

11 P

Time : 3.00 Hrs.

31.01.25

Second Revision Examination- 2025

+1 CHEMISTRY Answerkey

PART - I

Choose the best answer and write the option code and the corresponding answer. 15x1=15

Equivalent mass of KMnO_4 is a) 49g eq^{-1} b) 56g eq^{-1} c) 31.6g eq^{-1} d) 32.69g eq^{-1} I Volume Page No: 9

Splitting of spectral lines in an electric field is called

a) Zeeman effect b) Shielding effect c) Compton effect d) Stark effect

Which of the following orders of ionic radii is correct?

a) $\text{H}^- > \text{H}^+ > \text{H}$ b) $\text{Na}^+ > \text{F}^- > \text{O}^{2-}$ c) $\text{F}^- > \text{O}^{2-} > \text{Na}^+$ d) None of theseWater gas is a) $\text{CO} + \text{H}_2$ b) $\text{CO}_2 + \text{H}_2\text{O}$ c) $\text{CO} + \text{H}_2\text{O}$ d) $\text{CH}_4 + \text{H}_2$

The oxidation state of Alkaline earth metal is a) +1 b) +2 c) +3 d) 0

The value of the gas constant 'R' is

a) 0.032 dm^3atm b) 0.987 $\text{cal mol}^{-1} \text{K}^{-1}$ c) 8.3J $\text{mol}^{-1} \text{K}^{-1}$ d) 8 $\text{erg mol}^{-1} \text{K}^{-1}$

Calorimeter constant of bomb calorimeter is determined using standard sample is I Volume Page No: 204

a) acetic acid b) formic acid c) lactic acid d) benzoic acid

Q>Kc which of the following reaction takes place? II Volume Page No: 11

a) Reverse b) Forward c) equilibrium d) all of the above

Mole fraction of solvent in solution is 0.75. What is the mole fraction of solute

a) 1 b) 0.25 c) 0 d) 0.75 I Volume Page No: 33

Which one of the following is diamagnetic? a) O_2 b) O_2^{2-} c) O_2^+ d) None of these

Which one of the following shows functional isomerism?

a) ethylene b) propane c) ethanol d) CH_2Cl_2

Assertion: Tertiary carbocations are generally formed more easily than primary carbocations.

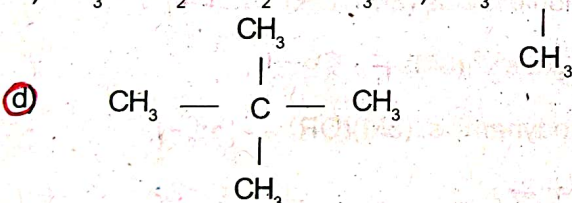
Reason: Hyper conjugation as well as inductive effect due to additional alkyl group stabilize tertiary carbonium ions.

a) Both assertion and reason are true and reason is the correct explanation of assertion b) Both assertion and reason are true but reason is not the correct explanation of assertion c) Assertion is true but reason is false d) Both assertion and reason are false

The compound that will react most readily with gaseous bromine has the formula

a) C_3H_6 b) C_2H_2 c) C_4H_{10} d) C_2H_4

Which one of the following compounds has the lowest boiling point?

a) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ b) $\text{CH}_3 - \text{CH} - \text{CH}_3$ c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ 

The pH of normal rain water is a) 6.5 b) 7.5 c) 5.6 d) 4.6

PART - II

II. Answer any six questions. (Q.No.24 is compulsory)

6x2=12

16. Distinguish between oxidation and reduction. F-4-5

17. Give the stable electronic configuration of Cu (Atomic Number is 29), and Cr (Atomic Number is 24).

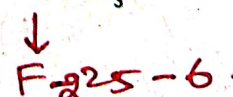
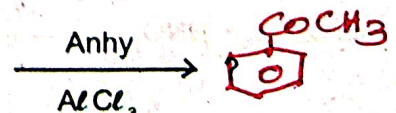
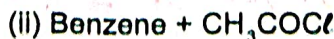
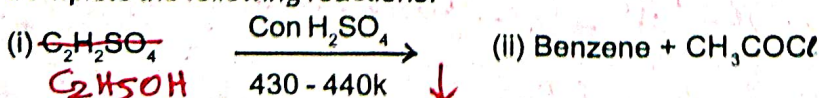
18. How is Plaster of Paris prepared? F-67-12

19. Define Gibbs Free Energy. F-96-8

20. Write the balanced chemical equation for the following equilibrium reaction. $\text{Kc} = \frac{[\text{CaO}] [\text{CO}_2]}{[\text{CaCO}_3]}$ F-125-12

21. What is meant by Resonance? F-203-1 (a)

22. Complete the following reactions.

1 mark
Answers:

1. C

2. d

3. d

4. a

5. b

6. c

7. d

8. a

9. b

10. b

11. c

12. a

13. a

14. d

15. c

BB-9

Int-6

15

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23. How is Acid rain formed? *F-266-2*
 24. 0.75g of a substance is dissolved in 200g solvent. If $\Delta T_b = 0.15K$ and $K_b = 7.5 K kg mol^{-1}$ then, calculate the Molar Mass of substance. *II Volume Page No: 53 Example: 4 Ans: 187.5 g/mol.*

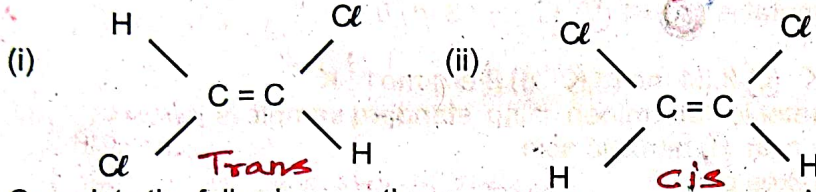
PART - III

III. Answer any six questions. (Q.No.33 is compulsory)

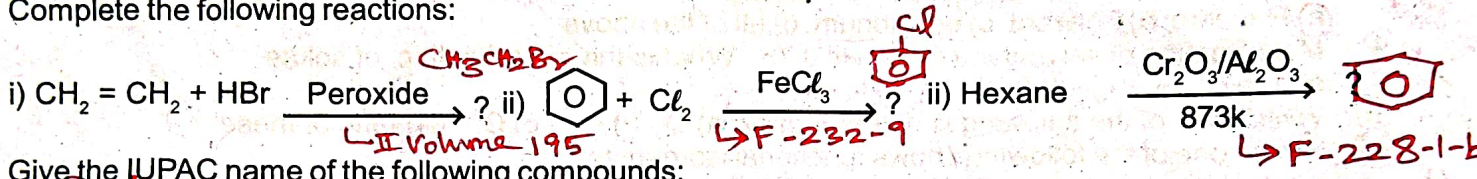
6x3=18

25. Derive De-broglie equation. *F-28-3*
 26. Define Modern Periodic Law. *F-37-1*
 27. Explain the three types of covalent hydrides with examples. *F-51-2*
 28. Derive ideal gas equation. *F-86-12*
 29. Write characteristics of internal energy. *F-103-3*
 30. Define osmotic pressure. *F-140-28*
 31. Find out cis-trans isomerism of the following compound:

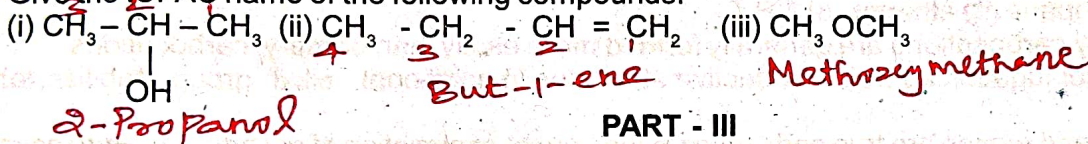
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32. Complete the following reactions:



33. Give the IUPAC name of the following compounds:

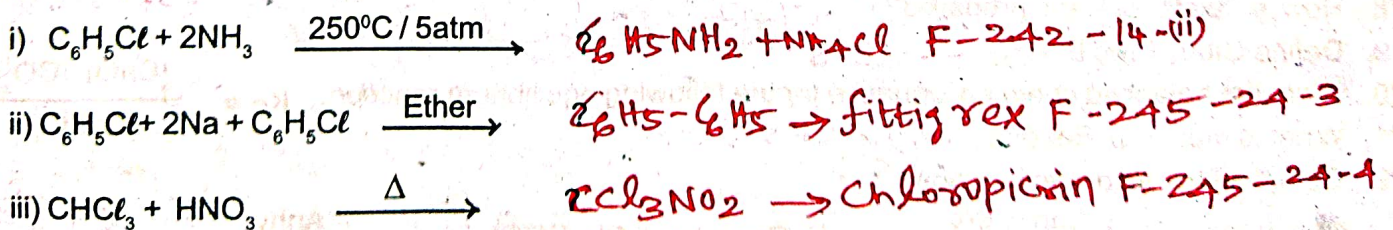


PART - III

III. Answer all questions.

5x5=25

34. a) (i) Calculate Molar Mass - (i) NH_2CONH_2 (ii) $C_{12}H_{22}O_{11}$ (2M) *F-4-6*
 (ii) Write note on Bohr atom model (3M) (OR) *F-23-1*
 b) (i) What are iso-electronic ions? Give examples. (2M) *F-37-2*
 (ii) How is temporary hardness of water can be removed by Clark's Method? (3M) *F-60-3(b)*
 35. a) (i) How do you convert Para hydrogen into Ortho hydrogen? (2M) *F-52-11*
 (ii) Explain the pauling method for the determination of ionic radius (3M) (OR) *F-44-1*
 b) (i) Define Joule Thomson effect (2M) *F-84-5*
 (ii) What are the three methods used for liquefaction of gases? (3M) *F-86-11*
 36. a) (i) Define Lattice energy. (2M) *F-96-12*
 (ii) Write three statements of the Second Law of Thermodynamics. (3M)(OR) *F-102-1*
 b) (i) State Le-Chatelier principle. (2M) *F-121-6*
 (ii) Derive the relation between K_p and K_c (3M) *F-126-2*
 37. a) (i) Define Van't - Hoff factor. (2M) (ii) Draw MO Diagram for oxygen molecule. (3M) (OR) *F-165-2*
 b) (i) What is meant by Homologous series. (2M) *F-178-2*
 (ii) Explain detection of Nitrogen by Lassaigne Method. (3M) *F-181-10*
 38. a) (i) Define inductive effect. (2M) (ii) Explain Aromaticity by using Huckel Rule (3M) (OR) *F-204-4*
 b) (i) Which is considered to be earth's protective umbrella? Why? (2M) *F-259-4*
 (ii) Complete the following Reactions. (3M)



Chemistry

Tiruppur district Answerkey

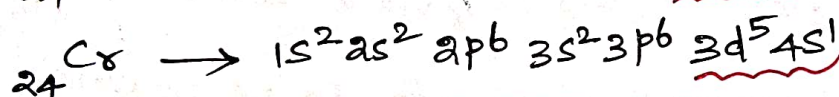
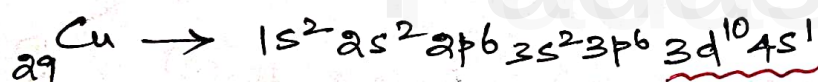
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1. c) 31.6 g eq^{-1}
2. d) Stark effect
3. d) none of these
4. a) $\text{CO} + \text{H}_2$
5. b) +2
6. c) $8.3 \text{ J mol}^{-1} \text{ K}^{-1}$
7. d) benzoic acid
8. a) Reverse

9. b) 0.25
10. b) O_2^{2-}
11. c) ethanol
12. a) Both are true and correct explanation
13. a) C_3H_6
14. d) $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{CH}_3$
15. c) 5.6.

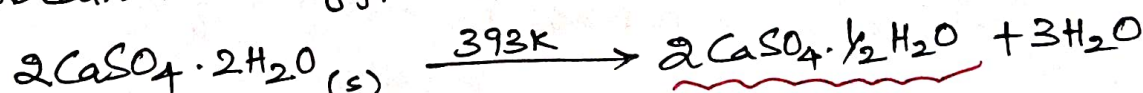
2 Marks:Part-II6x2=12

16.	Oxidation	Reduction
1.	Addition of oxygen	Addition of Hydrogen
2.	Removal of hydrogen	Removal of oxygen
3.	Loss of electrons	Gain of electrons
4.	Oxidation Number increases	oxidation number decreases.

17. Stable electronic configuration:18. Plaster of Paris Preparation:

hemihydrate of calcium sulphate is called plaster of Paris.

It is obtained when gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is heated to 393K.

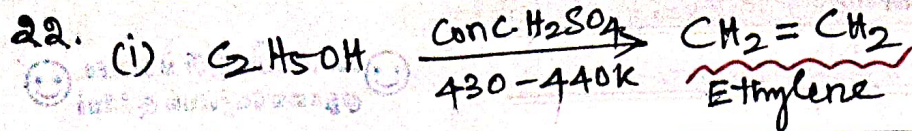
19. Gibb's free energy:

$G = H - TS$ $G \rightarrow$ Gibb's free energy, $H \rightarrow$ enthalpy, $S \rightarrow$ entropy.

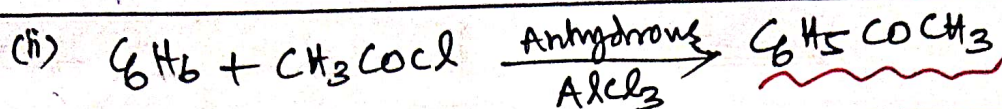
21. Resonance:

Certain organic compounds can be represented by more than one structure and they differ only in the position of bonding and lone pair of electrons. Such structures are called resonance structures and this phenomenon is called resonance.



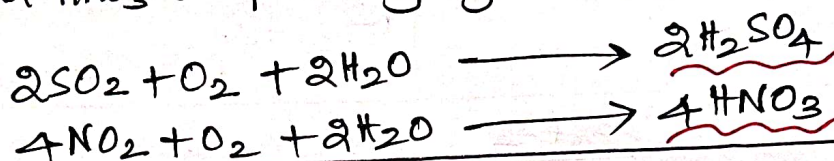


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23. Acid Rain formation:

1. Acid rain is a by-product of a variety of Sulphur and nitrogen oxides in the atmosphere.
2. Acid rain consists of SO_2 and NO_2 . They are converted into H_2SO_4 and HNO_3 respectively by the reaction with oxygen and H_2O .



24. [Compulsory] :-

$$\Delta T_b = K_b \times m = \frac{K_b \times W_2 \times 1000}{M_2 \times W_1}$$

$$M_2 = \frac{K_b \times W_2 \times 1000}{\Delta T_b \times W_1} = \frac{7.5 \times 0.75 \times 1000}{0.15 \times 200} = 187.5 \text{ g mol}^{-1}$$

3 Marks:

Part - III

6 × 3 = 18

25. De-broglie equation:

Planck's quantum hypothesis $\Rightarrow E = h\nu$ (for wave nature) — ①

Einstein's mass-energy relationship $E = mc^2$ (for particle nature) — ②

From above two equations we get,

$$h\nu = mc^2 \quad (\nu = c/\lambda) \Rightarrow h \frac{c}{\lambda} = mc^2 \Rightarrow \lambda = \frac{h}{mc}$$

For a particle of matter with mass 'm' and moving with a velocity 'v'

$$\lambda = \frac{h}{mv}$$

26. Modern Periodic law:

The physical and chemical properties of the elements are periodic functions of their atomic numbers.

27. Three types of Covalent hydrides:

1. Electron precise hydrides eg: CH_4 , C_2H_6
2. Electron deficient hydrides eg: B_2H_6
3. Electron rich hydrides eg: NH_3 , H_2O .

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28. Ideal gas equation:

According to

Boyle's law $V \propto \frac{1}{P}$ — (1) Charles law $V \propto T$ — (2)

Avogadro's law $V \propto n$ — (3) Combined eqn (1) (2) & (3) we get

$$V \propto \frac{nT}{P}, \quad V = \frac{nRT}{P} \text{ — (4) } R \Rightarrow \text{gas constant}$$

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Rearrange the eqn (4) we get

$PV = nRT$ This is called ideal gas equation.

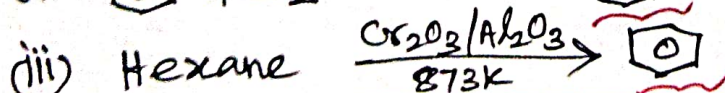
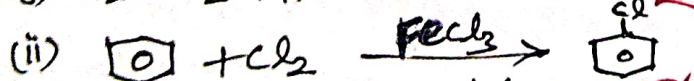
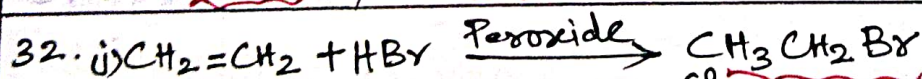
29. Characteristics of Internal energy:

1. The internal energy of a system is an extensive property.
2. It is State function.
3. The Change in internal energy of a system is expressed as $\Delta U = U_f - U_i$
4. In a cyclic process, there is no internal energy change.
 $\Delta U_{\text{cyclic}} = 0$.
5. If the internal energy of the system in the final state (U_f) is less than the internal energy of the system in its initial state (U_i), then $\Delta U = -ve$ i.e., ($U_f < U_i$)
6. If the internal energy of the system in the final state (U_f) is greater than the internal energy of the system in its initial state (U_i) then $\Delta U = +ve$ i.e., ($U_f > U_i$)

30. Osmotic Pressure: (π)

The pressure that must be applied to the solution to stop the influx of the solvent through the semipermeable membrane.

31. (i) Trans / (ii) Cis.



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33. [Compulsory]:-

(i) 2-Propanol

(ii) But-1-ene

(iii) Methoxy Methane.

Part-IV

34. a) (i) NH_2CONH_2 :

$$\begin{array}{l}
 \text{C} \rightarrow 1 \times 12 = 12 \\
 \text{O} \rightarrow 1 \times 16 = 16 \\
 \text{N} \rightarrow 2 \times 14 = 28 \\
 \text{H} \rightarrow 4 \times 1 = 4 \\
 \hline
 60 \text{ u}
 \end{array}$$

(ii) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$:

$$\begin{array}{l}
 \text{C} \rightarrow 12 \times 12 = 144 \\
 \text{H} \rightarrow 22 \times 1 = 22 \\
 \text{O} \rightarrow 11 \times 16 = 176 \\
 \hline
 342 \text{ u}
 \end{array}$$

34. a) (ii) Bohr atom model:

1. The energies of electrons are quantised.
2. The electron is revolving around the nucleus in a certain fixed circular path called stationary orbit.
3. Electron can revolve only in those orbits in which the angular momentum (mvr) of the electron must be equal to an integral multiple of $\frac{h}{2\pi}$.

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4. As long as an electron revolves in ^{the} fixed stationary orbit, it doesn't lose its energy. When an electron jumps from higher energy state (E_2) to a lower energy state (E_1), the excess energy is emitted as radiation. The frequency of the emitted radiation is

$$E_2 - E_1 = h\nu \text{ and } \nu = \frac{E_2 - E_1}{h}$$

5. Conversely, when suitable energy is supplied to an electron it will jump from lower energy orbit to a higher energy orbit.

(OR)

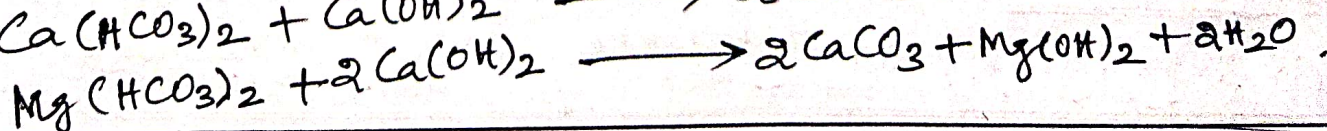
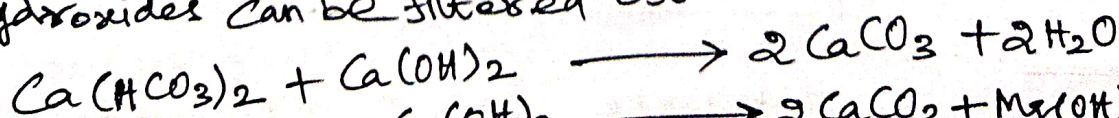
34. b) (i) Iso electronic ions:

Ions having the same number of electrons but different nuclear charge. eg: N^{3-} , O^{2-} , F^{-} .

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34. b) (ii) Clark's Method:

In this method calculated amount of lime is added to hard water containing the Mg and Ca and the resulting carbonates and hydroxides can be filtered off.



35. a) (i) Conversion of Para hydrogen into ortho hydrogen:

1. By treatment with Catalysts Pt or Fe
2. By passing an electric discharge
3. By heating 800°C (or) more
4. By mixing with Paramagnetic molecules like O_2 , NO , NO_2 .

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35. a) (ii) Pauling method:

Ionic radius of uni-univalent crystal can be calculated using Pauling's method from the interionic distance between the nuclei of the cation and anion.

1. Pauling assumed that ions present in a crystal lattice are perfect spheres and they are in contact with each other

therefore, $d = r_{\text{C}^+} + r_{\text{A}^-}$ ————— (1)

Where, $d \Rightarrow$ distance between the centre of the nucleus of C^+ and anion A^- .

$r_{\text{C}^+}, r_{\text{A}^-} \Rightarrow$ the radius of the cation and anion respectively.

2. Pauling also assumed that the radius of the ion having noble gas electronic configuration is inversely proportional to the effective nuclear charge felt at the periphery of the ion.

$r_{\text{C}^+} \propto \frac{1}{(Z_{\text{eff}})_{\text{C}^+}}$ — (2) $r_{\text{A}^-} \propto \frac{1}{(Z_{\text{eff}})_{\text{A}^-}}$ — (3)

Where, $Z_{\text{eff}} \Rightarrow$ effective nuclear charge, $Z_{\text{eff}} = Z - S$

eqn (2/3) $\frac{r_{\text{C}^+}}{r_{\text{A}^-}} = \frac{(Z_{\text{eff}})_{\text{A}^-}}{(Z_{\text{eff}})_{\text{C}^+}}$ — (4)

On solving eqn (1) and (4) the values of r_{C^+} and r_{A^-} can be obtained.

(OR)

35. b) (i) Joule thomson effect:

The phenomenon of lowering of temperature when a gas is made to expand adiabatically from a region of high pressure into a region of low pressure.

35. b) (ii) The methods used for liquefaction of gases:

1. Linde's method
2. Claude's process
3. Adiabatic process.

It is defined as "The amount of energy required to completely remove the constituent ions from its crystal lattice to an infinite distance."

36. a) (ii) Second Law of thermodynamics:

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(i) Kelvin Planck Statement:

It is impossible to construct a machine that absorbs heat from a hot source and converts it completely into work by a cyclic process without transferring a part of heat to a cold sink.

(ii) Clausius Statement:

It is impossible to transfer heat from a cold reservoir to a hot reservoir without doing some work.

(iii) Entropy Statement:

The entropy of an isolated system increases during a spontaneous process.

$$\Delta S_{\text{universe}} > \Delta S_{\text{system}} + \Delta S_{\text{surrounding}}$$

Entropy is measure of the molecular disorder (randomness) of a system.

(iv) Efficiency Statement:

The maximum efficiency of a heat engine which operates reversibly, depends only on the two temperatures between which it is operated.

$$\text{Efficiency} = \frac{\text{Work performed}}{\text{Heat absorbed}} = \left(\frac{q_h - q_c}{q_h} \right)$$

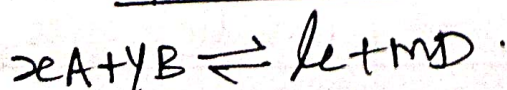
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$$\% \text{ Efficiency} = \left(1 - \frac{T_c}{T_h} \right) \times 100.$$

36 b) (i) Le-Chatelier Principle: (OR)

If a system at equilibrium is disturbed, then the system shifts itself in a direction that nullifies the effect of that disturbance.

36. b) (ii) K_p, K_c Relationship:-



$$K_c = \frac{[\text{C}]^l [\text{D}]^m}{[\text{A}]^x [\text{B}]^y}$$

$$K_p = \frac{P_c^l \times P_D^m}{P_A^x \times P_B^y} \quad (2)$$

⑦

Ideal gas eqn,

$$PV = nRT \text{ (or) } P = \frac{n}{V} RT$$

Active mass = molar Concentration = n/V , $P = \text{active mass} \times RT$

$$P_A^x = [A]^x [RT]^x, P_c^l = [C]^l [RT]^l$$

$$P_B^y = [B]^y [RT]^y, P_D^m = [D]^m [RT]^m \text{ on Substitution in eqn(2)}$$

$$K_p = \frac{[C]^l [RT]^l [D]^m [RT]^m}{[A]^x [RT]^x [B]^y [RT]^y} \Rightarrow \frac{[C]^l [D]^m [RT]^{l+m}}{[A]^x [B]^y [RT]^{x+y}} \quad (3)$$

$$K_p = \frac{[C]^l [D]^m}{[A]^x [B]^y} [RT]^{(l+m)-(x+y)} \quad (4)$$

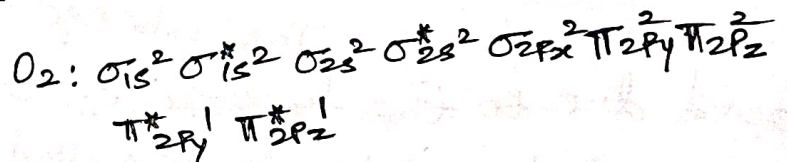
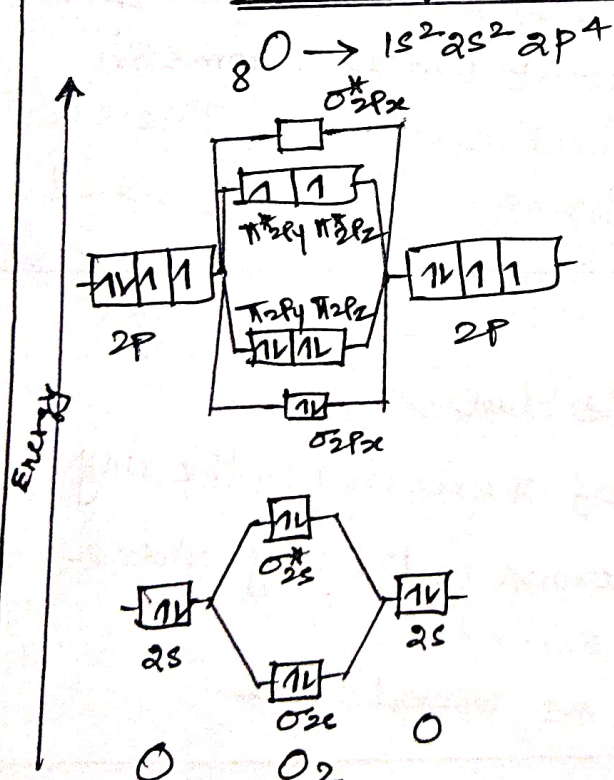
By comparing eqn(1) and (4), we get, $K_p = K_c (RT)^{\Delta ng} \quad (5)$

37. a) (i) Van't - Hoff factor: (i)

The ratio of the observed colligative property to the Calculated colligative property.

$$i = \frac{\text{Observed Colligative Property}}{\text{Calculated colligative property.}}$$

37. a) (ii) MO Diagram for O_2 :



$$\text{Bond order} = \frac{N_b - N_a}{2} = \frac{10 - 6}{2} = 2$$

Magnetic Property $\Rightarrow$ Paramagnetic.

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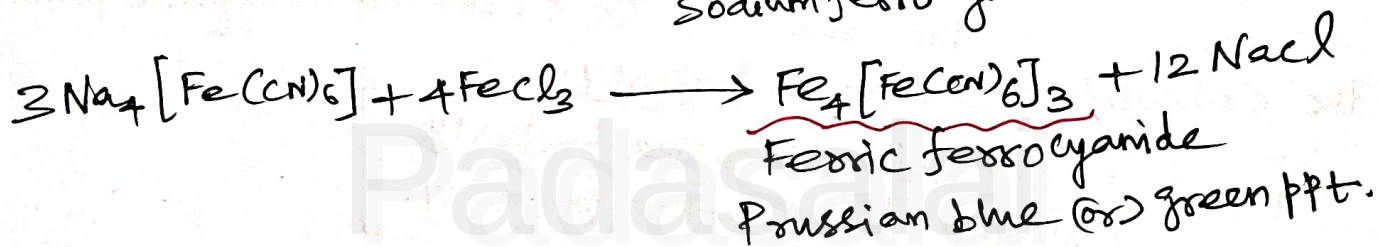
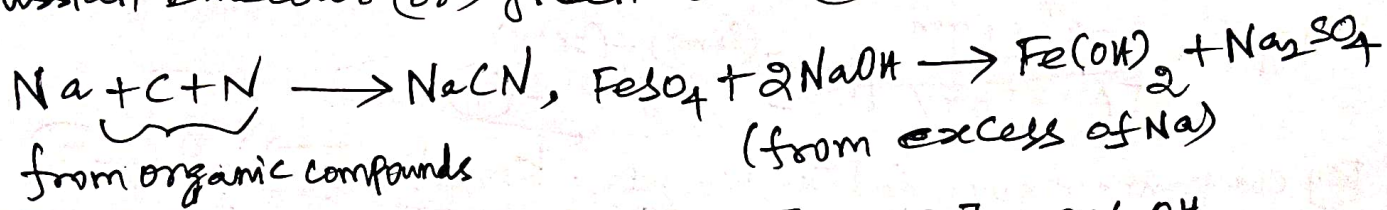
☺ (OR) ☺

37.b)(i) Homologous Series:

A series of Compounds each containing a characteristic functional group and the successive members differ from each other by a -CH₂ group is called homologous series.

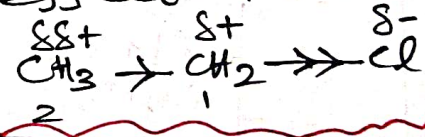
37.b)(ii) Detection of nitrogen by Lassaigne method:

If nitrogen is present in hydrocarbon it gets converted to Sodium cyanide which reacts with ferrous Sulphate and ferric ion followed by conc. HCl and gives a Prussian blue color (or) green colour (or) precipitate.



38.a)(i) Inductive effect:

The change in the polarisation of a Covalent bond due to the presence of adjacent bonds, atoms (or) groups in the molecule is called inductive effect. This is a permanent effect. Eg: Ethylchloride.



38.a)(ii) Huckel Rule:

1. The molecule must be Coplanar
2. Complete delocalization of π electron in the ring
3. Presence of $(4n+2)\pi$ electrons in the ring where n is an integer ($n=0, 1, 2, 3, \dots$)

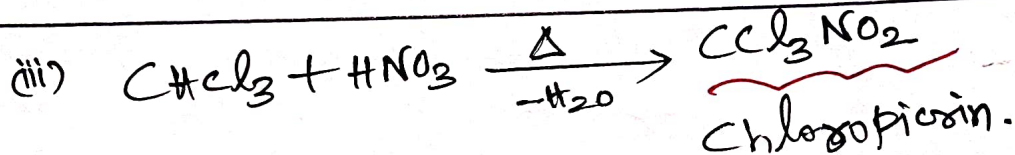
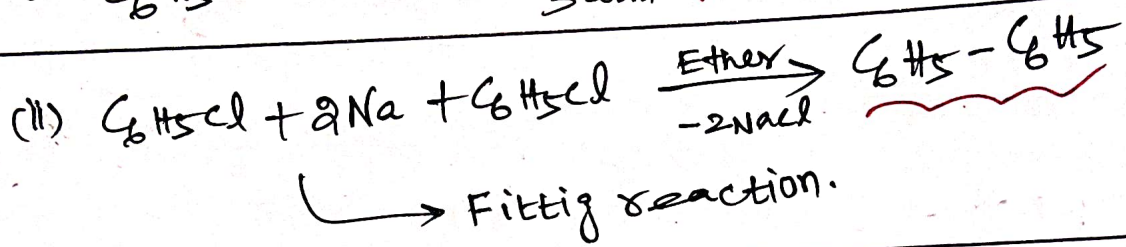
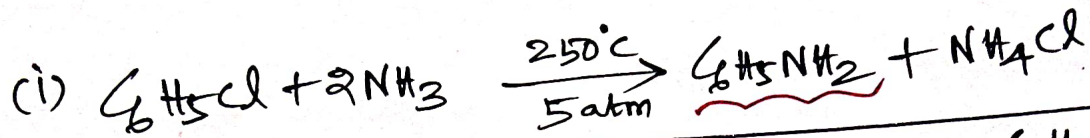
This is known as Huckel's rule.
(OR)

38. b) (i) Earth's protective umbrella:

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Ozone (O₃) acts as an umbrella or shield for harmful UV radiations. It protects us from harmful effect such as skin cancer.

38. b) (ii)



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உயர் புகழிலும் வுருகுகிறோம்"
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