3. STRUCTURE OF ATOM

SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. The sub-atomic particle with no charge is
   A)Electron B)Proton C)Neutron D)Positron.

Answer:C

Solution:Neutrons are neutral (no charge).
Electrons (A) are negative, protons (B) are positive, and positrons (D) are anti-electrons (positive charge).

2. A neutron has approximately the same mass as a _____.
   A) an alpha particle B) a beta particle
   C)an electron D) a proton

Answer:D

Solution:Neutron mass ~ Proton mass ~ 1 atomic mass unit (u).
Electrons (C) are ~1/1836 times lighter, while alpha (A) and beta (B) particles are not single subatomic particles.

3. Almost the entire mass of an atom is concentrated in the _____.
   A) protons B)electrons C)nucleus
   D)neutrons

Answer:C

Solution:The nucleus contains protons and neutrons, contributing >99.9% of an atom's mass.
Electrons (B) have negligible mass.

4. Name an atom in which the nucleus of that atom does not contain any neutrons?
   A) Oxygen B) Hydrogen C) Phosphorous D) Sodium

Answer:B

Solution:Hydrogen-1 (^1H) has 1 proton and 0 neutrons in its nucleus.

5 The atomic mass of an atom is equal to the number of
   A) Protons or electrons B) Protons
   C) Electrons and neutrons D) Protons and neutrons

Answer:D

Solution:Mass number (A) = Protons (Z) + Neutrons (N).

6. If the atomic number of an element is 6 and its mass number is 13, how many protons are contained in the nucleus?

A) 6 B) 7 C) 8 D) 13

Answer:A

Solution:Atomic number (Z) = Number of protons = 6.

Mass number (13) = Protons (6) + Neutrons (7).

7. Which statement about subatomic particles is not true?

A) An electron has far less mass then either a proton or a neutron.
B) Neutrons have no charge and no mass.
C) Unlike protons or neutrons, electrons have no mass.
D) Protons, neutrons, and electrons all have about the same mass.

Answer:B,C,D

Solution:B) False: Neutrons have no charge but have mass (~1 u).
C) False: Electrons have mass (though negligible compared to nucleons).
D) False: Protons/neutrons are ~1836× heavier than electrons.
A) True: Electrons are much lighter.

8. If atomic number for an element is 5,and its neutrons is equal to 6. calculate its mass number?

A) 10 B)12 C)11 D)13

Answer:C

Solution:Mass number (A) = Protons (Z) + Neutrons (N) = 5 + 6 = 11.

9. The sub-atomic particle with negligible mass is

A)Proton B)Electron C)Neutron D)None

Answer:B

Solution:Electron mass ˜ 0.00055 u (negligible vs. protons/neutrons).

10. Protons and neutrons present in...

A) Nucleus B)Nucleons C)Positrons D)Neutrinos

Answer:A

Solution:Protons and neutrons are nucleons (B), but they reside in the nucleus (A).

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

11. Which is /are correct about Electrons?
A)Negatively charged B)0.00054 amu
C)Discovered by J.J.Thomson. D)Present outside the nucleus.

Answer:A,B,C,D

Solution:All statements about electrons in this question are scientifically accurate.

12. Mass of Proton is /are:
A)1.007 amu B)0.00054amu
C)1.008amu D)1.672×10^{-27}kg

Answer:A,D

Solution:A) 1.007 amu: The approximate mass of a proton in atomic mass units.
D)1.672×10^{-27}kg:The exact mass of a proton in kilograms.

Statement Type:

13. **Statement I** : Electrons are having negligible mass.
Statement II : Mass of electrons is 0.0005 amu.

Answer:A

Solution:Statement I is correct because electrons have a mass of ~0.0005 amu, which is negligible compared to protons/neutrons (~1 amu).
Statement II provides the exact mass value, explaining why electrons are considered negligible in mass.

14. **Statement I** : Protons and neutrons are present inside the nucleus.
Statement II : Nucleus is the small region inside atom with positive charge.

Answer:B

Solution:Statement I is correct: Protons and neutrons (nucleons) are indeed in the nucleus.
Statement II is also correct: The nucleus is tiny and positively charged (due to protons).
However, II does not explain I—it describes the nucleus's charge/size but not why nucleons reside there.

Comprehension Type:

15. Nucleons are
A)Only protons B)Only neutrons
C)Both protons and neutrons D)Both electrons and protons.

Answer:C

Solution:Nucleons are the particles that constitute the nucleus of an

atom.
These include:Protons (positively charged),Neutrons (neutral, no charge)

Integer type:

16 Mass of electron in amu is ____x10^{-4}

Answer:5

Solution:Mass of electron = 0.0005 amu
In scientific notation: 5 × 10^{-4} amu

17. Mass number of an element is 14. then its nucleons is _____

Answer:14

Solution:Mass number (A) = Number of nucleons (protons + neutrons)
Therefore, nucleons = 14

18. Charge of neutron is _____

Answer:0

Solution:Neutrons are electrically neutral (no charge)

Matrix Matching Type:

19. **Answer:A-4,B-1,C-2,D-3**

Solution:

COLUMN-I	**COLUMN-II**
A)Mass of electron	4.0.0005 amu
B)Mass of proton	1. 1.007 amu
C)Mass of neutron	2. 1.008 amu
D)Charge of nucleus	3. Positive

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. The protons and neutrons collectively present with in the nucleus are called

A) Protons B) Nucleons C) Mesons D) Neutrinos

Answer:B

Solution:Nucleons = Protons + Neutrons (collectively).

2. What is the mass of one proton?

A)1 a.m.u B) 1 gram C) 2 kg D) 0.1 kg

Answer:A

Solution:Proton mass ˜ 1 atomic mass unit (u) (1.007276 u to be precise).

3. What is the charge of neutron?
A) +1 B) -1 C) Zero D) All of these.

Answer:C

Solution:Neutrons are neutral (no charge).

4. Smallest unit of matter is
A)Molecule B)Atom C)Mixture D)Compound

Answer:B

Solution:Atom is the smallest unit retaining an element's properties.

5. Atomic number is denoted by
A) A B)N C)Z D)P

Answer:C

Solution:Z = Atomic number = Number of protons.

6. Sum of protons and neutrons is called .....
A)Nucleus B)Mass number
C)Atomic number D)Nucleons.

Answer:B

Solution:Mass number (A) = Protons (Z) + Neutrons (N).

7. Atom consists of
A)Electron B)Proton C)Neutron D)All the above

Answer:D

Solution:Atoms contain electrons, protons, and neutrons.

8. Electron was discovered by
A)J.J.Thomson B)Goldstein C)Chadwick D)Rutherford

Answer:A

Solution:J.J. Thomson identified electrons (1897) via cathode ray experiments.

9. Protons are ..... charged particles.
A) Positive B)Negative C)Neutral D)highly negative

Answer:A

Solution: Proton charge = $+1.6 \times 10^{-19}$ C.

10. Nucleus contains .....
A)Electron B)Proton C)Neutron D)Both B and C.

Answer:D

Solution:Nucleus has protons (B) and neutrons (C). Electrons orbit outside.

JEE MAINS LEVEL QUESTIONS

1. Charge of nucleus is.....
   A)+vely charged B)-vely charged C)0 D)None

Answer:A

Solution:The nucleus contains protons (+) and neutrons (neutral), giving it an overall positive charge.

2. The proton is heavier than an electron by_____.
   A)1850 times B)1840 times C)1000 times D)100 times

Answer:B

Solution:Proton mass ˜ 1.6726×10^{-27}kg

Electron mass ˜ 9.109×10^{-31} kg

Ratio ˜ 1836:1 (closest to 1840 in options)

3. Mass number is equal to the_____.
   A) number of protons + number of electrons
   B) number of protons + number of neutrons
   C) number of neutrons + number of electrons
   D) number of electrons

Answer:B

Solution:Mass number (A) = Protons (Z) + Neutrons (N)

Electrons are not counted in mass number.

4. In 1932 who had discovered neutron?
   A) J.J Thomson B) James Chadwick
   C) Goldstein D) Rutherford

Answer:B

Solution:James Chadwick discovered neutrons in 1932 through alpha particle experiments.

5. Which of the following is not a fundamental particle?
   A) Proton B)Neutron C)Alpha particle
   D)Electron

Answer:C

Solution:Alpha particle (a) is not fundamental—it's made of 2 protons + 2 neutrons.

Fundamental particles: Proton, Neutron, Electron.

6. Which subatomic particle has a negative charge?
   A) proton B) electron C) neutron D)nucleus

Answer:B

Solution:Electron: -1.6×10^{-19} C charge.
Proton: +ve, Neutron: neutral.

7. Which of the following are true for an element?
(i) Atomic number = number of protons + number of electrons
(ii) Mass number = number of protons + number of neutrons
(iii) Atomic mass = number of protons = number of neutrons
(iv) Atomic number = number of protons = number of electrons
(A) (i) and (ii) B) (i) and (iii) C) (ii) and (iii) D) (ii) and (iv)

Answer:D

Solution:(ii) Correct: Mass number = Protons + Neutrons.
(iv) Correct: Atomic number = Protons = Electrons (in neutral atom).

(i) Incorrect: Atomic number ? Protons + Electrons.
(iii) Incorrect: Atomic mass ? Protons = Neutrons.

8. Mass of neutron is .....g.
A) 1.674×10^{-24} B) 1.674×10^{-27} C)9.1×10^{-24} D)9.1×10^{-31}.

Answer:A

Solution:Neutron mass ˜ 1.6749×10^{-24} g (or 1.675×10^{-27} kg).
Option B is in kg; others are electron masses.

9. Mass of Proton in ..... amu
A)0.0005 B)1.007 C)1.008 D)0.06

Answer:B

Solution:Proton mass ˜ 1.007276 amu (close to 1.007 in options).

10. Electrons are present ..... the nucleus.
A)inside B)outside C)everywhere D)None

Answer:B

Solution:Electrons orbit the nucleus in electron clouds (outside the nucleus).

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

11. Which of the following are correct pair about discoveries?
A) Proton-Goldstein B)Electron-Neils bohr
C)Neutron-James chadwick D)Nucleus-Rutherford.

Answer:A,C,D

Solution:A) Proton - Goldstein: Correct. Eugen Goldstein discovered protons in 1886 through canal ray experiments.
B) Electron - Neils Bohr: Incorrect. Electrons were discovered by J.J. Thomson (1897), not Bohr. Bohr proposed the atomic model.
C) Neutron - James Chadwick: Correct. Chadwick discovered neutrons in 1932.
D) Nucleus - Rutherford: Correct. Rutherford identified the nucleus via the gold foil experiment (1911).

12. The element with atomic number 8 contains :
A)8 electrons B)6 electrons C)8 protons D)6 protons.

Answer:A,C

Solution:For an element with atomic number 8 (Oxygen):
C) 8 protons: Atomic number (Z) = Number of protons.
A) 8 electrons: In a neutral atom, protons = electrons.
B) 6 electrons and D) 6 protons: Incorrect (these would correspond to Carbon, Z=6).

Comprehension Type:

Comprehension - I

Atoms take part in chemical reactions.they consists of sub-atomic particles like electrons ,protons and neutrons.

13. Charge of proton is:
A)+1 B)-1 C)+2 D)-2

Answer:A

Solution:A proton carries a positive charge of +1 elementary charge unit

Comprehension - II

14. An element X have atomic number 6 and number of neutrons is 7 .What is its mass number?
A)14 B)12 C)13 D)14

Answer:C

Solution:Given:Atomic number (Z) = Number of protons = 6

Number of neutrons (N) = 7
Mass number (A) = Protons + Neutrons = 6 + 7 = 13

15. Atomic number is equal to
A) no.of electrons B)no. of protons
C)no.of neutrons D)Both A & B

Answer:D

Solution:Atomic number (Z) = Number of protons = Number of electrons (in a neutral atom).

Integer type:

15. No. of electrons with an atom having atomic number 10 is _____

Answer:10

Solution:Atomic number (Z) = 10 means the atom has 10 protons.
In a neutral atom, the number of electrons equals the number of protons.
Thus, electrons = protons = 10.

Matrix Matching Type:

16 .**Answer:A-4,B-3,C-2,D-1**

Solution:

COLUMN-I	**COLUMN-II**
A) Electron	4. J.J.Thomson
B)Proton	3. Goldstein
C)Neutron	2. James Chadwick
D)Nucleus	1. Rutherford

KEY

				TEACHING TASK					
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
C	D	C	B	D	A	B,C,D	C	B	A
			JEE ADVANCED LEVEL QUESTIONS						
11	12	13	14	15	16	17	18	19	
A,B,C,D	A,D	A	B	C	5	14	0	A-4,B-1,C-2,D-3	
				LEARNERS TASK					
				CUQ'S					
1	2	3	4	5	6	7	8	9	10
B	A	C	B	C	B	D	A	A	D
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
A	B	B	B	C	B	D	A	B	B
			JEE ADVANCED LEVEL QUESTIONS						
11	12	13	14	15	16				
A,C,D	A,C	A	C	10	A-4,B-3,C-2,D-1				