

1. Isotopes are atoms of same element with different:

- (A) atomic mass (B) atomic number  
(C) number of protons (D) number of electrons

2. One of the isotopes of uranium is  ${}^{238}_{92}\text{U}$ . The number of neutrons in this isotope is:

- (A) 92 (B) 146  
(C) 238 (D) 330

3. Which among the following radiations has more penetrating power?

- (A) a beta particle (B) a gamma ray  
(C) an alpha particle (D) all have the same penetrating ability

4. What happens to the atomic number of an element which emits one alpha particle?

- (A) increases by 1 (B) stays the same  
(C) decreases by 2 (D) decreases by 1

5. The half-life of a certain isotope is 1 day. What is the quantity of the isotope after 2 days?

- (A) one-half (B) one-quarter  
(C) one-eighth (D) none of these

6. When Uranium (92 protons) ejects a beta particle, how many protons will be in the remaining nucleus?

- (A) 89 protons (B) 90 protons  
(C) 91 protons (D) 93 protons

7. Release of energy by the Sun is due to:

- (A) nuclear fission (B) nuclear fusion  
(C) burning of gases (D) chemical reaction

8. When a heavy nucleus splits into two lighter nuclei, the process would:

- (A) release nuclear energy (B) absorb nuclear energy  
(C) release chemical energy (D) absorb chemical energy

9. The reason carbon-dating works is that:

- (A) plants and animals are such strong emitters of carbon-14  
(B) after a plant or animal dies, it stops taking in fresh carbon-14  
(C) there is so much non-radioactive carbon dioxide in the air  
(D) When plants or animals die, they absorb fresh carbon -14

**Answer Key:**

1	(B)	6	(D)
2	(B)	7	(B)
3	(B)	8	(A)

4	(C)	9	(B)
5	(A)		

## ★ Short Questions ★



**Q1: What is difference between Atomic Number and Atomic Mass number?**

**Ans:** The difference between Atomic Number and Atomic Mass number is:

Atomic Number	Atomic Mass number
Atomic number is the number protons in the nucleus of an atom of the element.	Atomic number is the total number of protons and neutrons in the atom.

**Q2: What do you mean by the term radioactivity?**

**Ans:** "Radioactivity is such a process in which the elements with the charge number greater than 82, naturally keep on radiating".

**Q3: How can we make radioactive elements artificially?**

**Ans:** For this purpose very high energy particles are bombarded on the stable element. This bombardment excites the nuclei and the nuclei after becoming unstable become radioactive element.

**Q4: What are the three basic radioactive decay processes and how do they differ from each other?**

**Ans:** There are following basic radioactive decay processes:

- Alpha decay
- Beta decay
- Gamma decay

**Q5: Write two properties of beta rays?**

**Ans:** Two properties of beta rays are:

- (i) Beta particles are of high energy electrons.
- (ii) Beta particles have speed as high as close to the speed of light.

**Q6: Explain whether the atomic number can increase during nuclear decay?**

**Ans:** Yes, atomic number can increase during nuclear decay. During the B-decay atomic number of atom can be increased.

**Q7: What do you understand by half-life of a radioactive element?**

**Ans:** "The time during which half of the unstable radioactive nuclei disintegrate is called the half-life of a radioactive element".

**Q8: Is radioactivity a spontaneous process?**

**Ans:** Radioactive decay involves the spontaneous transformation of one element into another. So, radioactivity is a spontaneous process.

**Q9: What is meant by Background radiations?**

**Ans:** Radiations present in atmosphere due to different radioactive substance are called background radiations. Everywhere in rocks, soil, water and air of our planet are traces of radioactive elements. This natural radioactivity is called the background radiation.

**Q10: Describe two uses of radioisotopes in medicine, Industry or research?**

**Ans:** Use of radioactive isotope in medicine:

- (i) Radioactive cobalt-60 is used for curing cancerous tumors and cells.

(ii) Isotopes of Iodine-131 are used for diagnosis of goiter in thyroid gland.

**Use of Radioisotope in Industry or research:**

- (i) The radioisotopes are used in a chemical reaction to follow a radioactive element during the reaction and ultimately to determine the structure.
- (ii) Radioactive isotopes are used to generate electricity by carrying out controlled nuclear fission reaction in nuclear reactors.

**Q11: What are two common radiation hazards? Briefly describe the precautions that are taken against them.**

**Ans: Common Radiations Hazards:**

- (i) Radiation burns, mainly due to beta and gamma radiations, which may cause redness and sores on the skin.
- (ii) Blindness or formation of cataract in the eye.

**Precautions:**

- The sources should only be handled with tongs and forceps.
- All radioactive sources should be stored in thick lead containers.
- Never point a radioactive source towards a person.

**Q12: What is meant by cosmic radiations?**

**Ans:** The earth, and all living things on it also receive radiation from outer space, this radiation is called cosmic radiation.

**Q13: Nuclear fusion reaction is more reliable and sustainable source of energy than nuclear fission chain reaction?**

**Ans:** Fusion reaction produces very less or, if the right atoms are chosen, no radioactive waste. In case of nuclear fission large radioactive waste is produced and disposal of radioactive waste is a complicated problem. For nuclear power, fusion is the better choice.

**Additional Short Questions**

**Q14: Define Isotopes?**

**Ans:** Isotopes are atoms of an element which have same number of protons but different number of neutrons in their nuclei.

**Q15: Define nuclear transmutation.**

**Ans:** A process in which nucleus of an unstable heavy element breaks into two nuclei of lighter elements with the emission of radiation is called nuclear transmutation.

**Q16: Define Ionization.**

**Ans:** The phenomenon by which radiations split matter into positive and negative ions is called Ionization.

**Q17: Write two properties of gamma rays?**

**Ans:** The properties of gamma rays are:

- (i) Their wave lengths and energies can vary.
- (ii) Gamma rays are electromagnetic radiation of very short wave length.

**Q18: Which has more penetrating power, an Alpha particle or a Gamma ray photon?**

**Ans:** The alpha particle has the shortest range because of its strong interacting or ionizing power. The gamma rays can penetrate a considerable thickness of concrete. It is due to their large speed and neutral nature.

**Q19: What is the difference between Natural and Artificial radioactivity?**

**Ans:** The difference between Natural and Artificial radioactivity is:

Natural Radioactivity	Artificial Radioactivity
Natural radioactivity arises from radioactive components contained in nature.	Artificial radioactivity will come through, elements produced, with in nuclear reactors as well as accelerators.

**Q20: Define Fission reaction.**

**Ans:** When a heavy nucleus such as U-235, splits or fissions, into two smaller nuclei by absorbing a slow moving neutron. This reaction is called nuclear fission reaction.

**Q21: Define nuclear fusion. Write its equation?**

**Ans:** When two light nuclei combine to form a heavier nucleus, this process is called nuclear fusion.



**Q22: Define Carbon dating?**

**Ans:** The age of a dead human, animal or tree can be estimated by comparing the activity of carbon-14 in the live and dead tree. The technique is called carbon dating.

**Q23: Define Penetrating Power?**

**Ans:** The strength of radiations to penetrate a certain material is called penetrating power.

**Q24: What is meant by tracer?**

**Ans:** Radioactive tracers are chemical compounds containing some quantity of radioisotopes.

**Q25: Write two properties of  $\alpha$ -Particle?**

**Ans:** The properties of  $\alpha$ -Particle are:

- (i) Alpha particles ejected at high speed.
- (ii) Alpha particles have a range of only a few centimeters in air.

**Q26: Define radioactive isotopes?**

**Ans:** The stable and non-radioactive elements can also be changed into radioactive elements by bombarding them with protons, neutrons or alpha particles.

**Q27: Difference between stable and unstable nuclei?**

**Ans:** Nuclei which do not emit radiations naturally are called stable nuclei.  
Nuclei which emit radiations naturally are called unstable nuclei.

**Q28: Write Half-life of Hydrogen, Lead, Uranium and Carbon?**

**Ans:** Half-life of Hydrogen, Lead, Uranium and Carbon is:

- Half-life of Hydrogen = 12.3 years
- Half-life of Lead = 10.6 years
- Half-life of Uranium =  $7.1 \times 10^8$  years
- Half-life of Carbon = 5730 years

**Q29: Define atom and write its basic particles?**

**Ans:** Atom is an indivisible particle of matter. Protons, Neutrons and Electrons are the basic particles of atom.

**Q30: Define Electron Volt?**

**Ans:** Electron volt is also a unit of energy used in atomic & nuclear physics.

$$1\text{ev} = 1.6 \times 10^{-19}$$