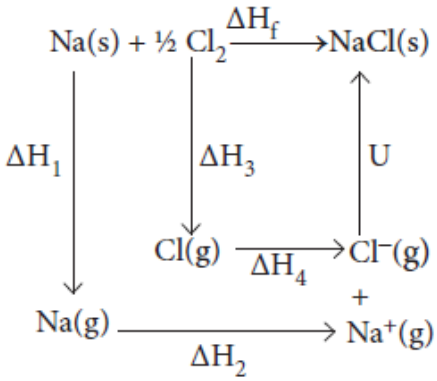
+1 CHEMISTRY PUBLIC EXAM MARCH-25 ANSWER KEY(VENKATESAN M, AGR BOYS- KPM,VPM- Dt)

Q.No	Answer	Mark
16	**Relative atomic mass** Relative atomic mass(A_r) = $\frac{Average\ mass\ of\ the\ Atom}{Unified\ atomic\ Mass}$	2
17	**Heisenberg's Uncertainty Principle** 'It is impossible to **accurately** determine both the position and the momentum of a microscopic particle **simultaneously**'. $\Delta x\ .\Delta P \geq \frac{h}{4\pi}$	2
18	**Three type of Covalent Hydride** Electron – precise (CH_4, C_2H_6, SiH_4, GeH_4), Electron – deficient (B_2H_6) Electron - rich hydrides (NH_3, H_2O).	2
19	**Avogadro hypothesis Law** Avogadro hypothesised that equal volumes of all gases under the same conditions of temperature and pressure contain equal number of molecules V α n $\frac{V_1}{n_1} = \frac{V_2}{n_2}$ = constant	2
20	**Third law of thermodynamics** Third law of thermodynamics states that the entropy of pure crystalline substance at absolute zero is zero. $\lim_{T \to 0} S = 0$	2
21	**Sublimation** Few substances like benzoic acid, naphthalene and camphor when heated pass directly from solid to vapor without melting (ie liquid). On cooling the vapours will give back solids. Such phenomenon is called sublimation.	2
22	**Inductive effect** 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. This is a permanent phenomenon. Ex Ethylchloride $\overset{\delta\ \delta+}{CH_3} \rightarrow \overset{\delta+}{CH_2} \rightarrow\!\!\rightarrow \overset{\delta-}{Cl}$ 2 1	2
23	**Define Smog** Smog is a combination of smoke and fog which forms droplets that remain suspended in the air. Smog is a chemical mixture of gases that forms a brownish yellow haze over urban cities. Smog mainly consists of ground level ozone, oxides of nitrogen, volatile organic compounds, SO_2, acidic aerosols and gases, and particulate matter.	2
24	$N_2 + 3H_2 \rightleftharpoons 2NH_3$ $K_c = \frac{[NH_3]^2}{[H_2]^3\,[N_2]} = \frac{[1.8\ x10^{-2}]^2}{[3\ x10^{-2}]^3\,[1.2\ x\ 10^{-2}]} = 1 \times 10^3\ M^{-2}$ Or $= 1 \times 10^3\ L^2mol^{-2}$	2
25	**Molar mass Calculation** Ethanol C_2H_5OH = 46 Or 46u Or 46g Gulucose($C_6H_{12}O_6$) = 180 Or 180u Or 180g	½ ½
26	**Pauling Scale** By Pauling, he assigned arbitrary value of electronegativities for hydrogen and fluorine as 2.1 and 4.0 respectively. Based on this the electro negativity values for other elements can be calculated using the following expression $(X_A - X_B) = 0.182 \sqrt{E_{AB} - (E_{AA}\ x\ E_{BB})^{\frac{1}{2}}}$ Where E_{AB}, E_{AA} and E_{BB} are the bond dissociation energies (K cal) of AB, A_2 and B_2 molecules respectively. Or (Any two 1m)	1 2

27	**Para Hydrogen 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 and 4. Mixing with paramagnetic molecules such as O_2, NO, NO_2 or with nascent/atomic hydrogen.	Any three Point 3
28	No can't Liquefied, there are no intermolecular force of attraction ,so can't liquefied	3
29	**Limitation of Henry's Law** 1. Henry's law is applicable at moderate temperature and pressure only. 2. Only the less soluble gases obeys Henry's law 3. The gases reacting with the solvent do not obey Henry's law. For example, ammonia or HCl reacts with water and hence does not obey this law. $NH_3 + H_2O \leftrightarrows NH_4^+ + OH^-$ 4. The gases obeying Henry's law should not associate or dissociate while dissolving in the solvent.	Any three Point 3
30	**Covalent character in ionic Bond** 1. The partial covalent character in ionic compounds can be explained on the basis of a phenomenon called polarisation. 2. We know that in an ionic compound, there is an electrostatic attractive force between the cation and anion. 3. The positively charged cation attracts the valence electrons of anion while repelling the nucleus. 4. This causes a distortion in the electron cloud of the anion and its electron density drifts towards the cation, which results in some sharing of the valence electrons between these ions. Thus, a partial covalent character is developed between them. This phenomenon is called polarisation.	3
31	**Define Isomerism** Two or more compounds with the same molecular formula but different structure and properties (physical, chemical, or both). Compounds exhibiting this isomerism are called isomers **Constitutional Isomers: Chain,Position,Functional,Metamer,Tautomer and RingChain** **Sterioisomer:Conformational,Configurational,Geometrical,Optcal - Isomers**	
32	**Uses of Chlorobenzene** 1. Chloro benzene is used in the manufacture of pesticides like DDT 2. It is used as high boiling solvent in organic synthesis. 3. It is used as fibre - swelling agent in textile processing.	3
33	**Chain reaction between Methane and Chlorine** $CH_4 + Cl_2 \xrightarrow{Light\ Or\ Uv\ Or\ h\vartheta} CH_3Cl + HCl$ (Four equation 3m) $CH_3Cl + Cl_2 \xrightarrow{Light\ Or\ Uv\ Or\ h\vartheta} CH_2Cl_2 + HCl$ $CH_2Cl_2 + Cl_2 \xrightarrow{Light\ Or\ Uv\ Or\ h\vartheta} CHCl_3 + HCl$ (any three equation 2 ½ m) $CHCl_3 + Cl_2 \xrightarrow{Light\ Or\ Uv\ Or\ h\vartheta} CCl_4 + HCl$ (any one equation 1m)	3
34(A)	**Define Molar Volume** The volume occupied by one mole of any substance in the gaseous state at a given temperature and pressure is called molar volume. At 273K 1atm 22.4L	2 1

	Limitation of Bohr's atoms model 1. The Bohr's atom model is applicable only to species having one electron such as hydrogen, Li^{2+} etc... And not applicable to multi electron atoms. 2. It was unable to explain the splitting of spectral lines in the presence of magnetic field (Zeeman Effect) or an electric field (Stark effect). 3. Bohr's theory was unable to explain why the electron is restricted to revolve around the nucleus in a fixed orbit in which the angular momentum of the electron is equal to $\frac{nh}{2\pi}$ and a logical answer for this, was provided by Louis de Brogli	Any three Point 3
34(B)	**Why Halogen Act as Oxidising agent** Halogen are highly electronegative and has high negative electron gain enthalpy , so they have high tendency to gain electron hence they act as strong oxidizing agent	2
	Periodic variation of Electronegativity in Group and Period The electronegativity generally increases across a period from left to right. As discussed earlier, the atomic radius decreases in a period, as the attraction between the valence electron and the nucleus increases. Hence the tendency to attract shared pair of electrons increases. Therefore, electronegativity also increases in a period The electronegativity generally decreases down a group. As we move down a group the atomic radius increases and the nuclear attractive force on the valence electron decreases. Hence, the electronegativity decreases	$1\frac{1}{2}$ $1\frac{1}{2}$
35(B)	Let us calculate the lattice energy of **Sodium chloride using Born-Haber cycle**  (Diagram 2m) $U = (\Delta H_f) - (\Delta H_1 + \Delta H_2 + \frac{1}{2}\Delta H_3 + \Delta H_4)$ Or $\Delta H_f = \Delta H_1 + \Delta H_2 + \frac{1}{2}\Delta H_3 + \Delta H_4 + U$ ΔH_1 - Enthalpy change for the sublimation (Hess law 1m) ΔH_2 - Enthalpy change for the Dissosiation $\frac{1}{2}\Delta H_3$ - Enthalpy change for the Ionisation energy (Any 4 Explanation 2m) ΔH_4 - Enthalpy change for the electron affinity	5
35(A)	**Magnesium and Calcium also plays a vital role in Biological functions.** 1. A typical adult human body contains about 25 g of magnesium and 1200 g of calcium. Magnesium plays an important role in many biochemical reactions catalyzed by enzymes. 2. It is the co-factor of all enzymes that utilize ATP in phosphate transfer and energy release. 3. It also essential for DNA synthesis and is responsible for the stability and proper functioning of DNA. 4. It is also used for balancing electrolytes in our body. 5. Deficiency of magnesium results into convulsion and neuromuscular irritation. 6. The main pigment that is responsible for photosynthesis, chlorophyll, contains magnesium which plays an important role in photosynthesis	Any three Point 3

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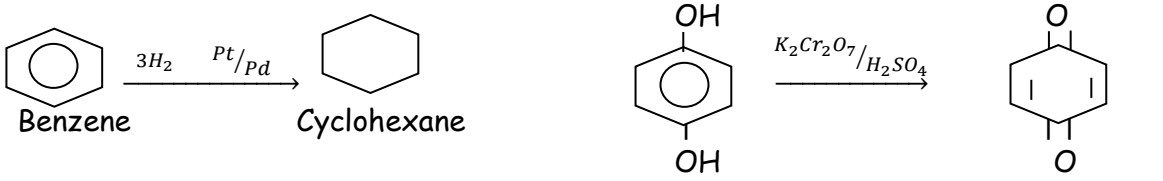
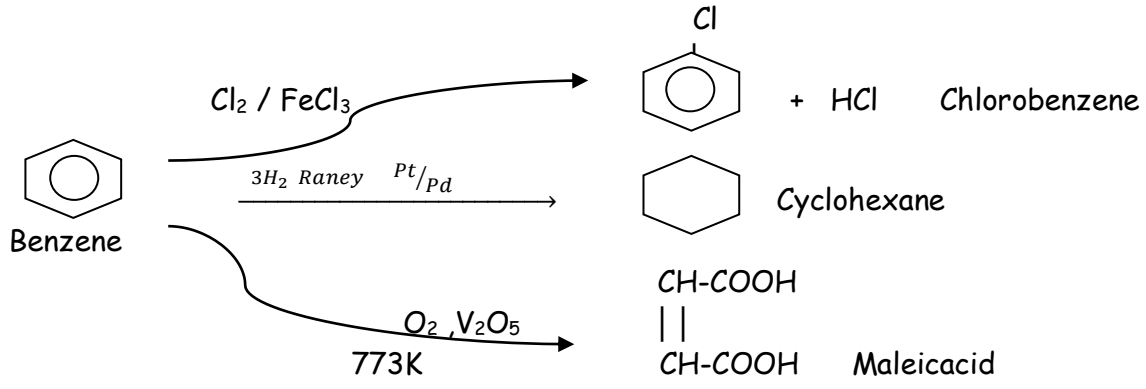
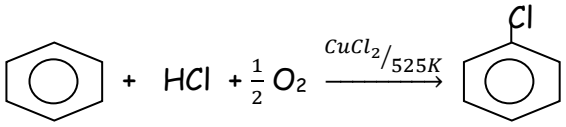
	1. Is a major component of bones and teeth. 2. It is also present in in blood and its concentration is maintained by hormones (calcitonin and parathyroid hormone). 3. Deficiency of calcium in blood causes it to take longer time to clot. 4. It is also important for muscle contraction.	Any two Point 2
36(A)	Concentration Pressure Temperature Presence of Catalyst Inert Gase	5
36(B)	"in the case of a solution of volatile liquids, the partial vapour pressure of each component (A & B) of the solution is directly proportional to its mole fraction". According to **Raoult's Law** $P_A \alpha X_A$, $P_A = kX_A$ Where $X_A = 1$ $k = P_A^0$ Where P_A^0 is the vapour pressure of pure component A For compound A $P_A = P_A^0 X_A$ For compound B $P_B = P_B^0 X_B$ XA and XB are the mole fraction of the compound A and B respectively $P_{Total} = P_A + P_B$, $P_{Total} = P_A^0 X_A + P_B^0 X_B$ we know that $X_A + X_B = 1$, $X_A = 1 - X_B$ $P_{Total} = (1 - X_B) P_A^0 + P_B^0 X$ $P_{Total} = P_A^0 + X_B(P_B^0 - P_A^0)$ the plot of P_{total} Vs X_B will give straight line $(P_B^0 - P_A^0)$ as slope and P_A^0 as the intercept	1 1 1 1 1 1
37(A)	**Molecular orbital diagram of oxygen molecule (O_2)** Electronic configuration of O atom is **$1s^2$ $2s^2$ $2p^4$** Electronic configuration of O_2 molecule is $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2px^2 \pi 2py^2, \pi 2pz^2, \pi^* 2py^1, \pi^* 2pz^1,$ Bond order = $\frac{N_b - N_a}{2}$ = $\frac{10-6}{2}$ = 2 Molecule has *two unpaired electrons*. Hence, it is **paramagnetic**	1 2 1 1
37(B)	CH_3-CH_2-CH-CHO (OH: 2-Hydroxybutanal) $CH_3 - C \equiv C - CH - CH_3$ (Cl: 4-Chloropent-2-yne)	2
		1½ 1½
38(A)		1½ 2 1½
38(B)	 $C_6H_5Cl + NaOH \xrightarrow{350^oC/300atm} C_6H_5OH + NaCl$ $CH_3 - CH_2 - Br + CH_3 - CH_2 - ONa \xrightarrow{\Delta} CH_3 - CH_2 - O - CH_2 - CH_3 + NaBr$	1½ 2 1½

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