A

Cuddalore - Dt

COMMON HALF YEARLY EXAMINATION - 2022

Standard - XI

Reg No

Time: 3.00 hrs. **CHEMISTRY** *Marks: 70*

PART - I

Choose the best answer: **15×1=15**

1. The oxidation state of S in H_2SO_4 is
   a) +2 b) +4 c) +8 d) +6
2. Which one of the following is correct electronic configuration of Chromium
   a) $[Ar]3d^4 4s^2$ b) $[Ar]3d^5 4s^1$ c) $[Kr]3d^4 4s^1$ d) $[Ar]3d^9 4s^1$
3. The element with Atomic number III, the IUPAC name is
   a) Unununium b) bibibium c) Unnilbum d) Uninseptium
4. Tritium nucleus contains
   a) 1p + 0n b) 2p + 1n c) 1p + 2n d) none of these
5. Sodium is stored in
   a) alcohol b) water c) kerosene d) none of these
6. Inversion temperature Ti is
   a) $\frac{8a}{27Rb}$ b) 3b c) $\frac{2a}{Rb}$ d) $\frac{3a}{Rb}$
7. The temperature of the system, decrease is an
   a) Isothermal expansion b) Isothermal compression
   c) adiabatic expansion d) adiabatic compression
8. For which reaction $\Delta ng = 0$
   a) $H_2 + I_2 \rightleftharpoons 2HI$ b) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ c) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ d) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
9. The degree of dissociation can be related to VantHoff factor (i) using
   a) $\alpha = \frac{i-1}{n-1}$ b) $\frac{1-i}{n-1}$ c) $\frac{1-i}{1-n}$ d) $\frac{n-1}{i-1}$
10. The bond order of N_2 is
    a) 0 b) 1 c) 2 d) 3
11. The coloured impurities can be removed by adding
    a) Charcoal b) animal charcoal c) NaOH d) $NaHCO_3$
12. Which of the group has highest +1 effect
    a) CH_3 - b) $CH_3 - CH_2$ - c) $(CH_3)_2 - CH$ - d) $(CH_3)_3 - C$ -
13. $2C_2H_5Br + 2Na \xrightarrow{\text{diethyl Ether}} C_4H_{10} + 2NaBr$ This reaction is
    a) Friedel crafts Reaction b) Wurtz Reaction
    c) Wurtz - Fittig Reaction d) Kolbej Electrolysis
14. Benzen reacts with Cl_2 in the presence of $FeCl_3$ and in absence of sunlight to form
    a) Chlorohenzene b) Benzyl Chloride
    c) Benzal Chloride d) Benzene hexachloride
15. Haemoglobin of the blood forms carboxy hemoglobin with
    a) Carbon dioxide b) Carbon tetra chloride
    c) Carbon monoxide d) Carbonic acid

PART - II

Write any six question. (Q.No.22 is compulsory): **6×2=12**

16. Find emprical formula of fructose ($C_6H_{12}O_6$) and Caffeine $C_8H_{10}N_4O_2$
17. Define electronegativity.
18. Give the colour of the following metal in flame.
    a) Barium b) Lithium c) Calcium d) Sodium

19. What is lattice energy?
20. State Le - Chatelier's Principle.
21. State Lewis - Octate rule.
22. Write the function group for the following :
    1) Aldehyde 2) Ketone 3) Carboxylic acid 4) Ether
23. What happens when acetylene gas is passed through red hot iron tube.
24. Write Williamson's Ether synthesis.

PART - III

Write any 6 question (Q.No.30 is compulsory): **6×3=18**

25. Distinguish between oxidation and Reduction.
26. State Heisenberg uncertainity principle and give its expression.
27. How is Tritium prepared. Give its half life period.
28. What are uses of Hydrogen peroxide.
29. What is diffusion and effusion.
30. If an automobile engine burns petrol at a temperature of 816°c and if the surrounding temperature is 21°C Caclulate its maximum possible efficiency.
31. What is dipole movement.
32. What is inductive effect.
33. Using Huckle rule, find out the compound  (Benzene) whether it is aromatic or non aromatic

PART - IV

Write all the questions: **5×5=25**

34. i) a) What is disproponation reaction give an example. **(2)**
    b) An organic compound present in Vinegar has 40% Carbon, 6.6% hydrogen and 53.4% Oxygen. Find the empirical formula of the compound. **(3)**

    (OR)

    ii) a) Explain Davison and Germer experiment. **(3)**
    b) State Aufbau principle. **(2)**

35. i) a) State Modern Periodic law. **(2)**
    b) The inter nuclear distance in Cl_2 molecule is 1.98A°. Find the covalent radius of Cl. **(3)**

    (OR)

    ii) a) What are called inter and Intra Molecular hydrogen bonding give example. **(2)**
    b) How Para hydrogen is converted into ortho hydrogen. **(2)**

36. i) a) State Boyle's Law. **(2)**
    b) What is compressiblity factor, give z value for ideal gas **(3)**

    (OR)

    ii) Derive the relationship between ΔH and ΔU. **(5)**

37. i) a) State Law of mass action. **(2)**
    b) Define Reaction Quotient (Q) **(3)**

    (OR)

    ii) Define Ionic bond, Covalent bond, Co-ordinate covalent bond. **(3)**

38. i) a) Write characeristics of organic compounds. (3)
    ii) Explain functional isomerism with an example. (2) **(OR)**
    b) i) Explain E_2 Mechanism. (3)
    ii) How is DDT prepared. Give its use. (2)

Common Half yearly Exam - 2022.

XI

Chemistry

part - I

Choose

Q.NO	Option	Answer	Q.NO	Option	Answer
1	d	+6	9	a	$\alpha = \frac{i-1}{n-1}$
2	b	[Ar] $3d^5 4s^1$	10	d	3
3	a	Unununium	11	b	animal charcoal.
4	c	1p + 2n	12	d	$(CH_3)_3C-$
5	c	kerosene	13	b)	wurtz reaction.
6	c	29 / Rb	14	a	chlorobenzene
7	c	adiabatic expansion	15	c	carbon monoxide.
8	a	$H_2 + I_2 \rightleftharpoons 2HI$			

16. Empirical formula fructose - CH_2O.
caffeine - $C_4H_5N_2O$.

17. Electronegativity:- relative tendency of an element present in a covalently bonded molecule, to attract shared pair of e^- towards itself.

18. a) barium - apple green b) Lithium - ~~Orange~~ Crimson red
c) Calcium - brick red. d) Sodium - yellow.

19 Lattice energy:- - amount of energy required to completely remove the constituent ions from its crystal lattice to an infinite distance from one mole of crystal.

20. Le-chatelier's principle

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

21. Octet Rule:- The atoms transfer (or) share electrons so that all atoms involved in chemical bonding obtain 8 electrons in their outer shell.

22. functional group

1) Aldehyde — CHO 2) Ketone — CO

3) Carboxylic acid — COOH 4) Ether —O—

23. $3\,CH \equiv CH \xrightarrow[873K]{\text{red hot iron tube}}$ 

24. Williamson ether synthesis

$$CH_3-CH_2-Br + NaO-C_2H_5 \xrightarrow{\Delta} C_2H_5-O-C_2H_5 + NaBr.$$

Part - III

3 marks

25.

Oxidation	Reduction
1. Loss of e^-	1. gain of e^-
2. Addition of oxygen.	2. Addition of hydrogen
3 removal of hydrogen.	3 removal of oxygen.
4. Increase of positive charge	4 Decrease of positive charge.
5 Oxidation number increases	5 Oxidation number decreases

26. Uncertainity principle:- It is impossible to accurately determine both position and momentum of a microscopic particle simultaneously

$$\Delta x \cdot \Delta p \geq h/4\pi$$

27 Tritium preparation

$$_3Li^6 + {}_0n^1 \longrightarrow {}_1T^3 + {}_2He^4$$

Half life period :- 12.3 years

28 uses of hydrogen peroxide :-

1) used in water treatment to oxidise pollutants
2) as a mild antiseptic
3) as bleach in textiles, paper and hair-care industry.

29. Diffusion :- The property of gas which involves the movement of the gas molecules through another gas is called diffusion.

Effusion :- is a process in which a gas escapes from a container through a very small hole.

30. Efficiency :-

$$\% \eta = \frac{T_h - T_c}{T_h} \times 100 \qquad T_h = 816 + 273 = 1089K$$

$$T_c = 21 + 273 = 294K.$$

$$= \frac{1089 - 294}{1089} \times 100$$

$$= 73\%$$

32. Inductive effect :- It is defined as the change in the polarisation of a covalent bond due to the presence of adjacent bonds, atoms (or) groups in the molecule.

31 Dipole moment :- ~~It is defined as~~ $\boxed{\mu = q \times 2d}$

The polarity of a covalent bond can be measured in terms of dipole moment. q - charge and 2d - distance b/w two charges.

Non-polar molecules H_2, N_2 and O_2.
- Zero dipole moment.

polar molecules – HF, HCl, CO, NO
– non-zero dipole moment

33. 

Benzene
1) planar molecule
2) Six delocalised π e^-s.
3) $4n+2 = 6$
$4n = 6-2$
$4n = 4$
$\boxed{n = 1}$

→ It obeys Huckel's $(4n+2)$ π electron with $n=1$
→ benzene is aromatic.

Part – IV

34. (i) a) Disproportionation reaction:
– Same compound undergo both oxidation and reduction.
In such reactions, oxidation state of one and same element is both increased and decreased.

eg:- $H_2\overset{-1}{O_2} \longrightarrow 2H_2O + \overset{0}{O_2}$ (oxidn; reduction; -2)

b)

Element	%	Relative no of moles	Simple ratio
C	40	$\frac{40}{12} = 3.3$	$\frac{3.3}{3.3} = 1$
H	6.6	$\frac{6.6}{1} = 6.6$	$\frac{6.6}{3.3} = 2$
O	53.4	$\frac{53.4}{16} = 3.3$	$\frac{3.3}{3.3} = 1$

Empirical formula is CH_2O

(or)

a) Davisson - Germer experiment :-

→ wave character of e^- was experimentally confirmed by Davisson and Germer.

→ They allowed the accelerated beam of e^-s to fall on nickel crystal and recorded the diffraction pattern.

→ The resultant diffraction pattern is similar to X-ray diffraction pattern. The finding of wave nature of electron leads to the development of various techniques such as electron microscope

b) Aufbau principle :- In the ground state of atoms, the orbitals are filled in the order of their increasing energies.

35 a) Modern periodic law :- The physical and chemical properties of the elements are the periodic functions of their atomic number.

b) Given :- $d(Cl-Cl) = 1.98 A^\circ$

$$d(Cl-Cl) = r(Cl) + r(Cl)$$

$$1.98 = 2r(Cl)$$

$$r(Cl) = \frac{1.98}{2} = 0.99 A^\circ$$

(or)

a) Intermolecular H-bonding :- This type of hydrogen bonding is formed b/w two separate molecules. (Same (or) different)

eg :- water, ammonia.

Intramolecular H-bonding :- This type of hydrogen bonding is formed within the molecules. (Single)

eg :- o-nitrophenol.
o-hydroxybenzaldehyde.

b) Conversion of Para into ortho hydrogen

(1) by using catalyst like pt (or) iron.

2) by passing electric discharge.

3) heating above 800°c

4) mixing with paramagnetic molecules such as O_2, NO, NO_2 (or) with nascent hydrogen.

36 a) Boyle's law:- At a given temperature the volume occupied by a fixed mass of a gas is inversely proportional to its pressure

$$V \propto \frac{1}{P}$$

$$V = K \, 1/P$$

b) Compressibility factor:-

The deviation of real gas from ideal behaviour is measured interms of a ratio of pV to nRT. This is termed as Compressibility factor

$$Z = \frac{PV}{nRT}$$

for ideal gas $\boxed{Z = 1}$

(or)

Relation b/w ΔH and ΔU

$$\Delta H = \Delta U + P\Delta V$$

$$= q + w + P\Delta V \qquad w = -P\Delta V$$

$$= q - P\Delta V + P\Delta V$$

$$\boxed{\Delta H = q_p}$$

Consider a closed system,

reactant - initial states

products - final states

$PV = nRT$

$PV_i = n_i RT$ (for reactants)

$PV_f = n_f RT$ (for products)

$P(V_f - V_i) = (n_f - n_i) RT$

$P\Delta V = \Delta n_g RT$

$\Delta H = \Delta U + P\Delta V$.

$$\boxed{\Delta H = \Delta U + \Delta n_g RT}$$

37. a) Law of mass action:

At any instant, the rate of a chemical reaction at a given temperature is directly proportional to the product of active masses of the reactant at that instant.

b) reaction quotient - It is defined as the ratio of the product of active masses of reaction products raised to the respective stoichiometric coefficients in the balanced chemical equation to that of the reactants under non-equilibrium conditions.

(or)

Ionic bond - This type of bond is formed by transfer of electron from one atom to another atom.

Covalent bond - mutual sharing of electron b/w two combining atoms

Co-ordinate covalent bond - In certain bond formation, one of the combining atoms donates a pair of electrons, such type of bonding is called as co-ordinate covalent bond.

38 a) characteristics of organic compds

1) organic compds are covalent compds and insoluble in water

2) readily soluble in organic solvents such as benzene, ether and toluene.

3) Most of the organic compounds are inflammable. (except CCl_4).

4) low melting and boiling point due to their covalent nature.

ii) <u>functional isomerism</u>:

Different compds having same molecular formula but different functional groups.

<u>eg</u>: CH_3-CH_2-CHO (propanal)

$CH_3-\underset{\underset{O}{\|}}{C}-CH_3$ (propanone)

b) <u>E2 mechanism</u>:

→ one step process

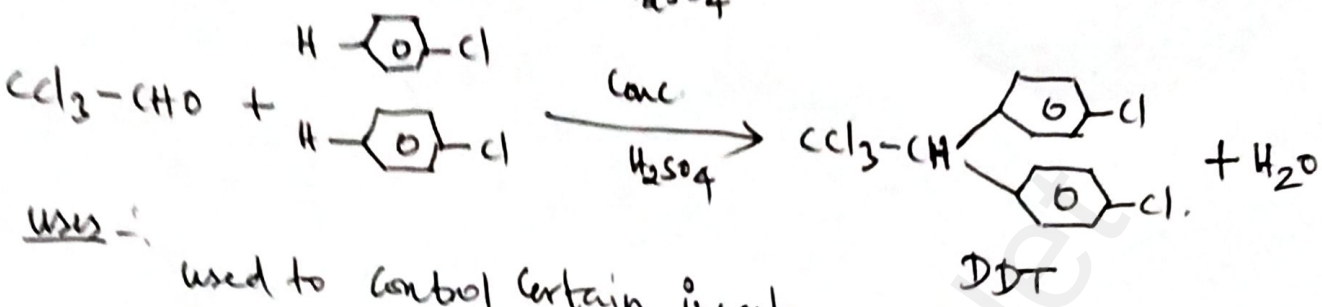
→ abstraction of proton from the β carbon and expulsion of halide ion from α-carbon occur simultaneously.

$$HO^- \rightarrow H \quad CH_3-CH-CH_2-Cl \xrightarrow[KOH]{alc} CH_3-CH=CH_2 + H_2O + KCl$$

1-chloropropane propene.

ii) DDT preparation :-

chloral + chlorobenzene $\xrightarrow[H_2SO_4]{Conc.}$ DDT



Uses :-

used to control certain insects which carries diseases like malaria and yellow fever.