

# AMRITA VIDYALAYAM

## AMRITA PRE BOARD EXAMINATION 1 - 2018 - '19

Class : XII

Marks : 70

Time : 3 hrs

### CHEMISTRY (043)

#### General Instructions:

1. All questions are compulsory.
2. Question No. 1 to 5 are very short answer questions of 1 mark each.
3. Question No. 6 to 12 are short answer questions of 2 marks each.
4. Question No. 13 to 24 are also short answer questions of 3 marks each.
5. Question No. 25 to 27 are long answer questions of 5 marks each.
6. There is no overall choice. However an internal choice has been provided in 2 questions of 1 mark, 3 questions of 3 marks and all the 3 questions of 5 marks. You have to attempt only 1 of the choices in such questions.
7. Use log tables if necessary. Use of calculator is not allowed.

#### SECTION - A

1. ZnO crystal on heating acquires the formula  $Zn_{1+x}O$ . Give reason.

OR

There is an increase in conductivity when silicon is doped with phosphorous. Give reason.

2. Based on the type of dispersed phase, what type of colloids are micelles?
3. On the basis of crystal field theory, write the electronic configuration of  $d_6$  in terms of  $t_{2g}$  and  $e_g$  in an octahedral field when  $\Delta_0 > P$ .

OR

Low spin configuration are rarely observed in tetrahedral coordination entity formation. Explain.

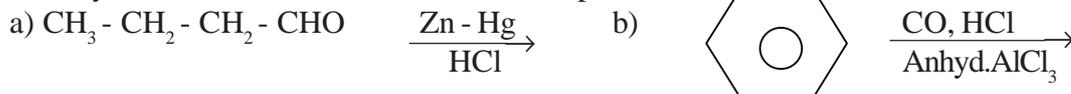
4. Write the name of the biodegradable polymer used in unbreakable crockery.
5. Write the IUPAC name of the following compound.  
( $CH_3$ )<sub>2</sub>C = CHCOOCH<sub>3</sub>

#### SECTION - B

6. Calculate the freezing point of a solution containing 8.1 g of HBr in 100 g of water by assuming the acid to be 90% ionised.

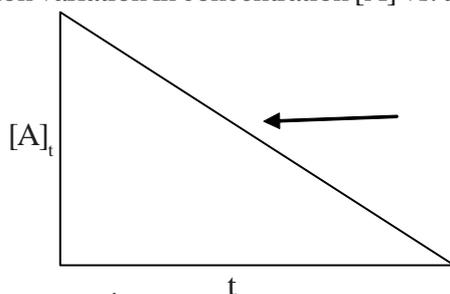
(Given : Molar mass Br = 80g / mol,  $K_f = 1.86 \text{ K kg / mol}$ )

7. Identify the reaction and IUPAC names of the products.



8. Justify the statement that chain growth polymers are non biodegradable.
9. Explain the fact that in aryl alkyl ethers
- a) the alkoxy group activates the benzene ring towards electrophilic substitution and
  - b) it directs the incoming substituents to ortho and para positions in benzene ring.
10. a) On the basis of the standard electrode potential values stated for acid solutions, predict whether  $Ti^{4+}$  species may be used to oxidise Fe (II) to Fe (III).
- $$Ti^{4+} + e^- \rightarrow Ti^{3+} \quad E^0 = +0.01 \text{ V}$$
- $$Fe^{3+} + e^- \rightarrow Fe^{2+} \quad E^0 = +0.77 \text{ V}$$
- b) Based on the data arrange  $Fe^{2+}$ ,  $Mn^{2+}$  and  $Cr^{2+}$  in the increasing order of stability of +2 oxidation state. (Give a brief reason)

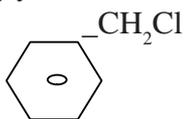
11. For a certain chemical reaction variation in concentration  $[A]$  vs. time (s) plot is given below.



- Predict the order of the given reaction.
  - What does the slope of the line and intercept indicate?
  - What is the unit of rate constant  $k$ ?
12. Draw the structure of the following.
- Dibasic oxoacid of phosphorous.
  - Fluoride of xenon which gives  $\text{XeOF}_4$  and  $\text{XeO}_2\text{F}_2$  on hydrolysis.

### SECTION - C

13. Silver crystallise with face centered cubic unit cell. Each side of this unit cell has a length of 409 pm. What is the radius of the atom? Assume the atoms just touch each other on the diagonal across the face of the unit cell.
14. Give reasons for the following.
- When 2g of benzoic acid is dissolved in 25 g of benzene, the experimentally determined molar mass is always greater than the true value.
  - Mixture of ethanol and acetone shows positive deviation from Raoult's Law.
  - The preservation of fruits by adding concentrated sugar solution protects against bacterial action.
15. How would you obtain
- Benzoquinone from phenol?
  - Propan-2-ol from propene?
  - 2-Methyl propan-2-ol from methyl magnesium bromide?
16. Which one of the following compounds will undergo faster hydrolysis reaction by  $\text{SN}_1$  mechanism? Justify your answer.



OR



OR

A compound is formed by the substitution of two chlorine atoms for two hydrogen atoms in propane. Write the structures of the isomers possible. Give the IUPAC name of the isomer which can exhibit enantiomerism.

17. Write the equations involved in the following reactions.
- Riemer - Tiemann reaction
  - Williamson's ether synthesis
18. Give reasons for the following.
- Use of aspartame as an artificial sweetener is limited to cold foods.
  - Metal hydroxides are better alternatives than sodium hydrogen carbonate for treatment of acidity.
  - Aspirin is used in prevention of heart attacks.
19. What is the essential difference between  $\alpha$  - form of glucose and  $\beta$  - form of glucose? Explain.
20. The decomposition of  $\text{NH}_3$  on platinum surface is zero order reaction. What are the rates of production of  $\text{N}_2$  and  $\text{H}_2$  if  $k = 2.5 \times 10^{-4} \text{ mol}^{-1} \text{ L s}^{-1}$ ?

OR

In a reaction between A and B, the initial rate of reaction ( $r_0$ ) was measured for different initial concentrations of A and B as given below.

A / mol L <sup>-1</sup>	0.20	0.20	0.40
B / mol L <sup>-1</sup>	0.30	0.10	0.05
r <sub>0</sub> / mol L <sup>-1</sup> s <sup>-1</sup>	5.07 × 10 <sup>-5</sup>	5.07 × 10 <sup>-5</sup>	1.43 × 10 <sup>-4</sup>

What is the order of the reaction with respect to A and B?

21. Explain what is observed when
- an electric current is passed through a sol.
  - a beam of light is passed through a sol.
  - an electrolyte is added to ferric hydroxide sol.
22. Describe how the following steps can be carried out.
- Recovery of gold from leached gold metal complex.
  - Conversion of zirconium iodide to pure zirconium.
  - Formation of slag in the extraction of copper.
- (Write the chemical equations also for the reactions involved)

OR

Explain the use of the following.

- NaCN in Froth Floatation Method.
  - Carbon monoxide in Mond process.
  - Coke in the extraction of zinc from zinc oxide
23. Explain the following.
- Out of Sc<sup>3+</sup>, Co<sup>2+</sup> and Cr<sup>3+</sup> ions, only Sc<sup>3+</sup> is colourless in aqueous solutions.  
(Atomic no. : Co = 27; Sc = 21 and Cr = 24)
  - The E<sup>0</sup><sub>Cu/Cu<sup>2+</sup></sub> for copper metal is positive (+0.34), unlike the remaining members of the first transition series.
  - La(OH)<sub>3</sub> is more basic than Lu(OH)<sub>3</sub>.
24. a) Give the IUPAC name of the ionisation isomer of [Cr(NH<sub>3</sub>)<sub>5</sub>Cl]SO<sub>4</sub>.  
b) [Fe(CN)<sub>6</sub>]<sup>3-</sup> is weakly paramagnetic while [Fe(CN)<sub>6</sub>]<sup>4-</sup> is diamagnetic. Justify your answer.

### SECTION - D

25. a) Give a test to distinguish between Aniline and N- Methyl aniline.  
b) Mention chief use of quaternary ammonium salts from long chain amines.  
c) An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B' which on heating with Br<sub>2</sub> and 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, C.

OR

- Account for the following.
    - Direct nitration of aniline yields significant amount of meta derivative.
    - Primary aromatic amines cannot be prepared by Gabriel phthalimide synthesis.
  - Carry out the following conversions.
    - Ethanoic acid into methanamine.
    - Aniline to p-Bromoaniline.
  - Arrange the following in increasing order of basic strength.  
Aniline, p-nitroaniline and p-toluidine.
26. a) What are the advantages of fuel cells?  
b) Write the products of electrolysis of aqueous solution of NaCl with platinum electrodes.  
c) Calculate e.m.f. of the following cell at 298 K.  
Ni (s) / Ni<sup>2+</sup> (0.01 M) // Cu<sup>2+</sup> (0.1M) / Cu (s)  
[Given E<sup>0</sup><sub>Ni<sup>2+</sup>/Ni</sub> = - 0.25 V, E<sup>0</sup><sub>Cu<sup>2+</sup>/Cu</sub> = + 0.34 V]. Write the overall cell reaction.

OR

- a) The standard electrode potential ( $E^0$ ) for Daniel cell is + 1.1 V. Calculate the  $\Delta G^0$  for the reaction  

$$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$$
 (1 faraday = 96500 C mol<sup>-1</sup>)
- b) Apply Kohlrausch law of independent migration of ions, write the expression to determine the limiting molar conductivity of calcium chloride.
- c) Given are the conductivity and molar conductivity of NaCl solutions at 298K at different concentrations.

Concentration M	Conductivity S cm-1	Molar conductivity S cm <sup>2</sup> mol <sup>-1</sup>
0.100	$106.74 \times 10^{-4}$	106.7
0.05	$55.53 \times 10^{-4}$	111.1
0.02	$23.15 \times 10^{-4}$	115.8

Compare the variation of conductivity and molar conductivity of NaCl solutions on dilution.  
 Give reason.

27. a) Account for the following observations.
- $\text{SF}_4$  is easily hydrolysed whereas  $\text{SF}_6$  is not easily hydrolysed.
  - $\text{H}_2\text{S}$  is less acidic than  $\text{H}_2\text{Te}$ .
  - Bi (V) is a stronger oxidising agent than Sb (V).
- b) What happens when
- white phosphorus is heated with concentrated NaOH solution in an inert atmosphere of  $\text{CO}_2$ ?
  - $\text{XeF}_4$  undergoes hydrolysis? (Give the chemical equations involved)

OR

- a) Why is ICl more reactive than  $\text{I}_2$ ?
- b) Arrange the following in the order of property indicated against each set.
- $\text{F}_2, \text{I}_2, \text{Br}_2, \text{Cl}_2$  (increasing bond dissociation enthalpy)
  - $\text{NH}_3, \text{AsH}_3, \text{SbH}_3, \text{BiH}_3, \text{PH}_3$  (decreasing base strength)
- c) Complete the following equations.
- $\text{Au} + \text{H}^+ + \text{NO}_3^- + \text{Cl}^- \rightarrow$
  - $\text{H}_2\text{S} + \text{Cl}_2 \rightarrow$