Name _____

AP Chemistry: Nuclear Chemistry
Multiple Choice

30. When $^{214}_{84}Po$ decays, the emission consists consecutively of an alpha particle, then two beta particles, and finally another alpha particle. The resulting stable nucleus is…

(A) $^{206}_{83}$Bi (B) $^{210}_{83}$Bi (C) $^{206}_{82}$Pb (D) $^{208}_{82}$Pb (E) $^{210}_{81}$Tl

38. The radioactive decay of $^{14}_{6}$C to $^{14}_{7}$N occurs by the process of…

(A) beta particle emission (B) alpha particle emission (C) positron emission
(D) electron capture (E) neutron capture

18. For the types of radiation given, which of the following is the correct order of increasing ability to penetrate a piece of lead?

(A) Alpha particles < gamma rays < beta particles

(B) Alpha particles < beta particles < gamma rays

(C) Beta particles < alpha particles < gamma rays

(D) Beta particles < gamma rays < alpha particles

(E) Gamma rays < alpha particles < beta particles

38. $^{251}_{98}Cf \rightarrow 2\ ^{1}_{0}n + {}^{131}_{54}Xe + \_\_\_\_$

What is the missing product in the nuclear reaction represented above?

(A) $^{114}_{42}$Mo (B) $^{118}_{44}$Ru (C) $^{120}_{42}$Mo (D) $^{120}_{44}$Ru (E) $^{122}_{46}$Pd

68. The specific rate constant k for radioactive element X is 0.023 min^{-1}. What weight of X was originally present in a sample if 40 grams is left after 60 minutes?

(A) 10 grams (B) 20 grams (C) 80 grams (D) 120 grams (E) 160 grams

21. Correct statements about alpha particles include which of the following?

I. They have a mass number of 4 and a charge of +2.

II. They are more penetrating than beta particles.

III. They are helium nuclei.

(A) I only (B) III only (C) I and II (D) I and III (E) II and III

72. The nuclide $^{245}_{96}Cm$ is radioactive and decays by the loss of one beta particle. The product nuclide is…

(A) $^{245}_{94}Pu$ (B) $^{245}_{95}Am$ (C) $^{248}_{96}Cm$ (D) $^{250}_{96}Cm$ (E) $^{245}_{97}Bk$

48. If 87.5 percent of a sample of pure Iodine-131 decays in 24 days, what is the half-life of Iodine-131?

(A) 6 days (B) 8 days (C) 12 days (D) 14 days (E) 21 days

23. $^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{141}_{55}Cs + 3\ {}^{1}_{0}n + \text{X}$

Neutron bombardment of uranium can induce the reaction represented above. Nuclide X is which of the following?

(A) $^{92}_{35}Br$

(B) $^{94}_{35}Br$

(C) $^{91}_{37}Rb$

(D) $^{92}_{37}Rb$

(E) $^{94}_{37}Rb$