

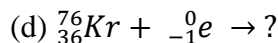
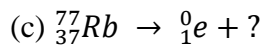
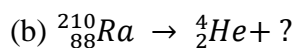
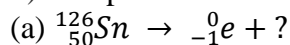
**CHEM 1311**  
**Practice Set**  
**Atomic Structure**

- (1.61) If  $6.02 \times 10^{23}$  atoms of element **Y** has a mass of 83.80 g, what is the identity of **Y**?
- (1.62) If the atomic weight of an element is  $x$ , what is the mass in grams of  $3.17 \times 10^{20}$  atoms of the element?
- (1.63) If  $4.61 \times 10^{21}$  atoms of element **Z** have a mass of 0.815 g, what is the identity of **Z**?
- (1.75) The radioactive isotopes cesium-137 and iodine-131 were released in substantial amounts after the nuclear power plant disaster at Fukushima, Japan, on March 11, 2011. Write the symbols for both isotopes in standard format.
- (1.76) Write symbols for the following isotopes:  
(a) Radon-220            (b) Polonium-210            (c) Gold-197
- (1.77) Write symbols for the following isotopes:  
(a)  $Z = 58$  and  $A = 140$             (b)  $Z = 27$  and  $A = 60$
- (1.78) How many protons, neutrons, and electrons are in each of the following neutral atoms?  
(a)  ${}^{15}_7N$             (b)  ${}^{60}_{27}Co$             (c)  ${}^{131}_{53}I$             (d)  ${}^{142}_{58}Ce$
- (1.79) Determine the number of protons and neutrons in the nucleus of each of the following atoms.  
(a)  ${}^{27}Al$             (b)  ${}^{32}S$             (c)  ${}^{64}Zn$             (d)  ${}^{207}Pb$
- (1.80) Identify the following elements:  
(a)  ${}^{24}_{12}X$             (b)  ${}^{58}_{28}X$             (c)  ${}^{104}_{46}X$             (d)  ${}^{183}_{74}X$
- (1.81) Identify the following elements:  
(a)  ${}^{202}_{80}X$             (b)  ${}^{195}_{78}X$             (c)  ${}^{184}_{76}X$             (d)  ${}^{209}_{83}X$
- (1.82) Which of the following isotopes can't be correct? Explain.  
(a)  ${}^{18}_9F$             (b)  ${}^{12}_5C$             (c)  ${}^{33}_{33}Br$             (d)  ${}^{18}_8O$             (e)  ${}^{11}_5B$
- (1.84) Naturally occurring boron consists of two isotopes:  ${}^{10}B$  (19.9%) with an atomic mass of 10.0129 and  ${}^{11}B$  (80.1%) with an atomic mass of 11.00931. What is the atomic weight of boron?
- (1.85) Naturally occurring silver consists of two isotopes:  ${}^{107}Ag$  (51.84%) with an atomic mass of 106.9051 and  ${}^{109}Ag$  (48.16%) with an atomic mass of 108.9048. What is the atomic weight of silver.

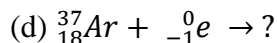
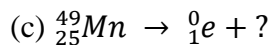
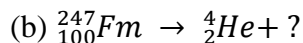
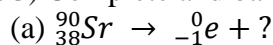
14. (1.86) Magnesium has three naturally occurring isotopes:  $^{24}\text{Mg}$  (23.985) with 78.99% abundance,  $^{25}\text{Mg}$  (24.986) with 10.00% abundance, and a third with 11.01% abundance. Look up the atomic weight of magnesium and then calculate the mass of the third isotope.

15. (1.87) A sample of naturally occurring silicon consists of  $^{28}\text{Si}$  (27.9769),  $^{29}\text{Si}$  (28.9765), and  $^{30}\text{Si}$  (29.9738). If the atomic weight of silicon is 28.0855 and the natural abundance of  $^{29}\text{Si}$  is 4.68%, what are the natural abundances of  $^{28}\text{Si}$  and  $^{30}\text{Si}$ ?

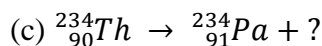
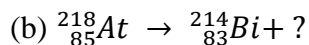
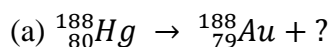
16. (1.92) Complete and balance the following nuclear reactions.



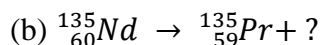
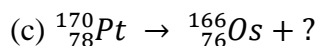
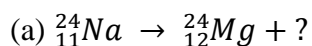
17. (1.93) Complete and balance the following nuclear reactions.



18. (1.94) Complete and balance the following nuclear reactions.



19. (1.95) Complete and balance the following nuclear reactions.



20. (1.96) Write balanced nuclear equations for the following processes:

- (a) Alpha emission of  $^{162}\text{Re}$
- (b) Electron capture of  $^{138}\text{Sm}$
- (c) Beta emission of  $^{188}\text{W}$
- (d) Positron emission of  $^{165}\text{Ta}$

21. (1.97) Write balanced nuclear equations for the following processes:

- (a) Beta emission of  $^{157}\text{Eu}$
- (b) Electron capture of  $^{126}\text{Ba}$
- (c) Alpha emission of  $^{146}\text{Sm}$
- (d) Positron emission of  $^{125}\text{Ba}$

22. Determine the molar mass of the following:

- (a)  $\text{CaSO}_4$
- (b)  $\text{K}_2\text{SO}_4$
- (c)  $\text{H}_2\text{CO}_3$
- (d)  $\text{KNO}_3$
- (e)  $\text{Ca}(\text{NO}_3)_2$
- (f)  $\text{HNO}_2$