



St. Xavier's Sr. Sec. School

Delhi-54

Pre Board Examination 2017

Set 2

Std. 12

CHEMISTRY

Max. Marks : 70

03-01-2017

Time : 3 hrs.

General Instructions:-

- i) All questions are compulsory.
- ii) Question numbers 1 to 5 carry one marks each.
- iii) Question numbers 6 to 10 carry two marks each.
- iv) Question numbers 11 to 22 carry three marks each.
- v) Question number 23 is a value based question carrying four marks.
- vi) Question numbers 24 to 26 carry five marks each.
- vii) Use log tables, if necessary.

1. What type of semiconductor is obtained when silicon is doped with boron? 1
2. What is an emulsion? 1
3. Which divalent metal ion has maximum paramagnetic character among the first transition series? 1
4. Formaldehyde does not take part in aldol condensation. Why? 1
5. Write the IUPAC name of $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{Br}}{\text{C}}} = \text{C} - \text{CH}_2\text{OH}$. 1
6. a) State Henry's law. What is the effect of temperature on the solubility of a gas in a liquid?
b) Liquids A and B on mixing produces a warm solutions. Which type of deviation from Raoult's law is there?

(OR)

Derive the relationship between relative lowering of vapour pressure and mole fraction of a volatile liquid. 2



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7. Rate constant ' K ' of a reaction varies with temperature ' T ' according to the equation,

$$\log K = \log A - \frac{E_a}{2.303 R} \left(\frac{1}{T} \right)$$

where E_a is the activation energy. When a graph is plotted for $\log K$ vs $\frac{1}{T}$, a straight line with a slope of -4250 K is obtained. Calculate E_a for the reaction. $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$. 2

8. Give a simple chemical test to distinguish between following pairs of compounds:

- i) Aniline and N-methylaniline
- ii) Acetophenone and Benzophenone 2

9. What happens when?

- i) PCl_5 is heated
- ii) H_3PO_3 is heated

Write the reaction involved. 2

10. a) How are double salts different from a complex? 2
b) Draw the structure of cis-isomer of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$

11. a) Write down the structures and names of the products formed when D-glucose is treated with
(i) hydroxylamine (ii) Acetic anhydride
b) How are nucleosides different from nucleotides? 3

12. At 300 K , 36 g of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$ present per litre in its solution has an osmotic pressure of 4.98 bar . If the osmotic pressure of another glucose solution is 1.52 bar at the same temperature, calculate the concentration of the other solution. 3

13. Illustrate the following name reactions:

- i) Cannizzaro reaction
- ii) Clemmensen reduction
- iii) Swarts reaction 3

14. a) What is the name of the polymer formed by condensation of phenol and formaldehyde? Give its use.
b) What are biodegradable polymers?
c) How does vulcanization change the character of natural rubber? 3

15. a) What is the role of silica in the extraction of copper?
b) Write the principle behind the following methods:
i) Hydraulic washing ii) Vapour phase refining 3



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16. a) Write the hybridization and shape of the following complexes:
i) $[\text{CoF}_6]^{3-}$ ii) $[\text{Ni}(\text{CN})_4]^{2-}$
(Atomic number of Co = 27, Ni = 28)
- b) Out of NH_3 and CO , which ligand forms a more stable complex with a transition metal and why? 3

17. Nitrogen pentoxide decomposes according to equation : $2\text{N}_2\text{O}_{5(\text{g})} \rightarrow 4\text{NO}_{2(\text{g})} + \text{O}_{2(\text{g})}$. This first order reaction was allowed to proceed at 40°C and the data below were collected.

$[\text{N}_2\text{O}_5]$ (M)	Time (min)
0.400	0.00
0.289	20.0
0.209	40.0
0.151	60.0
0.109	80.0

- a) Calculate rate constant. Include units with your answer.
- b) What will be the concentration of N_2O_5 after 100 minutes?
- c) Calculate the initial rate of reaction. 3
18. The edge length of unit cell of a metal having molecular mass 75g/mol is 5\AA , which crystallizes in a cubic lattice. If the density is 2g/cc , then find the radius of the metal atom. 3
19. Give reason for the following:
- a) Bond enthalpy of F_2 lower than Cl_2
- b) PH_3 has lower boiling point than NH_3 .
- c) Helium is used in diving apparatus.

(OR)

Draw the structure of the following molecules:

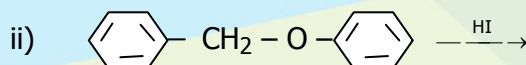
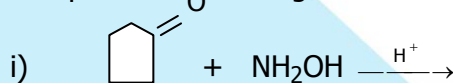
- i) BrF_3 ii) $(\text{HPO}_3)_2$ iii) XeF_4 3
20. How are the following conversions carried out?
- i) Benzoic acid to aniline.
- ii) Ethanol to propanenitrile
- iii) Ethanamine to Propanamine 3
21. a) In reference to Freundlich adsorption isotherm, write the expression for adsorption of gases on solids in the form of an equation.
- b) Write an important characteristic of lyophobic sols.
- c) Write the dispersed phase and dispersion medium of smoke. 3



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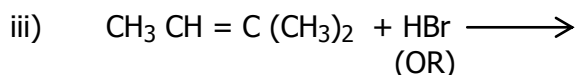
22. Give reason:
- Ethyl iodide undergoes S_N2 reaction faster than ethyl bromide.
 - 1-Chloro butane has higher boiling point than 2-Chloro butane.
 - Grignard reagent should be prepared under anhydrous conditions.
23. Upasana's younger brother likes taking medicines. He sometimes even drinks cough syrups even when he is not ill. One such day, he drank cough syrup when he was healthy. After sometime he started feeling headache and his body started itching. Upasana's father did not take him to the doctor and wanted to give medication on his own. Upasana insists that her father should not give medicines to her brother on his own but should take him to a doctor.
- Mention the values shown by Upasana.
 - Why did his body started itching?
 - Why should not medicines be taken without consulting doctors?
 - What are analgesics?
24. a) Complete the following chemical reaction:
- $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow$
 - $Cr_2O_7^{2-} + Fe^{2+} + H^+ \rightarrow$
- b) Give reason for the following:
- Mn^{2+} is much more resistant than Fe^{2+} towards oxidation.
 - Many of the transition elements are known to form interstitial compounds.
 - The second and the third transition series elements have almost similar atomic radii.
- (OR)
- Assign reason for the following:
- The enthalpies of atomization of transition elements are high.
 - The transition metals and many of their compounds act as good catalyst.
 - From element to element, the actinoid contraction is greater than the lanthanoid contraction.
 - Scandium ($Z=21$) does not exhibit variable oxidation state and yet it is regarded as a transition element.
 - Cu(I) ion is not known in aqueous solution.
25. Arrange the following in the order of property indicated against each set.
- $C_6H_5NH_2$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, NH_3 (decreasing order of their basic strength)
 - $CH_3CH_2CH_2CHO$, $CH_3CH_2CH_2CH_2OH$, $C_2H_5-O-C_2H_5$, $CH_3CH_2CH_2CH_3$ (Increasing order of boiling point)
- b) Complete the following reactions:



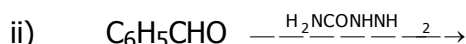
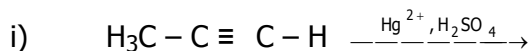


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a) Write the final products in each of the following reaction:



b) Two moles of organic compound A on treatment with a strong base gives two compounds B and C. Compound B on dehydrogenation with Cu gives A.

Acidification of C yields Carboxylic acid D with molecular formula of CH_2O_2 .

Identify the compound A, B, C and D and write all chemical reactions involved. 5

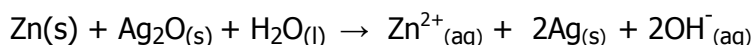
26. a) Resistance of a conductivity cell filled with 0.1 mol/L KCl solution is 100Ω . The resistance of the same cell when filled with 0.02 mol/L KCl solution is 520Ω . Calculate the conductivity and molar conductivity of 0.02 mol/L KCl solution. The conductivity of 0.1 mol/L KCl solution is $1.29 \times 10^{-2} \Omega^{-1} \text{cm}^{-1}$.

b) Calculate the cell potential of a hydrogen electrode in contact with a solution whose pH is 10.

(OR)

a) Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of solution for a weak and strong electrolyte.

b) In the button cell widely used in watches, the following reaction takes place:



Determine E^0 and ΔG^0 for the reaction.

$$E^0_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}, \quad E^0_{\text{Ag}^+/\text{Ag}} = -0.80 \text{ V}$$

5

-X-X-X-X-X-