



CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

SAMPLE PAPER 2015

Part I Question 1

1. (Increases, decreases, positive, efficient, 68, non-efficient, no α -hydrogen, negative, Rosenmund's, greater, Cannizzaro, 74, commonion effect, lesser, buffer action, diamagnetic, paramagnetic)

The more_____is standard reduction potential of a metal, the_____is its ability to displace hydrogen from acids.



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2. Fill in the blanks choosing appropriate words given in brackets :

(Sodium chloride, Caesium chloride, copper, diamond, graphite, ions, atoms, close, 74%, 68%.

Both cop and hcp are packings and occupy about % of the available space.

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3. (Increases, decreases, positive, efficient, 68, non-efficient, no α -hydrogen, negative, Rosenmund's, greater, Cannizzaro, 74, commonion effect, lesser, buffer action, diamagnetic, paramagnetic)

Solubility of silver chloride_____in the presence of sodium chloride because of_____.

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4. (Increases, decreases, positive, efficient, 68, non-efficient, no α -hydrogen, negative, Rosenmund's, greater, Cannizzaro, 74, commonion effect, lesser, buffer action, diamagnetic, paramagnetic)
Benzaldehyde undergoes_____in reaction on treatment with concentrated sodium hydroxide because it has_____atom.

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5. (Increases, decreases, positive, efficient, 68, non-efficient, no α -hydrogen, negative, Rosenmund's, greater, Cannizzaro, 74, commonion effect, lesser, buffer action, diamagnetic, paramagnetic)
The transition metals show_____character because of the presence of unpaired electrons and Cu^+ is_____because its electronic configuration is $[Ar]3d^{10}$.

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6. The molal freezing points constant of water is $1.86 \text{ K kg mol}^{-1}$.

Therefore, the freezing point of 0.1 M NaCl in water is expected to be

A. -1.86°C

B. -0.372°C

C. -0.186°C

D. $+0.372^\circ \text{C}$

Answer: B

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7. For a first order reaction the rate constant for decomposition of N_2O is $6 \times 10^{-4} \text{ sec}^{-1}$. The half-life period for the decomposition in seconds is :

A. 11.55

B. 115.5

C. 1155

D. 1.155

Answer: C



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8. When acetaldehyde is treated with Grignard reagent, followed by hydrolysis the product formed is :

A. Primary alcohol

B. Secondary alcohol

C. Carboxylic acid

D. Tertiary alcohol

Answer: B

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9. The geometry of XeF_6 molecule and the hybridization of Xe atom in the molecule is :

- A. Distorted octahedral and sp^3d^3
- B. Square planar and sp^3d^2
- C. Pyramidal and sp^3
- D. Octahedral and sp^3d^3 .

Answer: A

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10. In the complexes $[Fe(CN)_6]^{3-}$ and $[Pt(en)(H_2O)_2(NO_2)(Cl)]^{2+}$ the respective oxidation numbers of central metal atoms are :

A. +3 and +4

B. +6 and +4

C. +6 and +3

D. +3 and +3

Answer: A

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Part I Question 1 Answer The Following Questions

1. What is the effect of temperature on the ionic product of water?

How will it change the pH value of a neutral solution?

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2. How many hours does it take to reduce 3 moles of Fe^{3+} to Fe^{2+} with 2A current intensity ?

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3. How is urea prepared by Wohler synthesis?

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4. Two liquids A and B form type II non-ideal solution which shows a minimum in its temperature-molefraction plot (T-X diagram). Can the two liquids be completely separated by fractional distillation?

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5. The aqueous solution of sodium acetate is basic. Explain.



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- 6.
- | | |
|--|------------------------------------|
| (i) Disaccharide | (a) Lucas reagent |
| (ii) Carbylamine | (b) Condensation polymer |
| (iii) Dacron | (c) Obnoxious smell |
| (iv) Low spin complex, $d^2 sp^3$ | (d) Sucrose |
| (v) Anhydrous
$ZnCl_2 + \text{conc. HCl}$ | (e) Hexaammine-
cobalt(III) ion |

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Part II Section A Question 2

1. A solution containing 0.5 g of KCl dissolved in 100 g of water and freezes at $-0.24^\circ C$. Calculate the degree of dissociation of the salt. (

K_f for water $= 1.86^\circ C$. [Atomic weight K = 39, Cl = 35.5]

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2. If 1.71 g of sugar (molar mass = 342) are dissolved in 500 mL of an aqueous solution at 300 K. What will be its osmotic pressure?

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3. 0.70 g of an organic compound when dissolved in 32 g of acetone produces an elevation of 0.25°C in the boiling point. Calculate the molecular mass of organic compound.

(K_b for acetone = $1.72 \text{ K kg mol}^{-1}$).

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4. Write two differences between 'order of reaction' and 'molecularity of reaction'.

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5. A substance decomposes by following first order kinetics. If 50% of the compound is decomposed in 120 minutes, how long will it take for 90% of the compound to decompose?

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6. Name the crystal structure of copper metal.

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Part II Section A Question 3

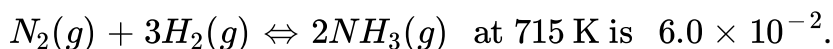
1. Chromium metal crystallizes with a body-centred cubic lattice. The edge length of the unit cell is found to be 287 pm. Calculate the atomic radius. What would be the density of chromium in g cm^{-3} ? (atomic mass of Cr = 52.99)

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2. Why sodium chloride on heating with sodium vapours acquires yellow colour?

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3. The equilibrium constant for the reaction :



If, in a particular reaction, there are 0.25 mol L^{-1} of H_2 and 0.06 mol L^{-1} of NH_3 present, calculate the concentration of N_2 at equilibrium.

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4. Calculate the concentration of OH^- ions in solution when

$$[H^+] = 6.2 \times 10^{-2} \text{ mol L}^{-1}.$$



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5. Le Chatelier's Principle

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6. For a crystal of sodium chloride, state:

(i) The type of lattice in which it crystallizes.

(ii) The coordination number of each sodium ion and chloride ion in the crystal lattice.

(iii) The number of sodium ions and chloride ions present in a unit cell of sodium chloride.

(iv) The structural arrangement of the sodium chloride crystal.

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7. For a crystal of diamond, state :

The coordination number of each carbon atom.

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8. How many sodium ions and chloride ions are present in a unit cell of sodium chloride ?

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9. For a crystal of sodium chloride, state :

The structural arrangement of the sodium chloride crystal.

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10. Consider the following reaction.



How is the composition of equilibrium mixture affected by :

- (i) A change in temperature
- (ii) A change in pressure
- (iii) A change in concentration of N_2O_4
- (iv) The removed of NO_2 from the reaction mixture

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Part II Section A Question 4

1. The specific conductance of a 0.01 M solution of acetic acid at 298K is $1.65 \times 10^{-4} \text{ ohm}^{-1} \text{ cm}^{-1}$. The molar conductance at infinite dilution for H^+ ion and CH_3COO^- ion are $349.1 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ and $40.9 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively.

Calculate :

Molar conductance of the solution.

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2. The specific conductance of a 0.01 M solution of acetic acid at 298K is $1.65 \times 10^{-4} \text{ ohm}^{-1} \text{ cm}^{-1}$. The molar conductance at infinite dilution for H^+ ion and CH_3COO^- ion are $349.1 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ and $40.9 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively.

Calculate :

Degree of dissociation of CH_3COOH .

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3. The specific conductance of a 0.01 M solution of acetic acid at 298K is $1.65 \times 10^{-4} \text{ ohm}^{-1} \text{ cm}^{-1}$. The molar conductance at infinite dilution for H^+ ion and CH_3COO^- ion are $349.1 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$

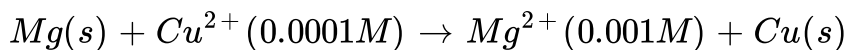
and $40.9 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively.

Calculate :

Dissociation constant for acetic acid.

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4. Calculate the emf of the following cell reaction at 298 K:



The standard potential (E^\ominus) of the cell is 2.71 V.

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5. The solubility product (K_{sp}) of BaSO_4 is 1.5×10^{-9} . Calculate the solubility of barium sulphate in pure water and in 0.1 M BaCl_2 .

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6. Explain the following :

When NH_4Cl and NH_4OH are added to a solution containing both, Fe^{3+} and Ca^{2+} ions, which ion is precipitated first and why?

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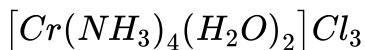
7. Explain the following :

Dissociation of H_2S is suppressed in acidic medium.

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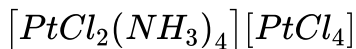
Part II Section B Question 5 Answr Any Two Questions

1. Write the IUPAC names of the following coordination compound



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2. Write the IUPAC names of the following coordination compounds :



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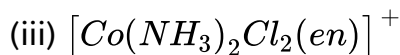
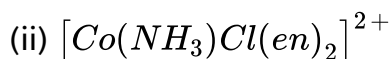
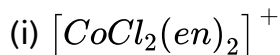
3. State the hybridization and magnetic property of $[Fe(CN)_6]^{3-}$ ion according to the valence bond theory.

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4. What type of structural isomers are $[Co(NH_3)_5Br]SO_4$ and $Co[(NH_3)_5SO_4]Br$? Give a chemical test to distinguish the isomers.

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5. Draw all the isomers (geometrical and optical) of:



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Part II Section B Question 6

1. Give balanced chemical equations for the following reactions :

(i) Fluorine is passed through cold, dilute NaOH solution.

(ii) Hydrogen peroxide is treated with acidified $KMnO_4$ solution.

(iii) Sulfuric acid is treated with hydrogen sulfide.

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2. Give balanced chemical equations for the following reactions :

Hydrogen peroxide is treated with acidified $KMnO_4$ solution.

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3. Give balanced chemical equations for the following reactions :

Hydrogen sulphide treated with concentrated sulphuric acid.

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4. Explain the hybridization in XeF_4 . Also draw its molecular structure.

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1. Name the important ore of silver. Write all the steps and reactions involved in the cyanide process for the extraction of silver from its ore.

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2. Explain why transition metals form complex compounds.

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3. Explain the following :

The paramagnetic character in 3d-transition series elements increases upto Mn and then decreases.

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1. How can the following conversions be brought about :

Glycerol to formic acid

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2. How can the following conversion be brought about?

Chlorobenzene to phenol.

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3. How can the following conversions be brought about :

Diethyl ether to ethanol

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4. How can the following conversion be brought about: Phenol to aniline

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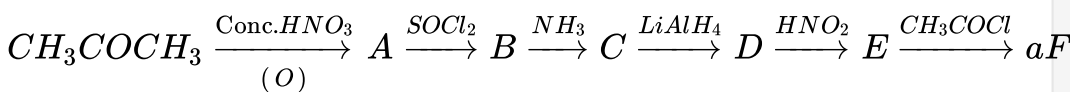
5. How is iodoform prepared from ethanol? Give balanced equation.

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6. What will be the product formed when chlorobenzene is heated with sodium metal in the presence of dry ether?

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7. Identify the compounds A,B,C,D,E, and F :



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Part II Section C Question 9

1. Give balanced equation for the following name reaction:

Reimer-Tiemann reaction.

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2. Give balanced equations for the following name reactions :

Rosenmund reaction

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3. Give balanced equation for Hofmann's degradation reaction.

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4. Give one good chemical test to distinguish between the following pair of compounds: Methylamine and dimethylamine.

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5. Give one chemical test to distinguish between the following pairs of compounds :

Acetaldehyde and benzaldehyde

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6. Arrange the following compounds in the ascending order of their basic strength and give reasons for your answer :

Methylamine, Aniline, Ethylamine, Diethyl ether

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7. Name the monomers and the type of polymerization in each of the following polymers:

(a) Polyester (b) Bakelite

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Part II Section C Question 10

1. An organic compound A with molecular formula C_2H_7N on reaction with nitrous acid gives a compound B. B on controlled oxidation gives a compound C. C reduces Tollens' reagent to give silver mirror and D. B reacts with D in the presence of concentrated sulfuric acid to give a sweet smelling compound E. Identify A, B, C, D and E. Give the reaction of C with ammonia and name the product.

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2. Give balanced equations for the following reactions :

How will you convert ethyl amine to methyl amine?

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3. What is the effect of denaturation on the structure of proteins?

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4. Name the nitrogen base residues present in DNA ?

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5. Give balanced equations for the following reactions :

Aniline is treated with nitrous acid and HCl at low temperature.

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6. Give balanced equation for the following reaction :

Acetyl chloride is treated with ethyl alcohol.

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7. Give balanced equation for the reaction:

Formaldehyde is treated with ammonia.

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