CHEM 1423
Chapters 23
Homework Solutions

TEXTBOOK HOMEWORK

23.6 **Note:** To balance the nuclear equations, the total of mass numbers and charges must be be equal on both sides of the equation.

(a) $^{234}_{92}U \rightarrow {}^{230}_{90}Th + {}^{4}_{2}He$

(b) $^{232}_{93}Np + {}^{0}_{-1}e \rightarrow {}^{232}_{92}U$

(c) $^{22}_{7}N \rightarrow {}^{12}_{6}C + {}^{0}_{1}e$

23.8 **Note:** To balance the nuclear equations, the total of mass numbers and charges must be be equal on both sides of the equation.

(a) $^{48}_{23}U \rightarrow {}^{48}_{22}Ti + {}^{0}_{1}e$

(b) $^{107}_{48}Cd + {}^{0}_{-1}e \rightarrow {}^{107}_{47}Ag$

(c) $^{210}_{86}Rn \rightarrow {}^{206}_{84}Po + {}^{4}_{2}He$

23.9 **Note:** To balance the nuclear equations, the total of mass numbers and charges must be be equal on both sides of the equation.

(a) $^{241}_{94}Pu \rightarrow {}^{241}_{95}Am + {}^{0}_{-1}e$

(b) $^{228}_{88}Ra \rightarrow {}^{228}_{89}Ac + {}^{0}_{-1}e$

(c) $^{207}_{85}At \rightarrow {}^{203}_{83}Bi + {}^{4}_{2}He$

23.12 **Note:** In the text HW, you are expected to calculate N/Z and then look at Figure 23.2 (pg. 769) to determine whether N/Z is above or below the stable isotope values for this atomic number, in order to determine the mode of decay. On a test, I will furnish the "typical" N/Z value for comparison.

(a) $_{92}{}^{238}$U: A > 83. Therefore, the mode is α decay

(b) $_{24}{}^{48}$Cr: N/Z = (48-24)/24 = 1.00. For Z = 24, the stable N/Z = 1.1. Therefore, N/Z is too low. The decay mode will be either positron decay or electron capture.

(c) $_{25}{}^{50}$Mn: N/Z = (50-25)/25 = 1.00. For Z = 25, the stable N/Z = 1.1. Therefore, N/Z is too low. The decay mode will be either positron decay or electron capture.

23.13 **Note:** In the text HW, you are expected to calculate N/Z and then look at Figure 23.2 (pg. 769) to determine whether N/Z is above or below the stable isotope values for this atomic number, in order to determine the mode of decay. On a test, I will furnish the "typical" N/Z value for comparison.

(a) $_{47}{}^{111}$Ag: N/Z = (111-47)/47 = 1.36. For Z = 47, the stable N/Z = 1.2. Therefore, N/Z is too high. The decay mode will be β decay

(b) $_{17}{}^{41}$Cl: N/Z = (41-17)/17 = 1.41. For Z = 17, the stable N/Z = 1.1. Therefore, N/Z is too high. The decay mode will be β decay.

(c) $_{44}{}^{110}$Ru: N/Z = (110-44)/44 = 1.50. For Z = 44, the stable N/Z = 1.2. Therefore, N/Z is too high. The decay mode will be β decay.

23.34 (a) $^{31}_{15}P + \gamma \rightarrow {}^{29}_{14}Si + {}^{1}_{1}H + {}^{1}_{0}n$

(b) $^{252}_{98}Cf + {}^{10}_{5}B \rightarrow {}^{257}_{103}Lr + 5\,{}^{1}_{0}n$

(c) $^{238}_{92}U + {}^{4}_{2}He \rightarrow {}^{239}_{94}Pu + 3\,{}^{1}_{0}n$