



CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

SAMPLE QUESTION PAPER 1

Part 1

1. Fill in the blanks by choosing the appropriate word/words from those given in the brackets :

(iodoform, acetaldehyde, positive, greater, acidic, acetone, disaccharide, negative, increases, glucose,

decreases, chloroform, polysaccharide, lactose, lesser,
basic, cationic hydrolysis, anionic hydrolysis)

(i) Calcium acetate on heating gives _____ which gives
_____ on heating with iodine and sodium hydroxide
solution.

(ii) On dilution of a solution, its specific conductance
while its equivalent conductance _____

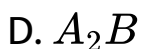
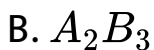
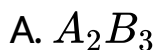
(iii) Sucrose is a _____ and yields upon hydrolysis, a
mixture of _____ and fructose.

(iv) More _____ is the standard reduction potential of
a substance, the _____ is its ability to displace
hydrogen from acids.

(v) An aqueous solution of CH_3COONa is _____ due
to _____.



2. In a face centered cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face centers. One of the B atoms missing from one of the face in unit cell. The simplest formula of compounding is:



Answer: A

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3. The half-life period of a first order reaction is 20 minutes. The time required for the concentration of the reactant to change from 0.16 M to 0.02 M is :

A. 80 minutes

B. 60 minutes

C. 40 minutes

D. 20 minutes

Answer: B

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4. A cell reaction would be spontaneous if the cell potential and $\Delta_r G$ are respectively:

A. $-ve$ and $+ve$

B. $+ve$ and $-ve$

C. $+ve$ and $+ve$

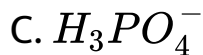
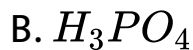
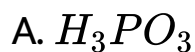
D. $-ve$ and $-ve$

Answer: A



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5. The conjugate acid of HPO_4^{2-} is:



Answer: C



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6. The polymer formed by the condensation of hexamethylenediamine and adipic acid is :

A. Teflon

B. Bakelite

C. Dacron

D. Nylon-66

Answer: D

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7. Answer the following questions :

Why the freezing point depression (ΔT_f) of 0.4M NaCl solution is nearly twice than that of 0.4M glucose solution ?

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8. What do you understand by the order of a reaction ? Identify the reaction order from each of the following units of the reaction rate constant :

(i) $L^{-1}mols^{-1}$

(ii) $Lmols^{-1}$



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9. Specific conductivity of 0.20 M solution of KCl at 298 K is $0.025Scm^{-1}$. Calculate its molar conductivity.



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10. Name the order of reaction which proceeds with a uniform rate throughout.



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11. What are the products formed when phenol and nitrobenzene are treated separately with a mixture of concentrated sulphuric acid and concentrated nitric acid ?



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12. Match the following:

- | | |
|------------------------------|-----------------------------|
| (i) Diazotization | (a) Bakelite |
| (ii) Argentite | (b) Nernst equation |
| (iii) Thermosetting plastics | (c) Aniline |
| (iv) Electrochemical cell | (d) Ethylenediamine |
| (v) Bidentate ligand | (e) Froth flotation process |



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Part II Section A

1. Determine the freezing point of a solution containing 0.625 g of glucose ($C_6H_{12}O_6$) dissolved in 102.8 g of water.

(Freezing point of water = 273 K, K_f for water = 1.87 K

kg mol⁻¹ at. wt. C = 12, H = 1, O = 16)



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2. A 0.15 M aqueous solution of KCl exerts an osmotic pressure of 6.8 atm at 310 K. Calculate the degree of dissociation of KCl. ($R = 0.0821 \text{ Lit. atm } K^{-1} \text{ mol}^{-1}$).



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3. A solution containing 8.44 g of sucrose in 100 g of water has a vapour pressure 4.56 mm of Hg at 273K. If the vapour pressure of pure water is 4.58 mm of Hg at the same temperature, calculate the molecular weight of sucrose.

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4. When ammonium chloride and ammonium hydroxide are added to a solution containing both Al^{3+} and Ca^{2+} ions, which ion is precipitated first and why?

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5. A solution of potassium chloride has no effect on litmus whereas, a solution of zinc chloride turns the blue litmus red. Give a reason.

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



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7. Lead sulphide has face centred cubic crystal structure. If the edge length of the unit cell of lead sulphide is 495 pm, calculate the density of the crystal.
(at. Wt. Pb =207, S=32)



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8. For the reaction: $2\text{H}_2 + 2\text{NO}$

| S. No. | $[\text{NO}] \text{ mol L}^{-1}$ | $[\text{H}_2] \text{ mol L}^{-1}$ | Rate $\text{mol L}^{-1} \text{sec}^{-1}$ |
|--------|----------------------------------|-----------------------------------|--|
| 1. | 0.40 | 0.40 | 4.6×10^{-3} |
| 2. | 0.80 | 0.40 | 18.4×10^{-3} |
| 3. | 0.40 | 0.80 | 9.2×10^{-3} |

Calculate the following:

- (1) The overall order of reaction.
- (2) The rate law.
- (3) The value of rate constant (k).



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9. The following electrochemical cell is set up at 298 K:



Given:

$$E^\circ \text{Zn}^{2+} / \text{Zn} = -0.761\text{V}, E^\circ \text{Cu}^{2+} / \text{Cu} = +0.339\text{V}$$

(1) Write the cell reaction.

(2) Calculate the emf and free energy change at 298 K



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10. (ii) Answer the following:

(1) What is the effect of temperature on ionic product of water (K_w) ?

(2) What happens to the ionic product of water (K_w) if some acid is added to it ?



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11. Schottky defect lowers the density of ionic crystals while Frenkel defect does not. Why?



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12. Name the law or principle to which the following observations conform :

(1) When water is added to a 1.0 M aqueous solution of acetic acid, the number of hydrogen ion (H^+) increases.

(2) When 9650 coulombs of electricity is passed through a solution of copper sulphate, 3.175 g of copper is deposited on the cathode.(at. wt. of Cu =

63.5).

(3) When ammonium chloride is added to a solution of ammonium hydroxide, the concentration of hydroxyl ions decreases.

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

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14. Explain why high pressure is required in the manufacture of sulphur trioxide by contact process.

State the law or principle used.

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15. Calculate the equilibrium constant (K) for the formation of NH_3 in the following reaction: $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ At equilibrium, the concentration of NH_3 , H_2 and N_2 are 1.2×10^{-2} , 3.0×10^{-2} and 1.5×10^{-2} M respectively.

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16. Explain the following: Hydrolysis of ester (ethyl acetate) begins slowly but becomes fast after

sometime.

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17. Assertion : The pH of an aqueous solution of acetic acid remains unchanged on addition of sodium acetate.

Reason : The ionization of acetic acid is increased by addition of sodium acetate.

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1. Write the formula of the following compounds :

(i) Potassium trioxalatoaluminate (III)

(ii) Hexaaquairon (II) sulphate.

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2. Name the types of isomerism shown by the following pairs of compounds :

(i) $[Cu(NH_3)_4][PtCl_4]$ and $[Pt(NH_3)_4][CuCl_4]$

(ii) $[Co(en)_2Cl_2]^+$ and $[Co(en)_2Cl_2]^+$

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3. For the coordination complex ion $[Co(NH_3)_6]^{3+}$

Give the IUPAC name of the complex ion.



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4. Give balanced equations for the following reactions

:

(i) Potassium permanganate is heated with concentrated hydrochloric acid.

(ii) Lead sulphide is heated with hydrogen peroxide.

(iii) Ozone is treated with potassium iodide solution.



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5. With the help of equations, give an outline for the manufacture of sulphuric acid by the contact process.

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6. (i) What are the types of hybridization of iodine in interhalogen compounds IF_3 , IF_3 and IF_7 , respectively?

(ii) Draw the structure of xenon hexafluoride (X_eF_6) molecule and state the hybridization of the central atom.

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7. Give the equations for the conversion of argentite (Ag_2S) to metallic silver.



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Part II Section C

1. How can the following conversions be brought about:

(i) Acetaldehyde to propan-2-ol.

(ii) Nitrobenzene to p-aminoazobenzene.

(iii) Acetic acid to methylamine.

(iv) Aniline to benzene.

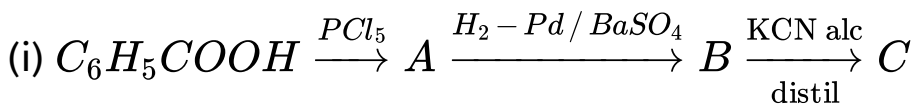


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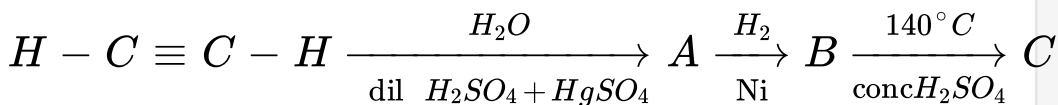
2. How will you distinguish between primary, secondary and tertiary amines ?

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3. Identify the compounds A, B and C :



(ii)



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4. Give balanced equations for the following name reactions :

(i) Friedel - Crafts reaction (alkylation)

(ii) Williamson's synthesis

(iii) Aldol condensation



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5. Give chemical test to distinguish : ethyl alcohol and sec - propyl alcohol.



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6. State two main differences between globular and fibrous proteins.

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7. An aliphatic unsaturated hydrocarbon (A) when treated with $HgS \xrightarrow{H_2} SO_4$ yields a compound (B) having molecular formula C_3H_6O . (B) on oxidation with concentrated HNO_3 gives two compounds (C) and (D). Compound (C) when treated with PCl_5 gives compound (E). (E) when reacts with ethanol gives a sweet-smelling liquid (F). Compound (F) is also formed when (C) reacts with ethanol in the presence of

concentrated H_2SO_4 .

(i) Identify the compound A, B, C, D, E and F.

(ii) Give the chemical equation for the reaction of (C) with chlorine in the presence of red phosphorus and name the reaction.

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8. Answer the following:

(i) What is the common name of the polymer obtained by the polymerization of caprolactam ? Is it an addition polymer or a condensation polymer ?

(ii) Name the two organic compounds which have the

same molecular formula C_2H_6O . Will they react with PCl_5 ? If they react what are the products formed?

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9. Give balanced equations for the following reactions

:

(i) Methyl magnesium bromide with ethyl alcohol.

(ii) Acetic anhydride with phosphorous pentachloride.

(iii) Acetaldehyde with hydroxylamine.

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