QB365 Question Paper Software
12th Standard - Physics
Nuclei Assertion and reason

Exam Time: 00:20 Hrs | Date: 2025-09-30
Total Marks: 10

Questions:

1. **Assertion (A)** : Rydberg's constant varies with the mass number of a given element.
Reason (R) : The reduced mass of the electron depends on the mass of the nucleus only.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

2. **Assertion (R)** : $^{14}_{7}$ N is stable.
Reason (R) : Nuclei having an odd number of protons and an odd number of neutrons are generally less stable than the one having even number of protons and even number of neutrons.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

3. **Assertion (A) :** The nuclear force becomes weak if the nucleus contains too many protons compared to neutrons.
Reason (R) : The electrostatic forces weaken the nuclear force.
Codes:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

4. **Assertion (A) :** Cadmium rods used in a nuclear reactor, control the rate of fission.
Reason (R) : Cadmium rods speed up the slow neutrons.
Codes:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

5. **Assertion (A):** The mass of a nucleus is less than the sum of the masses of its individual nucleons.
Reason (R): The mass deficit is converted into binding energy, according to Einstein's mass-energy equivalence principle.
Codes:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.
(d) A is false and R is also false.

6. **Assertion (A)**: The energy released in nuclear reactions is much larger than that in chemical reactions.
Reason (R): Nuclear reactions involve changes in the nucleus, which have much higher energy densities compared to chemical reactions involving electrons.
Codes:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

7. **Assertion (A)**: The half-life of a radioactive substance is constant and independent of the initial quantity of the substance.
Reason (R): The half-life is the time taken for half of the radioactive nuclei to decay, and it remains constant for a particular radioactive isotope.
Codes:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

8. **Assertion :** Density of all the nuclei is same.
Reason : Radius of nucleus is directly proportional to the cube root of mass number.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

9. **Assertion :** Radioactive nuclei emit β^{-1} particles.
Reason : Electrons exist inside the nucleus.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

10. **Assertion :** ${}_{Z}X^{A}$ undergoes 2α, 2β- particles and 2γ-rays, the daughter product is ${}_{Z-2}Y^{A-8}$.
Reason : In α- decay the mass number decreases by 4 and atomic number decreases by 2. In β-decay the mass number remains unchanged, but atomic number increases by 1.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

Answers Key:

1. **(d)**: The Rydberg constant is given by $R = \frac{13.6\text{eV}}{hc}$ which is independent of the mass number of an element. Reduced mass of the system depends on the masses of both the electron as well as nucleus.
2. **(b)**: Nitrogen is a stable element. Those elements which have an odd number of protons 'and an odd number of neutrons are generally unstable. $^{14}_{7}$ N has 7 protons and 7 neutrons i.e., odd number of both protons and neutrons but it is an exception. It is a stable element.
3. (c) A is true but R is false.
4. (c) A is true but R is false.
5. (a) Both A and R are true and R is the correct explanation of A.
6. (a) Both A and R are true and R is the correct explanation of A.
7. (a) Both A and R are true and R is the correct explanation of A.
8. (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
9. (c) If the Assertion is correct but Reason is incorrect.
   Explanation:
   Electrons are not inside nucleus.
10. (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.