

CHM152 Quiz 12 Spring 2011 Name: _____

Provide explanations whenever possible, then put your answers on a Green Scantron.

1. Which of the following nuclides will produce ^{192}Pt upon undergoing beta decay?
 - A) ^{192}Ir
 - B) ^{196}Hg
 - C) ^{192}Au
 - D) ^{188}Os
 - E) ^{193}Pt

2. Which of the following nuclides will produce ^{233}Pa upon undergoing alpha decay?
 - A) ^{233}U
 - B) ^{234}Pa
 - C) ^{233}Th
 - D) ^{229}Ra
 - E) ^{237}Np

3. ^{40}Ar can be prepared by electron capture from
 - A) ^{36}Cl .
 - B) ^{40}K .
 - C) ^{41}Ar .
 - D) ^{40}Ca .
 - E) ^{33}S

4. The radioactive nuclide, ^{21}Na , with a half-life of 23 s, undergoes decay by emitting a positron. What is the nuclear composition of the product nuclide?
 - A) 12 protons and 9 neutrons
 - B) 11 protons and 11 neutrons
 - C) 11 protons and 10 neutrons
 - D) 10 protons and 11 neutrons
 - E) 9 protons and 12 neutrons

5. Which of the following types of nuclear decay results in an increase in the nuclear charge?
 - A) electron capture
 - B) positron emission
 - C) beta emission
 - D) alpha emission
 - E) fission

6. Nuclides with too many neutrons to be in the band of stability are most likely to decay by what mode?
- α
 - fission
 - β^+
 - electron capture
 - β^-
7. The nuclide ${}_{92}^{232}\text{Th}$ is radioactive. When one of these atoms decays, a series of \square and \square^- particle emissions occurs, taking the atom through many transformations to end up as an atom of ${}_{82}^{208}\text{Pb}$. How many \square particles are emitted in converting ${}_{92}^{232}\text{Th}$ into ${}_{82}^{208}\text{Pb}$?
- 6
 - 8
 - 2
 - 214
 - 4
8. Use the following table to assist in answering the question below.

Nuclide	Half-Life
Uranium-238	4.51×10^9 years
Uranium-234	2.48×10^5 years
Thorium-230	8.0×10^4 years
Radium-226	1.62×10^3 years
Lead-210	20.4 years

- The rate constant for the decay of unstable nuclide X by alpha-particle emission is 1.17×10^{-6} / day. What is the identity of X?
- uranium-238
 - uranium-234
 - thorium-230
 - radium-226
 - lead-210

9. What is the decay constant for iodine-131? It decays by beta emission with a half-life of 8.04 days.
- $1.24 \square 10^{-1}$ /day
 - $3.35 \square 10^{-1}$ /h
 - $5.18 \square 10^{-3}$ /h
 - $5.99 \square 10^{-5}$ /min
 - 1.44×10^{-6} /s

10. The half-life of the radioisotope ^{158}Eu is 0.77 h. How much time is required for a 160.0-g sample of ^{158}Eu to decay to 2.33 g?
- A) 3.0 h
 - B) 4.0 h
 - C) 6.0 h
 - D) 2.0 h
 - E) 4.7 h
11. The half-life of ^{42}K is 12.5 h. How much will remain after 69 h if the original sample contained 256 g of ^{42}K ?
- A) 22 g
 - B) 19 g
 - C) 17 g
 - D) 12 g
 - E) 5.6 g
12. The isotope ^{210}Pb has a half-life of 22 years. What percentage of a pure ^{210}Pb sample prepared in April 1937 remains in April 2001?
- A) 38%
 - B) 31%
 - C) 26%
 - D) 21%
 - E) 13%
13. A living tree contains ^{14}C (half-life, 5730 years) and has a specific activity of 750 counts per hour. A wooden artifact recovered from an archeological site gives a count of 190 counts per hour. The age of this artifact is most nearly
- A) 5730 years.
 - B) 11,000 years.
 - C) 4,900 years.
 - D) 22,000 years.
 - E) 47,000 years.

