Parvatibai Chowgule College of Arts & Science, Margao-Goa.

(Higher Secondary Section)

Class: - XII Science | **Max Marks:- 20**

Day: Tuesday | **(Subject:-Chemistry)** | **Date:- 27-10-2015**

Time: - 12.00 a.m. TO 01.00 p.m. | **Answer key** | **Duration: - One Hour**

Total No of Questions: - 2 | **for Formative Test-II October - 2015** | **Total No of Printed pages: 2**

Q No ***INSTRUCTIONS:*** **Marks**

Q 1 A **Explain the following** **3**

a) **Formation of complex compounds w.r.t transition elements.**

The transition metals form a large number of complex compounds. This is due to the comparatively smaller sizes of the metal ions, their high ionic charges and the availability of *d* orbitals for bond formation.

A few examples are: $[Fe(CN)_6]^{3-}$, $[Fe(CN)_6]^{4-}$, $[Cu(NH_3)_4]^{2+}$ and $[PtCl_4]^{2-}$

b) **Formation of coloured compounds w.r.t transition elements.**

( ) Most of the complexes of transition metals are coloured. This is because of the absorption of radiation from visible light region to promote an electron from one of the *d*–orbitals to another. In the presence of ligands, the *d*-orbitals split up into two sets of orbitals having different energies. Therefore, the transition of electrons can take place from one set toanother. The energy required for these transitions is quite small and falls in the visible region of radiation. The ions of transition metals absorb the radiation of a particular wavelength and the rest is reflected, imparting colour to the solution.

c) **Zirconium and Hafnium have almost similar radii.**

The atomic radii of Zr (160 pm) and Hf (159 pm) is almost identical due to lanthanoid contraction

Q 1 B Write chemical reactions to show the preparation of potassium dichromate from chromite ore. **2**

Step (1): Preparation of sodium chromate

$$4FeCr_2O_4 + 16NaOH + 7O_2 \longrightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8H_2O$$

Step (2): Conversion of sodium chromate into sodium dichromate

$$2Na_2CrO_4 + conc.H_2SO_4 \longrightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$$

Step(3): Conversion of sodium dichromate to potassium dichromate

$$Na_2Cr_2O_7 + 2KCl \longrightarrow K_2Cr_2O_7 + 2NaCl$$

Potassium chloride being less soluble than sodium chloride is obtained in the form of orange coloured crystals and can be removed by filtration.

Q 1 C Determine the values of equilibrium constant (K_c) and ΔG° for the following reactions: **2**

$$Ni(s)+2Ag^+(aq)\longrightarrow Ni^{2+}(aq)+2Ag(s),\quad E^0=1.05V$$

$$\left(1F = 96500\ C\ mol^{-1}\right)$$

Ans.

$Ni_{(s)} + 2Ag^+_{(aq)} \longrightarrow Ni^{2+}_{(aq)} + 2Ag_{(s)},\ E^0 = 1.05V$

The galvanic cell of the given cell reaction is depicted as :

$Ni(s)|Ni^{2+}||Ag^+|Ag(s)$

Now, the standard cell potential is

$E^0_{cell} = 1.05V$

$n = 2$

$F = 96500\ C\ mol^{-1}$

$\Delta_r G^0 = -nFE^0_{cell}$

$\Delta_r G^0 = -2\times 96500\ C mol^{-1}\times 1.05\ V$

$= -202650\ J mol^{-1}$

$= -202.65\ kJ mol^{-1}$

Q 1 D **State the following**. **2**

1. **Faraday's First Law of Electrolysis**

The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte (solution or melt).

2. **Kohlrausch's law of independent migration of ions.**

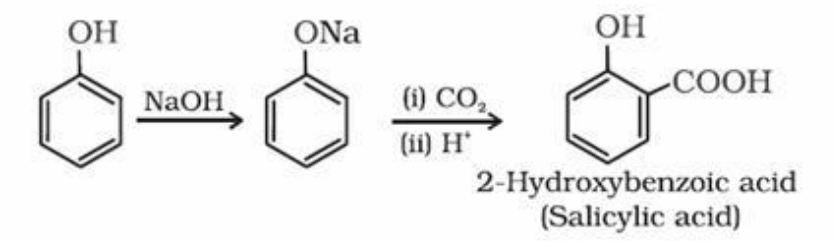
The law states that *limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte.*

Q 1 E On hydrolysis maltose gives____ **Two molecules of glucose** **1**

Q 2 A **Explain the following reactions with an example.** **3**

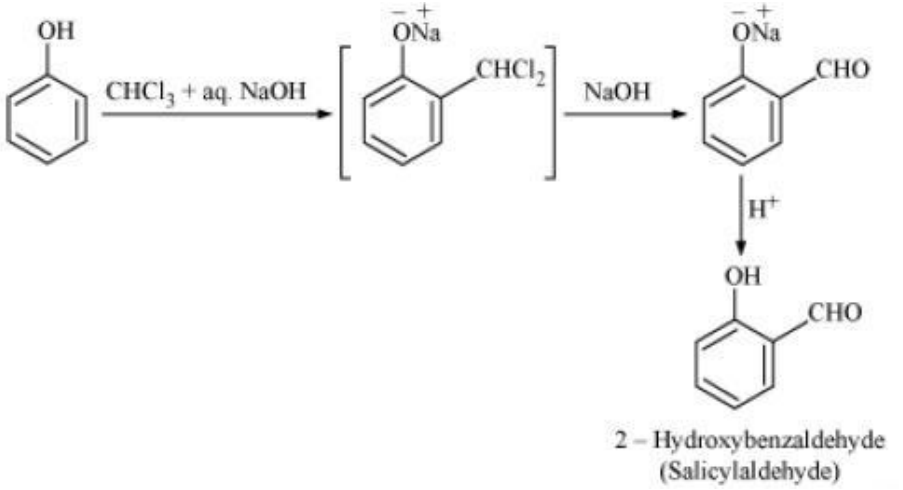
a) Kolbe's reaction

In this reaction, phenol is reacted with sodium hydroxide to form sodium phenoxide. Sodium phenoxide formed reacts with carbon dioxide to form orthohydroxy benzoic acid or salicylic acid as the main product.



b) Reimer-Teimann reaction

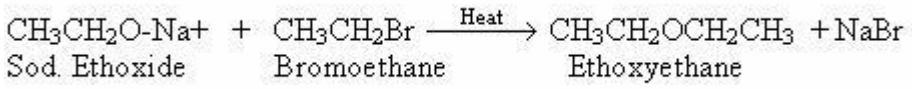
Riemer-Tiemann reaction: Riemer-Tiemann reaction involves the treatment of phenol with chloroform in the presence of aqueous sodium hydroxide at 340 K followed by hydrolysis of the resulting product to give 2-hydroxybenzaldehyde (salicylaldehyde). The chemical reaction can be represented as follows.



2 – Hydroxybenzaldehyde
(Salicylaldehyde)

c) Williamson's synthesis

Sodium or potassium alkoxides and phenoxides on treatment with alkyl halides form ethers. This is Williamson's synthesis reaction.

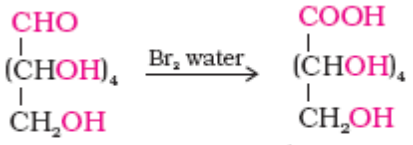


It is an important laboratory method for the preparation of symmetrical and unsymmetrical ethers. In this method, an alkyl halide reacts with sodium alkoxide to form ether.

Q 2 B Answer the following. **2**

a) Write the chemical reaction to show the presence of an aldehyde group in glucose.

Glucose gets oxidised to six carbon carboxylic acid (gluconic acid) on reaction with a mild oxidising agent like bromine water. This indicates that the carbonyl group is present as an aldehydic group.



Gluconic acid

b) Write two important structural differences between **DNA and RNA**.

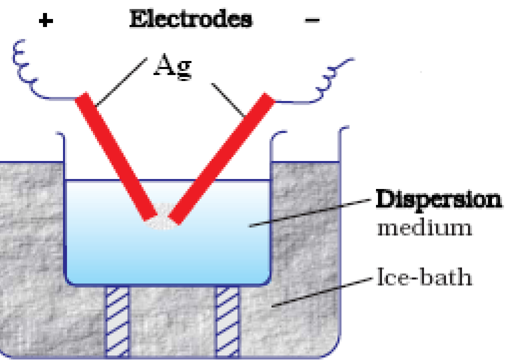
DNA (Deoxyribonucleic acid)	**RNA (Ribonucleic acid)**
(i) DNA contains Cytosine and Thymine as pyrimidine bases and Guanine and Adenine as purine bases.	(i) RNA contains Cytosine and Uracil as pyrimidine bases and Guanine and Adenine as purine bases.
(ii) DNA has double stranded alpha-helix structure.	(ii) RNA has single stranded structure.
(iii) DNA occurs in nucleus of the cell.	(iii) RNA occurs in cytoplasm of the cell.
(iv) The sugar present in DNA is 2-deoxy-D(-) ribose.	(iv) The sugar present in RNA is D(-) ribose.

Q 2 C Differentiate between **Physisorption** and **Chemisorption** with respect to effect of temperature and enthalpy of adsorption. **2**

Physisorption	**Chemisorption**
Low temperature is favourable for adsorption. It decreases with increase of temperature.	**High temperature** is favourable for adsorption. It increases with the increase of temperature.
Enthalpy of adsorption is **low** (20-40 kJ mol$_{-1}$)in this case.	Enthalpy of adsorption is **high** (80-240 kJ mol$_{-1}$) in this case.

Q 2 D **Answer the following.** **2**

a) Draw a neat labeled diagram to show the preparation of colloidal solution of silver by Bredig's arc method.



Bredig's Arc method

b) Explain the process of settling of colloidal particles by electrophoresis.

The process of settling of colloidal particles is called coagulation or precipitation of the sol. During electrophoresis the colloidal particles move towards oppositely charged electrodes, get discharged and precipitated.

Q 2 E Anisole reacts with HI at 373 K to give___ **CH_3I + C_6H_5OH**________ **1**

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