

## Competitive Exams: Chemistry MCQs (Practice-Test 31 of 31)

1. The carbon-14 activity of some ancient Peruvian corn was found to be 10 disintegrations/minute/gram. If present-day plant life shows 15 disintegrations/minute/gram, how old is the Peruvian corn? The half-life of carbon-14 is 5,730 years.
  - a. 1,455 years
  - b. 1,910 years
  - c. 3,350 years
  - d. 3,820 years
  - e. 9,080 years
2. Which type of nuclear process requires a temperature of over a million degrees?
  - a. beta particle production
  - b. fission reaction
  - c. alpha particle emission
  - d. fusion reaction
  - e. positron production
3. In passing through matter, alpha particles lose energy and damage tissues by producing:
  - a. neutrons.
  - b. gamma rays.
  - c. radiation.
  - d. beta particles.
  - e. ions.
4. It is well-known that uranium isotopes can undergo fission reactions and that hydrogen isotopes can undergo fusion reactions. These reactions are examples of a drive toward:
  - a. equilibrium.

- b. thermodynamic stability.
  - c. negative S.
  - d. kinetic stability.
  - e. positive G.
5. Which of the following balanced equations indicates a FUSION reaction?
- a. bismuth-209 + helium-4  $\rightarrow$  astatine-211 + 2 neutrons
  - b. helium-2 + hydrogen-2  $\rightarrow$  hydrogen-3 + hydrogen-1
  - c. plutonium-239 + neutron  $\rightarrow$  americium-240 + beta particle
  - d. uranium-239  $\rightarrow$  neptunium-239 + beta particle
  - e. beryllium-7 + electron  $\rightarrow$  lithium-7
6. Which statement is FALSE?
- a. The larger the binding energy per nucleon, the more stable the nucleus.
  - b. The alpha particle has a charge of 2 +.
  - c. The mass of a nucleus is always less than the original mass of its constituent protons and neutrons.
  - d. Alpha particle production is the only route by which unstable nuclei can spontaneously decay.
  - e. Alpha particles are more massive than beta particles.
7. Iron-49 decays by positron emission with a half-life of 0.08 seconds. What nuclide is produced in this decay process?
- a. manganese-49
  - b. cobalt-49
  - c. chromium-45
  - d. iron-48
  - e. None of these.
8. The following are produced in radioactive decay processes. Which one has neither mass nor charge?
- a. alpha particles

b. beta particles

c. gamma rays

d. positrons

e. neutrons

9. The function of the CONTROL RODS in a nuclear power plant is to:

a. slow the neutrons down so that they can cause fission.

b. absorb the heat produced so that it can be carried to an external turbine.

c. absorb neutrons to control the amount of fission that is occurring.

d. provide the fuel needed for fission to occur.

e. None of the above:

10. Smoke detectors contain a small amount of americium-241. What is the final product nuclide if americium-241 radioactively decays by a total of eight alpha decays and four beta decays?

a. rhenium-209

b. gold-209

c. bismuth-209

d. plutonium-237

e. americium-225