Chem 117 Jasperse Quiz 3 Chapter 14 Name:
Due: Wednesday, September 29

1. For isotope Zr-93, who many protons and how many neutrons are present?

   Protons: Neutrons:

2. What is produced when Ti-44 undergoes alpha emissions?

3. What is produced when Fe-58 undergoes beta emissions?

4. What is produced when C-11 undergoes positron emissions?

5. What is produced when S-35 undergoes electron capture?

6. Suppose Rn-222 undergoes a radioactive decay series in which 4 alpha particles and 4 beta particles are emitted. What would be produced?

7. Which of the following statements is true?
   a. Alpha particles are both the largest particles and the most penetrating particles
   b. Beta particles are both the largest and most penetrating particles
   c. Gamma particles are the most penetrating particles

8. Which of the following statements is **FALSE**?
   a. Positron emission and electron capture both result in the atomic number decreasing by one (conversion of a proton to a neutron).
   b. Gamma emission and electron capture both result in the atomic number increasing by one.
   c. The amount of biological impact radiation can have depends both on the amount or radiation and the penetrating power of the radiation.
   d. Radioactive radon is a gas produced by natural decay of uranium. It can leak in through basement cracks, linger in a basement because of its weight, be breathed into human lungs, and do harmful alpha radiation in the lungs.

9. If the half-life of "X" is 7 days, how much of an 88-mg sample of "X" will be left after 21 days?

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10. If the half-life of "Y" is 4 days, if you start with 16 mg of "Y" about how much time would it take to have only 1.5 mg left?
    a. Somewhere between 4-8 days
    b. Somewhere between 8-12 days
    c. Somewhere between 12-16 days
    d. Somewhere between 16-20 days

11. An accident involves the spill of a sample of radioisotope "Q", which has a half-life of 12 minutes. If the "activity" of the sample is 8 mCi when measured after 36 minutes, what was the initial "activity" at the time of the spill?
    a. 8 mCi
    b. 16 mCi
    c. 32 mCi
    d. 64 mCi
    e. 128 mCi

12. Which of the following statements is **FALSE**?
    a. Most nuclear radiation experienced by people arises from natural sources
    b. Most people experience dangerous levels of nuclear radiation
    c. All forms of electromagnetic radiation (x-rays, gamma-rays, microwaves…) have exactly the same wavelength and frequency
    d. All forms of electromagnetic radiation (x-rays, gamma-rays, microwaves…) move at exactly the same speed, the speed of light

13. Which of the following statements is **FALSE**?
    a. While many radioisotopes are found naturally, many unnatural radioisotopes can be made in laboratories by bombarding normally stable nuclei by particles (alph particles, beta particles, neutrons, protons…)
    b. All nuclei are naturally unstable and undergo radiation even without bombardment.
    c. Carbon-dating is useful for things that are a few thousands of years old, but not for things that would be hundreds of thousands or millions of years old.
    d. C-14 dating is based on the fact that living things maintain a steady supply of radioactive C-14, but that once a living thing dies, the amount of C-14 deteriorates

14. Which of the following statements is **FALSE**?
    a. An important use of radioisotopes is as diagnostic tracers in medicine (to try to diagnose good health or ill health)
    b. An important use of radioisotopes is for medicinal therapy (cancer chemotherapy…)
    c. All radioisotopes used in medicine are exclusively beta emitters. Positron, gamma, or alpha emitters are never used.
    d. Radioisotopes are used to prevent food spoilage by killing molds and bacteria.

Did you remember to write your name on the front?