Indraprastha INTERNATIONAL SCHOOL
Sector 10, Dwarka, New Delhi – 110075

SESSION: 2016-17
HALF YEARLY EXAMINATION
CHEMISTRY
SET - B

Class: XII
Date: 12.9.2016

Maximum Marks: 70
Time allowed: 3 hours

Instructions

- **This question paper contains 26 questions and 4 printed pages.**
- **All questions are compulsory.**
- **Write the answers neatly and legibly.**
- **Question numbers 1 to 5 are very short answer questions carrying 1 mark each.**
- **Question numbers 6 to 10 are short answer questions and carry 2 marks each.**
- **Question numbers 11 to 22 are also short answer questions and carry 3 marks each.**
- **Question number 23 is a value based question and carries 4 marks.**
- **Question numbers 24 to 26 are long answer questions and carry 5 marks each.**
- **Use log tables if necessary, use of calculator is not allowed.**

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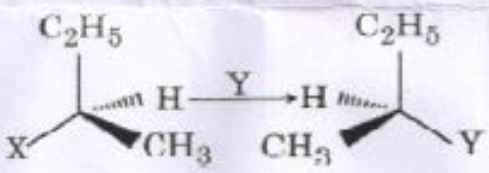
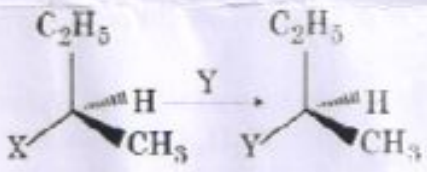
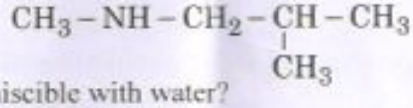
1. What is the coordination number for an octahedral void?
2. A & B liquids, on mixing, produce a warm solution. Which type of deviation from Raoult's law is there?
3. Which of the following reaction is S_N1 type?

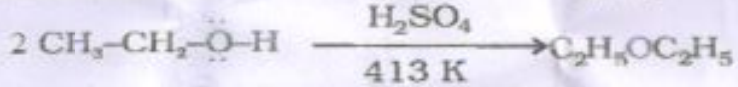
(i) 

(ii) 

4. What will be the order of reaction, if half life period is directly proportional to initial concentration of reactant?
5. Write down the IUPAC name of:

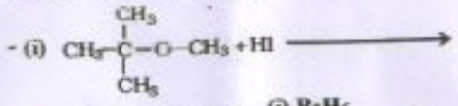


6. a. Why alkyl halides are immiscible with water?
   b. Why chloroform is kept in black bottles away from sunlight?
7. Write the mechanism of the following reaction with appropriate arrows:

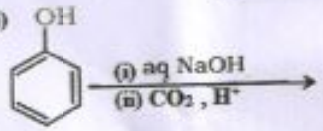


8. How will you convert: (i) Propene to Propan-1-ol (ii) Phenol to 2, 4, 6-tribromophenol?
9. How does the presence of double bonds in rubber molecules influence their structure and reactivity.
10. The conductivity of 0.02 M solution of KCl at 298 K is 0.025 S cm^{-1}. Calculate its molar conductivity.

20. Complete the following reactions:

(i) 

(ii) $CH_3-CH=CH_2 \xrightarrow[(ii)\ H_2O/OH^-]{(i)\ B_2H_6}$

(iii) 

21. a. Differentiate between lyophobic and lyophilic colloidal.
b. Out of $MgCl_2$ and $AlCl_3$, which one is more effective in causing coagulation of positively charged sol and why?
c. Out of sulphur sol and protein, which one forms multimolecular colloidal?

22. a. Show that the time required for completion of $\frac{3}{4}^{th}$ of reaction of first order is twice that of half-life ($t_{1/2}$) of the reaction.
b. Define half-life period.

OR

The rate of a reaction doubles when the temperature changes from 293k to 303k. Calculate the activation energy of the reaction assuming that it does not change with temperature.

23. Due to hectic and busy schedule, Mr. Angad made his life full of tensions and anxiety. He started taking sleeping pills to overcome depression without consulting the doctor. Mr. Deepak, a close friend of Mr. Angad, advised him to stop taking sleeping pills and suggested to change his lifestyle by doing Yoga, meditation and some physical exercise. Mr. Angad followed his friend's advice and after few days he started feeling better

After reading the above passage, answer the following:
a. What are the values (at least two) displayed by Mr. Deepak?
b. Why it is not advisable to take sleeping pills without consulting doctor?
c. What are tranquilizers? Give two examples.

24. a. Calculate Ecell for the following reaction at 298K:

$$2\ Cr\ (s) + 3\ Fe^{2+}\ (0.1\ M) \longrightarrow 2\ Cr^{3+}\ (0.01\ M) + 3\ Fe\ (s)$$

Given: $E^{\circ}(Cr^{3+}/Cr) = -0.74$ V and $E^{\circ}(Fe^{2+}/Fe) = -0.44$ V.

b. Using the E° values of A and B, predict which is better for coating the surface of iron $[E^{\circ}(Fe^{2+}/Fe) = -0.44V]$ to prevent corrosion and why ?

OR

a. Three electrolytic cells A, B, and C containing solutions of zinc sulphate, silver nitrate, and copper sulphate, respectively, are connected in series. A steady current of 1.5 ampere was passed through them until 1.45 g of silver was deposited at the cathode of cell B. How long did the current flow? What masses of copper and zinc were deposited in the concerned cells?(Atomic masses of Ag = 108, Zn = 65.4, Cu = 63.5)

b. How much electricity is required in Faraday for the oxidation of-
(i) 1 mol H_2O to O_2
(ii) 1 mol FeO to Fe_2O_3

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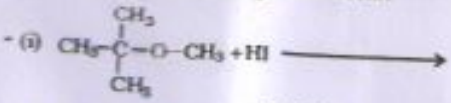
(i) 

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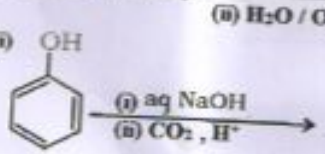
(iii) 

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b. Using the E° values of A and B, predict which is better for coating the surface of iron $[E^\circ(Fe^{2+}/Fe) = -0.44V]$ to prevent corrosion and why? $E^\circ_A = -0.76V$, $E^\circ_B = +0.34\,V$

OR

Three electrolytic cells A, B, and C containing solutions of zinc sulphate, silver nitrate, and copper sulphate, respectively, are connected in series. A steady current of 1.5 ampere was passed through them until 1.45 g of silver was deposited at the cathode of cell B. How long did the current flow? What masses of copper and zinc were deposited in the concerned cells? (Atomic masses of Ag = 108, Zn = 65.4, Cu = 63.5)

How much electricity is required in Faraday for the oxidation of-
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11. Arrange the following compounds in the increasing order of their property as indicated:

a. Acetaldehyde, Acetone, Di-*tert*-butyl ketone, Methyl *tert*-butyl ketone (Reactivity towards HCN)

b. CH_3CH_2CH (Br) COOH, $CH_3CH(Br)CH_2COOH$, $(CH_3)_2CHCOOH$, $CH_3CH_2CH_2COOH$ (Acid strength)

c. Benzoic acid, 4-Nitrobenzoic acid, 3, 4-Dinitrobenzoic acid, 4-Methoxybenzoic acid (Acid strength)

12. a. What type of semiconductor is obtained when silicon is doped with boron?

b. What type of magnetism is shown in the following alignment of magnetic moments? ↑↑↑↑↑↑↑↑

c. What type of point defect is produced when AgCℓ is doped with $CdCℓ_2$?

13. Determine the osmotic pressure of a solution prepared by dissolving 2.5×10^{-2} g of K_2SO_4 in 2L of water at 25^0 C assuming that it is completely dissociated. (R= 0.0821 L atm K^{-1} mol^{-1}, Molar mass of K_2SO_4 =174 g mol^{-1}).

14. a. Silver crystallises in fcc lattice. If edge length of the unit cell is 4.077×10^{-8} cm, then calculate the radius of silver atom.

b. Solid A is very hard, electrical insulator in solid as well as in molten state and melts at extremely high temperature. What type of solid is it?

15. a. Gas (A) is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henrys constant) and why?

b. Nacl is used to clear snow from roads in hill stations, why?

c. RBC swell up and burst when placed in 0.1% Nacl solution, why?

16. For the first order thermal decomposition reaction, the following data were obtained:

$$C_2H_5Cl(g) \rightarrow C_2H_4(g) + HCl(g)$$

Time / sec	Total pressure / atm
0	0.30
300	0.50

Calculate the rate constant (Given log 2 = 0.3010, log 3 = 0.4771, log 5 = 0.6990).

17. a. Write the differences between physisorption and chemisorption with respect to the following:

i Specificity ii Temperature dependence

iii Reversibility and iv Enthalpy change

b. What is the reason for the stability of colloidal sols?

18. a. Write the name and structure of one of the common initiators used in free radial addition polymerization.

b. Identify the monomers in the following polymers: $\left[NH-(CH_2)_6-NH-CO-(CH_2)_4-CO\right]_n$

c. Arrange the following polymers in the increasing order of their intermolecular forces: Polystyrene, Terylene, Buna-S.

19. Give reasons:

a. Iodoform has appreciable antiseptic property.

b. The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.

c. SN_1 reactions are accompanied by recemisation in optically active alkyl halides.

25. a Write the structures of A and B in the following reactions:

(i) $CH_3COCl \xrightarrow{H_2, Pd-BaSO_4} A \xrightarrow{H_2N-OH} B$

(ii) $CH_3MgBr \xrightarrow[2.\ H_3O^+]{1.\ CO_2} A \xrightarrow{PCl_5} B$

b. Distinguish between: (i) $C_6H_5COCH_3$ and C_6H_5CHO (ii) CH_3COOH and HCOOH

c. Arrange the following in the increasing order of their boiling points: CH_3CHO, CH_3COOH, CH_3CH_2OH

OR

a. Write the chemical reaction involved in Wolff-Kishner reduction.

b. Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:
$C_6H_5COCH_3$, CH_3CHO, CH_3COCH_3

c. Why carboxylic acid does not give reactions of carbonyl group?

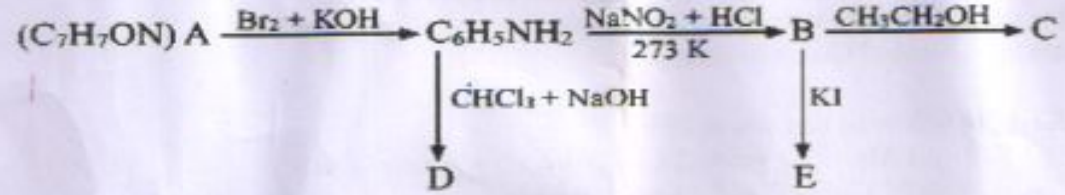
d. Write the product in the following reaction

$$CH_3CH_2CH=CH-CH_2CN \xrightarrow[2.\ H_2O]{1.\ (i\text{-}Bu)_2AlH}$$

e. A and B are two functional isomers of compound C_3H_6O. On heating with NaOH and I_2, isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate. Write the formulae of A and B.

26. An aromatic compound 'A' of molecular formula C_7H_7ON undergoes a series of reactions as shown below.

Write down the structures of A, B, C, D and E in the following reactions:



OR

a. Account for the following:

i. pK_b of aniline is more than that of methylamine.

ii. Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.

iii. Aniline can't be prepared by Gabriel phthalimide reaction.

b. Convert:

i. Methanamine to ethanamine ii. Aniline to Phenol