Date: 10.07.24

- Solution and Chemical bond → Mid-term
- What is Chemical entity? ~~and it ব্যবহার ? NTI?~~
- How does electricity flow through metal wire?
- warm ~~body~~ blooded animals ~~realise~~ release heart from body?
- How the hit is genarated their body?
- সর্বনিম্ন কত ডাটা হলে 1 বাইট
- How many (Si) atom do we need to store 1 byte data?

- what is chemical entity?

= A New chemical entity (NCE) is, according to the U.S Food and Drug Administration, a novel small chemical molecule drug

Date: 11.07.24

Lecture: 02

Chemical Bond

- Chemical bonds involve the interaction of electrons.

$$NaOH + HCl \longrightarrow NaCl + H_2O$$

- Nacl structure → 6:6 cystal
- ~~Why~~ CO is called slow poison?

- gm → mL → $\frac{gm}{1.84 mL}$

(I) 0.3N HCl 100mL

(II) 0.2N Na_2CO_3 250mL

(I) $W = \frac{SMV}{1000} = \frac{0.3 \times 36.5 \times 100}{1000}$

$= 1.095$ gm

$= \frac{1.095}{1.18}$ mL

$= 0.93$ ml

37 ——— 100

1 ——— $\frac{100}{37}$

0.93 ——— $\frac{100 \times 0.93}{37} = 2.514$ M

(11) $W = \frac{SMV}{1000} = \frac{0.2 \times 98 \times 250}{1000} = 4.9$

$= 2.65 gm$

0.4 N NaOH 100 ml

0.2N $H_2C_2O_4 \cdot 2H_2O$ 100 ml

$W = \frac{SMV}{1000} = \frac{0.4 \times 40 \times 100}{1000} = 1.6 gm$

$W = \frac{SMV}{1000} = \frac{0.2 \times 63 \times 100}{1000} = 1.26 gm$

$\frac{0.4 \times 98 \times 0.4}{1000}$

Properties of co-valent bond and ionic bonds.

1. Co-valent Bond:

(I) Because of the lack of free electrons, covalently bonded compounds do not conduct electricity.

(II) Generally covalent compounds are not soluble in water.

(III) They are strong chemical bonds that exist between atoms.

(IV) Most covalently bonded compounds have relatively low melting and boiling points.

2. Ionic Bond:

(I) The ionic bonds are the strongest of all the bond

2. The ionic bond has charge separation and so they are the most reactive of all the bonds in the propere medium.

3. The ionic bonded molecules have high melting and boiling point.

4. The ionic bonded molecules in their aqueous solutions or in the molten state are good conductors of electricity. This is due to the presence of ions which acts as charge carrciers.

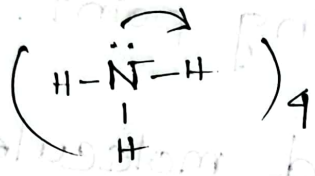
⊞ What is the different in metalic bond from other chemical bond.

= Covalent bonds from when two atoms share electrons in orderc to fill their outer shells. Metallic bonding is unique in that it occurs when atoms lose their outerc most electrons completely.

Date: 28.08.24

* $K_4[Fe(CN)_6]$ and $[Cu(NH_3)_4]SO_4$ what is the structure?

* $[Cu(NH_3)_4]SO_4$ what type of numbers bonds present in? (complex portion, ionic atom)

$\Rightarrow Cu^{2+}$  $\ominus O-\overset{\overset{O}{\|}}{\underset{\underset{O}{\|}}{S}}-O\ominus$

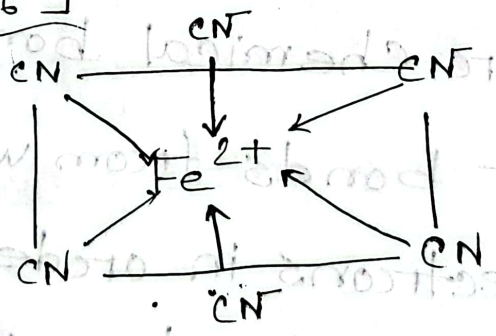
(I) Ionic Bond – 1

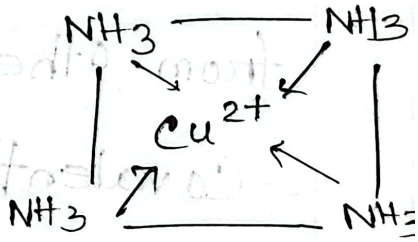
(II) Covalent – 12 + 6 = 18

(III) Coordination = 4 Bond

↳ Complex compound

* $K_4[Fe(CN)_6]$ → পটাশিয়াম ফেরোসায়ানাইড





(I) Octa-hedral (II) Square planer

* CO why is called slow poison?

* $Fe - O_2 < Fe - CO_2 << Fe - CO$

Date: 29.08.24

* bond by Sharing of electron: Co-valent Bond

01.09.24 Lab (Quiz, Viva)

Experiment Name: Measurement of pH of Different Solution.

* What is the definition of pH measurement.

= pH measurement determine the acidity or alcinity of solution on a scale of 0 – 14

* How could you measure the pH of solution

- Using pH meter.
- pH Strips / Litmus paper
- Application of pH measurement
- Monitoring of chemical process of drug and medicine.
- ensuring the pH of skin care product.

Product	pH
(i) Stromachacid	1.5 – 2
(ii) Human Skin	5.5
(iii) Saliva	6.5 – 7.4

(iv) Blood ⟶ 7.3 – 7.5

(v) Breaking soda ⟶ 8.4

(vi) ~~Heard~~ Hard soap ⟶ 9 – 10

M + n.M → Ionic

M + M ⟶ Metalic

n.M + n.M ⟶ Co-valent

∫ → electron cloud

I

electron Cloud:

e- প্রাপ্তির সম্ভাবনাময় স্তর কে (90% – 99%)

Chemistry

1. What is chemical entity ?
2. How does electricity flow through metal wire ?
3. Warm blooded animals released heat from body ?
4. How the hit is genarated their body ?
5. WHY CO is called Slow poison ?
6. Proparcises of co-valent bond and Ionic Bond ?
7. What is the different in metalic Bond from othere chemical Bond ?
8. What is the Structure of $K_4[Fe(CN)_6]$?
9. What type of numbere bonds present in $[Cu(NH_3)_4]SO_4$?
10. Metal shows riseing

*co-valent এর মধ্যে ইলাস্টিসিটি থাকে।

*ionic সবচেয়ে ভঙ্গুর।

Valence shell Theory Structure / Shape বিস্তারিত ব্যাখ্যা করো।

তাপমাত্রা বাড়লে অনু পরমাণুগুলো মধ্যে নড়াচড়া বেড়ে যায় এতে resistance বৃদ্ধি পায় তাই free e⁻ কমে যায়।

* জলীয় দ্রবণে থাকে / গলিত অবস্থা থাকে ionic compounds conduct Electricity.

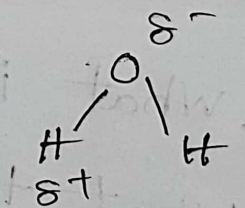
* Co-valent সাধারন বিদ্যুৎ পরিবহন করতে পারে না।

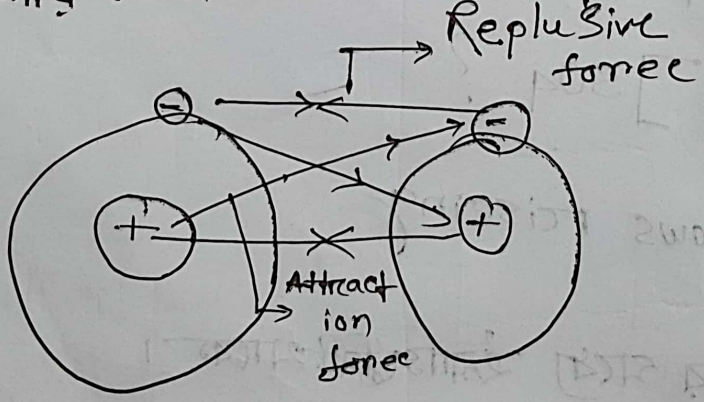
{ HCl, H_2SO_4, HNO_3 → বিদ্যুৎ পরিবহন করে }

* Co-valent → Non-polar

* ionic compound fixed structure থাকে না

* তড়িৎ প্রবাহ এর পার্থক্য থাকে বেশি পোলার বেশি।





$H_2 \rightarrow H \rightarrow$ p.n. e^-

Tempt. বৃদ্ধি

* Replusion force বেশি হলে অনু গঠন সম্ভব হয়না।

* Valence Bond theory.

* Molecular orbital

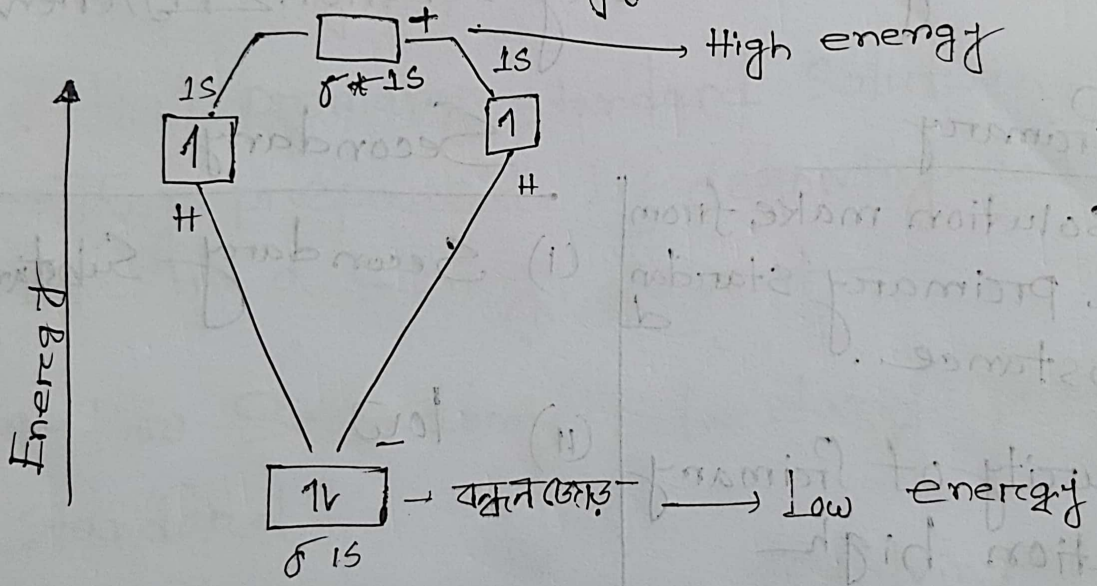
* face to face ⟶ সম্মুখা (σ)

* পাশাপাশি ⟶ π

Date : 04.09.24

• Molecular Orbital Theory :-

Valence sell এর Energy ভিত্তি ব্যাখ্যা করে।



H_2 molecule

* π ⟶ high Energy তে ⟶ দুত ভেঙ্গে যায়।
  ⟶ বেশি শক্তি প্রয়োজন হয় ভাঙ্গতে।
* σ ⟶ low " "

Date: 08.09.24

Lab

(i) **Normality:** $\frac{\text{gm equivalent weight of solute}}{\text{volume of solution in Litere}}$

(ii) **Molarcity:** $\frac{\text{Number of mole of Solute}}{\text{volume of solution in litere}}$

(iii) **Molality:** $\frac{\text{Number of moles of Solute}}{\text{weight of ~~solvete~~ solvent}}$

* Primary & Secondary solution different.

Primary	Secondary
(i) Solution make from the primary standard Substance.	(i) Secondary Substance
(ii) purcity of Primary solution high	(ii) low
(iii) Reactivity of Primary Standard low	(iii) high
(iv) Non-hygroscopic	(iv) Hygroscopic

(v) rately condamine ted	(v) Highly condamineted
(vi) use to standerdise Secondary Std Subst.	(vi) use for analitical substance

* Application/use:

* Why primary standard solution used in titarction?

⇒ because they provide accureate result due to high purity.

* How primary standard solution prepared?

= They prepared by degolving correct amount of in a ~~stoving~~ solvent.

* How Secondary Standard prepared and Standard?

= They prepared by degolving correct amount of in a solvent then it is standise by titarction method with the help of primary solution.

*precorsion:

(I) accurate measurement of solute.

(II) Ensuring purcity of ~~reagent (ex.t~~

(III) vaithation of instrument.

* Define chemical bond Types and define them.

* Matals atoms resistance at electron temperature explain

* Write the name of the modern approches that can help for defining the nuture of chemical

* what is complex compound ? Draw the Stracture and find the the total bonds in

*why aluminimum can be used as an covered wire?

* According to molecular e theory draw the MO of HF molecule.

1. Define chemical bond. Types and define them.

= A chemical bond is a force of attraction that holds atoms together in a chemical compound. Atoms form bonds in order to achieve a more stable and lower energy state. The bonding between atoms allows them to combine in specific ratio to form molecules and compounds. chemical bonds involve the interaction of electrons, which are negatively charged particles that orbit the atomic nucleus.

There are several types of chemical bonds, and the nature of the bond depends on how electron are shared, gained, or lost between atoms. The three main types of chemical bonds are:

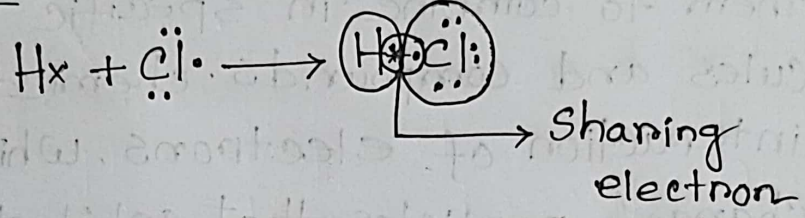
(1) Ionic Bond: Ionic bond is a type of chemical bond between two oppositely charged atoms known as cation (+) and Anion (-) where electron is transfered from one ion to another. It occurs between metals and non-metals.

For example: NaCl, $MgCl_2$

$$Na^+ + Cl^- \longrightarrow NaCl$$

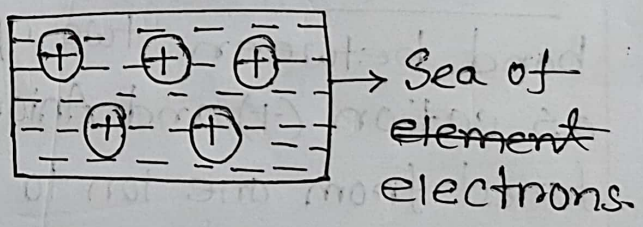
(ii) Co-valent Bond :- Covalent bond is a type of chemical bond is formed by mutual sharing of electrons between two non-metal elements.

For example: HCl, H_2O, etc



(iii) Metalic Bond :- Metalic bond is a type of chemical bond between two metal ions in a crystal matalic structure where the sea of electrons, which are de localised form the bond and hold the whole structure together.

For example: Al_2



(ii) Metals shows resistance at elevated temperature, explain.

= For metals, the number density n of free electrons is almost independent of temperature. As temperature increases, and the thermal speed of free electrons increases,

and also the amplitude of vibration of the metal ions increases. Consequently, the free electrons collide more frequently with the metal ions. The mean collision time τ decreases. Hence, the resistance of the metal ($R \propto 1/\tau$) increases with the increase in temperature.

3. Write the name of the modern approaches that can help for defining the nature of Chemical compounds.

= The morderen approaches that helps to define the nature of chemical compound to achieve a details and accurate structure are:

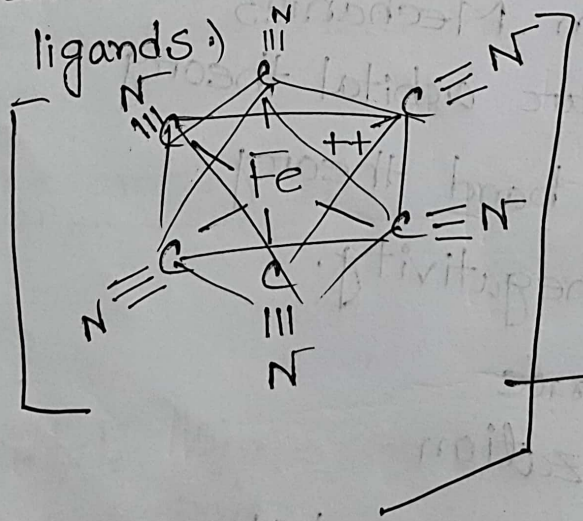
1. Quantum Mechanics
2. Molecular orbital theory
3. Valence bond theory
4. Electronegativity.
5. Resonance
6. Hybridization
7. Molecular geometry.
8. Intermolecular structure.

Among them, quantam mechanics and molecular Orbital theory are the primary factors

in these approaches.

4. What is complex compound? Draw the structure and find the total bonds in Ferric Ferrocyanide.

= A complex compound is a molecular structure that is composed of one or more complex ions. In a complex compound, a metal ion is present in the center and many molecular s or ions surround it. These surrounding molecules are joined by chemical bonds. (A complex compound has a central metal atom and it is surrounded by non metals or ligands.)



(i) Fe–C = 3×6 = 18

(ii) C≡N = 3×6 = 18

(iii) Fe–N = 4×6 = 24

Total Bond = 60

5. Why aluminium can be used as uncovered wire?

= Aluminum Wire is used uncovered Because:

(I) Aluminum wire usally creats an oxide layer when exposed to aire. This layere preventes ruts, as a result no unecessary insulation is used.

(II) Uncovered aluminium wire reduces manufactoring cost of insulation. so, its costfriendly.

(III) Uncovered aluminium wire is easier to install. so, it saves labourc.

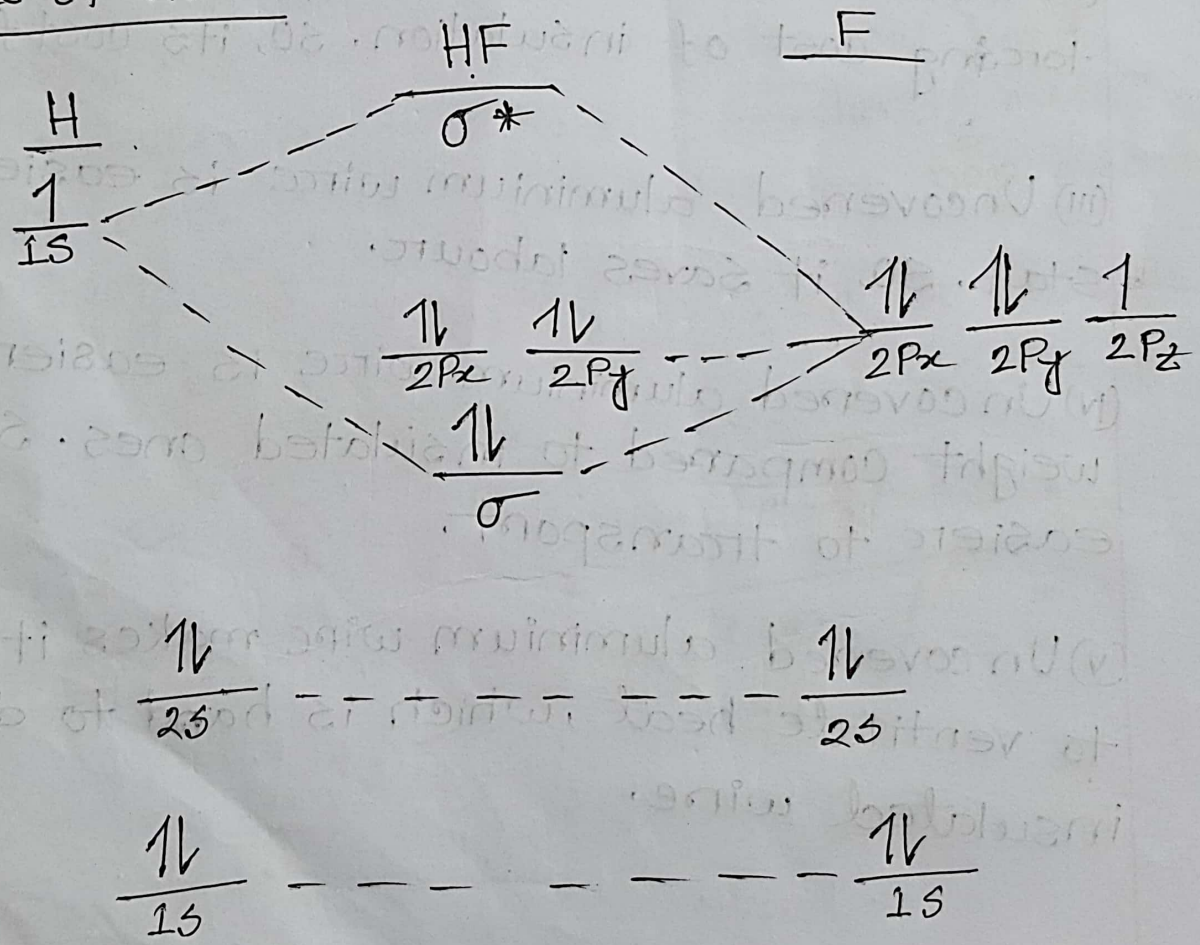
(IV) Uncovered aluminium wire is easier to light weight compared to insulated ones. So, its easierc to transport.

(V) Uncovered aluminium wire makes it easier to ventilate heat, which is hard to do in insulated wire.

6. According to the molecular orbital theory draw the MO of HF molecular. / Oxygen.

= In MO theory, Molecular orbital are mathematical functions representing the distribution of electrons in a molecule. When atomic orbitals overlap, they combine to form molecular orbitals, which can be bonding, antibonding or non bonding.

MO of HF:

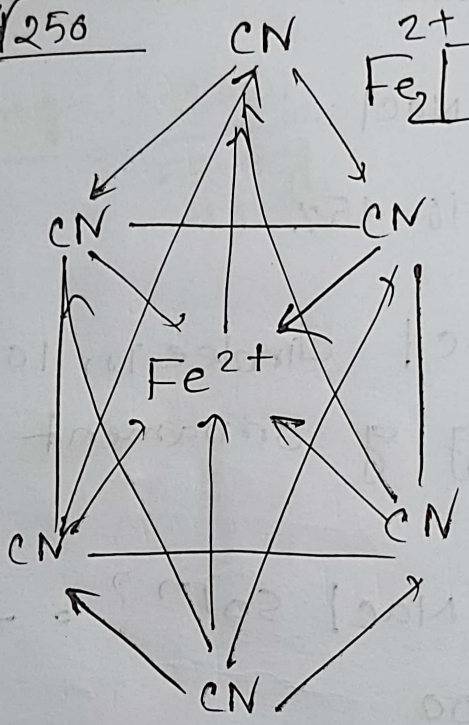


4. H_2SO_4 by 0.4N Na_2CO_3

SL NO	Volume	Initial	final	Difference	Average
1.	10	0	6		
2.	10				
3.	10				

$$W = \frac{0.4 \times 49 \times 250}{1000}$$

$= 4.9$ gm



অষ্টতলীয়

$Fe_2^{2+}[Fe(CN)_6^{2+}]^{4-}$

ফেরিক ফেরোসায়ানাইড

$Fe^{3+}[Fe^{3+}(CN)_6]^{3-}$

ফেরিক ফেরিসায়ানাইড

Date: 25.09.24

M = mol/L

N = g.eq/L

Molar = mol/Kg

ppm = mg/L

ppb = µg/L

ppt = ng/L

% $\frac{w \rightarrow \text{घ}}{w \rightarrow \text{द्रावक}}$ ⟶ 78% Gold → ornament

% $\frac{w}{v}$ ⟶ NaCl

% $\frac{v}{v}$ → 40-45%

0.1 g NaCl dimlee in 100 ml Soln.

78% 100 g g ornament 78 g gold

0.1% NaCl soln? = $\frac{0.1\,g}{100\,ml} \times \frac{1000\,mg}{1\,g}$

ppm = 1000

$\times \frac{1000\,mL}{1\,L}$

$M = \frac{0.1\,g}{100\,ml} \times \frac{1000\,ml}{1\,L} \times \frac{1\,mol}{58.5\,g}$

=

Ex 2% NaOH Soln M = ? ppm = ? N = ?

$$W = \frac{S M V}{1000} =$$

$$S = \frac{W \times 1000}{MV}$$

$$= \frac{2 \times 100 \times 40}{1000}$$

$$= 11.78 \text{ mg/L}$$

$$\frac{2\text{g}}{100\text{mL}} = \frac{1000\text{mg}}{1\text{g}} \cdot \frac{1000\text{mL}}{1\text{L}}$$

$\Rightarrow 20000$ ppm

$$\text{ppm} = \frac{2\text{g}}{100\text{mL}} = \frac{1000\text{mg}}{1\text{L}} = \frac{1\text{mol}}{\frac{58.5}{40}\text{g}}$$

$M = 0.5$ mg/L / M

$N = M \times$ eqn. Number

$= 0.5 \times 1$

$= 0.5\,N$

7% Na_2CO_3 Soln

M = ?

N = ?

ppm = ?

$$M = \frac{7\,g}{100\,mL} \times \frac{1000\,mg}{1\,g} \times \frac{1\,mol}{106\,g}$$

$$= 0.66\ mol/L$$

$$N = M \times eqn.N$$

$$= 0.66 \times 2$$

$$= 1.32\,N$$

$$ppm = \frac{7\,g}{100\,mL} \times \frac{1000\,mg}{1\,g} \times \frac{1000\,mL}{1\,L}$$

$$= 70000\ ppm$$

* propertise of Dilute Solution.

* use of Osmotic pressure

* প্রবনিস্ত যতটুকু চাপ দিলে O smosis ঘটে না।

⇒ The Minimum of pressure applied to the solvant or system for preventing osmosis proescss is called osmotic pressure.

Solution:

(I) Type of Solutions based on the states of the solute and solvent.

(II) Solubility ?

(III) Solution, solute, solvent define.

(IV) gases in liquids.

(V) dissolution

Propentise of Dilute Solution ——

(I) **Lowen Osmotic Pressune:-** The osmotic pressure of a dilute solution is lowen compared to a concentrated solution. Osmotic pressure is direct ly proportional to the concentration of solute particles in the solution, according to Van't Hoff's law.

(II) **Lowen Boiling point Elevation:-** Dilute solutions exhibit a smallen increase in boiling point compared to pure solvant due to the presence of solute particles. This phenomenon is gov erned by Raoult's law and is less pronoun ced in dilute solutions.

(III) **Lowen Freezing point Depression:** Similarly dilute solutions experience a smallen decrease in freezing point compared to pure solvant due to the presence of solute particles. This is also govened by Raoult's law and is less significant in dilute solutions.

(iv) Ideal Behavion: In dilute solutions, the interactions between solute particles are minimal and the solution may have more ideally, adhering closely to ideal solution behavion assumptions. This simplifies calculations and predictions in dilute solution systems.

(v). Colligative propertise: Dilute solutions exhibit colligative properties, which depend only on the number of solute particles and not on their nature. These properties include vapor pressure lowering, boiling point elevation, freezing point depression, and osmotic pressure.

(vi) Increased Reactivity: Dilute solutions can sometimes enhance the reactivity of solute particles due to increased accessibility of solvent molecules to the solute particles. This property in particularly relevant in chemical reactions occurring in dilute solution environments.