

Reg.

(Code No. 5016)

Name:

(Second Year - March 2017)

Time: 2 Hours

Cool-off time: 15 Minutes

General Instructions to Candidates:

- There is a 'cool-off time' of 15 minutes in addition to the writing time of 2 hrs.
- You are not allowed to write your answers nor to discuss anything with others during the 'cool-off time.'
- Use the 'cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub-questions must be answered from the same question itself.
- Calculations, figures and graphs all should be shown in the answer sheet itself.
- Give equations wherever necessary
- Electronic devices except non programmable calculators are not allowed in the Examination Hall.

(Score: 1)

- (i) Schottky defect (ii) Frenkel defect
(iii) Interstitial defect (iv) Metal deficiency defect

(b) What type of substance could make better permanent magnets - ferromagnetic or ferrimagnetic? Justify your answer. (Scores: 2)

(c) In terms of Band theory write the differences between Conductor and insulator (Score: 1)

2 (a) Henry's law is related to solubility of a gas in liquid

(i) State Henry's Law

(ii) Write any two applications of Henry's Law (Scores: 2)

(b) 1000 cubic cm of an aqueous solution of a protein contains 1.26 gm. of the protein. The osmotic pressure of such a solution at 300K is found to be 2.57×10^{-3} bar.

Calculate molar mass of the protein ($R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$) (Scores: 2)

3. (a) Represent the Galvanic based on the cell reaction given below:



(b) Write the half-cell reactions of the above cell (Score: 1)

(c) Λ_m^0 for NaCl, HCl, NaAc are 126.4, 425.9 and 91.0 $\text{cm}^2 \text{ mol}^{-1}$ respectively.

Calculate Λ_m^0 for HAc. (Score: 2)

4. (a) Plot a graph showing variation in the concentration of reactants against time for a zero order reaction (Score: 1)

(b) What do you mean by zero order reaction? (Score: 1)

(c) The initial concentration of the first order reaction, $\text{N}_2\text{O}_5(g) \rightarrow 2\text{NO}_2(g) + 1/2\text{O}_2(g)$ was $1.24 \times 10^{-2} \text{ mol L}^{-1}$ at 300K. The concentration of N_2O_5 after 1 hour was $0.20 \times 10^{-2} \text{ mol L}^{-1}$. Calculate the rate constant of the 300k. (Score: 2)

5. There are mainly two types of adsorption. They are physisorption and chemisorption.

- (a) Differentiate between physisorption and chemisorption. (Scores : 2)
(b) Write any two applications of adsorption. (Score : 1)

6. (a) Leaching is a process of concentration of the ores. Explain the leaching of Alumina from the bauxite (Scores: 3)

7. Nitrogen forms a number of oxides and oxoacids.

(a) Which of the following is a neutral oxide of Nitrogen? (Score:1)

- (i) N_2O
(ii) N_2O_5
(iii) NO_2
(iv) N_2O_4

(b) Prepare a short write-up on Nitric acid highlighting its laboratory preparations, chemical properties and uses. (Score: 4)

Or

Phosphorous forms a number of compounds

(a) The gas liberated when calcium phosphide is treated with dil. HCl is

- (i) Cl_2
(ii) H_2
(iii) PH_3
(iv) All the above

(Score:1)

(b) Prepare a short write up on PCl_3 and PCl_5 highlighting the preparation and chemical properties of PCl_3 and structure of PCl_5 . (Score: 4)

8. (a) Transition elements are "d" block elements

- (i) Write any 4 characteristic properties of transition elements (score:2)
(ii) Cr^{2+} and Mn^{3+} have d^4 configuration. But Cr^{2+} is reducing and Mn^{3+} is oxidising. Why? (Score:1)

(b) Which of the following is not a lanthanoid element?

- (i) Cerium
(ii) Europium
(iii) Lutetium
(iv) Thorium

(Score:1)

9. $[Co(NH_3)_5SO_4]Cl$ and $[Co(NH_3)_5Cl]SO_4$ are co-ordination compounds

- (a) Identify isomerism shown by the above compounds (Score:1)
- (b) Write the IUPAC name of the above compounds (Score:2)
- (c) Identify the ligands in each of the above compounds (Score:1)

10. (a) An ambident nucleophile is

- (i) Ammonia
- (ii) Ammonium Ion
- (iii) Chloride Ion
- (iv) Nitrite Ion (Score:1)

(b) Halo alkanes and halo arenes are organic halogen compounds

- (i) Suggest a method of preparation of alkyl chloride (Score:1)
- (ii) Aryl halides are less reactive towards Nucleophilic substitution reactions. Give reasons. (Score:2)

11. (a) Arrange the following compounds in the order of increasing boiling points: Ethanol, Propanol, butan-1-ol, butan-2-ol. (Score: 1)

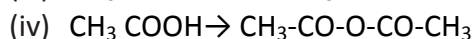
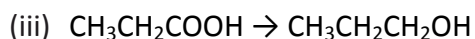
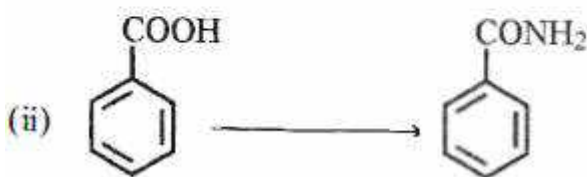
(b) In the lab, students are asked to carry out the reaction between phenol and conc. HNO_3 . But, one student, "A" carried out the reaction between phenol and dil. HNO_3 . Do you think student "A" got the same result as the others? Substantiate with suitable explanations.

[Also write the chemical equations wherever necessary]. (Score: 3)

12. The product obtained when benzene is treated with carbon monoxide and hydrogen chloride in the presence of anhydrous $AlCl_3$ is

- (i) Chlorobenzene
- (ii) Phenol
- (iii) Benzaldehyde
- (iv) Benzoic Acid (Score: 1)

(b) How will you carry out the conversions?



(Score:4)

Or

(b) Explain the following

(i) Esterification

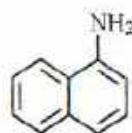
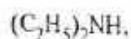
(ii) Tollen's test

(iii) HVZ reaction

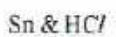
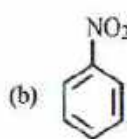
(iv) Decarboxylation of Carboxylic acid.

(Score:4)

13. (a) Classify the following amines as primary, secondary and tertiary



(Score : 1)



B



C

Identify the products B and C and write their formulae.

(Scores : 2)

14. (a) Which of the following is a polysaccharide?

(Score: 1)

(i) Maltose

(ii) Sucrose

(iii) Fructose

(iv) Cellulose

(b) Explain the amphoteric behaviour of amino acids

(Score:2)

15. (a) Which of the following is not applicable to Nylon 6, 6?

(i) Synthetic

(ii) Fibre

(iii) Addition Polymer

(iv) Condensation Polymer

(Score:1)

(b) Differentiate between thermoplastics and thermo setting plastics. Write one example for each of them.

(Score:2)

16. "Antibiotics, Antiseptics and disinfectants are antimicrobial drugs." Explain any of the above mentioned drugs with examples.

(Score:3)

