MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Estd. 2000

IQAC

MUST KNOW CONCEPTS

MKC

CHEMISTRY

2021-2022

Course Code & Course Name : 21BSS11 - ENGINEERING CHEMISTRY

Year/Sem/Sec :

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
Unit-I : Water Technology				
1.	Hard water	-	Presence of Salts Mg and Ca in water	-
2.	Soft water	-	Absence of Salts Mg and Ca in water	-
3.	Alkalinity	-	Due to presence of OH^-,CO_3^{2-} & HCO_3^- ions	-
4.	PPM	-	Parts Per Million(1 PPM= 1 Mg/Lit)	-
5.	Hardness	-	Characteristic of water due to presence of Salts Mg and Ca in water	PPM
6.	EDTA	-	Ethylene Diamine Tetra Acetic Acid	-
7.	Zeolite	Ze	Green Sand, Molecular formula $Na_2O.Al_2O_3.xSiO_2.yH_2O$	-
8.	Calgon	-	Sodium Hexa Meta Phosphate – $Na_2[Na_4(PO_3)_6]$	-
9.	Caustic Embrittlement	-	Formation of irregular, intergranular cracks on the boiler metal. It is caused by high concentration of NaOH in boiler	-
10.	Carbonate Hardness	-	Hardness of water due to presence of $Ca(HCO_3)$ and $Mg(HCO_3)$ (**Temporary hardness)**	-
11.	Non-Carbonate Hardness	-	Hardness of water due to presence of sulphate and chloride Ca and Mg **(Permanent hardness)**	-
12.	Scale	-	Hard and strong Coating on the surface of walls due to the presence of high concentrated salts in boiler	-
13.	Sludge	-	Formation of loose and slimy precipitate due to the presence of high concentrated salts in boiler	-
14.	Priming	-	Production of wet stream in boiler	-
15.	Wet Stream	-	Stream containing droplets of water	-
16.	Foaming	-	Production of persistent foam or bubbles on the surface of the water in boiler	-

17.	Erichrome Black T	EBT	It is an indicator used for estimation of hardness by EDTA Method. It is form wine red coloured week colmplex with Ca^{2+} Mg^{2+}	-
18.	Buffer solution	-	During the Chemical reaction pH should be maintained at particular range so that add buffer solution to reaction mixture	-
19.	Blow down operation	-	It is process of removal of concentrated water by fresh water frequently from the boiler during steam production	-
20.	Carry over	-	The droplets of liquid water carry with some dissolved salts and suspended impurities.	-
21.	Aeration	-	The process of mixing water with air	-
22.	Disinfection	-	The process of removal of bacteria from drinking water	
23.	Break point chlorination	-	It indicates the amount of chlorine to kill bacteria and to remove organic matter present in water	-
24.	Boiler corrosion	-	The corrosion in boiler due to chemical or electrochemical attack of its environment	-
25.	Exchange resins	RH & ROH	The resins containing may be basic or acidic functional group are capable exchanging anion and cations in hard water	-
Unit-II :Corrosion and its Control				
26.	Corrosion	-	Destruction or deterioration of metals or alloys	-
27.	Chemical or dry corrosion	-	Corrosion due the direct attack or reaction of chemicals at dry condition	-
28.	Wet or electrochemical corrosion	-	Corrosion due the electrochemical reaction on the metal surface at wet condition	-
29.	Anodic reaction	-	Oxidation reaction which involves loss of electron	-
30.	Cathodic reaction	-	Reduction reaction which involves gain of electrons	-
31.	Decarburization	-	Removal of Carbon content from the steel	-
32.	Hydrogen embrittlement	-	Crack and blister of metal surface due to the reduction of hydrogen	-
33.	Sacrificial anodic protection	-	Metallic structure can be protected by connecting with more active metal	-
34.	Impressed current cathodic protection	-	Metallic structure can be protected by passing direct current to nullify the corrosion current	-
35.	Paint	-	Mechanical dispersion of pigment along with other ingredients	-
36.	Pigment	-	Color producing substance in paint	-
37.	Electroplating	-	One metal can be coated on other metal surface by passing direct current	-

38.	Electroless plating	-	One metal can be coated on other metal or non -metal surface by using reducing agent without current	-
39.	Electrochemical Series	-	Arrangement of various metallic electrodes based on their reduction electrode potential on hydrogen scale	-
40.	Oxidation Corrosion	-	The direct reaction of oxygen on metal surface at low or high temperature in the absence of air	-
41.	Pilling bed worth rule	-	The radio of the volume of the oxide film formed to the volume of metal consumed	-
42.	Stable oxide layer	-	It is fine structured and gets adsorbed tightly to the metal surfave	-
43.	Unstable oxide layer	-	It is produced on metal surface of nobel metals which easily decompose back in to metal and oxgen	-
44.	Volatile oxide layer	-	The oxide layer volatilize as soon as it is formed, leaving the metal surface for further corrosion	
45.	Inter-granular corrosion	-	corrosion that occurs in the grain boundaries in a metal/alloy	-
46.	Pitting corrosion	-	It is a localized attack, resulting in the formation of a hole around which the metal is relatively unattacked.	-
47.	Crevice corrosion	-	Crevice between metal and non-metallic material is in contact with liquids	-
48.	Galvanic Corrosion	-	when two different kinds of metals of the electrochemical series (more active metal and less active metal) are in contact with each other in the presence of solution or moisture	-
49.	Corrosion Inhibitors	-	when added in a small concentration to an environment reduces the corrosion rate of a metal exposed to that environment	-
50.	Mixed inhibitors		The substances, which reduce both the cathodic and anodic reactions	-
Unit-III :Polymer Chemistry				
51.	Polymer	-	Macromolecules with high molecular weight formed by repeating linking of monomers	-
52.	Monomer	-	Micromolecule which combines with each other to form polymer	-
53.	Polymerization	-	Process large no of small molecules combine to form a polymer	-
54.	Addition polymerization	-	Polymerization follow addition reaction (Single type of monomer having minimum one double bond)	-
55.	Condensation polymerization	-	Polymerization follow Condensation reaction (monomer having two polar groups)	-
56.	Co or joint polymerization	-	Polymerization follow addition reaction (more than one type of monomer involve in	-

			polymerization)	
57.	Homopolymer	-	Polymer containing same type of monomer (Polyethene)	-
58.	Heteropolymer	-	Polymer containing more than one type of monomers (Nylon 6,6)	-
59.	Degree of polymerization	-	No of repeating units in a polymer chain	-
60.	Functionality	-	No of reactive sites (Functional Group) in a monomer	-
61.	Isotactic	-	Functional groups are projected at same side with respect to main chain	-
62.	Syndiotactic	-	Functional groups are projected at alternate side with respect to main chain	-
63.	Atactici	-	Functional groups are projected at randomly with respect to main chain	-
64.	Plastics	-	High molecular weight organic materials which can moulded into any desired shape by the application of heat and pressure	-
65.	Thermoplastics	-	Soften on heating	-
66.	PVC	-	Polyvinylchloride	-
67.	Polydispersive index	PDI	Ratio of weight average molecular weight and number average molecular weight	-
68.	Natural polymer	-	Polymer exist as natural resources	-
69.	Synthetic Polymer	-	Polymers made by artificially using chemicals	-
70.	Random polymer	-	Monomers are arranged in randomly	-
71.	Block polymer		Monomers are arranged block wise	
72.	Degree of polymerization	-	The number of repeating units in the polymer chain	-
73.	Graft polymer	-	Different monomers as its backbone	-
74.	Sterospecific polymer	-	The orientation of monomeric units in a polymer molecule can takes place an orderly or disorderly fashion with respect to main chain	-
75.	Functionality	-	The number of bonding sites or reactive sites or functional present in monomer	
Unit-IV :Energy Resources & Storage Devices				
76.	Nuclear energy	-	The enormous amount of energy released during nuclear reaction	-
77.	Nuclear fission	-	Process of heavier nuclei splits into two or more smaller nuclei with liberation of large	-

			amount of energy	
78.	Nuclear fusion	-	Process of two small nuclei combine to form single nuclei with liberation of large amount of energy	-
79.	Critical Mass	-	The minimum amount of fissionable material required to continue nuclear chain reaction	-
80.	Super Critical Mass	-	More than the Critical Mass	-
81.	Sub- Critical Mass	-	Smaller than the Critical Mass	-
82.	Solar cell	-	It is a device which convert solar energy in to electricity	-
83.	Control rod	-	Control the speed of nuclear reaction in reactor by absorbing neutrons formed during nuclear reaction (Cd & B)	-
84.	Moderators	-	Slow down the speed of neutron in nuclear reactor (water, Heavy water & Graphite)	-
85.	Breeder reactor	-	Convert non-fissionable material in to fissionable material	-
86.	Battery	-	The arrangements of several electrochemical cells connected in a series	-
87.	Primary battery	-	Not rechargeable battery due to irreversible cell reaction	-
88.	Fuel cell	-	Convert energy of fuel into electrical energy	-
89.	Solid state battery	-	Electrolyte also used in solid state (Lithium battery)	-
90.	Lithium Battery	-	battery of Future	-
91.	Fuel Cells	-	Which convert chemical energy in to electricity without combustion	-
92.	NICAD Battery	-	Nickel-Cadmium Battery	-
93.	Multiplication factor	-	The number of neutrons resulting from single fission reactions	-
94.	Wind energy	-	Energy recovered from the force of wind	-
95.	Wind mills	-	The wind energy harnessed by making use of wind mills	-
96.	Spallation	-	Heavy nucleus in to several fragments	-
97.	Fuel battery	-	Large number of fuel cell is connected in series	-
98.	Electrolyte	-	Dissociate of ions	
99.	Lead acid Battery	-	Electrical energy converted in to chemical energy	-

100.	Primary battery	-	Electro chemical cell reaction is irreversible	-
Unit-V :Refractories & Abrasives				
101.	Abrasives	-	It is a hard substances, used for polishing, shaping, drilling and grinding operations	-
102.	Natural Abrasives	-	Diamond, Corundum, Emery, Quartz, Garnet	-
103.	Hardness	-	It is an ability of an abrasive to grind or scratch away other material	-
104.	Moh's Scale	-	It is an unit of hardness of abrasives	Mohs
105.	Soft Abrasives	-	Hardness in the range of 1-4 in moh's Scale	Mohs
106.	Abrasive power	-	The strength of an abrasive to grind to another material	-
107.	Refractories	-	It is a material, withstand high temperature and load without softening and melting	-
108.	Pyrometric Cone Equivalent	PCE	It is used to measure refractoriness of a refractories	-
109.	Rerfractorines under load	R.U.L	The load bearing capacity of a refractory can be measured	-
110.	Porosity	-	The ratio between pores volume and the bulk volume of refractories	-
111.	Thermal Spalling	-	It is the property of breaking, cracking or peeling off a refractory material under high temperature.	-
112.	Carborundam	-	SiC	-
113.	Bauxite	-	Alumina bricks are manufactured from bauxite, ore of alumina	-
114.	Types of Refractory's	-	Acid, Basic and Neutral	-
115.	Toughness	-	Hard and brittleness of the abrasive	-
116.	Diamond	-	Pure crystalline of carbon	-
117.	Corundum	-	Pure crystalline of alumina	
118.	Dimensional Stability	-	The volume change of refractory when subjected to higher temperature	-
119.	Quartz	-	$Si O_2$	-
120.	Garnet	-	The combination of Trisilicates of alumina, magnesia and ferrous oxide. General formula : $X_3Y_2(SiO_4)_3$	-
121.	Graphite	-	Neutral Refractory's	-
122.	Grinding wheel	-	It is used for removal of scales from iron	-

			surfaces, cutting tool harpening	
123.	loose powder	-	To clean the surface prior to coating abrasive powders are used.	-
124.	Reversible dimensional changes	-	The uniform expansion and contraction of a refractory material	-
125.	Irreversible dimensional changes	-	contraction or expansion of a refractory	-
Placement Questions				
126.	Chemistry	-	Chemistry is the scientific discipline involved with elements and compounds composed of atoms, molecules and ions: their composition, structure, properties, behavior and the changes they undergo during a reaction with other substances	-
127.	Organic chemistry	-	Organic chemistry is the study of carbon containing compounds	-
128.	Inorganic chemistry	-	Inorganic chemistry deals with other than carbon compounds	-
129.	Physical chemistry	-	Physical chemistry is the study of macroscopic, atomic, subatomic, and particulate phenomena in chemical systems	-
130.	Normality	N	Normality is a measure of concentration equal to the gram equivalent weight per liter of solution	-
131.	Molarity	M	Molarity indicates the number of moles of solute per liter of solution (moles/Liter)	-
132.	Molality	m	Molality is a measure of the concentration of a solute in a solution in terms of amount of substance in a specified amount of of the solvent	-
133.	Avogadro's number	-	Avogadro's number, number of units in one mole of any substance equal to 6.02214076 $\times 10^{23}$ atoms, ions, or molecules	-
134.	Atom	-	It is the smallest particle of a chemical element that can exist	-
135.	Molecules	-	Molecules are made up of atoms that are held together by chemical bonds	-
136.	Chemical bond	-	A chemical bond is a lasting attraction between atoms, ions or molecules that enables the formation of chemical compounds	-
137.	Types of bonds	-	There are three major types of chemical bonds: ionic, covalent, and metallic bond	-
138.	Ionic bond	-	Ionic bond form due to the transfer of an electron from one atom to another	-

139.	Covalent bond	-	Covalent bond involve the sharing of electrons between two atoms	-
140.	Metallic bonding	-	It is a type of chemical bonding that rises from the electrostatic attractive force between conduction electrons and positively charged metal ions	-
141.	Orbital	-	It is a specific path, in which electrons are revolved around the nucleus of an atom	-
142.	Types of orbitals	-	There are four types of orbitals namely s, p, d and f	-
143.	Chemical equilibrium	-	Chemical equilibrium is the state in which both reactants and products are present in same concentrations which have no change with time	-
144.	Acid	-	An acid is a molecule or ion capable of donating a proton (hydrogen ion H^+)	-
145.	Base	-	Bases are substances that, in aqueous solution, release hydroxide (OH^-) ions	-
146.	Stoichiometry or law of conservation of mass	-	total mass of the reactants equals the total mass of the products	-
147.	Oxidation	-	Oxidation is the loss of electrons during a reaction by a molecule, atom or ion	-
148.	Reduction	-	Reduction is the gaining of electrons during a reaction by a molecule, atom or ion	-
149.	Salt	-	Salt is a solid chemical compound consisting of an ionic assembly of cations and anions	-
150.	Hydrolysis	-	It is a chemical process in which a molecule of water is added to a substance	-