6. BASIC STRUCTURE OF ATOM

TEACHING TASK

I) MCQ's with single correct answer :

1. Which of the valence orbit in case of potassium

A) 4 C) 3 C) 2 D) 1

Solution: Potassium (K) has atomic number 19. Its electronic configuration is 2,8,8,1, so its valence electrons are in the 4th orbit (n=4), but it has 1 valence electron.

Answer:A

2. Number of valence electrons present in carbon

A) 1 B) 2 C) 3 D) 4

Solution: Carbon (C) has atomic number 6. Its electronic configuration is 2,4, meaning it has 4 valence electrons.

Answer:D

3. Maximum number of valence electrons present in the atom from the following

A) Nitrogen B) Oxygen C) Carbon D) Chlorine

Solution:Nitrogen (N): 5 valence electrons (2,5)

Oxygen (O): 6 valence electrons (2,6)

Carbon (C): 4 valence electrons (2,4)

Chlorine (Cl): 7 valence electrons (2,8,7) $\rightarrow$Maximum

Answer:D

4. The electronic configuration of an element X is 2, 8.

A) O_2 B) H_2 C) Cl D) Ne

Solution:The given configuration (2,8) matches Neon (Ne), a noble gas with atomic number 10.

Answer:D

5. Find the no. of neutrons in sulphur

A) 36 B) 16 C) 18 D) 20

Solution:Sulphur (S) has atomic number 16 and mass number 32.

Neutrons = Mass no. - Atomic no. = 32 - 16 = 16.

Answer:B

6. The stable atom is

A) O_2 B) H_2 C) Cl D) Ne

Solution:Neon (Ne) is a noble gas with a complete valence shell (2,8), making it chemically inert and stable.

O_2 (A), H_2 (B), and Cl (C) are reactive.

Answer:D

7. The maximum of electrons which can be present in any shell of an atom is given by the formula

A) 2n B) $2n^2$ C) 3n D) n

Solution:The formula $2n^2$ gives the maximum electrons in the nth shell

Answer:B

8. The electrons in the shell close to nucleus are held strongly by the electric pull of protons these electrons are called

A) Valency electrons B) Free electrons

C) Bond electrons D) Bind electrons

Solution:Electrons in the innermost shell are tightly bound to the nucleus due to strong electrostatic attraction.

Answer:D

9. Distribution of electrons revolving around the nucleus of an atom in different orbits is called

A) Electronegativity B) Electro positivity

C) Electorn effinity D) Electronic configuration

Solution:Electronic configuration describes how electrons are arranged in an atom's orbitals

Answer:D

II) <u>Multi correct answer type :</u>

10. Which of the following symbols of elements are correct?

A)Mercury - Hg B)Sodium - S C) Potassium - K D) Fluorine - F

Solution:A) Mercury - Hg (From Latin Hydrargyrum)

C) Potassium - K (From Latin Kalium)

D) Fluorine - F

B) Sodium - S → Incorrect. Sodium's symbol is Na (from Latin Natrium).

Answer:A,C,D

11. Which of the following elements following latin names

A)Sodium B) Potassium C) Iron D) Mercury

Solution:A) Sodium →Natrium (Symbol: Na)

B) Potassium → Kalium (Symbol: K)

C) Iron → Ferrum (Symbol: Fe)

D) Mercury → Hydrargyrum (Symbol: Hg)

Answer:A,B,C,D

12. The orbits present in atom

A) k-shell B) B-shell C) M-shell D) L- shell

Solution:A) K-shell (n=1)

C) M-shell (n=3)

D) L-shell (n=2)

B) B-shell → No such shell exists. Shells are labeled K, L, M, N... (not A, B, C).

Answer:A,C,D

III) Comprehension Type

13. The general configuration for Phosphorus is

A) 2,8,3 B) 2,8,5 C) 2,8,7 D) 2,8,6

Solution:Phosphorus (P) has atomic number 15.

Its electron distribution across shells is:

K-shell (n=1): 2 electrons

L-shell (n=2): 8 electrons

M-shell (n=3): 5 electrons (valence shell)

Thus, the configuration is 2,8,5.

Answer:B

14. The number of electrons that can be accomodated in M shell is

A) 36 B) 18 C) 8 D) 32

Solution:The M-shell corresponds to the 3rd energy level (n=3).

Maximum electrons in a shell = $2n^2$.

For M-shell (n=3): $2 \times (3)^2 = 18$ electrons.

Answer:B

V) Match the following

15.Solution:

COLUMN -I	**COLUMN -II**
1) Oxygen	d) 2,6
2) Neon	c) 2,8
3)Magnesium	b)2,8,2
4) chlorine	a)2,8,7

Answer:1-d,2-c,3-b,4-a

16. Solution:

Element Name	**Valency electrons**
1) Fluorine	d) 7
2) Aluminium	c) 3
3)Sulphour	b) 6
4) Calcium	a) 2

Answer:1-d,2-c,3-b,4-a

LEARNERS TASK

BEGINNERS (Level - I)

I) **MCQ's with single correct answer :**

1. Maximum number of electrons present in 3rd orbit of an atom

A) 3 B) 18 C) 8 D) 32

Solution:The maximum number of electrons in any shell is given by the formula $2n^2$, where n is the shell number.

For the 3rd orbit (n=3): $2 \times 3^2 = 18$ electrons.

Answer:B

2. Configuration of calcium

A) 2, 8, 8 B) 2, 8, 2 C) 2, 8, 8, 2 D) 2, 8, 18

Solution:Calcium (Ca) has an atomic number of 20. Its electron distribution is:

K-shell (n=1): 2 electrons

L-shell (n=2): 8 electrons

M-shell (n=3): 8 electrons

N-shell (n=4): 2 electrons (valence electrons)

Answer:C

3. Magnesium will attain which element's configuration for its stability

A) He B) Mg C) Ne D) Ar

Solution:Magnesium (Mg) has the configuration 2,8,2. To achieve stability, it tends to lose 2 electrons to attain the configuration of Neon (Ne), which is 2,8 (a stable noble gas configuration).

Answer:C

4. Configuration of the atom if is electrons are these in the atom

A) 2, 8, 3 B) 2, 2, 8, 1 C) 2, 7, 4 D) 2, 8, 2, 1

Solution:Total electrons = 2 + 8 + 3 = 13

Atomic number = 13

Element = Aluminum (Al)

Configuration is correct: 1st shell (2), 2nd shell (8), 3rd shell (3)

Answer:A

5. How many electrons should be share in the third shell, of an neutral atom, if its proton number is 7.

A) 7 B) 8 C) 18 D) 0

Solution:Atomic number = 7 (Nitrogen).

Its ground-state configuration is 2,5 (K-shell: 2, L-shell: 5).

The M-shell (n=3) is empty because nitrogen's electrons only fill up to the L-shell.

Answer:D

6. There are seven electrons in third orbit of a neutral atom by filling the before two orbits according to Bohr-Bury's formula. Then what is the atomic number of atom.

A) 7 B) 17 C) 18 D) 8

Solution:According to Bohr-Bury's formula, electrons fill shells in order:

K-shell (n=1): 2 electrons

L-shell (n=2): 8 electrons

M-shell (n=3): 7 electrons (given)

Total electrons = 2 + 8 + 7 = 17 = Atomic number.

This matches Chlorine (Cl).

Answer:B

7. Maximum number of electrons that can be accomodated in M shell

A) 2 B) 8 C) 18 D) 32

Solution:The M-shell is the third energy level (n=3).

Maximum electrons = $2n^2 = 2 \times (3)^2 = 18$ electrons

Answer:C

8. Which of the following shells can be accomodated 32 electrons

A) K B) L C) M D) N

Solution:The N-shell (n=4) can hold up to $2n^2 = 2 \times (4)^2 = 32$ electrons.

Answer:D

9. The symbol used to represent atomic number

A) Z B) A C) Y D) K

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

A = Mass number (protons + neutrons).

Answer:A

10. The formula used to find the no. of neutrons is

A) M - Z B) A - Z C)$2n^2$ D) None

Solution:Neutrons (N) = Mass number (A) - Atomic number (Z).

Answer:B

11. The atomic number of sodium element is

A) 11 B) 22 C) 14 D) 32

Solution:Sodium (Na) has an atomic number of 11 (2,8,1 configuration).

Answer:A

12. Sn is the symbol of

A) Tin B) Antimony C) Sulphur D) Ferrus

Solution:Sn is the symbol for Tin (from Latin Stannum).

Answer:A

13. The symbol H_2 means

A) One atom of hydrogen B) Two atoms of nascent hydrogen

C) Two molecules of hydrogen D) One molecule of hydrogen

Solution:H_2 represents one molecule of hydrogen gas, composed of 2 atoms.

Answer:D

14. The number of un paired electrons present in Cr

A)4 B) 6 C) 5 D)3

Solution:Chromium (Cr, atomic number 24) has an exceptional configuration: [Ar] $4s^1$ $3d^5$.

$3d^5$ has 5 unpaired electrons, and $4s^1$ has 1 more, totaling 6 unpaired electrons.

Answer:B

15. The electronic configuration of scandium (Sc)

A) (Ar)$4s^2 3d^1$ B) (Ar)$4s^1 3d^2$ C)(Ar)$4s^2 3d^2$ D)None

Solution:Scandium (Sc, atomic number 21) follows the standard transition metal configuration:[Ar] $4s^2$ $3d^1$

Answer:A

16. The element similar to carbons

A) Pb B)Mn C) Mg D) Ga

Solution:Carbon (C) and Lead (Pb) belong to Group 14 of the periodic table, sharing similar valence electron configurations (4 valence electrons).

Answer:A

17. Latin Name of Mercury.

A)Hydragyrum B) Hydro C) Argentum D)All

Solution:Mercury's symbol Hg comes from its Latin name Hydrargyrum ("liquid silver").

Other Latin names:

Argentum = Silver (Ag)

Hydro = Not a Latin name for any element.

Answer:A

18. The atomicity of sulphur is

A) 8 B) 2 C) 4 D)3

Solution:Sulphur (S) exists as S8 molecules in its most stable form (8 atoms in a ring structure).

Answer:A

19. Latin Name of Tin

A)Stibium B) Stanum C) Aurum D) Ferrum

Solution:Tin's symbol Sn comes from its Latin name Stannum.

Answer:B

20. The atomicity of phosphorous is

A) 8 B)4 C) 2 D) 1

Solution:Phosphorus (P) exists as P4 molecules (tetrahedral structure) in its white phosphorus form.

Answer:B

21. How many electrons present in N-Shell

A)32 B)18 C)8 D)All

Solution:The N-shell is the 4th energy level (n=4).

Maximum electrons = $2n^2 = 2 \times (4)^2 = 32$ electrons.

Answer:A

EXPLORERS (Level - II)

I) MCQ's with more than one correct answer

1. Which of the following elements belongs to L - Shell

A) H B) C C) O D) Ne

Solution:The L-shell is the second energy level (n=2), which can hold up to 8 electrons.

Hydrogen (H): 1 electron (K-shell only)

Carbon (C): 2,4 → L-shell has 4 electrons

Oxygen (O): 2,6 → L-shell has 6 electrons

Neon (Ne): 2,8 → L-shell has 8 electrons

Answer:B,C,D

2. The isotopes of hydrogen are

A) ${}_1P^1$ B) ${}_1D^2$ C) ${}_6C^{13}$ D) ${}_1T^3$

Solution:Protium ($1H^1$) →Not listed.

Deuterium ($1D^2$ or $1H^2$) → (Option B)

Tritium ($1T^3$ or $1H^3$) →(Option D)

Answer:B,D

3. Which of the following statement is correct reg. Argon

A) Its general configuration is 2,8,7 B) atomic number is 18

C) It is a Noble gas D) Its symbol is "ar"

Solution:A) 2,8,7 →Wrong→ (Argon's configuration is 2,8,8).

B) Atomic number = 18 ?→(Argon has 18 protons).

C) Noble gas →(Argon is in Group 18).

D) Symbol "ar" →Wrong→ (Correct symbol is Ar, case-sensitive).

Answer:B,C

4. Which of the following statement is wrong

A) Atomic number of Sodium is 11

B) Symbol of Chlorine is "Ca"

C) General configuration of Silicon is 2,8,4

D) L-Shell can accomodate a maximum of 18 electrons

Solution:A) Sodium's atomic number = 11 → Correct (not wrong).

B) Chlorine's symbol = "Ca" → Wrong (Correct symbol is Cl; "Ca" is Calcium).

C) Silicon's configuration = 2,8,4 → Correct (not wrong).

D) L-shell holds 18 electrons → Wrong (L-shell max = 8 electrons; M-shell holds 18).

Answer:B,D

II) **Comprehension type**

5. The number of electrons present in sulphur

A) 16 B) 18 C) 14 D) 17

Solution:Sulphur (S) has an atomic number of 16, which means it has 16 protons and, in a neutral atom, 16 electrons.

The electron configuration is 2,8,6.

Answer:A

6. Number of protons present in Phosphorus is equal to its

A) Atomic number B) Valence electrons C) Both 1 & 2 D) None

Solution:The number of protons in an atom is always equal to its atomic number.

For Phosphorus (P):

Atomic number = 15 → 15 protons.

Valence electrons = 5 (configuration: 2,8,5).

Answer:A

III) Reason and Assertion type

7. **Assertion :** The path of rotation of electron is called as orbit.

Reason : Orbits are designated by K,L,M,N.....

Solution:Assertion (I) is true: In Bohr's model, electrons revolve in defined paths called orbits (or shells).

Reason (II) is true: Orbits are labeled as K, L, M, N... and also correspond to principal quantum numbers (n=1,2,3...).

II justifies I because the naming convention (K, L, M...) supports the concept of orbits.

Answer:A

8. **Assertion** : General configuration of neon is 2,8,8

Reason : Neon is a rare gas

Solution:Assertion (I) is false: Neon's configuration is 2,8 (atomic number = 10), not 2,8,8.

Reason (II) is true: Neon is a noble (rare) gas, but this doesn't explain the configuration error.

Answer:D

9. **Assertion :** Atomic number of carbon is "6"

Reason : The number of protons is considered as atomic number and in case of neutral atom, electron number is also considered as atomic number.

Solution:Assertion (I) is true: Carbon's atomic number is 6.

Reason (II) is true:

Atomic number = Proton number.

In neutral atoms, electrons = protons.

II justifies I by defining how atomic number relates to protons/electrons.

Answer:A

V) **Match the following :**

10. **Solution:**

Elements	**Valency electrons**
a) Oxygen	3) 6
b) Flourine	4) 7
c) Phosphorous	2) 5
d) Hydrogen	1) 1

Solution:

a-3,b-4,c-2,d-1

KEY

			TEACHING TASK						
1	2	3	4	5	6	7	8	9	10
A	D	D	D	B	D	B	D	D	A,C,D
11	12	13	14	15		16			
A,B,C,D	A,C,D	B	B	1-d,2-c,3-b,4-a		1-d,2-c,3-b,4-a			
			LEARNERS TASK						
			BEGINNERS (Level - I)						
1	2	3	4	5	6	7	8	9	10
B	C	C	A	D	B	C	D	A	B
11	12	13	14	15	16	17	18	19	20
A	A	D	B	A	A	A	A	B	B
21									
A									
			EXPLORERS (Level - II)						
1	2	3	4	5	6	7	8	9	10
B,C,D	B,D	B,C	B,D	A	A	A	D	A	a-3,b-4,c-2

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