

SAMODAY

STD. XII

CHEMISTRY

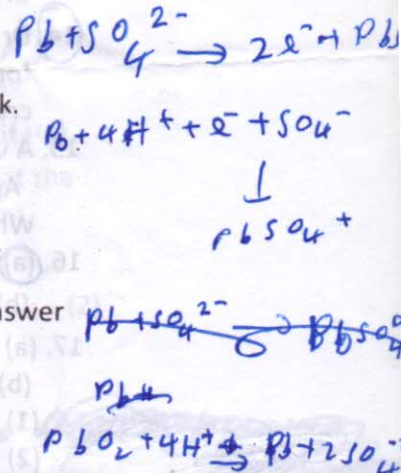
FIRST TERM EXAMINATION 2016 - 17

Time: 3 hours

Max. Marks : 70

General Instructions:

- (1) All questions are compulsory.
- (2) Question numbers 1 to 5 are very short answer type questions, each of 1 mark.
- (3) Question numbers 6 to 10 are short answer type questions of 2 marks each.
- (4) Question numbers 11 to 22 are short answer type questions of 3 marks each.
- (5) Question number 23 carry 4 marks and question numbers 24 to 26 are long answer questions of 5 marks each.
- (6) Use log tables, if necessary. Calculators are not permitted.



1. Write IUPAC name of  $(\text{CH}_3)_3\text{CCH}_2\text{COOH}$ .
2. Write the IUPAC name for the ionisation isomer of  $[\text{Cr}(\text{H}_2\text{O})_5\text{Br}]\text{SO}_4$ .
3. How much charge is required for the reduction of 1 mol of  $\text{MnO}_4^-$  to  $\text{Mn}^{2+}$ ?
4. Some liquids on mixing form azeotropes. What are azeotropes?
5. What are isotonic solutions?
6. (a) An alkyl halide having molecular formula  $\text{C}_4\text{H}_9\text{Cl}$  is optically active. What is its IUPAC name and structural formula?  
(b) Give one chemical test to distinguish between Chlorobenzene and Benzyl chloride.
7. Using valence bond theory predict hybridisation, geometry and magnetic behaviour of  $[\text{Cr}(\text{NH}_3)_6]^{3+}$  ion (Atomic number of Cr = 24).
8. Write chemical equations for the reactions involved in the manufacture of potassium permanganate from pyrolusite ore ( $\text{MnO}_2$ ).
9. What type of battery is the lead storage battery? Write the anode and cathode reactions and the overall reaction occurring in a lead storage battery sending out an electric current.
10. State the difference between Schottky and Frenkel defects. Which of the two changes the density of the solid?
11. Sodium crystallises in the cubic lattice and edge of the cubic lattice is 430 pm. Calculate the number of atoms in the unit cell. (Atomic mass of Na = 23u, density of Na =  $0.9623\text{g cm}^{-3}$ )

OR

Silver crystallises in face centred cubic (fcc) unit cell. If the radius of silver atom is 145 pm, what is the length of each side of the unit cell?

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- (12) (a) What happens when ferrimagnetic  $\text{Fe}_3\text{O}_4$  is heated to 850 K and why?  
(b) If NaCl crystals are doped with  $2 \times 10^{-3}$  mol % of  $\text{SrCl}_2$ , calculate the cation vacancies per mole?
13. (a) State Raoult's law for solutions of volatile liquid components.  
(b) The density of water of a lake is  $1.25 \text{ g (mL)}^{-1}$  and 1 kg of this water contains 92 g of  $\text{Na}^+$  ions. What is the molarity of  $\text{Na}^+$  ions in the water of the lake? (Atomic mass of  $\text{Na}^+ = 23 \text{ u}$ ).
- (14) Draw a sketch to show the splitting of d-orbitals in an octahedral crystal field. State for a  $d^6$  ion how the actual configuration of the split d-orbitals in an octahedral crystal field is decided by the relative values of  $\Delta_o$  and P.
15. A voltaic cell is set up at  $25^\circ\text{C}$  with the half cells:  
 $\text{Ag}^+ (0.001\text{M}) / \text{Ag}$  and  $\text{Cu}^{2+} (0.10\text{M}) / \text{Cu}$ .  
What should be its cell potential? ( $E^\circ_{\text{cell}} = 0.46 \text{ V}$ )
16. (a) What is the effect of increasing pH on  $\text{K}_2\text{Cr}_2\text{O}_7$  solution?  
(b) Calculate the spin only magnetic moment of  $\text{M}^{2+}_{(\text{aq})}$  ion ( $Z = 28$ ).  $\sqrt{n(n+2)}$
17. (a) How will you distinguish between Chloroform and methyl chloride.  
(b) Do the following conversions:  
(1) 2-Chlorobutane to 3,4-dimethylhexane.  
(2) Benzyl chloride to 2-phenyl acetic acid.
18. Primary alkyl halide  $\text{C}_4\text{H}_9\text{Br}$  (a) reacted with alcoholic KOH to give compound (b). Compound (b) is reacted with HBr to give compound (c) which is an isomer of (a). When (a) is reacted with Na metal it gives compound (d),  $\text{C}_8\text{H}_{18}$  which is different when n-butyl bromide is reacted with sodium. Give the structural formula of (a), (b), (c), (d) and write equations for all the reactions.
19. Predict the products of the following reactions:  
(1)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-O-CH}_3 + \text{HBr} \rightarrow$   
(2)  $\text{C}_6\text{H}_5\text{OC}_2\text{H}_5 + \text{HBr} \rightarrow$   
(3)  $(\text{CH}_3)_3\text{C-OC}_2\text{H}_5 + \text{HI} \rightarrow$
20. (a) While separating a mixture of ortho- and para- nitrophenols by steam distillation, name the isomer which will be steam volatile. Give reason.  
(b) Give two reactions that show the acidic nature of phenol. Compare acidity of phenol with that of ethanol.
21. What happens when ethanol is heated with concentrated sulphuric acid at 443 K? Write the mechanism of this reaction.
22. Give simple tests to distinguish between the following pairs of compounds :  
(1) Pentan-2-one and Pentan-3-one  
(2) Benzaldehyde and Acetophenone  
(3) Phenol and Benzoic acid
23. Gundeep went with his father to buy hinges for the door. They showed them two qualities, the normal iron hinges and the galvanised one. The normal iron hinges

were cheaper while the galvanised one were costlier. Gundeep's father opted for the cheaper normal iron hinges. Gundeep intervened and suggested his father to go for galvanised hinges.

- ✓ a) What was the rationale for Gundeep to buy galvanised hinges? (Give two reasons)
- ✓ b) What values are attached to this decision?

24. (a) Define osmosis and osmotic pressure.

(b) Calculate the amount of KCl which must be added to 1 kg of water so that the freezing point is depressed by 2K. ( $K_f$  for water =  $1.86 \text{ K kg mol}^{-1}$ )

OR

(a) Define the following terms :

- (1) van't Hoff factor
- (2) Ebullioscopic constant

(b) At  $25^\circ\text{C}$  the saturated vapour pressure of water is 3.165 kPa (23.75 mm of Hg). Find saturated vapour pressure of 5% aqueous solution of urea (carbamide) at the same temperature. (Molar mass of urea =  $60.05 \text{ g mol}^{-1}$ )

25. (a) Complete and balance the following chemical equations :

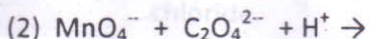
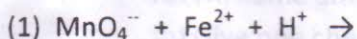


(b) Explain the following observations:

- (1) Transition metals and their compounds are known to act as catalysts
- (2) The higher oxidation states are usually exhibited by the members in the middle of a series of transition elements.
- (3) Cu (I) is not stable in aqueous solution.

OR

(a) Complete and balance the following equations:



(b) How would you account for the following ?

- (1) Many of the transition elements are known to form interstitial compounds.
- (2) The metallic radii of the third (5d) series of transition metals are virtually the same as those of the corresponding group members of the second (4d) series.
- (3) Lanthanoids form primarily +3 ions, while the actinoids usually have higher oxidation states in their compounds, +4 or even +6 being typical.

26. a) Give name of the reagents to bring about the following transformations:

- i) Ethanoic acid to ethanol.
- ii) Propan-1-ol to propanal.
- iii) Pent-3-en-2-ol to pent-3-en-2-one.

- iv) Sodiumbenzoate to benzene.
- b) Give one chemical test to distinguish between ethanal and propanal.

OR

- a) Bring out the following conversions
  - i) Ethanal to But -2 - enal.
  - ii) Ethylbenzene to benzoic acid.
- b) Give a reason for the following:
  - i) Chloroacetic acid is more acidic than acetic acid.
  - ii) Carboxylic acids have higher boiling point than alcohols.
  - iii) 4- nitrobenzoic acid is more acidic than 4-methoxybenzoic acid.