

Examrace

Competitive Exams: Chemistry MCQs (Practice_Test 23 of 31)

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1. Isotones are nuclides that have the same number of neutrons. Which of the following pairs of nuclides are isotones?
 - a. oxygen-15 and nitrogen-15
 - b. oxygen-16 and oxygen-17
 - c. neon-20 and sodium-23
 - d. magnesium-25 and aluminum-26
 - e. None of these.
2. Some lantern mantles are manufactured using thorium-232 to increase the durability of the mantle. Thorium-232 undergoes alpha decay with a half-life of 1.4×10^{10} years. Which of the following is the product nuclide of the decay of thorium-232?
 - a. radium-228
 - b. actinium-232
 - c. proactinium-232
 - d. uranium-236
 - e. None of these.
3. Nuclear fission of uranium-235 nuclei produces ON AVERAGE:
 - a. 1 neutron.
 - b. 2 neutrons.
 - c. 3 neutrons.
 - d. 4 neutrons.
 - e. 5 neutrons.
4. Uranium-234 radioactively decays by alpha-particle emission. The neutron-to-proton ratio of the product nuclide is:
 - a. smaller than that for uranium-234.
 - b. greater than that for uranium-234.

- c. the same as that for uranium-234.
 - d. equal to 1.0.
 - e. It is impossible to tell.
5. Which of the following can be detected by a Geiger counter?
- a. alpha particles
 - b. beta particles
 - c. gamma rays
 - d. All of these.
 - e. None of these.
6. Which of the following statements about radon-222 is TRUE?
- a. The radioactive decay products of radon-222 are solids.
 - b. Radon-222 is produced via a series of radioactive decay steps from naturally-occurring plutonium.
 - c. Radon-222 is a green gas that smells like lemons.
 - d. The density of radon-222 is less than the density of air.
 - e. None of these are TRUE.
7. Strontium-90 is one of the harmful nuclides resulting from nuclear fission explosions. Strontium-90 decays by beta particle emission with a half-life of 28.0 years. How long (in years) would it take for 99.0 % of a sample of strontium-90 released in an atmospheric test of an atomic bomb to decay?
8. In which of the following medical diagnostic procedures is a radioactive substance introduced into the patient's body?
- a. MRI scan
 - b. PET scan
 - c. CAT scan
 - d. DOG scan
 - e. FISH scan
9. Fluorine-18 radioactively decays by the emission of a positron. Which of the following is the product nuclide of this decay?
- a. nitrogen-14
 - b. neon-18

- c. oxygen-18
 - d. fluorine-17
 - e. fluorine-18
10. The chemistry of atoms, molecules and ions is determined primarily by the number and arrangement of which of the following?
- a. positrons
 - b. electrons
 - c. neutrons
 - d. quarks
 - e. alpha particles
11. Uranium-235 decays in a series of steps to produce the stable nuclide, lead-207. Which of the following series of decays would produce lead-207 from uranium-235?
- a. 6 alpha + 2 beta
 - b. 3 alpha + 3 positron
 - c. 7 alpha + 4 beta
 - d. 5 alpha + 6 beta
 - e. 7 alpha
12. Which of the following statements about food irradiation is TRUE?
- a. The irradiated food is radioactive.
 - b. Irradiation of food produces chemical degradation products similar to those produced from cooking food using heat.
 - c. Food irradiation employs positrons.
 - d. The radioactive nuclide that is used in food irradiation is thorium-230.
 - e. In the US, there are no foods which have been approved by the FDA for treatment by irradiation.
13. Which of the following characteristics of particles produced by radioactive decay are important for assessing the potential for biological damage to living systems?
- a. mass
 - b. charge
 - c. penetrating ability
 - d. kinetic energy

e. All of these.

14. The first orange “Fiestaware” dishes contained salts of uranium as pigments. If one of these “Fiestaware” dishes initially contained 0.50 g of uranium-238, calculate how long it would take (in years) for the uranium-238 to decay to 0.25 g. For uranium-238,
- $$t_{\frac{1}{2}} = 4.5 \times 10^9 \text{ years.}$$

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