by 69 amu + (-68.418 MeV/931.5 MeV/amu) = 69 amu – 0.073 amu = 68.927 amu.] The calculation should be:

$$T_r = \frac{E_\gamma^2}{2M_0c^2} = \frac{(0.439MeV)^2}{2(68.927x931.5)} = 1.50x10^{-6}\,MeV = 1.5eV$$

p 223 part (b) mass defect=mass excess
Line 27 should begin: $T_r = E^2_\gamma / 2M_0c^2$
P 225 line 5 it excites-> it de-excites
P 226 the nucleus is $^{69}Zn^m$.
P 227 : In the last equation on this page, replace $(r_0)^{(2L-2)/2}$ with $(r_0)^{(2L-2)}\,A^{(2L-2)/3}$. In lines 3 and 4 from the bottom, it should be $B_{sp}(E,l)$ and $B_{sp}(M,l)$.
P 229 Table 9.2 M2 transition estimate should be $2.24x10^7A^{2/3}E_\gamma^5$
p 247 problem 1 should read "Does the 5/2 level decay primarily to the 3/2-….."
p 251 line 11 mass defect->mass excess
two lines above figure Applying conservation <u>of.</u>
Fig 10.1 p-> P
P 253 Figure 10.2. The notation in this figure does not agree with the text.
In this figure, lower case x should be capital P; capital X should be capital T; lower case y should be lower case x; capital Y should be capital R; and v_f should be v_P.
Line 13 from the bottom, which ends in T_0. Add $T_0 = [\,M_T/\,(\,M_T + M_P)]\,T_{lab}$.
P 256 Figure 10.5. The σ in the circle in the "before" part of the figure should be an "a" since the reaction now is A(a,b) B.
P 271 3 lines from bottom
$\pi_A\pi_{B*} = (-1)^{\ell_n}$
p 295 problem 13, l3 ^{18}F(n,2n) →^{19}F(n,2n)
p 296 problem 18 the $t_{1/2}$ of ^{44}Sc = 3.93 h
p 307 eqn 11.14 is an approximation, i.e., =→≅
p 314 eqn 11.18
$\exp[2a_n^{1/2}(E*-B_f)^{1/2} - 2a_f^{1/2}(E*-B_f)^{1/2}] \rightarrow \exp[2a_n^{1/2}(E*-B_n)^{1/2} - 2a_f^{1/2}(E*-B_f)^{1/2}]$
p 343 first equation should read

$$P(v) = \left(\frac{m}{2\pi kT}\right)^{3/2} \exp\left(\frac{-mv^2}{2kT}\right) 4\pi v^2 dv$$

p 346 Q=26.7
p 359 Fig 12-19 (and color version) SNO $\nu_c \rightarrow$SNO ν_e; SNO All $\nu_c \rightarrow$SNO All ν
p399 an alternating beam (AC) beam ->an alternating current (AC) beam
p 414 Chumberlin->Chamberlin
p 457 Liljinzin -> Liljenzin
p 503 line 6 I/Z = (12 + 7Z^{-1}).
P 503 and 507: In the Bethe-Bloch equation just below the middle of the page, there is the product Zq^2 just before the [ ] bracket. The Z appears to be dropped in all the relevant calculations, but with different "problems." On page 503, the (Z = 4) should appear before the 8^2; in this case, this calculation is done including the 4 and gets the correct answer of 518.0 MeV (which actually should be MeV/cm). On page 507, the Z value is not included in the calculations for oxygen and nitrogen. As a result, there should be an 8 in front of 2^2 for oxygen, giving an answer of 875.1 (not 109.4); similarly for nitrogen, there should be a 7 in front of the 2^2 giving an answer of 911.4 (not 130.2). If you then substitute the correct numbers in the last equation on this page (for air), the final answer in 903.8 (not 125.8).
P 505: The ordinate of Figure 17.3 is MeV.
P 512: Last line in the footnote: "these" should be "there."
P 515 Z*E -> ZE
P 519 Fig 17.10 ordinate is μ_o/ρ in units of cm^2/g lead.
Last line Fig 17.10 in both places
P 520 (μ_o/ρ) (ρ).
P 522: Equation 17.33 should end with $p_e \cos\phi$ and 17.34 should end with $p_e \sin\phi$.
P 523: In Table 17.2, all "m" should be "m_e." In the last line of text, 225 keV should be 255 keV.
P 524: line 3 225 keV should be 255 keV.