

Page No: 1/9

WINTER – 2012 EXAMINATION **Model Answer**

Basic Chemistry

Subject Code: 17103

Sub.	Mo	odel Answer		Marks	Total
Que.					Marks
a)	Isotopes of hydrogen: 1H1	1H ²	1H ³	2	2
	1 proton 0 neutron	1 proton 1 neutron	hydrogen-3 1 proton 2 neutrons 1 electron		
b)					2
	f				
		.		$\frac{1}{2}$	
c)	(valence) shell of an atom areii) Atom: Atom is the smalle	e called valence e est particle of an	electrons. element which cannot	1	2
d)	substance deposited or libera	ated at an electro	de during electrolysis	2	2
e)	the battery is called cathode. Electrolytic cell: It is devided bring about a chemical change. It is an apparatus of conver	ce in which an elges OR nient shape, size,	ectrical energy is used	1	2
	Que. a) b)	A lsotopes of hydrogen: H	a) Isotopes of hydrogen: H1	And a lastopes of hydrogen: H'	Answer Model Answer Model Answer Marks Isotopes of hydrogen: IH IH IH IH IH IH IH IH IH I



WINTER – 2012 EXAMINATION

Subject Code: 17103 Page No: 2/9 **Model Answer**

No. Que. Model Answer	Marks 2	Marks
ii) At anode, O_2 gas is evolved. iii) In electrolytic cell, colorless Sulphuric acid is formed. g) Given: $pH = 4.2596$ $[H^+] = ?$ Solution: $pH = -\log_{10}[H^+]$ $4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog}(-4.2596)$ $[H^+] = 5.50 \times 10^4 \text{ moles/lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		2
g) Given: pH = 4.2596 [H +] = ? Solution: pH = -log 10 [H +] 4.2596 = -log 10 [H +] [H +] = antilog (-4.2596) [H +] = 5.50 x 10-4 moles/ lit.		2
Given: $pH = 4.2596$ $[H^+] = ?$ Solution: $pH = -\log_{10}[H^+]$ $4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog}(-4.2596)$ $[H^+] = 5.50 \times 10^4 \text{ moles/lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		
Given: $pH = 4.2596$ $[H^+] = ?$ Solution: $pH = -\log_{10}[H^+]$ $4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog}(-4.2596)$ $[H^+] = 5.50 \times 10^{-4} \text{ moles/ lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		
Given: $pH = 4.2596$ $[H^+] = ?$ Solution: $pH = -\log_{10}[H^+]$ $4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog}(-4.2596)$ $[H^+] = 5.50 \times 10^{-4} \text{ moles/ lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		
Solution: $pH = -\log_{10}[H^{+}]$ $4.2596 = -\log_{10}[H^{+}]$ $[H^{+}] = \text{antilog}(-4.2596)$ $[H^{+}] = 5.50 \times 10^{-4} \text{ moles/lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		
$pH = -\log_{10}[H^+]$ $4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog } (-4.2596)$ $[H^+] = 5.50 \times 10^{-4} \text{ moles/ lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these	1/2	2
$4.2596 = -\log_{10}[H^+]$ $[H^+] = \text{antilog}(-4.2596)$ $[H^+] = 5.50 \times 10^{-4} \text{ moles/ lit.}$ i) Gangue: Ore is associated with impurities like sand and clay; these		
[H +] = antilog (-4.2596) [H +] = 5.50 x 10 ⁻⁴ moles/ lit. i) Gangue: Ore is associated with impurities like sand and clay; these	1/2	
[H +] = antilog (-4.2596) [H +] = 5.50 x 10 ⁻⁴ moles/ lit. i) Gangue: Ore is associated with impurities like sand and clay; these		
[H +] = 5.50 x 10 ⁻⁴ moles/ lit. i) Gangue: Ore is associated with impurities like sand and clay; these	1/2	
i) Gangue: Ore is associated with impurities like sand and clay; these	1/2	
unwanted impurities associated with the ores are known as gangue o matrix.	1 1	2
ii) Ore: The mineral from which the metal is conveniently and economically extracted is known as ore.	1 1	
Purposes of Calcination: (consider any two)	1	2
1) To convert carbonates and hydroxide into oxides.	mark	
$CaCO_3 \rightarrow CaO + CO_2$	each	
(Lime stone) Calcium oxide		
$CuCO_3 Cu(OH)_2 \rightarrow 2CuO + CO_2 + H_2O$		
(Malachite) Copper oxide		
2) To remove the moisture		
Fe ₂ O ₃ . $3H_2O \rightarrow Fe_2O_3 + 3H_2O$		
3) To remove the volatile impurities.4) To make the ore porous for easy reduction.	l .	1



WINTER – 2012 EXAMINATION

Subject Code: 17103 Page No: 3/9 **Model Answer**

Que. No.	Sub. Que.		Model Ansv	ver	Marks	Total Marks
1.	j)	Compositi	on of Duralumin: Al : 95%		2	2
			Cu: 4%			
			Mg: 0.5%			
			Mn: 0.5%			
	k)		k is the special property of rubb ces can stick to each other. This hicles.	•	2	2
	1)	in refrigera	s low coefficient of thermal and ation and air conditioning. longy, porous, strong, light in v	l electrical expansion, it is used weight, it is used in packing of	1	2
2.	a)		n between Atomic number &			4
		Sr. No.	Atomic Number (z)	Atomic mass no. (A)	1	
		1)	The no. of protons in the nucleus is equal to the no. of electrons in extra nuclear part of an atom is called at. no. of an element. i.e. Z = p = e	The sum of protons & neutrons present in the nucleus of an atom of element is called at mass number of an element. i.e. $A = Z + n$	mark each	
		2)	Elements are placed in periodic table according to their at. number	Elements are not placed in periodic table as per at mass number.		
		3)	Different element have different atomic number e.g. ₂ He ⁴ , ₁ H ¹ , ₆ C ¹²	Atoms of the same of different elements may or may not have the same at mass no.		
		4)	Chemical properties of an element depend on atomic no.	Chemical properties element are not depends on at mass no.		
		5)	At no. does not decide atomic weight of element.	At mass no. of element decide atomic weight of element.		



WINTER – 2012 EXAMINATION

Subject Code: 17103 **Model Answer** Page No: 4/9

Que.	Sub.	Model Answer	Marks	Total
No.	Que.			Mark
2.	b)	i) ${}_{2}\text{He}^{4} = 1\text{s}^{2}$ ii) ${}_{6}\text{C}^{12} = 1\text{s}^{2}$, 2s^{2} , 2p^{2} iii) ${}_{12}\text{Mg}^{24} = 1\text{s}^{2}$, 2s^{2} , 2p^{6} , 3s^{2} iv) ${}_{19}\text{K}^{39} = 1\text{s}^{2}$, 2s^{2} , 2p^{6} , 3s^{2} , 3p^{6} , 4s^{1}	1 1 1 1	4
	c)	Covalency: The valency obtained by the mutual sharing of electrons between the similar or dissimilar atoms, so as to complete their last orbits is called 'Co-volency' or 'Co-valent bond'.	1	4
		Formation of Nitrogen molecule (N ₂)		
		Three shared pairs of electrons \times N \times	1	
		Nitrogen (Z=7) 1S ² , 2S ² , 2P ³ (2, 5) Nitrogen molecule is diatomic. Each nitrogen atom (2, 5) is in short of 3 electrons to complete the octet. So each nitrogen atom contributes 3 electrons for sharing. Thus, nitrogen molecule is formed by sharing three pairs of electrons between two atoms of nitrogen & hence completing the octet of each. Three shared pairs form a triple covalent bond.	2	
	d)	Degree of ionization: - "The fraction of the total number of molecules of an electrolyte that ionizes in solution called the degree of ionization".	1	4
		Factors affecting degree of ionization (any three)		
		1) Nature of Solute: - Ionic compounds such as acids, bases & salts are highly ionized in solution. e.g. strong acids like HCl, H ₂ SO ₄ & strong bases like NaOH, KOH are highly ionized in solution. Weak acids like CH ₃ COOH & weak bases NH ₄ OH are weakly ionized in solution.	1 mark each	



WINTER – 2012 EXAMINATION

Subject Code: 17103 **Model Answer** Page No: 5/9

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
2.	Que.	Nature of Solvent: - In polar solvents like water & ammonia, degree of		Marks
		ionizations is more. In non polar solvents degree of ionization is less.		
		Concentration of the solution: - If concentration of solution is more,		
		then degree of ionization is less.		
		Temperature: - At higher temperature molecules acquire thermal energy		
		hence degree of ionization increases with increase in temperature.		
	e)	Electrorefining: - 'The process in which a pure metal can be obtained from the impure metal by the method of electrolysis is known as electrorefining.' Or 'The process of purification of metal into its most pure form by the passage of	1	4
		electric current is called electrorefining.'		4
		Pure copper plate (cathode) Electrolyte Anode mud	1	
		Consider electrorefining of impure copper rod. a) Anode electrode: Impure metal (Cu) rod (thick)		
		b) Cathode electrode :- pure metal rod (Thin)		
		c) Electrolyte:-Solution of salt of metal. By the passage of electric current, the anode of impure metal goes in Soln. in the form of metal ions. The electrolyte breaks up into positively charged metal ions & negative ions. Positively charged metal ions go to the cathode & are deposited thereafter neutralizing their charge. The negatively charged ions go to the anode & take an equivalent amount of pure metal & again change into electrolyte. The process is continued till whole of the pure metal gets transferred to cathode. As a result of electrolysis, the anode gets dissolved & impurities get settled down below the anode as 'anode mud'. The cathode is refined metal. It is washed, dried & put to use. A no. of metal like Zn, Cu, Sn, Ag etc. is refined by the process of electrolysis. (Note: Marks shall be given for electrorefining of Cu with reaction also)	2	



WINTER – 2012 EXAMINATION

Subject Code: 17103 **Model Answer** Page No: 6/9

Que.	Sub.			Total
No.	Que.	Model Answer	Marks	Marks
2.	f)	Given: C=2 amperes t= 16 minutes & 5 seconds= 965 seconds At. wt. of Cu= 63.5 Valency = 2 To calculate: w =?	1	4
		Step i) Atomic weight = equivalent weight x valency Equivalent weight (c. e.) = Atomic weight / valency Equivalent weight (c. e.) = 63.5 / 2 = 31.75	1	
		Step ii) c. e. = $96,500 ext{ x e. c. e. (z)}$ e. c. e. (z) = c. e. / $96,500$ e. c. e. (z) = $31.75 / 96,500 = 3.29 ext{ x } 10^{-4}$	1	
		Step iii) $w = z \times c \times t$ $w = 3.29 \times 10^{-4} \times 2 \times 965$ w = 0.635	1	
3.	a)	Concentration: The concentration of ore means the removal of gangue or matrix from crushed ore.	1	4
		Gravity separation process: is a process of concentration of ore to remove gangue from crushed ore under gravity.		
		Principle: In this process ore is mixed with water and washed by directing it on inclined surface having depressions. The lighter sandy and clay impurities are washed away. While heavier ore particles are left behind in the depressions as shown in the,	1 ½	
		Ore Water Sloping platform	1 ½	
		Ore particles		
		Gravity separation is suitable for oxide ores like haematite, tinstone and carbonate ores.		



WINTER – 2012 EXAMINATION

Subject Code: 17103 Page No: 7/9 **Model Answer**

Que.	Sub.			Total
No.	Que.	Model Answer	Marks	Marks
3.	b)	i) Hardness: It is a property which enables the material to resist penetration or abrasion or scratching by other materials.	1	4
		ii) Ductility: It is a property of a material which allows it to be drawn into wires.	1	
		iii) Soldering : It is defined as a process of joining the metal surfaces by introducing a molten non –ferrous ally with melting point below 400° C between them is known as soldering.	1	
		iv) Brazing : It is defined as a process of joining the metal surfaces by introducing a molten non –ferrous ally with melting point above 400° C between them is known as brazing.	1	
	c)	Fusion method for preparation of alloys.		
		In this method, metal having higher melting point is melted in silica crucible & then other elements of low melting points are added to it. After stirring we get a homogeneous mixture of these elements i.e. an alloy. This process is known as fusion.	2	4
		During fusion oxidation of molten mass is prevented by covering with fine charcoal powder. Alloys like brass, bronze are prepared by this fusion method.eg-brass, an alloy of copper & zinc is prepared as copper with melting pt. 1090°c & zinc melting point. 420°c. Copper is first melted in crucible & then zinc is added to this molten mass. After stirring homogeneous mixture of brass		
		Refractory lined crucible avoid oxidation for stirring molten mixture Alloy components in proper proportions Fusion Fusion mixture	2	



WINTER – 2012 EXAMINATION

Subject Code: 17103 Page No: 8/9 **Model Answer**

Que. No.	Sub. Que.		Model Ans	swer	Marks	Total Marks
3.	d)	Properties	of plastics and corresponding	engineering applications : (any 4)	1	4
		Sr. No.	Properties	Applications	1 mark	
		1.	Low specific gravity and high tensile strength.	Air-craft, motor car, structural purpose	- each	
		2.	In combination with metals.	Steering wheels of automobiles plastic covered dash board		
		3.	Low electrical conductivity and good corrosion resistance.	Electrical insulator, for giving coating on printed circuit in electrical circuit.	-	
		4.	Bad conductor of heat.	Handles for electric irons, soldering iron, for pans, pressure cookers etc.		
		5.	Water repelling e.g polystyrene refined with glass fibers.	End sections of condensers in electricity generating stations Tarpaulin.		
		6.	Clear transparent, translucent or opaque & can take up wide range of colors & has high decorative value.	Safety glass, windscreens for automobiles knobs for radios automobiles & household applications.		
		7.	Good adhesive property.	Adhesive for laminated wood products, synthetic paints & varnishes.		
		8.	High optical clarity & smoothness	Optical lenses		
		9.	Greater strength per unit weight, greater resistance to wear & tear. Hard & high shock absorbing capacity.	Timing gears, self-lubricating bearings, pulleys, etc. Noise & vibrations are reduced.		



WINTER – 2012 EXAMINATION

Subject Code: 17103 Page No: 9/9 **Model Answer**

Que.	Sub.	Model Answer	Marks	Total
No.	Que.			Marks
3.	e)	 It has low strength, hardness and toughness. It has large water absorbing capacity. It is non resistant to non polar solvents. It is attacked by oxidizing agents. During summer, the raw rubber becomes soft & sticky while in cold weather it becomes hard & brittle. 	3	4
		6. It is too weak to be used in heavy duty operation.		
		7. On stretching, it undergoes permanent deformation.Vulcanization is the process that increases the stiffness of natural rubber.		
		Valeanization is the process that increases the summess of natural rabber.	1	
	f)	Thermal insulators: The substances having extremely low conductivity which prevent the loss of heat by conduction or radiation are called insulators. E.gGlass wool.	1	4
		Uses of glass wool:- (consider any three)		
		 It is used for insulation against heat of house domestic applications such as ovens refrigerators, etc. It is also used for insulating steam metal pipe lines in industry. As it has great resistance to chemicals used as a filter for filtering corrosive liquids. It is used as a dust filter in vehicle machines It is used for electrical insulation and for sound proofing. It is used as a shock absorber in chemical equipments. e.gVictors Meyer's apparatus. 	1 mark each	