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KARNATAKA PUE PUC–I

FOR MARCH 2019 EXAMINATION

CHEMISTRY

Published by :
OSWAAL BOOKS
1/11, Sahitya Kunj, M.G. Road, Agra-282002 (UP) India
0562-2857671, 2527781
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Latest Syllabus
(Issued by Department of PUE, Karnataka)
BLOW UP SYLLABUS
I PUC CHEMISTRY - Code No. 34

Column1	Column2	Column3	Column4	Column42	Column5	Column6
SUBJECT	**CHEMISTRY**	**CODE–34**	**DEPARTMENT OF P U EDUCATION**		**ACADEMIC PROGRAM FOR THE YEAR 2018-19**	
	CLASS	**I PUC**	*PUC (4 THEORY + 2 PRACTICE HOURS A WEEK)*	***PRACTICE SESSIONS***	PRACTICALS (1 CLASS OF 2 HOURS DURATION PER WEEK PER BATCH	
DAY	DATE	DAY				
DAY 1	02-May-18	WEDNESDAY				
DAY 2	3-May-18	THURSDAY				
DAY 3	04-May-18	FRIDAY				
DAY 4	5-May-18	SATURDAY				
DAY 5	06-May-18	SUNDAY				
DAY 6	7-May-18	MONDAY				
DAY 7	08-May-18	TUESDAY				
DAY 8	9-May-18	WEDNESDAY				
DAY 9	10-May-18	THURSDAY				
DAY 10	11-May-18	FRIDAY				
DAY 11	12-May-18	SATURDAY				
DAY 12	13-May-18	SUNDAY				
DAY 13	14-May-18	MONDAY	BRIDGE COURSE			
DAY 14	15-May-18	TUESDAY	BRIDGE COURSE			
DAY 15	16-May-18	WEDNESDAY	BRIDGE COURSE			
DAY 16	17-May-18	THURSDAY	BRIDGE COURSE			
DAY 17	18-May-18	FRIDAY				
DAY 18	19-May-18	SATURDAY				
DAY 19	20-May-18	SUNDAY				

DAY 20	21-May-18	MONDAY	Some Basic concepts of Chemistry : General introduction: Importance and scope of chemistry, nature of matter-classification, homogeneous and heterogeneous mixtures – examples, concept of elements, atoms, molecules and compounds			
DAY 21	22-May-18	TUESDAY	Properties of matter and their measurement: seven basic physical quantities, their SI units and scientific notation (exponential notation). Laws of chemical combinations, with suitable examples.			
DAY 22	23-May-18	WEDNESDAY	Dalton's atomic theory – postulates. Atomic and molecular masses: Atomic mass, amu (value of 1amu), average atomic mass with an example, molecular mass, examples, formula mass – NaCl as example			
DAY 23	24-May-18	THURSDAY	Mole concept and molar mass			
DAY 24	25-May-18	FRIDAY		PRACTICE SESSIONS		
DAY 25	26-May-18	SATURDAY		PRACTICE SESSIONS		
DAY 26	27-May-18	SUNDAY				
DAY 27	28-May-18	MONDAY	Avogadro constant, mole and molar mass – examples			
DAY 28	29-May-18	TUESDAY	Percentage composition, empirical formula and molecular formula- numerical problems			
DAY 29	30-May-18	WEDNESDAY	Stoichiometry and calculations based on stoichiometry –numerical problems to calculate amount of reactants/ products formed (in terms of mole and mass in grams) by giving balanced equations			
DAY 30	31-May-18	THURSDAY	Limiting reagent –numerical problems. Reactions in solutions: concentration terms			

DAY 31	01-Jun-18	FRIDAY		PRACTICE SESSIONS	**Unit-1:** Basic Laboratory equipments and procedure 1.1 Study of Bunsen Burner 1.2 Some basic laboratory techniques - Glass	
DAY 32	2-Jun-18	SATURDAY		PRACTICE SESSIONS		
DAY 33	03-Jun-18	SUNDAY				
DAY 34	4-Jun-18	MONDAY	Concentration terms: mass %, mole fraction, morality, molarity. Numerical problems.			
DAY 35	05-Jun-18	TUESDAY	**Unit 2 :** Structure of Atom Discovery of electron – name of the discoverer, characteristics of cathode rays,values of charge and mass.			
DAY 36	6-Jun-18	WEDNESDAY	Discovery of proton - characteristics of canal rays,values of charge and mass. Discovery of neutron- name of the discoverer, value of charge and mass.			
DAY 37	07-Jun-18	THURSDAY	Atomic number, mass number, isotopes, isobars, problems		1.1 Study of Chemical Balance 1.2 Preparation of 0.1M standard solution	
DAY 38	8-Jun-18	FRIDAY		PRACTICE SESSIONS		
DAY 39	09-Jun-18	SATURDAY		PRACTICE SESSIONS		
DAY 40	10-Jun-18	SUNDAY				
DAY 41	11-Jun-18	MONDAY	**Atomic models :** Thomson atomic model and its limitations. Mention the observations and conclusions of α - ray scattering experiment. Rutherford atomic model and its limitations(based on Maxwell electromagnetic theory)			
DAY 42	12-Jun-18	TUESDAY	Electromagnetic radiations – c, , , , their relationships, electromagnetic spectrum, particle nature of EMR (E = hν), line spectrum of hydrogen, formula to calculate of spectral lines in hydrogen – numerical problems.			

DAY 43	13-Jun-18	WEDNESDAY	Bohr's model-postulates and its limitations, concept of shells and subshells		**Unit-2 :** Purification and Criteria of purity 2.1 Purification of compounds by Crystallization 2.2 Determination of melting point 2.3 Determination of boiling point	
DAY 44	14-Jun-18	THURSDAY	Dual nature of matter and light, de-Broglie relationship – numerical problems. Heisenberg uncertainity principle and its mathematical form.			
DAY 45	15-Jun-18	FRIDAY		PRACTICE SESSIONS		
DAY 46	16-Jun-18	SATURDAY	RAMZAN			
DAY 47	17-Jun-18	SUNDAY				
DAY 48	18-Jun-18	MONDAY		PRACTICE SESSIONS		
DAY 49	19-Jun-18	TUESDAY	Concept of orbitals, nodal surfaces or nodes.Calculation of total number of nodes, angular nodes and radial nodes, Quantum numbers.		**Unit-3 :** Study of Chemical Equilibria 3.1 Study of shift in equilibrium between ferric ions and thiocyanate ions 3.2 Study of shift in equilibrium between $[Co(H_2O)_6]^{2+}$ and Cl^- ions	
DAY 50	20-Jun-18	WEDNESDAY	Shapes of s, p, d orbitals, rules for filling electrons in orbitals- (n + l) rule, Aufbau principle			
DAY 51	21-Jun-18	THURSDAY	Pauli exclusion principle, Hund's rule. Electronic configuration of atoms (1 to 36). Stability of half filled and completely filled orbitals.			
DAY 52	22-Jun-18	FRIDAY	**Unit 3 :** Classification of Elements and Periodicity in Properties : Significance of classification, brief history of development of periodic table – law of triads with an example, law of octaves			
DAY 53	23-Jun-18	SATURDAY		PRACTICE SESSIONS		
DAY 54	24-Jun-18	SUNDAY				
DAY 55	25-Jun-18	MONDAY		PRACTICE SESSIONS		

DAY 56	26-Jun-18	TUESDAY	Mendeleev periodic law – statement, Henry moseley observation based on X-ray spectra of elements, modern periodic law, long form of periodic table			
DAY 57	27-Jun-18	WEDNESDAY	Brief account of groups, periods, s, p, d and f blocks, Nomenclature of elements with atomic number greater than 100. Periodic trends in properties of elements with reason: atomic radii, inert gas radii, ionic radii. Compare radius of cation and anion with parent atom ,with reason.		**Unit-4 :** pH and pH changes in aqueous solutions 4.1 Determination of pH of fruit juices 4.2(a) Determination of change in pH of HCl solution on dilution 4.2 (b) Determination of change in pH of NaOH solution	
DAY 58	28-Jun-18	THURSDAY	Variation of radii of isoelectronic species, ionisation enthalpy, exception in first ionization enthalpy of N and O, with reason.			
DAY 59	29-Jun-18	FRIDAY	Electron gain enthalpy, compare $\Delta_{eg}H$ of some main group elements i.e. Gp1, Gp16, Gp17(F and Cl with reason). Electroneg-ativity. Valence – periodicity of valence or oxidation states (s and p block elements).			
DAY 60	30-Jun-18	SATURDAY		PRACTICE SESSIONS		
DAY 61	01-Jul-18	SUNDAY				
DAY 62	2-Jul-18	MONDAY		PRACTICE SESSIONS	4.3 (a) Determination of change in pH of acetic acid solution on the addition of sodium acetate 4.3 (b) Determination of change in pH of ammonium hydroxide solution on the addition of NH_4Cl	
DAY 63	03-Jul-18	TUESDAY	**Unit 4 :** Chemical bonding and molecular structure • KOSSEL - LEWIS approach to chemical bonding, Lewis symbols, significance of Lewis symbols. • Electrovalent bond and electrovalance			
DAY 64	4-Jul-18	WEDNESDAY	• Octet rule, covalent bond Lewis representation of simple molecules (the Lewis structures), Formal charge. Limitations of octet rule.			

DAY 65	05-Jul-18	THURSDAY	• Ionic or electrovalent bond, Lattice enthalpy, Bond parameters 1. Bond length, 2. Bond angle, 3. Bond order 4. Bond enthalpy 5. Resonance structures			
DAY 66	6-Jul-18	FRIDAY	Polarity of Bonds, dipole movements, VSEPR Theory			
DAY 67	07-Jul-18	SATURDAY		PRACTICE SESSIONS		
DAY 68	8-Jul-18	SUNDAY				
DAY 69	09-Jul-18	MONDAY		PRACTICE SESSIONS		
DAY 70	10-Jul-18	TUESDAY	Geometry of molecules in which central atom has no lone pair of electrons Geometry of some simple molecules / ions with central ions having one or more lone pair of electrons			
DAY 71	11-Jul-18	WEDNESDAY	Shapes of molecules containing bond pair and lone pair of electrons.Valence bond theory		4.4 Study of variation in pH during titration of a strong acid by a strong base 4.5 Determination of pH of solutions of salts	
DAY 72	12-Jul-18	THURSDAY	Orbital overlap concept Directional properties of bonds Overlapping of atomic orbitals Types of overlaping and nature of covalent bonds *i.e.* sigma and pi Bonds and their strengths.			
DAY 73	13-Jul-18	FRIDAY	Hybridisation Salient features of hybridi-sation **Types of hybridisation :** 1. Sp hybridisation, example of molecule having Sp hybridisation ($BeCl_2$) 2. Sp^2 hybridisation,example of molecule having Sp^2 hybridisation. (BCl_3)			
DAY 74	14-Jul-18	SATURDAY		PRACTICE SESSIONS		
DAY 75	15-Jul-18	SUNDAY				

DAY 76	16-Jul-18	MONDAY		PRACTICE SESSIONS		
DAY 77	17-Jul-18	TUESDAY	3. Sp^3 Hybridisation, example of molecules having Sp^3 hybridisation, CH_4, NH_3 and H_2O Other examples of Sp^3, Sp^2 and Sp hybridisation Hybridisation of elements involving d orbitals. Formation of PCl_5 (Sp^3d hybridisation)			
DAY 78	18-Jul-18	WEDNESDAY	Formation of SF_6 (Sp^3d^2 hybridisation)Molecular orbital theory Formation of molecular orbitals, Linear combination of atomic orbitals			
DAY 79	19-Jul-18	THURSDAY	I TEST			
DAY 80	20-Jul-18	FRIDAY	I TEST			1 TEST
DAY 81	21-Jul-18	SATURDAY	I TEST			
DAY 82	22-Jul-18	SUNDAY				
DAY 83	23-Jul-18	MONDAY	Condition for combination of atomic orbitals, types of molecular orbitals. Electronic configuration and molecular behaviour. Stability of molecules, bond order, nature of the bond length, magnetic nature,		**Unit-5 :** Titrimetric Analysis 1. Determination of concentration of NaOH solution using standard Oxalic acid solution	
DAY 84	24-Jul-18	TUESDAY	Bonding in some homonuclear diatomic molecules, examples H_2, He_2, Li_2, C_2 and O_2 molecule. Hydrogen bondingcause of formation of hydrogen bond Types of hydrogen bond.			
DAY 85	25-Jul-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 86	26-Jul-18	THURSDAY		PRACTICE SESSIONS		
DAY 87	27-Jul-18	FRIDAY	**Unit 12 :** Some basic principles and techniques. Tetravalence of carbon. Shapes of organic compounds. Some characteristic features of pi bonds. Structural representation of organic compounds. 3-D representation of organic molecules.			

DAY 88	28-Jul-18	SATURDAY	Classification of organic compounds Acyclic, Alicylic, Aromatic, Benzenoid and non Benzenoid compounds. Heterocyclic aromatic compounds. Functional groups, homologous series.			
DAY 89	29-Jul-18	SUNDAY				
DAY 90	30-Jul-18	MONDAY	IUPAC Nomenclature			
DAY 91	31-Jul-18	TUESDAY	Nomenclature of organic compounds having functional groups.		5.1 Preparation of a standard solution of anhydrous sodium carbonate 5.2 Standardisation of HCl solution using standard Na_2CO_3 solution	
DAY 92	1-Aug-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 93	02-Aug-18	THURSDAY		PRACTICE SESSIONS		
DAY 94	3-Aug-18	FRIDAY	Nomenclature of substituted Benzene compounds. Isomerism. Types of Isomerism. Structural isomerism and stereo isomerism			
DAY 95	04-Aug-18	SATURDAY	Fundamental concepts in organic reaction mechanism. Homolytic cleavage and heterolytic cleavage of covalant bond.Nucleophiles and electrophiles electron movement in organic reactions			
DAY 96	5-Aug-18	SUNDAY				
DAY 97	06-Aug-18	MONDAY	Electron displacement effects in covalant bonds. Inductive effect, resonance structures, resonance effect.			
DAY 98	7-Aug-18	TUESDAY	Electromeric effect, hyperconjugation. methods of purification of organic compounds Sublimation, crystallisation, distillation		Systematic Qualitative Analysis of simple inorganic salts	
DAY 99	08-Aug-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 100	9-Aug-18	THURSDAY		PRACTICE SESSIONS		
DAY 101	10-Aug-18	FRIDAY	Differential extraction and chromato graphy. Qualitative analysis of organic compounds 1. Detection of Carbon and Hydrogen			

DAY 102	11-Aug-18	SATURDAY	Detection of other elements : test for Nitrogen, Sulphur, Halogens and Phosporus.			
DAY 103	12-Aug-18	SUNDAY				
DAY 104	13-Aug-18	MONDAY	Quantitative Analysis 1. Carbon and Hydrogen. 2. Nitrogen by Dumes method			
DAY 105	14-Aug-18	TUESDAY	Nitrogen by Kjeldahl's method 3. Halogens, Sulphur, Phosporus and Oxygen		Systematic Qualitative Analysis of simple inorganic salts	
DAY 106	15-Aug-18	WEDNESDAY	INDEPENDENCE DAY			
DAY 107	16-Aug-18	THURSDAY		PRACTICE SESSIONS		
DAY 108	17-Aug-18	FRIDAY		PRACTICE SESSIONS		
DAY 109	18-Aug-18	SATURDAY	**Unit 5 : States of matter** Intermolecular forces 1. Dispersion forces or London forces. 2. Dipole-Dipole forces 3. Dipole-induced Dipole forces			
DAY 110	19-Aug-18	SUNDAY				
DAY 111	20-Aug-18	MONDAY	4. Hydrogen bond 5. Thermal energy 6. Intermolecular forces versus thermal energy. The Gaseous State The Gas Laws: 1. Boyle's Law			
DAY 112	21-Aug-18	TUESDAY	2. Charle's Law 3. Gay Lussac's Law 4. Avagadro Law STP Conditions		Systematic Qualitative Analysis of simple inorganic salts	
DAY 113	22-Aug-18	WEDNESDAY	BAKRID			
DAY 114	23-Aug-18	THURSDAY	Ideal Gas equation Universal Gas constant Calculation of value of R in SI Units. Combined gas law Relation between Density and molar mass of a gaseous substance			
DAY 115	24-Aug-18	FRIDAY		PRACTICE SESSIONS		

DAY 116	25-Aug-18	SATURDAY		PRACTICE SESSIONS		
DAY 117	26-Aug-18	SUNDAY				
DAY 118	27-Aug-18	MONDAY	Dalton's Law of partial pressures, Partial pressure in terms of Mole Fraction, Kinetic molecular theory of gases.			
DAY 119	28-Aug-18	TUESDAY	**Behaviour of Real Gases:** Deviation from Ideal gas behaviour. Van der waals equation, Compressibility factor, Boyle Temperature or Boyle point		Systematic Qualitative Analysis of simple inorganic salts	
DAY 120	29-Aug-18	WEDNESDAY	Liquifaction of gases, Isotherms of CO_2 at various temperatures. Critical Temperature, critical volume, critical pressure. Liquid state, vapour pressure, Normal Boiling point and standard boiling point.			
DAY 121	30-Aug-18	THURSDAY	Surface tension and Viscosity. Numericals			
DAY 122	31-Aug-18	FRIDAY		PRACTICE SESSIONS		
DAY 123	01-Sep-18	SATURDAY		PRACTICE SESSIONS		
DAY 124	2-Sep-18	SUNDAY				
DAY 125	03-Sep-18	MONDAY	Numericals			
DAY 126	4-Sep-18	TUESDAY	Topic - Thermodynamics Introduction, thermodynamic terms, types of systems, State of a system, State functions, Types of Thermodynamic processes		Systematic Qualitative Analysis of simple inorganic salts	
DAY 127	05-Sep-18	WEDNESDAY	Internal energy (U), Types of energy changes - Work, Heat. First law of thermodynamics, mathe-matical formula-tion of the law			
DAY 128	6-Sep-18	THURSDAY	Expressions for mechanical work done in isothermal compression and isothermal expansion of an ideal gas, Problems			
DAY 129	07-Sep-18	FRIDAY		PRACTICE SESSIONS		
DAY 130	8-Sep-18	SATURDAY		PRACTICE SESSIONS		
DAY 131	09-Sep-18	SUNDAY				

DAY 132	10-Sep-18	MONDAY	MID TERM EXAMINATION			
DAY 133	11-Sep-18	TUESDAY	MID TERM EXAMINATION			
DAY 134	12-Sep-18	WEDNESDAY	MID TERM EXAMINATION			
DAY 135	13-Sep-18	THURSDAY	GANESH CHATURTHI			
DAY 136	14-Sep-18	FRIDAY	MID TERM EXAMINATION			
DAY 137	15-Sep-18	SATURDAY	MID TERM EXAMINATION			MID TERM
DAY 138	16-Sep-18	SUNDAY				
DAY 139	17-Sep-18	MONDAY	MID TERM EXAMINATION			
DAY 140	18-Sep-18	TUESDAY	MID TERM EXAMINATION			
DAY 141	19-Sep-18	WEDNESDAY	MID TERM EXAMINATION			
DAY 142	20-Sep-18	THURSDAY	MID TERM EXAMINATION			
DAY 143	21-Sep-18	FRIDAY	LAST DAY OF MOHARRUM			
DAY 144	22-Sep-18	SATURDAY	Thermochemical reactions, enthalpy, relation between enthalpy change and internal energy change, Extensive and intensive properties			
DAY 145	23-Sep-18	SUNDAY				
DAY 146	24-Sep-18	MONDAY	Heat capacity, Relation between C_p and C_v, Measurement of heat changes at constant volume and constant pressure by calorimeter experiments.			
DAY 147	25-Sep-18	TUESDAY	Enthalpy change of a reaction, enthalpy changes during phase transformation, Standard Enthalpy of formation		Systematic Qualitative Analysis of simple inorganic salts	
DAY 148	26-Sep-18	WEDNESDAY	Thermochemical equations, Hess's law, Enthalpies of different types of reactions			
DAY 149	27-Sep-18	THURSDAY		PRACTICE SESSIONS		
DAY 150	28-Sep-18	FRIDAY		PRACTICE SESSIONS		
DAY 151	29-Sep-18	SATURDAY	Problems on the above enthalpies			
DAY 152	30-Sep-18	SUNDAY				
DAY 153	01-Oct-18	MONDAY	Lattice enthalpy, Born-Haber's cycle, Enthalpy diagram for Lattice enthalpy of sodium chloride			
DAY 154	2-Oct-18	TUESDAY	MAHATMA GANDHI JAYANTHI			

DAY 155	03-Oct-18	WEDNESDAY	Spontaneity, enthropy, Gibbs energy, Gibbs equation		Systematic Qualitative Analysis of simple inorganic salts	
DAY 156	4-Oct-18	THURSDAY	Gibbs energy change and equilibrium, Second law of thermodynamics and problems			
DAY 157	05-Oct-18	FRIDAY		PRACTICE SESSIONS		
DAY 158	6-Oct-18	SATURDAY		PRACTICE SESSIONS		
DAY 159	07-Oct-18	SUNDAY				
DAY 160	8-Oct-18	MONDAY	MAHALAYA AMMAVASYA			
DAY 161	09-Oct-18	TUESDAY	**Topic- Equilibrium** Introduction, Equilibrium in physical processes		Systematic Qualitative Analysis of simple inorganic salts	
DAY 162	10-Oct-18	WEDNESDAY	Equilibrium in chemical processes - Dynamic Equilibrium, Equilibrium constant (K_C)			
DAY 163	11-Oct-18	THURSDAY	Problems in Equilibrium constant, homogenous equilibrium			
DAY 164	12-Oct-18	FRIDAY	Equilibrium constant in gaseous systems (K_P), Relation between K_P and K_C, Problems			
DAY 165	13-Oct-18	SATURDAY		PRACTICE SESSIONS		
DAY 166	14-Oct-18	SUNDAY				
DAY 167	15-Oct-18	MONDAY				
DAY 168	16-Oct-18	TUESDAY				
DAY 169	17-Oct-18	WEDNESDAY				
DAY 170	18-Oct-18	THURSDAY	MAHANAVAMI			
DAY 171	19-Oct-18	FRIDAY	VIJAYADASHMI			
DAY 172	20-Oct-18	SATURDAY				
DAY 173	21-Oct-18	SUNDAY				MID TERM
DAY 174	22-Oct-18	MONDAY				VACATION
DAY 175	23-Oct-18	TUESDAY				
DAY 176	24-Oct-18	WEDNESDAY	VALMIKI JAYANTHI			
DAY 177	25-Oct-18	THURSDAY				

DAY 178	26-Oct-18	FRIDAY				
DAY 179	27-Oct-18	SATURDAY				
DAY 180	28-Oct-18	SUNDAY				
DAY 181	29-Oct-18	MONDAY		PRACTICE SESSIONS		
DAY 182	30-Oct-18	TUESDAY	Heterogenous Equilibrium, applications of Equilibrium constant, Reaction quotient (Q), predicting the direction of reaction, calculation of Equilibrium constant			
DAY 183	31-Oct-18	WEDNESDAY	Relation between Equilibrium constant, reaction quotient, Gibb's energy, Problems		Systematic Qualitative Analysis of simple inorganic salts	
DAY 184	1-Nov-18	THURSDAY	KANNADA RAJYOTHSAVA			
DAY 185	02-Nov-18	FRIDAY	Factors affecting Equilibrium, Le Chatelier's principle			
DAY 186	3-Nov-18	SATURDAY	Ionic equilibria in solutions, Acids, Bases and Salts Arhenius concept of acids and bases			
DAY 187	04-Nov-18	SUNDAY				
DAY 188	5-Nov-18	MONDAY		PRACTICE SESSIONS		
DAY 189	06-Nov-18	TUESDAY	NARAKA CHATURDASHI			
DAY 190	7-Nov-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 191	08-Nov-18	THURSDAY	BALIPADYAMI DEEPAWALI			
DAY 192	9-Nov-18	FRIDAY	Bronsted Lowry concept - Conjugate acid base pair Lewi's concept			
DAY 193	10-Nov-18	SATURDAY	Ionisation of acids and bases, ionic product of water (K_W), pH scale			
DAY 194	11-Nov-18	SUNDAY				
DAY 195	12-Nov-18	MONDAY	Ionisation constants of weak acids and weak bases (K_a, K_b), Relation between K_a and K_b of a conjugate acid base pair			
DAY 196	13-Nov-18	TUESDAY	Factors affecting acid strength, common ion effect in ionisation of acids and bases, Buffer solutions		Systematic Qualitative Analysis of simple inorganic salts	
DAY 197	14-Nov-18	WEDNESDAY		PRACTICE SESSIONS		

DAY 198	15-Nov-18	THURSDAY		PRACTICE SESSIONS		
DAY 199	16-Nov-18	FRIDAY	Solubility equilibria of sparingly soluble salts, Solubility product constant, common ion effect of solubility of ionic salts			
DAY 200	17-Nov-18	SATURDAY	Topic - Redox reactions Introduction, definitions of oxidation and reduction, Redox reactions in terms of electron transfer, Oxidant and reductant			
DAY 201	18-Nov-18	SUNDAY				
DAY 202	19-Nov-18	MONDAY	Oxidation number - Definition, Rules for calculating oxidation number, Stock notation			
DAY 203	20-Nov-18	TUESDAY	Definitions of oxidising and reducing agents in terms of Oxidation number, Types of redox reactions with examples		Systematic Qualitative Analysis of simple inorganic salts	
DAY 204	21-Nov-18	WEDNESDAY	EID MILAD			
DAY 205	22-Nov-18	THURSDAY		PRACTICE SESSIONS		
DAY 206	23-Nov-18	FRIDAY		PRACTICE SESSIONS		
DAY 207	24-Nov-18	SATURDAY	Balancing of redox reactions by oxidation number method and half reaction method			
DAY 208	25-Nov-18	SUNDAY				
DAY 209	26-Nov-18	MONDAY	KANAKLDAS JAYANTHI			
DAY 210	27-Nov-18	TUESDAY	Applications of redox reactions - In titrations, electrode processes, electrode potential, standard electrode potential, Galvanic cell		Systematic Qualitative Analysis of simple inorganic salts	
DAY 211	28-Nov-18	WEDNESDAY	Topic: Hydrocarbons. Classification. Alkanes. Nomenclature and Isomerism			
DAY 212	29-Nov-18	THURSDAY	Preparation from unsaturated hydrocarbons, alkyl halides, carboxylic acids. Properties. Chemical properties. Substitution reactions. Halogenation, Mechanism			
DAY 213	30-Nov-18	FRIDAY		PRACTICE SESSIONS		

DAY 214	1-Dec-18	SATURDAY		PRACTICE SESSIONS		
DAY 215	02-Dec-18	SUNDAY				
DAY 216	3-Dec-18	MONDAY	Combustion, Controlled oxidation, Isomerisation, Aromatisation, Reaction with steam, pyrolysis and conformations.			
DAY 217	04-Dec-18	TUESDAY	Alkenes, structure of double bond. Nomenclature and isomerism.		Systematic Qualitative Analysis of simple inorganic salts	
DAY 218	5-Dec-18	WEDNESDAY	Preparation of alkenes. Properties. Addition of dihydrogen, halogens, hydrogen halides, Markovnikov addition, Mechanism			
DAY 219	06-Dec-18	THURSDAY	II TEST			
DAY 220	7-Dec-18	FRIDAY	II TEST			2 TEST
DAY 221	08-Dec-18	SATURDAY	II TEST			
DAY 222	9-Dec-18	SUNDAY				
DAY 223	10-Dec-18	MONDAY	Anti Markovnikov addition. Addition of sulphuric acid, water. Oxidation, ozonolysis and polymerisation.			
DAY 224	11-Dec-18	TUESDAY		PRACTICE SESSIONS	Systematic Qualitative Analysis of simple inorganic salts	
DAY 225	12-Dec-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 226	13-Dec-18	THURSDAY	Alkynes. Nomenclature and Isomerism. Structure of triple bond. Preparation.			
DAY 227	14-Dec-18	FRIDAY	Properties of alkynes			
DAY 228	15-Dec-18	SATURDAY	Aromatic hydrocarbons. Nomenclature and isomerism. Structure of Benzene.			
DAY 229	16-Dec-18	SUNDAY				
DAY 230	17-Dec-18	MONDAY	Aromaticity. Preparation of benzene. Properties.			
DAY 231	18-Dec-18	TUESDAY		PRACTICE SESSIONS	Systematic Qualitative Analysis of simple inorganic salts	
DAY 232	19-Dec-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 233	20-Dec-18	THURSDAY	Mechanism of electrophilic Substitution reactions.			

DAY 234	21-Dec-18	FRIDAY	Directive influence of a functional group in monosubstituted benzene. Carcinogenicity and Toxicity.			
DAY 235	22-Dec-18	SATURDAY	**Unit 9 :** Hydrogen. Position of hydrogen in the periodic table. Dihydrogen, occurrence. Isotopes of hydrogen. Preparation of dihydrogen.			
DAY 236	23-Dec-18	SUNDAY				
DAY 237	24-Dec-18	MONDAY	Properties of dihydrogen. Uses of dihydrogen. Hydrides			
DAY 238	25-Dec-18	TUESDAY	CHRISTMAS			
DAY 239	26-Dec-18	WEDNESDAY		PRACTICE SESSIONS		
DAY 240	27-Dec-18	THURSDAY		PRACTICE SESSIONS	Systematic Qualitative Analysis of simple inorganic salts	
DAY 241	28-Dec-18	FRIDAY	Water, structure of water and ice. Chemical properties of water. Hard and soft water.			
DAY 242	29-Dec-18	SATURDAY	Hydrogen peroxide. Heavy water. Dihydrogen as fuel.			
DAY 243	30-Dec-18	SUNDAY				
DAY 244	31-Dec-18	MONDAY	Unit 10: The s-Block elements. Group 1 elements: Alkali metals.			
DAY 245	01-Jan-19	TUESDAY	General characteristics of the compounds of the alkali metals. Oxides, hydroxides, halides, salts of oxoacids.		Systematic Qualitative Analysis of simple inorganic salts	
DAY 246	2-Jan-19	WEDNESDAY		PRACTICE SESSIONS		
DAY 247	03-Jan-19	THURSDAY		PRACTICE SESSIONS		
DAY 248	4-Jan-19	FRIDAY	Anomalous properties of lithium. Some important compounds of sodium; Sodium carbonate.			
DAY 249	05-Jan-19	SATURDAY	Sodium chloride, sodium hydroxide. Sodium hydrogen carbonate. Biological importance of sodium and potassium.			
DAY 250	6-Jan-19	SUNDAY				

DAY 251	07-Jan-19	MONDAY	Group 2 elements: Alkaline earth metals. General characteristics of the compounds of the alkaline earth metals. Anomalous behaviour of Beryllium.			
DAY 252	8-Jan-19	TUESDAY	Some important compounds of Calcium: Calcium oxide. Calcium hydroxide, calcium carbonate.		Systematic Qualitative Analysis of simple inorganic salts	
DAY 253	09-Jan-19	WEDNESDAY		PRACTICE SESSIONS		
DAY 254	10-Jan-19	THURSDAY		PRACTICE SESSIONS		2NDPUC PREPARA-TORY
DAY 255	11-Jan-19	FRIDAY	Calcium suphate (Plaster of Paris). Cement. Biological importance of Magnesium and Calcium.			EXAM
DAY 256	12-Jan-19	SATURDAY	Unit 11: The p-block elements. General properties and electronic configuration.			
DAY 257	13-Jan-19	SUNDAY				
DAY 258	14-Jan-19	MONDAY	Group 13 elements: The boron family. Electronic configuration. Atomic radii. Ionisation enthalpy. Electronegativity. Physical properties.			
DAY 259	15-Jan-19	TUESDAY	Chemical properties.			
DAY 260	16-Jan-19	WEDNESDAY		PRACTICE SESSIONS		
DAY 261	17-Jan-19	THURSDAY		PRACTICE SESSIONS		
DAY 262	18-Jan-19	FRIDAY	Important trends and anomalous properties of boron. Some important compounds of boron. Borax. Orthoboric acid. Diborane.			
DAY 263	19-Jan-19	SATURDAY	Uses of boron and aluminium and their compounds. Group 14 elements: The carbon family			
DAY 264	20-Jan-19	SUNDAY				
DAY 265	21-Jan-19	MONDAY	Important trends and anomalous behaviour of carbon. Allotropes of carbon. Uses of carbon.			
DAY 266	22-Jan-19	TUESDAY	Some important compounds of carbon and silicon. Oxides of carbon.			

DAY 267	23-Jan-19	WEDNESDAY		PRACTICE SESSIONS		
DAY 268	24-Jan-19	THURSDAY		PRACTICE SESSIONS		
DAY 269	25-Jan-19	FRIDAY	Silicon dioxide, silicones. Silicates and Zeolites			
DAY 270	26-Jan-19	SATURDAY	**Unit 14 :** Environmental chemistry. Environmental pollution. Atmospheric pollution. Tropospheric pollution.			
DAY 271	27-Jan-19	SUNDAY				
DAY 272	28-Jan-19	MONDAY	Particulate pollutants. Stratospheric pollution. Water pollution.			
DAY 273	29-Jan-19	TUESDAY	Soil pollution. Industrial waste. Strategies to control environmental pollution. Green chemistry.			
DAY 274	30-Jan-19	WEDNESDAY		PRACTICE SESSIONS		
DAY 275	31-Jan-19	THURSDAY		PRACTICE SESSIONS		

PUC I — CHEMISTRY (34)

GROUP	Unit	Title	Hrs	Marks	Part A 1×10 (VSA)**	Part B $2 \times \frac{8}{5}$ (SA)***	Part C $3 \times \frac{8}{5}$ (Inorganic)	Part D $5 \times \frac{7}{11}$ (Physical & Organic)	Total
Group–I Physical Hrs – 52 Marks = 47	I.	**Some basic concepts of Chemistry** Part 1 = pg 1–14; Part 2 = pg 15–23;	9	8	✓(1)	✓(11)	–	✓(27)	08
	II.	**Structure of Atom** Part 1 = pg 26–45; Part 2 = pg 46–65;	10	9	–	–	–	✓(28) ✓(29)	10
	V.	**States of Matter : Gases and Liquids** Part 1= pg 132–143; Part 2 = pg 143–152;	9	8	✓(2)	✓(12)	–	✓(30)	08
	VI.	**Thermodynamics** Part 1= pg154–164; Part 2 = pg 164–180;	11	10	–	–	–	✓(31) ✓(32)	10
	VII.	**Equilibrium** Part 1 = pg185–205; Part 2 = pg 205–222;	13	12	✓(3)	–	–	✓(33) ✓(34)	11
Group–II Inorganic Hrs – 41 Marks = 35	III.	**Classification of Elements and Periodicity in Properties** Part 1 = pg 70–82; Part 2 = pg 82–92;	5	4	✓(4)	–	✓(19)	–	04
	IV.	**Chemical bonding and molecular structure** Part 1 = pg 96 – 112; Part 2 = pg 113–128;	12	11	–	✓(13)	✓(20) ✓(21) ✓(22)	–	11
	VIII.	**Redox Reactions** Part 1 = pg 255–266; Part 2 = pg 266–272;	5	4	✓(5)	–	✓(23)	–	04
	IX.	**Hydrogen.**	4	3	–	–	✓(24)	–	03
	X.	***s*–Block Elements** Part 1 = pg 291–298 (Alkali metals); Part 2 = pg 298–305 (Alkaline earth metals);	7	6	✓(6)	✓(14)	✓(25)	–	06
	XI.	**Some *p*–block Elements** Part 1= pg 307–314 (group– 13); Part 2 = pg 314–322 (Group 14);	8	7	✓(7) ✓(8)	✓(15)	✓(26)		07
Group–III Organic Hrs – 27 Marks = 23	XII.	**Organic chemistry :** some basic principles and Techniques Part 1= pg 326–341; Part 2= pg 341–360;	12	11	✓(9)	–	–	✓(35) ✓(36)	11
	XIII.	**Hydrocarbons** Part 1 = pg 365–384; Part 2= pg 384–395;	12	10	✓(10)	✓(16) ✓(17)	–	✓(37)	10
	XIV	**Environmental Chemistry**	3	2	–	✓(18)	–	–	02
		Total	**120**	**105**	**10**	**16**	**24**	**55**	**105**

Note : (1) The question paper must be prepared based on the individual blue print which is based on the weightage of marks fixed for each unit/chapter.

Note : (2) In chapters with marks wtg > 4, each chapter is split in 2 parts, about half of the total marks should be from part 1 and next half from part 2 of the chapter.

SOLVED PAPER	I PUC Annual Examination 2018	Chemistry Subject Code 34 (N)

Time : 3 Hours 15 Minutes **Max. Marks : 70**

General Instructions :

1. *The question paper has FOUR parts A,B,C and D. All parts are compulsory.*
2. *Write balanced chemical equations and draw labelled diagrams wherever required.*
3. *Use log table and simple calculator if necessary.*
4. *Use of Scientific Calculator is not allowed.*

PART-A

I. Answer All the questions in one word or in one sentence each : **10 × 1 = 10**

1. Name the SI unit of amount of substance.

2. Write ideal gas equation for one mole of a gas.

3. The hydrogen ion concentration of a solution is 0.01 M, What is its pH ?

4. Among O^{2-}, F^- ions which one has smaller in size?

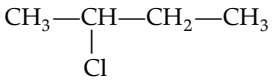
5. What is the oxidation state of Manganese (Mn) in K_2MnO_4?

6. Li^+ ion has maximum degree of hydration. Why?

7. Name the colour imparted by CoO in borax beed test.

8. Give the valence shell electronic configuration of p-block elements.

9. Give the IUPAC name of,



10. Name the gas liberated when calcium carbide reacts with water.

PART-B

II. Answer any FIVE questions : (Each question carries two marks.) **5 × 2 = 10**

11. Calculate the amount of water produced in gram by the combustion of 8 g of Methane.

12. State Boyle's law. Write its mathematical form.

13. Write the Lewis dot structure of

(i) Oxygen molecule (O_2)

(ii) Ethyne molecule (C_2H_2)

14. Give any two diagonal relationship between Lithium and Magnesium.

15. Give any two reasons for anomalous behaviour of carbon in its group.

16. Define geometrical isomerism. Give an example.

17. Explain Wurtz reaction. Give an example.

18. Give any two effects of depletion of the ozone layer.

PART-C

III. Answer any FIVE questions : (Each question carries three marks.) **5 × 3 = 15**

19. Define ionisation Enthalpy. How does it vary along a period and down a group in the periodic table? **3**

20. Explain sp^2 hybridisation taking boron trichloride (BCl_3) as an example. **3**

21. Write the electronic configuration of Li_2 molecule.
Calculate bond order and mention its magnetic property. **3**

22. Write any three postulates of VSEPR theory. 3

23. Balance the following redox reaction by half reaction method.
Fe^{2+} (aq) + $Cr_2O_7^{2-}$ (aq) $\longrightarrow$ Fe^{3+} (aq) + Cr^{3+} (aq) (In acid medium) **3**

24. (a) (i) How temporary hardness of water is removed by Clark's Method?
(ii) Give one example for ionic hybride. **2**
(b) Which isotope of hydrogen is radioactive? **1**

25. Give the chemical equation involved in the preparation of sodium carbonate by Solvay process. **3**

26. (a) Write any two differences in the properties of Graphite and Diamond. **2**
(b) Give the composition of WATER GAS. **1**

PART-D

IV. Answer any FIVE questions : (Each question carries five marks.) **5 × 5 = 25**

27. (a) Write any three postulates of Dalton's atomic theory. **3**
(b) Determine the empirical formula of an oxide of Iron which has 69.9% Iron and 30.1% dioxygen by mass. [Atomic mass of Fe = 56 O = 16] **2**

28. (a) Explain the significance of Principal, Azimuthal and Magnetic quantum numbers. **3**
(b) Calculate the frequency of yellow radiation having wavelength 5800Å.
[1 Å = 10^{-10} m, C = 3×10^8 ms^{-1}] **2**

29. (a) State Pauli's exclusion principle. Give the possible values of 'l' for n = 2. **3**
(b) Write de Broglie equation and explain the terms involved in it. **2**

30. (a) Write any three postulates of Kinetic molecular theory of gases. **3**
(b) Define (i) Boyle temperature
(ii) Critical Volume (V_c) **2**

31. (a) Calculate the enthalpy of formation of Benzene (C_6H_6), if standard enthalpies of combustion of Carbon (C), Hydrogen (H_2) and benzene (C_6H_6) are – 393.5 Kj mol^{-1}, – 285.83 Kj mol^{-1}, and – 3267 Kj mol^{-1} respectively. **3**
(b) Define 'Entropy'. What is the value of Entropy change at equilibrium in a spontaneous reversible process ? **2**

32. (a) (i) State Hess's law of constant heat summation. **2**
(ii) Give an example for an extensive property.
(b) Explain Born-Haber cycle for the formation of 1 mole of sodium chloride crystal. **3**

33. (a) State Le-Chatelier's principle. **1**
(b) Explain the effect of temperature and pressure on the equilibrium equation. **2**
(c) What is a buffer solution? Give an example. **2**

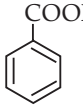
34. (a) Explain Lewis acid-base concept of acid and base. **2**
(b) Define common ion effect. Mention any one factor which affect acid strength. **2**
(c) Give the value of ionic product of pure water at 298 K. **1**

V. Answer any TWO questions : (Each question carries five marks.) **2 × 5 = 10**

35. (a) How carbon and hydrogen in organic compound are estimated by Leibig's Method ? **3**
(b) What is inductive effect ? Give an example for electron withdrawing group. **2**

36. (a) What is position isomerism ? Give an example. **2**
(b) What are electrophiles ? Give an example. **2**
(c) Write the bond line structure of 2 – bromobutane. **1**

37. (a) Explain the mechanism of chlorination of methane. **3**
(b) Complete the following reaction. **2**

(i) 

+ NaOH $\xrightarrow[\Delta]{CaO}$ ..... + Na_2CO_3

(ii) $CH_3 - CH = CH_2 + HBr \longrightarrow$ .....
(Major Product)

❑❑❑

SOLUTIONS
As Per Scheme of Valuation
(Issued by Department of PUE, Karnataka)

PART - A

I. 1. mole **1**

2. PV = RT **1**

3. 2 or TWO **[Scheme of Valuation 2018] 1**

Detailed Answer :

In K_2MnO_4 Oxidation state be (x).

$pH = -\log [M] = -\log (0.01) = -\log (10^{-2}) = 2$ **1**

4. F^- OR Fluoride ion **1**

5. +6 OR Six **[Scheme of Valuation 2018] 1**

Detailed Answer :

In K_2MnO_4 oxidation state be (x)

K_2MnO_4 Oxidation state :

$2 + x + 4(-2) = 0$

$x = +6$ **1**

6. Smaller in Size **[Scheme of Valuation 2018] 1**

Detailed Answer :

Li^+ ion has maximum degree of hydration due to small size and high charge density.

7. Blue **1**

8. $ns^2\, np^{1-6}$ **1**

9. 2- chlorobutane **1**

10. Acetylene OR Ethyne **1**

PART - B

II. 11. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ **1**

$\downarrow$ $\downarrow$

16 g 2×18 g

8 g ?

$$\frac{8 \times 2 \times 18}{16} = 18 \text{ g}$$

1

12. At constant temperature, the pressure of a gas fixed amount of gas inversely proportional to its volume **1**

PV = constant OR $P \propto 1/V$ OR $P = k/V$ **1**

13. (i) $:\ddot{O}::\ddot{O}:$

(ii) $H \cdot\cdot C \vdots\vdots C \cdot\cdot H$ **1+1**

14. (i) React slowly with water

(ii) Oxides and hydroxides are less soluble

Any two correct - similarities **[Scheme of Valuation 2018] 1+1**

Detailed Answer :

(i) Carbonate of Li and Mg decompose on heating to liberate CO_2.

$Li_2CO_3 \longrightarrow Li_2O + CO_2$

$MgCO_3 \longrightarrow MgO + CO_2$

(ii) Both Li and Mg combine directly with N_2 to form nitrides.

$6\,Li + N_2 \longrightarrow 2\,Li_3N$

$3\,Mg + N_2 \xrightarrow{800^\circ C} Mg_3N_2$ **1 + 1**

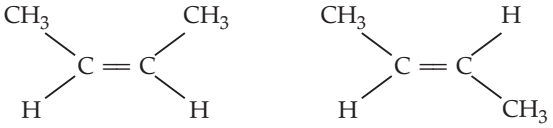
15. (i) Smaller Size

(ii) High electronegativity

(iii) High ionisation energy

Any two correct - reason. **1+1**

16. Same moleculur formula but differ in the spatial arrangements of atoms or groups due to restricted rotation of Carbon — Carbon double bond **1**



Cis-But-2-ene Trans-But-2-ene

17. Alkyl halides on treatment with sodium metal in dry ether give higher alkanes. **1**

e.g., Bromomethane is heated with sodium metal in dry ether to give ethane.

$CH_3Br + 2Na + BrCH_3 \xrightarrow{\text{dry ether}} C_2H_6 + 2NaBr$ **1 + 1**

18. UV radiation lead skin cancer.
Killing of many phytoplanktions.
Any two harmful effects **1+1**

PART - C

III.

19. Correct statement **1**
Increases in a period **1**
Decreases in a group. **[Scheme of Valuation 2018] 1**

Detailed Answer :

Ionisation enthalpy is defined as the amount of energy required to remove the most loosely bound electron (valence e^-) from an isolated gaseous atom. **1**
I. E. increases along a period. **1**
and decreases down the group. **1**

20. Excited state electronic configuration of boron atom $1s^2 2s^1 2p_x^{\ 1} 2p_y^{\ 1}$ **1**
One 2*s* orbital and Two 2*p* orbitals undergo sp^2 hybridisation having 3 sp^2 hybridised orbitals. **1**
Overlap of hybrid orbitals with 2*p* orbitals of chlorine. **1**

OR

Orbital picture diagram **[Scheme of Valuation 2018]**

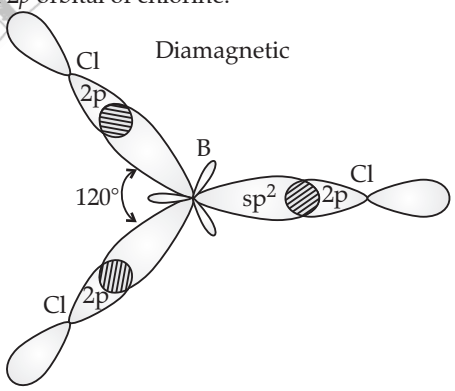
Detailed Answer :

Boron Ground state $1s^2 \quad 2s^2 \quad 2p^2$

Excited state $\underbrace{1s^2 \quad 2s^1 \quad 2p^{x^1} \quad 2p^{y^1}}$

Hybrid state sp^2

One 2*s* orbital and two 2*p* orbitals hybridise to form three sp^2 hybridised orbitals.
These orbitals overlap with 2*p* orbital of chlorine.



Diamagnetic

Bond angle = 120°
Shape = Trigonal planar

21. $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2$ **1**
KK $\sigma 2s^2$

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

or $\frac{4-2}{2} = 1$

or $\frac{2-0}{2} = 1$ **1**

Diamagnetic **1**

22. Any three postulates **1+1+1**

Detailed Answer :

Three postulates of VSEPR Theory are given as below :

(i) The shape of the molecule is determined by repulsion between the electron pairs around the central atom.

(ii) The order of repulsion is

$lp - lp > lp - bp > bp - bp$

(iii) The electron pairs are oriented around central atom in such a way that repulsion is minimum. **1+1+1**

23. Reduction

$\overset{+2}{Fe^{2+}} + \overset{+6}{Cr_2O_7^{2-}} \longrightarrow \overset{+3}{Fe^{3+}} + \overset{+3}{Cr^{3+}}$ **1**

Oxidation

$Fe^{2+} \xrightarrow{\text{Loss of } 1e^-} Fe^{3+} \times 6$

$Cr_2O_7^{2-} \xrightarrow[2\times 3\, e_s^-]{\text{Gain of}} 2Cr^{3+} \times 1$ **1**

$6Fe^{2+} + Cr_2O_7^{2-} + 14H^+ \longrightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$ **[Scheme of Valuation 2018] 1**

Detailed Answer :

$Fe^{2+} + Cr_2O_7^{2-} \longrightarrow Fe^{3+} + Cr^{3+}$

Dividing equation into two half reactions :

Oxidation	Reduction
$Fe^{2+} \longrightarrow Fe^{+3}$	$Cr_2O_7^{2-} \longrightarrow Cr^{3+}$ **1**
$6 \times [Fe^{2+} \longrightarrow Fe^{3+} + e^-]$	$14H^+ + Cr_2O_7^{2-} + 6e^- \longrightarrow 2Cr^{3+} + 7H_2O$ **1**

Adding the two equations, the final balanced equation is

$6\,Fe^{2+} + Cr_2O_7^{2-} + 14\,H^+ \longrightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$ **1**

24. (a) (i) Calculated amount of lime is added to hard water. It precipitated out as $CaCO_3$ and $Mg(OH)_2$ **1**

(ii) NaH, LiH, BeH_2. Any one correct example. **1**

(b) Tritium OR $^3H_1$ **1**

25. $2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2\,CO_3$ **1**

$(NH_4)_2\,CO_3 + H_2O + CO_2 \longrightarrow 2NH_4HCO_3$ **1**

$NH_4HCO_3 + NaCl \longrightarrow NH_4Cl + NaHCO_3$

$2NaHCO_3 \xrightarrow{\text{heating}} Na_2CO_3 + H_2O$ **1**

26. (a) Any two differences **1+1**

(b) $CO + H_2$ **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a)

S. No.	Graphite	Diamond
1.	It is soft.	It is the hardest.
2.	It is good conductor of electricity.	It is an insulator.

PART - D

IV.

27. (a) Any three postulates **1+1+1**

(b) Fe $= \frac{69.9}{56} = 1.248$ | $\frac{1.248}{1.248} = 1.000$

O $= \frac{30.1}{16} = 1.88$ | $\frac{1.88}{1.248} = 1.500$ **1**

Fe $\rightarrow 1 \times 2 = 2$

O $\rightarrow 1.5 \times 2 = 3$

$\therefore$ Empirical formula Fe_2O_3 **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) There are following three postulates of Dalton's atomic theory :

(i) Elements are made of extremely small particles called atoms.

(i) Atoms are indivisible.

(iii) Two different types of atoms combine to form compounds. **1+1+1**

28. (a) Principal quantum number signifies size and energy of the orbital. **1**

Azimuthal quantum number signifies three dimensional shape of the orbital. **1**

Magnetic quantum number signifies spatial orientation of the orbital. **1**

(b) $v = \frac{c}{\lambda}$

$v = \frac{3 \times 10^8}{5800 \times 10^{-10}} = 5.172 \times 10^{14}\ s^{-1}$ **1**

29. (a) Correct Statement **1**

$l = 0, 1$ **1+1**

(b) $\lambda = \frac{h}{mv}$ OR $\lambda = \frac{h}{p}$ **1**

Any one term **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) According to this principle, "In an atom or molecule, no two electrons can have same four set of quantum numbers."

For $n = 2$, Values of $l = 0$ and 1 ($\because$ $l = 0$ to $n - 1$) **1 + 1**

(b) de-Broglie relation $\lambda = \frac{h}{mv}$

where λ = wave length of particle

h = Planck's constant, m = mass of particle, v = velocity of particle. **1 + 1**

30. (a) Any three postulates **1+1+1**

(b) (i) The temperature at which at real gas obeys ideal gas law. **1**

(ii) Volume of one mole of the gas at critical temperature. **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) There are following three postulates of kinetic theory of Gases :

(i) Gases consist of particles in random constant motion.

(ii) The pressure of the gas is due to elastic collision of molecules with walls of container.

(iii) The average K. E. of gas is directly propotional to its temperature. **1+1+1**

31. (a) $C + O_2 \longrightarrow CO_2$; – 393.5 Kj mol^{-1}

$H_2 + \frac{1}{2} O_2 \longrightarrow H_2O$; – 285.83 Kj mol^{-1} **1**

$$C_6H_6 + \frac{15}{2} O_2 \longrightarrow 6CO_2 + 3H_2O \; ; -3267 \text{ Kj mol}^{-1}$$

Required equation, $6C + 3H_2 \longrightarrow C_6H_6 \; ; \Delta H_f = ?$ **1**

$1 \times 6 + 2 \times 3 +$ Reve 3

$= -2361 - 857.49 + 3267$

$= 48.51 \text{ Kj mol}^{-1}$ **1**

(b) Measure of disorderness OR **1**

Measure of Randomness

'0' OR Zero **1**

32. (a) (i) Correct Statement **1**

(ii) Mass, Volume, I.E, Enthalpy, heat capacity (Any one) **1**

(b) $Na(s) \longrightarrow Na(g) \; ; \Delta_{sub}H^{\ominus} = +Q_1 KJ$

$Na(g) \longrightarrow Na^+(g) + e^- \; ; \Delta_I H^{\ominus} = +Q_2 KJ$ **1**

$\frac{1}{2} Cl_2(g) \longrightarrow Cl(g) \; ; \Delta_{bond}H^{\ominus} = +Q_3 KJ$

$Cl(g) + e^- \longrightarrow Cl^-(g) \; ; \Delta_{eg}H^{\ominus} = -Q_4 KJ$ **1**

$Na^+(g) + Cl^-(g) \longrightarrow Na^+Cl^-(s)$ **1**

Calculation of $\Delta_{lattice}H^{\ominus}$ using specific values. **[Scheme of Valuation 2018]**

Detailed Answer :

(a) Hess's law states that the amount of heat evolved or absorbed in a chemical reaction is same whether the reaction takes place in one step or a number of steps. **1**

33. (a) Correct statement **1**

(b) When temperature is increased at equilibrium, endothermic reaction proceeds in forward direction and an exothermic reaction proceeds in backward direction. Pressure has no effect on equilibrium when equal number of gaseous molecules of reactants and products are present and increase of pressure shifts the equilibrium in the direction with lesser number of gaseous molecules. **1**

(c) The solution which resists change in pH on addition of small amount of acid or alkali. **1**

[Scheme of Valuation 2018]

Detailed Answer :

(a) If a chemical reaction at equilibrium is subjected to small changes in P, T or concentration, the equilibrium shifts in a direction so to undo the effect of the change. **1**

(b) Effect of temperature - Increase of Temperature

(i) For exothermic reactions, equilibrium shifts in backward direction.

(ii) For endothermic reactions, equilibrium shifts in forward direction.

Effect of Pressure - Increase of pressure shifts the equilibrium in the direction with lesser number of gaseous molecules and no effect of pressure in case of equal number of molecules of reactants and products. **1+1**

(c) Example of Buffer Solution : $CH_3COOH + CH_3COONa$ (Acidic buffer solution)

$NH_4OH + NH_4Cl$ (Basic buffer solution) **(Any one example)**

34. (a) Acid is a substance which accepts pair of electrons. **1**

Base is a substance which denotes pair of electrons.

(b) Correct Statement, Strength or polarity of H — A bond **1**

(c) 10^{-14} **[Scheme of Valuation 2018] 1**

Detailed Answer :

(b) The suppression of ionisation of an electrolyte by adding an electrolyte containing a common ion.

The strength of an acid depends on the polarity of H-A bond. More polarity leads to more acidity. **1+1**

V. 35. (a) A known mass of organic compound *m* is burnt in the presence of excess of oxygen and CuO. Carbon is oxidised to CO_2 and Hydrogen is oxidised to H_2O.

The mass of H_2O is determined from weighed U tube and that of CO_2 using weighed KOH tube diagram.

Mass of water and CO_2 are m_1 and m_2 respectively.

$$\% \text{ Carbon} = \frac{12 \times m_2 \times 100}{44 \times m}$$

$$\% \text{ Hydrogen} = \frac{2 \times m_1 \times 100}{18 \times m}$$

1

(b) Correct Statement

—NO_2, —CN, —COOH **(Any one example)** **[Scheme of Valuation 2018] 1**

Detailed Answer :

(b) Inductive effect is a permanent electron displacement effect along a carbon chain with sigma bonds. It occurs due to polarisation of σ bonds which arises due to an electronegativity difference between atoms at the end of the chain

e.g., of EWG — NO_2, — CN, — COOH, — CHO **(Any one example)** **1+1**

36. (a) Correct Statement 1

propan – 1 – o1 ↔ Propan — 2 — ol

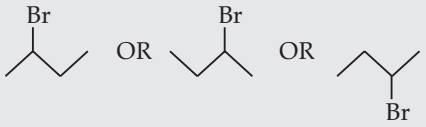
OR

$CH_3CH_2CH_2OH \leftrightarrow CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

OR (Any other example)

(b) A reagent that accepts an electron pair.

e.g., CH_3^+ **(Any other example)**

(c)  **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) **Position Isomerism :**

Isomers that have same carbon skeleton but differ from each other in location of functional group. They have same molecular formula. **1**

e.g.,

$CH_3CH_2CH_2OH$ Propan -1- ol

$CH_3\ \underset{\displaystyle OH}{\underset{|}{CH}}\ CH_3$ Propan - 2- ol

Molecular formula C_3H_8O.

or any other example. **1**

(b) Electrophile is a positively charged or neutral electron deficient species which attacks electron rich sites. **1**

eg. CH_3^+, $AlCl_3$ **1**

or any other

37. (a) Chain initiation

Homolysis of chlorine molecule

$Cl - Cl \xrightarrow{h\nu} \dot{Cl} + \dot{Cl}$ **1**

Chain propagation

Attack of chlorine free radical on methane molecule

$CH_4 + \dot{Cl} \longrightarrow \dot{C}H_3 + HCl$ **1**

Chain termination

The reaction stops by consumption of reactants

$\dot{Cl} + \dot{Cl} \longrightarrow Cl_2$

$\dot{C}H_3 + \dot{C}H_3 \longrightarrow C_2H_6$ } **Any two** **1**

$\dot{C}H_3 + \dot{Cl} \longrightarrow CH_3Cl$

(b) (i) C_6H_6 OR  **1**

(ii) $CH_3—\underset{\underset{Br}{|}}{CH}—CH_3$ OR $CH_3—CHBr—CH_3$ **1**

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SOLVED PAPER	I PUC Annual Examination 2018	Chemistry Subject Code 34 (S)

Time : 3 Hours 15 Minutes **Max. Marks : 70**

General Instructions :

1. *The question paper has FOUR parts A,B,C and D. All parts are compulsory.*
2. *Write balanced chemical equations and draw labelled diagrams wherever required.*
3. *Use log table and simple calculator if necessary (use of Scientific Calculator is not allowed).*

PART-A

I. Answer All the questions in one word or in one sentence each : **10 × 1 = 10**

1. Express 0.00035 in scientific notation.
2. State Boyle's law.
3. Given an example of heterogeneous equilibrium.
4. Write the IUPAC name of the element with atomic number 104.
5. What is the oxidation number of Mn in MnO_4^- ?
6. Which alkali metal is the strongest reducing agent ?
7. What is the composition of producer gas ?
8. Name the allotropic from of carbon whose structure resembles soccer ball.
9. Write the bond line structure of $HC \equiv C - CH = CH_2$.
10. Complete the following equation $3CH \equiv CH \xrightarrow[\text{Iron tube}\\ 873\ K]{\text{red hot}}$

PART-B

II. Answer any FIVE of the following questions : (Each question carries two marks.) **5 × 2 = 10**

11. Mention any two postulates of Dalton's atomic theory.
12. Given the expression for.
    (i) Van der Waal's equation for '*n*' moles of a gas.
    (ii) Compressibility factor (z).
13. Write the lewis dot structure for (i) CO_2 (ii) CH_4
14. Given any two anomalous behaviour of Beryllium.
15. How do you prepare diborane in the laboratory ?
16. State Markovnikov's rule.
17. Write the Newman's projections of ethane.
18. How is "Ozone layer" formed in the stratosphere ? Name a chief chemical that causes its depletion.

PART-C

III. Answer any FIVE of the following questions : (Each question carries three marks.) **5 × 3 = 15**

19. What are Iso-electronic species ? Arrange the following in the increasing order of their ionic radius :
    N^{-3}, Mg^{+2}, Na^+ and O^{-2} **3**
20. Explain the structure of methane molecule on the basis of hybridisation. **3**
21. Define hydrogen bond. Give an example for the molecule having
    (i) Intermolecular hydrogen bond.
    (ii) Intramolecular hydrogen bond. **3**
22. Write any three postulates of Molecular orbital theory. **3**
23. Balance the following redox reaction by using Oxidation number method.
    $Cr_2O_7^{-2}(aq) + SO_3^{-2}(aq) \rightarrow Cr^{+3}(aq) + SO_4^{-2}(aq)$ **3**

(in acidic medium)

24. (i) What are ionic hydrides ? Give one example. **2**

(ii) Write any one use of heavy water. **1**

25. Explain the manufacture of sodium carbonate by Solvay's process. **3**

26. Complete the following equations. **3**

(i) $SiO_2 + 4HF \rightarrow ? + 2H_2O$

(ii) $HCOOH \xrightarrow[Conc.H_2SO_4]{373\,K} ? + H_2O$

(iii) $ZnO + CO \rightarrow ? + CO_2$

PART-D

IV. Answer any FIVE questions : (Each question carries five marks.) **3 × 5 = 15**

27. (a) A sample of a compound contains 4.07% hydrogen, 24.27% carbon and 71.66% chlorine. Its molecular mass is 98.96g. What are its empirical and molecular formulae ? (Given atomic mass of H = 1, C = 12 and Cl = 35. 45) **4**

(b) Define molarity of a solution. **1**

28. (a) Write any three postulates of Rutherford's nuclear model of an atom. **3**

(b) Calculate the energy of one mole of photon of radiation whose frequency is 5×10^{14} Hz. (Given $h = 6.626 \times 10^{-34}$ J_S) **2**

29. (a) State :

(i) Pauli's exclusion principle

(ii) Hund's rule

(iii) Heisenberg's Uncertainty principle **3**

(b) Describe the orbital with following quantum number using *s, p, d* or *f* notations.

(i) when $n = 2, l = 0$

(ii) when $n = 4, l = 2$ **2**

30. (a) Write any four postulates of kinetic theory of gases. **4**

(b) Define critical temperature. **1**

31. (a) Calculate the standard enthalpy of formation of liquid benzene (C_6H_6). Given the enthalpies of combustion of $Carbon_{(s)}$, $Hydrogen_{(g)}$ and $Benzene_{(l)}$ are – 393.5 kJ, – 285.83 kJ and – 3267.0 respectively. **4**

(b) What is an intensive property ? **1**

32. (a) What is a spontaneous process ? Write the criteria for spontaneity of a process in terms of ΔG. **2**

(b) Find out the value of equilibrium constant for the following reaction at 298K.

$2NH3(g) + CO_2(g) \rightleftharpoons NH_2CONH_2(aq) + H\,O(l)$

Standard Gibbs energy change ΔG° at the given temperature is – 13.6 kJ mol^{-1}. (Given R = 8.314 JK^{-1} mol^{-1}) **3**

33. (a) What is chemical equilibrium ? Write Kp and Kc for the reaction.

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ **3**

(b) Explain lewis acid-base concept with an example. **2**

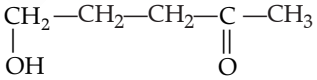
34. (a) What is meant by a buffer solution ? Write an example.

(b) State Le Chatelier's principle.

(c) Mention the conjugate base of H_2SO_4 **2+2+1**

V. Answer any TWO questions : (Each question carries five marks.) **2 × 5 = 10**

35. (a) Mention the IUPAC name of the following compound



(b) What is position isomerism ? Given an example.

(c) Write the chemical equations when sodium fusion extract is prepared from an organic compound containing nitrogen and sulphur. **1+2+2**

36. (a) Given any two differences between inductive effect and electromeric effect.

(b) Write the principle and formula involved in the estimation of halogen by Carious method. **2+3**

37. (a) How is ethene prepared from bromoethane ?

(b) Explain the mechanism of nitration of benzene. **2+3**

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SOLUTIONS
As Per Scheme of Valuation
(Issued by Department of PUE, Karnataka)

PART - A

I. 1. 3.5×10^{-4}. **1**

2. **Statement :** At constant temperature, the pressure of a fixed amount of a gas varies inversely with its volume. **1**

3. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$.

OR

Any other suitable example. **1**

4. Unnilquadium. **1**

5. + 7. **[Scheme of Valuation 2018] 1**

Detailed Answer : In, MnO_4^-

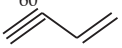
Let Oxidation state of Mn = x

$$x + 4(-2) = -1$$
$$x - 8 = -1$$
$$x = -1 + 8$$
$$x = +7$$ **1**

6. Lithium or Li. **1**

7. $CO + N_2$. **1**

8. C_{60} or Fullerene **1**

9.  **1**

10.  OR  **1**

PART - B

II. **2**

11. Any two postulates. **[Scheme of Valuation 2018] 2**

Detailed Answer :

There are following two postulates of Dalton's atomic theory :

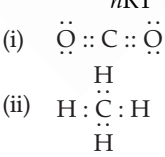
(i) Elements are made of extremely small particles called atoms.

(ii) Atoms are indivisible.

12. (i) $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$ **1**

(ii) $Z = \frac{PV}{nRT}$ **1**

13. (i) $\ddot{O} :: C :: \ddot{O}$ **1**

(ii)  **1**

14. Any two anomalous behaviour of Be. **[Scheme of Valuation 2018] 2**

Detailed Answer :

(i) Beryllium does not react with water even at high temperature.

(ii) Beryllium forms covalent compounds whereas other members form ionic compounds **2**

15. $2NaBH_4 + I_2 \longrightarrow B_2H_6 + 2NaI + H_2$ **[Scheme of Valuation 2018] 2**

Detailed Answer :

Diborane can be prepared by the reaction of iodine on sodium borohydride in diglyme (high boiling ether) in the laboratory.

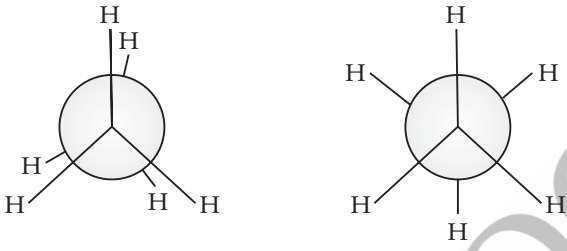
16. Correct Statement. **[Scheme of Valuation 2018] 2**

Detailed Answer :

Markownikoff's rule states that addition of unsymmetrical reagent to unsymmetrical alkenes takes place in such a manner that the negative part of adding molecule attaches to the carbon having lesser number of hydrogens.

e.g. $CH_3 - CH = CH_2 + HCl \longrightarrow CH_3 - \underset{Cl}{\underset{|}{CH}} - CH_3$

17. Newman's projections of ethane.



Eclipsed Staggered **1+1**

18. Ozone layer is formed due to action of use radiation on oxygen. **1**

CFC or Freons. **[Scheme of Valuation 2018] 1**

Detailed Answer :

Ozone layer is formed in the stratosphere by following reactions :

$$O_2 \xrightarrow{h\nu} O + O$$

$$O_2 + O \longrightarrow O_3$$

Ozone **1 + 1**

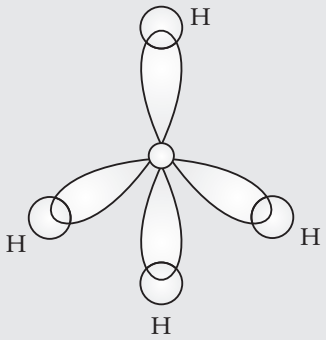
CFC or Freon causes its depletion.

PART - C

III. 19. Atoms and ions containing same number of electrons are called isoelectronic species. **1**

Correct order is Mg^{+2}, Na^{+}, O^{-2}, N^{-3} **2**

20. Electronic configuration of C in excited state, sp^3 hybridised **1**



1

Bond angle 109.5°

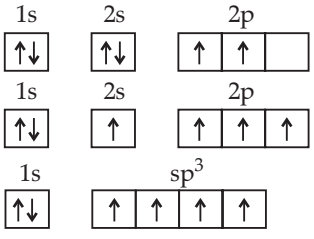
Stage – tetrahedron **[Scheme of Valuation 2018] 1**

Detailed Answer :

Ground state of C

Excited state of C

Hybrid state of C

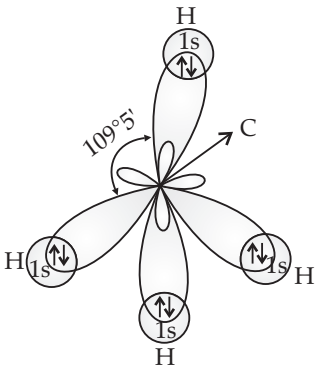


1

Shape → Tetrahedral

Bond Angle → 109°.5' **1**

Diagram



1

21. Correct definition **1**

(i) example → HF or any other suitable example **1**

(ii) → o–nitrophenol **[Scheme of Valuation 2018]**

Detailed Answer :

(i) Hydrogen bond : It is defined as an electrostatic attraction between hydrogen atom of one molecule and an electronegative atom F, N or oxygen of the neighbouring molecule. This occurs only when H is bonded to highly electronegative atom F, N or O. **1**

eg. $\overset{\delta^+}{H}—\overset{\delta^-}{F}$ ..... $\overset{\delta^+}{H}—\overset{\delta^-}{F}$

↑

Hydrogen bond

22. Any three postulates of molecular orbital theory **[Scheme of Valuation 2018] 3**

Detailed Answer :

(i) Atomic orbitals of comparable energy and proper symmetry combine to form molecular orbitals. **1**

(ii) The number of molecular orbitals formed is equal to the number of atomic orbitals that combine with each other.

When two atomic orbitals combine, two molecular orbitals form. The one which has lower energy is called bonding molecular orbital and other is called anti bonding molecular orbital. **1**

(iii) Electrons are filled in orbitals in accordance with Pauli's exclusion principle, Aufbau and Hund's rule. **1**

23. **Step-1 :** Assign oxidation number for Cr and S

$\overset{+6}{Cr_2O_7^{-2}} + \overset{+4}{SO_3^{-2}} \longrightarrow \overset{+3}{Cr^{+3}} + \overset{+6}{SO_4^{-2}}$ **1**

↓ ↓

Oxidant Reductant

Step-2 : Calculate increase and decrease of oxidation number and make them equal

$Cr_2O_7^{-2} + 3SO_3^{-2} \longrightarrow 2Cr^{+3} + 3SO_4^{-2}$ 1

Step-3 : In acidic medium

$Cr_2O_7^{-2} + 3SO_3^{-2} + 8H^+ \longrightarrow 2Cr^{+3} + 3SO_4^{-2}$

Finally balanced eqn. is

$Cr_2O_7^{-2} + 3SO_3^{-2} + 8H^+ \longrightarrow 2Cr^{+3} + 3SO_4^{-2} + 4H_2O$ **1**

24. (i) **Ionic hydrides :** These are the compounds of dihydrogen formed with *s*-block elements. or A hydride is a compound with hydrogen bonded to other elements. Except for a few of the Nobel gases. **1**

e.g. : NaH or any other example **1**

(ii) Any one use of heavy water

Heavy water is used as a moderator in nuclear reactors. **1**

25. Manufacture of Sodium Carbonate by Solvay's Process

Step-1 : Formation of ammonium bicarbonate from ammonia.

$2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2CO_3$

$(NH_4)_2CO_3 + H_2O + CO_2 \longrightarrow 2NH_4HCO_3$ **1**

Step-2 : Formation of sodium bicarbonate

$NH_4HCO_3 + NaCl \longrightarrow NH_4Cl + NaHCO_3$ **1**

Step-3 : On heating sodium bicarbonate gives sodium carbonate

$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O$ **1**

26. (i) SiF_4 (ii) CO (iii) Zn **1 + 1 + 1**

PART - D

IV.

27. (a)

Elements	At. mass	% ase of element	% ase At. mass	Simple Ratio	Relative no.
C	12	24.27	$\frac{24.27}{12} = 2$	$\frac{2}{2}$	1
H	1	4.07	$\frac{4.07}{1} = 4$	$\frac{4}{2}$	2
Cl	35.45	71.66	$\frac{71.66}{35.45} = 2$	$\frac{2}{2}$	1

2

Emp. Formula $= CH_2Cl$

$n = \frac{98.26}{49.48} = 2$ **1**

Molecular Formula $= n \times$ E. F.

$= 2 \times CH_2Cl$

M. F. $= C_2H_4Cl_2$ **1**

(b) Correct definition **[Scheme of Valuation 2018] 1+1**

Detailed Answer :

(b) Molarity is defined as the number of moles of solute present per unit volume of solution (in L). **1**

28. (a) Any three postulates of Rutherford's model. **3**

(b) $E = h\nu$

$E = 6.626 \times 10^{-34} \times 5 \times 10^{-14}$

$= 3.313 \times 10^{-19}$ J

$\therefore$ Energy of 1 mole of photons

$= 3.313 \times 10^{-19} \times 6.022 \times 10^{23}$

$= 199.51$ kJ mol^{-1} **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) There are following three postulates of Rutherford's nuclear model of an atom.

(i) The positive charge of an atom is concentrated in the centre of the atom and is called nucleus.

(ii) Electrons revolve around the nucleus in circular paths called orbits.

(iii) The size of nucleus is very small as compared to size of atom. **1**

29. (a) (i) Correct Statement **1**

(ii) Correct Statement **1**

(iii) Correct Statement **1**

(b) (i) $n = 2$, $l = 0$ orbital is $2s$

(ii) $n = 4$, $l = 3$ orbital is $4f$ **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) (i) Pauli's Exclusion principle states that no two electrons in an atom can have the same set of four quantum number. **1**

(ii) Hund's Rule states that in a set of degenerate orbitals like *p*, *d* and *f* pairing of electrons will not take place unless each orbital is singly occupied. **1**

(iii) It is impossible to predict both position and momentum of a moving microscopic particle simultaneously with complete accuracy. **1**

30. (a) Any four postulates of kinetic theory of gases **4**

(b) Definition **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) There are following four postulates of kinetic theory of gases :

(i) Gases are composed of large number of identical molecules moving randomly, having large intermolecular spaces.

(ii) The molecules undergo perfect elastic collisions among themselves and with the walls of the container.

(iii) The volume occupied by the molecules is negligible as compared to the total volume occupied by the gas.

(iv) The force of attraction between molecules is negligible. **4**

or any other

(b) Critical temperature is the temperature above which no gas can be liquefied, no matter how much pressure is applied. **1**

31. (a) $C + O_2 \longrightarrow CO_2 \qquad \Delta H_f = -393.5\ kJ$ ...(i)

$H_2 + \frac{1}{2} O_2 \longrightarrow H_2O \qquad \Delta H_f = -285.83\ kJ$ ...(ii)

$C_6H_6 + \frac{15}{2} O_2 \longrightarrow 6CO_2 + 3H_2O \qquad \Delta H_f = -3267\ kJ$ ...(iii) **1½**

Required eq^n. $6C + 3H_2 \longrightarrow C_6H_6 \qquad \Delta H = ?$ **1**

eq^n. (i) × 6 + eq^n. (ii) × 3 + Reverse eq^n. (iii) **1**

Calculation and Answer *i.e.*, $\Delta H_{f\,Benzene} = +48.51\ kJ$ **½**

(b) It does not depend on the quantity of the matter. **1**

32. (a) A process which takes place on its own without any external aid. **1**

$\Delta G = -ve$ **1**

(b) $\log K = \frac{-\Delta G^\circ}{2.303RT}$ **1**

$= \frac{-13.6 \times 10^3}{2.303 \times 8.514 \times 298} = 2.38$ **1**

$K = \text{anti log } 2.38$

$= 2.4 \times 10^2$ **1**

33. (a) **Chemical equilibrium :** A state of a reversible reaction in which the rate of forward reaction is equal to the rate of backward reaction so that the concentrations of reactants and products remain constant. **1**

$K_p = \frac{P^2_{NH_3}}{P_{N_2} \times P^3_{H_2}}$ **1**

$K_c = \frac{[NH_3]^2}{[N_2][H_2]^3}$ **1**

(b) Lewis acid — BF_3 ∵ it accepts a pair of electrons **1**

Lewis base — NH_3 ∵ it donates a pair of electrons **1**

34. (a) Correct statement of buffer and example **1+1**
(b) Statement of Le-chateliers Principle **2**
(c) HSO_4^- **[Scheme of Valuation 2018] 1**

Detailed Answer :

(a) **Buffer Solution :** The solution which resists change in pH on addition of small amount of acid or alkali is called buffer solution.

e.g., $CH_3COOH + CH_3COONa$ (Acidic buffer solution)

$NH_4OH + NH_4Cl$ (Basic buffer solution) **(Any one example)**

(b) **Le-Chatelier's Principle :** It states that "if an external stress is applied to a reacting system at equilibrium, the system will adjust itself in such a way that the effect of the stress is nullified."

V. 35. (a) 5-hydroxy pentan-2-one **1**
(b) Correct statement **1**
Correct example **1**
(c) $Na + C + N \longrightarrow NaCN$ **1**
$2Na + S \longrightarrow Na_2S$ **[Scheme of Valuation 2018] 1**

Detailed Answer :

(b) **Position isomerism :** Isomers that have same carbon skeletan but differ from each other in location of functional group. They have same molecular formula.

e.g., $CH_3CH_2CH_2OH$ Propan-1-ol

$CH_3—\underset{\displaystyle OH}{\underset{|}{CH}}—CH_3$ Propan-2-ol

36. (a) Any two differences between inductive effect and electromeric effect. **2**
(b) Principle **2**

$$\% \text{ ase of Halogen } = \frac{\text{At mass of halogen} \times \text{mass of AgX}}{\text{Mol. mass of AgX} \times \text{mass of org. compd.}} \times 100$$ **1**

[Scheme of Valuation 2018]

Detailed Answer :

(a) **2**

S. No.	Inductive Effect	Electromeric Effect
1.	It is transmitted through sigma electrons.	It is transmitted through π electrons.
2.	It is a permanent effect of polarisation.	It is a temporary effect.
3.	It occurs due to presence of an electron with drawing or electron releasing group at one end of the carbon chain in molecule	It occurs due to attack of a reagent on pi bonded carbon atoms.

(b) **Principle of Carius method :** In this method, a known quantity of organic compound is heated with fumic HNO_3 in the pressure of $AgNO_3$. **2**

$$\% \text{ of Halogen} = \frac{\text{At. Mass of halogen} \times \text{mass of AgX}}{\text{Mol. mass of AgX} \times \text{mass of organic compound}} \times 100$$ **1**

37. (a) $C_2H_5Br + KOH \xrightarrow[\text{alcoholic}]{} C_2H_4 + KBr + H_2O$ **1**

Explanation

(b) Mechanism of nitration of benzene

3 Steps

each step carries one mark **[Scheme of Valuation 2018] 3**

Detailed Answer :

(a) When bromoethane is treated with alcoholic KOH, it undergoes elimination reaction to form ethene. **1**

$C_2H_5Br + KOH \longrightarrow C_2H_4 + KBr + H_2O$

Bromoethane (alcoholic) ethene **1**

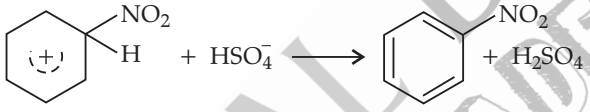
(b) Mechanism of nitration of benzene :

Step-1 : $HNO_3 + H_2SO_4 \longrightarrow HSO_4^- + H_3O^+ + NO_2^+$ **1**

Step-2 :

Benzene **1**

Step-3 :



Nitrobenzene **1**

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