

**2018  
CHEMISTRY**

Total marks : 70

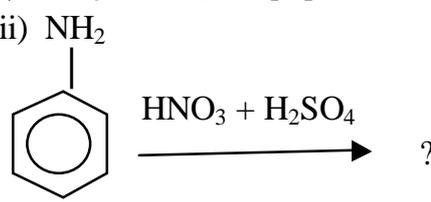
Time : 3 hours

**General instructions:**

- i) *Approximately 15 minutes is allotted to read the question paper and revise the answers.*
- ii) *The question paper consists of 30 questions. All questions are compulsory.*
- iii) *Marks are indicated against each question.*
- iv) *Internal choice has been provided in some questions.*

**N.B:** *Check that all pages of the question paper is complete as indicated on the top left side.*

1. The number of atoms in a body centred cubic unit cell of an element is **1**  
(a) 4                      (b) 3                      (c) 2                      (d) 1
2. Fog is an example of colloidal system of **1**  
(a) liquid dispersed in gas                      (b) gas dispersed in gas  
(c) solid dispersed in gas                      (d) solid dispersed in liquid
3.  $K_3[Al(C_2O_4)_3]$  is named as **1**  
(a) potassium trioxalatoaluminate (III)  
(b) potassium alumino oxalate  
(c) potassium aluminium (III) oxalate  
(d) potassium trioxalatoaluminate (II)
4. Ribose is a **1**  
(a) monosaccharide                      (b) polysaccharide  
(c) polypeptide                      (d) disaccharide
5. An ether is more volatile than an alcohol having the same molecular formula due to **1**  
(a) dipolar character of ether  
(b) alcohols having resonance structure  
(c) intermolecular hydrogen bonding in ether  
(d) intermolecular hydrogen bonding in alcohol
6. What is salt bridge? **1**
7. What is instantaneous rate of reaction? **1**

8. Write the IUPAC name of  $(\text{CH}_3)_2\text{CHCHO}$ . 1
9. What are amines? 1
10. What is Wurtz reaction? 1
11. Why do some non-ideal solutions show positive deviation from ideal behaviour? Give suitable diagram. 2
12. **a.** Compare two properties of lanthanoids and actinoids. 2  
**Or**  
**b.** Why do transition elements form complexes? 2
13. **a.** What is optical isomerism? Draw the structure of optical isomers of  $[\text{Cr}(\text{Ox})_3]^{3-}$  2  
**Or**  
**b.** What are chelating ligand? Give an example. 2
14. Explain  $\text{SN}^2$  reaction mechanism of haloalkanes. 2
15. Complete the reaction: 2
- i)  $\text{CH}_3\text{CONH}_2 + 4[\text{H}] \xrightarrow{\text{LiAlH}_4/\text{ether}} ?$
- ii)  ?
16. **a.** Why is secondary amine more basic than the tertiary amine? 2  
**Or**  
**b.** How can  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  amine be distinguished by Hinsberg test? 2
17. Calculate the value of Avogadro's number from the data : density of  $\text{NaCl} = 2.165 \text{ g cm}^{-3}$ , distance between  $\text{Na}^+$  and  $\text{Cl}^-$  in  $\text{NaCl}$  crystal is 281 pm (molar mass of  $\text{NaCl}$  is  $58.5 \text{ g mol}^{-1}$ ). 3

18. a. 0.75g of sodium bicarbonate (molar mass =  $84\text{g mol}^{-1}$ ) are dissolved in 250ml of a solution. Calculate its molarity and normality. 3  
**Or**
- b. Ethylene glycol (molar mass =  $62\text{g mol}^{-1}$ ) is used as an antifreeze for water to be used in car radiators in cold places. How much ethylene glycol should be added to 1kg of water to prevent it from freezing at  $10^\circ\text{C}$ ? [ $K_f$  for water =  $1.86\text{ K Kg mol}^{-1}$ ]
19. The rate constant of a first order reaction becomes 5 times when the temperature is raised from 350K to 400K. Calculate the activation energy of the reaction. ( $R = 8.314\text{ JK}^{-1}\text{mol}^{-1}$ ,  $\log 5 = 0.69897$ ) 3
20. Write three differences between physical adsorption and chemical adsorption. 3
21. a. How is zinc extracted from zinc blende? Give chemical reaction. 3  
**Or**
- b. Explain with neat diagram the extraction of aluminium from molten alumina.
22. Write the steps and reactions involved in the manufacture of sulphuric acid by Contact process. 3
23. How is  $\text{KMnO}_4$  prepared from pyrolusite? Give one use of  $\text{KMnO}_4$ . 3
24. Why are phenols more acidic than alcohols? What happen when phenol is treated with excess of aqueous bromine solution? 3
25. a. What are globular and fibrous proteins? Give examples. 3  
**Or**
- b. What is glycosidic linkage? Name the disease caused by the deficiency of vitamin D. Give one function of vitamin D.
26. a. How is Nylon-66 obtained? Give one of its uses. 3  
**Or**
- b. What are biodegradable and non-biodegradable polymers? Give one example each.
27. Explain the cleansing action of soap and detergents. 3

28. a. What is electrochemical series? Write one of its application. Calculate the e.m.f of the cell  $\text{Cr} \mid \text{Cr}^{3+}(0.1\text{M}) \parallel \text{Fe}^{2+}(0.01\text{M}) \mid \text{Fe}$ . [ $E^\circ_{\text{Cr}^{3+} \mid \text{Cr}} = -0.75\text{v}$  and  $E^\circ_{\text{Fe}^{3+} \mid \text{Fe}} = -0.45\text{v}$ ,  $\log 10 = 1$ ].

**Or**

**5**

- b. Write the Nernst equation for the cell:



where  $E^\circ_{\text{Zn}^{2+} \mid \text{Zn}} = -0.76\text{v}$ ;  $E^\circ_{\text{Cu}^{2+} \mid \text{Cu}} = +0.34\text{v}$ . Write the reaction occurring at each of the electrode and its net cell reaction. Also determine its cell potential.

29. a. (i) How is  $\text{XeF}_4$  prepared?  
(ii) Mention the types of hybridization of Xe in  $\text{XeF}_4$  and  $\text{XeOF}_4$ . Draw their structures.

**Or**

**5**

- b. (i) Explain the basic strengths of hydrides of group-15 elements.  
(ii) Give reason for the following:  
a) Nitrogen does not form pentahalide like phosphorous.  
b) Electron gain enthalpy of chlorine is higher than fluorine.

30. a. (i) Why are the boiling points of carboxylic acid higher than those of the corresponding alcohols?  
(ii) Define the following terms and write the reaction involved in it:  
A) Reimer-Tiemann reaction  
B) Rosenmund's reduction reaction.

**Or**

**5**

- b. (i) What is aldol-condensation reaction ? Write the reaction involved in it.  
(ii) What happens when  
(A) Aldehyde reacts with hydroxylamine.  
(B) Ketone reacts with hydrazine.

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