SYMBOLS AND FORMULAE

In this chapter we will learn

- * What is a Symbol ?
- * Rules for assigning symbols
- * Atomic number & Electronic configuration
- * Bohr - Bury formula
- * Valency
  - i) Positive valency
  - ii) negetive valncy
- * What is Formula ?
- * Criss Cross method
- * Molecular weight,
- * Atomicity
- * Iso - Electronic Species

Symbol:

As you denote '+' is a symbol to addition and ' ÷ ' is a symbol for division in mathematics similarly each element is denoted by a symbol in chemistry.

Definition :

Short hand notation of an element is called Symbol.

Symbols can be denoted by thesingle letter, two letters & three letters. Many elements have their symbol derived from either the first letter (H for Hydrogen) or the first two letterrs (He for Helium)of their names.

Rules for assigning symbols :

1). An element is represented with the first letter in capital of the english name of the element.

H - Hydrogen, **N** - Nitrogen, **C** - Carbon, **O** - Oxygen.

2). When the names of two or more elements begins with the same initial letter, the letter followed by the next letter is used to represent the element.

He - Helium, **Ca** - calcium, **Si** - Silicon.

3). A few elements have symbols derived from their latin names.

Common Name	Latin Name	Symbol
Sodium	Natrium	Na
potassium	kalium	K
Copper	Cuprum	Cu
Iron	Ferrum	Fe
Gold	Aurum	Au
Silver	Argentum	Ag
Mercury	Hydragyrum	Hg
lead	plumbum	Pb
Tin	Stanum	Sn
Antimony	Stibium	Sb
Tungstun	Wolfram	W

4). Elements named after scientists.

Common Name	Scientist Name	Symbol
Bohrium	Niels bohr,	Bh
Einsteinium	Albert Einstein,	En
Mendelevium	Dmitri Mendeleev,	Md
Rutherfordium	Ernest Rutherford.	Rf
Curium	Pierre and Marie Curie	Cm
Nobelium	Alfred Nobel	Nb
Lawrencium	Ernest lawrence	Lr

5). Some elements are named after planets.

Element Name	Planet Name
Mercury	Mercury
Uranium	Uranus
Neptunium	Neptune
Tellurium	Earth
Cerium	Ceres
Palladium	The asteroid Pallas

Atomic number:

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

Atomic number(Z)= protons number (or) electrons number

Orbit or Shell:

The path of rotation of electron is called as orbit. The maximum number of electrons revolving in one orbit is equal to $2n^2$ where n= 1,2,3..... proposed by Bohr - Bury. The outer-

most orbit is also known as valence orbit. And the number of electrons in that orbit are known as valence electrons.

Stability:

If any atom contains eight electrons in its outermost { octet nature} is considered as stable atom. So every atom tries to acquire eight electrons in the outermost orbit. This is called as *octet rule*.

In this process some atoms lose its electron and some atoms gain electrons to form stable ions.

Electronic Configuration: The systematic arrangement of electrons in an orbit or shell is called electronic configuration.

Electrons revolves around the nucleus in circular orbits, these orbits are named as follows

(n = 1) 1st orbit is named as K - shell,
(n = 2) 2nd orbit is named as L - shell,
(n = 3) 3rd orbit is named as M - shell,
(n = 4) 4th orbit is named as N- shell,

Bohr - Bury Formula

To understand electronic configuration a scheme was proposed by two scientists. Bohr - Bury.

Points :

1. The maximum number of electrons that can be present in any shell or orbit of an atom is given by the formula is $2n^2$.
2. Octet rule determines the actual no. of electrons present in a shell. If an elment has 8 electrons in the valency shell configuration then it becomes stable (Octet).Except if atom has only one shell which can have two electrons (duplet).

TEACHINGTASK -I

I. Single answer type questions

1. Number of the valence orbit in case of potassium
   A) 4 C) 3 C) 2 D) 1
2. Number of valence electrons present in carbon
   A) 1 B) 2 C) 3 D) 4
3. Maximum number of valence electrons present in the atom from the following
   A) Nitrogen B) Oxygen C) Carbon D) Chlorine
4. The electronic configuration of an element X is 2, 8.
   A) O_2 B) H_2 C) Cl D) Ne
5. Find the no. of neutrons in sulphur
   A) 36 B) 16 C) 18 D) 20

6. The stable atom is

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

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

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) bound electrons

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

II. Multi correct answer type

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

A)mercury - Hg B)sodium - S

C) potassium - K D) fluorine - F

11. Which of the following elements following latin names

A)sodium B) potassium C) Iron D) mercury

12. The orbits present in atom

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

III. OOD one out

13. Sodium, Magresium, Hydrogen, Aluninium

14. Magensium, Berylium, caluium, potassium.

15. 2, 8, 13, 18, 50.

IV. Write the True or Flase

16. The atomic number of Neon is10.

17. Calcium electronic configuration is 2,8,8,2

18. Magnesium having 2 valency e-

19. Number of neutrons present in Argon are 22

V. Match the following

20.

1) Oxygen	a)2,8,7
2) Neon	b)2,8,2
3)Magnesium	c) 2,8
4) chlorin	d) 2,6

21.

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

LEARNER'S TASK

*Beginners (*LEVEL -1)

I. MCQs with only one option is correct.

1. Maximum number of electrons present in 3rd orbit of an atom
   A) 3 B) 18 C) 8 D) 32
2. Configuration of calcium
   A) 2, 8, 8 B) 2, 8, 2 C) 2, 8, 8, 2 D) 2, 8, 18
3. Magnesium will attain which element's configuration for its stability
   A) He B) Mg C) Ne D) Ar
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
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
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
7. Maximum number of electrons that can be accomodated in M shell
   A) 2 B) 8 C) 18 D) 32
8. Which of the following shells can be accomodated 32 electrons
   A) K B) L C) M D) N
9. The symbol used to represent atomic number
   A) Z B) A C) Y ID) K
10. The formula used to find the no. of neutrons is
    A) M - Z B) A - Z C) $2n^2$ D) None
11. The atomic number of sodium element is
    A) 11 B) 22 C) 14 D) 32
12. S_n is the symbol of
    A) Tin B) Antimony C) Sulphur D) Ferrus
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

Achievers (LEVEL -2)

II. Multi correct answer type

14. Which of the following elements belongs to L - Shell
    1) H 2) C 3) O 4) Ne
15. The isotopes of hydrogen are
    1) $_1P^1$ 2) $_1D^2$ 3) $_6C^{13}$ 4) $_1T^3$

III. OOD one out

16. 2,8 2,8,8 2,8,2 2.
17. Carbon, silicon, germanium, nitrogen
18. He, Ne, Ar, Na

IV. Write the True or Flase

19. Carbon name is comes from latin word carbon which mens charcoal.
20. Iodine name comes from greek work ioeides means violet.
21. Selenium name is based on moon.

V .Matching type

22.

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

Explorers (LEVEL -3)

DESCRIPTIVE TYPE QUESTIONS

23. Define atomic number?
24. Define symbol and write the some symbols of elements upto 30 elements?
25. Explain Bohr - Bury formula?

Researchers (LEVEL-4)

(Higher Order Thinking(H.O.T)

26. What is the valency shell,no of valency electrons and valency of atomic no' 16?
27 According to Bohr and Bury formula the maximum no' of electrons present in O-shell?
28. 50,18,72,98,128,These numbers are releated to ---------- concept.
29. Write the formula for to find the mass no of elements.----------
30. The atomic no of the element is equal to ---------- sub atomic particals of atom.
31. In the given below which of the following set have same no of valency electrons
A)F,I,At,Cl B)N,As,P,Sb C)Be,Mg,Ca,Sr D)All the above

Valency:

The combining power of an element is know as "Valency"

The number of electrons donated or accepted by an atom of an element so as to have eight electrons in its outermost orbit, is called as valency.

Positive valency:

If the atom donates its electrons from its outermost orbit to get stability, the valency is called as positive valency and the that ion is called as cation.

If it donates one electron or two electrons or three electrons is called as monovalent positive valency or divalent positive valency or trivalent positive valency respectively.

Example: Na^{+}, Ca^{2+}, Al^{3+}, NH_4^{+}

Monovalent electropositive ions

Name of the cation	Symbol of the cation	Charge
Hydrogen	H+	+1
Lithium	Li+	+1
Sodium	Na+	+1
Potassium	K+	+1
Rubidium	Rb+	+1
Copper	Cu+ Cuprous or Copper (I)	+1
Silver	Ag+	+1
Gold	Au+ Aurous or gold (I)	+1
Mercury	Hg^{+1} Mercurous or Mercury (I)	+1
Ammonium	NH_4^{+}	+1
Phosphonium	PH_4^{+}	+1

Name of the cation	Symbol of the cation	Charge
Beryllium	Be^{2+}	+2
Magnesium	Mg^{2+}	+2
Calcium	Ca^{2+}	+2
Strontium	Sr^{2+}	+2
Barium	Ba^{2+}	+2
Radium	Ra^{2+}	+2
Copper	Cu^{2+} Cupric or Copper (II)	+2
Mercury	Hg^{2+} Mercuric or Mercury (II)	+2
Iron	Fe^{2+} Ferrous or Iron (II)	+2
Chromium	Cr^{2+} Chromous	+2
Cobalt	Co^{2+} Cobaltous of Cobalt (II)	+2
Nickel	Ni^{2+}	+2
Manganese	Mn^{2+} Manganous or Manganese (II)	+2
Cadmium	Cd^{2+}	+2
Zinc	Zn^{2+}	+2
Lead	Pb^{2+} Plumbous or lead (II)	+2
Tin	Sn^{2+} Stannous or Tin (II)	+2

Name of the cation	Symbol of the cation	Charge
Iron	Fe^{3+} Ferric or Iron (III)	+3
Manganese	Mn^{3+} Manganic or Manganese (III)	+3
Aluminium	Al^{3+}	+3
Gold	Au^{3+} Auric or gold (III)	+3
Antimony	Sb^{3+} Antimonous or Antimony (III)	+3
Arsenic	As^{3+} Arsenous or Arsenic (III)	+3
Chromium	Cr^{3+}	+3
Cobalt	Co^{3+} Cobaltic or Cobalt (III)	+3
Boron	B^{3+}	+3

Name of the cation	Symbol of the cation	Charge
Platinum	Pt^{4+} Platinic or Platinum (IV)	+4
Lead	Pb^{4+} Plumbic or Lead (IV)	+4
Tin	Sn^{4+} Stannic or Tin (IV)	+4

Variable electropositive valency:

It has been found that sometimes an atom of a metallic element can lose electrons from the inner orbits in addition to losing electrons from the outermost orbit. For example an atom of iron lose two electrons from its outermost orbit to form iron ion (Fe^{2+}). However, under special conditions, it can lose one more electron from the last but one orbit. Thus it forms Fe^{3+}. In such situations, the element is said to exhibit variable valency.

In this for lower valency is pronounced with a suffix **-ous**, and for higher a suffix**ic** is attached at the end.

Examples: Fe^{2+}or **Fe(II)** - Fe^{3+} or **Fe(III)**, Cu^{+} - Cu^{2+}, Ag^{+} - Ag^{2+}.

Negative valence:

Non metals tend to take electrons from other elements so as to have eight electrons in their outermost orbit. The number of electrons accepted by an atom of an element is its negative valency.

An ion or radical formed by the acceptance of one electron or two electrons or three electrons for its stability is called as monovalent negative ion or divalent negative ion or trivalent negative ion respectively.

Example: $Cl^{-}, O^{2-}, N^{3-}, SO_4^{2-}, O_2^{2-}$

Monovalent electronegative ions		
Name of the anion	**Symbol**	**Charge**
Acetate	CH_3COO^- or $C_2H_3O_2^-$	–1
Formate	$HCOO^-$ or CHO_2^-	–1
Bicarbonate or Hydrogen Carbonate	HCO_3^-	–1
Bisulphate	HSO_4^-	–1
Bisulphite or Hydrogen Sulphite	HSO_3^-	–1
Hydrogen Sulphide or Bisulphide	HS^-	–1
Fluoride	F^-	–1
Chloride	Cl^-	–1
Bromide	Br^-	–1
Iodide	I^-	–1
Hypochlorite	ClO^-	–1
Iodate	IO_3^-	–1
Nitrite	NO_2^-	–1
Nitrate	NO_3^-	–1
Hypophosphite or Dihydrogen phosphate	$H_2PO_2^-$	–1
Cyanide	CN^-	–1
Thiocyanate	SCN^- Sulphocyanide	–1
Permanganate	MnO_4^-	–1
Hydride	H^-	–1
Hydroxide	OH^-	–1
Superoxide	O_2^-	–1
Hydrogen peroxide	HO_2^-	–1

Divalent electronegative ions		
Name of the anion	**Symbol**	**Charge**
Iodate	IO_3^-	– 1
Nitrite	NO_2^-	– 1
Nitrate	NO_3^-	– 1
Hypophosphite or Dihydrogen phosphite	$H_2PO_2^-$	– 1
Cyanide	CN^-	– 1
Thiocyanate	SCN^- Sulphocyanide	– 1
Permanganate	MnO_4^-	– 1
Hydride	H^-	– 1
Hydroxide	OH^-	– 1
Superoxide	O_2^-	– 1
Hydrogen peroxide	HO_2^-	– 1
Carbonate	CO_3^{2-}	– 2
Chromate	CrO_4^{2-}	– 2
Dichromate	$Cr_2O_7^{2-}$	– 2
Manganate	MnO_4^{2-}	– 2
Sulphide	S^{2-}	– 2
Sulphite	SO_3^{2-}	– 2
Sulphate	SO_4^{2-}	– 2
Oxide	O^{2-}	– 2
Peroxide	O_2^{2-}	– 2
Oxalate	$C_2O_4^{2-}$ or $\begin{matrix}COO^-\\ \vert \\ COO^-\end{matrix}$ or $\left[(COO)_2\right]^{2-}$	– 2
Zincate	ZnO_2^{2-}	– 2

Trivalent electronegative ions		
Name of the anion	**Symbol**	**Charge**
Trivalent Aluminate	$A\ell O_3^{3-}$	– 3
Arsenate	AsO_4^{3-}	– 3
Boride	B^{3-}	– 3
Borate	BO_3^{3-}	– 3
Nitride	N^{3-}	– 3
Phosphide	P^{3-}	– 3
Phosphite	PO_3^{3-}	– 3
Phosphate	PO_4^{3-}	– 3
Ferricyanide	$[Fe(CN)_6]^{3-}$ Iron(III)	– 3

TEACHING TASK-II

I. Single answer type questions

1. Fe^{3+} will be pronounced as
   A) Ferrous B) Irum C) Ferric D) Ironic
2. Which of the following contains positive charge
   A) Ammonium B) nitrogen C) Oxide D) Argon
3. What is valency and valence electrons in nitride ion ?
   A) 3, 5 B) 5, 8 C) 3, 8 D) 8, 8
4. Reason for variable valency
   A) Outer orbit contains different electrons in different conditions
   B) Along with valence electrons, inner electrons also participate under such conditions
   C) Nuclear charge changes, so attraction decreases in certain conditions
   D) All the above
5. Negative valency refers
   A) Protons and neutrons are equal B) Atom lost electrons
   C) Atom gained electrons D) Motion number is more than electron number
6. The valency of hydrogen is one in NH_3. What is the valency of nitrogen
   A) 1 B) 2 C) 3 D) 4
7. The valency of phosphate radical is
   A) 2 B) 3 C) 4 D) 5
8. The valency of nitrogen is
   A) 1 B) 3 C) 5 D) both B, C

9. What is the symbol for the nitrate ion ?

A) NO^- B) NO_2^- C) NO_3^- D) NO_2^{3-}

10. The valency of carbon is

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

II. Muliti correct answer

11. The valency of copper

A)+1 B)+2 C)-1 D)-3

12. Which of the following elements having valancy 3

A)chromium B)aluminium C)nitrogen D)phosphorous

13. valency is a

A) no. of electrons gained B)no.of electrons lost

C) no.of electrons shared D) valency electrons

14. which of the following is a radical

A) Sulphate B)Phosphate C)Ammonium D) Sodium

15. which are divalent electrolent radical

A) Oxide B) Sulphide C)Zincate D)sodium

III. **OOD one out**

16. Na^+, Ca^{2+}, Al^{3+}, NH_4^+.

17. Carbon, iron, nitrogen, manganese

18. nitrite, nitrate, Hypochlorate, phosphate

IV. **Write the True or Flase**

19. Atom can be converted into anion by gaining electrons.

20. Valency and valency shell electrons gives the same meaning.

21. Noble gases are stable regarding chemical reactions.

V. Match the following

22.

A) carbon	1) trivalent
B) hypochlorite	2) monovalent
C) sulphate	3) divalent
D) borate	4) tetravalent

LEARNER TASK

Beginners (LEVEL -1)

I. MCQs with only one option is correct.

1. The valency of lead is

A) +2 B) + 4 C) + 3 D) A & B

2. Which element occurs in free state in nature.

A) Fe B) CO C) Pt D) Ni

3. The metalloid amongest the following is
A) As B) Na C) Au D) Fe

4. The volatile metal is
A) Ag B) Cu C) Na D) Fe

5. Ferrous ion is
A) monovalent B) divalent C) trivalent D) None

6. In which of the following does manganese have an oxidation state of +4.
A) Mn_2O_3 B) Mn_2O C) Mn_2O_3 D) MnO_2

7. Valency of Nitride
A) +3 B) -3 C) +2 D) -2

8. Symbol for mercury
A) Mc B) Hg C) Mr D) My

9. Valency of the positive radical ammonium
A) 2 B) 3 C) 1 D) 0

10. One valency of copper is +1, the other one is
A) +2 B) +1 C) 0 D) +3

11. What is having the highest negative valency among the following
A) nitrate B) sulphate C) oxide D) carbide

12. Valence electrons and valency respectively in calcium
A) 2, 1 B) 2, 2 C) 8, 2 D) 2, 8

13.. Formula for sulphate ion
A) SO_4^{2-} B) SO_3^{2-} C) SO_2^{2-} D) SO_4^{-}

14. The bivalent ion among the following is
A) Nitride B) phosphade C) antimony D) Sulphate

15. Identify tetra valent ion
A) ferry cyanide B) ferro cyanide C) carbide D) hydride

16. Which of the following is monovalent anion
A) acetate B) oxide C) zincate D) Nitride

17. Two atoms of hydrogen combine with one atom of oxygen to form a molecule of water. The valency of hydrogen is
A) 3 B) 1 C) 2 D) 4

Achievers (LEVEL -2)

II. Multi correct answer type

18. Which of the following has same valency
A) Sodium B) Ammonium C) Mercurus D) Plumbus

19. Which of the following tri valent species
A) ferric B) manganic C) Arsenic D) Plumbic

20. Stability atom depends on
A) Octet configuration B) energy C) Size D) proton number

21. Radicals are formed by

A) single atoms only B) two atoms of same element

C) two atoms of different elements D) loosing or gaining of electrons

III. Pick odd one out and give your reason

22. Platinum, lead, tin , Boron

23. Ferrous , barium , cupric , chromous.

IV. Correct the sentence if it is correct otherwise rewrite the sentence.

24. peroxide ion is $O_2^{-2.}$

25. Sodium is a divalent mtallic ion .

26. alluminium is having 3 valency electrons.

27. nitrogen can vgain 3 valency electrons to get stable.

V. Match the following:

28.

Column - I	***Column - II***
a) carbide	1) one
b) Ferric	2) two
c) carbonate	3) three
d) Chloride	4) four

29.

Column - I	***Column - II***
a) Cation	1) NH_4^+
b) Anion	2) N^{3-}
c) Stable	3) CO_3^{2-}
d) compound	4) NH_3

Explorers (LEVEL -3)

DESCRIPTIVE TYPE QUESTIONS

30. Explain variable valency with some examples ?

31. Define electropostive electronegative valency?

Researchers (LEVEL-4)

Higher Order Thinking(H.O.T)

32. The name of anion present in H2C2O4.

33. Valency of Chlorine in 3rd excited state.

34. Valency of carbon in ground state.

35. In which of the following does manganese have an oxidation state of 1.

A) Mn_2O_3 B) Mn_2O C) Mn_2O_3 D) MnO_2

36. Write the total seven metalloids name in periodic table.
37. Which metalloids mostly used in Nano technology.
38. In the given below,which of the following are isoelectronic species.
Ne,Al^{+3},Si^{+4},F^{-1},O^{-2},N^{-3}.

Formula:

Write the symbolic representation of one molecule of a compound representing the number of atoms of various elements present in it, is called formula of the compound.

Criss - cross Method:

Step I: Write the symbol of positive ion or radical to the left side and for the negative ion or radical to the right side.

Step II: Put the valency number of each radical or ion on its top right. Divide the valency numbers by highest common factor, if any, to get simple ratio. Now ignore (+) and (-) symbols. Interchange the valency numbers of radicals or ions as once superscript to others subscript and vice versa.

Step III: If the radicals receives a number more than one, enclose it within brackets. Donot enclose ions in brackets.

Example 1 : **Step I:** Ca^{2+}, Cl^{-} **Step II:** $Ca^{2}\times^{1}Cl$ **Step III:** $CaCl_2$.

Example 2: **Step I:** Mg^{2+}, OH^{-} **Step II:** $Mg^{2}\times^{1}OH$ **Step III:** $Mg(OH)_2$.

Information from the formula of a compound:

When a numeral is written on the left hand side before the formula, it represents number of molecules of the compound. Example: 2NaCl, 4ZnO etc.

When the numeral is written on the right bottom side of the symbol, it represents the number of atoms in one molecule of a compound . Example: $Al_2(SO_4)_3$. In this 2 atoms of aluminium , 3 atoms of sulphur and 12 atoms of oxygen are present.

It is able to calculate its molecular weight by looking at a molecular formula.

Molecular weight:

The weight of the molecule of the compound is called as its molecular weight. To calculate it add all atoms atomic weight. For example, to calculate $Al_2(SO_4)_3$ weight add the weight of 2 atoms of aluminium, weight of three atoms sulphur and weight of twelve atoms weight of oxygen.

((2 x 27) + (3 x 32) + (12 x 16)) = (54 + 96 + 192) = 352 units.

Atomicity:

Number of atoms present in a molecule of an element is called as atomicity.

Mono atomic molecules - All Noble gases[He,Ne, Ar, Xe, Kr, Rn]

Diatomic molecules - Hydrogen [H_2],Oxygen[O_2],Nitrogen[N_2], Chlorine[Cl_2], Bromine,[Br_2],Iodine[I_2],

Tri atomic molecules - Ozone[O_3],

Tetra atomic molecules - phosphorous[P_4],

Octa atomic molecules - Sulphur[S_8],

Isoelectronic:

Two or more molecules or ions or molecules and ions which contain same number of electrons is called as isoelectronic with each other.

Ex: NH_3, CH_4, N^{3-}.

TEACHING TASK -III

I. Single answer type questions

1. By using criss-cross method, the formula may obtain for oxide and potassium is

   A) K_2O_3 B) K_2O_2 C) K_2O D) KO

2. Number of electrons present in ammonium ion are

   A) 9 B) 10 C) 11 D) 12

3. Isoelectronic with O^{2-} is

   A) CH_4 B) Al^{3+} C) Mg^{2+} D) all

4. To form a molecule of Aluminium nitride, how many aluminium and nitrogen atoms are required respectively

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

5. Formula for the radicals magnesium and sulphide

   A) Mg_2S_3 B) MgS C) Mg_3S_2 D) MgS_2

6. Outermost shell of two elements X and Y have three and five electrons respectively.
   If they combine expected formula of the compound will be

   A) XY B) X_2Y C) X_3Y_4 D) X_2Y_3

7. Molecular weight of $MgCO_3$

   A) 74 B) 84 C) 72 D) 68

8. The chemical formula of photassium super oxide is

   A) KO_2 B) K_2O C) K_2O_2 D) KO

9. Chemical formula for calcium sulphate is $CaSO_4$. The formula for ferric sulphate will be:

   A) $Fe_2(P_2O_7)_3$ B) $Fe_4P_3O_{14}$ C) $Fe_2(SO_4)_3$ D) Fe_3PO_4

10. Select the correct formula for each of the following compounds:
i) Calcium carbonate ii) Calcium hydrogen carbonate

	(i)	(ii)		(i)	(ii)
A)	$Ca(OH)_2$	$CaCO_3$	B)	$CaCO_3$	$Ca(HCO_3)_2$
C)	$CaCO_3$	$Ca(OH)_2$	D)	$Ca(HCO_3)_2$	$Ca(OH)_2$

11. A metal M forms a compound M_2HPO_4. What will be the formula of the metal sulphate?
A) M_2SO_4 B) $M_2(SO_4)_3$ C) MSO_4 D) $M(SO_4)_3$

II. MCQs with more than one answer:

12. In which of the following compounds metal is having valency 1?
A) NaCl B) LiCl C) $MgCl_2$ D) CsCl

13. which of the following are di atomic molecules?
A)Cl_2 B)Br_2 C)I_2 D)O_2

III. OOD one out

14. Helium , Neon , Argon, Phosphorous

15. N^{-3}, O^{-3} ,O^{-2}, F^-

IV. Write the True or Flase

16. Sulphur atomicity is 8.

17. The number of electrons in ammonia 10.

18. The atoms which contain eight electrons in the outermost configuration are unstable.

19. proton number varies from atom to its ion.

V. Match the following

20.

Column-I	**Column -II**
a) Hg_2Cl_2	1) Manganous sulphate
b) $Ca(OH)_2$	2) Sodium dichromate
c) $MnSO_4$	3) Calcium hydroxide
d) $Na_2Cr_2O_7$	4) Mercurous chloride
	5) Nickel bisulphate

LEARNER TASK

Beginners (LEVEL - 1)

I. MCQs with only one answer is correct:

1. Number of electrons transfer takes place from magnesium to oxygen in the formation of magnesium oxide.
A) 4 B) 3 C) 2 D) 1

2. Name of the molecule that will form from two sodium atoms, one carbon atom and three oxygen atoms
   A) Sodium Oxide B) Sodium Carbon trioxide
   C) Sodium Carbonate D) Sodium Carbon dioxide
3. The atomicity of phosphorous is
   A) 4 B) 8 C) 2 D) 1
4. The chemical formulae of a compound shows the
   A) arrangement of atoms in the compound
   B) mass of atoms in each of its molecule
   C) number of atoms that have chemically combined in a molecule
   D) number of atoms that have been mixed physically mixed in a molecule.
5. Molecular weight of water is
   A) 28 B) 18 C) 8 D) None
6. The number of oxygen atoms in $Pb(NO_3)_2$ are
   A) 2 B) 3 C) 5 D) 6
7. The number of oxygen atoms in sulphur dioxide is
   A) 1 B) 2 C) 3 D) 4
8. The ratio of hydrogen and oxygen in water is
   A) 1 : 2 B) 2 : 1 C) 4 : 1 D) 1 : 4
9. Formula for calcium carbonate is
   A) $CaCO_3$ B) $CaHCO_3$ C) Na_2CO_3 D) $CuCO_3$
10. That symbol of lead is
   A) Pb B) Cu C) Ag D) Au
11. A formula has :
   A) Qualitative significance only B) Quantitative significance only
   C) Both qualitative and quantitative significance. D) None of these
12. What is the formula of hydrochloric acid
   A) HCl B) H_2 C) Cl_2 D) H_2SO_4
13. The symbolic representation of actual number of atoms in molecule is called
   A) Valency B) Formula C) Both 1 & 2 D) Ion
14.. The chemical formula of water is:
   A) H_2O_2 B) H_2O C) O_2 D) H_2
15. The valency of tin in $SnCl_2$ is ____A_____ and $SnCl_4$ is _____B_____.

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

16. Identify the right chemical formula for the following compounds.

i) Calcium sulphate ii) Magnesium oxide iii) Potassium nitrite

	i	*ii*	*iii*
A)	$Ca(HSO_4)_2$	MgO	KNO_3
B)	$CaSO_4$	MgO	KNO_2
C)	CaS	Mg_2O_2	KNO_3

D) None of the above

17. Sodium phosphate has the chemical formula

A) $Na_2P_2O_7$ B) Na_3PO_4 C) $Na_4P_2O_7$ D) Na_3PO_3

18. Correct formula of a trivalent metal nitride is:

A) M_3N_2 B) M_3N_3 C) MN D) Both 2 and 3

Achievers (LEVEL - 2)

II. MCQs with more than one answer:

19. The information that you can observe from a formula

A) number of atoms B) shape of the molecule C) molecular weight D) colour

20. Identify the atoms that which can form negative valencies

A) chlorine B) berylium C) oxygen D) nitrogen

21. Identify the elements which can form variable valency

A) oxygen B) copper C) Iron D) Flourine

22. Which contain same electron number from the following

A) H_2 B) He C) Li^+ D) Na^+

23. The atoms that will donate electrons for their stability

A) Na B) Li C) N D) Ca

24. The compounds that can form using two carbons one oxygen and six hydrogen from the following are

A) C_2H_5OH B) CH_3CHO C) CH_3CH_2O D) CH_3-O-CH_3

25. Which of the following contain same valence electrons

A) Argon B) Neon C) Magnesium ion D) Oxide ion

26. Which following contain same number as valence orbit

A) Sulphur (16) B) Oxygen (8) C) Silicon (14) D) Argon (18)

27. Identify the correct statement/s:

A) The representation of a molecule of a substance (element or compound) in terms of symbols and subscript numbers is known as the formula.

B) Atoms of different elements combine in certain fixed ratio to form a compound.

C) All chemical compounds are represented by their respective formulae.

D) None of the above.

28. Which of the following formula is having 2 atoms?

A) HCl B) $HgCl_2$ C) CaO D) $CaCO_3$

III. Odd one out

29. H_2S, $NaHSO_4$, SiO_2, $NaCl_2$

30. CaO , NaCl, HCl,$CaCO_3$

IV. True or False

31. A formula has qualitative as well as quantitative significance.

32. Quantitatively it represents the actual number of atoms of each element present in one molecule of the substance.

33. The formula of calcium carbonate is $CuCO_3$.

34. The formula of Sodium chloride is NaCl.

V. Match the following:

	Column-I	**Column-II**
35.	a) Mercurous chloride	1) $PbCrO_4$
	b) Lead chromate	2) $CaOCl_2$
	c) Solid carbondioxide	3) CO_2
	d) Calcium oxychloride	4) Hg_2Cl_2
		5) H_2SO_4

VI. Comprehension Type:

The representation of a molecule of a substance in terms of symbols & subscripts numbers is known as formule.

The representation of a molecule of a substance (element or compoun4) in terms of symbols and subscript numbers is known as the formula.

36. A metal M forms a compound MPO_4. What will be the formula of the metal sulphate?

1) M_2SO_4 2) $M_2(SO_4)_3$ 3) MSO_4 4) $M(SO_4)_3$

37. Chemical formula for sodium sulphate is Na_2SO_4. The formula for trivalent metal sulphate will be:

1) $M_2(P_2O_7)_3$ 2) $M_4P_3O_{14}$ 3) $M_2(SO_4)_3$ 4) M_3PO_4

38. The phosphate of a metal has the formula MPO_4. The formula of its nitrate will be:

1) MNO_3 2) $M_2(NO_3)_2$ 3) $M(NO_3)_2$ 4) $M(NO_3)_3$

Explorers (LEVEL - 3)

I. Descriptive type questions.

39. Write down the criss cross method for magnesium and sulphate?

40. Calculate the molecular weight of Phosphorous molecule?

41. Write down the following in their stable form?

i) Na ii) Ca iii) Ar iv) Li

42. A metal M forms a compound M_2HPO_4.What will be the formula of the meatlsuphate?

43. Formula of chromic acid is H_2CrO_4.What is the formula of its divalent metal chromate?

Researchers (LEVEL-4)

Higher Order Thinking(H.O.T)

44. A metal Ca forms a compound [$Ca_2P_2O_7$] Calcium pyro phosphate. Predict the formula of the Ferric pyrophosphate by criss cross method?

45. The formula of a metal phosphate is MPO_4. The formula of its nitrate according to criss cross method?

46. The atomicity of Ar is how much?

47. What is the molecular weight of tetra atomic phosphorus & Octa atomic Sulphur

48. Calculate the number of electrons in NH_3,CH_4 & N^{-3} species?

49. Write the electronic configuration of the following elements

i) Hydrogen ii) Carbon iii) Sulphur iv) Neon

50. 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

51. There are Eight 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) 8 C) 18 D) none

Additional Practice Bits

1. Number of valence electrons present in Fluorine

A) 5 B) 3 C) 7 D) 4

2. The electronic configuration of an element X is 2, 8,7.

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

3. Maximum number of electrons present in 7th orbit of an atom

A) 50 B) 98 C) 100 D) 32

4. The formula used to find the mass no' of element is

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

5. The valency of inert gases are

A) 8 B) 2 C) zero D) none

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1. The atoms that will accept electrons for their stability

A) S B) F C) N D) Ca

2. O^{-2},O^{-3},N^{-3},Ca^{+2},K^{+1}.

3. W is the symbol of

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

4. The atomic number of Bromine element is

A) 41 B) 32 C) 34 D) 35

5. The no' of neutrons present in Iron.

A) 40 B) 30 C)31 D) 35

6. Ferric ion is

A) monovalent B) divalent C) trivalent D) None

7. Molecular weight of $C_6H_{12}O_6$

A) 180 B) 184 C)1 72 D) 168

KEY:

Teaching task:I

1-D 2-D 3-D 4-D 5-B 6-D 7-B 8-D 9-D 10-A,C,D

11-A,B,C,D 12-A,B,C 13-Hydrogen 14-Potasium 15-13 16-T 17-T 18-T 19-T 20-d,c,b,a 21-d,c,b,a

Learner's task:

1-B 2-C 3-C 4-A 5-D 6-B 7-C 8-D 9-A 10-B 11-A 12-A 13-D 14-2,3,4 15-1,2,4 16-2,8,2 17-Nitrogen 18-Na 19-T 20-T 21-T 22-3,4,2,1

H.O.T:

26-3,6,2 27-50 28-Maximun no of electrons in shells ($2n^2$) 29)A=n+Z 30-Proton and electrons 31-D

Teaching Task:II

1-C 2-A 3-C 4-D 5-C 6-C 7-B 8-B 9-C 10-D 11-A,B 12-B,C,D 13-A,B 14-A,B,C 15-A,B,C 16-NH4+ 17-Nitrogen 18-Phosphate 19-T 20-F 21-T 22-4,2,3,1

Learner Task:II

1-B 2-D 3-A 4-C 5-B 6-D 7-B 8-B 9-C 10-A 11-D 12-B 13-A 14-D 15-C 16-A 17-B 18-A,B,C 19-A,B,C 20-A,C 21-B 22-Boron 23-Barium 24-T 25-F 26-T 27-T 28-4,3,2,1 29-1,3,2,4 32-$C_2O_4^{-2}$(Oxalate) 33-7 34-2 35-B 36-B,Si,Ge,As,Sb,Te,Po. 37-Si,Ge. 38-All

Teaching Task:III

1-C 2-D 3-D 4-D 5-B 6-A 7-B 8-A 9-C 10-B 11-A 12-A,B,D 13-A,B,C,D 14-Phosphorous 15-O^{-3} 16-T 17-T 18-F 19-T 20-4,3,1,2.

Learner 's Task:III

1-C 2-C 3-A 4-C 5-B 6-D 7-B 8-B 9-A 10-A 11-C 12-A 13-B 14-B 15-A 16-B 17-B 18-D 19-A,C 20-A,C,D 21-B,C 22-A,B,C 23-A,B,D 24-A,D 25-A,B,C,D 26-A,C,D 27-A,B,C 28-A,C 29-NaCl 30-$CaCO_3$ 31-T 32-T 33-F 34-T 35-4,1,3,2 36-2 37-3 38-4

Additional practice bits:

1-C 2-C 3-B 4-B 5-C

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1-A,B,C 2-O^{-3} 3-C 4-D 5-B 6-C 7-A