

# AMRITA VIDYALAYAM

## AMRITA PRE BOARD EXAMINATION 2019 - 20

Class : XII

Marks : 70

Time : 3 hrs

### CHEMISTRY (043)

#### General Instructions:

1. Questions 1 to 20 are very short answer questions and carry one mark each.
2. Questions 21 to 27 are short answer questions and carry two marks each.
3. Questions 28 to 34 are long answer questions and carry three marks each.
4. Questions 35 to 37 are long answer questions and carry five marks each.
5. Use log tables if necessary.

#### SECTION - A

Read the following passage to answer questions 1 to 5.

A Lead storage battery is the most important type of secondary cell having a lead anode and a grid of lead packed with  $\text{PbO}_2$  as cathode. A 38% solution of sulphuric acid is used as electrolyte. (Density = 1.294 g / mL) The battery holds 3.5L of acid. During the discharge of the battery the density of  $\text{H}_2\text{SO}_4$  falls to 1.139g / ml. (20%  $\text{H}_2\text{SO}_4$  by mass)

1. Write the reaction taking place at the cathode when the battery is in use.
2. How much electricity in coulombs is required to carry out the reduction of one mole of  $\text{PbO}_2$ ?
3. What is the molarity of sulphuric acid before discharge?
4. Lead storage battery is considered as a secondary cell. Why?
5. Write the product of electrolysis when dilute sulphuric acid is electrolysed using Platinum electrodes.
6. Which reducing agent is employed to get copper from the leached low grade copper ore?
7. Name the unit formed by the attachment of a base to 1 position of sugar in a nucleoside.
8. Which component of starch is a branched polymer of  $\alpha$  glucose and insoluble in water?
9. What type of reaction occurs in the formation of Nylon 6, 6 polymer?
10. Arrange the following in increasing order of their reactivity in nucleophilic addition reaction. ethanal, propanal, propanone, butanone
11. The IUPAC name for  $\text{CH}_3-\text{CH}-\text{CH}_2-\text{Br}$  is \_\_\_\_\_.  
 $\begin{array}{c} | \\ \text{C}_2\text{H}_5 \end{array}$ 
  - a) 1-Bromo-2ethyl-propane
  - b) 1-Bromo-2-ethyl-2-methyl-ethane
  - c) 1-bromo-2-methyl-butane
  - d) 2-Methyl-1-Bromo-butane
12. Which of the following has the higher molar conductivity?
  - a) potassium hexacyano ferrate (II)
  - b) hexaaqua chromium (III) chloride
  - c) tetraamine dichlorido cobalt (III) chloride
  - d) diamine dichlorido platinum (II)
13. Which of the following species is not expected to be a ligand?
  - a) NO
  - b)  $\text{NH}_4^+$
  - c)  $\text{NH}_2\text{CH}_2\text{NH}_2$
  - d) CO
14. Predict the number of ions produced per formula unit in an aqueous solution of  $[\text{Co}(\text{en})_3]\text{Cl}_3$ .
  - a) 4
  - b) 3
  - c) 6
  - d) 2
15. The incorrect statement about LDP is \_\_\_\_\_.  
(It is obtained through the free radical addition of ethene, It consists of linear molecules, It is obtained by the H - atom abstraction, Peroxide is used as an initiator)
  - A) Both assertion and reason are correct statements and reason is the correct explanation of the assertion.
  - B) Both assertion and reason are correct statements but reason is not the correct

**explanation of the assertion.**

**C) Assertion is correct but reason is wrong statement.**

**D) Assertion is wrong but reason is correct statement.**

16. Assertion :- Vitamin D can be stored in our body.  
Reason :- Vitamin D is fat soluble Vitamin.
17. Assertion :- Glucose reacts with hydroxylamine to form an oxime and also adds a molecule of hydrogen cyanide to give cyanohydrin.  
Reason :- The carbonyl group is present in the open chain structure of glucose.
18. Assertion :-  $\text{SF}_6$  cannot be hydrolysed but  $\text{SF}_4$  can be.  
Reason :- Six atoms in  $\text{SF}_6$  prevent the attack of  $\text{H}_2\text{O}$  on sulphur atom of  $\text{SF}_6$ .
19. Assertion :- p-nitro phenol is more acidic than phenol.  
Reason :- Nitro group helps in stabilisation of phenoxide ion by dispersal of negative charge due to resonance.
20. Assertion :- KCN reacts with methylchloride to give methyl isocyanide.  
Reason :-  $\text{CN}^-$  is an ambidentate ligand.

**SECTION - B**

21. a) Why is helium used in diving apparatus?  
b) How can you prepare  $\text{Cl}_2$  from HCl and HCl from  $\text{Cl}_2$ ? Write reactions only.
22. A first order reaction is 50% complete in 25 minutes. Calculate the time for 80% completion of the reaction.
23. The experimentally determined molar mass of what substance is always lower than the true value when water is used as the solvent? Explain. Give one example of such a substance and one example of a substance which does not show large variation from the true value.
24. Write equations involved in the following reactions.  
a) Etard reaction  
b) Clemmenson reduction
25. Name the following coordination entities and describe their structures.  
a)  $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$   
b)  $[\text{Ni}(\text{CN})_4]^{2-}$

OR

- a) Although both  $[\text{NiCl}_4]^{2-}$  and  $[\text{Ni}(\text{CO})_4]$  have  $\text{sp}^3$  hybridisation yet  $[\text{NiCl}_4]^{2-}$  is paramagnetic and  $[\text{Ni}(\text{CO})_4]$  is diamagnetic. Give reason. (Atomic number of Ni = 28)
- b) Write the electronic configuration of  $d^5$  on the basis of crystal field theory when  
(i)  $\Delta_0 < P$  (ii)  $\Delta_0 > P$
26. Write the name and principle of the method used for refining  
a) Zinc. b) Germanium.

OR

Write the reactions involved in the extraction of gold.

27. Among all the isomers of molecular formula  $\text{C}_4\text{H}_8\text{Br}$  identify  
a) the one isomer which is optically active.  
b) the two isomers which gives same product on dehydrohalogenation with alcoholic KOH.

**SECTION - C**

28. A solution containing 1.9 per 100 ml of KCl ( $M = 74.5 \text{ g/mol}$ ) is isotonic with a solution containing 3g per 100 ml of urea ( $M = 60 \text{ g/mol}$ ). Calculate the degree of dissociation of KCl solution. Assume that the both solutions have same temperature.
29. Define order of a reaction. How does order of a reaction differ from molecularity for a complex reaction?

OR

A reaction is of second order with respect to a reactant. How is the rate of reaction affected if the

- concentration of the reactant is reduced to half? What is the unit of rate constant for such a reaction?
30. a) Which of the following electrolytes is more effective for the coagulation of AgI / Ag<sup>+</sup> sol?  
MgCl<sub>2</sub>, K<sub>2</sub>SO<sub>4</sub>, K<sub>4</sub>[Fe(CN)<sub>6</sub>]  
b) What happens when a freshly precipitated Fe(OH)<sub>3</sub> is shaken with a little amount of dilute solution of FeCl<sub>3</sub>?  
c) Out of sulphur sol and proteins, which one forms macromolecular colloids?
31. a) Account for the following.  
(i) Acidic character increases from H<sub>2</sub>O to H<sub>2</sub>Te.  
(ii) F<sub>2</sub> is more reactive than ClF<sub>3</sub> whereas ClF<sub>3</sub> is more reactive than Cl<sub>2</sub>.  
(iii) Draw the structures of XeF<sub>2</sub> and BrF<sub>3</sub>.
32. Identify the product formed when propan-1-ol is treated with conc. H<sub>2</sub>SO<sub>4</sub> at 413K. Write the mechanism involved for the above reaction.
33. a) Give chemical tests to distinguish between  
(i) Acetaldehyde and benzaldehyde. (ii) Propanone and propanol.  
b) Arrange the following compounds in increasing order of their acidic strength.  
Benzoic acid, 4-Nitrobenzoic acid, 3, 4-dinitrobenzoic acid, 4-Methoxybenzoic acid

OR

Compare the reactivity of benzaldehyde and ethanal towards nucleophilic addition reactions. Write the cross aldol condensation product between benzaldehyde and ethanal.

34. a) Pick out the odd one from the following on the basis of their medicinal properties.  
Equanil, Seconal, Bithional, Luminal.  
b) What type of detergents are used in dishwashing liquids?  
c) Why is the use of aspartame limited to cold foods?

#### SECTION - D

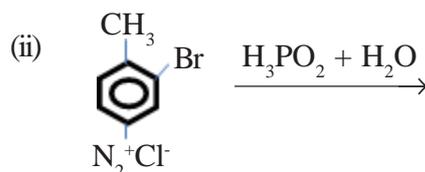
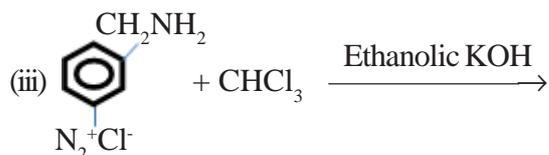
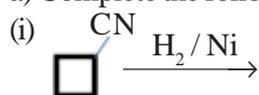
35. a) The e.m.f of the cell at 298K is 0.1745V  
Fe(s) / Fe<sup>2+</sup> (0.1M) // H<sup>+</sup> (xM) / H<sub>2</sub>(g) (1bar / Pt(s))  
Given : E<sup>0</sup> Fe<sup>2+</sup> / Fe = -0.44V  
Calculate the H<sup>+</sup> ions concentration of the solution at the electrode where hydrogen is being produced.  
b) Aqueous solution of copper sulphate and silver nitrate are electrolysed by 1 ampere current for 10 minutes in separate electrolytic cells. Will the mass of copper and silver deposited on the cathode be the same or different? Explain the answer.

OR

- a) Calculate the degree of dissociation of 0.0024 M acetic acid if conductivity of this solution is 8.0 × 10<sup>-5</sup> S/cm. Given : λ<sup>0</sup><sub>H<sup>+</sup></sub> = 349.6 Scm<sup>2</sup> / mol. λ<sup>0</sup><sub>CH<sub>3</sub>COO<sup>-</sup></sub> = 40.9 Scm<sup>2</sup> / mol.  
b) Solutions of two electrolytes A and B are diluted. The limiting molar conductivity of B increases to a small extent while that of A increases to much larger extent comparatively. Which of the two is a strong electrolyte? Justify your answer.
36. a) An aromatic compound (A) on treatment with aqueous ammonia and heating forms compound (B) which on heating with Br<sub>2</sub>, KOH forms a compound (C) of molecular formula C<sub>6</sub>H<sub>7</sub>N. Write the structures and IUPAC names of compounds A, B and C.  
b) (i) Arrange the following in the increasing order of basic strength.  
Aniline, p-nitroaniline and p-toluidine.  
(ii) Arrange the following in the increasing order of solubility in water.  
C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>, (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>NH, C<sub>2</sub>H<sub>5</sub>NH<sub>2</sub>

OR

a) Complete the following reactions.



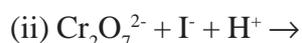
b) How do you convert the following?

(i) Benzene diazonium chloride to nitro benzene.

(ii) Chloro ethane to propan-1-amine.

37. a) When a chromite ore (A) is fused with an aqueous solution of sodium carbonate in free excess of air, a yellow solution of compound (B) is obtained. This solution is filtered and acidified with sulphuric acid to form compound (C). Compound (C) on treatment with solution of KCl gives orange crystals of compound (D). Write the chemical formulae of compounds A to D.

b) Complete the following reactions.



OR

a) Assign reasons for the following.

(i) The enthalpy of atomisation of transition elements are high.

(ii) The transition metals and many of their compounds act as good catalyst.

(iii) From element to element the actinoid contraction is greater than the lanthanoid contraction.

(iv) The  $E^0$  value for the  $\text{Mn}^{3+} / \text{Mn}^{2+}$  couple is much more positive than that of  $\text{Cr}^{3+} / \text{Cr}^{2+}$ .

(v) Scandium ( $Z = 21$ ) does not exhibit variable oxidation states and yet it is regarded as a transition element.