

4. Which of the following quantities for a nucleus is independent of its mass number?
 (a) Density (b) Volume
 (c) Mass (d) Radius
5. The radius of a copper nucleus is of the order of
 (a) 10^{-16} m (b) 10^{-14} m
 (c) 10^{-12} m (d) 10^{-9} m
6. Binding energy of nucleus is defined as
 (a) the energy released, when the nucleus has been separated into its constituent particle
 (b) the energy added, to separate the nucleus from the constituent particles
 (c) the energy added to form the nucleus from its constituent particle
 (d) None of the above
7. The curve of binding energy per nucleon as a function of atomic mass number has a sharp peak for helium nucleus. This implies that helium
 (a) can easily be broken up
 (b) is very stable
 (c) can be used as fissionable material
 (d) is radioactive

Objective Questions

(For Complete Chapter)

Multiple Choice Questions (MCQs)

1. For the stability of any nucleus,
 (a) binding energy per nucleon will be more
 (b) binding energy per nucleon will be less
 (c) number of electrons will be more
 (d) None of the above
2. In the nuclear reaction
 ${}^{14}_7\text{N} + X \longrightarrow {}^{14}_6\text{C} + {}^1_1\text{p}$, the X will be
 (a) ${}^0_{-1}\text{e}$ (b) ${}^1_1\text{H}$
 (c) ${}^2_1\text{H}$ (d) ${}^1_0\text{n}$
3. The element with maximum value of binding energy per nucleon is
 (a) iron (b) aluminium
 (c) uranium (d) hydrogen

Assertion-Reason Questions

Directions (Q. Nos. 8-12) *In the following questions, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below*

- (a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
 - (b) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
 - (c) If Assertion is correct but Reason is incorrect.
 - (d) If both Assertion and Reason are incorrect.
8. **Assertion** Ratio of mass of nucleus of H-atom and proton is approximately 1.
Reason Nucleus of the lightest atom of hydrogen is usually known as proton.

9. Assertion Initially, it was believed that mass and energy are conserved separately in a nuclear reaction.

Reason According to Einstein, one can convert mass-energy into other forms of energy.

10. Assertion Nuclear force between neutron-neutron, proton-neutron and proton-proton is approximately the same.

Reason The nuclear force does not depend on the electric charge.

11. Assertion Binding energy per nucleon is practically constant for middle mass numbers ($30 < A < 170$).

Reason Nuclear force is short ranged in nature.

12. Assertion The detection of neutrino particles is extremely difficult.

Reason Neutrinos interact very weakly with matter.

(iii) Density of a nucleus is

(a) more for lighter elements and less for heavier elements

(b) more for heavier elements and less for lighter elements

(c) order of 10^{12} kg/m^3

(d) a constant

(iv) If R is the radius and A is the mass number, then $\log R$ versus $\log A$ graph will be

(a) a straight line

(b) a parabola

(c) an ellipse

(d) a circle

(v) The ratio of the nuclear radii of the nuclei 3_1X and ${}^{81}_{14}Y$ is

(a) 3 : 1

(b) 1 : 3

(c) 9 : 1

(d) 1 : 9

Case Based Questions

Directions (Q.No. 13) This question is case study based question. Attempt any 4 sub-parts from this question. Each question carries 1 mark.

13. Discovery of Nucleus

The nucleus was first discovered in 1911 by Lord Rutherford and his associates by experiments on scattering of α -particles by atoms. He found that the scattering results could be explained, if atoms consist of a small, central, massive and positive core surrounded by orbiting electrons. The experimental results indicated that the size of the nucleus is of the order of 10^{-14} m and is thus 10000 times smaller than the size of atom.

(i) A particle having no charge and no mass is

(a) positron (b) neutron

(c) neutrino (d) proton

(ii) Masses of nuclei of protium, deuterium and tritium are in ratio

(a) 1 : 2 : 3 (b) 1 : 1 : 1

(c) 1 : 1 : 2 (d) 1 : 2 : 4