F.R.M. [Final Revision Module] JEE Main - CHEMISTRY

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IIT-JEE SYLLABUS

CHEMISTRY PHYSICAL CHEMISTRY Matter and its nature, Dalton's atomic theory of measurements in Ole, Dalton's atomic theory of Matter and its nature, Dalton's atomic theory; Concept of atom, molecule, element and compound; Physical quantities and their measurements in Chemistry, precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; Chemical combination; Adomic and molecular masses, mole concept, molar mass, equations and stoichiometry. **UNIT 2: STATES OF MATTER** Classification of matter into solid, liquid and gaseous states. Gaseous State: Massurable presenting of second Case Java – Deulois Java O

Gaseous State: Measurable properties of gases; Gas laws - Boyle's law, Charle's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation; Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behaviour, compressibility factor and van der Waals equation. Liquid State:

Properties of liquids - vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only). Solid State:

Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical, magnetic and dielectric properties.

Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hop lattices), voids, calculations involving unit Cell parameters, imperfection in solids, Electrical, magnetic and dielectric properties. UNIT 3: ATOMIC STRUCTURE Entropy of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Boh's model, Dual nature of matter, de-Broglie's relationship, Heisenberg uncertainty principe. Elementary ideas of guantum mechanics, guantum mechanical model of atom, its important features, ?? and 7?2, concept of atomic orbitals as one electron wave functions; Variation of ?? and 1?? with r for 1s and 2s orbitals; various guantum numbers (pincipal, angular momentum and magnetic quantum numbers) and their significance; shapes of s. p and d - orbitals, electron spin and spin guantum numbers (burdes for filling electrons in orbitals - a urbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of natif-filled and completely filled orbitals. UNIT 4: CHEMICAL BONDING AND MOLECLLAR STRUCURE Molecular orbitals can approach to covalent bonding. Concept of electronegativity, Fajan's rule, dipole moment, Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. Guantum mechanical approach to covalent bonding. Valence bond theory - its important features, concept of electronegativity, Fajan's rule. dipole moment, Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. There and the atomic configurations of homouclear diatomic molecules, concept of bond order, bond length and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications. UNIT 5: CHEMICAL THERMODYNAMICS

UNIT 8' REDOX REACTIONS AND ELECTROCHEMISTRY
 Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions. Eectrolytic and metallic conduction, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law and its applications.
 Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half - cell and cell reactions; emf of a Galvanic cell and its measurement; Nernst equation and its applications; Relationship between cell potential and Gibbs energy change; Dry cell and lead accumulator; Fuel cells.
 UNIT 9: CHEMICAL KINETICS
 Rate of a chemical reactions, their characteristics and half - lives, effect of temperature, pressure and catalyst; elementary and complex reactions, order reactions, collision theory of bimolecular gaseous reactions (no derivation).
 UNIT-10: SURFACE CHEMISTRY

Adsorption- Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids - Freundlich and Langmuir adsorption isotherms, adsorption from solutions. Colloidal state - distinction among true solutions, colloids and suspensions, classification of colloids - lyophilic, lyophobic; multi molecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and flocculation; Emulsions and their characteristics.

INORGANIC CHEMISTRY

INURGANIC CHEMISTRY UNIT 11: CLASSIFICATON OF ELEMENTS AND PERIODICITY IN PROPERTIES Modem periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity. UNIT 12: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals - concentration, reduction (chemical and electrolytic methods) and refining with special reference to the extraction of AI, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals. UNIT 13: HYDROGEN Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen.

INIT 13: PLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS) Group - 1 and 2 Elements General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds - sodium carbonate and sodium hydroxide; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca. **UNIT 15: P -BLOCK ELEMENTS** (ALKALI AND ALKALINE EARTH METALS) Group - 1 and 2 Elements General introduction, electronic configuration and general trends in physical and chemical properties of some important compounds - sodium carbonate and sodium hydroxide; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca. **UNIT 15: P -BLOCK ELEMENTS** Group - 13 to Group 18 Elements General Introduction: Electronic configuration and general trends in physical and chemical properties of the prodettes of elements across the periods and down the groups; unique behaviour of the first element in each group. Groupwise study of the p - block elements Group - 13 Preparation, properties and uses of boron and aluminium; properties of boric acid, diborane, boron trifluoride, aluminium chloride and alums.

alums.

| П | | |
|---|---|--|
| Π | Ш | Group - 14 Allotropes of carbon tendency for catenation: Structure & properties of silicates and zeolites |
| | | Group - 15 Properties and uses of nitrogen and phosphorus; Allotrophic forms of phosphorus; Preparation, properties, structure and uses of properties and uses of nitrogen and phosphorus; Allotrophic forms of phosphorus; Preparation, properties, structure and uses of |
| | | Group - 16 Preparation, properties, structures and uses of ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of |
| | | Sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur. Group - 17 Preparation, properties and uses of hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen Lormonunds and oxides and oxoacids of balonens |
| | | Group - 18 Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon. |
| | | General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition lelements - physical properties, ionization enthaloy, oxidation states, atomic radii, colour, catalytic behaviour, magnetic properties. |
| | | complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of K ₂ Cr ₂ O ₇ and KMnO ₄ . Inner Transition Elements Lanthanoids - |
| | | UNIT 17: CO-ORDINATION COMPOUNDS Introduction to co-ordination compounds, Werner's theory, ligands, co-ordination number, denticity, chelation; IUPAC nomenclature of |
| | | Imononuclear co-ordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of co-ordination compounds (in qualitative analysis, extraction of metals and in biological isystems). |
| | | UNIT 18: ENVIRONMENTAL CHEMISTRY Environmental pollution - Atmospheric, water and soil. Atmospheric pollution - Tropospheric and Stratospheric Tropospheric pollutants |
| | | house effect and Global warming; Acid rain; Particulate pollutants: Smoke, dust, smog, fumes, mist; their sources, harmful effects and prevention. Stratospheric pollution- Formation and breakdown of ozone, depletion of ozone layer - its mechanism and effects. |
| | | Water Pollution - Major pollutants such as, pathogens, organic wastes and chemical pollutants; their harmful effects and prevention. Soil pollution - Major pollutants such as: Pesticides (insecticides, herbicides and fungicides), their harmful effects and prevention. Istrategies to control environmental pollution |
| | | ORGANIC CHEMISTRY |
| | | Purification - Crystallization, sublimation, distillation, differential extraction and chromatography - principles and their applications. |
| | | Qualitative analysis - Detection of nitrogen, suipnur, prosphorus and naiogens. Quantitative analysis (basic principles only) - Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus. |
| | | Calculations of empirical formulae and molecular formulae; Numerical problems in organic quantitative analysis. UNIT 20: SOME BASIC PRINCIPLES OF ORGANIC CHEMISTRY |
| | | based on functional groups: C = C - , - C h C - and those containing halogens, oxygen, nitrogen and sulphur; Homologous series; Isomerism - structural and stereoisomerism. |
| | | Covalent bond fission - Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free fradicals, electrophiles and nucleophiles. |
| | | Electronic displacement in a covalent bond - Inductive effect, electromeric effect, resonance and hyperconjugation. |
| | | Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions. Alkanes - Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenation of alkanes. |
| | | (Markownikoff's and personal effect); Ozonolysis and polymerization. Alkynes - Acidic character; Addition of hydrogen halides (water and hydrogen halides; Polymerization. Aromatic hydrocarbons - Nomenclature, benzene - structure and aromaticity; Mechanism |
| | | of electrophilic substitution: halogenation, nitration, Friedel - Craft's alkylation and acylation, directive influence of functional group in mono-substituted benzene. IUNIT 22: ORGANIC COMPOUNDS CONTAINING HALOGENS |
| | | General methods of preparation, properties and reactions; Nature of C-X bond; Mechanisms of substitution reactions. Uses; Environmental effects of chloroform & iodoform. |
| | | General methods of preparation, properties, reactions and uses. ALCOHOLS, PHENOLSAND ETHERS |
| | | Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration. Phenols: Acidic nature, electrophilic substitution reactions: halogenation, nitration and sulphonation, Reimer - Tiemann reaction. Ethers: Structure, Aldehyde and Ketones: Nature of carbonyl group:Nucleophilic addition to >C=O group, relative reactivities of |
| | | aldehydes and ketones; Important reactions such as — Nucleophilic addition reactions (addition of HČN, NH, and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of - hydrogen, aldol condensation, Cannizzaro |
| | | CARBOXYLIC ACIDS Acidic strength and factors affecting it. UNIT 24: ORGANIC COMPOUNDS CONTAINING NITROGEN |
| | | General methods of preparation, properties, reactions and uses. Amines: Nomenclature, classification, structure, basic character and identification of primary, secondary and tertiary amines and their basic character. Diazonium Salts: Importance in synthetic organic chemistry. |
| | | UNIT 25: POLYMERS General introduction and classification of polymers, general methods of polymerization-addition and condensation, copolymerization; Natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses - polythene |
| | | nylon, polyester and bakelite. UNIT 26: BIOMOLECULES |
| | | CARBOHYDRATES - Classification: aldoses and ketoses; monosaccharides (glucose and fructose) and constituent monosaccharides lof oligosacchorides (sucrose, lactose and maltose). |
| | | PROTEINS - Elementary Idea of - amino acids, péptide bond, polypeptides; Proteins: primary, secondary, tertiary and quaternary structure (qualitative idea only), denaturation of proteins, enzymes. |
| | | units - Chemistre in every day LIFE |
| | | antihistamins - their meaning and common examples. Chemicals in food - Preservatives, artificial sweetening agents - common examples. Cleansing agents - Soaps and detergents, |
| | | Cleansing action. UNIT 28: PRINCIPLES RELATED TO PRACTICAL CHEMISTRY Detection of extra elements (N.S. halogens) in organic compounds: Detection of the following functional groups: hydroxyl (alcoholic |
| | | and phenolic), carbonyl (aldehyde and ketone), carboxyl and amino groups in organic compounds. • Chemistry involved in the preparation of the following: Inorganic compounds: Mohr's salt, potash alum. Organic compounds: |
| | | Chemistry involved in the titrimetric excercises - Acids bases and the use of indicators, oxalic-acid vs KMnO4, Mohr's salt vs KMnO4, Mohr's salt vs |
| | | • Chemical principles involved in the qulitative salt analysis. Cations - Pb, +, Cu, + Al, +, Zn, +, Ni, +, Ca, +, Ba, +, Mg, +, NH ₄ +. Anions - CC, -, S, -, SC, -, NC, -, NC, -, Cl, -, Br, L. |
| | | ((Insoluble salts excluded). 1. Enthalpy of solution of CuSO |
| | | L. Entitialpy or neutralization of strong acid and strong base. 3. Preparation of lyophilic and lyophbic sols. 4. Kinetic study of reaction of iodide ion with hydrogen peroxide at room temperature. |
| | | |



| | | EX | ERCISE | |
|-----|--|--|---|--|
| 1. | A sample of proteir analysisi revealed th these are the only r minimum possible m (A) 600000 | n was analyed for m hat it contained mag netallic species pre nolar mass of the por (B) 150000 | metal content an gnesium and titar sent in the protei tein is [Mg=24, Ti (C) 300000 | d analysed for metal content and hium in equal amounts, by mass. If n and contains 0.016% metal, the = 48] (D) 1200000 |
| 2. | 1 mol of N_2 and 4 m and after reaction, reaction. Mol fractio (A) 1/6 | ol of H_2 are allowed water is added. Aq on of H_2 in the gas m (B) 5/6 | to react in a vess ueous solution re ixture after react (C) 1/3 | sel to form NH ₃ gas as only product equired 1 mol of HCl for complete ion is (D) 1.0 |
| 3. | pH of 0.05 M H ₂ SO ₄ s (A) 0.005 | olution will be (B) 2 | (C) 1 | (D) 0.01 |
| 4. | Which of the followi (A) 5 ml pure water | ng does not make a (B) 20 ml pure wat | ny change in pH w ter (C) 10 ml HCl | hen added to 10 mi dilute HCl (D) Same 20 ml dilute HCl |
| 5. | The pH of a soft drin (A) 1.96×10 ⁻² mol/l | nk is 3.82. Its hydro (B) 1.96×10 ⁻³ mol/ | gen ion concentra I (C)1.5×10 ⁻⁴ m | ation will be ol/ l (D) 1.96×10 ⁻¹ mol / l |
| 6. | A monoprotic acid ir (A) 1.0×10⁻³ | n a 0.1 M solution io (B) 1.0×10 ⁻⁶ | nizes to 0.0001% (C) 1.0×10 ⁻⁸ | . Its ionization constant is (D) 1.0×10^{-10} |
| 7. | In the reaction A+2I a 2.0 lit. flask flask constant (K_c) for the | $3 \longrightarrow 2C$, if 2 moles and the equilibrium e reaction is (B) 0.147 | s of A.3.0 moles o n concentration o | f B and 2.0 moles of C are placed in f C is 0.5 mole/ I. The equilibrium |
| 8. | For which state of composition ? (A) solid | (B) liquid | ent of cubic expa | (D) all |
| 9. | In a reversible 2NO | $k_1 \xrightarrow{k_1} N_2 O_4$, the rate | e of disappearanc | e of NO_2 is equal to |
| | (A) $\frac{2k_1}{k_2}[NO_2]^2$ | | (B) 2k ₁ [NO ₂] ² - | - 2k ₂ [N ₂ O ₄] |
| | (C) $2k_1 [NO_2]^2 - k_2 [NO_2]^2$ | N ₂ O ₄] | (D) (2k ₁ -k ₂) [N | 10 ₂] |
| 10. | 4.5 moles each of hy moles of HI were for (A) 1 | ydrogen and iodine und. The equilibriun (B) 10 | headed in a seale n constant for H _{2(c} (C) 5 | d ten litre vessel. At equilibrium, 3 $H_{2(g)} \rightleftharpoons 2HI_{(g)}$ is (D) 0.33 |
| 11. | Average velocity of r | molecules of an idea | l gas in a containe | er, moving only in one dimension, is |
| | (A) $\sqrt{\frac{8RT}{\pi M}}$ | (B) $\frac{1}{3}\sqrt{\frac{8\text{RT}}{\pi\text{M}}}$ | (C) zero | (D) Infinite |
| • | | | | |

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- **12.** In a chemical equilibrium $A+B \rightleftharpoons C+D$, when one mole each of the two reactants are mixed, 0.6 mole each of the products are formed. The equilibrium constant calculated is (A) 1 (B) 0.36 (C) 2.25 (D) 4/9
- **13.** The ratio PV_m/RT fof a gas is known as the compressibility factor. What is the value of this ratio of r one mole of a vanderwaal's gas at its Boyle temperature ?

(A)
$$1 + \frac{b^2}{V_m(V_m - b)}$$
 (B) $1 + \frac{b^2}{V_m^2}$ (C) $1 + \frac{b}{V_m}$ (D) $1 - \frac{b^2}{V_m^2}$

- **14.** The following equilibrium exists in aqueous solution $CH_3COOH \rightleftharpoons CH_3COOH^- + H^+$. If dilute HCl is added without a change in temperature then the
 - (A) Concentration of CH_3COO^- will increase
 - (B) Concentration of CH₃COO⁻ will decrease
 - (C) Equilibrium constant will increase
 - (D) Equilibrium constant will decrease
- **15.** Reaction in which yield of product will increases with increases in pressure is

$$\begin{array}{ll} \text{(A)} \ H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)} \\ \text{(C)} \ H_{2}O_{(g)} + C_{(s)} \rightleftharpoons CO_{(g)} + H_{2(g)} \\ \end{array} \\ \begin{array}{ll} \text{(B)} \ H_{2}O(g) + CO_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)} \\ \text{(D)} \ CO_{(g)} + 3H_{2(g)} \rightleftharpoons CH_{4(g)} + H_{2}O_{(g)} \\ \end{array}$$

16. The distance between tow nearest neighbors in body centered cubic lattice of axial length, I, is

(A) I (B)
$$\frac{\sqrt{3}}{2}$$
I (C) $\frac{\sqrt{2}}{2}$ I (D) none

17. Let the height of hop unit cell is 'h'. The height of tetrahedral voids from the bases i

(A)
$$\frac{h}{2}$$
 (B) $\frac{h}{2}$, $\frac{2h}{3}$ (C) $\frac{h}{8}$, $\frac{7h}{8}$ (D) $\frac{h}{4}$, $\frac{3h}{4}$

- **18.** 3.0 molal NaOH solution has a density of 1.110 g/ml. The molarity of the solution is

 (A) 3.0504
 (B) 3.64
 (C) 3.05
 (D) 2.9732
- **19.** Boiling point of chloroform was raised by 0.323 K, when 0.5143 g of anthracence was dissolved in its its 35 g. Molecular mass of ant hracence is $(K_b \text{ for CHCl}_3 = 3.9 \text{ k-kg-mol}^{-1})$ (A) 79.42 g/mol (B) 132.32 g/mol (C) 177.42 g/mol (D) 242.32 g/mol
- A solution containing 30 gms of non-volatile solute in exactly 90 gm water has a vapour pressure of 21.85 mm Hg at 25° C. Further 18 gms of water is then added to the solution. the resulting solution has a vapour pressure of 22.15 mm Hg at 25°C, Calculate the molecular weight of the solute

 (A) 74.2
 (B) 75.6
 (C) 70.3
 (D) 78.7
- **21.** With 63 gm of oxalic acid how many litres of $\frac{N}{10}$ solution can be prepared (A) 100 litre (B) 10 litre (C) 1 litre (D) 1000 litre
- **22.** The heat evolved on combustion of 1 gm of starch, $(C_6H_{10}O_5)$, into $CO_2(g)$ and $H_2O(I)$ is 4.18 Kcal. What is the standard enthalpy of formation of 1 gm of starch? Heat of formation of $CO_2(g)$ and $H_2O(I)$ are -94.05 and -68.32 Kcal/mol. (A) -2.82 Kcal (B) -0.71 Kcal (C) - 1.41 Kcal (D) - 8.46 Kcal
- **23.** The bond enthalpies of C–C=C and bonds are are 348, 610 and 835 kJ/mol, respectively at 298K and 1 bar. The enthalpy of polymeristion permole mole of 2-Butyne at 298K and 1 bar, as shown below, is

 $n CH_{3}-C \equiv C-CH_{3}(g) \rightarrow -(CH_{2}-CH=CH-CH_{2})_{n} -(g)$ (A) -123 kJ (B) -132 kJ (C) - 139 kJ (D) - 37 kJ

| 24. | Which of the following in not corre | ct for dieal solution |
|-----|-------------------------------------|---------------------------|
| | (A) ∆S _{mix} =0 | (B) ∆H _{mix} =0 |
| | (C) It obeys Raoult's law | (D) ∆V _{mix} = 0 |

- A 5% solution of canesugar (mol. wt. = 342) is isotonic with 1% solution of a substance X. the molecular weight of X is
 (A) 34.2
 (B) 171.2
 (C) 68.4
 (D) 136.8
- **26.** A certain aqueous solution of FeCl_3 (formula mass =162) has a density fo 1.1 g/ml and
contains 20.0% FeCl_3 . Molar concentration of this solution is.
(A) 0.028 (B) 0.163 (C) 1.27 (D) 1.47
- 27. The exact mathermatical expression of Raoult's law is (n= moles of non-volatile solute, N = moles of solvent, P = V.P. os solution & P°=V.P. of pure solvent)

(A)
$$\frac{P^0 - P}{P^0} = \frac{n}{N}$$
 (B) $\frac{P^0 - P}{P^0} = \frac{N}{n}$ (C) $\frac{P^0 - P}{P} = \frac{n}{N}$ (D) $\frac{P^0 - P}{P^0} = n \times N$

28. Pressure over an ideal binary liquid solution contaaining 10 moles each of liquid A and B is gradually decreased isothermally. At what pressure, half of the total amount of liquid will get converted into vapour? ($P_A^0 = 200$ torr, $P_B^0 = 100$ torr) (A) 150 torr (B) 166.5 torr (C) 133.3 torr (D) 141.4 torr

(B) n=4, l=4, m=+2, s= $-\frac{1}{2}$

(D) n=4, l=3, m=-2, s=+ $\frac{1}{2}$

29. Which of the following sets is possible for quantum numbers

(C) n=4, l=4, m=-2, s=+
$$\frac{1}{2}$$

30. The value of Planck's constant is 6.63×10^{-34} Js. The velocity of light is 3.0×10^8 ms⁻¹. Which value is closest to the wavelenggh in nanometres of a quantum of light with frequency of 8×10^{15} S⁻¹ (A) 3×10^7 (B) 2×10^{-25} (C) 5×10^{-18} (D) 4×10^1

31. Values of four quantum numbers for the last electron in the atom are n=4, l=1, m=+1 and s=-

 $\frac{1}{2}$. Atomic number of the atom will be

32. which one of the following explains light both as a stream of particles and as wave motion

(A) Diffraction (B) $\lambda = \frac{h}{p}$ (C) Interference (D) Photoelectric effect.

33. On adding $AgNO_3$ solution into KI solution, a negatively charged colloidal sol is obtained when they are in

(A) 100 ml of 0.1 M-AgNO $_3$ +100 ml of 0.1 M-KI

- (B) 100 ml of 0.1 M-AgNO $_3$ +50 ml of 0.2 M-KI
- (C) 100 ml of 0.1 M-AgNO $_3$ +50 ml of 0.1 M-KI
- (D) 100 ml of 0.1 M-AgNO $_3$ +100 ml of 0.15 M-KI
- **34.** Be's 4th electron will have four quantum numbers

| | n | l | m | m |
|-----|---|---|----|------|
| (A) | 1 | 0 | 0 | +1/2 |
| (B) | 1 | 1 | +1 | +1/2 |
| (C) | 2 | 0 | 0 | -1/2 |
| (D) | 2 | 1 | 0 | +1/2 |

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35. In a 3.0 litre vessel, the following equilibrium partial are measured : $N_2 = 100 \text{ mm}$, $H_2=400 \text{ mm}$ and $NH_3=100 \text{ mm}$. Nitrogen is removed from the vessel at constant temperature unit the pressure of hydrogen at equilibrium is equal to 700 mm. The new equilibrium partial pressure of N_2 is

(A) 11.94 mm (B) 200 mm (C)

- (C) 18.66 mm (D) 43.78 mm
- **36.** Suppose the gas phase isomeriation reactions $A \cong B$, $A \cong C$ and $B \cong C$ reach equilibrium at a fixed temperature. Express the quilibrium mole fraction of A in terms of equilibrium constants, which are K_1 , K_2 and K_3 respectively.

(A)
$$\frac{K_1}{K_1 + K_2 + K_3}$$
 (B) $\frac{1}{1 + K_1 + K_2}$ (C) $\frac{1}{K_1 + K_2 + K_3}$ (D) $\frac{1}{K_1 + K_2}$

37. The data for the rection $A+B \rightarrow C$ is

| Exp. | [A] ₀ | [B] ₀ | Inittila rate |
|--------|------------------|-------------------|--|
| 1 | 0.012 | 0.035 | 0.10 |
| 2 | 0.024 | 0.070 | 0.80 |
| 3 | 0.024 | 0.035 | 0.10 |
| 4 | 0.012 | 0.070 | 0.80 |
| The ra | ate law corresp | onds to the ab | ove data is |
| (A) Ra | $te = k[B]^3$ | (B) Rate = $k[B]$ | $[B]^4$ (C) Rate = k[A] [B] ³ (D) Rate = k[A] ² [B] ² |
| | | | |

- 38. The rate of a gaseous reaction is given by the expression K [A] [B]. If the volume of the reaction vessel is suddenly reduced to 1/4th of the initial volume, the reaction rate relating to original rate will be

 (A) 1/10
 (B) 1/8
 (C) 8
 (D) 16
- **39.**The rate of of reaction is doubled for every 10° rise in temperature. The increases in reaction
rate as a result of temperature rise from 10° to 100° is
(A) 112(B) 512(C) 400(D) 614
- **40.** The decomposition of N_2O_5 is a first order reacton represented by $N_2O_5 \longrightarrow N_2O_4 + \frac{1}{2}O_2$. After 15 minutes the volume of O_2 produced is 9 ml and at the end of the reaction 35 mL. The rate constant it equal to

(A) $\frac{1}{15} \ln \frac{35}{44}$ (B) $\frac{1}{15} \ln \frac{44}{26}$ (C) $\frac{1}{15} \ln \frac{44}{35}$ (D) $\frac{1}{15} \ln \frac{35}{36}$

41.
$$C + \frac{1}{2}O_2 \rightarrow CO; \Delta H = -42 \text{ kJ}$$

CO+
$$\frac{1}{2}$$
O₂ → CO₂; Δ H = -24 kJ
The heat of formation of CO₂ is

(A) -16 kJ (B) +66 kJ (C) +16 kJ (D) -66 kJ

- **42.** The heat of combustion of $CH_{4(g)}$. $C_{(graphite)}$ and $H_{2(g)}$ are 20 kcal, -40 kcal and -10 kcal respectively. The heat of formation of methane is (A) -4.0 kcal (B) + 40 kcal (C) -80 kcal (D) + 80 kcal
- 43.
 The work done in ergs for the reversible expansion of one mole of an ideal gas from a volume of 10 litres to 20 litres at 25° C is

 (A) 2.303×298×0.082 log 2
 (B) 298×10⁷×8.31×2.303 log 2

 (C) 2.303×298×0.082 log 0.5
 (D) 8.31×10⁷×298-2.303 log 0.5
- **44.** When different types of salts have nearly solubility product constant K_{sp} but less than one, the most soluble salt is that which
 - (A) produces maximum nuber of ions (B) produces minimum number of ions
 - (C) produces high charge on ion
- (D) produces low chages on ions

- 45. When 20 ml of a strong acid is added to 20 ml of an alkali, the temperature rises by 5°C. If 200 ml of each liquid are mixed, the temperature rise would be (A) 5°C
 (B) 50°C
 (C) 20°C
 (D) 0.5°C
- 46. To perform an analysis of a mixture of metal ions by electrodeposition, the second metal to be deposited must not being plating out until the concentration ratio of the second to the first is about 10⁶. What must be the minimum difference in standard potential of the two metals at 25°C, which form dipositive ions in order for such an analysis to be feasible ?

 (A) 0.177 V
 (B) 0.354 V
 (C) 0.708 V
 (D) 0.005 V
- **47.** The heat of neutralisation of a strong acid and a strong alkali is 57.0 kJ mol⁻¹. The heat released when 0.5 mole of HNO_3 solution, is mixed with 0.2 mole of KOH is. (A) 57.0 kJ (B) 11.4 kJ (C) 28.5 kJ (D) 34.9 kJ
- **48.** In a discharge tube, there are only two hydrogen atoms. If the electrons in both atoms are de-exciting from 4th orbit, the minimum and maximum number of spectral lines should respectively be

49. If n and l are respectively the principal and azimuthal numbers, then the expression for calculating the total number of electrons in any energy level is

(A)
$$\sum_{l=1}^{l=n} 2(2l+1)$$
 (B) $\sum_{l=1}^{l=n-1} 2(2l+1)$ (C) $\sum_{l=0}^{l=n+1} 2(2l+1)$ (D) $\sum_{l=0}^{l=n-1} 2(2l+1)$

50. The mass defect of the nuclear reaction: ${}_{5}B^{8} \rightarrow_{4}Be^{8} + e^{+}$ is (A) m = At, mass of ${}_{5}B^{8}$ – At. mass of ${}_{4}Be^{8}$ (B) m = At, mass of ${}_{5}B^{8}$ – At. mass of ${}_{4}Be^{8}$ +mass of one electron (C) m = At, mass of ${}_{5}B^{8}$ – At. mass of ${}_{4}Be^{8}$ –mass of one electron (D) m = At, mass of $_{5}B^{8}$ – At. mass of $_{4}Be^{8}$ + mass of two electron 51. An electron is allowed to move freely in a closeed cubic box of length of side 10 cm. The maximum uncertainty in its velocity will be -(B) 5.8 × 10⁻⁴ m/sec (A) 3.35×10^{-3} m/sec (C) 4 × 10⁻⁵ m/sec (D) 4×10^{-6} A single e⁻ in an ion has ionization energy equal to 217.6 ev. What is total no. of neutrons 52. present in one ion of it? (A) 2 (B) 4 (C) 5 (D) 9 A small particle of mass m in such a way that P.E. = -1/2 mKr², where K is a constant and r 53. is distance of particle from origin. Assuming Bohr's model of quantization of angular momentum and circular orbit, r is directly proportional to -(A) n² (C) √n (D) None (B) n 54. If value of I = 0 to (n + 1) then calculate max. no. of elements in II period of pariodic table (A) 2 (B) 8 (C) 18 (D) 32 55. When 2L mixture of CO & CO, is passed over red hot charoal, its volume increased by 1.4 times. If all the volume measurement one made under similar conditions of P & P. Find out the % composition of mixture -(A) 40 %, 60% (B) 60 %, 40 % (C) 50 %, 50% (D) 70 %, 30 % 0.8 mole of a mixture of CO & CO, requires exactly 40 gm of NaOH is solution for conversion of 56. all the CO, into Na,CO₃. How many moles of NaOH would it requires for conversion nito Na,CO₃. if the mixture (0.8 mle) is completely oxidised to CO₂? (A) 0.2 (B) 0.6 (D) 1.5 (C) 1

57. The total no. of neutrons present is 54 ml $H_2O(\ell)$ are – (A) 3 N_A (B) 30 N_A (C) 24 N_A (D) None of these

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(A) 30 (B) 12 (C) 24 (D) 36 If w_1 g of a metal X displaces w_2 g of another metal Y from its salt solution and if the 59. equivalent weights are E_1 and E_2 respectively, the correct expression for the equivalent weight of X is : (A) $E_1 = \frac{W_1}{W_2} \times E_2$ (B) $E_1 = \frac{W_2 \times E_2}{W_1}$ (C) $E_1 = \frac{W_1 \times W_2}{E_2}$ (D) $E_1 = \sqrt{\frac{W_1}{W_2} \times E_2}$ A metal oxide is reduced by heating it in a stream of hydrogen. It is found that after complete 60. reduction, 3.15 g of oxide yielded 1.05 g of metal. From the above data we can say that (A) The atomic weight of metal is 8 (B) The atomic weight of metal is 4 (C) The equivalent weight of metal is 4 (D) The equivalent weight of metal is 8 100 mL of 0.1 N hypo decolourised iodine by the addition of x gram of crystalline copper 61. sulphate to excess of KI. The value of 'x' is (molecular wt. of $CuSO_4$.5H₂O is 250) (A) 5.0 g (B) 1.25 g (C) 2.5 g (D) 4 g 62. Which of the following is not a redox reaction? (A) $2Na + Cl_2 \rightarrow 2NaCl$ (B) C + $O_2 \rightarrow CO_2$ (C) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ (D) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ 63. The value of n in $MnO_4^- + 8H^+ + ne^- \rightarrow Mn^{2+} + 4H_2O$ is (C) 2 (D) 3 (A) 5 (B) 4 64. When KMnO₄ acts as an oxidizing agent and ultimately forms MnO₄²⁻, MnO₂, Mn₂O₃ and Mn²⁺ then number of electrons transferred in each case respectively are-(A) 4, 3, 1, 5 (B) 1, 5, 3, 7 (C) 1, 3, 4, 5 (D) 3, 5, 7, 1 65. The ratio between the root mean square velocity of H₂ at 50 K and that of O₂ at 800 K is (A) 1 (B) 4 (C) 2 (D) 1/4 1.22 g of a gas measured over water at 15°C and a pressure of 775 mm of mercury occupied 66. 900 mL. Calculate the volume of dry gas at NTP (vapour pressure of water at 15°C is 14 mm). (A) 372.21 mL (B) 854.24 mL (C) 869.96 mL (D) 917.76 mL 67. A bhalloon filled with methane gas is pricked with a sharp point and guickly plunged into a tank of hydrogen at the same pressure. After sometime, the balloon will have (A) Enlarged (B) Collapsed (C) Remained unchanged in size (D) Unpredictable 68. Gas CO CH HCI SO₂ Critical 324 134 190 temp.T_(K) 430 In the context of given values of critical temperature, the greter ease of liquefication is of (C) CH (A) SO₂ (B) HCl (D) CO 69. In the heterogeneous equilibrium: $CaCO_3(s) \rightleftharpoons NH_3(g)$; $K_p = 4.0 \times 10^4$ what would be the effect of addition of CaCO₃ on the equilibrium concentration of CO₂? (A) increases (B) Unpredictable (C) Decreases (D) Remains unaffected

The sulphate of a metal contains 20% metal. This sulphate is isomorphous with zinc sulphate

hepta hydrate. The atomic mass of the metal is-

58.

- **70.** What is △G^o for the following reaction? 1/2 N₂(g) + 3/2 H₂(g) \rightleftharpoons NH₃(g) ; K_p = 4.0 × 10⁴ at 25^oC (A) -26.5 kJ mol⁻¹ (B) -11.5 kJ mol⁻¹ (C) - 2.2 kJ mol⁻¹ (D) - 0.97 kJ mol⁻¹
- **71.** Reaction K $1/2N_2(g) + O_2(g) \rightleftharpoons NO_2(g) K_1$ $1/2N_2(g) + O_2(g) \rightleftharpoons NO_2(g) K_2$ Using above equations, write down expression for K of the following reaction : $N_2O_2(g) \rightleftharpoons N_2(g) + 2O_2(g)$

(A)
$$K_1 K_2$$
 (B) $\frac{K_2^2}{K_1}$ (C) $\frac{1}{K_2 K_1}$ (D) $\frac{1}{K_1^2 K_2}$

72. In Haber's process, the ammonia is manufactured according to the following reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$; $\Delta H^0 = -(22.4 \text{ kJ})$

The pressure inside the chamber is maintained at 200 atm and temperature at 500°C. Generally, this reaction is carried out in presence of Fe catalyst.

The preparation of ammonia by Haber's process an exothermic reaction. If the preparation follos the following temperature pressure relationship for its % yield. Then for temperature T_1 , T_2 and T_3 the correct option is :



73. In Haber's process, the ammonia is manufactured according to the following reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$; $\Delta H^0 = -(22.4 \text{ kJ})$ The pressure inside the chamber is maintained at 200 atm and temperature at 500%C. Gener

The pressure inside the chamber is maintained at 200 atm and temperature at 500°C. Generally, this reaction is carried out in presence of Fe catalyst.

If K_p for the reaction is 1.44×10^{-5} then the value of K_p for the decomposition of NH_3 , $2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$ will be:

(A)
$$\sqrt{1.44 \times 10^{-5}}$$
 (B) $(1.44 \times 10^{-5})^2$ (C) $\frac{1}{1.44 \times 10^{-5}}$ (D) 2.88×10^{-5}

74. In Haber's process, the ammonia is manufactured according to the following reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$; $\Delta H^0 = -(22.4 \text{ kJ})$ The pressure inside the chamber is maintained at 200 atm and temperature at 500°C. Generally, this reaction is carried out in presence of Fe catalyst.

For which of these processes is the value of Δ S negative ? a. Sugar is dissolved in water b. Stream condenses on a surface c. CaCO₃ is decomposed into CaO and CO₂ (A) a only (B) b only (C) a and c only (d) b and c only

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| 75. | Consider this equation and the associated value for ΔH^{0} . $2H_{2}(g) + 2CI_{2}(g) \rightarrow 4HCI(g)$; $\Delta H^{0} = -92.3 \text{ kJ}$ Which statement about this information is incorrect? (A) If the equation is reversed, the ΔH^{0} value equals + 92.3 kJ (B) The four HCl bonds are stronger than four bonds in H ₂ and Cl ₂ (C) The ΔH^{0} value will be -92.3 kJ if HCl is produced as a liquid (D) 23.1 kJ of heat will be evolved when 1 mole of HCl (g) is produced | | | |
|-----|---|--|--|--|
| 76. | The heat of formatic (A) Zero (C) Molar heat of cou | on (ΔH_{f}^{0}) of $H_{2}^{0}O(\ell)$ is one mbustion of $H_{2}^{0}(g)$ | equal to: (B) Molar heat of co (D) Sum of heat of f | mbustion of $H_2(\ell)$ ormation of $H_2O(g)$ and $O_2(g)$ |
| 77. | Which salt can furnis (A) NaH ₂ PO ₂ | sh H+ in its aqueous so (B) Na ₂ HPO ₃ | blution: (C) Na ₂ HPO ₄ | (D) All of these |
| 78. | Given that K _w for wa aqueous solution at (A) 7.0 | ater is 10 ⁻¹³ M² at 62º 62ºC. (B) 13.30 | C, compute the sum (C) 14.0 | of pOH and pH for a neutral (D) 13.0 |
| 79. | 1 mL of 0.1 N HCl is a (A) 7 | idded to 999 mL soluti (B) 4 | on of NaCl. The pH of (C) 2 | the resulting solution will be: (D) 1 |
| 80. | What is the molar so (A) 10 ⁻⁶ | lubility of Ag ₂ CO ₃ (K _{sp} (B) 10 ⁻⁷ | = 4 × 10 ⁻¹³) in 0.1 M (C) 2 × 10 ⁻⁶ | Na ₂ CO ₃ solution ? (D) 2 × 10 ⁻⁷ |
| 81. | Which of the followir | ng sets of quantum nu | mbers is not possible | ? |
| | (A) n=2, ℓ=1, m = −3 | $1, s = -\frac{1}{2}$ | (B) n=2, ℓ =0, m = 0, | $s=+\frac{1}{2}$ |
| | (C) n=3, ℓ=2, m = −2 | $2, s = +\frac{1}{2}$ | (D) n=3, ℓ=2, m = −: | 3, s=+ $\frac{1}{2}$ |
| 82. | The mass of the pr potential difference | oton is 1840 times of 1 kV, the kinetic er | that of electron. If i lergy of proton is | t accelerated by applying a |
| | (A) 1840 keV | (B) $\frac{1}{1840}$ keV | (C) 1 keV | (D) 920 keV |
| 83. | The firest emission li | ine in the atomic spec | trum of hydrogen in t | he Balmer series appears at - |
| | (A) $\frac{5R}{36}$ cm ⁻¹ | (B) $\frac{3R}{4}$ cm ⁻¹ | (C) $\frac{7R}{144}$ cm ⁻¹ | (D) $\frac{9R}{400}$ cm ⁻¹ |
| 84. | The four quantum nu | umbers of valence ele | ctron of potassium ar | e |
| | (A) 4,0,1 ¹ / ₂ | (B) 4, 1, 0, ¹ / ₂ | (C) 4,0,0 ¹ / ₂ | (D) 4,1,1, ¹ / ₂ |
| 85. | The energy of an ele | ectron in n th orbit of hy | drogen atom is | |
| | (A) $\frac{13.6}{n^4} eV$ | (B) $\frac{13.6}{n^3}$ eV | (C) $\frac{13.6}{n^2}$ eV | (D) $\frac{13.6}{n}$ eV |
| 86. | If threshold wavelen for the photoelectric | gth (λ^{o}) for ejection of emission is - | electron from metal | is 330 nm, then work function |

(A) 6×10^{-10} J (B) 1.2×10^{-18} J (C) 3×10^{-19} J (D) 6×10^{-19} J

| 87. | The uncertainty in the position of an electron moving with a velocity of 1.0×10^4 cm s ⁻¹ (accurate up to 0.011%) will be | | | a velocity of 1.0×10^4 cm s ⁻¹ |
|------|---|---|---|---|
| | (A) 1.92 cm | (B) 7.68 cm | (C) 0.528 cm | (D) 3.8 cm |
| 88. | The ionization energe would be - | gy of hydrogen atom | is 13.6 eV. The third | ionization energy of lithium |
| | (A) 13.6 eV | (B) 27.2 eV | (C) 40.8 eV | (D) 122.eV |
| 89. | For a 'p'-electron the | orbital angular mome | entum is | |
| | (A) √6 h | (B) <u>√</u> 2 h | (C) h | (D) 2 h |
| 90. | The mass of CO_2 that (A) 4.4 kg | t shall be obtained by (B) 6.6 kg | heating 10 kg of 80% (C) 3.52 kg | % pure limestone (CaCO ₃) is - (D) 8.8 |
| 91. | The number of atom (A) 1×10^{23} | s in 20 g of SO ₃ is app (B) 1.5×10 ²³ | roximately - (C) 2×10 ²³ | (D) 6×10 ²³ |
| 92. | The number of moles (A) 0.1 | s of SO ₂ in 6.4 g is (B) 0.2 | (C) 0.3 | (D) 0.4 |
| 93. | The number of ions (A) 4.8×10 ²² | oresent in 2.0 L of a s (B) 4.8×10 ²⁴ | olution of 0.8 M K ₄ [(F (C) 9.6×24 ²⁴ | eCN) ₆] is (D) 9.6×10 ²² |
| 94. | The number of moles (A) 0.5 | s of BaCO ₃ which cont (B) 1 | ains 1.5 moles of oxy (C) 3 | rgen atoms is - (D) 6.02×10²³ |
| 95. | The specific heat of r (A) 32 | metal is 0.16. Its app (B) 16 | roximate atomic weig (C) 40 | ght would be - (D) 64 |
| 96. | Caffeine has a molec atoms of nitrogen in | cular mass of 194. If i one molecule of caffe | it contains 29.9% by eine is - | mass of nitrogen, number of |
| | (A) 4 | (B) 6 | (C) 2 | (D) 3 |
| 97. | The simplest formula of element Y (atomic | of a compound conta mass 20) is | ining 50% of element | X (atomic mass 10) and 50% |
| | (A) XY | (B) X ₂ Y | (C) XY ₃ | (D) X ₂ Y ₂ |
| 98. | No. of moles in 11.2 (A) 0.5 | L of CO_2 at NTP is - (B) 0.3 | (C) 0.2 | (D) 0.1 |
| 99. | The oxidation numbe (A) 7 | er of I in HIO₄ is - (B) 6 | (C) 9 | (D) 4 |
| 100. | In which of the follow (A) $2NO_2 + H_2O \rightarrow HNO_3$ (C) $2NO_2 \rightarrow N_2O_4$ | ving reaction, oxidati +HNO ₂ | on number of N does (B) $N_2 + O_2 \rightarrow 2NO$ (D) $NH_4NO_2 \rightarrow N_2 + 2H_2$ | not change - D |
| 101. | In the following equation $Cl_3^-+6H^++$. $X\rightarrow Cl^-+3$ (A) O | ation: 3H ₂ O, then X is (B)6e [_] | (C) 0 ₂ | (D) 5e [_] |

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| 102. | In the equation : | | | |
|------|---|--|---|---|
| | $Cr_2O_7^{2-}Fe^{2+}H^+ \rightarrow Cr^{3+}Fe^{3+}+H_2O$ | | | |
| | the coefficients of | Fe ²⁺ and H ⁺ are respe | ectively | |
| | (A) 6, 7 | (B) 6, 14 | (C) 5, 7 | (D) 5, 14 |
| 103. | Oxidation number o | of sulphur in H_2SO_5 is - | | |
| | (A) +2 | (B) +4 | (C) +8 | (D) +6 |
| 104. | Which of the follow | ing process represent | s disproportionation ? |) |
| | (A) Cu+4HNO ₃ \rightarrow Cu(| $NO_{3})_{2} + 2NO_{2} + 2H_{2}O$ | (B) $3I_2 + 60H^- \rightarrow IO_3^-$ | +5I [−] +3H ₂ O |
| | (C) $Cl_2 + I_2 \rightarrow 2ICl$ | | (D) $Zn+2HCI \rightarrow ZnC$ | $CI_2 + H_2$ |
| 105. | In alkaline medium | , KMnO₄, reacts as foll | ows | |
| | 2 KMnO ₄ +2KOH \rightarrow 2k | $K_2MnO4+H_2O+O$ | | |
| | Therefore, the equi | valent mass of KMnO | ₄ will be | |
| | (A) 31.6 | (B) 52.7 | (C) 7.0 | (D) 158.0 |
| 106. | A meallic oxide con | tains 60% of the met | al is | |
| | (A) 12 | (B) 24 | (C) 48 | (D) 72 |
| 107 | 20 ml of diabasis a | aid is poutrolized by | | The molecity of the exid is |
| 107. | | (B) 0.2 M | | |
| | (A) 0.05 M | (B) 0.2 M | (C) 0.3 M | (D) 0.4 M |
| 108. | 100 mL of a mixture of NaOH in 100 mL | e of NaOH and Na ₂ SO ₄ solution is | is neutralized by 10 n | nL of 0.5 M H_2SO_4 . The amound |
| | (A) 0.2 g | (B) 0.4 g | (C) 0.6 g | (D) 0.8 g |
| 109. | A 1.0 g sample of I solution for comple | H_2O_2 solution contains | s x% by mass and rec mality of KMnO, is - | quires x mL of KMnO ₄ in acidic |
| | (A) 0.58 | (B) 0.116 | , , , , , , , , , , , , , , , , , , , | (D) 0.3 |
| 110 | | Foc Q in the repetie | | |
| 110. | Equivalent mass of E_{0} | FeC_2O_4 in the reaction | n | |
| | $\operatorname{FeC}_2 \mathbb{O}_4 \to \operatorname{Fe}^{-1} \mathbb{CO}_2 \mathbb{I}$ | (P) M/2 | (C) M/2 | (U) 2M/2 |
| | (A) M | (b) M/2 | (C) 14/5 | |
| 111. | Electrolysis of hot a | equeous solution of Na | aCl gives NaClO₄, i.e., | sodium perchlorate, |
| | NaCl + $4H_2O \rightarrow Na$ | $CIO_4 + 4H_2 \uparrow$ | - | |
| | Now many faraday | are required to obtain | n 1000 g of sodium pe | rchlorate ? |
| | (A) 65.3 | (B) 40.3 | (C) 18.3 | (D) 31.6 |
| 112. | Salt of A (atomic m | ass 15). B (atomic m | ass 27) and C (atom | ic mass 48) were electrolysed |
| | using same amoun B and C deposited | t of charge. It was for were 2.7 g and 9.6 g | und that when 4.5 g of . The valencies of A, E | f A was deposited, the mass of B and C were respectively : |
| | (A) 1, 3 and 2 | (B) 3, 1 and 3 | (C) 3, 1 and 2 | (D) 2, 3 and 2 |

113. $2Ag^{+}(aq) + Cu(s) \Longrightarrow Cu^{2+}(aq) + 2Ag(s)$

The standard potential $E^{\rm o}$ for this reaction is 0.46 V. Which change will increase the potential the most ?

- (A) Doubling the [Ag⁺]
- (B) Halving the $[Cu^{2+}]$
- (C) Doubling the size of the Cu(s) electrode
- (D) Decreasing the size of the Ag electrode by one-half
- **114.** The plot of cell potential (E_{cell}) against $\log_{10} Q$ may be given as :



Which of the following is /are correct about the plot ?

- (A) Slope of line = $-\frac{0.059}{n}$ (B) Intercept = E_{cell}^{o} (C) Slope of line = E_{cell}^{o} (D) (A) & (B) Both
- **115.** The relationship between osmotic pressure at 273 K when 10 g of glucose (P_1); 10 g of urea (P_2) and 10 g of sucrose (P_3) are dissolved in 250 mL of water is : (A) $P_1 > P_2 > P_3$ (B) $P_3 > P_1 > P_2$ (C) $P_2 > P_1 > P_3$ (D) $P_2 > P_3 > P_1$
- **116.** FeCl₃ on reaction with $K_4[Fe(CN)_6]$ in aqueous solution gives blue colour. These are separated by a semipermeable membrane AB as shown. Due to osmosis there is :



- (A) blue colour formation in side X
- (B) blue colour formation in side Y
- (C) blue colour formation in both of the sides X and Y
- (D) no blue colour formation
- **117.** Solubility of oxygen gas in water follows Henry's law. When the solubility is plotted against partial pressure at a definite temperature we get following plots.



Which of the following sequence of temperatures is correct ? (A) $T_1 = T_2 = T_3 = T_4$ (B) $T_1 > T_2 > T_3 > T_4$ (C) $T_1 < T_2 < T_3 < T_4$ (D) $T_1 > T_2 < T_3 > T_4$

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- **118.** The number of maganess ions in tetrahedral and octahedral sites, respectively in Mn_3O_4 are :
 - (A) one Mn²⁺ and two Mn³⁺ ions
- (B) one Mn^{3+} and two Mn^{2+} ions
- (C) two Mn³⁺ and one Mn²⁺ ions
- (D) two Mn^{2+} and one Mn^{3+} ions
- **119.** Xenon crystallizes in face centered cubic unit cell with edge length of 620 pm then radius of xenon atom is :

(A) 268 pm

- (B) 219.20 pm
- (C) 436.6 pm
- (D) 526.8 pm



If all the atoms, on the shaded plane are removed then the molecular formula of the solid will be :

- (A) $A_5 B_7$ (B) $A_7 B_5$ (C) AB (D) $A_3 B_4$
- 121. The rate constant of a reaction depends on
 (A) Temperature
 (B) Initial concentrations of the reactants
 (C) Extent of reaction
 (D) None of these
- **122.** In the following reaction, how is the rate of appearance of the underlined product related to the rate of disappearance of the underlined reactant

 $BrO_{3}^{-}(aq) + 5Br^{-}(aq) + 6H^{+}(aq) \rightarrow 3Br_{2}(\ell) + 3H_{2}O(aq)$

- (A) $-\frac{d[BrO_{3}^{-}]}{dt} = \frac{d[Br_{2}^{-}]}{dt}$ (B) $-\frac{1}{3}\frac{d[BrO_{3}^{-}]}{dt} = \frac{d[Br_{2}^{-}]}{dt}$ (C) $\frac{-d[BrO_{3}^{-}]}{dt} = \frac{1}{3}\frac{d[Br_{2}^{-}]}{dt}$ (D) None of these
- **123.** Which of the following expressions is correct for zero order and first order respectively [where a is initial concentration] ?
 - (A) $t_{1/2} \propto a; t_{1/2} \propto \frac{1}{a}$ (B) $t_{1/2} \propto a; t_{1/2} \propto a^0$

| (D) $t_{1/2} \propto a; t_{1/2} \propto \frac{1}{a^2}$ |
|--|
| |

- **124.** Which one has highest co-agulation power to co-agulate the ferric hydroxide sol -
(A) NaCl(B) $MgSO_4$ (C) $Ca_3 (PO_4)_2$ (D) all equal
- **125.** Milk is -
(A) liquid in liquid(B) solid in solid(C) liquid in solid(D) solid in liquid

126. When graph is plotted between $\log_{10} \frac{x}{m} \& \log_{10} P$ then value of intercept & slope will be

(A) n, log K (B) log K $\frac{1}{n}$ (C) $\frac{1}{n}$, log K (D) log K, n

127. 18.0 sec are required for the diffusion of x mol of O_2 through some porous partition. Another gas G requires 45.0 sec ofr the diffusion of x mol through the saem partition under similar conditions, the molar mass of G is

(A) $\left(\frac{45}{18}\right)^2 \times (32)$ (B) $\left(\frac{45 \times (32)}{18}\right)^2$ (C) $\left(\frac{18}{45}\right)^2 \times 32$ (D) $\left(\frac{18}{45}\right)^2 \times \frac{1}{32}$

- **128.** The r.m.s. speed of molecules of a gas of density 4.0 kg m⁻³ and pressure 1.2×10^5 Nm⁻² is-
(A) 300 m s⁻¹(B) 900 m s⁻¹(C) 600 m s⁻¹(D) 400 m s⁻¹
- **129.** The kinetic energy of 2.8 g of nitrogen gas at 127°C in nearly

 (A) 249.3 J
 (B) 200.4 J
 (C) 498.8 J
 (D) 20.5 J

130. Rates of essusion of hydrogen and deuterium under similar conditions are in the ratio;

(A) 1:1 (B) $\sqrt{2}$:1 (C) 2:1 (D) 1:4

- **131.** Ideal gas obeying kinetic theory of gases can be liquefied if -
(A) $T > T_c$
(C) P > P and $T < T_c$ (B) $P > P_c$
(D) It cannot be liquefied at any value of P and T
- 132. 2 moles fo an ideal gas are compressed isothermally (100°C) and reversibly from a pressure of 10 atm. The value of W_{rev}. is _
 (A) -200 R log 2/5
 (B) 746 R In 2/5
 (C) +200 R log 5/2
 (D) 746 R In 5/2

133. If $\Delta H_{lattice}$ and $\Delta H_{hydration}$ of NaCl are respectively 778 and $-774.3 \text{ kJ mol}^{-1}$ and $\Delta S_{dissolution}$ of NaCl at 298 K is 43 J mol}^{-1}. The value of ΔG° for dissolution of 1 mole of Nacl is -(A) -9.114 kJ(B) -11.14 kJ(C) -7.114 kJ(D) +9.114 kJ

134. Which of the following equaton represents the value for ΔH_f of AgI

| (A) $Ag^+(aq)+I^-(aq) \rightarrow AgI(s)$ | (B) $\operatorname{Ag}(g) + \frac{1}{2}\operatorname{I}_2(g) \rightarrow \operatorname{AgI}(s)$ |
|---|---|
| (C) $2Ag(s)+I_2(g) \rightarrow 2AgI(s)$ | (D) $Ag(s) + \frac{1}{2}I_2(s) \rightarrow AgI(s)$ |

135. Given the bond energies of N=N, and N-H bonds as 945, 436 and 391 kJ/mol respectively, the enthalpy of reaction $N_2(g) \rightarrow 2NH_3(g)$ is (A) 102 kJ (B) 90 kJ (C) -93 kJ (D) 105 kJ

136. In a chemical reaction, the rate constant for the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. The rate constant for the forward reaction is –(A) 5×10^{-4} (B) 2×10^{-3} (C) 1.125×10^{-3} (D) 9.0×10^{-4}

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| 137. | A quanity of PCl_5 was heated in a 2 litre vessel at 525 K. It dissociates as $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ At equilibrium 0.2 mol each of PCl_5 , PCl_3 and Cl_2 is found in the reaction mixture. The equilibrium constnat K_c for the reaction is - | | | |
|------|---|--|--|--|
| | | | | |
| | (A) 0.2 | (B) 0.5 | (C) 0.1 | (D) 0.05 |
| 138. | For the equilibrium $NH_4HS(s) \Longrightarrow NH_3(g) + H_2S(g)$ $K_c = 1.8 \times 10^{-4}$ at 298 K. The value of K_p at 298 K would be - (A) 0.108 (B) 4.4 \times 10^{-3} (C) 1.8 \times 10^{-4} (D) 4.4 \times 10^{-4} | | | |
| 139. | If K for the reaction $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$, is 0.025 at a certain temperature, the value of K for the reaction $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$ at the same temperature would be - | | | |
| | (A) 10 | (B) 40 | (C) \ 30 | (D) <u>\{40</u> |
| 140. | The dissociation constants of two acids HA_1 and HA_2 are 3.0×10^{-4} and 1.8×10^{-5} respective. The relative strenghts of the acids will be appoximately | | | |
| | (A) 1:4 | (B) 4:1 | (C) 1:16 | (D) 16:1 |
| 141. | The solubility product Ksp fo the sparingly solubel salt Ag_2CrO_4 is 4×10^{-12} . The solubility of the salt is - | | | |
| | (A) 1×10 ⁻¹² mol L ⁻¹ | (B) 2×10 ⁻⁶ mol L ⁻¹ | (C) 1×10 ⁻⁶ mol L ⁻¹ | (D) 1×10 ⁻⁴ mol L ⁻¹ |
| 142. | If $K_a = 10^{-5}$ for a weak acid, then pK _b for its conjugate base would be - | | | |
| | (A) 10 ⁻¹⁰ | (B) 9 | (C) 10 ⁻⁹ | (D) 5 |
| 143. | A solution is prepared by mixing equal volumes of 0.4 M CH ₃ COOH and 0.2 M CH ₃ COONa. K _a for CH ₃ COOH = 10^{-6} . the pH of the resulting solution would be. | | | |
| | (A) 6 | (B) 5.69 | (C) 6.69 | (D) 6.5 |
| 144. | A 0.01 M ammonia solution is 5% ionized, the concentration of OH^- ion is | | | |
| | (A) 0.005 M | (B) 0.0001 M | (C) 0.0005 M | (D) 0.05 M |
| 145. | Select the incorrect statement for CsCl crystal. (A) Co-ordination number for Cs ⁺ and Cl ⁻ is 6 (B) $\frac{r_{Cs^+}}{r_{Cl^-}} = 0.732$ (C) The structure changes to NaCl at 760 K (D) Cl ⁻ ions are present at cubic sites | | | |
| | | | | |
| | | | | |
| 146. | The number of atoms in 100 gm of an fcc crystal with density $d = 10$ g/cm ³ and cell edges a 200 pm is equal to - | | | |
| | (A) 3×10^{25} | (B) 5 × 10 ²⁴ | (C) 1 × 10 ²⁵ | (D) 5.96 × 10 ⁻³ |

- 147. The correct statement regarding defects in solids is -
 - (A) Frenkal defect is favoured by a very small difference in the size of cation & anion
 - (B) Frenkal defect is not a dislocation defect
 - (C) Trapping of e- in lattice leads to the formation of F-center
 - (D) Schottky defects ahve no effect on the physical properties of solid
- **148.** What will be order of reaction and rate constant for a chemical change having log $t_{50\%}$ v/s log cnc. (a) curve as.



149. For a reaction $\frac{dx}{dt} = K[H^+]$. If pH of reaction medium changes from two to one the rate becomes 100 times of value at pH = 2, The order of reaction is -(A) 1 (B) 2 (C) 0 (D) 3

Questions based on statements (Q. 150 - 167)

Each of the questions given below consist of Statement – I and Statement – II. Use the following Key to choose the appropriate answer.

(A) If both Statement - I and Statement - II are true, and Statement - II is the correct explanation of Statement- I.

(B) If both Statement-I and Statement - II are true but Statement - II is not the correct explanation of Statement-I.

(C) If Statement-I is true but Statement - II is false.

(D) If Statement-I is false but Statement - II is true.

150. Statement - I : All the members of any class of hydrocarbon (alkane, alkene, alkyne or arene) have the same, empirical formula.

Statement - II : Compounds having the same general formula may have different empirical formula.

151. Statement - I : For reaction : $2A(g) + 3B(g) \rightarrow 4C(g) + D(g)$, the vapour density remain constant throughout the progress of reaction.

Statement - II : In all the gaseous chemical reactions, the vapour density remains constant.

152. Statement - I : When any hydrocarbon is burnt, the moles of oxygen needed for complete combustion is always greater than the moles of hydrocarbon burnt.

Statement - II : Complete combustion of any substance requires more moles of oxygen than the moles of substance burnt.

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153. Statement - I : At 273 K, hydrogen and helium gases have positive slope at all pressure in PV vs P graph.

Statement - II : Complete combustion of any substance requires more moles of oxygen than the moles of substance burnt.

- 154. Statement I : Above critical temperature, a substance can not exist in liquid state.
 Statement II : Above critical temperature, the average kinetic energy of gas molecules is always greater than the maximum kinetic energy of a molecule possible in liquid state.
- **155. Statement I :** Only metallic, never ionic or covalent substances, form crystals exhibiting the maximum coordination number of twelve among like-sized atoms.

Statement - II : In metallic crystals, the forces are non- directional and hence arrangement of atoms frequently corresponds to the closest packing of spheres.

156. Statement - I : KCl is more likely to show Schottky defect while LiI is more likely to show Frankel defect.

Statement - II : Schottky defect is more likely in ionic solids in which cations and anions are of comparable size while Frankel defect is more likely in ionic solids in which cations and anions have large differences in their ionic sizes.

157. Statement - I : The melting point of diamond is very high.Statement - II : Diamond has very high packing efficiency.

reversible for the sorrounding.

158. Statement - I : The final temperature of an ideal gas in adiabatic expansion is less in reversible expansion than in irreversible expansion against a constant external pressure.
 Statement - II : The magnitude of work done by an ideal gas in adiabatic expansion is more

in reversible process than that in irreversible process.

- **159.** Statement I : Standard enthalpy of isomerisation of an enantiomer into the other is zero.
 Statement II : The two enantiomers of any chiral compound have the same enthalpy of formation.
- 160. Statement I : In an adiabatic expansion of an ideal gas, the entropy of the surrounding remains unchanged independent whether the expansion is reversible or irreversible.
 Statement II : In an adiabatic process, the surrounding does not exchange heat with the system and the process may be reversible or irreversible for system but it always remain
- **161. Statement I :** When an ideal binary solution of liquids A and B is distilled, the boiling point of the distillate becomes lower than that of the parental liquid solution.

Statement - II : When an ideal binary solution of liquids A and B is distilled, the distillate contains relatively larger amount of the more volatile liquid.

162. Statement - I : The time of completion of reactions of type : $A \rightarrow products$ (order < 1) may be determined.

Statement - II : Reactions with order > 1 are ether too slow or too fast and hence, the time of completion can not be determined.

- 163. Statement I : The active mass of pure solid and pure liquid is taken as constant
 Statement II : The active mass of pure solid and liquid depends on density and molecular mass. The density and molecular mass of pure liquids and solids are constant.
- **164.** Statement I : For adsorption of gases on solids, ΔG , S and

Statement - II : Adsorption is a spontaneous exothermic process in which randomness decreases due to force of attraction between adsorbent and adsorbate.

165. Statement - I : Electrode potential of any electrode will change on changing any of its intensive properties.

Statement - II : Any intensive property of system changes on changing any of its properties whether intensive or extensive.

166. Statement - I : For Hydrogen spectrum all Balmer lines in the emission spectrum have longer wavelengths than that of any line of Lyman series.

Statement - II : Transition energy is always greater when electrons come to an orbit with lower orbit number than an electron come to an orbit with higher orbit number, irrespective to higher orbit from which electron is coming.

167. Statement - I : If a nucleus may undergo positron decay as well as K-capture, the amount of energy released in positron decay is more than that in K-capture.

Statement - II : The loss in K-capture is equal to the difference in atomic masses of parent nucleus and the daughter nucleus but in positron decay, additional mass loss equal to the mass of two electrons also occur.





Organic



186. Due to benzene having a cloud of delocalised electrons, the molecule is more stable. This stability generated by delocalisaion is known as what type of energy ? (C) Resonance (D) Potential (B) Kinetic (A) lonisation The molecule benzene can undergo a chemical reaction known as nitration. The carry out this 187. reaction there is need for the presence of two concentrated acids. Nitric acid is one,but what is the other ? (B) Sulphuric acid (C) Hydrochloric acid (D) Propanoic acid (A) Citric acid **188.** During the nitration of benzene, the two acids involved react to form a cation. The formula of this positive ion is \overline{NO}_2 , but what is the name of this ? (A) Nitronium (B) Polonium (C) Deuterium (D) Nitroglycerin 189. Arenediazonium salts are formed by reaction of (A) an arometic amine with hydrogen and palladium (B) an arometic amine sodium dichromate (C) an arometic amine with nitrous acid (D) an arometic amine with potassium nitrosodisulfonate **190.** A Friedel-Craft reaction is a type of : (A) nucleophilic substitution (B) addition reaction to alkenes (C) electrophilic aromatic substitution (D) acid-base reaction (D) **191.** $CH_2 = CH - CH = CH - \overset{+}{N}H_3$ $\overset{+}{C}H_2 - CH = CH - \overset{-}{C}H - \overset{+}{N}H_3$ $\overset{+}{C}H_2 - CH = CH - CH = NH_3$ (III) (II) Which of these structures is not a valid resonance structure ? (D) B and C both (A) I (B) II (C) III $\begin{array}{c|c} \bigoplus \\ \bigoplus \\ H \\ CH_{3} - C - N \\ \hline \\ CH_{3} \\ \end{array} \begin{array}{c} CH_{3} \\ CH_{3} \\ \hline \\ CH_{3} \\ \end{array} \begin{array}{c} OH \\ CH_{3} \\ \hline \\ CH_{3} \\ CH_{3} \\ \hline \\ CH_{3} \\$ 192. The correct stability order of the given resonance structure is : (A) I > II > III (B) III > I > II (C) I > III > II (D) II > III > I**193.** Which of the following is / are D-carbohydrate. (A) HO + H (B) HO + H (C) H + CHO (D) H + OH (CH-OH) (D) H + OH (CH-OH) (CH-194. Which of the following reactant on reaction with conc. NaOH followed by acidification gives the following lactone as the only product ? CO_2H (C) (B) ((D) [

195. Total number of carbon in the parent chain of given compound is ?



196. How many moles of Gignard will consume when it reacts with following compound?



197. What product (s) would you expect to obtian from the following reaction?



198. The maximum concentration of zwitter ion of given amino acid will be at



200. In which of the following reaction maximum character of reactant in Transistion State is ? (A) $CH_4 + F^{\bullet} \rightarrow$ (B) $CH_4 + CI^{\bullet} \rightarrow$ (c) $CH_4 + Br^{\bullet} \rightarrow$ (D) $CH_4 + I^{\bullet} \rightarrow$







Correct IUPAC name of the following compound is-

(A) 4-(1,1dimethylethyl)-5-ethyloctane
(B) 5-ethyl-4-(1,1-dimethylethyl)octane
(C) 5-(1,1-dimethylethyl)-4-ethyloctane
(D) 4-ethyl-5-(1,1-dimethylethyl)octane

216. The most acidic among the following compounds is:



217. Which of the following compound will undergo addition reaction?

(A) (B)
$$CH_3 - C \equiv N$$
 (C) (D) All

218. Give the major product of the following reation :



219. Give the product from the following reaction sequence :



220. Give the major product of the following reaction :

222.



221. The most characteristic reactions of benzenoid arenes arethe substitution reactions that occur when they react with electrophilic reagents. These reactions are of the general type shown below.

$$Ar-H+E-A \rightarrow Ar-E+H-A \text{ or } \bigcirc +E-A \rightarrow \bigcirc^{E} +H-A$$

$$H-N \longrightarrow O$$

$$Identify the position where EAS (Electrophilic Aromatic Substitution) reaction takes place.(A) a (B)b (C)c (D)d$$
Correct order of EAS (Electrophilic Aromatic Substitution) of given compound will be :



223. Which of the following is O/P director of EAS (Electrophilic Aromatic Substitution)?



224. Which of the following reaction does not give chloro benzene as a product ?



225. Which of the following compound easily undergo decarboxylation on heating ?



226. Total number of substituents present in following compound are ?



- 227. The total number of all structural isomers of molecular formula $C_4H_{10}O$ will be. (A) 5 (B) 6 (C) 7 (D) 8
- **228.** Give the major product of the following reaction

(ii)

(A) 2

Sum of (x + y)



 $\xrightarrow{\text{cold dilKMnO}_4}$ (y) products

(C) 4

(D) 5

(B) 3

231. Which of the following compound give positive isocyanide test?



Order of the below reaction is 232.



234.

Find out the product 'P' of the following reaction

Δ



235. Which of the following compound react with only one mole of RMgX followed by reaction with HOH to form alcohol

Ö

(A)
$$CH_3 - \overset{\circ}{C} - OEt$$
 (B) $CH_3 - \overset{\circ}{C} - CI$ (C) $H - \overset{\circ}{C} - O - Et$ (D) $H - \overset{\circ}{C} - \overset{\circ}{C} - O - Et$

Which of the following compound will not undergo Hoffmann bromamide reaction ? 236.

(A)
$$CH_3 - \overset{\circ}{C} - NH_2$$
 (B) $Ph - \overset{\circ}{C} - NH - Br$ (C) $Ph - \overset{\circ}{C} - NH - CH_3$ (D) $\bigvee_{O}^{H} N - H$

237. Among the following. How many compounds have plane of symmetry a well as centre of symmetry



238. How many isomers of given compound rotate plane polarised light ?



239. Find out P & Q in the following reaction







35

NO₂

247. Electrophile in the above reaction is/are



248. Which is more reactive towards Reimer Tiemann reaction.(Assume r.d.s. step is atteck of Nucleophilic)



249. In which of the following reactions Geometrical isomer will not formed as product.



250. Correct IUPAC name of the given compound is :



(A) 2,4,6-trinitrotoluene(C) 1,3,6-trinitrotoluene

(B)1,3,5-trinitrotoluene (D)2,3,6-trinitrotoluene

251. Correct IUPAC name of the given compound is :

(A) pent-1-en-3-yne (B) pent-1-ene-4yne (C) pent-4-yn-1-ene (D) pent-1-en-4-yne


253. Which of the following compounds might be useful to seprate recemic mixture?



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257. In which of the following reaction formation of 2° alcohol will take place?

(A)
$$H - \overset{O}{C} - O - Et \xrightarrow{(1) \text{ PhMgBr (excess)}}_{(2) H^{\oplus}}$$
 (B) $CH_3 - \overset{O}{C} - H \xrightarrow{(1) \text{ PhMgBr (excess)}}_{(2) H^{\oplus}}$
(C) $H - \overset{O}{C} - CI \xrightarrow{(1) \text{ PhMgBr (excess)}}_{(2) H^{\oplus}}$ (D) All

258. Product (A) is





259. Functional group is not present in given compund are ?



260. Intermediate product during given reaction will be :



261. Which of the given compound do not undergo acid catalysed hydrolysis(A) Ph - O - Ph(B) $Ph - O - CH = CH_2$ (C) $Ph - O - CH_2 - Ph$ (D) $CH_3 - O - CH_2CH_3$

- **262.** The number of open chain structure isomers for the compound with molecular formula $C_3FCIBrI$ is: (A) 3 (B) 7 (C) 4 (D) 8
- **263.** Which of the following reagents may be used to distinguish between phenol and benzoic acid? (A) Aqueous NaOH (B) Tollen's reagent (C) Molisch reagent (D) Nautral FeCl₃
- **264.** The strongest acid among the following compound is : (A) CH₃COOH (C) CH₃CH₂CH(Cl)CO₂H (D) CICH₂CH₂CH₂CH₂COOH
- **265.** Identify the compound the exhibits tautomerism.
(A) 2-Butene
(C) 2-Pentanone(B) Lactic acid
(D) Phenol







In given reactions missing reagent (X) and (Y) is : (A) $x = CHCl_3 / KOH, y = CHCl_3 / KOH$ $(B) x = CCl_4 / KOH, y = CHCl_3 / KOH$ (D) $x = CHCl_2 / KOH, y = CCl_4 / H^{\oplus}$ (C) $x = CHCl_2 / KOH, y = Br_2 / KOH, \Delta$

270. Total number of α - hydrogen in given compound is



Total number of SN, products formed during given reaction will be (A) 2 (B) 3 (C) 4 (D) 5

- 272. Ozonolysis of an oganic compound given formaldehyde as one of the products. This confirms the presence of : (A) two ethylenic double bonds (B) a vinyl group
 - (C) an isopropyl group

(D) an acetylenic triple bond

- Sodium ethoxide has reacted with ethanoyl chloride. The compound that is produced in the 273. above reaction is (A) Diethyl ether (B) 2-Butanone (D) Benzophenone (C) Formaldehyde
- 274. Which is true about aerial distance between chlorine atom



275. possible geometrical isomers are



- **276.** $2CH_{3}CHO \xrightarrow{\text{dil KOH}} A$ (Aldol condensation product) How many geometrical isomers is possible for compound A (A) 1 (B) 2 (C) 3 (D) 4
- **277.** Enol form of which of the given compound will form racemic mixture.



- **278.** How many five membered parent chain alkanes are possible for molecular formula C_7H_{16} ? (A) 3 (B) 5 (C) 2 (D) 4
- 279. Given the major product of the following reaction sequence :



- 282. Periodic acid splits glucose and fructose into formic acid and formaldehyde. Ratio of formic acid and formaldehyde from glucose and frustose is :
 (A) 5/1 and 4/2
 (B) 5 / 1 and 5 / 1
 (C) 4/2 and 4/2
 (D) 5/1 and 3/2
- 283. Consider the reaction









290. A compound was synthesized by a student, but its structure was not identified. However, his wonderfully helpful instructor in MOTION IIT -JEE told him that it was a meso compound with 5 carbons and 2 stereogenic centers. Which of the following structures should not consider by student as possibilities for this compound ?



291.
$$\begin{array}{c} CH_2 - CH_3 \\ | \\ Ph - C - Cl \\ | \\ CH_3 \end{array}$$

The total number of E₂ (elimination bimolecular product) when above compound react with alcoholic KOH ? (A) 2 (B) 3 (C) 4 (D) 5

292. Hydrogenation of benzoyl chloride in the presence of Pd on BaSO₄ gives (A) Benzyl alcohol (B) Benzaldehyde (C) Benzoic acid (D) Phenol

293.

How many times of Hoffmann exhaustive methylation takes place to remove nitrogen from given compound. (A) 1 (B) 2

294.

$$\xrightarrow{\text{dil. NaOH}} (A) \xrightarrow{\Delta} (B)$$

Product (A) and type of reaction from $A \rightarrow B$ is

(A)
$$(A) \rightarrow (A) \rightarrow$$





296. → Br₂ A (excluding stereoisomer)
 Draw A in fischer projection
 (A) Total number of stereoisomers of A is 2 (B) A poses center of symmetry
 (C) A posses plane of symmetry
 (D) A poses axis of symmetry

297. In which of following reaction diastereomers will formed as a product ?



- (B) P & Q are structural isomers
- (C) Possible products of P is two (ortho/para) & possible products of Q are three
- (D) Posible products of P is only one & possible products of Q is two (ortho/para)

303. x and y is the number of times of H.E.M. takes place to remove Nitrogen from the compound. (HEM = offmann Hxhaustive Methylation)



304.

309. Which of following on acid catelyst hydrolysis give two product both give positive lodoform test.



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311. Choose from the indicated protons, the one that is most acidic.



312. In which of reaction formation of (1° amine) take place ?



313. Which of following pair is differentiated by lodoform and Tollen's reagent ?

(A) Ph COOCH₃; Ph - CHO
(B)
$$H - C - CH_3$$
; CH₃ - CH₂ - CHO
(C) $H - C - CH_3$; CH₃ - CH₂ - CHO
(D) $H - C - H$; Ph - CH = O

- **314.** How many homocyclic isomers are possible for C_4H_8O (including stereoisomers). (A) 6 (B) 7 (C) 8 (D) 9
- **315.** How many structural isomers are posible for C_4H_9Cl ? (A) 3 (B) 4 (C) 5 (D) 6
- **316.** Which of the following reaction is most exothermic ? (A) Propane + $Cl_2/hv \rightarrow 2$ -chloro propane + HCl (B) Propane + $Br_2/hv \rightarrow 2$ -bromopropane + HBr (C) Isobutane + $Cl_2/hv \rightarrow t$ -butyl chloride + HCl (D) Isobutane + $Br_2/hv \rightarrow t$ -butyl bromide + HBr
- **317.** Which of the following is non reducing sugar ?
(A) Sucrose(B) Cellulose(C) Protein(D) Terylene

Questions based on statements (Q. 318 - 334)

Each of the questions given below consist of Statement – I and Statement – II. Use the following Key to choose the appropriate answer.

(A) If both Statement - I and Statement - II are true, and Statement - II is the correct explanation of Statement- I.

(B) If both Statement-I and Statement - II are true but Statement - II is not the correct explanation of Statement-I.

(C) If Statement-I is true but Statement - II is false.

(D) If Statement-I is false but Statement - II is true.

- 318. Statement -1: Me₃C C OH + MeOH ¹⁸/<sub>Conc. H₂SO₄ → Me₃C C OMe (major)
 Statement 2: During esterification, removed water molecule contains H of alcohol and OH of carboxylic acid.
 </sub>
- 319. Statement -1 :

$$Me - \bigvee_{\substack{I \\ Me}}^{Me} CH_{2} - CH_{2} - \bigvee_{\substack{I \\ He}}^{Me} Me \xrightarrow{Conc. H_{2}SO_{4}} Me_{3}C - CH = CMe_{2} + Me_{2}C - CH_{2} - \bigcup_{\substack{I \\ P_{2}}}^{Me} CH_{2} - CH_{2} - \bigcup_{\substack{I \\ P_{2}}}^{Me} CH_{2} - CH_{2} - UH_{2} -$$

Statement - 2 : P_1 is having 6 α H while P_2 is having 5 α H so P_1 is Saytzef's alkene.

- **320.** Statement -1 : Rate of nitration is $C_6H_6 \cong C_6D_6 \cong C_6T_6$ Statement - 2 : Formation of wheland intermediate is rate determining step in nitration of benzene, not the breaking of C – H or C – D bond.
- **321.** Statement -1 : Product of $(i) \xrightarrow{(i) PhCO_3H}$ reaction is $(ii) \xrightarrow{OHOH}$

(Optically inactive)

Statement - 2 : In reactions involving epoxidation followed by hydrolysis, the overall addition is Anti oriented.

322. Statement -1 :

Statement - 2 : 2-but the is more stable than 1-butene as it is having more α -H.

323. Statement -1 : The reactivity of



0

towards nucleophilic substitution reaction.

Statement - 2: I gives two step S_N reaction where as II gives single step S_N reaction. **324. Statement -1**: S-configuration change into R-configuration and vice versa in S_N^2 reaction mechansim.

Statement - 2 : Walden inversion takes place in $S_N 2$ reaction mechansim.

- 325. Statement -1: 1,1,1-trideutero-2-propanol reacts with conc. H₂SO₄ at high temperature to give only one alkene, 3,3,3-trideutero propene.
 because
 Statement 2: C D bond is stronger than C H bond.
- 326. Statement -1 : R-1-bromo-1-fluoro ethane reacts with MeONa to give S-1-fluoro-1-methoxy ethane.
 Statement 2 : Walden inversion takes place during S_N2 reaction.

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327. Statement -1 : $CH_3 - CH_2 - NaI \xrightarrow{Acetone} CH_3 - CH_2 - I + NaCl \downarrow$

Finkelstein reaction.

Above reaction is

Statement - 2 : Acetone is polar protic solvent and solubility order of sodium halides decreases dramatically in order NaI > NaBr > NaCl. The last being virtually insoluble in this solvent and a 1° and 2° chloro alkane in acetone is completely driven to the side of Iodoalkane by the precipitation reaction.

328. Statement -1: \int gives turbidity with ZnCl₂/HCl in 5 minutes.

Statement - 2 : 2° alcohol usually gives turbidity in 5 minutes.

329. Statement -1: $\int_{1}^{N-H} does not give bromamide reaction.$

Statement - 2 : Secondary amides does not give bromamide reaction.

330. $CH = CH - CH_3 + HX \xrightarrow{Peroxide} CH_3 - CH - CH_2 - CH_3$

OH

Statement -1 : The stereochemistry of product is same whether HCl or HBr is used as reactant. **Statement - 2 :** The reaction mechanism with HCl and HBr are same in above conditions.







| | EXERCISE | | | | | | |
|------|---|---|--|--|--|--|--|
| 335. | The bond order in O ₂ | - ion is | | | | | |
| | (A) 2 | (B) 1 | (C) 2.5 | (D) 1.5 | | | |
| 336. | Which of the followir (A) NH ₃ | ig molecules has the s $(B) H_2O$ | mallest bond angle? (C) H ₂ Se | (D) H ₂ S | | | |
| 337. | Unusually high boiling point of water is the result of (A) Intermolecular hydrogen bonding (B) Both intra and inter molecular hydrogen bonding (C) High specific heat (D) Intramolecular hydrogen bonding | | | | | | |
| 338. | Dissolution of ionic s . This implies that (A) $\Delta H_{lattice} > \Delta H_{hydrat}$ (C) $\Delta H_{hydration} > \Delta H_{lattice}$ | olid in water is accomp | banied by release of e (B) $\Delta H_{\text{lattice}} = \Delta H_{\text{hydratice}}$ (D) $\Delta H_{\text{lattice}} : \Delta H_{\text{hydration}}$ | nergy represented by $\Delta H_{solution}$ | | | |
| 339. | In which of the follow (A) H ₂ O | wing molecules, the c (B) H ₂ S | entral atom does not (C) BF ₃ | follow the octet rule? (D) CO_2 | | | |
| 340. | d²sp³ hybridization o (A) Triangular struct (C) Square planar st | f atomic orbitals gives ure ructure | (B) Tetragonal struc (D) Octahedral struc | ture cture | | | |
| 341. | Which of the followi (A) The dipole mome (B) The dipole mome (C) The dipole mome (D) The dipole mome | ng statements is true ent of NH ₃ is zero. ent of NF ₃ is equal to N ent of NF ₃ is zero ent of NF ₃ is less than | ? IH ₃ NH ₃ | | | | |
| 342. | Which one of the foll (A) CIF | owing has zero dipole (B) CIF ₃ | moment ? (C) SiF ₄ | (D) CFCI ₃ | | | |
| 343. | Which of the followir (A) C_2H_6 | ng is an electron defici (B) B ₂ H ₆ | ent molecule? (C) SiH ₄ | (D) PH ₃ | | | |
| 344. | Which of the followin (A) H_2^+ | ng is paramagnetic wi (B) O ₂ - | th bond order 0.5 ? (C) B ₂ | (D) F ₂ | | | |
| 345. | Which type of bond i (A) Covalent (C) Ionic | s not present HNO ₂ m | olecule ? (B) Coordinate (D) Ionic as well as o | corrdinate | | | |

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| 346. | Which of the followin (A) BF_3 | g molecules has trigo (B) NH ₃ | nal planar geometry? (C) PCl ₃ | (D) IF ₃ | | |
|------|---|---|--|--|--|--|
| 347. | Which of the following would have a permanent dipole moment?(A) SiF_4 (B) SF_4 (C) XeF_4 (D) BF_3 | | | | | |
| 348. | In TeCl ₄ , the central a (A) dsp ² | atom, tellurium, involv (B) sp ³ | ves hybridization. (C) sp³d | (D) sp ³ d ² | | |
| 349. | In which of the follow (A) SF_4 and XeF_4 | ecies are isostructure (C) BF_3 and NF_3 | al ? (D) BrO_3^- and XeO_3 | | | |
| 350. | The correct sequenc (A) LiCl < NaCl < BeC (C) NaCl < LiCl < BeC | e of increasing covale Cl Cl ₂ | ent character is repre (B) BeCl ₂ < LiCl < Na (D) BeCl ₂ < NaCl < Li | sented by Cl Cl | | |
| 351. | What is the correct of (A) NH N < OH (C) CIH CI < NH | order of the strength O < FH F · N < OH O | of hydrogen bonds? (B) CIH CI > NH - (D) NH N > OH | - N > OH O • O > FH F | | |
| 352. | Bond angle of 109°2 | 8' is found in | | | | |
| | (A) NH ₃ | (B) H ₂ O | (C) [⊕] CH₃ | (D) $\stackrel{\oplus}{\mathrm{NH}}_4$ | | |
| 353. | Which of the followin (A) NH_3 | g molecules has almo (B) H ₂ O | st negligible tendenc (C) HF | y to form hydrogen bonds? (D) HI | | |
| 354. | Identify the correct | sequence of increas | sing number of π -boi | nds in the structures of the | | |
| | (I) $H_2S_2O_6$ (A) I, II, III | (II) H ₂ SO ₃ (B) II, III, I | (III) H ₂ S ₂ O ₅ (C) II, I, III | (D) I, III, II | | |
| 355. | First compound of in | tert gases was prepa | red by scientist Neil | Barthleta in 1962. This com- | | |
| | (A) XePtF ₆ | (B) XeO ₃ | (C) XeF ₆ | (D) XeOF ₄ | | |
| 356. | Which bond angle, θ XY ₂ shown below: | would result in the m | aximum dipole mome | ent for the triatomic molecule | | |
| | Υ\ | | | | | |
| | | | | | | |
| | <u>< </u> | —Y | | | | |
| | (A) θ = 120° | (B) θ = 90° | (C) θ = 145° | (D) θ = 175° | | |
| 357. | Which of the followin (A) N_2 | ng has the highest bor (B) O ₂ | nd order ? (C) He ₂ | (D) H ₂ | | |
| 358. | The energy of hydro (A) 40 kJ mol ⁻¹ | gen bond is of the ord (B) 140 kJ mol ⁻¹ | der of (C) 400 kJ ⁻¹ | (D) 4 kJ mol ⁻¹ | | |
| 359 | In the formation of Ν (A) σ-orbital | I_2^+ from N ₂ , the electric (B) π -orbital | ron is removed from a (C) σ-orbital | a (D) π-orbital | | |

- **360.** Which of the followng is diamagnetic ? (A) H_2^+ (B) O_2 (C) Li_2 (D) He_2^+
- **361.** How many types of S F bonds are present in SF_4 ? (A) 5 (B) 4 (C) 3 (D) 2
- **362.** The pair of species having identical shapes for molecules of both species is (A) CF_4 , SF_4 (B) XeF_2 , CO_2 (C) BF_3 , PCI_5 (D) PF_5 , IF_5
- **364.** The correct order regarding the electronegativity of hybrid orbitals of carbon is (A) $sp < sp^2 > sp^3$ (B) $sp < sp^2 < sp^3$ (C) $sp > sp^2 > sp^3$ (D) $sp > sp^2 > sp^3$
- 365. Correct order of dipole moment is

| | ~ 100 | | | |
|------|---|--|--|---|
| | (1) | (2) | (3) | |
| | (A) 1 = 2 = 3 | (B) 3 < 2 < 1 | (C) 1 < 2 < 3 | (D) 2 < 3 < 1 |
| 366. | The maximum numb (A) 3 | er of hydrogen bonds (B) 4 | that a molecule of wa (C) 1.3 | ater can have is (D) 2.4 |
| 367. | The number of lone p (A) 0 | pairs of electrons pres (B) 1 | sent in central atom c (C) 2 | of CIF ₃ is : (D) 3 |
| 368. | In [Ag(CN) ₂] ⁻ the nur (A) 2 | mber of π bonds is (B) 3 | (C) 4 | (D) 6 |
| 369. | Among the following | compounds, the one | e that is polar and ha | as the central atom with sp^2 |
| | (A) SiF ₄ | (B) BF ₃ | (C) HCIO ₂ | (D) H ₂ CO ₃ |
| 370. | Bond order of nitric of (A) 1 | xide is (B) 2.5 | (C) 2 | (D) 1.5 |
| 371. | Which one of the follo (A) $(NH_4)_2SO_4$ | owing compounds on a (B) HNO ₃ | strong heating evolve (C) (NH ₄) ₂ Cr ₂ O ₇ | es ammonia gas ? (D) NH ₃ NO ₃ |
| 372. | Which combination o (A) px – px | f atomic orbitals is no (B) px – py | ot allowed according t (C) py – py | o MO theory? (D) pz – pz |
| 373. | Which one of the follo (A) H_2^- | owing species is diam (B) H ₂ | agnetic in nature? (C) H_2^+ | (D) He ₂ ⁺ |
| 374. | Which of the following $(A) CH_4$ | g molecules is planar (B) NH_3 | ? (C) C ₂ H ₄ | (D) SiCl ₄ |

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| 375. | The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is: | | | | |
|------|--|--|---|--|--|
| | (A) 4 | (B) 1 | (C) 2 | (D) 3 | |
| 376. | The paramagnetism (A) σ2s | of O_2^+ is due to the p (B) $\pi 2py$ | resence of an odd ele (C) π2pz | ectron in the MO (D) π2py | |
| 377. | Which of the followin (A) O_2^{2-} | ig molecules/ions doe (B) B ₂ | s not contain unpaired (C) N ₂ + | d electrons? (D) O ₂ | |
| 378. | In which of the follow (A) AIF ₃ | ving molecules, all th (B) NF ₃ | e bonds are not equal (C) CIF ₃ | ? (D) BF ₃ | |
| 379. | PCI_5 in solid state spl (A) PCI_6^+ and PCI_4^- | its into (B) PCl ₄ + and PCl ₆ - | (C) PCl_3 and Cl_2 | (D) PCI_4 and CI^- | |
| 380. | How many sigma and (A) $3\pi + 6\sigma$ | d pi bonds are present (B) $3\pi + 8\sigma$ | t in toluene ? (C) $6\pi + 6\sigma$ | (D) 3π + 15σ | |
| 381. | The hybrid state of c (A) sp ³ , sp ³ d | entral iodine atom is (B) sp ³ d, sp ³ | I ₃ ⁺ and I ₃ ⁻ are, respective (C) sp ³ d, sp ³ d | ctively (D) sp², sp³d | |
| 382. | The correct order of (A) NaCl > MgBr ₂ > C (C) NaCl > CaO > Mg | the lattice energies o CaO > Al ₂ O ₃ IBr ₂ > Al ₂ O ₃ | f the following ionic c (B) $Al_2O_3 > CaO > Moonomega(D) MgBr_2 > Al_2O_3 > CaO > Moonomega(D) MgBr_2 > Al_2O_3 > CaO > Ca$ | ompounds is gBr ₂ > NaCl CaO > NaCl | |
| 383. | The following composite Identify the correct of (I) K_2CO_3 (A) I < II < III < IV | ounds are to be arrang order : (II) MgCO ₃ (B) IV < II < III < I | ged in order of their ir (III) CaCO ₃ (C) IV < II < I < III | (IV) BeCO ₃ (D) II < IV < III < I | |
| 384. | Which of the followin (A) SF_4 , CH_4 , SeF_4 | ng set contains specie (B) NF ₃ , BCl ₃ , NH ₃ | es having same angle (C) BF ₃ , NF ₃ , AlCl ₃ | around the central atom? (D) BF_3 , BCI_3 , BBr_3 | |
| 385. | The magnetic mome (A) 1.43 BM | nt of KO ₂ at room tem (B) 2.64 BM | perature is : (C) 2.41 BM | (D) 1.73 BM | |
| 386. | The electronic config a : $1s^2 2s^2 2p^4$ Now decide the poss (A) a_2c , da, cb, d_2b | uration of four eleme b : 1s ² 2s ² 2p ⁵ ible formulae of ionic (B) ac, da, cb, cb | nts are as follows. c : $1s^2 2s^2 2p^6 3s^1$ compounds that could (C) c_2a , da, cb, db_2 | d : $1s^2 2s^2 2p^6 3s^2$ d be formed between them. (D) ac, d ₂ a, c ₂ b, db | |
| 387. | The molecular shapes of diborane is shown : Consider the following statements for diborane : 1. Boron is approximately sp³ hydbridised 2. B-H-B angle is 180° 3. There are two terminal B-H bonds for each boron atom 4. There are only 12 bonding electrons available Of these statements : | | | | |
| | | | | | |

H B B H

(A) 1, 3 and 4 are correct

(C) 2, 3 and 4 are correct

(B) 1, 2 and 3 are correct(D) 1, 2 and 4 are correct

| 388. | The correct order of increasing bond angle (A) $NO_2^+ < NO_2 < NO_2^-$ (C) $NO_2^- < NO_2^+ < NO_2$ | es in the following triatomic species is (B) $NO_2^+ < NO_2^- < NO_2^-$ (D) $NO_2^- < NO_2 < NO_2^+$ | | | |
|------|---|--|--|--|--|
| 389. | The correct order in which the O – O bond (A) $O_2 < H_2O_2 < O_3$ (B) $O_3 < H_2O_2 < O_2$ | length increases in t (C) $H_2O_2 < O_2 < O_3$ | he following is (D) $O_2 < O_3 < H_2O_2$ | | |
| 390. | A precipitate of calcium oxalate will r (A) acetic acid (B) HCl | not dissolve in (C) HNO ₃ | (D) aquaregia | | |
| 391. | The bond order in NO is 2.5 while that in N for these two species? (A) Bond length in NO ⁺ is greater than in N (C) Bond length in NO ⁺ is equal to NO | NO ⁺ is 3. Which of the NO (B) Bond length in (D) Bond length is | following statements is true NO is greater than in NO ⁺ unpredictable | | |
| 392. | The sequence that correctly describes the ecule and its cation or anion is : (A) $O_2^{2^-} > O_2^- > O_2 > O_2^+$ (C) $O_2^+ > O_2 > O_2^{2^-} > O_2^-$ | (B) $O_2 > O_2^+ > O_2^- >$ (D) $O_2^+ > O_2 > O_2^- >$ | th pertaining to oxygen mol- $O_2^{2^-}$ $O_2^{2^-}$ | | |
| 393. | The dipole moments of methane ant its ha (A) $CH_4 < CH_2CI_2 < CHCI_3 < CH_3CI$ (C) $CH_4 < CHCI_3 < CH_2CI_2 < CH_3CI$ | logen derivatives are (B) $CH_3CI < CH_2CI_2 <$ (D) $CH_4 < CH_3CI < CH_2CI_2 <$ | in the order. $CHCl_3 < CH_4$ $l_2Cl_2 < CHCl_3$ | | |
| 394. | The correct order of increasing bond angle (A) $OF_2 < H_2O < CI_2O < CIO_2$ (C) $CIO_2 < CI_2O < H_2O < OF_2$ | es is (B) $CIO_2 < OF_2 < CI_2O_2$ (D) $OF_2 < CI_2O < H_2O_2$ | 0 < H ₂ 0 0 < ClO ₃ | | |
| 395. | The hydration energy of Mg ²⁺ is- (A) more than that of Mg ³⁺ ion (C) more than that of Al ³⁺ ion | (B) more than that o (D) more than that o | of Na+ ion of Be ³⁺ ion | | |
| 396. | The golden yellow colour associated with I of- | NaCl to Bunsen flame | can be explained on the basis | | |
| | (A) low ionisation potential of sodium(C) photosensitivity of sodium | (B) emission spectrum(D) sublimation of me | m tallic sodium of yellow vapours | | |
| 397. | Consider the following molecules or ions. (I) CH_2Cl_2 (II) NH_4^+ (III) SO_4^{2-} sp ³ hybridization is involved in the formation (A) I, II, V only (C) I, II, III, IV only | (IV) ClO₄ [–] on of (B) I, II only (D) I, II, III, IV, V | (V) NH ₃ | | |
| 398. | The correct increasing bond angle among (A) $BF_3 < PF_3 < CIF_3$ (C) $CIF_3 < PF_3 < BF_3$ | BF ₃ , PF ₃ and CIF ₃ follo (B) PF ₃ < BF ₃ < CIF ₃ (D) BF ₃ = PF ₃ = CIF ₃ | ows the order | | |
| 399. | The decreasing order of the boiling points (I) NH_3 (II) PH_3 (IV) SbH_3 (V) H_2O (A) (V) > (IV) > (I) > (III) > (II) (C) (IV) > (IV) > (IV) > (IV) > (IV) | of the following hydri (III) AsH_3 (B) (V) > (I) > (II) > | des is | | |
| 400. | KO ₂ finds use in oxygen cylinders used for use of KO ₂ is/are- (A) it produces O ₂ (C) it absorbs CO ₂ | (b) (10) > (11) > (1) space and submarine (B) it produces O_3 (D) it absorbs both (| (11) > (11) es. The fact(s) related to such CO and CO ₂ | | |

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- 401. Among the following, the species having square planar geometry for central atom are :

 (I) XeF₄
 (II) SF₄
 (III) [NiCl₄]²⁻
 (IV) [PdCl₄]²⁻

 402. Which of the following types of bonds are present in CuSO₄ . 5H₂O ?

 (I) Statistical atom are constrained atom
- (I) Electrovalent (II) Covalent (III) Coordinate Select the correct answer using the codes given as : (A) I and II only (B) I and III only (C) I, II and III (D) II and III only
- **403.** The number of sigma and pi-bonds in the compound $(CN)_2 C = C(CH_3)(MCO)_3$ is (A) 16 σ and 10 π bonds (B) 15 σ and 11 π bonds (C) 17 σ and 11 π bonds (D) 16 σ and 11 π bonds
- **404.** The dipole moment of is X. The dipole moment of :



- **405.** The formation of $O^{2-}(g)$ starting from O (g) is endothermic by 603 kJ mol⁻¹. If electron affinity of O(g) is -141 kJ mol⁻¹, the second electron affinity of oxygen would be : (A) + 744 kJ mol⁻¹ (B) -744 kJ mol⁻¹ (C) +462 kJ mol⁻¹ (D) -462 kJ mol⁻¹
- **406.** The correct order of first ionization potential is
(A) F > He > Mg > N > O
(C) He > O > F > N > Mg(B) He > F > N > O > Mg
<math>(D) N > F > He > O > Mg
- **407.** The correct sequence of the ionic radii of the following is (A) $I^- > S^{2-} > CI^- > O^{2-} > F^-$ (B) $S^{2-} > I^- > O^{2-} > CI^- > F^-$ (C) $I^- > CI^- > S^{2-} > O^{2-} > F^-$ (D) $I^- > S^{2-} > CI^- > F^- > O^{2-}$
- **408.** (Mily Cloud) $C \leftarrow CO_2 A + Na_2CO_3 \rightarrow B + C$ The chemical formulae of A and B are-(A) NaOH and Ca(OH)₂ (B) Ca(OH)₂ and NaOH (C) NaOH and CaO (D) CaO and Ca(OH),
- 409. Which of the following statements are correct?

 (I) HF is a stronger acid than HCl
 (II) Among halide ions, iodide is the most powerful reducing agent.
 (III) Fluorine is the only halogen that does not show a variable oxidation state.
 (IV) HOCl is a stronger acid than HOBr.
 (A) II and IV
 (B) II and III
 (C) I, II and III
 (D) II, III and IV

 410. Identify the correct order in which the ionic radius of the following ionis increases:

 (IV) Frequencies
 - (I) F⁻
 (II) Na⁺
 (III) N³⁻

 (A) III, I, II
 (B) I, II, III
 (C) II, III, I
 (D) II, I, III

| 411. | Which one of the following orders is not in accordance with the property stated against it? (A) $SO_3 < Cl_2O_7$ (acidic strength) (B) $F_2 > Cl_2 > Br_2 > I_2$; bond dissociation energy (C) $F_2 > Cl_2 > Br_2 > I_2$; oxidzing power (D) HI > HBr > HCl > HF; acidic property in water | | | | | |
|------|---|---|--|--|--|--|
| 412. | Sodium forms Na ⁺ io (A) Very low value of (B) Very high value of (C) Very high value of (D) Low value of (IE) | In but it does not form $f(IE)_1$ and $(IE)_2$. $f(IE)_1$ and $(IE)_2$. $f(IE)_1$ and IOW value $f(IE)_1$ and low value of $(I)_1$ h_1 and high value of $(I)_2$. | n Na ²⁺ ion but it does of (IE) ₂ . IE) ₂ . | not from Na ²⁺ because | | |
| 413. | Which of the following order is wrong? (A) $NH_3 < PH_3 < AsH_3acidic$ (B) Li < Be < B < C (IE) ₁ (C) $AI_2O_3 > MgO < Na_2O < K_2O Basic$ (D) Li ⁺ < Na ⁺ < K ⁺ < Cs ⁺ ionic radius | | | | | |
| 414. | Amongst the following the highest ionization (A) [Ne] 3s ² 3p ¹ | ng elements (whose e n energy is : (B) [Ne] 3s ² 3p ³ | electronic cnfiguration (C) [Ne] 3s ² 3p ² | ns are given), the one having (D) [Ar] 3d ¹⁰ 4s ² 4p ³ | | |
| 415. | The outermost electr (A) ns ² np ³ | ronic configuration of (B) ns² np⁴ | the most electronega (C) ns² np⁵ | ative element is (D) ns² np ⁶ | | |
| 416. | Which one of the foll (A) AsH_3 | owing is the stronges (B) PH ₃ | st base ? (C) NH ₃ | (D) SbH ₃ | | |
| 417. | Which one of the foll (A) LiF | owing fluoride of alka (B) CsF | li metals metals has (C) NaF | the highest lattice energy ? (D) KF | | |
| 418. | The first ionization p (A) Na > Mg > Al < S (C) Na < Mg < Al < S | otential of Na, Mg, Al ii ii | and Si are in the ord (B) Na > Mg > Al > S (D) Na < Mg > Al < S | er Si Si | | |
| 419. | The electronegativity (A) Si, P, C, N (C) P, Si, N, C | y of the following eler | nents increase in the (B) N, Si, C, P (D) C, N, Si, P | order | | |
| 420. | A pair of substances (A) Mg and MgO | which gives the sam (B) Sr and SrO | e products on reactic (C) Ca and CaH ₂ | on with water is- (D) Be and BeO | | |
| 421. | $MgBr_2$ and MgI_2 are s (A) Their ionic nature (C) Their metallic nat | soluble in acetone bec e ture | cause of (B)Their coordinate (D)Their covalent n | nature ature | | |
| 422. | Mercury is a liquid a (A) very high ionisati (C) high heat of hydr | t 0°C because of- on energy ration | (B) weak metallic bo (D) high heat of subl | nds imation | | |
| 423. | The formation of the step as shown here $O(g) + e^- \rightarrow O^-(g)$; $O^-(g) + e^- \rightarrow O^{2^-}(g)$ This is because (A) Oxygen is more e (B) Oxygen has high (C) O^- ion has compared (D) O^- ion will tend to be a statement of the st | e oxide ion O ²⁻ (g) req : electronegative electron affinity pratively larger size th o resist the addition o | uires first an exother $\Delta H^{o} = -142 \text{ kJ mol}^{-1}$ $\Delta H^{o} = -844 \text{ kJ mol}^{-1}$ han oxygen atom of another electron | rmic and the an endothermic | | |

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|-------|--|---|---|---|--|
| | (A) green Cu ²⁺ ions (C) blue Cu ²⁺ ions and | green CrO_4^{2-} ions | (B) green CrO_4^{2-} ions at (D) blue Cu^{2+} ions at | s nd yellow CrO ₄ ^{2–} ions | |
| 434. | The aqueous solution of | of CuCrO ₄ is green b | ecause it contains- | | |
| | (A) III < IV < II < I | B) III < IV < I < II | (C) I < II < IV < III | (D) II < I < IV < III | |
| | (III) 2s ² 2p ⁴ | wer using the codes | (IV) $3s^2 3p^4$ | | |
| 455. | correct order of the ma (I) $2s^2 2p^5$ | agnitude (without si | ign) of their electron (II) 3s ² 3p ⁵ | affinity. | |
| 422 | (D) F ⁻ ions have greate | er electron attractin | ig power than I- ions | Arrange these elements in the | |
| 432. | Fluorine is a better oxic (A) Fluorine is less stat (C) Fluorine is more rea | dizing agent than io ble than iodine active than iodine. | dine. The most proba (B) Flurine has smal | able reason is ler atomic radius than iodine | |
| 431. | During estimation of ox (A) KMnO ₄ (I | xalic acid Vs KMnO ₄ , B) oxalic acid | self indicator is- (C) K ₂ SO ₄ | (D) MnSO ₄ | |
| | $(A) A > B > C \qquad (I$ | B) C > B > A | (C) B > C > A | (D) C > A > B | |
| 430. | The electronic configurespectively. Which on k1 mol ⁻¹) of A B and C | iration of elements the of the following of ? | A, B and C are [Herder is correct for the | 2] 2s ¹ , [Ne] 3s ¹ and [Ar] 4s ¹ e first ionization potentials (in | |
| | (A) I, II and III (I | B) II, III and IV | (C) II and III | (D) I and III | |
| | (IV) Metallic character Select the correct anse | decreases and the er by using the follo | basic nature of their wing codes. | oxides decrease | |
| | (II) Gram atomic volum (III) Electronegativity (| decreases | | | |
| | (I) All the atoms have (II) Cram atomic using | the same number o | f valence electrons | | |
| 429. | In the descending orde | er of a group in mod | ern periodic table wh | ich of this following would be | |
| | (A) XO_3 , basic (I | nd acid - base chara B) X ₂ O ₃ , acidic | (C) X ₂ O ₃ , Basic | (D) XO ₂ acidic | |
| 428. | An element (X) which | occurs in the first s | hort period has as o | uter electrnoc structure s ² p ¹ . | |
| 427. | The electron affinities (A) $O \approx CI < N \approx S$ (B) | of N, O, S and Cl ar B) O < S < Cl < N | e (C) N < O < S < Cl | (D) 0 < N < Cl < S | |
| | (A) 489 kJ (I | B) 289 kJ | (C) 259 kJ | (D) 389 kJ | |
| 426. | The amount of energy ion is 4.8×10^{-13} 1 Wh | released when 10 ⁶ a nat is the electron af | atoms of iodine in vap finity of iodine in k1/ | pour state is converted into I- mole? | |
| | (C) $SiO_2 < SO_2 < Al_2O_3$ | $< P_2O_3$ | (D) $Al_2O_3 < SiO_2 < S$ | $O_2 < P_2O_3$ | |
| 425. | Among AI_2O_3 , SiO_2 , P_2O_3 | O_3 and SO_2 the corrors | ect order of acid stre (B) SO < P O < Si(| ngth is) < Al O | |
| | (A) I, II and III (I | B) I and III only | (C) I, II and IV | (D) I and II only | |
| | (III) $B < C < N < O$ (IV) $AI^{3+} < Mq^{2+} < Na^+$ | < F- | Increasing first ionization energy | | |
| | (1) I < Br < F < Cl (II) Li < Na < K < Rb | | Increasing electron increasing metallic r | gain enthalpy adius | |
| 424. | 1. In which of the following arrangements, the order is according to the property indicated against it. | | | | |

| 435. | In which one of the following pairs, the radius of the second species is greater than that of the first? | | | | | |
|------|---|---|---|---|--|--|
| | (A) O ²⁻ , N ³⁻ | (B) Na, Mg | (C) Al, Be | (D) Li ⁺ , Be ²⁺ | | |
| 436. | The electron affinity chlorine is completely 1). | of chlorine is 3.7 eV. y converted into Cl ⁻ io | How much energy in n in a gaseos state. (C | n kcal is released when 4g of Given : 1 eV = 23.06 kcal mol ⁻ | | |
| | (A) 9.6 kcal | (B) 19.6 kcal | (C) 4.8 kcal | (D) 11.6 kcal | | |
| 437. | The first and second energy values is 222 (A) 1095 | ionization energies of 6 kJ/mol, calculate th (B) 1960 | Mn are in the ratio 0. e second ionization n (C) 1069 | .475 : 1. If the sum of the two eergy (in kJ/mol). (D) 1509 | | |
| 438. | The second ionizatio (A) O>N>F>C | n energies of the C, I (B) F>O>N>C | N, O and F atoms are (C) C>O>N>F | such that (D) O>F>N>C | | |
| 439. | Which of the followin (A) Mg ²⁺ | g has the maximum n (B) Ti³+ | umber of unpaired ele (C) V ³⁺ | ectrons? (D) Fe ²⁺ | | |
| 440. | Which of the following $= 26$ | ions has a magnetic m | oment 5.93 BM? (At. n | o. V = 23, Cr = 24, Mn = 25, Fe | | |
| | (A) Cr ²⁺ | (B) V ³⁺ | (C) Mn ²⁺ | (D) Fe ²⁺ | | |
| 441. | Assign the hybridizat (A) dsp² , square pla (C) dsp², square plar | tion, shape and magne nar, 1.73 BM nar, 2.44 BM | etic moment of K ₂ [Cu (B) sp ³ , tetrahedral, (D) sp ³ , tetrahedral, | (CN)₄]. 1.73 BM . 2.44 BM | | |
| 442. | IUPAC name of the compound K ₃ [Fe(CN) ₃ CO] is (A) Potassium pentacyanocarbonylferrate (III) (B) Potassium carbonylpentacyanoferrate (III) (C) Potassium pentacyanocarbonylferrate (II) (D) Potassium carbonylpentacyanoferrate (II) | | | | | |
| 443. | The aqueous solution (A) $Zn(NO_3)_2$ | n of the following salt (B) LiNO ₃ | s will be coloured in t (C) $Co(NO_3)_2$ | the case of (D) Potash alum | | |
| 444. | which one of the fo | llowing high spin cor | mplexes has the larg | gest C. F. S. E. (crystal field | | |
| | (A) $[Cr(H_2O)_6]^{2+}$ | (B) [Cr(H ₂ O) ₆] ³⁺ | (C) $[Mn(H_2O)_6]^{2+}$ | (D) [Mn(H ₂ O) ₆] ³⁺ | | |
| 445. | The equivalent weight $(A) Mn_2O_3$ | ht of MnSO ₄ is half of (B) MnO ₂ | its molecular weight (C) MnO₄⁻ | when it is converted to (D) MnO_4^{2-} | | |
| 446. | The number of chloric aqueous solution is | le ion produced by con | nplex tetraamminechl | oroplatinum(IV) chloride in an | | |
| | (A) 1 | (B) 2 | (C) 3 | (D) 4 | | |
| 447. | The compounds whic (A) $[Cu(NH_3)_4]Cl_2$ | th does not show para (B) [Ag(NH ₃) ₂]Cl | magnetism is (C) NO | (D) NO ₂ | | |
| 448. | Amongst the followin (A) $[Cr(H_2O)_6]^{3+}$ | ig ions which one has (B) $[Fe(H_2O)_6]^{2+}$ | the highest paramagi (C) [Cu(H ₂ O) ₆] ²⁺ | netism? (D) [Zn(H ₂ O) ₆] ²⁺ | | |
| 449. | Which one of the follo are monodentate. (A) (MA_4B_2) | owing octahedral comp (B) (MA ₅ B) | olexes will not show g (C) (MA ₂ B ₄) | eometric isomerism ? A and B (D) (MA ₃ B ₃) | | |

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- **450.** The formula of tetrachloro diamine platinum (IV) is (A) $[Pt(NH_3)_2]Cl_4$ (B) $[Pt(NH_3)_2Cl_4]$ (C) $[Pt(NH_3)_2Cl_2]Cl_2$ (D) $K_4[Pt(NH_3)_2Cl_4]$
- **451.** Which of the following statements is not correct? (A) The complexes $(NiCl_{4})^{2-}$ and $[Ni(CN)_{4}]^{2-}$ differ in geometry. (B) The complexes $(NiCl_4)^{2-}$ and $[Ni(CN)_4]^{2-}$ differ in primary valencies of nickel. (C) Nickel ion has the same secondary valency in the complexes $(NiCl_{4})^{2-}$ and $[Ni(CN)_{4}]^{2-}$. (D) The complexes $(NiCl_{4})^{2-}$ and $[Ni(CN)_{4}]^{2-}$ differ in the state of hybridization of nickel. 452. Both Co³⁺ and Pt⁴⁺ have a coordination number of six. Which of the following pairs of complexes will how approximately the same electrical conductance for their 0.0001 M aqueous solutions? (D) CoCl₃. 4 NH₃ and PtCl₄. 4 NH₃ In the complexes $[Fe(H_2O)_6]^{3+}$, $[Fe(CN)_6]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[FeCl_6]^{3-}$ more stability is shown 453. bv (A) $[Fe(H_2O)_6]^{3+}$ (B) $[Fe(C_2O_4)_3]^{3+}$ (C) $[FeCl_6]^{3-}$ (D) [Fe(CN)₆]³⁻ **454.** From the stability constant (hypothetical values) given below, predict which is the strongest ligand. $K = 9.5 \times 10^{8}$ (A) $Cu^{2+} + 4H_2O \rightleftharpoons [Cu(H_2O)_4]^{2+}$ (B) $Cu^{2+} + 2en \rightleftharpoons [Cu(en)_{,}]^{2+}$ $K = 3.0 \times 10^{15}$ (C) $Cu^{2+} + 4en \rightleftharpoons [Cu(CN)_{4}]^{2+}$ $K = 2.0 \times 10^{27}$ (D) $Cu^{2+} + 4NH_3 \rightleftharpoons [Cu(NH_3)_4]^{2+}$ $K = 4.5 \times 10^{11}$ **455.** Which of the following complex ions will not show optical activity? (A) [Co(en)(NH₃),Cl₂]⁺ (B) $[Cr(NH_3)_4CI_3]^+$ (C) [Pt(Br)(Cl)(I)(NO₅)(Py)NH₅] (D) cis - [Co(en),Cl,]+ **456.** The number of d-electrons in $[Cr(H_2O)_6]^{3+}$ (at. no. of Cr = 24) is (A) 2 (B) 3 (C) 4 (D) 5 The number of ions produced from one molecule of [Pt(NH₃)₅Br]Br₃ in the aqueous solution will 457. he (A) 4 (B) 5 (C) 6 (D)7 The stability constants of the complexes formed by a metal ions (M²⁺) with NH₃, CN⁻, H₂O and 458. 'en' are of the order of 10¹¹, 10²⁷, 10¹⁵ and 10⁸ respectively. Then (A) en is the strongest ligand. (B) These values cannot predict the strength of the ligand. (C) CN⁻ is the strongest ligand. (D) All ligands are equally strong. **459.** The complex with spin only magnetic moment of \approx 4.9 B. M. is (A) $[Fe(CN)_{c}]^{3+}$ (B) $[Fe(H_2O)_6]^{3+}$ (C) [Fe(CN)₆]⁴⁻ (D) [Fe(H₂O)₆]²⁺ 460. The value of magnetic moment for a complex ion is 1.73 BM. The complex ion is (A) $[Mn(CN)_{6}]^{4-}$ (B) $[Co(NH_2)_{e}]^{3+}$ (C) (MnF₆)³⁻ (D) [Fe(CN), NO]²⁻ **461.** A metal M which is not affected by strong acids like conc. HNO₃, conc. H₂SO₄ and conc. solution of alkalies like NaOH, KOH forms MCl, which finds use for toning in photography. The metal M is-(A) Ag (C) Au (D) Cu (B) Hg

| 462. | Why is [Ni(en)₃]²⁺ nearly 10¹⁰ times more stable than [Ni(NH₃)₆]²⁺ ? (A) NH₃ is the weakest ligand (B) 'en' is a chelating ligand and forms thermodynamically more stable complexe (C) Six NH₃ ligands cause steric hindrance around the Ni²⁺ centre. (D) NH₃ evaporates easily and causes instability to the [Ni(NH₃)₆]²⁺ complex. | | | | | |
|------|--|--|--|---|--|--|
| 463. | Find out the wrong statement for an octahedral complex. (A) An ion with d ⁵ configuration has one unpaired electron both in weak and strong fields. (B) A central metal ion with d ⁸ configuration has two unpaired electrons (C) An ion with d ⁶ configuration is diamagnetic in a strong field. (D) In d ⁴ , d ⁵ , d ⁶ and d ⁷ configuration, weak and strong field complexes have different numbers of unpaired electrons. | | | | | |
| 464. | What is the effective atomic number, (EAN) of Cr and /or Cu in their complexes, $[Cr(CN)_6]^3$ and $[Cu(CN)_4]^{3-}$? (Atomic numbers : Cr = 24, Cu = 29)(A) 36 for both(B) 36 for neither(C) 36 for Cr in $[Cr(CN)_6]^{3-}$ (D) 36 for Cu in $[Cu(CN)_4]^{3-}$ | | | | | |
| 465. | Which of the following is not a bidentate ligand? (A) Acetyl acetonate (acac) (B) Bis (dimethyl glyoximato) system (dmg H) (C) Bis (diphenyl phosphino) ethane (dppe) (D) Glyme, CH ₃ -O-CH ₂ -CH ₂ -O-CH ₃ | | | | | |
| 466. | A certain complex ion, with octahedral geometry has six different ligands: $(ML_1, L_2, L_3, L_4, L_5, L_6)^{n+}$. How many isomeric structures are possible counting optical isomers separately? (A) 15 (B) 30 (C) 45 (D) 120 | | | | | |
| 467. | Which of these gives (A) Pb ²⁺ , Ag, Ba ²⁺ (C) Pb ²⁺ , Ba ²⁺ | precipitate with K ₂ Cr | O ₄ ? (B) Hg ₂ ²⁺ , Pb ²⁺ , Ag ⁺ (D) Ag ⁺ , Ba ²⁺ | , Ba ²⁺ | | |
| 468. | The magnetic mome tion would be: | nt of a transition met | al of 3d series is 6.92 | BM. Its electronic configura- | | |
| | (A) 3d ¹⁰ | (B) 3d ³ 4s ^o | (C) 3d ⁴ 4s ² | (D) 3d ³ 4s ¹ | | |
| 469. | Which of the followin | ig set represents only | coloured ions ? | | | |
| | (I) Fe ³⁺ (A) I and III only | (II) SC ³⁺ (B) II, III and IV | (III) Cu ²⁺ (C) I, II and III | (IV) Cr ³⁺ (D) I, III and IV | | |
| 470. | Choose the correct statements. 1. Geometry of the coordination entity can be predicted if its magnetic behaviour is known. 2. $[Ni(CN)_4]^{2-}$ involves dsp ² hybridization. 3. For analogous entities within a group, Δ_0 value follows $3d > 4d > 5d$. 4. $[Pt(CN)_4]^{2-}$ ion is square planar and diamagnetic. (A) 1, 2 and 3 (B) 2 and 4 (C) 2, 3 and 4 (D) 1, 3 and 4 | | | | | |
| 471. | Which of the followir I. The ligand thiosulp II. In metallic carbor III. The complex [Pt(IV. The complex ferri (A) 1 and 2 only | ing statement is/are constant of $S_2O_3^{2-}$ can give hyls the ligand CO mopy)(NH ₃ (NO ₂)ClBrI] exception (B) 2 and 4 only | orrect? rise to linkage isome lecule acts both as de kists in eight different ow effective atomic ne (C) 1, 2 and 3 | rs. onor and acceptor. geometrical isomeric forms. umber (EAN) rule. (D) 1, 2 and 4 | | |

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| 472. | Amongst CuF₂, CuCl₂ and CuBr₂ (A) only CuF₂ is ionic (B) both CuCl₂ and CuBr₂ are covalent (C) CuF₂ and CuCl₂ are ionic but CuBr₂ is covalent (D) CuF₂, CuCl₂as well as CuBr₂ are ionic | | | | | |
|------|---|--|---|--|--|--|
| 473. | Amongst the followin (A) FeCl ₂ | ng species, maximum (B) ZnCl ₂ | covalent character is (C) HgCl ₂ | exhibited by- (D) CdCl ₂ | | |
| 474. | $CuSO_4(aq) + 4NH_3 - (A) [Cu(NH_3)_4]^{2+}$ (C) coloured | → X, then X is- | (B) paramagnetic (D) of a magnetic m | oment of 1.73 BM | | |
| 475. | The oxidation number (A) 0, +3, +2 | of Fe in [Fe(CN) ₆]⁴- Cr ir (B) +3, +3, 0 | $[Cr(NH_3)_3(NO_2)_3]$ and $(C) + 3, 0, + 3$ | Ni in $[Ni(cO)_4]$ are, respectively. (D) +2, +3, 0 | | |
| 476. | In the complex [Cu(θ electron are, respect (A) dsp ² + 1 = 1 | $(CN)_4]^{3-}$ the hybridizat ively. $(B) sn^3 + 1$ zero | ion state, oxidation s (C) sp ³ + 2 1 | tate and number of unpaired (D) $dsp^2 + 2$ zero | | |
| 477. | Consider the followin $[Cr(NH_3)_5CO_3]ClO_4$ The coordination nun electrons on the met (A) 6, 3, 3, 3 | g complex: nber, oxidation numbe al are, respectively. (B) 6, 3, 6, 3 | (C) 6, 0, 6, 3 | (D) 6, 2, 6, 3 | | |
| 478. | Which of the followin I. $[Cr(NO_3)_3(NH_3)_5]$ (Here en = ethylene of (A) 1 and 2 | g will have three stere II. $K_3[Co(C_2O_4)_3]$ diamine) (B) 1 and 3 | eoisomeric forms ? III. $K_3[Co(C_2O_4)_2Cl_2]$ (C) 1 and 4 | IV. [Co (en_2) ClBr] (D) 3 and 4 | | |
| 479. | Which of the following pairs of isomers and types of isomerism are correctly matched? (I) $[Co(NH_3)_5(NO_2)]Cl_2$ and $[Co(NH_3)_5(ONO)]Cl_2$ Linkage (II) $[Cu(NH_3)_4][PtCl_4] & [Pt(NH_3)_4] [CuCl_4]$ Coordinations (III) $[Pt(NH_3)_4Cl_2]Br_2 & [Pt(NH_3)_4Br_2]Cl_2$ Ionization Select the correct answer using the codes given below : (A) 1 and 2 (B) 2 and 3 (C) 1 and 3 (D) 1, 2 and 3 | | | | | |
| 480. | $\begin{array}{l} KMnO_4 + HCI \rightarrow H_2O + \\ \text{(acidified)} \end{array}$ | X(g),X is a | | | | |
| | (A) red liquid | (B) violet gas | (C) greenish yellow | gas (D) yellow-brown gas | | |
| 481. | Select the correct incr (I) $[Cr(en)_3]^{3+}$ (III) $(CrF_6)^{3-}$ (Here, dtc = dithioca | easing order of 10 Dq v rbamate) | value for chromium cor (II) $[Cr(ox)_3]^{3-}$ (IV) $[Cr(dtc)]^{3+}$ | nplexes using the given codes. | | |
| | (A) 1 < 2 < 3 < 4 | (B) 3 < 4 < 2 < 1 | (C) 4 < 1 < 2 < 3 | (D) 3 < 1 < 4 < 2 | | |
| 482. | A salt on reaction wi (A) KNO ₂ | th dilute H_2SO_4 gives (B) ZnBr ₂ | a reddish brown gas. (C) NaNO ₃ | The salt is: (D) ZnCO ₃ | | |
| 483. | Matte contains (A) Cu_2S , FeO and Si (C) Cu_2S , Cu_2O and S | lica Silica | (B) Cu_2S , FeS and Si (D) Cu_2S , CuO and S | lica ilica | | |
| 484. | By which of the follow (A) $Cu_2S + FeS \rightarrow 2C$ (C) $Cu_2S + FeO \rightarrow 2C$ | wing reactions is blist Cu + FeS ₂ Cu + FeO | er copper obtained? (B) $Cu^{2+} + Fe \rightarrow Fe^{2+}$ (D) $Cu_2S + 2Cu_2O \rightarrow$ | + + Cu 6 Cu + SO ₂ | | |

Questions based on statements (Q. 485 - 500)

Each of the questions given below consist of Statement – I and Statement – II. Use the following Key to choose the appropriate answer.

(A) If both Statement - I and Statement - II are true, and Statement - II is the correct explanation of Statement- I.

(B) If both Statement-I and Statement - II are true but Statement - II is not the correct explanation of Statement-I.

(C) If Statement-I is true but Statement - II is false.

(D) If Statement-I is false but Statement - II is true.

485. Statement - I : Aqueous solution of Na_2SO_4 on electrolysis gives H_2 and O_2 gases in cathode and anode respectively.

Statement - II : Discharge potential on H^{\oplus} is less than Na⁺ but discharge potential of OH⁻ is more than SO₄²⁻.

- **486. Statement I :** Number of P–O–P bonds in cyclotrimetaphosphoric acid is 3. **Statement II :** Number of P = O bonds in cyclo trimetaphosphoric acid is three.
- 487. Statement I : The solid N₂O₅ is ionic.
 Statement II : In solid state N₂O₅ exist as [NO₂]⁺ [NO₂]⁻
- **488. Statement I :** The formation of ozone gas from gaseous oxygen is a non spontaneous process.

Statement - II : The formation of ozone is initiated by the formation of atomic oxygen.

489. Statement - I : PCI_{s} is possible but PH_{s} is not possible.

- **Statement II :** Hydrogen is not sufficiently electronegative to hybridise among 3s, 3p and 3d atomic orbitals of phosphorus.
- **490. Statement I :** In group III metal ion analysis we should not use only NH₄OH without saturating by NH₄Cl.

Statement - II : In the highly alkaline solution Mn²⁺ and Ca²⁺ both precipitated together.

- **491. Statement I :** Prussion blue and Turns bull's blue are formed by different reagents, yet they are identical are formed by different reagents, yet they are identical. **Statement II :** They have molecular formula as Fe[Fe(CN)_e]⁻.
- **492.** Statement I : The reaction $[Mn(CO)_5]^- + NOCI \longrightarrow [Mn(CO)_4NO] + Cl^- + CO is a feasible.$

Statement - II : The complex $[Mn(CO)_{5}]^{-}$ and $[Mn(CO)_{4}NO]$ both are stable as per EAN rule.

493. Statement - I : In the begining for the transition element 4s orbital has lower energy than 3d orbital. But on the addition of some 3d electrons the energy of 3d level becomes lower than 4s elements.

Statement - II : In the second series transition element 4s orbital has higher energy than 3d orbital.

- **494. Statement I :** The square planar complex, $[M_{abed}]^{n+}$ type shows geometrical isomerism. **Statement II :** Restricted rotation around the single bond is present within the above complex.
- **495.** Statement I : The value of Δ_0 for M³⁺ complexes are always much higher than value for M²⁺ complexes.

Statement - II : The crystal field stabilization energy of $[Co(NH_3)_6]^{3+} < [Rh(NH_3)_6]^{3+}$

- **496. Statement I :** Magnesia is used for the lining of steel making furnace. **Statement II :** Dolomite contains Magnesia.
- **497. Statement I :** HF is not stored in glass bottles. **Statement II :** HF is only the liquid halogen acid.
- **498. Statement I :** The hydrogen carbonates of the alkali metals are soluble in water, but are less soluble than the corresponding normal carbonates. **Statement II :** The hydrogen carbonates of the alkali metals have H-bonding.
- **499.** Statement I : d_{P-F} is greater than d_{P-CI} in PF_2CI_3 . Statement - II : Axial orbital has no s-character while equatorial orbital is having 33.33 % s-character in TBP geometry.
- **500.** Statement I : $(CH_3)_3Si$ –OH is more acidic than $(CH_3)_3C$ –OH. Statement - II : $(CH_3)_3Si$ –OH has back bonding.

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| | | | | WER KEY | | |
|------|---|---------------|---------------|---------------|---------------|---------------|
| | | | PHY | SICAL | | |
| 1. | А | 2. B | 3. B | 4. D | 5. C | 6. D |
| 7. | C | 8. C | 9. C | 10. A | 11. C | 12. C |
| 13. | A | 14. B | 15. D | 16. B | 17. C | 18. D |
| 19. | С | 20. C | 21. B | 22. C | 23. A | 24. A |
| 25. | С | 26. C | 27. C | 28. D | 29. D | 30. D |
| 31. | D | 32. B | 33. D | 34. C | 35. A | 36. B |
| 37. | A | 38. D | 39. B | 40. D | 41. D | 42. C |
| 43. | В | 44. A | 45. A | 46. A | 47. B | 48. A |
| 49. | D | 50. D | 51. A | 52. C | 53. C | 54. C |
| 55. | В | 56. B | 57. C | 58. C | 59. A | 60. C |
| 61. | С | 62. C | 63. A | 64. C | 65. A | 66. B |
| 67. | А | 68. A | 69. D | 70. A | 71. D | 72. B |
| 73. | С | 74. B | 75. C | 76. C | 77. C | 78. D |
| 79. | В | 80. A | 81. D | 82. C | 83. A | 84. C |
| 85. | С | 86. D | 87. C | 88. D | 89. B | 90. C |
| 91. | D | 92. A | 93. B | 94. A | 95. C | 96. A |
| 97. | В | 98. A | 99. A | 100. C | 101. B | 102. B |
| 103. | D | 104. B | 105. D | 106. A | 107. A | 108. B |
| 109. | А | 110. C | 111.A | 112. C | 113. A | 114. D |
| 115. | С | 116. D | 117. B | 118. A | 119. B | 120. C |
| 121. | А | 122. C | 123. B | 124. C | 125. A | 126. B |
| 127. | | 128. | 129. | 130. | 131. | 132. |
| 133. | | 134. | 135. | 136. | 137. | 138. |
| 139. | | 140. | 141. | 142. | 143. | 144. |
| 145. | | 146. | 147. | 148. | 149. | 150. D |
| 151. | С | 152. C | 153. A | 154. A | 155. A | 156. A |
| 157. | С | 158. A | 159. A | 160. A | 161. A | 162. C |
| 163. | А | 164. A | 165. C | 166. A | 167. A | |

| | ORGANIC | | | | | | | |
|---------------|---------------|---------------|---------------|---------------|---------------|--|--|--|
| | | | | | | | | |
| 168. D | 169. C | 170. D | 171. C | 172. A | 173. D | | | |
| 174. B | 175. C | 176. B | 177. B | 178. C | 179. C | | | |
| 180. C | 181. D | 182. A | 183. C | 184. C | 185. C | | | |
| 186. C | 187. C | 188. A | 189. C | 190. C | 191. C | | | |
| 192. B | 193. D | 194. C | 195. D | 196. C | 197. B | | | |
| 198. C | 199. D | 200. A | 201. A | 202. C | 203. A | | | |
| 204. A | 205. D | 206. B | 207. D | 208. C | 209. C | | | |
| 210. C | 211. A | 212. D | 213. B | 214. B | 215. A | | | |
| 216. C | 217. D | 218. D | 219. D | 220. B | 221. B | | | |
| 222. D | 223. A | 224. D | 225. C | 226. B | 227. C | | | |
| 228. A | 229. A | 230. B | 231. B | 232. D | 233. B | | | |
| 234. C | 235. D | 236. C | 237. A | 238. C | 239. D | | | |
| 240. C | 241. D | 242. C | 243. B | 244. C | 245. C | | | |
| 246. B | 247. C | 248. C | 249. D | 250. A | 251. D | | | |
| 252. C | 253. B | 254. A | 255. B | 256. D | 257. D | | | |
| 258. A | 259. C | 260. D | 261. A | 262. D | 263. D | | | |
| 264. C | 265. C | 266. C | 267. C | 268. A | 269. A | | | |
| 270. C | 271. C | 272. B | 273. D | 274. B | 275. D | | | |
| 276. D | 277. A | 278. B | 279. A | 280. A | 281. B | | | |
| 282. D | 283. A | 284. C | 285. D | 286. B | 287. A | | | |
| 288. C | 289. B | 290. C | 291. B | 292. B | 293. C | | | |
| 294. C | 295. B | 296. D | 297. A | 298. D | 299. C | | | |
| 300. D | 301. A | 302. A | 303. B | 304. D | 305. D | | | |
| 306. c | 307. D | 308. B | 309. A | 310. C | 311. C | | | |
| 312. A | 313. C | 314. C | 315. B | 316. c | 317. B | | | |
| 318. D | 319. D | 320. A | 321. A | 322. D | 323. D | | | |
| 324. D | 325. D | 326. D | 327. C | 328. D | 329. D | | | |
| 330. C | 331. B | 332. D | 333. D | 334. D | | | | |

| INORGANIC | | | | | | | |
|---------------|------------------|---------------|----------------|---------------|----------------|--|--|
| | | | | | | | |
| 335. D | 336. C | 337. A | 338. C | 339. C | 340. D | | |
| 341. D | 342. C | 343. B | 344. A | 345. D | 346. A | | |
| 347. B | 348. C | 349. D | 350. C | 351. A | 352. D | | |
| 353. D | 354. B | 355. A | 356. B | 357. A | 358. A | | |
| 359 A | 360. C | 361. D | 362. A | 363. B | 364. D | | |
| 365. D | 366. B | 367. C | 368. C | 369. D | 370. B | | |
| 371. A | 372. B | 373. B | 374. C | 375. C | 376. D | | |
| 377. A | 378. C | 379. B | 380. D | 381. A | 382. D | | |
| 383. B | 384. D | 385. D | 386. C | 387. A | 388. D | | |
| 389. D | 390. A | 391. B | 392. D | 393. C | 394. A | | |
| 395. B | 396. A | 397. D | 398. C | 399. A | 400. AC | | |
| 401. A | 402. C | 403. C | 404. D | 405. A | 406. B | | |
| 407. A | 408. B | 409. D | 410. D | 411. B | 412. D | | |
| 413. B | 414. B | 415. C | 416. C | 417. A | 418. D | | |
| 419. A | 420. C | 421. D | 422. AB | 423. D | 424. C | | |
| 425. A | 426. B | 427. C | 428. B | 429. A | 430. A | | |
| 431. A | 432. D | 433. B | 434. D | 435. A | 436. A | | |
| 437. D | 438. D | 439. D | 440. C | 441. C | 442. D | | |
| 443. C | 444. B | 445. B | 446. D | 447. B | 448. B | | |
| 449. B | 450. B | 451. B | 452. A | 453. B | 454. C | | |
| 455. B | 456. B | 457. A | 458. C | 459. D | 460. A | | |
| 461. C | 462. B | 463. A | 464. D | 465. B | 466. B | | |
| 467. B | 468. D | 469. D | 470. B | 471. D | 472. AB | | |
| 473. C | 474. ABCD | 475. D | 476. B | 477. A | 478. C | | |
| 479. D | 480. C | 481. B | 482. A | 483. B | 484. D | | |
| 485. C | 486. B | 487. C | 488. B | 489. A | 490. C | | |
| 491. C | 492. A | 493. B | 494. C | 495. B | 496. C | | |
| 497. B | 498. A | 499. D | 500. A | | | | |

HINTS & SOLUTIONS : PHYSICAL

1. Α

Both the metals are 0.008% by mass and no. of metal atoms in each molecule must be integer.

For Mg : 0.008 =
$$\frac{Z_{Mg} \times 24}{M} \times 100$$

 $\Rightarrow M = 300000 Z_{Mg}$
For Ti : 0.008 = $\frac{Z_{Ti} \times 24}{M} \times 100$
 $\Rightarrow M = 600000 Z_{Ti}$

2. В

Only 1 mole of NH₃ gas is formed Soluiton requires 1 mole HCl and hence, 8. only 1 mole of NH₃ is formed. + $NH_3 \rightarrow NH_4CI$ HCI 1 mole 1 mole For NH₂ formation $N_2 + 3H_2 \rightarrow 2NH_3$ 0 4

initial moles 1 Final mole

1-x 4-3x 2x = 1=2.5 x=0.5 =0.5 \therefore Mole-fraction of H₂ gas in the final gaseous mixture

$$= \frac{n_{H_2}}{n_{N_2} + n_{H_2}}$$
 (NH₃ will dissolve in water)

 $=\frac{2.5}{0.5+2.5}=\frac{5}{6}$

3. [B] $0.005 \text{ M H}_2\text{SO}_4 = 0.01 \text{ MH}^+ = 10^{-2} \text{ MH}^+,$

4. [D] Buffer solution is formed. So the pH will not change.

[C] $pH=.82 = -\log [H^+]$ \therefore [H⁺] = 1.5×10⁻⁴ mole/litre.

6. [D]

5.

Monobasic acid [H⁺] = 0.1 M : $a^2 \frac{K}{C}$:

$$K = a^{2} \times C = \left(\frac{0.0001}{100}\right)^{2} \times 0.1$$

K = 10⁻¹³.

7. **[C]**

| [0] | А | + 2B |
|-----------------------------------|----------------------|----------------------|
| \Rightarrow 2C Initial conc. | 2 | 3 |
| at eqm. 1 | 2.5 | 4 |
| Molar | $\frac{2.5}{2} = 1.$ | 25 $\frac{4}{2} = 2$ |

$$\frac{1}{2} = 0.5$$

$$\mathsf{K} = \frac{[0.5]^2}{[1.25] \times [2]^2} = 0.05$$

С

Express charle's Law in °C For thermal expansion of any substance : $V_t = V_0(1+\gamma t)$ From Charle's law application for all the gases :

$$V_{t} = V_{0} \left(1 + \frac{t}{273} \right)$$

. The coefficient of cubic expansion for all the gases, $g = \frac{1}{273} / {}^{\circ}C = constant$

[C]

9.

It is weak electrolyte because it is slightly ionized.

10. [A]

 $H_2 + I_2 = 2HI$ 4.5 4.5 0 Intial conc. х х х 2x=3

from question

$$x=\frac{3}{2}=1.5$$

So conc. at eqm. $4.5-1.\overline{5}$ of H₂ = 4.5-1.5 of I₂ and 3 of HI

$$\mathsf{K} = \frac{[\mathsf{HI}]^2}{[\mathsf{I}_2][\mathsf{H}_2]} = \frac{3 \times 3}{3 \times 3} = 1$$

С

Gaseous molecules are travelling randomly in in all direction. As all the molecular collisions are perfectly elastic,

$\sum_{\textbf{[C]}} \overrightarrow{V_x} = -\sum \overrightarrow{V_x}$ 12.

$$\begin{array}{c} A+B \rightleftharpoons C+D \text{ for this reaction} \\ \text{Initial} & 1 & 1 & 0 & 0 \\ \text{remaining at equilibrium} & 0.4 & 0.4 & 0.6 & 0.6 \\ \text{K} = \frac{[C][D]}{[A][B]} = \frac{0.6 \times 06}{0.4 \times 04} = \frac{36}{16} = 2.25 \end{array}$$

(€): 0744-2209671, 08003899588 | url : www.motioniitjee.com, ⊠info@motioniitjee.com 65 13. A

For Vanderwal gas, at any temperature :

$$Z = \frac{V_m}{V_m - b} - \frac{a}{V_m RT}$$

For Vanderwal gas: $\left(P + \frac{a}{V_m^2}\right) (V_m - b) = RT$

$$\therefore \qquad Z = \frac{PV_m}{RT} = \frac{V_m}{V_m - b} - \frac{a}{V_m RT}$$

Z =

$$\frac{V_m}{V_m - b} - \frac{a}{V_m \cdot R \cdot \frac{a}{Rb}} = \frac{V_m}{V_m - b} - \frac{b}{V_m} = 1 + \frac{b^2}{V_m (V_m - b)}$$

14. [B]

When adding HCl in CH_3COOH solution the concentration of H⁺ is increased. So reaction is proceed in reverse direction and the concentration of CH_3COO^- is decreased.

15. [D]

In reaction $CO+3H_2 \rightleftharpoons CH_4+H_2O$

Volume is decreasing in forward direction so on increasing pressure the yield pf product will increase.

16. B

For BCC : $\sqrt{3}\ell = 4r$

BCC crystal : $\sqrt{3}\ell = 4r$

 \therefore Distance between two nearest neighbour,

$$2r = \frac{\sqrt{3}\ell}{2}$$

17. C

In AB AB AB...... type paking, exactly in between A & B layers, there are octahedral voids and exctly in between a layer and octahedral voides, there are tetrahedral voides. A _____



18. [D]

19. [C]

Here: $\Delta T_b = 0.323$ K w=0.5143g weight of Anthracence. W= 35g weight of chloroform K_b= Molal elevation constant (3.9 K-Kg/ mol)

$$M = \frac{K_b \times W \times 100}{0.323} \times \frac{35}{0.5143} = 177.42 \text{g/mol}$$

20. [C]

21. [B]

22. [C]

First calculate ${\boldsymbol{\Delta}}_c {\boldsymbol{H}}$ per mol and then convert it inot per gm.

The required thermochemical equation is

$$6x C(s) + 5x H_2(g) + \frac{5x}{2} O_2(g) \rightarrow (C_6 H_{10} O_5)_x;$$

$$\Delta_f H = ?$$

Now,
$$\Delta_f H = \left[6x \times \Sigma \Delta_C H_{C(s)} + 5x \times \Sigma \Delta_C H_{H_2(g)} \right]$$

$$- [\Delta_{C}H_{(C_{6}H_{10}O_{5})_{x}}]$$
= 6x × (-94.05)+5x × (-68.32) -(-4.18)
× 162x
= - 228.74 × Kcal/mol =
$$- \frac{228.74x}{162x} = - 1.41 \text{ Kcal/gm}$$

23. [A]

On cheavage of one π -bond, one σ -bond is formed in the polymerisation reactions. $\Delta H = B.E._{C-C \pi \text{ bond}}$ $= (B.E._{C-C} - B.E._{C-C}) - (B.E._{C-C})$

= (835-610) - 348 = - 123 kJ/Mol

24. [A]

For the-ideal solution $\Delta S_{_{mix}}$ is not equal to zero.

25. [C]

Molar concentration of cone sugar

$$=\frac{5}{342}\times\frac{1000}{100}=\frac{50}{342}$$

Molar concentration of solution =

$$\frac{1}{m} \times \frac{1000}{100} \times \frac{10}{m}$$

$$\frac{10}{m} = \frac{50}{342}$$
 or m=68.4

26. [C]

27. [C]

Raoult's law :
$$\frac{P^0 - P}{P^0} = \frac{n}{n + N}$$

28. [D] (1000-2x) mm Total of 10 moles of liquids will move in vapour form. Apply Raoult's law on liquid well as vapour composition Final composition Vapour form Liauid x 10-x А В 10x х Now, $P=X_{A}P_{A}^{0}+X_{B}P_{B}^{0}$ 36. $=\frac{10-x}{10}\times 200+\frac{x}{10}\times 100$ or, P=200 - 10x(1) And, $\frac{1}{P} = \frac{Y_A}{P_A^0} + \frac{Y_B}{P_B^0} = \frac{x/10}{200} + \frac{(10-x)/10}{100}$ 37. [A] 38. [D] or, $P = \frac{2000}{20 - x}$(2) From (1) & (2) : P = 141.4 torr 39. **FB1** 29. [D] 30. [D] $\lambda = \frac{c}{v} = \frac{3 \times 10^8}{8 \times 10^{15}} = 3.75 \times 10^{-8}$ 40. [C] $=3.75 \times 10^{-8} \times 10^{9}$ nm $= 4 \times 10^{1}$ nm. 31. [D] Atomic number is 36 and element is kr. 32. [B] 41. [D] $\lambda = \frac{h}{n} \text{ or } \frac{h}{mv} \text{ or } \frac{h}{mc}$ de-Broglie equation. -ve. 42. 33. D [C] For negative sol, I⁻ should be in excess. For negative sol, $[I^-] > [Ag^+]$ 34. [C] 35. Α $N_2 + 3H_2 \rightleftharpoons 2NH_3$ On removing N₂ gas, reaction will shift in 43. back direction. $N2 + 3H_2 \implies 2NH_3$

Equilibrium 100 mm 400 mm 1000 mm Partical pressure Partial pressure (100-a)mm 400mm 1000 mm just on removing N₂

New equilibrium (100-a+x) mm (400+3x)mm Partial pressure = P_{N_2} = 700 mm = 800 mm ∴ x=100 Now, $K_p = \frac{P_{NH_3}^2}{P_{N_2}P_{H_2}^3} = \text{constant}$ or, $\frac{1000^2}{100 \times 400^3} = \frac{800^2}{P_{N_2} \times 700} \Rightarrow P_{N_2} = 11.94 \text{ mm}$ $K_1 = \frac{[B]}{[A]}$ and $K_2 = \frac{[C]}{[A]}$ Now, mole-fraction of $A = \frac{[A]}{[A] + [B] + [C]} = \frac{[A]}{[A] + K_1[A] + K_2[A]} = \frac{1}{1 + K_1 + K_2}$ When volume is reduced to $\frac{1}{4}$, concentrations becomes four times. $\frac{k_{\rm t} + 10}{K_{\rm t}} = \frac{r_{\rm t} + 10}{r_{\rm t}} = 2$ For an increase of temperature to 90° C i.e. 9 times. the rate increases by 29 times i.e. 512 times. $t_{1/2} = \frac{0.693}{K_1 + K_2}$ $t_{1/2} = \frac{0.693}{K_1 + K_2} = \frac{0.693}{0.02 + 0.03} = 13.86 \text{ min}$ eq. (i)+eq. (ii) gives ΔS is same and ΔH is Given : (i) $CH_4+2O_2 \rightarrow CO_2+2H_2O$, $\Delta H=+20$ kcal (ii) $C+O_2 \rightarrow CO_2$. $\Delta H=-40$ kcal. (iii) $H_2 + \frac{1}{2}O2 \rightarrow H_2O$. $\Delta H = -10$ kcal Atm : C+2H₂ \rightarrow CH₄ (ii) $+2\times(iii)$ –(i) gives. $\Delta H = -40+2 (-10)-(+20) = -80 \text{ kcal}.$ W=2.303 nRT lot $\frac{V_2}{V_2}$ $= 2.303 \times 1 \times 8.314 \times 10^{7} \times 298 \log \frac{20}{10}$

 $= 298 \times 10^7 \times 8.314 \times 2.303 \log 2.$

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44. [A]

 $K_{sp} = a.S^{x}$

If Ksp << 1, then increase in 'x' will increase the solubility of salt.

For different salts, $K_{_{Sp}}$ may be generalised as $K_{_{Sp}}$ = a.S^{\scriptscriptstyle X}

If $K_{sp} << 1$, then the solubility, S, of salt increases with the increase in value of 'x'.

45. [A]

Heat evolved in the Ist case = $40 \times 5=200$ cal. Heat evolved in the IInd case =10 times because amountstaken are 10 times = $10 \times 200=2000$ cal. = $400 \times \Delta T$ or $\Delta t=5^{\circ}$ C.

46. A

$$\Delta E^{\circ} = \frac{RT}{nF} \cdot \ln \frac{C_1}{C_2}$$
$$\Delta E^{\circ} = \frac{RT}{nF} \cdot \ln \frac{C_1}{C_2} = \frac{0.059}{2} \times \log 10^6 = 0.177V$$

47. [B]

0.2 mole will neutralize 0.2 mole of HNO_3 , heat evolved = $57 \times 0.2 = 11.4$ kJ.

48.

Α



For minimum spectral lines, only possibility is A. Hence, min. no. of spectral lines = 1 For maximum spectral lines, any two possibility mya be considered Hence Max no. of spectral lines = 4

49. [D]

The maximum number of electrons in any sub-shell is 2(2l+1)

The maximum number of electrons in any sub-shell is 2(2l+1). Hence, the total number of electrons in an energy level is

$$\sum_{l=0}^{l=(n-1)} 2(2l+1)$$

50. [D]

 Δm for nuclear reaction may be presented in terms of atomic mass from their nuclear masses

 $\Delta m = (Nuclear mass of {}_{5}B^{8}) - (nuclear mass of {}_{5}B^{2})$

of
$$_{4}Be^{8} + e_{+1}$$
)
= $(m_{5p} + m_{3n}) - (m_{4p} + m_{4d} + m_{e})$
= $(m_{5p} + m_{3n} + m_{5e}) - (m_{4p} + m_{4n} + m_{4e} + m_{2e})$
= At mss of $_{5}B^{8}$ - At. mass of $_{4}Be^{8} - 2 \times mass$ of electron

51. [A]





 $4r = \sqrt{3}a$

Max. Uncertainity = $\sqrt{3}$ a

$$= \sqrt{3} \times 10$$

= 1.732 × 100
= 17.32 cm
= 0.1732 m

$$\Delta V = \frac{h}{4\pi m \Delta x}$$

$$= \frac{6.6 \times 10^{-34}}{4 \times 3.14 \times 9.1 \times 10^{-31} \times 0.1732}$$

= 3.34 × 10⁻³

52. [C]

Last - IP. = 13.6 Z²ev 13.6 × Z² = 217.6 Z² = $\frac{217.6}{13.6}$ = 16 Z = 4 Z = 4 = Be \Rightarrow_{4} Eb⁹ n = 5

53.

С

We Know
K.E. =
$$-\frac{1}{2}$$
 P.E
= $-\frac{1}{2}\left(\frac{1}{2} \text{ mKr}^2\right)$
= $-\frac{1}{4}\text{ mKr}^2 = \frac{1}{2}\text{ mv}^2$
 $v^2 = -\frac{1}{2}\text{ Kr}^2$
mv r = $\frac{nh}{2\pi}$ m² v² r² = $\frac{n^2h^2}{4\pi^2}$
m² $\left(-\frac{1}{2}\text{ Kr}^2\right)r^2 = \frac{n^2h^2}{4\pi^2}$
r⁴ $\propto n^2$
r $\propto \sqrt{n}$

59. [A]

Eqv. of metal X = Eqv. of metal Y

$$\frac{W_1}{E_1} = \frac{W_2}{E_2}$$
$$\therefore \quad E_1 = \frac{W_1}{W_2} \times E_2$$

60.

61.

62.

63.

C
Eqv. of oxide = Eqv. of metal

$$\frac{3.15 \text{ gm}}{E+8} = \frac{1.05}{E}$$

$$E = 4$$
C
Eqv. of CuSO₄ .5H₂O = Eqv. of Hypo

$$\frac{W}{E} = N \times V_{(iit)}$$

$$\frac{'x'gm}{250} = 0.1 \times \frac{100 \text{ ml}}{1000} \begin{bmatrix} (+2) & (+1) \\ CuSO_4 \rightarrow Cu_2I_2 \end{bmatrix}$$

$$x = 2.5 \text{ gm} \quad E = \frac{M}{I}$$
[C]
AgNO₃ + NaCl → AgCl + NaNO₃
No Change in O.S

$$\therefore \quad R_{xn} \text{ is non-redox}$$
[A]
MnO₄⁻ + 8H⁺ + ne⁻ → Mn⁺² + 4H₂O
Charge Balance

Charge Balance $-1 + 8 + n \times (-1) = +2; n = 5$

64. [C]

(+7) $KMnO_4$ $\longrightarrow MnO_4^{-2} (0.S = +6); e^- transfer = 1$ $\longrightarrow MnO_2 (0.S = +4); e^- transfer = 3$ $\longrightarrow Mn_2O_3 (0.S = +3); e^- transfer = 4$ $\longrightarrow Mn^{+2} (0.S = +2); e^- transfer = 5$

65.

Α

$$\frac{V_{H_2}}{V_{O_2}} = \sqrt{\frac{T_{H_2}}{T_{O_2}} \times \frac{M_{O_2}}{M_{H_2}}}$$
$$\sqrt{\frac{50}{2} \times \frac{32}{800}} = 1$$

66. B

pressure of dry gas = pressure of moist gas - vapour pressure of water = 775 - 14 = 761 mm

 $\begin{array}{ll} \mbox{Initial conditions} & \mbox{NTP conditions} \\ V_1 = 900 \mbox{ mL} & V_2 = ? \\ p_1 = 761 \mbox{ mm} & p_2 = 760 \mbox{ mm} \\ T_1 = (273 + 15) & T_2 = 273 \mbox{ K} \\ & = 288, \mbox{ K} \end{array}$

From,
$$\frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2}$$

So,
$$V_2 = \frac{P_1 v_1 v_2}{T_1 p_2} = \frac{761 \times 900 \times 273}{288 \times 760}$$

= 854.24 mL

67. A

Rate of diffusion of H2 is more than CH_4 balloon will have enlarged.

68. A

:.

Tc \uparrow liquefication ease \uparrow

69. D

Solid component will not affect the equilibrium

70. [A]

 $\Delta G^{o} = -2.303 \text{ RT} \log \text{ Kp}.$ $\Delta G^{o} = -2.303 \times 8.314 \times 298 \log 4.00 \times 10^{4}$ $= -26.25 \text{ KJ mol}^{-1}$

71. [D]

72. [B]

As Temp \uparrow % yeild \downarrow

73. [C]

Keq = $\frac{1}{Kp} = \frac{1}{1.44 \times 10^{-5}}$

74. [B] As steam is converted into water ∆S become -ve

75. [C] When HCl is produced in gaseous state Δ H is -92.3 KJ

76. C

Molar heat of combustion of $H_2(g)$

$$\begin{split} &H_2(g) + \frac{1}{2} \ O_2(g) \rightarrow \ H_2O(\ell) \\ &\Delta H^0_{\ comb} = \Delta H^0_{\ f}(H_2O) \ (\ell) \end{split}$$

77. [C]

 \therefore H₃PO₄ is Tri basic acid So it contains three replaceable H⁺ ion

78. [D]

 $pk_w = -log k_w$ $pk_w = 13$ $pH + pOH = pk_w$

79. [B]

 $N_1 V_1 = N_2 V_2$ 0.1 × 1 = $N_2 \times 1000$

$$N_2 = \frac{0.1}{1000} = 10^{-4}$$

pH = 4

80. [A]

Let solubility of Ag_2CO_3 in presence of Na_2CO_3 is x, Ag_2CO_3 (s) $\implies 2 Ag^+ + CO_3^{2-}$ $2x (x + 0.1) \cong 0.1$ $K_{sp} = [Ag^+]^2 [CO_3^{2-}]$ $4 \times 10^{-13} = (2x)^2 \times 0.1$ $x = 10^{-6}$

81. [D]

Numberical value of m cannot be greater than that of I

82. [C]

When a body carrying charge equal to that of electron is accelerated by a potential difference of 1 volt, its kinetic energy is equal to 1 eV.

83. [A]

$$\overline{v} = R \left[\frac{1}{2^2} - \frac{1}{3^2} \right] cm^{-1}$$

84. [C]

$$_{19}$$
k : 1s², 2s², 2p⁶, 3s², 3p⁶, 4s¹

For which n = 4

$$I = 0$$

 $m = 0$
 $s = +\frac{1}{2}$ or $-\frac{1}{2}$

85. [C]

 $E = -13.6 \frac{z^2}{n^2} eV \text{ and}$ for H -atom Z = 1

93. [B] 86. [D] $K_4[Fe(CN)_6]$ Ions Work function $W_0 = hv_0 = \frac{hc}{\lambda_0}$ Molecules $(0.8 \times 2) \times 6.02 \times 10^{23}$ $= 4.8 \times 10^{24}$ 87. [C] From $\Delta x \cdot \Delta v = \frac{h}{4\pi m}$ 94. [A] BaCO₃ O-atoms 6.6×10^{-27} 1 mol 3 mol $\Delta x =$ $4 \times (3.14) \times (9.1 \times 10^{-28}) \times \left(1.0 \times 10^{4} \times \frac{0.011}{100}\right)$ Molecules : 1.5 mol 88. D $= 0.5 \, mol$ 3^{rd} I.E. of Li = I.E. of Li²⁺ from I.E. of any single electron species 95. [C] $=13.6 \times z^{2} eV$ Dulong petit's law $= 13.6 \times 3^2 \, eV$ At. wt. x sp-heat (cal g⁻¹ per degree) = 122.4 eV ≈ 6.4 89. [B] 96. [A] Orbital angular momentum = $\sqrt{\ell(\ell+1)h}$ Caffeine for p-electron, $\ell = 1$ 194×28.9 100 194 g 90. [C] $\frac{28.9}{100}\times\frac{194}{N_A}g$ $CaCO_3(s) \longrightarrow CO_2(g) + CaO(s)$ <u>194</u> g N_A Sto Given : $\frac{0.289\times194}{N_A}\times\frac{1}{14}\times N_A \text{ atoms}$ 100 kg 44 kg 97. [B] $\frac{48}{100}$ ×10 kg Х Υ mol 50/10 50/20 = 3.52 kg 0.5 =1 91. [D] X : Y = 1 : 0.5*.*.. Molecules : = 2 : 1 S0₃ atoms 98. [A] $n = \frac{11.2}{22.4} \times 0.5$ $\frac{48}{100} \times 6.02 \times 10^{23}$ $= 6.02 \times 10^{23}$ 99. Α 92. [A] HIO_4 ; (+1) + x + 4 (-2) = 0SO₃ moles 64q x = +7Mass : 100. [C] 6.4 g (+4) 2NO₂ — (+4) →<u>N</u>₂O₄ = 0.1 mol (C): 0744-2209671, 08003899588 | url : www.motioniitjee.com, 🖂 info@motioniitjee.com

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101. B 110. [C] $CIO_{3^{-}} + 6H^{+} + 6e^{-} \rightarrow Cr^{3+} + 3H_{2}O$ $\begin{array}{c} (+2)(+3) \\ \text{FeC}_2\text{O}_4 \end{array} \xrightarrow{(+4)} \text{Fe}^{3+} + \text{CO}_2 \\ \text{v.f. (FeC}_2\text{O}_4) = 1 + 2 + 3 \end{array}$ 102. $Cr_2O_7^{2-}+6Fe^{2+}+14H^+ \rightarrow Cr^{3+}+6Fe^{3+}+7H_2O$ $E = \frac{M.M.}{v.f}$ 103. [D] 0 || H-O-O-S-O-H || 111. [A] no. of eq. of $NaClO_4 = no.$ of faraday's 112. [C] [B] (0) $3I_2 + 6OH^- \longrightarrow IO_3^- + 5I^- + 3H_2O$ $\uparrow \uparrow$ 104. $\frac{4.5}{15}$: $\frac{2.7}{27}$: $\frac{9.6}{48}$ 113. [A] $E_{cell} = E_{cell}^{o} - \frac{0.0591}{2} \log \frac{|Cu^{2+}|}{|Ag^{+}|^{2}}$ Reduction 114. [D] 105. D $\mathsf{E}_{\mathsf{cell}} = \mathsf{E}^{\mathsf{o}}_{\mathsf{cell}} - \frac{0.0591}{2} \log \mathsf{Q}$ $E = \frac{M.M}{Valence factor} = \frac{158}{1}$ v = c + mx115. [C] $\begin{array}{c} (+7) \\ \mathsf{KMnO}_4 & \longrightarrow & \mathsf{K}_2\mathsf{MnO}_4 \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\$ $\pi \propto C$ 116. [D] In osmosis solvent molecules migrate across the membrane 106. [A] 117. [B] Eq. mass of a metal in its oxide Solubility $\propto \frac{1}{\text{Temp.}}$ $= \frac{\text{wt. of metalin oxide}}{\text{wt. of Oin oxide}} \times 8$ 118. [A] $Mn^{2+} + 2Mn^{3+} = 40^{2-}$ $=\frac{60}{40}\times 8=12$ 119. [B] $\sqrt{2} a = 4r$ 107. [A] Meq.(Acid) = Meq.(NaOH)120. [C] \Rightarrow 30×(M×2) = 15 × 0.2 A : B $4 \times \frac{1}{8} + 4 \times \frac{1}{2} = \frac{5}{2}$ $10 \times \frac{1}{4} = \frac{5}{2}$ \Rightarrow M = 5 × 10⁻² M Milli equivalent 108. [B] 121. [A] $Eq.(NaOH) = Eq.(H_2SO_4)$ 122. [C] rate = $\frac{-d[BrO_3^-]}{dt} = \frac{1}{3} \frac{d[Br_2]}{dt}$ $\frac{W}{40/1} = (0.5 \times 2) \times (10 \times 10^{-3})$ 123. [B] \Rightarrow w = 0.4 g $t_{1/2} \propto \frac{1}{a^{n-1}}$ 109. [A] 124. [C] $Eq.(KMnO_4) = Eq(H_2O_2)$ Fe(OH)₃ /Fe⁺³ is positively charged colloidal sol. So $\Rightarrow \mathsf{N} \times (\mathsf{x} \times 10^{-3}) = \frac{\left(1 \times \frac{\mathsf{x}}{100}\right)}{24/2}$ coagulation power $\propto \Theta$ charge

125. [A] Fact

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 $\Rightarrow N = 0.58$
| 126. | [B] | 138. | $\begin{bmatrix} \mathbf{A} \end{bmatrix}$ K ₂ = K ₂ (RT) ^{An} g |
|------|---|------|--|
| | $\frac{x}{m} = K p^{1/n}$ | 139. | [B] |
| | $\log \frac{x}{m} = \frac{1}{n} \log P + \log K, \text{ slope} = \frac{1}{n}$ | | $\frac{1}{K} = \frac{1}{0.025} = 40$ |
| 127. | intercept = log K [A] | 140. | [B] |
| | $\frac{t(O_2)}{t(g)} = \sqrt{\frac{M(O_2)}{M(g)}}$ | | $\frac{\text{st. of HA}_1}{\text{st. of HA}_2} = \sqrt{\frac{K_{a_1}}{K_{a_2}}}$ |
| 128. | $\begin{bmatrix} \mathbf{A} \end{bmatrix}$ $\mathbf{u} = \sqrt{\frac{3P}{d}}$ | 141. | [D] $K_{sp} = 4s^{3}$ |
| 129. | [C] | 142. | [B] |
| 130. | $KE = \frac{3}{2} nRT$ [B] | | $K_{b} = \frac{K_{w}}{K_{a}} = \frac{10^{-14}}{10^{-5}} = 10^{-9}$ |
| | $r \propto \frac{1}{\sqrt{M}}$ | 143. | [B] |
| 131. | [D] Ideal gas can't be liquefied. | 144. | $pH = pK_a + \log \frac{1}{[Acid]}$ [C] |
| 132. | [B] $W_{rev.} - nRT \ ln \ \frac{P_1}{P_2}$ | 145. | [OH ⁻] = Cα [B] |
| 133. | $\begin{bmatrix} \mathbf{A} \end{bmatrix}$ $\Delta H_{\text{strat}} = \Delta H_1 + \Delta H_{\text{the st}}$ | | $r_{+} + r_{-} = \frac{a\sqrt{3}}{2}$ $2r_{-} = a$ |
| | = 778 + (-774.3) = 3.7 kJ $\Delta G_{\text{diss.}} = \Delta H_{\text{diss.}} - T \Delta S_{\text{diss}}$ | 146. | [B] Volume of autric cell = $(200 \times 10^{-10})^3$ cm ³ |
| 134. | [D] Factual | 147. | = 8 × 10 ⁻²⁴ cm ³ [C] |
| 135. | $\begin{bmatrix} \mathbf{C} \end{bmatrix}$ $\Delta H_{r} = \Sigma (B.E)_{R} - \Sigma (B.E)_{P}$ | 148. | [A] $t_{1/2} \uparrow$ as conc. \uparrow zero order |
| 136. | [C] | | Intercept = 0 = log 2K = 0 2k = 1 |
| | $K = \frac{K_{\rm b}}{K_{\rm b}}$ | 140 | k = 1/2 |
| 137. | $[C]$ $K = \frac{[PCl_3][Cl_2]}{[PCl_3]}$ | 173. | Conc. become 10 times rate become 100 times |
| | ·· [PCI ₅] | | which means order with respect to [17] IS 2. |

150. [D]

All members of any class of hydrcarbon do not have same empirical formula.

151. [C]

All moles remains constant vapour density remains constant.

152. [C]

 $C_nH_{2n+2} + \left(\frac{3n+1}{2}\right)O_2 \longrightarrow nCO_2(n+1)H_2O$ (Alkane)

$$C_nH_{2n} + \left(\frac{3n}{2}\right)O_2 \longrightarrow nCO_2 + nH_2O$$

(Alkane)

$$C_nH_{2n-2} + \left(\frac{3n-1}{2}\right)O_2 \longrightarrow nCO_2 + (n-1)H_2O$$

(Alkane)

moles of hydrocarbon < moles of O₂

153. [A]

Boyle temperature of hydrogen and helium gases are less than 273 K.

154. [A]

Above critical temperature gas state exists.

155. [A]

In metallic crystale like-sized atoms have arrangement of atoms corresponds to the closet packing.

156. [A]

Schottky defects is more likely in ionic solids in which cations and anions are of comparable size. Frankel defect is more likely in ionic solids in which cations and anions have large differences in their ionic size.

157. [C]

Diamond is having very high melting point due to its closely packed tetrahedral structure.

158. [A]

 $|W_{adi}|_{rev} > |W_{adi}|_{irr.}$

159. [A]

The two enantiomers fo any chiral compound have the same enthalpy of formation.

160. [A]

In an adiabatic process, the surrounding does not exchange heat with the system and the process may be reversible or irreversible for system but it always remain reversible for the surrounding.

161. [A]

When an ideal binary solution of liquids A and B is distilled, the contains relatively larger amound of the more volatile liquid.

162. [C]

order of reactions cannot give idea about slow or fast reaction.

163. [A]

The active mass of pure solid and liquids depends on density and molecular mass. The density and molecular mass of pure liquids and solids are constant.

164. [A]

Adsorption is a spontaneous exothermic process in which randomness decreases due to force of attraction between adsorbent and adsorbate.

165. [C]

166. [A]

Transition energy is always greater when electrons come to an orbit with lower orbit number than electron come to an orbit with higher orbit number, irrespective to the higher orbit from which is coming.

167. [A]

The loss in mass in K-capture is equal to the difference in atomic masses of parent nucleus and the daughter nucles but in positron decay, additional mass loss equal to the mass of two electrons also occur.

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electronegativity of O > N {I & III have same no. of covalent bond } + change on electronegative atom is less stable Hence, III > I. ∴ III > I > II.

193. [D] -OH α is present R.H.S. at last chiral carbon so It is D-torm 194. [C]



195. [D] longest carbon chair has 8 carbons.

196. [C]



197. [B]

Orther and para prodcut.

198. [C]

Max zwitter ion exist at isoelectric point

$$pI = \frac{pKa_1 + pKa_2}{2} = \frac{9.8 + 2.3}{2} \approx 6$$

199. [D]







 F^{o} is les stable and more reactive Than $.\mathsf{X}^{\mathsf{o}}$

201. [A]



202. [C]



No participation due to resonance.

203. [A]

 $\begin{array}{c} O \\ \parallel \\ X = CH_3 - CH_2 - CH_2 - C - NH_2 \\ Compound X \text{ is obtain from acid chloride} \\ \text{i.e. butanoyl chloride.} \end{array}$

204. [A]





A+B = 4+2 = 6



220. [B]

Friedal craft acylation which gives p-prod-



So EAS reaction takes place at p position

Because $-OCH_3$ group shows +M effect.

Because I.P. of N participate in conjugation. So o &-p position become e⁻ rich so



In this Reaction :C $\begin{pmatrix} F \\ C \end{pmatrix}$ is carbene &



 β keto acid so decarboxylation Reaction takes place



Three ethers & four alcohols so total iso-

Allylic alcohol is oxidised in presence of



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261. [A]

Ph–O–Ph do not undergo acid catalysed hydrolysis because lone pair of O is in conjugation with both benzene rings. SO Ph-O bond with not break.

262. [D]



263. [D] Phenol give violet color with neutral FeCl₃.

264. [C] due to –I effect of –Cl group CH₃–CH₂– CH(Cl)–COOH is strong acid among the given compounds.



 $\begin{array}{c} O & OH \\ \parallel \\ CH_3 - C - CH_2 - CH_2 - CH_3 \end{array} \rightleftharpoons CH_2 = C - CH_2 - CH_2 - CH_3 \end{array}$ 2.Pentanone







is more sterically hindered. So, it will not form.

268. [A]

 $-OCH_3$ and $-CH_3$ both are electron donating groups. Thus they are decreasing the electron deficiency of carbon.

269. [A]



271. [C]



272. [B]

273. [D] $C_2H_5ONa + C_2H_5 - C - CI \xrightarrow{-NaCl} C_2H_5 - O - C - C_2H_5$ U





275. [D]



geometrical isomers, $2^4 = 16$

276. [D]



Total geometrical isomer is = 4

277. [A]



278. [B]



279. A



280. [/

Acrylonitile ($CH_2 = CHCN$) is Monomer used to prepare Orlon.

281. [B]

A tripeptide has 3 Amide and 2 preptide bonds

282. [D]

283. [A]







Valine is one of the 20-essential amino acid for metabotism.

285. [D]



Keq $\propto \frac{1}{+m \text{ effect}} \propto \text{Electrophilicity}$





300. [D]



m-meso tribromoderivative It has penenulic – OH and dissolves in NaOH and characteristics colour with nevtral $FeCl_3$.

301. [A]





303. [B]

304. [D]



305. [D]

POS is present all of them and all are meso.

306. [C]

compound (C) have 10 e^- so it will aromatic.

307. [D]

(D) because of repulsion between hydrozen so it is non planner, and it will be aromatic

308. [B]

Stailibity order aromatic > non aromatic > anti aromatic I > III > II

- 309. [A]
- 310. [C]
- 311. [C]

Formed carbocation is most stable because it is in conjugation with benzene ring

312. [A]

 \cap

$$\begin{array}{c} \mathsf{NH}_2\\ \mathsf{COBr} \end{array} \xrightarrow{\mathsf{NH}_2} + \mathsf{CO}_2 + \mathsf{KBr} \end{array}$$

313. [C]

314. [C]

315.

B] Cyclohexene will react with Br_2/H_2O and cyclohexane will not react with Br_2/H_2O .

316. [C]

$$CH_{3} - C \equiv C - H \xrightarrow{\text{NaNH}_{2}} CH_{3} - C \equiv C \text{Na}^{\oplus}$$

$$CH_{3} - CH = CH - CH_{3} \xrightarrow{(U/2)} (H_{3} - I)$$

$$(b)$$

$$CH_{3} - CH = CH - CH_{3} \xrightarrow{(U/2)} (C^{O})^{\circ} CH_{3} - C \equiv C - CH_{3}$$

$$(c)$$

$$(c)$$

Both (b) & (c) are diastereomers.



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335. [D]

The electronic configuration of $O_{2^{-}}$ $\mathrm{O_2^-} \rightarrow \sigma\, 1s^2 ~\sigma *\, 1s^2 ~\sigma\, 2s^2 ~\sigma *\, 2s^2 ~\sigma \, p_z^{-2} ~\pi (2p_x)^2$ $\approx \bar{\pi}^2 p_v^2 \pi * (2p_v)^1$ Bond order = $1/2 [N_{b} - N_{a}]$ = 1/2 [10 - 7] = 3/2 = 1.5

336. [C]

As the no. of N.P. on central atom increases, bond angle decreases.

 \Rightarrow So, NH₃ has maximum bond angle.

 \Rightarrow Also, if no. of lone pair is same then if E. N. of central atom increases B. A. also increases.

H₂Se has smallest bond angle.

337. [A]

Due to intermolecular hydrogen bond in H₂O, its molecules are associated with each other which is responsible for unusually high boiling point of water.

338. [C]

339. [C]

In BF₂, the central atom (boron) has six electrons in the valence shell.

340. [D]

341. [D]



The dipole moment of NF₃ is less than NH₃.

342. [C]

 $\mu_{\gamma} > \mu_{\mu}$

SiF₄ has symmetrical tetrahedral structure so individual bond moments cancel each other resulting in zero dipole moment.

343. [B]



(Banana bond)

- \Rightarrow momeutanrity gain of octet
- \Rightarrow assumed incomplete octet.
- \Rightarrow electron deficient compound.

The compound of which central atom is octetless is known as electrodeficient compound. Hence, B₂H₆ is electron deficient compound.

344. [A]

```
(A) H_{2^{+}} total e^{-} = 1
B.O. = 1/2 [1, 0]
B = 1/2 \times 1 = 0.5
(B) O_2^- total e^- = 17
B. O. = 1/2 \begin{vmatrix} -2 & -2 \\ 2 & -2 \\ 6 & -3 \end{vmatrix} = 1/2 [6 - 3]
= 1/2 \times 3 = 1.5
(C) B_2 total e^- = 10
B. O. = 1/2 \begin{bmatrix} 2 & 2 \\ 2 & 0 \end{bmatrix} = 1/2[2 - 0] = 1
(D) F_2, total e^- = 18
B. O = 1/2 \begin{bmatrix} 2 & 2 \\ 2 & 2 \\ 6 & 4 \end{bmatrix} = 1/2 [6 - 4] = 1
```

345. [D]

346.

H - O - N = O. only covalent bonds are present. ГДЛ

(A)
$$F$$

(A) F
(B) H
(C) H
(C

Cl sp³ Trigonal pyromidal

(D)
$$\begin{bmatrix} I \\ F \end{bmatrix} = F$$
 sp³d, T-shaped

BF₃ is sp² hybridized. Hence, it is trigonal planner.

347. [B]

(A) SiF₄, sp³ ℓ .p. = 0 \Rightarrow symmetrical structure

$$\Rightarrow \mu = 0$$
F
(B)
S
sp³d see-say

 $\Rightarrow \mu = 0$

(

(Because of unsymmetrical structure individual bond moments can not cancel each other)



sp³, trigonal pyramidal $0 = \dot{X}_e = 0$ (isostructural) [C] $Be^{2+} < Li^{4+} < Na^+$ (ionic size) $Be^{2+} > Li^+ > Na^+$ (polonsing power of cation) polarsing of cation < covalent character \Rightarrow BeCl₂ > LiCl > NaCl (covalent character) As difference of electronegativity increases, percentage ionic character increases and covalent character decreases i.e., negativity difference decreases and covalent character increases. Na is more + ve than Li and Li is more + ve than Be. [A] Order of strength of hydrogen bonds NH --- N < OH --- O < FH --- F 13 18 40 kJ mol As greater the difference in the electronegativity, greater is the strength of the H - bond. [D] ⁺NH₄ is sp³ hybridised with tetrahedral shape \Rightarrow bond angle = 109°28' As it is sp³d hybridized with tetrahedral shape. [D] Molecule having almost negligible tendency

to form hydrogen bonds is HI as hydrogen

bonding dependes on two factors.

354. [B]

350.

351.

352.

353.

(I)
$$H - O - \bigcup_{I}^{II} - \bigcup_{I}^{II} \bigcup_{I}^{II} - O - H$$

No. of π -bond = 4
(II) $\bigcup_{HO - S - OH}^{II}$
No. of π - bond = 1
(III) $H - O - \bigcup_{I}^{II} - \bigcup_{I}^{II} - O - H$
No. of π -bond = 3
 \Rightarrow II < III < I

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355. **ΓΑ**] 364. [D] N_2 , total $e^- = 14$ $Xe^{\bigoplus} = PtF_{\epsilon}^{\ominus}$ Ist noble gas compound σ1s², σ*1s², σ2s², σ*2s², π2py, σ2px², π²2pz π*2py, σ*2px, π*2pz 356. [B] \Rightarrow since σ 2px is highest occupied molecu- $\mu = \sqrt{\left(\mu_1^2 + \mu_2^2 + 2\mu_1\mu_2 \cos\theta\right)}$ lar orbital (HOMO) hence e- will be reif $\theta = 90^{\circ}$, μ maximum. moved from $\sigma 2px$ for the formation of N₂⁺ from that of N₂. 357. [A] 365. [D] As bond order of N₂, O₂, He₂, H₂ are 3, 2, In (1) hydrogen bonding decreases θ < 0, 1, respectively 600 358. [A] In (2) dipole-dipole repulsion increases θ Hydrogen bond is weak bond. > 60° 359 [A] In (3) θ remains 60° N_2 , total $e^- = 14$ Hence, the correct order is 2 < 3 < 1. σ1s², σ*1s², σ2s², σ*2s², π2py, σ2px², π²2pz 366. [B] *π**2py, *σ**2px, *π**2pz The mlecular of water consists of two hy- \Rightarrow since σ 2px is highest occipied molecudrogen atoms bonded to oxygen atom by lar orbital (HOMO) hence e- will be recovalent bonds. Because of the polar namoved from $\sigma 2px$ for the formation of N₂⁺ ture of water molecular, the water molfrom that of N_2 . ecules are held together by intermolecu-360. [C] lar hydrogen bonds. In this arrangement, If sum of total e⁻ = even each oxygen is tetrahedrally surrounded \Rightarrow species will be diamagnetic (exception) by four hydrogen atom ; two by covalent \rightarrow 16e⁻ and 10e⁻ system are paramagbond and two hydrogen bonds. netic 367. [C] 361. [D] F | S - F sp³d TBP No. of L.P. = 2368. [C] \Rightarrow asial and equitorial, two types of F – S - F bonds are present in the molecule SF₄. 362. **ΓΑ**] No. of π - bond = 4 $F - \stackrel{l}{S} - F_{sp^{3}}$ tetrahedral 369. [D] S sp³d, see-saw Since structure is not symmetrical hence bond moment can not concel each other. (B) $F \xrightarrow{} K = F sp^3d$, linear 370. [B] No. (nitric oxide) total e⁻ = 15 O = C = O sp, linear B. O. = $1/2 \begin{vmatrix} 2 & 2 \\ 2 & 2 \\ 6 & 1 \end{vmatrix} = 1/2 (6-1) = 2.5$ (C) BF₃ sp², trigonal planer PCl₅ sp³d, TBP As both are linear in shape. 363. [B] $\begin{bmatrix} \mathbf{B} \\ \mathbf{Z}n + \text{Conc HNO}_3 \rightarrow \\ Zn(\text{NO}_3)_2 + \text{NO}_2 + \text{H}_2\text{O} \\ Zn + \text{dil. HNO}_3 \rightarrow \\ Zn(\text{NO}_3)_2 + \text{N}_2\text{O} + \text{H}_2\text{O} \end{bmatrix}$ 371. [A] $(NH_4)_2SO_4 \longrightarrow NH3 + H_2SO_4$ $HNO_3 \rightarrow H_2O + NO_2 + O_2$ $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + H_2O$ $NH_4NO_3 \longrightarrow N_2O + H_2O$

| 372. | [B] | 380. | [D] | |
|--|---|---------------|---|--|
| | px – py combination is not possible | | | |
| 373. | [B] | | H-C-H | |
| | (A) H_2^- total $e^- = 3 \Rightarrow$ paramagentic | | | |
| | (B) H_2 , total $e^- = 2 \Rightarrow$ diamagnetic | | Ĩ Ĩ | |
| | (C) Π_2' total $e^- = 1 \Rightarrow$ paramagentic | | н | |
| 374. | $(D) He_2$ total $e^2 = 1 \implies paramagentic$ | | H | |
| ••• | Ethylene is a planar molecule in which car- | | No. of σ -bond = 15 | |
| | bon atom is sp ² hybridized. | 201 | No. of π -Bond = 3 | |
| 375. | [C] | 501. | | |
| | S_2 molecule is paramagnetic like O_2 as both have two unpaired electrons. | | $I + \langle I \rangle cn^3$ | |
| 376. | [D] | | ¹³ I V I SP | |
| | σ1s ² , σ*1s ² , σ2s ² , σ*2s ² , σ2p ² x, π ² 2py, π*2py | | o J – J and | |
| | π2pz, π*2pz | | I ₃ I I spou | |
| | \Rightarrow e ⁻ is removed from π *2py for mormation | 382. | [D] | |
| 277 | | | Smaller the size of ions and more the carge, more is the lattice energy. | |
| 577. | | 383. | [B] | |
| | O_2^{2-} 18(e ⁻) all e ⁻ paired | | For polyationic anions | |
| | $B_2 10 e^- \Rightarrow$ unpaired electron | | TO 1 1 | |
| | \Rightarrow Paramagnetic | | 1.5. × Ionic choraetier × $\frac{1}{\phi}$ | |
| | O_2^+ 13 e \Rightarrow unpaired e ⁻ | | $\phi \times$ size of cator | |
| | ⇒ Paramagnetic | \Rightarrow | $Be^{2+} < Mg^{2+} < Ca^{2+} < K^+$ | |
| | O_2 16 e \Rightarrow unpaired e \Rightarrow Paramagnetic | _ | (Polarsing power) BeCO ₂ > MaCO ₂ > CaCO ₂ > K ₂ CO ₂ | |
| 378. | [C] | \Rightarrow | IV > II > III > I | |
| | (A) AIF_3 (all Bonds equal ionic Bond e×,sl) | 384. | [D] | |
| | N - 2 - 1 - 1 - 1 | | Bond Angle of too species will be same | |
| | (B) F' 'F sp ³ , Pyramidal F | | have symmetrical strecture | |
| | | | F | |
| | (C) $r_{I} \sim r_{F} sp^{3} d$ | | 民_ sp ² , 120° | |
| | ' É | | F′ F | |
| | \Rightarrow axial and equitorial Bond exist so all | | CI | |
| | Bonds are not equal | | CI SP ² , 120° | |
| | (\mathbf{D}) \mathbf{D} $\mathbf{c}\mathbf{p}^2$ | 205 | | |
| | F F | 505. | [U] $KO_2 \rightarrow K^+O_2^-$ | |
| | \Rightarrow all Bond length equal | \Rightarrow | O_2^- total $e^- = 17$ | |
| | Chlorine atom in CIF, is sp ³ d hybridized. | | 2 σ1s²,σ*1s², σ2s², σ*2s², σ2pn, | |
| | hence bonds are not equal as it has dis- | | π ² 2pv π ² 2pv | |
| | | | H_{20} , H_{21} σ^{*2px} | |
| 379. | [B] | | $\pi \ge py \pi \ge pz$ | |
| | $PCI_5 \rightleftharpoons PCI_4 + PCI_2$ | | | |
| | - + 0 | | $magnetic moment = \sqrt{n + (n + 2)}$ | |
| | | | $=\sqrt{1\times 3}$ BM | |
| | | | = 1.73 BM | |
| (C): 0744-2209671, 08003899588 url : www.motioniitjee.com, 🖂 info@motioniitjee.com | | | | |

386. [C] Here, A, B, C and D are O, F, Na and Mg, \Rightarrow respectively hence the compounds formed by them are C_2A (Na₂O), DA(MgO), CB(NaF) and DB₂ (MgF₂), respectively. 393. 387. [A] 394. 121.59 388. [D] $O = \overset{\oplus}{N} = O$ \Rightarrow ō−N=O ↓ 0=[⊕]N=0 395. no. of I.P = $\frac{1}{2}$ no. of I.p. =0 no. of lp=1 396. There for $NO_2^+ > NO_2 > NO_2^-$ (Bond Agle) \Rightarrow 389. [D] 0₂, B.O=2 397. $H_2^{2,0} = 0_2^{2-}$, total e⁻ = 18 B.O. $=\frac{1}{2} \begin{bmatrix} 2 & 2 \\ 2 & 2 \\ 6 & 4 \end{bmatrix} = \frac{1}{2} (6-4) = \frac{1}{2} \times 2 =$ (1) $\bar{O}-\bar{O}=O^{B.O.}=\frac{\text{Total w.of Bond}}{\text{Total }\sigma \text{ Bond}}$ $=\frac{3}{2}=1.5$ 02 0₂²⁻ 03 B.O. (2) (1) (1.5)398. B.O. $\times \frac{1}{BI}$ \Rightarrow $O_2^{2-} > O_3 > O_2$ (B.I.) \Rightarrow $H_2O_2 > O_3 > O_2$ (Bond length) \Rightarrow 390. [A] 391. [B] As bond length \propto 1/bond order Bond length is inversely proportional to \Rightarrow bond order. 399. Bond order in $NO^+ = 3$ Bond order in NO = 2.5Hence, bond length in $NO > NO^+$ 392. [D] 400. As Bond strength × Bond order O_2 , Total $e^- = 16 \Rightarrow B.O. = 2$ O_2^{-} Total e⁻=17 \Rightarrow B.O. = 1.5 O_2^{2-} , Total e⁻= 18 \Rightarrow B.O. = 1

[C] Correct order of dipole moments $CH_4 < CHCl_3 < CH_2Cl_2 < CH_3Cl_3$ [A] sp³ sp³ sp³ $Q_4 > O_2 > Q_3 > Q_1$ **[B]** Hydration energy ∞ polarising power $Na^{+} < Mg^{2+} < Mg^{3+} < Be^{3+} < Al^{3+}$ **ΓΑ**] In frame test thermal excitation deexcitation takes place in cation with low Ionisation potential [D] (I) $CI \sim CI \sim CI$ sp³, (II) $H \sim N \sim H$ sp³ \overline{O} sp³ (IV) O = CI = O sp³ sp³ [C] sp³ $BF_3 > PF_3 > CIF_3$ [A] Order of B.P. $H_2O>SbH_3>NH_3>AsH_3>PH_3$ V > IV > I > II > III(Order of Boiling points) [AC] $KO_2 _ \Delta \ K_2O + \frac{1}{2}O_2$

 O_2^+ , Total e⁻= 15 \Rightarrow 15 \Rightarrow 8.0. = 2.5

 $0_2^+ > 0_2^- > 0_2^- > 0_2^{2-}$

(Order of Bond strength)

$$KO_2 + H_2O \xrightarrow{0^\circ C} KOH + O_2$$



405. [A] $O(g) + 2e^{-} \rightarrow O^{2^{-}}(g), \Delta H = 603 \text{ kJ mol}^{-1}(i)$ $O(g) + e^{-} \rightarrow O^{-}(g), \Delta H = -141 \text{ kJ mol}^{-1}$ (ii) Equation (i) and (ii) gives : $O^{-} + e^{-} \rightarrow O^{2^{-}}(g), \Delta H = 603 - (-141)$

 $= 744 \text{ kJ mol}^{-1}$

406. [B] 407. [A]

Radii of anions carrying same charge decrease from left to right in a period and increase down the group.

408. [B]

$$A \rightarrow Ca(OH)_{2}$$

$$Lime water$$

$$Ca(OH)_{2} + CO_{2} \rightarrow CaCO_{3} + H_{2}O$$

$$Lime water$$

$$C \rightarrow CaCO_{3}$$

$$Ca(OH)_{2} + Na_{2}CO_{3} \rightarrow CaCO_{3} + NaOH$$

$$C \rightarrow CaCO_{3} + NaOH$$

409. [D]

As HF is not stronger acid than HCl because fluorine is more electronegative than chlorine therefore hydrogen does not donate easily in than in HCl.

410. [D]

411. [B]

As bond dissociation energy decreases in the order :

 $Cl_{2} > Br_{2} > F_{2} > I_{2}$

- 412. [D]
- 413. [B]

As the correct order of ionization energy is Li < B < Be < C

414. [B]

Both B and D have exactly half - filled configuration, but B has smaller size than D, hence it has higher I.E.

415. [C]

416. [C]

Nitrogen, being smallest in size, can given up its lone pair of electrons most easily.

417. [A]

Lattice energy $\alpha \frac{1}{r^+ + r^-}$

418. [D]

 IE_1 of Mg is higher than that of Na because of increased nuclear charge and also that of Al because in Mg a 3 s-electron has to be removed while in Al it is the 3pelectron. The IE_1 of Si is, however, higher than those of Mg and Al because of it increased nuclear charge. Hence, the order is

Na < Mg > Al < Si

419. [A]

Si and P are in the 3rd period while C and N are in the 2nd period. Elements in 2nd period have higher electronegativities than those in the 3rd period. Since N has msaller size and hgiher nuclear charge than C, its electronegativity is higher than that of Si. Thus, the order is Si, P, C, N.

420. [C]

 $\begin{array}{l} \mathsf{Ca}+\mathsf{H}_2\mathsf{O}\to\mathsf{Ca}(\mathsf{OH})_2+\mathsf{H}_2\mathsf{O}\\ \mathsf{CaH}_2+\mathsf{H}_2\mathsf{O}\to\mathsf{Ca}(\mathsf{OH})_2+\mathsf{H}_2\\ \mathsf{hydroith} \end{array}$

421. [D]

Like dissolues like as acetone has high covalent character dissoluves relatively covalent compound.

422. [AB]

Weak metallic bond as due to poor shielding of d & f orbital its ionisation energy became high & kernel formation becomes difficult.

423. [D]

It is because of the electronic repulsion.

424. [C]

As in (III) the correct order of increasing the first ionization enthalpy is B < C < O < N.

425. [A]

As acidic nature increases left to right in a period with increases in electronegativity.

426. [B]

Electron affinity =

 $\frac{\text{Energy released x N}_{0}}{\text{Number of atom ionized}}$

$$=\frac{4.8\times10^{-13}\times6.023\times10^{23}}{10^6}$$

$$= 28.9104 \times 10^4 \text{ J} = 289 \text{ kJ}.$$

427. [C]

Chlorine being the group 17 element has maximum electronegativity. 'N' has zero electron affinity because extra stability is associated with exactly half - filled orbitals. Sulphur has more electron affinity than 'O' because the effect of small size of O atom is more than by the repulsion of electron already present in 2p-orbitals of O atom. 428. [B]

429. [A]

430. [A]

As ionization energy decreases with the increases in number of orbits or down the group.

431. [A]

KMnO₄ acts as self indicator.

432. [D]

Since fluorine atom has a smaller size than iodine, it has greater electron attracting power and so it is a better oxidizing agent.

433. [B]

434. [D] $Cu^{2+} \rightarrow blue$ $CruO_4^{2-} \rightarrow yellow$

435. [A]

436. [A]

 $\text{Cl} + \text{e}^{-} \rightarrow \text{Cl}^{-} + 3.7 \text{ eV}$

35.5 3.7×23.06 kcal

As energy released for conversion of 4 g gaseous chlorine into CI^- ions.

$$= \frac{3.7 \times 23.06}{35.5} \times 4 = 9.6 \text{ kcal}$$

437. [D]

 $E_1 : E_2 n = 0.475 : 1$ Using the proportinally constant k, $E_1 k + E_2 k = 2226 \text{ kJ mol.}$ While, $E_1 k / E_2 k = 0.475/1.$ On solving.

 $E_2 k = 2226 \times 1/1.475 = 1509 \text{ kJ/mol.}$

438. [D]

Half-filled $2p^3$ subshell of O⁺ is more stable than $2p^4$ subshell of F⁺ So IE₂ of O will be greater than that of F⁺.

439. [D]

 Mg^{+2} has electronic configuration $1s^2 \ 2s^22p^6;$ no unpaired electrons

 $_{^{22}}\text{Ti}^{_{3+}}$ has electronic configuration (Ar) $3d^{_1}$; one unpaired electron.

 $V^{\rm 3+}$ has electronic configuration (Ar) $3d^2$; two unpaired electrons.

 Fe^{2+} has electronic configuration (Ar) $3d^6$; four unpaired electrons .

(D) K₂SO₄.H₂(SO₄)₃. 24H₂O \downarrow \downarrow \Rightarrow Unpaired unpaired $e^{-} = 0$ e⁻ = 0 \Rightarrow Co(NO₃)₂ would be compond. 444. [B] for Cr³⁺ \Rightarrow H₂O acts as SFL. \Rightarrow [Cr(H₂O)₆]³⁺ has highest SFL 445. [B] +2 +4 $MnSO_4 \rightarrow MnO_2$ There is transfer of two electrons Molecular mass Eq.mass = Number of electrons transferred= Molecularmass 2 146. [D] Formula of the complex salt is $[Pt(NH_3)_4CI]CI_3$ $[Pt(NH_3)_4CI]CI_3 \leftrightarrow [Pt(NH_3)_4CI]^+ + 3CI^-$ Total ion = 4147. [B] Ag⁺ has d¹⁰ configuration with no unpaired electron. 148. [B] Fe²⁺ has d⁶ configuration and is expected to be most paramagnetic with four unpaired electrons. 149. [B] (MA₅B) will not show geometrical isomerism. 450. [B] The coordination entity has four chloride ions, 451. [B] [NiCl₄]²⁻ \Rightarrow Ni²⁺ 4s⁰, 3d⁸ 111111 3d 4s 4p \Rightarrow Hyb sp³, tetrahedral [Ni(CN)₄]²⁻ Ni²⁺ 4s⁰, 3d⁸ $CN \rightarrow SFL$

 \Rightarrow Hyb dsp² sq. planer Primary valency = 0.5 of transition metal Secondary valency = C.N. of T.M.

452. [A]

(A) $[Co(NH_3)_6]Cl_3 \rightarrow [Co(NH_3)_6]^{3+} + 3Cl^{-1}$ Total ion = 4 $[Pt(NH_3)_5]Cl_3 \rightarrow Total ion = 4$ (B) $[Co(NH_3)_6]Cl_3$ Total ion = 4 [Pt(NH₂)₂Cl₂]Cl Total ion = 2 $(C) [Co(NH_3)_5CI]Cl_2$ Total ion = 3 $[Pt(NH_3)_6]Cl_4$ total ion = 5(D) $[Co(NH_3)_4Cl_2]Cl$ Total ion = 2 $[Pt(NH_3)_4Cl_2]Cl_2$ Total ion = 3 Same no, of ion = same electrical conductance.

453. [B]

 $C_2O_4^{2-}$ is ligand and a chelating ligand and hence most stable complex compound would be formed in can $C_2O_4^{2-}$.

454. [C]

More than value of K, more forward the reaction would be indicating the strong nature of ligand

455. [B]

 $[Cr(NH_3)_4Cl_2]^+$ has POS will be optically inactive

456. [B]

 $[Cr(H_2O)_6]^{3+}$ $Cr \rightarrow 4s^1 \ 3d^5$ $Cr^{3+} \rightarrow 3d^3 \ 4s^0$ $\Rightarrow \text{ No. of unpaired electron} = 3$

457. [A]

 $[Pt(NH_3)_5Br]Br_3 \rightarrow [Pt(NH_3)_5Br]^{3+} + 3Br^{-}$ Total no. of ion produced = 4

458. [C]

Value of stability constant α strength of the ligand \Rightarrow CN⁻ would be strongest ligand

459. [D]

 $\mu_{spin} = 4.9$

 $\Rightarrow \sqrt{n(n+2)} = 4.9 \Rightarrow n = 4$ \Rightarrow unpaired electron (A) $[Fe(CN)_{\epsilon}]^{3-} \Rightarrow Fe^{3+} 4s^0 3d^5$ unpaired = 1(B) $[Fe(H_2O)_6]^{3+} \Rightarrow Fe^{3+}$ 3d⁵ unpaired electron = 5(C) $[Fe(CN)_6]^{4-} \Rightarrow Fe^{3+}$ 3d⁶ unpaired electron = 0(D) $[Fe(H_2O)_{\epsilon}]^{2+} \Rightarrow Fe^{3+}$ 3d 4s 4p unpaired electron = 4 $\mu_{spin} = 4.9 \text{ BM}$ 460. [A] M.M. = 1.73 BM $\Rightarrow \sqrt{n(n+2)} = 1.73$ \Rightarrow n = 1 (A) $[Mn(CN)_{6}]^{4-}$ $\Rightarrow M^{2+}$ 3d⁵ unpaired electron = 1(B) $[Co(NH_2)_6]^{3-1}$ $\Rightarrow Co^{2+}$ 3d⁶ unpaired electron = 0(C) [MnF₆]³⁻ \Rightarrow Mn³⁺ $\uparrow \uparrow \uparrow \uparrow$ 3d 4s 4p unpaired electron = 4

461. [C]

Noble metal blue Au, Pt, Ir are not effect by conc HNO_3 or conc H_2SO_4 they are only affected by aqua regia. Au is used in photography (present in photograph) Ag + AuCl₃ \rightarrow AgCl + Au

462. [B]

463. [A]

 d^{5} 1 1 1 1 1 with SFL, unpaired e = 1 with WFW, unpaired e = 5 (B) 1 1 1 1 SFL or WFL, no unpaired e = 2 (C) d^{6}

with SFL unpaired e= 0(D) correct as in care of d^{A} , to d^{7} , no. of ungain evhor depar upon the nature of hige



(II) it occurs by partial or complete excuauge of liqaud between two coordiuation spuare,

(III) diff ion produced by dissoling the isomers in water

480. [C]

 $KMnO_4 + HCI \longrightarrow KCI + MnCI_2 + H_2O + CI_2$ (green yellow gan)

- 481. [B]
- 482. [A]
- 483. [B]
- 484. [D]
- 485. [C]
- 486. [B]



487. С

 $N_2O_5(s)$ exist as $[NO_2]^+[NO3]^-$

488. В

 $30_{3} \rightarrow 20_{3} \Delta_{r}$ H is positive and Δ_{r} S is negative therefor the formations of ozone from $O_2(g)$ is a non spontaneous process.

By the application of UV or electrical discharge the formation of atomic oxygen occur from gaseous oxygen Which initiate the formation of ozone.

$$\begin{array}{c} O_2(g) & \xrightarrow{hv} & 2O(g) \\ O_2(g) + O(g) & \longrightarrow & O_3(g) \end{array}$$

- 489. [A]
- 490. [C]

If NH₄OH is used Mn²⁺ is precipitated as MnO₂

- 491. [C] (A) is correct but (R) is incorrect $Fe^{3+}+Fe(CN)_{6}^{4-} \rightarrow prussian blue$ $Fe^{2+}+Fe(CN)_6^{3-} \rightarrow Turnsbull's blue$
- 492. [A]
- 493. [B]

Around the atomic number 25 the 4s orbital has higher energy than 3d orbital.



- 494. [C]
- 495. **[B]**
- 496. [C]
- 497. [B]

Due to itching of glass it can not be stored in glass vessel

 $4HF + SiO_2 \longrightarrow SiF4 + 2H_2O$

498. [A]

In Alkali metal bicrbonates intermolecular hydrogen bonding involed and therefore more energy is required to dissociate metal bicrbonate lattice by H₂O.

499. [D]

 $PF_2CI_3 \longrightarrow sp^3d$ hybridized \longrightarrow T.B.P. geometry.

sbp + O lb = 5



F-II period P-Cl B.L. > P-F. B.L. Cl - IIIr^d period

500. [A]



More acidic

due to availability of vacant d-orbital

$$H_3C$$

 H_3C
 H_3C
 H_3C
 C
 OH No back bondding

Does not act as Lewis acid due to nonavailability of vacant orbital.

