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PUBLIC EXAMINATION-2021-22

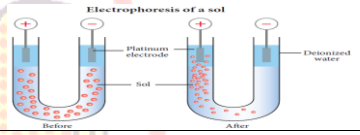
CLASS : XII 94420 09663, 93608 20805, 98423 28258 **MARKS : 70**

SUB JECT : CHEMISTRY **TENTATIVE ANSWER KEY-13.05.2022**

Q.NO	ANSWER		MARKS
	TYPE A	TYPE B	
1.	c)$1S^2 2S^2 2P^6 3S^2 3P^3$	c) Glycine	EACH ONE 1MARK
2.	a)$Al_2O_3.NH_2O$	a)Methanal	
3.	d)30 minutes	a) Basic	
4.	c)Sn/HCl	d) FeO	
5.	a)Methanal	c) Hydrolysis of sucrose in presence of dil.HCl	
6.	c) $[Fe(co)_5]$	c) Sn/HCl	
7.	a) HPO_4^{2-}	d) Charge carried by one mole of electrons	
8.	a) Basic	a) $Al_2O_3.NH_2O$	
9.	c) Hydrolysis of sucrose in presence of dil.HCl	d) 30 minutes	
10.	c) Nucleophilic addition	a) HPO_4^{2-}	
11.	c) +3	c) $[Fe(co)_5]$	
12.	d) Charge carried by one mole of electrons	c) +3	
13.	c) Glycine	c) $1S^2 2S^2 2P^6 3S^2 3P^3$	
14.	d) FeO	a) Liquid in gas	
15.	a) Liquid in gas	c) Nucleophilic addition	
	PART-II(Q.NO-24-COMPULSORY)		6X2=12
16.			2MARKS

MINERALS	ORES
A naturally occurring substance obtained by mining which contains the metal in free state or in the form of compounds like oxides, sulphides etc... is called a **mineral**. Metals cannot be extracted easily from minerals.	Minerals that contains a high percentage of metal, from which it can be extracted conveniently and economically are called **ores**. Ores can be used for the extraction of metals on a large scale readily and economically.
All minerals are not ores	All ores are minerals
It contains a low percentage of metal	It contains a high percentage of metals
Minerals of Aluminium - China clay $Al_2O_3\ SiO_2.2H_2O$	Ores of Aluminium - Bauxite $Al_2O_3.2H_2O$

17.	The electronic configuration of Fe is [Ar] $3d^6\ 4s^2$ Fe^{2+}= [Ar] $3d^6$ Fe^{3+}= [Ar] $3d^5$ Half filled d shell which is highly stable. So Fe^{3+} is more stable than Fe^{2+}	1MARK 1MARK
18.	The number of ligand donor atoms bonded to a central metal ion in a complex is called the co ordination number of the metal.	

	(OR) The number of nearest neighbours that surrounding a particle in a crystal is called the coordination number.	**2MARKS**
19.	In covalent crystals, the constituents (atom only) are bound together in a three dimensional network entirely by covalent bonds. **Example:Diamond, silicon carbide**	**2MARKS**
20.	i)Decompostion of dinitrogen pentoxide $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$ (ii) Decompostion of thionyl chloride $SO_2Cl_{2(l)} \rightarrow SO_2(g) + Cl_2(g)$ (iii) Decomposition of the H_2O_2 in aqueous solution. $H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ (iv) Isomerisation of cyclopropane to propene	**2MARKS**
21.	i.Arrhenius theory does not explain the behaviour of acids and bases in non aqueous solvents such as acetone, Tetrahydrofuran etc... ii. This theory does not account for the basicity of the substances like ammonia (NH_3) which do not possess hydroxyl group.	**1MARK** **1 MARK**
22.	**This migration of sol particles under the influence of electric field is called electrophoresis or cataphoresis**. If the sol particles migrate to the cathode, then they posses positive (+) charges, and if the sol particles migrate to the anode then they have negative charges(-). Thus from the direction of migration of sol particles we can determine the charge of the sol particles. 	**2MARKS**
23.	a)2-methyl –propane-2-ol b)Phenyl methanol	**1+1MARK**
24.	$CH_3Br \xrightarrow{NaN_3} CH_3N_3 \xrightarrow{LiAlH_4} CH_3NH_2 + N_2$ Methyl azide(A) methylamine(B)	**2MARKS**
	PART-III(Q.NO-33-COMPULSORY)	**6X3=18**
25.	i)Each halogen combines with other halogens to form a series of compounds called inter halogen compounds. **EXAMPLES:ClF , ClF_3 ,IF_5 ,IF_7 ,IF_3 ,BrCl, ICl_3,BrF ,BrF_3 ,BrF_5,BrCl, ICl_3, ICl, IBr(Any one)**	**2MARKS** **1 MARK**
26.	i)They are hard and show electrical and thermal conductivity (ii) They have high melting points higher than those of pure metals (iii) Transition metal hydrides are used as powerful reducing agents (iv) Metallic carbides are chemically inert.	**3MARKS**
27.	$k=Ae^{-Ea/RT}$ A the frequency factor, R the gas constant, Ea the activation energy of the reaction and, T the absolute temperature (in K)	**1MARK** **2MARKS**
28.	If the interionic attraction between the oppositely charged ions of solutes increases, the conductance will decrease. ❖ Solvent of higher dielectric constant show high conductance in solution. ❖ Conductance is inversely proportional to the Viscosity of the medium. i.e., conductivity increases with the decrease in viscosity.	

	❖ If the temperature of the electrolytic solution increases, conductance also increases. Increase in temperature increases the kinetic energy of the ions and decreases the attractive force between the oppositely charged ions and hence conductivity increases. ❖ Molar conductance of a solution increases with increase in dilution. This is because, for a strong electrolyte, inter ionic forces of attraction decrease with dilution. For a weak electrolyte, degree of dissociation increases with dilution.	**3MARKS**
29.	i)In a homogeneous catalysed reaction, the reactants, products and catalyst are present in the same phase. ii) $2SO_{2\,(g)} + O_{(g)} + [NO]_{(g)} \longrightarrow 2SO_{3g)} + [NO]_{(g)}$	**2MARKS** **1MARK**
30.	**i)** $2CH_3\text{-}CH_2\text{-}OH \xrightarrow[413K]{H_2SO_4} CH_3\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_3$ **(OR)** ethanol diethylether **ii)** $CH_3\text{-}O\text{-}CH_2\text{-}ONa + CH_3CH_2Br \xrightarrow{\Delta} CH_3\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_3$	**3MARKS**
31.	$CH_3\text{-}\underset{\underset{O}{\|}}{C}\text{-}CH_3 \xrightarrow[NaOH]{3Cl_2} CCl_3\text{-}\underset{\underset{O}{\|}}{C}\text{-}CH_3 \xrightarrow{NaOH} CHCl_3 + CH_3\text{-}\underset{\underset{O}{\|}}{C}\text{-}ONa$	**3MARKS**
32.	i)Sugar differing in confi guration at an asymmetric centre is known as epimers. ii)glucose and mannose are epimers at C2 carbon and glucose and galactose are epimers at C4 carbon.	**2MARKS** **1MARK**
33.	a)NH_3-Ammine b)Ag^+ c)diamminesilver(I)ion	**3MARKS**
	PART-IV	**5X5=25**
34.a)(i)	i)It used for ore having high specific gravity is separated from the gangue that has low specific gravity by simply washing with running water. ii)Ore is crushed to finely powder form and treated with rapidly flowing current of water. During this process lighter gangue particles are washed away by the running water. Example : **Hematite and tinstone**	**2MARKS**
(ii)	i)The impure nickel is heated in a stream of carbon monoxide at around 350 K. The nickel reacts with the CO to form a highly volatile nickel tetracarbonyl. The solid impurities are left behind. $Ni\ (s) + 4\ CO\ (g) \xrightarrow{350K} Ni(CO)4\ (g)$ ii)On heating the nickel tetracarbonyl around 460 K, the complex decomposes to give pure metal. $Ni(CO)4\ (g) \xrightarrow{460K} Ni\ (s) + 4\ CO\ (g)$	$1\frac{1}{2}$**MARKS** $1\frac{1}{2}$**MARKS**
	(OR)	
b) (i)	Heavier post-transition metals, the outer s electrons (ns) have a tendency to remain inert and show reluctance to take part in the bonding.	**2MARKS**
(ii)	i) Boric acid is used in the manufacture of pottery glases, enamels and pigments ii) It is used as an antiseptic and as an eye lotion. iii) It is also used as a food preservative	**3MARKS**

35.a)(i)	1.Oxygen is one of the essential component for the survival of living organisms. 2. It is used in welding (oxyacetylene welding) 3. Liquid oxygen is used as fuel in rockets etc...	**2MARKS**
(ii)	➢ Bleaching powder is produced by passing chlorine gas through dry slaked lime (calcium hydroxide). ➢ $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$	**3MARKS**
	(OR)	
b)		**5MARKS**

1.Most of the elements exhibit, two types of valence namely primary valence and secondary valence and each element tend to satisfy both the valences. In modern terminology, the primary valence is referred as the oxidation state of the metal atom and the secondary valence as the coordination number. For example, according to Werner, the primary and secondary valences of cobalt are 3 and 6 respectively.	4.According to Werner, there are two spheres of attraction around a metal atom/ion in a complex. The inner sphere is known as coordination sphere and the groups present in this sphere are firmly attached to the metal. The outer sphere is called ionisation sphere. The groups present in this sphere are loosely bound to the central metal ion and hence can be separated into ions upon dissolving the complex in a suitable solvent.
2. The primary valence of a metal ion is positive in most of the cases and zero in certain cases. They are always satisfied by negative ions. For example in the complex $CoCl_3.6NH_3$, The primary valence of Co is +3 and is satisfied by $3Cl^-$ ions	5.The primary valences are non-directional while the secondary valences are directional. The geometry of the complex is determined by the spacial arrangement of the groups which satisfy the secondary valence. For example, if a metal ion has a secondary valence of six, it has an octahedral geometry. If the secondary valence is 4, it has either tetrahedral or square planar geometry.
iii.The secondary valence is satisfied by negative ions, neutral molecules, positive ions or the combination of these. For example, in $CoCl_3.6NH_3$ the secondary valence of cobalt is 6 and is satisfied by six neutral ammonia molecules, whereas in $CoCl_3.5NH_3$ the secondary valence of cobalt is satisfied by five neutral ammonia molecules and a Cl^- ion	

36.a)

S.no	Crystalline solids	Amorphous solids
1	Long range orderly arrangement of constituents	Short range, random arrangement of constituents.
2	Definite shape	Irregular shape
3	Generally crystalline solids are anisotropic in nature.	They are isotropic like liquids
4	They are true solids	They are considered as pseudo solids (or) super cooled liquids
5	Definite Heat of fusion	Definite Heat of fusion is not definite
6	They have sharp melting points.	Gradually soften over a range of temperature and so can be moulded.
7	Eg: Nacl ; diamond	Eg: Rubber, plastics, glass
➢	**(ANY FIVE POINTS)**	

5MARKS

(OR)

b) (i) pH of a solution is defined as the negative logarithm of base10 of the molar concentration of the hydronium ions present in the solution. **(OR)**

$$pH = - \log_{10}[H_3O^+].$$

2MARKS

(ii) i)Thus, the dissociation of a weak acid (CH_3COOH) is suppressed in the presence of a salt (CH_3COONa) containing an ion common to the weak electrolyte. It is called the common ion effect.

ii)

$$CH_3COOH(aq) \rightleftharpoons H^+(aq) + CH_3COO^-(aq)$$

However, the added salt, sodium acetate, completely dissociates to produce Na^+ and CH_3COO^- ion

$$CH_3COONa(aq) \rightarrow Na^+(aq) + CH_3COO^-(aq)$$

3MARKS

37.a) .

- Let us consider an electrochemical cell for which the overall redox reaction is,

  $xA + yB \leftrightarrows lC + mD$

- The reaction quotient Q for the above reaction is given below

$$Q = \frac{[C]^l\ [D]^m}{[A]^x\ [B]^y} \quad \ldots\ldots\ldots (9.28)$$

- We have already learnt that,

  $\Delta G = \Delta G^\circ + RT \ln Q$ ..... (9.29)

- The Gibbs free energy can be related to the cell emf as follows [∴ equation (9.24) and (9.25)]

$\Delta G = - nFE_{cell}$; $\Delta G^\circ = - nFE^\circ_{cell}$

Substitute these values and Q from (9.28) in the equation (9.29)

$$(9.29) \Rightarrow - nFE_{cell} = - nFE^\circ_{cell} + RT \ln \frac{[C]^l[D]^m}{[A]^x\ [B]^y} \quad \ldots\ldots\ldots (9.30)$$

5MARKS

Divide the whole equation (9.30) by (-nF)

$$(9.25) \Rightarrow E_{cell} = E^{\circ}_{cell} - \frac{RT}{nF} \ln \frac{[C]^{r}[D]^{m}}{[A]^{x}[B]^{y}}$$

$$(or)\ E_{cell} = E^{\circ}_{cell} - \frac{2.303RT}{nF} \log \frac{[C]^{r}[D]^{m}}{[A]^{x}[B]^{y}} \quad .....(9.31)$$

The above equation (9.31) is called the Nernst equation

At 25°C (298K), the above equation (9.31) becomes,

$$E_{cell} = E^{\circ}_{cell} - \frac{2.303 \times 8.314 \times 298}{n(96500)} \log \frac{[C]^{r}[D]^{m}}{[A]^{x}[B]^{y}}$$

$$E_{cell} = E^{\circ}_{cell} - \frac{0.0591}{n} \log \frac{[C]^{r}[D]^{m}}{[A]^{x}[B]^{y}} \quad .....(9.32)$$

$[\therefore R = 8.314\ JK^{-1}\ mol^{-1}$, $T = 298\ K$, $1\ F = 96500\ C\ mol^{-1}]$

b)

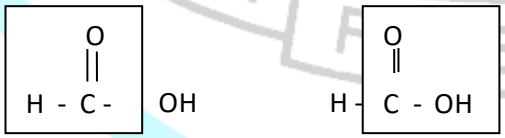
i)For a chemical reaction, catalyst is needed in very small quantity. Generally, a pinch of catalyst is enough for a reaction in bulk.
2. There may be some physical changes, but the catalyst remains unchanged in mass and chemical composition in a chemical reaction.
3. A catalyst itself cannot initiate a reaction. It means it can not start a reaction which is not taking place. But, if the reaction is taking place in a slow rate it can increase its rate.
4. A solid catalyst will be more effective if it is taken in a finely divided form.
5. A catalyst can catalyse a particular type of reaction, hence they are said to be specific in nature.
6. In an equilibrium reaction, presence of catalyst reduces the time for attainment of equilibrium and hence it does not affect the position of equilibrium and the value of equilibrium constant.
7. A catalyst is highly effective at a particular temperature called as optimum temperature.
8. Presence of a catalyst generally does not change the nature of products For example. $2SO_2 + 2\ O_2 \rightarrow SO_3$ This reaction is slow in the absence of a catalyst, but fast in the presence of Pt catalyst. **(Any five points)**

5MARKS

38.a)

i)Formic acid contains both an aldehyde as well as an acid group. Hence, like other aldehydes, formic acid can easily be oxidised and therefore acts as a strong reducing agent

ii)Aldehyde group Carboxylic acid group



2MARKS

i)Formic acid reduces Tollens reagent (ammonical silver nitrate solution) to metallicsilver.

$HCOO^- + 2Ag^+ + 3OH^- \longrightarrow 2\ Ag + CO_3^{2-} + 2H_2O$

(Tollens reagent) Silver mirror.

$1\frac{1}{2}$MARKS

ii) Formic acid reduces Fehlings solution. It reduces blue coloured cupric ions to red coloured cuprous ions.

$HCOO^- + 2Cu^{2+} + 5\ OH^- \longrightarrow Cu_2O + CO3^{2-} + 3\ H_2O$

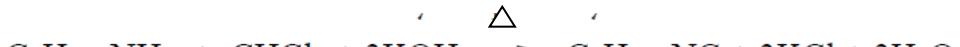
(Fehlings solution) red precipitate

$1\frac{1}{2}$MARKS

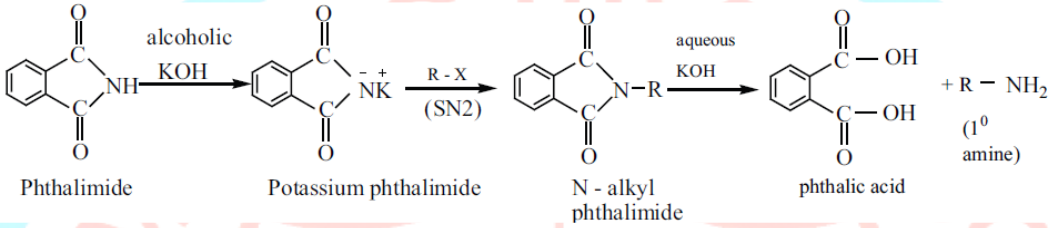
(OR)

b)

2MARKS



3MARKS



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