Chapter 9:Atomic and Nuclear Physics

MCQs;

1. The number of protons in an atom is known as its:
a) Atomic number
b) Mass number
c) Neutron number
d) Electron number
Answer: a)

2. The mass number of an atom is the sum of the number of:
a) Protons and neutrons
b) Electrons and protons
c) Neutrons and electrons
d) Protons, neutrons, and electrons
Answer: a)

3. Which of the following particles is found in the nucleus of an atom?
a) Electron
b) Proton
c) Neutron
d) Both b and c
Answer: d)

4. The electrons in an atom are arranged in:
a) Shells
b) Orbits
c) Energy levels
d) All of the above
Answer: d)

5. The discovery of the atomic nucleus was made by:
a) J.J. Thomson
b) Ernest Rutherford
c) Niels Bohr
d) Albert Einstein

Answer: b)

6. In an atom, the electrons revolve around the nucleus in:
a) Circular orbits
b) Elliptical orbits
c) Straight lines
d) Random motion

Answer: a)

7. What is the charge of a neutron?
a) Positive
b) Negative
c) Neutral
d) None

Answer: c)

8. Which of the following is a characteristic of isotopes?
a) Same number of protons but different number of neutrons
b) Different number of protons but same number of neutrons
c) Same number of electrons but different number of protons
d) Same number of protons and neutrons

Answer: a)

9. Which of the following is the lightest particle in an atom?
a) Neutron
b) Proton
c) Electron
d) Photon

Answer: c)

10. The atomic number of an element is equal to the number of:
a) Protons
b) Neutrons
c) Electrons
d) Protons and neutrons

Answer: a)

11. In a nuclear reaction, the total mass before and after the reaction is:
a) Always the same
b) Always different
c) A little bit more after the reaction
d) A little bit less after the reaction

Answer: a)

12. The process of a nucleus emitting an alpha particle is called:
a) Fission
b) Fusion
c) Alpha decay
d) Beta decay

Answer: c)

13. Which radiation has the highest penetrating power?
a) Alpha radiation
b) Beta radiation
c) Gamma radiation
d) Neutron radiation

Answer: c)

14. Which of the following is true for alpha particles?
a) They have no charge
b) They are negatively charged
c) They are positively charged
d) They have high penetration power

Answer: c)

15. Which of the following is true for beta particles?
a) They are emitted from the nucleus of an atom
b) They have no mass
c) They are positively charged
d) They are positively charged and have a high penetration power

Answer: a)

16. The emission of an electron from the nucleus of an atom is called:
a) Alpha decay
b) Beta decay
c) Gamma decay
d) Electron capture

Answer: b)

17. A substance that undergoes spontaneous emission of radiation is called a:
a) Radioactive substance
b) Stable substance
c) Magnetic substance
d) Conductor

Answer: a)

18. The half-life of a radioactive substance is defined as:
a) The time it takes for half of the substance to undergo decay
b) The time it takes for the entire substance to decay
c) The time it takes for a full cycle of radiation
d) The time required for the substance to become stable

Answer: a)

19. Which type of radiation is used in nuclear power plants to produce energy?
a) Alpha radiation
b) Beta radiation
c) Gamma radiation
d) Nuclear fission

Answer: d)

20. Which of the following particles is emitted in beta decay?
a) Proton
b) Neutron
c) Electron
d) Alpha particle

Answer: c)

21. In nuclear fusion, the nuclei of light atoms combine to form:
a) Lighter atoms
b) Heavier atoms
c) Stable atoms
d) Unstable isotopes

Answer: b)

22. The energy released in nuclear reactions is due to the conversion of:
a) Kinetic energy
b) Potential energy
c) Mass into energy
d) Energy into matter

Answer: c)

23. In fission, the nucleus of an atom splits into:
a) Two smaller nuclei and energy
b) One large nucleus and energy
c) Three nuclei and energy
d) Electrons and neutrons

Answer: a)

24. The atomic mass unit (amu) is based on the mass of:
a) Hydrogen atom
b) Oxygen atom
c) Carbon-12 isotope
d) Neutron

Answer: c)

25. Which of the following elements is commonly used as fuel in nuclear reactors?
a) Uranium-235
b) Carbon-14
c) Helium-3
d) Hydrogen-1

Answer: a)

26. The mass defect in nuclear reactions is the difference between the:
a) Mass of the nucleus and the sum of its constituent nucleons
b) Mass of the atom and the mass of the nucleus
c) Mass of the proton and neutron
d) Mass of the electron and proton

Answer: a)

27. The force that holds the nucleus of an atom together is known as:
a) Gravitational force
b) Electromagnetic force
c) Strong nuclear force
d) Weak nuclear force

Answer: c)

28. Which of the following is the product of the fission of Uranium-235?
a) Alpha particles
b) Energy and smaller nuclei
c) Neutrons and electrons
d) Gamma rays only

Answer: b)

29. Gamma rays are:
a) High energy electromagnetic waves
b) Particles with mass
c) Electrons emitted from the nucleus
d) Heavy nuclei

Answer: a)

30. Which of the following is used to detect radiation?
a) Geiger counter
b) Barometer
c) Thermometer

d) Manometer

Answer: a)

31. The main principle behind the operation of a nuclear reactor is:
a) Nuclear fission
b) Nuclear fusion
c) Radioactive decay
d) Thermal conduction

Answer: a)

32. In a chain reaction, each fission event:
a) Results in one new fission
b) Results in two new fissions
c) Causes an uncontrolled release of energy
d) Results in the decay of the radioactive substance
Answer: b)

33. The energy released by the fission of one kilogram of Uranium-235 is approximately:
a) 1000 kilojoules
b) 10,000 kilojoules
c) 1 million kilojoules
d) 100 million kilojoules

Answer: d)

34. What is the principle behind the functioning of a nuclear power plant?
a) Fission
b) Fusion
c) Radioactive decay
d) Conduction

Answer: a)

35. Which of the following radiation types is least harmful to living tissues?
a) Alpha radiation
b) Beta radiation
c) Gamma radiation

d) Neutron radiation

Answer: a)

36. The energy released in a nuclear reaction is much higher than in a chemical reaction due to the conversion of:
a) Electrons to energy
b) Mass into energy
c) Heat into work
d) Chemical bonds to energy

Answer: b)

37. Which of the following statements about nuclear reactions is correct?
a) The total mass before and after the reaction remains constant
b) Energy is conserved in nuclear reactions
c) Mass is always destroyed in nuclear reactions
d) Nuclear reactions cannot produce energy

Answer: b)

38. Which of the following particles is the most massive?
a) Electron
b) Proton
c) Neutron
d) Photon

Answer: b)

39. What happens when a radioactive substance undergoes beta decay?
a) The mass number decreases by one
b) The atomic number decreases by one
c) The atomic number increases by one
d) The mass number remains the same

Answer: c)

40. What type of radiation is used in cancer treatment?
a) Alpha radiation

b) Beta radiation
c) Gamma radiation
d) Neutron radiation

Answer: c)