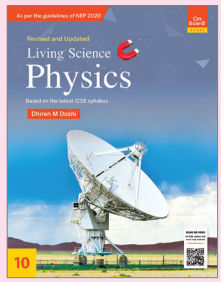
ICSE Living Science PHYSICS

Class 10



Multiple-Choice Questions

Chapter 12: RADIOACTIVITY AND NUCLEAR ENERGY

1. Which of the following particles constitute the nucleus of an atom?

   (a) Electrons only (b) Protons only

   (c) Protons and neutrons (d) Electrons and neutrons

   Ans: (c)

2. Identify the particle whose charge is negative in nature and equals 1.602×10^{19} C.

   (a) Electron (b) Proton (c) Neutron (d) None of these

   Ans: (d)

3. Identify the correct formula for the maximum number of electrons in a shell.

   (a) n (b) n^2 (c) $2n^2$ (d) $2n^3$

   Ans: (c)

4. In the element ${}^{19}_{9}F$, state its number of nucleons.

   (a) 9 (b) 10 (c) 19 (d) 28

   Ans: (c)

5. Which of the following interactions does not contribute to nuclear force?

   (a) Proton–proton (b) Proton–electron (c) Proton–neutron (d) Neutron–neutron

   Ans: (b)

6. ${}^{39}_{19}K$ and ${}^{40}_{20}Ca$ are examples of

   (a) isotopes. (b) isobars. (c) isotones. (d) none of these.

   Ans: (c)

7. In Rutherford's experiment, which of the following components was found to bend towards the negative plate?

   (a) α-particles (b) β-particles (c) γ-rays (d) None of these

   Ans: (a)

8. When does an element show spontaneous radioactivity?

   (a) When its nuclear force of attraction is greater than electrostatic force of repulsion.

   (b) When its nuclear force of attraction is equal to the electrostatic force of repulsion.

   (c) When its nuclear force of attraction is less than electrostatic force of repulsion.

   (d) None of the above.

   Ans: (c)

9. Identify the incorrect equation among the following.

(a) ${}^{A}_{Z}X \xrightarrow{\alpha-decay} {}^{A-4}_{Z+2}Y + {}^{4}_{2}He + Energy$

(b) ${}^{A}_{Z}X \xrightarrow{\alpha-decay} {}^{A-4}_{Z-2}Y + {}^{4}_{2}He + Energy$

(c) ${}^{A}_{Z}X \xrightarrow{\alpha-decay} {}^{A+4}_{Z+2}Y + {}^{4}_{2}He + Energy$

(d) ${}^{A}_{Z}X \xrightarrow{\alpha-decay} {}^{A+4}_{Z-2}Y + {}^{4}_{2}He + Energy$

Ans: **(b)**

10. Which of the following correctly states the radioactive decay law?

The rate of radioactive disintegration is

(a) directly proportional to the number of radioactive atoms present in the sample at that time.

(b) inversely proportional to the number of radioactive atoms present in the sample at that time.

(c) directly proportional to the number of radioactive atoms present in the sample at the start.

(d) inversely proportional to the number of radioactive atoms present in the sample at the start.

Ans: **(a)**

11. Which of the following radioactive emissions can also be called an electron, ${}^{0}_{-1}e$?

(a) α-particles (b) β-particles (c) γ-rays (d) None of these

Ans: **(b)**

12. Which of the following radioactive emissions has the highest ionising power?

(a) α-particles (b) β-particles (c) γ-rays (d) None of these

Ans: **(a)**

13. When high-energy electrons cause fluorescence in some atoms, it is due to the production of which of the following radiations?

(a) α-particles (b) β-particles (c) γ-rays (d) X-rays

Ans: **(d)**

14. An element ${}^{A}_{Z}X$ emits an alpha particle followed by two beta particles. The element so formed will be

(a) an isotope of *X*. (b) the original element *X*.

(c) a new element different from *X*. (d) none of these.

Ans: **(a)**

15. The correct mass–energy equivalence relationship is expressed as which of the following equations?

(a) $E = \Delta mc^{1/2}$ (b) $E = \Delta mc$ (c) $E = \Delta m/c$ (d) $E = \Delta mc^2$

Ans: **(d)**

16. 1 amu of mass destruction is equivalent of how much energy in MeV?

(a) 100 MeV (b) 500 MeV (c) 931 MeV (d) 1031 MeV

Ans: **(c)**

17. A nuclear fission reaction is given below. What is the value of *A*?

$${}^{235}_{92}\text{U} + {}^{1}_{0}n \xrightarrow{\text{Bombarded with slow neutron}} {}^{139}_{56}\text{Ba} + {}^{A}_{36}\text{Kr} + 3{}^{1}_{0}n + \text{Energy}$$

(a) 94 (b) 95 (c) 96 (d) 97

Ans: **(a)**

18. Fusion reactions are also called thermo–nuclear reactions because they

(a) take place at room temperature. (b) take place at a very high temperature.

(c) require large amount of energy. (d) none of these.

Ans: **(b)**

19. The amount of energy produced in nuclear fusion reactions

(a) is the same as in nuclear fission reactions.
(b) is less than nuclear fission reactions.
(c) is more than nuclear fission reactions.
(d) cannot be compared with nuclear fission reactions.

Ans: (c)

20. The source of energy of the sun is nuclear fusion in which hydrogen nuclei fuse at a very high temperature releasing high amount of energy. The equation is as follows.

$$4\,{}^{1}_{1}\mathrm{H} \xrightarrow{\textit{Nuclear fusion at high temperature}} \mathrm{A} + 2\,{}^{0}_{1}e + 28\ \mathrm{MeV}$$

Identify the missing component A in the product.

(a) ${}^{12}_{6}\mathrm{C}$ (b) ${}^{4}_{2}\mathrm{He}$ (c) ${}^{9}_{4}\mathrm{Be}$ (d) ${}^{13}_{6}\mathrm{C}$

Ans: (b)