11TH CHEMISTRY | VOLUME -1

Unit - 1

Basic concepts of chemistry and chemical calculation

Two marks & Three marks

1) **Define relative atomic mass**

The relative atomic mass is defined as the ratio of the average atomic mass factor the unfied atomic mass unit.

Relative atomic mass(z) : $\frac{\text{average mass of the atom}}{\text{unfied atomic mass}}$

2) **Understand by the term mole**

One mole is the amount of substance of a system, which contains elementary particles as there are atom in 12g of c-12 isotopes.

3) **What do you understand by the term oxidation number.**

Oxidation number is defined as the imaginary charge left on the atom when all other atoms of the compound have been removed in their usual oxidations states.

4) **Distinguish between oxidation and reduction.**

S.no	Oxidation	Reduction
1.	Additional of oxygen	Removal of oxygen
2.	Removal of hydrogen	Additional of hydogen
3.	Loss of electron	Gain of electron
4.	Increases in oxidation number	Decreases in oxidation number

5) **Equivalent mass.**

Gram equivalent of an element, compound or irom is the mass that combines or displaces 1.008g hydrogen (or) 8g oxygen (or)35.5g chlorine.

6) **Avogadro number.**

The total number of entities present in on mole of any substance is equal to 6.022x10(23) . This number is called avagadro number.

7) **What is limiting reagent.**

8) **What is gram equivalent mass.**

Equivalent mass has no unit but gram equivalent mass has the unit g eq-1 .

9) **Calculate relative atomic mass of h.**

Unit-2

Quantum mechanical model of atom.

10) **Information about the shape,energy,orientation and size of orbitals?**

->principle quantum number(n)

->azimuthal quantum number(l)

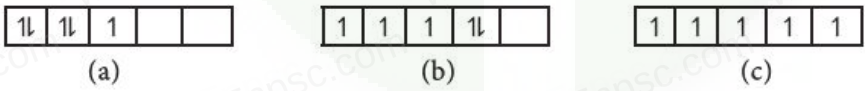
->magnetic quantum number(m1)

11) **How many orbitals are possible for n=4?**

4s,sp,4d and 4f orbitals = 1+3+5+7

= 16 orbitals

12) **Consider the following electronic arrangements for the d^5 configuration.**



(a) (b) (c)

(i) which of these represents the ground state

(ii) which configuration has the maximum exchange energy.

I)(c)represent the ground state among the given three d^5 electronic arrangements.

Ii)also, (c) has th maximum exchange energy.

13) **State and explain pauli's exculsion principle.**

Pauli formulated the exclusion principle which states that "no two electrons in an atom can have the same set of values of all four quantum numbers."

14) Define orbital? What are the n and 1? $3p_x$ and $4d_{x^2-y^2}$ electron?

Orbital is a three dimensional space in which the probability of finding the electron is maximum.

Orbital	N- value	L-value
$3p_x$	**3**	**1**
4d x^2 **-**Y^2	**4**	**2**

15) Define aufbau principle?

In an atom, the electrons are filled in various orbitals according to aufbau principle, pauli exclusion principle and of values of all four quantum numbers."

16) Give the electronic configuration of mn2+ and cr3+

Mn2+ (23 e-s) : $1s^2 2s^2 2p^6 3p^6 4s^0 3d^5$

Cr3+ (21 e-s) : $1s^2 2s^2 2p^6 3p^6 4s^0 3d^3$

17) Calculate the energy required for the process.

He+ (g) → he2+ (g) + e-

the ionisation energy for the h atom in its ground state is - 13.6 ev atom-1.

$$He^+ \rightarrow He^{2+} + e^-$$

$$E_n = \frac{-13.6z^2}{n^2}$$

$$E_1 = \frac{-13.6\,(2)^2}{(1)^2} = -56.4$$

$$E_\infty = \frac{-13.6(2)^2}{(\infty)^2} = 0$$

$\therefore$ Required Energy for the given process = $E_\infty - E_1 = 0 - (-56.4) =$ 56.4 ev

18) What is the de broglie wave length of an electron, which is accelerated from the rest, through a potential difference of 100v?

Potential difference = 100V

$$= 100 \times 1.6 \times 10^{-19} J$$

$$\lambda = \frac{h}{\sqrt{2mev}}$$

$$= \frac{6.626 \times 10^{-34} Kgm^2 s^{-1}}{\sqrt{2 \times 9.1 \times 10^{-31} Kg \times 100 \times 1.6 \times 10^{-19} J}}$$

$$\lambda = 1.22 \times 10^{-10} m$$

19)

Identify the missing quantum numbers and the sub energy level

n	l	m	Sub energy level
?	?	0	4d
3	1	0	?
?	?	?	5p
?	?	-2	3d

n	l	m_l	sub energy level
4	2	0	4d
3	1	0	3p
5	1	any one value −1, 0, +1	5p
3	2	−2	3d

20) Heisenberg's uncertainty principle

Heisenberg arrived at his uncertainty principle, which states that 'it is impossible to accurately determine both the position as well as the momentum of a microscopic particle simultaneously'.

$\Delta x.\delta p \geq h/4\pi$

21) Conclusion of rutherford's α-ray scattering experiment?

Rutherford's α-ray scattering experiment results proved that thomson's model was wrong

(i) most of the α–particles passed through the foil

(ii) some of them were deflected through a small angle

(iii) very few α–particles were reflected back by 180°

22) Principal quantum number (n):

This quantum number represents the energy level in which electron revolves around the nucleus and is denoted by the symbol 'n'.

1. The 'n' can have the values 1, 2, 3,... n=1 represents k shell; n=2 represents l shell and n = 3, 4, 5 represent the m, n, o shells, respectively.

2. The maximum number of electrons that can be accommodated in a given shell is $2n^2$.

23) Azimuthal quantum number (l) or subsidiary quantum number ?

1. It is represented by the letter 'l', and can take integral values from zero to n-1, where n is the principal quantum number

2. Each l value represents a subshell (orbital). L = 0, 1, 2, 3 and 4 represents the s, p, d, f and g orbitals respectively.

24) Magnetic quantum number (ml)?

1. It is denoted by the letter 'ml '. It takes integral values ranging from -l to +l through 0. I.e. If l=1; m = -1, 0 and +1

2. The zeeman effect (the splitting of spectral lines in a magnetic field) provides the experimental justification for this quantum number.

Unit - 3

Periodic classification of elements

25) Define modern periodic law.

"the physical and chemical properties of the elements are periodic functions of their atomic numbers." Based on this law, the elements were arranged in order of their increasing atomic numbers.

26) What are isoelectronic ions? Give examples.

Ions with same number of electons are called isoelectronics. Eg.

Na^+**,F,** mg^+

27) What is effective nuclear charge ?

The net nuclear charge experienced by valence electrons in the outermost shell is called the effective nuclear charge. It is approximated by the below mentioned equation.

$$Z_{eff} = z - s$$

28) Define electronegativity.

It is defined as the relative tendency of an element present in a covalently bonded molecule, to attract the shared pair of electrons towards itself.

29) In what period and group will an element with z = 118 will be present?

The electronic configuration is (

) therefore, this element belongs to period no.7 and group no.18 along with inert gases

30) Give the general electronic configuration of lanthanides and actinides?

Lanthanides : $4f^{1-14}\ 5d^{0-1}\ 6s^2$

Actinides : $5f^{0-14}\ 6d^{0-2}\ 7s^2$

31) Why halogens act as oxidising agents?

Halogens having the general electronic configuration of ns2, np5 readily accept an electron to get the stable noble gas electronic configuration (ns2, np6), and therefore in each period the halogen has high electron affinity. (high negative values). Hence they acts as oxidiising agents.

32) Explain the diagonal relationship.

On moving diagonally across the periodic table, the second and third period elements show certain similarities. Even though the similarity is not same as we see in a group, it is quite pronounced in the following pair of elements.

the similarity in properties existing between the diagonally placed elements is called 'diagonal relationship'.

33) **Notes on triads and periods**

Triads :

In 1817, j. W. Döbereiner classified some elements such as chlorine, bromine and iodine with similar chemical properties into the group of three elements called as triads

Periods:

The vertical columns are called groups and the horizontal rows are called periods.

34) **Define periodic law.**

Unit - 4

Hydrogen

35) **What is water-gas shift reaction ?**

The carbon monoxide of the water gas can be converted to carbon dioxide by mixing the gas mixture with more steam at 400°c and passed over a shift converter containing iron/copper catalyst. This reaction is called as water-gas shift reaction.

Co + h2 o o co2 + h2

36) **What are isotopes? Write the names of isotopes of hydrogen?**

Hydrogen has three naturally occurring isotopes, viz., protium ($_1H^1$ or H), deuterium ($_1H^2$ or D) and tritium ($_1H^3$ or t)

37) **Give the uses of heavy water.**

1. Heavy water is widely used as moderator in nuclear reactors as it can lower the energies of fast neutrons

2. It is commonly used as a tracer to study organic reaction mechanisms and mechanism of metabolic reactions

3. It is also used as a coolant in nuclear reactors as it absorbs the heat generated.

38) **How do you convert parahydrogen into ortho hydrogen ?**

1) the para-form can be catalytically transformed into ortho-form using platinum or iron.

2) it can also be converted by passing an electric discharge.

3) heating above 800° c

4) mixing with paramagnetic molecules such as o2 , no, no2 or with nascent/atomic

39) **Mention the uses of deuterium?**

1) as moderator in nuclear reactors

2)to find the mechanism of a chemical reaction iti is used as tracer element.

40) **Nh3 has exceptionally high melting point and boiling point as compared to those of the hydrides of the remaining element of group 15 - explain.**

41) **Why interstitial hydrides have a lower density than the parent metal.**

Metallic (interstitial) hydrides: metallic hydrides are usually obtained by hydrogenation of metals and alloys in which hydrogen occupies the interstitial sites (voids). Hence, they are called interstitial hydrides.

42) Compare the structures of H_2O and H_2O_2.

43) **Note the inter and intramolecular hydrogen bond?**

Inter molecular hydrogen bond:

1.intermolecular hydrogen bonds occur between two separate molecules.

2.they can occur between any numbers of like or unlike molecules as long as hydrogen donors and acceptors are present in positions which enable the hydrogen bonding interactions.

Intramolecular hydrogen bond

1.intramolecular hydrogen bonds are those which occur within a single molecule.

44) **Preparation of tritium?**

As explained earlier the tritium is present only in trace amounts. So it can be artificially prepared by bombarding lithium with slow neutrons in

a nuclear fission reactor. The nuclear transmutation reaction for this process is as follows.

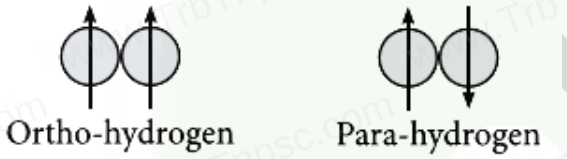
$$^{6}_{3}\mathrm{Li} + ^{1}_{0}\mathrm{n} \rightarrow ^{4}_{2}\mathrm{He} + ^{3}_{1}\mathrm{T}$$

45) Uses of h_2O_2?

It is used in water treatment to oxide pollutants, as a mild antiseptic, and as bleach in textile, paer and hair - care industry.

46) What is ortho and para hydrogen?

In the hydrogen atom, the nucleus has a spin. When molecular hydrogen is formed, the spins of two hydrogen nuclei can be in the same direction or in the opposite direction as shown in the figure. These two forms of hydrogen molecules are called ortho and para hydrogens respectively.



47) Any two types of hydrogen?

Unit -5

Alkali and alkaline earth metals

48) Why sodium hydroxide is much more water soluble than chloride?

1.NaoH is strong base.

2.it is dissolves in water to give a strong alkaline solution

3. 36g of nacl dissolves in 100g of water. The solubility does not increase with increase in temperature.

49) Explain what to meant by efflorescence?

1. Crystalline hydrated sats which on exposure to the atmosphere lose their moisture or water crystallization partly or completely to the atmosphere and change into the atmorphous state are called efflorescent substances. And the phenomenon is called efflorescence.

50)

An alkali metal (x) forms a hydrated sulphate, X_2SO_4. $10H_2O$. Is the metal more likely to be sodium (or) potassium.

1.the metal(x) is more likely to be sodium. The extent of hyrdration of alkali metals is inversely proportional toits size. The increasing order of size is $li^+ < Na^+ < K^+$

2.since the size of na^+ **is less than** k^+ **is hydrated more. The formular of the hydrated salt is** $na_2So_4.10h_2o$

51) Mention the uses of plaster of paris

1)the largest use of plaster of paris is in the building industry as well as plasters.

2) it is used for immobilising the affected part of organ where there is a bone fracture or sprain.

3)it is also employed in dentistry, in ornamental work and for making casts of statues and busts

52) Give the systematic names for the following

(i) milk of magnesia - magnesium hydroxide.

(ii) lye - sodium hydroxide

(iii) lime - calcium hydroxide or calcium oxide

(iv) caustic potash potassium hydroxide

(v) washing soda - sodium carbonate

(vi) soda ash - anhydrous sodium carbonate.

(v) trona - mixture of sodium carbonate and sodium bicarbonate.

53) Beryllium halides are covalent whereas magnesium halides are ionic why?

Smail size of be atom, high electronegativity and high polarsing ability of halide ions attached to beryllium.

54) Why alkaline earth metals are harder than alkali metals.

Alkaline earth metals are small in size and the atoms are tightly packed than in alkali metals.

55) How is plaster of paris prepared?

It is obtained when gypsum, ($caoso_4.2h_2o$**), is heated to 393k.**

$$2CaSO_4.2H_2O(s) \rightarrow 2CaSO_4.H_2O + 3H_2O$$

56) **Give the uses of gypsum.**

1)gypsum is used in making drywalls or plaster boards.

2) gypsum is used in making surgical and orthopedic casts, such as surgical splints and casting moulds.

3) gypsum plays an important role in agriculture as a soil additive, conditioner, and fertilizer.

57) **Lithium exhibit anomalous properties why?**

58) **Give uses of washing soda.**

59) **What is dead burnt plaster?**

60) **Milk of lime.**

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