The electronic structures of 

\[ \text{C}_2 \text{H}_5 \text{Ni}_2 \rightarrow \text{C}_2 \text{H}_5 \text{NH} \rightarrow \text{C}_2 \text{H}_5 \text{N} \]

2. Increasing order of basic strength (Bronsted)

3. Prominence of a permanent dipole. Therefore, when

4. Silicon is a deep violet phosphorescent. Therefore, when

5. Medium

So, there are certain differences in the physical actions of these dispersion

6. g) Certain devices. Physically, these are dispersion medium.

7. In real, physical action, dispersion medium is ignored.

8. 49 millimole cream (etc.) 1 g


Section A

Chemistry (Ad3) Class XI
The semiconductor thus formed is an extrinsic one.


β-D-Galactopeptidase & β-D-Glucanase.

5. Trichosanthin: 4-Chlorobenzene sulfonic acid
(iii) Overall order of reaction = 4 + 1 = 5

Rate law = \( k [NH_3][II] \)

where \( k \) is the rate constant.

The slowest step in the reaction is the rate-determining step because it is the rate law for the given reaction.
Ideal Solution

(a) The solution obeys Raoult's law over entire range of concentration.

(b) The intermolecular interactions between solute-solvent particles are of similar order to that of solute-solute particles and solvent-solvent particles. 

i.e. $\Delta_{\text{mix}} H = 0$ and $\Delta_{\text{mix}} V = 0$

E.g. Solution of n-hexane & n-heptane

Non-Ideal Solution

(a) The solution does not obey Raoult's law.

(b) The vapour pressure of the solution is either higher or lower than that predicted by Raoult's law.
11. (i) Diamagnetic complex: \( [\text{Co}(\text{C}_2\text{O}_4)_3]^{3-} \)
(ii) More stable complex: \( [\text{Co}(\text{C}_2\text{O}_4)_2]^{3-} \) (chelate effect)
(iii) Outer orbital complex: \( [\text{Co} \cdot \text{F}_6]^{3-} \)
(iv) Low spin complex: \( [\text{Co}(\text{C}_2\text{O}_4)_5]^{3-} \)

12. (i) Increasing acidic character:
\( \text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te} \)
(ii) Decreasing bond enthalpy.
\( \text{HF} > \text{HCl} > \text{HBr} > \text{HI} \)

Section C

13. Edge length of unit cell, \( a = 300 \text{ pm} \)
\[ a = 3 \times 10^2 \times 10^{-10} \text{ cm} = 3 \times 10^{-8} \text{ cm} \]

Volume of 1 unit cell = \( a^3 = 27 \times 10^{-24} \text{ cm}^3 \)

Density of element = \( \rho = 10.8 \text{ g cm}^{-3} \) (given)

Mass of 1 unit cell = \( \rho a^3 = 10.8 \times 27 \times 10^{-24} \text{ g} \)
Given mass of element = 108 g

So, total number of unit cells in this mass of element

\[ N = \frac{108 g}{10.8 \times 2 \times 2 \times 10^{-24}} \]

\[ N = \frac{108}{10.8} \times 2 \times 2 \times 10^{-24} \]

\[ N = 2 \times 10^{-24} \]

\[ 2 \times 10^{-24} \text{ unit cells} \]

Number of atoms present in one unit cell = 4 (given) (efficiency)

Number of atoms in \( \frac{1}{3} \text{ gram} = \frac{1}{3} \times 10^{24} \text{ atoms} \)

Hence, 4 atoms of \( \frac{1}{3} \text{ gram} \) i.e.

\[ \frac{1}{3} \times 10^{24} \text{ atoms} \]

are present in 108 g of the given element.

So, total numbers of unit cells in this mass of element

\[ \frac{108}{10.8} \times 2 \times 2 \times 10^{-24} \]

\[ = 2 \times 10^{-24} \text{ unit cells} \]

Given mass of element = 108 g
14. Concentration of solution = 4% (w/w)

Considering 100 g of solution:
Mass of sucrose = 4 g (M_s)
Mass of water = 100 - 4 = 96 g (m_w)
Molar mass of sucrose, M_s = 342 g mol^{-1}

Moles of sucrose molecules:
\[ n_s = \frac{m_s}{M_s} = \frac{4}{342} \text{ mol} = 0.0117 \text{ mol} \]

Molality of solution:
\[ m = \frac{n_s}{m_w (in \text{ kg})} = \frac{2 \times 1000}{171 \times 96} \text{ mol kg}^{-1} \]

Freezing point of solution = 271.15 K

Depression in freezing point = (273.15 - 271.15) = 2 \text{ K} = \Delta T
molarity of solution = \[ \frac{n}{V} \]

Moles of glucose, \( n_g = \frac{m_g}{M_g} = \frac{5}{180} \text{ mol} = 0.0278 \text{ mol} \)

Molar mass of glucose = \( 180 \text{ g/mol} \)

Moles of glucose = \( \frac{m_g}{M_g} = \frac{5}{180} \text{ mol} = 0.0278 \text{ mol} \)

Mass of glucose = \( 5 \times 180 = 900 \text{ g} \)

Considering 100 g of solution:

Now, given 5% glucose solution

\[ 2000 \times 0.05 = 100 \times \frac{x}{2000} \times 180 \]

or \( x = 2 \times 181.1496 = 171.7892 \text{ g} \)

\[ \Delta T = \frac{K_f m}{C} \]

Substituting values

Morea
\[ \Delta T_f^\circ = K_f^m \frac{1}{R} \times 9.6 \times 1000 \quad (\text{From } \theta) \]

\[ \Delta T_g^\circ = \frac{14 \times 9.6}{26 \times 9.5} K \times \frac{1}{4.8 K} \]

So, the actual freezing point = \(273.15 K - 4.8 K\)

\[ 268.35 K \]

\[ 268.35 K \]

Hence, the freezing point of solid aqueous solution

\[ 268.35 K \]

\[ 268.35 K \]

\[ \text{Rate of reaction} = -\frac{d[\text{NH}_3]}{dt} = k \text{[NH}_3] \]

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\[ \text{Rate of reaction} = -\frac{d[\text{NH}_3]}{dt} = k \text{[NH}_3] \]
\[ \frac{4 \times 10^3}{3} = 1333.3 \]
\[ 4.035 \text{ m} = 365 \text{ s} \cdot 98 \]
\[ k_f = 0.036 \]
\[ \text{at} \quad 0.036 \text{ m} = 0.100 \text{ m} - k_f \]

and \( R = 4 \times 10^{-3} \text{ M}^{-1} \)

\[ W_{664} = [\text{N}^3] \]
\[ W_{690} = 9 \text{ M} \]
\[ W_{940} = 9 \text{ M} \]
\[ W_{970} = 9 \text{ M} \]
\[ \text{N}^3 = [\text{N}^3] - R \]

\[ 0 \cdot 0 \quad \because \text{because} \]

\[ \text{At} \quad t = 9 \quad [\text{N}^3] = [\text{N}^3] \\text{(initial concentration)} \]
\[ [\text{N}^3] = -Rt + C \]

\[ \frac{d}{dt} [\text{N}^3] = -R \]

\[ \frac{d}{dt} [\text{N}^3] = R \]
(i) Activated charcoal acts as an adsorbent in gas masks, and adsorbs harmful and poisonous gases like \( \text{SO}_2 \), fumes of As etc., on itself, thus protecting the wearer of the mask from these gases.

(ii) The hydrated ferrous oxide colloid is negatively charged in this case, because it adsorbs on gelatin solution. Sol can be represented as \( \text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} \) or \( \text{Fe(OH)}_3 \cdot \text{H}_2\text{O} \).

(iii) The degree of chemisorption increases with increasing temperature, as chemical bond formation between the adsorbate and adsorbent molecules takes place in this case. Therefore, an appreciable amount of activation energy \( (E_a) \) is present, which can be easily overcome at high temperatures (According to Arrhenius \( k = A e^{-\frac{E_a}{RT}} \) equation). However, \( k \) can be very high at high temperature, the extent of chemisorption decreases.
due to increasing thermal energy of gas constituents (but that is very high temperature is not much perceptible).

17. (i) CO acts as a complexing agent and combines with Nickel atoms to form \([Ni(CO)_4]\) complex (volatile). This compound thus formed is highly volatile and is collected elsewhere and decomposed at higher temperature to give Nickel in pure form which allows us to separate pure Nickel from the impurities present in crude Nickel. Hence, it helps in refining of Nickel metal.

\[
\begin{align*}
Ni + 4CO & \quad 350^\circ K \quad [Ni(CO)_4] \quad \text{(volatile)} \\
[Ni(CO)_4] & \quad 450-470^\circ K \quad Ni(s) + 4CO \quad \uparrow \\
\end{align*}
\]

pub Nickel metal

(ii) Silica (SiO₂) acts as an acidic flux and combines with basic impurities (Gangue - FeO) to form Slag. The slag thus produced is a fusible component and immiscible with melted metal (Cu). Being lighter, slag can be easily removed from pure melted Cu and helps in further purification and extraction of Cu noda.
\[ 2 \text{FeS} + 3\text{O}_2 \rightarrow 2\text{FeO} + 2\text{SO}_2 \]

\[ \text{FeO(s)} + \text{SiO}_2(s) \rightarrow \text{FeSiO}_3(s) \text{ (slag)} \]

This way, iron is removed from CuFeS$_2$ and other Cu ores containing iron.

(iii) Highly electropositive elements such as Na, Mg, Al, etc. are generally extracted through electrolytic method. This is so because these metals are themselves the strongest reducing agents. Therefore, no other element or compound can reduce these metals from their salts to metal form. Hence, electrolytic principles have to be used and external voltage is used to drive the non-spontaneous chemical reaction.

For example, Extraction of Aluminium (Hall-Héroult Process)

18. (c) Transition metals have a large number of unpaired d-electrons. Some of these d-electrons can be used to form metallic bonds, giving the metals their characteristic properties.

Note: The diagram mentioned in the image is not included in the transcription.
in course, hence, the solution of MnO with nitric acid makes the solution of MnO. The isolation of MnO, however, needs the reduction of MnO with hydrogen gas to MnO. The isolation of MnO is done in a muffle furnace at a temperature of about 800°C.

In MnO, a manganese oxide is present in its oxidation state +3.

In oxidation, as shown in the reaction, MnO of MnO. 2MnO + O2 → 2MnO2,

MnO is the reducing agent, and MnO2 is the oxidizing agent.

E. A. Sic (Cu, Zn), CuO, ZnO, CaO, MgO, and CaCO3 are used to give either one another quite effectively and can also be used to give another one another (solid solution) readily.

The formation of oxides is also a period 9.
(iii) Eu (Eurupium) belongs to the 4f-series (lanthanoids) and has a more stable oxidation state of +3.

Hence, Eu^{2+} ion has a strong tendency to go to Eu^{3+} state (+3 oxidation state) and thus acts as a strong reducing agent.

\[ \text{Eu}^{2+} (aq) \rightarrow \text{Eu}^{3+} (aq) + e^- \quad E_{\text{cell}} > 0 \]

Also, \( E_{\text{cell}} > 0 \) for this reaction, making it much more favourable.

9. (i) Monomers of Nylon-6,6

- \( \text{Hexane-1,6-dioic acid} \)
- \( \text{Hexane-3,6-diamine} \)

(ii) Monomers of Crystal
This is underlined. There are a few corrections, possibly to the structure’s pronunciations.

In undeveloped etude, stroked notation, try to make pronunciations.

Even function. Rejection of not passing. The case present.

If ever shown, structures which result lead to transitions. If use and name to name, will utilize the medium. Theoretically, if use a mild base, as composed to name.

((Mg(OH))$_2$) as a mild base as composed to name.

Antibiotic properties to it.

As estimated pressure, to soak. To impact.

(c) Ether nitro and oxides to soak. To impact.

(o) Monomers & pure S.
Using place of NaHCO₃ gas being a weaker base, it only neutralises the excess acid and achieves the person from symptoms of hyperracidity. It does not make the stomachic medium alkaline and hence does not promote further reactions of acid.

(iii) Soaps are generally sodium salts of long chain fatty acids which are linear in structure and do not consist of extensive branching. For e.g. Sodium Stearate.

\[
\text{Linear chain (hydrocarbon)}
\]

\[\text{OR: Sodium oleate, Sodium palmitate etc.}\]

On the other hand, detergents are usually branched, which makes it difficult for microorganisms (like bacteria) to break them down (decompose them). Thus, they sustain themselves in the environment and cause pollution (wastes etc.).
These two cases generally non-biodegradable in nature.

E.g., Sodium - 4-(1,3,5,7-Tetramethyl)-cyclohexanesulfonate

Non-biodegradable in nature.

Main product

Main product

Branching group

Also meaning sufficiently.

Non-biodegradable and age.

Hence, non-biodegradable.

Many.
$(\text{CH}_3)_3\text{C}-\text{I}$ is more reactive than $(\text{CH}_3)_3\text{C}-\text{Br}$ towards $S_n1$ reaction, because $\text{I}^-$ is a better leaving group than $\text{Br}^-$. Because of its larger size as compared to $\text{Br}^-$, $\text{I}^-$ is able to effectively stabilise the negative charge on itself, therefore making the cleavage step more favourable.

Also, $\text{C}-\text{I}$ bond is weaker than $\text{C}-\text{Br}$ bond (i.e., $\text{C}-\text{I}$ bond is longer than $\text{C}-\text{Br}$ bond due to large size of $\text{I}^-$ ion).

$$
(\text{CH}_3)_3\text{C}-\text{I} \xrightarrow{\text{H}^+} (\text{CH}_3)_3\text{C}^+ + \text{I}^-
$$

Also, we know that $\text{H}-\text{I}$ is a stronger acid than $\text{H}-\text{Br}$ because $\text{H}-\text{I}$ bond dissociation enthalpy is higher than $\text{H}-\text{Br}$.

*By Bronsted theory of acids and bases, the conjugate base of a stronger acid is a weaker base.*

Hence, $\text{I}^-$ is more stable and hence further cleavage takes place easily.

Also, we know that $\text{I}^-$ should not be a weaker base than $\text{Br}^-$, and we know that a stronger base can replace a weaker base more easily step by step in a nucleophilic substitution reaction. Hence, $\text{I}^-$ is not.
The Chin Cooper 9 and Hector Ion are the same.

(R-configuration)

(R, S-configuration)

[Chemical structures and reactions depicted on the page]

This is interesting. The sake is something.

Equally surprising by other mechanisms and compounds. It's R, R.
Physical properties like - melting point, boiling point, electrical conductivity, solubility, etc.

Hence, it is difficult to separate these two isomers (optical stereoisomers) of Butan-2-ol by fractional distillation, as fractional distillation makes use of difference in boiling point of how substances (which should be greater than 20-25°C). But in this case, both the isomers have identical boiling points and thus, these are not separable by this method.

23. \[\text{C} = 0\] \[\text{C} = 0\]

\[\text{D-glucose} \text{ or } (\text{C}_6\text{H}_{12}\text{O}_6) \text{ or } (\text{C}_6\text{H}_{12}\text{O}_6)_n \rightarrow \text{H}_2\text{O} \rightarrow \text{glycosylation} \rightarrow \text{glycoside (\text{C}_6\text{H}_{14}\text{O}_7)}\]

\[\text{\(\gamma\)-hexane}\]

The prolonged heating of glucose molecule with HI to produce \(\text{\(\gamma\)-hexane}\) proved that the open structure of D-glucose contains a straight chain.
D-Glucose or n-oxon

This formation of peniacetate molecule in presence of pyridine

The reaction with phenylglycinol leads to epoxide product.
The structure of D-glucose contains an aldehyde group (as a ketone would not have been oxidised by \( \text{Br}_2 \text{ water} \)).

\[
\text{C}_6\text{H}_12\text{O}_6 + \text{NacN/НCl} \rightarrow \text{C}_6\text{H}_12\text{O}_5 + \text{NaCl}
\]

(iii) \( \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COCl} \rightarrow \text{C}_6\text{H}_5\text{Cl}_2 + 2 \text{C}_6\text{H}_5\text{NCl} \)

(iii) \( \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COCl} \rightarrow \text{C}_6\text{H}_5\text{Cl}_2 + 2 \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{H}_5 \)

(iii) \( \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COON} \rightarrow \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COON} \)

(iii) \( \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COON} \)

(iii) \( \text{Br}_2/\text{NaBr} \rightarrow \text{C}_6\text{H}_5\text{N}_2 \text{C}_6\text{H}_5 \text{COON} \)
Single bond. This makes the N-N bond longer than P-P. Significant higher on computer to track in P-P.

Because the non-bonding electron in N-N is due to this reason. The inter-electronic repulsion becomes smaller since the number of electrons to produce is shorter than P-P bond length.

Import 2 go. Positions of behavior can shift until,

More orbitals are stabilized. Hence, unpaired electrons are present in the 3p orbitals. In 3p,

Section 2.
(iii) Ozone is thermodynamically less stable than oxygen because for the reaction,

$$2O_3(g) \rightarrow 3O_2(g)$$

change in enthalpy of reaction $\Delta H$ is highly negative as ozone has a high tendency to go to oxygen state (more stable).

Also, $QS$ for the reaction is positive as from two moles of ozone (gas) we are getting three moles of oxygen (gas).

Therefore, in total,

$$\Delta G = \Delta H - T \Delta S$$

is highly negative as $\Delta H < 0$ and $\Delta S > 0$ making the reaction highly favourable at all temperatures. Hence, $O_3$ is thermodynamically less stable than $O_2$.

Also, comparing structures:

\[
\text{Ozone} \quad \begin{bmatrix} \text{O} \rightarrow O \rightarrow \text{O} \\ \text{O} \rightarrow \text{O} \rightarrow \text{O} \end{bmatrix} \quad \text{Oxygen} \quad \begin{bmatrix} [ \text{O} \rightarrow \text{O} \rightarrow \text{O} ] \\ [ \text{O} \rightarrow \text{O} \rightarrow \text{O} ] \end{bmatrix}
\]
The bond order in oxygen is actually 1.5 due to two resonance structures. Therefore, the bond order in a double bond via the compound O₂⁺ is thermodynamically more stable than O₂. The bond order, therefore, would be 2 in the compound, since, next to O₂⁺, the bond order of 1.5 in O₂⁺ is more stable than O₂. 

Conclude again that O₂⁺ is the compound we can conclude.
Total Electrons exchanged during redox reaction: \( n = 2 \) mol

Reaction quotient \( Q \):

\[
Q = \frac{[\text{Mg}^{2+}] \cdot 0.01 \text{ M}}{[\text{Cu}^{2+}] \cdot 0.01 \text{ M}} = \frac{1}{0.1} = 10
\]

Nernst's equation:

\[
E_{\text{cell}} = E_{\text{cell}}^0 - 0.059 \log \frac{Q}{n}
\]

Substituting the values:

\[
E_{\text{cell}} = 2.71 - 0.059 \log (10^2)
\]
(i) In an ungrounded cell, the given condition is:

Current flow from Cu cathode to Mg anode

When no external voltage is applied

Cell construction:

\[ E_{cell} = 2 \times 0.245 \]

\[ = 0.49 \]
\[ \text{S}_{2} \text{N}_{2} \text{S}_{2} \text{CH}_{3} \text{I} \rightarrow \text{SN}_{2} \text{CH}_{3} \text{I} \rightarrow \text{SN}_{2} \text{CH}_{3} \text{I} \]
(I) Reaction of $\text{N}_2\text{O}_4$ to $\text{N}_2\text{O}_3$

$2\text{N}_2\text{O}_4 \rightarrow 2\text{N}_2\text{O}_3 + \text{O}_2$

Mechanism of decomposition of $\text{N}_2\text{O}_4$ is discussed in course notes.

- Complexion of $\text{N}_2\text{O}_4$ followed by hydrolysis
- Hydrolysis of $\text{N}_2\text{O}_4$

We can connect electrons into the proper orbitals by the structure X-ray.

$\text{C}_3\text{N}_3\text{H}_2\text{O}$

$\text{C}_3\text{N}_3\text{H}_2\text{O}$

$\text{C}_3\text{N}_3\text{H}_2\text{O}$

Supplementary Answer-Book Supplementary Answer-Book

Please do not write your name or address on this paper.

(Roll Number on this Answer-Book) No.

Excess (Excess)
(II) Protonation of alcohol

CH₂CN₂⁺ + CH₃CN₂⁻ <--- CH₂CN₂⁻ + CH₃CN₂⁺

(III) Loss of water molecule by cleavage of C-O bond

CH₂CN₂⁻ + H₂O <--- CH₂CN₂⁻ + H₂O

(IV) Elimination of β-hydrogens to form ethylene

CH₂CN₂⁻ + H₂O <--- CH₂CN₂⁻ + H₂O

So, in totality - a loss of water molecule forms ethylene, water takes place and the equation can be separated.
In benzene, no such condition of standing together place, hence in benzene, no such condition of standing together place, hence.

Also, the steric effect of a group is more pronounced than the steric effect of a group. Increase of steric effect and density of group increase decreased of the group.

(C) Phenol consists of a - on group attached to one -