5.BASIC 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:Neutron is neutral (charge = 0).
Electron (A): -1 charge.
Proton (B): +1 charge.
Positron (D): +1 charge (anti-particle of electron).
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).
3. Almost the entire mass of an atom is concentrated in the _____.
A) protons B)electrons C)nucleus D)neutrons
Answer:C
Solution:Nucleus contains protons + neutrons (99.9% 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:Protium (^{1}H) has 1 proton and 0 neutrons.
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) = Proton count = 6.
Neutrons = Mass number (13) - Protons (6) = 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) Neutrons have mass (~1 u).

C) Electrons have mass (9.1×10^{-31} kg).
D) Electrons have negligible mass compared to protons/neutrons.
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) = Z + 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 ˜ 0.0005 u vs. proton/neutron ˜ 1 u.
10. Protons and neutrons present in...
A) Nucleus B)Nucleons C)Positrons D)Neutrinos
Answer:A
Solution:Nucleons (protons + neutrons) reside in the nucleus.

Multiple 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:A) Negative charge: Electrons carry a charge of -1.6×10^{-19} C.
B) Mass ˜ 0.00054 amu
C) Discovery: J.J. Thomson identified electrons in 1897 (Cathode Ray Experiment).
D) Location: Electrons orbit the extranuclear region (Bohr's model).
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:The mass of a proton is:Approximately 1.0073 amu (atomic mass units)
In kilograms: 1.672×10^{-27} kg

Statement Type

A) Both statement I and II are correct and statement II is correct explanation of statement I.
B) Both statement I and II are correct and statement II is not correct explanation of statement I.
C) Statement I is correct and statement II is incorrect.
D) Statement I is incorrect and statement II is correct.
13. Statement-I : Electrons are having negligible mass.
Statement-II : Mass of electrons is 0.0005 amu.
Answer:A
Solution:Statement I is TRUE: Electrons contribute negligibly to atomic mass (~0.05% of proton mass).
Statement II is TRUE and explains I:
Electron mass = 9.1×10^{-31} kg ˜ 0.00054 amu (rounded to 0.0005 amu in the statement).

This tiny value justifies why electrons are considered "negligible" in mass compared to nucleons (protons/neutrons).

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

Answer:A

Solution:The nucleus contains protons (positive) and neutrons (neutral).
Since protons are positive and neutrons are neutral, the nucleus as a whole is positively charged.
Thus, Statement II correctly explains Statement I.

Comprehension Type

15. Atoms take part in chemical reactions.they consists of sub-atomic particles like electrons ,protons and neutrons. 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 present inside the nucleus of an atom.These include:Protons (positively charged),Neutrons (neutral charge).
Electrons are not nucleons because they orbit outside the nucleus.

Integer Type

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

Answer:5

Solution:Mass of an electron ˜ 0.00055 amu
That is ˜ 5.5 × 10^{-4} amu, which is approximately 5 × 10^{-4} amu

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

Answer:14

Solution:Mass number = Number of nucleons = protons + neutrons
So if mass number = 14, then the atom has 14 nucleons

18. Charge of neutron is _____

Answer:0

Solution:A neutron has no charge (it is neutral).So, its charge = 0

Matrix MatchingType

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

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

Solution:

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 (collective term for particles in the nucleus).

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:1 proton ˜ 1 atomic mass unit (a.m.u) ˜ 1.67×10^{-27} kg.

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 elemental properties.

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

Answer:C

Solution:Z = Atomic number = Proton count.
A = Mass number, N = Neutron count.

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 = Electrons (A) + Protons (B) + Neutrons (C).

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

Answer:A

Solution:J.J. Thomson (1897): Cathode ray experiment identified electrons.

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 = Protons (B) + Neutrons (C).

JEE MAIN LEVEL QUESTIONS

1. Charge of nucleus is.....
A)+vely charged B)-vely charged C)0 D)None
Answer:A
Solution:Nucleus contains protons (+) and neutrons (0) $\rightarrow$ Net charge = positive (equal to proton count).
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 ˜ 1.67×10^{-27}kg
Electron mass ˜ 9.1×10^{-31} kg
Ratio = $(1.67 \times 10^{-27})/(9.1 \times 10^{-31})$ ˜ 1840.
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).
4. In 1932 who had discovered neutron?
A) J.J Thomson B) James Chadwick C) Goldstein D) Rutherford
Answer:B
Solution:Chadwick identified neutrons via alpha-particle bombardment 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 = He nucleus (2p + 2n) $\rightarrow$ Composite particle.
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.
Proton: $+1.6 \times 10^{-19}$ C.
Neutron: 0 charge.
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) Mass number = p + n $\rightarrow$ True.
(iv) Atomic number = p = e (in neutral atom) $\rightarrow$ True.
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 ˜ 1.675×10^{-27} kg = 1.675×10^{-24} g.
9. Mass of Proton in ..... amu
A) 0.0005 B) 1.007 C) 1.008 D) 0.06
Answer:B
Solution:Proton mass ˜ 1.0073 amu (closest to 1.007).
0.0005 amu (A) = electron mass.
10. Electrons are present ..... the nucleus.
A) inside B)outside C)everywhere D)None
Answer:B
Solution:Electrons orbit in extranuclear space (Bohr's model).

ADVANCED LEVEL QUESTIONS

Multiple 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) Eugen Goldstein discovered protons in 1886 using anode rays.
C)Chadwick identified the neutron in 1932 via alpha-particle experiments.
D)Ernest Rutherford proposed the nuclear model in 1911 (gold foil experiment).
B)J.J. Thomson discovered electrons (1897), not Bohr. Bohr later proposed the atomic quantum model.
12. The element with atomic number 8 contains :
A)8 electrons B)6 electrons C)8 protons D)6 protons.
Answer:A,C
Solution:Atomic number (Z) = 8 (e.g., Oxygen):
Protons = 8 (defines the element).
In a neutral atom, electrons = protons = 8.

Comprehension Type

Comprehension - I :
13. Atoms take part in chemical reactions.they consists of sub-atomic particles like electrons ,protons and neutrons. 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.
Comprehension - II :
14. The sum of protons and neutrons in the nucleus of an atom is called Mass number. The no. of protons or no of electrons in an atom is called Atomic number.
i) 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:Mass number (A)=Protons (Z)+Neutrons (N)
Calculation:A=6(protons)+7(neutrons)=13
ii). 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) = Proton count (defines the element).
In a neutral atom, electron count = proton count to balance charge.

Integer Type

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

Answer:10

Solution:Atomic number (Z) = Number of protons = 10 (given).
In a neutral atom, number of electrons = number of protons.
Therefore, electrons = 10.

Matrix MatchingType

16 . COLUMN-I COLUMN-II

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

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

Solution:
A) Electron 4. J.J.Thomson
B)Proton 3. Goldstein
C)Neutron 2. James Chadwick
D)Nucleus 1. Rutherford

KEY

				TEACHING TASK					
1	2	3	4	5	6	7	8	9	10
C	D	C	B	D	A	B,C,D	C	B	A
11	12	13	14	15	16	17	18	19	
A,B,C,D	A,D	A	a	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 MAIN&ADVANCED LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
A	B	B	B	C	B	D	A	B	B
11	12	13	14-i	14-ii	15	16			
A,C,D	A,C	A	C	D	10	A-4,B-3,C-2,D-1			