KENDRIYA VIDYALAYA SANGATHAN
BHOPAL REGION

WORKSHEETS FOR CLASS XII

SUBJECT CHEMISTY (043)

SESSION 2024-25

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CLASS: XII **WORKSHEET No: 01**

CHAPTER: SOLUTIONS **TIME: 35 MINUTES**

Q.1 4L of 0.02M aqueous solution of NaCl was diluted by adding one litre of water. The molality of the resultant soltion is

(a) 0.004 (b) 0.008

(c) 0.012 (d) 0.016

Q.2The value of Henry's constant K_H is:

(a) greater for gases with higher solubility (b) greater for gases with lower solubility.

(c) constant for all gases. (d) not related to the solubility of gases

Q.3 What is the mole fraction of ethylene glycol in a solution containing 20g by mass?

(a) 0.022 (b) 0.054

(c) 0.068 (d) 0.090

Q.4 The solubility of a substance in a solvent depends on

(a) Temperature (b) Pressure

(c) Nature of solute and solvent (d) All of the above

Q. 5 Which of the following does not dissolve in benzene?

(a) Naphthalene (b) Anthracite

(c) $C_6H_{12}O_6$ (d) All of the above

Q.6 Choose the ideal solution from the following.

(a) Carbon disulphide and acetone (b) Phenol and Aniline

(c) Chloroform and Acetone (d) Ethyl iodide and ethyl bromide

Q.7 How does the solubility of gasses vary with pressure?

(a) Increases with pressure (b) Decreases with pressure

(c) First increases and then decreases (d) No effect

Q.8 How does the solubility of gasses in a liquid vary with increase in temperature?

(a) Increases with temperature (b) Decreases with temperature

(c) First increases and then decreases (d) No effect

Q.9 Increasing the temperature of an aqueous solution will cause:

(b) decrease in molality (b) decrease in molarity

(c) decrease in mole fraction (d) decrease in % (w/w)

Q.10 Which of the following condition is not satisfied by an ideal solution?

(a) $\Delta H_{mixing} = 0$ (b) $\Delta V_{mixing} = 0$

(c) Raoult's Law is obeyed (d) Formation of an azeotropic mixture

Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below:

Both A and R are true and R is the correct explanation of A

Both A and R are true but R is not the correct explanation of A

A is true but R is false

A is false but R is true

1. **Assertion:** Molarity of a solution in liquid state changes with temperature.
   Reason: The volume of a solution changes with change in temperature

2. **Assertion:** When NaCl is added to water a depression in freezing point is observed.
   Reason: The lowering of vapour pressure of a solution causes depression in the freezing point.

3. **Assertion:** When a solution is separated from the pure solvent by a semipermeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.
   Reason: Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.

4. **Assertion:** Molecular mass of polymers cannot be calculated using boiling point or freezing point methods.
   Reason: Polymers solution do not possess a constant boiling point or freezing point.

5. **Assertion:** Non-ideal solutions always from azeotropes.
   Reason: Boiling point of azeotrope may be higher or lower than boiling points of both components.

Short Answer Type questions

Q.1 Components of a binary mixture of two liquids A and B were separated by distillation. After some time separation of components stopped and the composition of the vapour phase became the same as that of the liquid phase. Both the components started coming in the distillate. Explain why this happened?

Ans:_____

Q.2 Explain why on the addition of 1 mol of NaCl to 1 liter of water, the boiling point of water increases, while the addition of 1 mol of methyl alcohol to one liter of water decreases its boiling point.

Ans:_____

Q.3 Explain the solubility rule "like dissolves like" in terms of intermolecular forces that exist in solutions.

Ans:_____

Q.4 Concentration terms such as mass percentage, ppm, mole fraction and molality are independent of temperature, however molarity is a function of temperature. Explain why?

Ans:_____

Q.5 What is the significance of Henry's Law constant K_H ?

Ans:_____

Q.6 What type of deviation is shown by mixture of ethanol and acetone? Give reason**.**

Ans:_____

Matching Type Questions

Note: In the following questions match the items given in Column I and Column II.

Match the items given in Column I and Column II.

Column I	**Column II**
(a) Saturated solution	(i) Solution having the same osmotic pressure at a given temperature as that of the given solution.
(b) Binary solution	(ii) A solution whose osmotic pressure is less than that of another.
(c) Isotonic solution	(iii) Solution with two components.
(d) Hypotonic solution	(iv) A solution which contains the maximum amount of solute that can be dissolved in a given amount of solvent at a given temperature.
(e) Solid solution	(v) A solution whose osmotic pressure is more than that of another.
(f) Hypertonic solution	(vi) A solution in the solid phase.

Ans

Column I	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
Column II						

2. Match the items given in Column I with the type of solutions given in Column II.

Column I	Column II
(a) Soda water	(i) A solution of gas in solid
(b) Sugar solution	(ii) A solution of gas in gas
(c) German silver	(iii) A solution of solid in liquid
(d) Air	(iv) A solution of solid in solid
(e) Hydrogen gas in palladium	(v) A solution of gas in liquid

Ans

Column I	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	
Column II						

3. Match the laws given in Column I with expressions given in Column II.

Column I	Column II
(a) Raoult's law	(i) $\Delta T_f = K_f m$
(b) Henry's law	(ii) $\pi = CRT$
(c) Elevation of boiling point	(iii) $p = x_1p_1^0 + x_2p_2^0$
(d) Depression in freezing point	(iv) $\Delta T_b = K_b m$
(e) Osmotic pressure	(v) $p = K_H x$

Ans

Column I	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	
Column II						

VERY SHORT ANSWER TYPE QUESTIONS

1. What inter-particle interaction is present when NaCl is dissolved in water?

Ans_____

2. Vapour pressure is ---------- (increased, decreased) when NaCl is added in water.

3. Which has more Freezing point and why? (Distilled water or Sea water)

Ans_____

4. What is the van't Hoff factor of NaCl for very dilute solution in Water?

Ans_____

5. Which has more boiling point and why? (1mol of NaCl in 100 mL water, 1 mol of Glucose in 100mL water)

Ans_____

6. Why doctors asked the patient to take low sodium salt for high B.P patient?

Ans_____

7. Why do you gargle Luke warm salt water?

Ans_____

8. When you measure molar mass through colligative properties, why NaCl shows abnormal molecular mass but nor glucose?

Ans_____

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CLASS: XII **WORKSHEET No: 02**

CHAPTER: SOLUTION **TIME: 35 MINUTES**

Numericals -

1. Calculate the mole fraction of ethylene glycol ($C_2H_6O_2$) in a solution containing 20% of $C_2H_6O_2$ by mass.

Ans: _____

2. Calculate the molarity of a solution containing 5 g of NaOH in 450 mL solution

Ans: _____

3. Calculate (a) molality (b) molarity and (c) mole fraction of KI if the density of 20% (mass/mass) aqueous KI is 1.202 g mL^{-1} .

Ans: _____

4. The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non-volatile, non-electrolyte solid weighing 0.5 g when added to 39.0 g of benzene (molar mass 78 g mol-1). Vapour pressure of the solution, then, is 0.845 bar. What is the molar mass of the solid substance?

Ans: _____

5. The boiling point of benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of
6. benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. Kb for benzene is 2.53 K kg mol^{-1}

Ans: _____

7. 2 g of benzoic acid (C_6H_5COOH) dissolved in 25 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant for benzene is 4.9 K kg mol–1. What is the percentage association of acid if it forms dimer in solution?

Ans: _____

_____

_____

Write Short Notes on -

Henery's law----------

Mole fraction----------

Raoult's law----------

Azeotropic Mixture----------

Ideal and non Ideal solution----------

Reverse Osmosis----------

Edeama----------

Hypertonic solution----------

Q.Give reason for followings

(a) Why are aquatic species more comfortable in cold water than in warm water?

(b) Deep sea divers are advised not to come to surface immediately from deep waters. Why?

(c) Cooking is faster in pressure cooker than in cooking pan

(d) Two liquids A and B boil at 120°C and 160°C respectively. Which of them has higher vapour pressure at 70°C?

(e) Name the substances which are used by deep sea divers to neutralize the toxic effects of nitrogen dissolved in the blood.

Ans- (a) ----------

(b)----------

(c)----------

(d)----------

(e)----------

Case study based question –

In order to account extent of association and dissociation van't Hoff introduced a factor i called van't Hoff factor is defined as i= theoretical molar mass/ experimental molar mas. In case of association, the magnitude of experimental mass is greater theoretical molar mass. So the factor i has value less than one &in case of dissociation vice-versa. In case of solute which neither undergo association nor dissociation magnitude of experimental and theoretical molar mass is same so i is one.

Now answer the following-

(i)What is the value of van't Hoff i when solute undergoes to dimerization

---

(ii) What is the expected value of van't Hoff factor i for $K_4[Fe(CN)_6]$

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CLASS: XII **WORKSHEET No: 01**

CHAPTER: ELECTROCHEMISTRY **TIME: 35 MINUTES**

Q1. Which of the following statements is not correct about an inert electrode in a cell?

(i) It does not participate in the cell reaction. (ii) It provides a surface for oxidation or for the reduction.

(iii) It provides a surface for conduction of electrons. (iv) It provides a surface for a redox reaction

Q2. An electrochemical cell can behave like an electrolytic cell when _____.

(i) $E_{cell} = 0$ (ii) $E_{cell} > E_{ext}$ (iii) $E_{ext} > E_{cell}$ (iv) $E_{cell} = E_{ext}$

Q3. The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is____.

(i) 1F (ii) 6F (iii) 3F (iv) 2F

Q4. $\wedge^0m(H_2O)$ is equal to ___.

(i) $\wedge^0m(HCl) + \wedge^0m(NaOH) - \wedge^0m(NaCl)$ (ii) $\wedge^0m(HNO_3) + \wedge^0m(NaNO_3) - \wedge^0m(NaOH)$

(iii) $\wedge^0m(HNO_3) + \wedge^0m(NaOH) - \wedge^0m(NaNO_3)$ (iv) $\wedge^0m(NH_4OH) + \wedge^0m(HCl) - \wedge^0m(NH_4Cl)$

Read the Assertion and Reason statements and choose the appropriate option from below:

a) Both assertion and reason are correct and reason is the correct explanation of the assertion

b) Both assertion and reason are correct and reason is not the correct explanation of the assertion

c) Assertion is correct but reason is incorrect

d) Assertion is wrong Reason is correct.

Q5. **Assertion**: It is difficult to measure the conductivity of ionic solutions

Reason: Electrolytes conduct electricity and undergo chemical change.

Q6. **Assertion:** Current stops flowing when $E_{Cell} = 0$.

Reason: Equilibrium of the cell reaction is attained.

Q7. **Match the items of Column I and Column II.**

Column I	**Column II**
(i) $\wedge m$	(a) $S\ cm^{-1}$
(ii) E Cell	(b) m^{-1}
(iii) κ	(c) $S\ cm^2\ mol^{-1}$
(iv) G*	(d) V

Q8. **Read the passage given below and answer the following questions i-iv** .

The standard electrode potentials are very important and we can extract a lot of useful information from them. If the standard electrode potential of an electrode is greater than zero then its reduced form is more stable compared to hydrogen gas. Similarly, if the standard electrode potential is negative then hydrogen gas is more stable than the reduced form of the species. It can be seen that the standard electrode potential for fluorine is the highest in the Table indicating that fluorine gas (F_2) has the maximum tendency to get reduced to fluoride (F^-) and therefore fluorine gas is the the strongest oxidizing agent and fluoride ion is the weaker reducing agent. Lithium has the lowest electrode potential indicating that lithium metal is the most powerful reducing agent in an aqueous solution.

i). A negative E^0 means that

(A) the redox couple is a stronger reducing agent. (B) the redox couple is a stronger oxidizing agent.

(C) the redox couple is a weak reducing agent. (D) the reaction is spontaneous in the forward direction.

ii). Standard Electrode Potential is

(A) the reduction potential of a molecule under specific and standard conditions. (B) extensive property.

(C) measured by calorimeter. (D) oxidation potential.

---

iii). The standard hydrogen electrode can be represented as

(A) Pt (s) / Pt^{+2} (aq) / H_2 (g) / H^+ (aq.) (B) Pt (s) / H_2 (g, 1 bar) / H^+ (aq, 1M)

(C) Pt (s) / H_2 (g, 2 bar) / H^+ (aq, 1M) (D) Pt (s) / H_2 (g, 4 bar) / H^+ (aq, 2M)

---

iv). E^0 Mg $^{+2}$/Mg = -2.36 V, E^0 Ag $^+$ /Ag = 0.80 V. The E^0 cell is

(A) -3.16 V (B) -1.56 V (C) 2.3 V (D) 3.16

Q9. Consider the following figure and answer the questions (i) to (vi) given below:

(i) Draw the diagram to show the direction of electron flow.

_____

(ii) Is silver plate the anode or cathode?

_____

(iii) What will happen if the salt bridge is removed?

_____

(iv) When will the cell stop functioning?

_____

(v) How will concentration of Zn^{2+} ions and Ag^+ ions be affected when the cell functions?

_____

(vi) How will the concentration of Zn^{2+} ions and Ag^+ ions be affected after the cell becomes 'dead'?

_____

Q10. A solution of $CuSO_4$ is electrolyzed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?

Ans _____

_____

_____

_____

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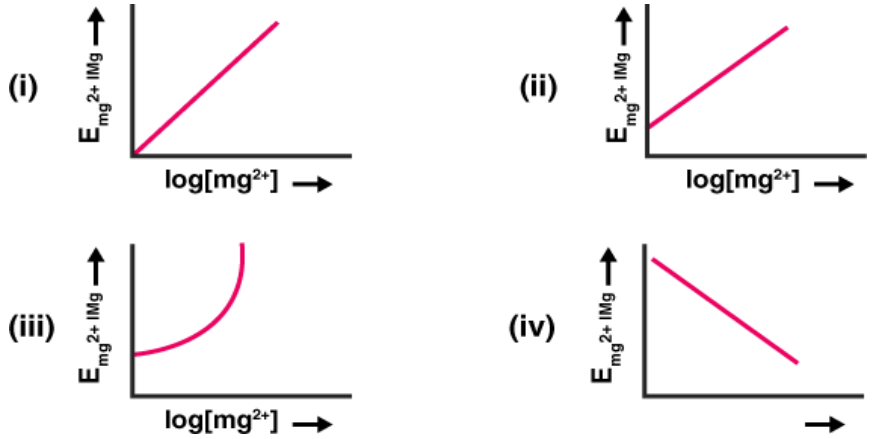
CLASS: XII **WORKSHEET No: 02**

CHAPTER: ELECTROCHEMISTRY **TIME: 35 MINUTES**

1.

Electrode potential for Mg electrode varies according to the equation EMg2+/Mg = E°Mg2+/Mg – 0.0591/2 log1/[Mg^{2+}] . The graph of EMg2+/Mg Vs log [Mg2+] is



2. In a Galvanic cell

(A) According to IUPAC convention, electrode potentials are expressed as standard oxidation potential.

(B) standard electrode potential can be measured experimentally.

(C) Oxidation potential is the tendency to release electrons.

(D) the electrode potential values represent the standard reduction potential &standard oxidation potential will have the same values but with opposite sign

3. Rust is a mixture of

(a) Fe O and Fe $(OH)_3$ (a) Fe O and Fe $(OH)_2$ (b) Fe_2O_3 and Fe $(OH)_3$ (d) Fe_3O_4 and Fe $(OH)_3$

Read the Assertion and Reason statements and choose the appropriate option from below:

a) Both assertion and reason are correct and reason is the correct explanation of the assertion

b) **Both assertion and reason are correct and reason is not the correct explanation of the assertion**

c) Assertion is correct but reason is incorrect

d) **Assertion is wrong Reason is correct.**

5. **Assertion**: Molar conductivity of strong electrolytes increases with dilution

Reason: On dilution inter ionic interaction increases.

---

6. **Assertion**: Electronic conduction decreases with temperature

Reason: The flow of electrons hindered on increasing the temperature

---

7. **Assertion**: Limiting molar conductivity of weak electrolytes, like water, can be found by using Kohlrausch's law.

Reason: Kohlrausch's law is applicable to electrolytic solutions at infinite dilution.

---

8. Predict the products of electrolysis in each of the following.

a. An aqueous solution of $AgNO_3$ with silver electrodes

_____

_____

b. An aqueous solution of $AgNO_3$ with platinum electrodes

_____

_____

c. A dilute solution of H_2SO_4 with platinum electrodes

_____

_____

d. An aqueous solution of $CuCl_2$ with platinum electrodes

_____

_____

9. If a current of 0.5 ampere flows through a metallic wire for 2 hours, then how many electrons would flow through the wire?

_____

_____

_____

_____

10. Read the passage given below and answer the following questions:

The potential difference between the two electrodes of a galvanic cell is called the cell potential and is measured in volts. The cell potential is the difference between the electrode potentials (reduction potentials) of the cathode and anode. It is called the cell electromotive force (emf) of the cell when no current is drawn through the cell. It is now an accepted convention that we keep the anode on the left and the cathode on the right while representing the galvanic cell. A galvanic cell is generally represented by putting a vertical line between metal and electrolyte solution and putting a double vertical line between the two electrolytes connected by a salt bridge. In a galvanic cell, the following cell reaction occurs: $Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$; $E°_{cell} = +1.56$ V

(i) What is the direction of the flow of electrons?

(a) First from silver to zinc, then the direction reverses (b) Silver to zinc

(c) First from zinc to silver, then the direction reverses (d) Zinc to silver

_____

(ii) How will concentration of Zn^{2+} ions and Ag^+ ions be affected when the cell functions?

(a) Concentration of both Zn and Ag^+ ions increase (b) Concentration of Zn^{2+}increases and Ag^+ ions decrease

(c)Concentration of Zn^{2+} decreases and Ag^+ ions increase (d)Concentration of both Zn^{2+} and Ag^+ ions decrease

_____

(iii) Name the cell which is generally used in inverters?

(a) Mercury cell (b) Leclanche cell (c) Lead storage battery (d) Lithium-ion battery

_____

(iv) Which cell is used in hearing aids?

(a) Mercury cell (b) Leclanche cell (c) Dry cell (d) Nickel Cadmium cell

_____

(v) The standard electrode potential for Daniell cell is 1.1V. Calculate the standard Gibbs energy for the reaction: **$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$**.

(a) 215.36 kJ mol^{-1} (b) -212. 27 kJ mol^{-1} (c) 210.56 kJ mol^{-1} (d) -218 kJ mol^{-1}

_____

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: CHEMICAL KINETICS **TIME: 35 MINUTES**

1. Which among the following is a ***false*** statement?

(a)Rate of zero order reaction is independent of initial concentration of reactant.

(b)Half life of a zero order reaction is proportional to the initial concentration of the reactant.

(c)Molecularity of a reaction is an experimental parameter (d)For a first order reaction,t1/2=0.693/K

Ans

2. For the reactionN2+3H2→2NH3 if Δ[NH3]/Δt=2×10-4molL-1s-1,the valueof−Δ[H2]/Δtwould be:

(a)1×10-4molL-1s-1 **(b)** 3×10-4molL-1s-1 **(c)** 4×10-4molL-1s-1 **(d)** 6×10-4molL-1s-1

Ans

3. For a chemical reaction A→B, it is found that the rate of reaction doubles when the concentration of A is increased four times. The order of reaction is:

(a) Two (b) One (c) Half (d) Zero

Ans

4. The half-life of the first-order reaction having rate constant K = 1.7x10-5s-1

(a) 12.1h (b)9.7h (c)11.3h (d)1.8h

Ans

5. In the rate equation, when the concentration of reactants is unity, then the rate is equal to:

a. specific rate constant **b.** average rate constant **c.** instantaneous rate constant **d.** None of the above

Ans

Assertion Reason Type Questions:

In these questions, a statement of assertion is followed by a statement of reason. Choose the correct answer out of the following choices:

a) Assertion and reason both are correct statements, and reason is the correct explanation for the assertion.

b) Assertion and reason both are correct statements, but reason is not the correct explanation for the assertion.

c) Assertion is a correct statement, but reason is a wrong statement.

d) Assertion is a wrong statement, but reason is a correct statement.

1. **Assertion:** Molecularity has no meaning for a complex reaction.

Reason: The overall molecularity of a complex reaction is equal to the molecularity of the slowest step.

Ans

2. **Assertion:** If in a zero-order reaction, the concentration of the reactant is doubled, the half-life period is also doubled.

Reason: For a zero-order reaction, the rate of reaction is independent of the initial concentration.

Ans

3. **Assertion:** Half-life period of a reaction of first order is independent of the initial concentration.

Reason: Half-life period for a first-order reaction $t_{1/2}$ = 2.303/K log2.

Ans

Match the following:

Column A	Column B
1. Zero-order reaction	a. Decreases in the presence of catalyst
2. First-order reaction	b. Rate is independent of reactant concentration
3. Second-order reaction	c. $t_{1/2} \propto 1/[A]_0$
4. Activation energy	d. Plot of ln [A] vs. time gives k= -slope

Column A	**1**	**2**	**3**	**4**
Column B				

Answer the following questions very shortly

(1) The conversion of molecules X to Y follows second-order kinetics. If the concentration of X is decreased 3 times, how will it affect the rate of formation of Y?

---

(2) **Define:** Specific reaction rate or rate constant.

---

(3) Write the difference between order and molecularity of a reaction. (any 2)

---

(4) Rate of reaction is given by the equation: Rate = $k[A]^2[B]$. What are the units of the rate constant for this reaction?

Short Answer questions

(1) The following reaction takes place in one step: $2NO + O_2 \rightarrow 2NO_2$.
How will the rate of the reaction change if the volume of the reaction vessel is diminished to one-third of its original volume? Will there be any change in the order of the reaction with the reduced volume?

---

(2) The following reaction takes place in one step: $2NO + O_2 \rightarrow 2NO_2$.
How will the rate of the reaction change if the volume of the reaction vessel is diminished to one-third of its original volume? Will there be any change in the order of the reaction with the reduced volume?

---

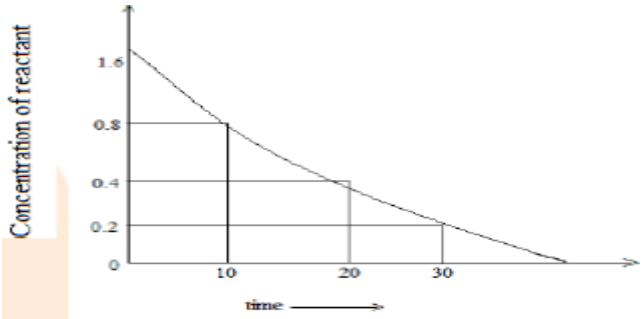
(3) For the reaction at 500 K:
(i) NO2(g) + NO2(g) -> NO + NO3 (slow)
(ii) NO3 + CO -> CO2 + NO2 (fast)

(a) What is the rate law for the reaction? Write the overall order of the reaction.

(b) Out of (i) or (ii), which one is the rate-determining step?

---

(4) Analyze the given graph, drawn between concentration of reactant vs. time.



a) Predict the order of the reaction.
Ans ----------

(b) Theoretically, can the concentration of the reactant reduce to zero after infinite time? Explain.

Ans ----------

(5) 60% of a first-order reaction was completed in 60 minutes. When was it half completed?

Ans ----------

Case based questions

The rate of a chemical reaction is expressed either in terms of the decrease in the concentration of the reactant per unit time or the increase in the concentration of a product per unit time. The rate of reaction depends upon the nature of reactants, concentration of reactants, temperature, presence of a catalyst, surface area of reactants, and the presence of light. The rate of reaction is directly related to the concentration of the reactant.

Rate law states that the rate of reaction depends upon the concentration of terms on which the rate of reaction actually depends, as observed experimentally. The sum of powers of the concentration of the reactants in the rate law expression is called the order of reaction, while the number of reacting species taking part in an elementary reaction, which must collide simultaneously to bring about a chemical reaction, is called the molecularity of the reaction.

1.If the rate of a reaction is expressed by, rate = $A[A]^{1/2}[B]$, the order of the reaction w.r.t. A will be:

Ans ----------

2. Give example of Pseudo unimolecular reaction

Ans ----------

3. For a reaction $x + y \rightarrow z$, rate $\propto [X]$. What is:
   (i) Molecularity and
   (ii) Order of reaction?

Ans ----------

4. A radioactive substance disintegrates upto 99.9% the time required for its completion will be equal to how many times of its half life.

Long Answer questions

1 (a) Consider a certain reaction A -> Products with $k = 2.0 \times 10^{-2}\ s^{-1}$. Calculate the concentration of A remaining after 100 s if the initial concentration of A is 1.0 mol L^{-1}.

Ans ----------

(b) why is it so that on increasing temperature by 10 degrees the reaction rate gets doubled? Explain using graph.

Ans ----------

---

2. (a) A sample of a radioactive substance takes 80 days to lose half of its radioactivity. What time will be required to lose 1/8 of its radioactivity?

Ans ----------

(b) Entropy of activation is usually negative. Why?

Ans ----------

(c) Write the order of a chemical reaction, which proceeds at a uniform rate.

Ans ----------

(d) What is the ratio of $t_{3/4} : t_{1/2}$ for a first-order reaction?

Ans ----------

(e) State any one condition under which a bimolecular reaction may be kinetically of first order.

Ans ----------

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: CHEMICAL KINETICS **TIME: 35 MINUTES**

Multiple choice questions

1. The average rate and instantaneous rate of a reaction are equal.

a. at the start **b.** at the end **c.** in the middle **d.** when two rates have a time interval equal to zero

Ans----------

2. The rate constant of zero-order reactions has the unit.

a. s−1 **b.** mol L−1s−1 **c.** L2mol−2 s-1 **d.** Lmol−1s-1

Ans----------

3. When the rate of the reaction is equal to the rate constant, the order of the reaction is.

a. zero order **b.** first order **c.** second order **d.** third order

Ans----------

4. If the rate of a reaction is expressed by rate=$A[A]^2[B]$ the order of the reaction will be:

(a) 2 **(b)** 3 **(c)** 1 **(d)** 0

Ans----------

5. A reaction in which reactants (R) are converted into products (P) follows second-order kinetics. If the concentration of R is increased by three times, what will be the increase in the rate of formation of P?

(a) 9times **(b)** 4times **(c)** 16times **(d)** 8times

Ans--------

Assertion Reason Type Questions:

In these questions, a statement of assertion is followed by a statement of reason. Choose the correct answer out of the following choices:

a) Assertion and reason both are correct statements, and reason is the correct explanation for the assertion.

b) Assertion and reason both are correct statements, but reason is not the correct explanation for the assertion.

c) Assertion is a correct statement, but reason is a wrong statement.

d) Assertion is a wrong statement, but reason is a correct statement.

1. Assertion: The rate of reaction is always negative.

Reason: Minus sign used in expressing the rate shows that concentration of reactant is decreasing.

Ans-

2. Assertion: Order of the reaction can be zero or fractional.

Reason: We cannot determine order from the balanced chemical equation.

Ans-

Match the following:

Column A	Column B
1. Arrhenius Equation	a. Increases the rate of reaction
2. Increase in temperature	b. Directly proportional to initial concentration
3.Half-life of zero-order reaction	c. Number of molecules colliding in a single step
4.Molecularity	d. k = Ae-Ea/RT

Ans-

Column A	**1**	**2**	**3**	**4**
Column B				

Very Short Answer questions

1. The gas-phase decomposition of acetaldehyde, CH3CHO -> CH4 + CO, follows the rate law Rate = k(CH3CHO)(3/2). What are the units of its rate constant?

Ans----------

---

2. A chemical reaction is of zero order with respect to a reactant. How is the rate of reaction affected if the concentration is reduced to half?

Short Answer Type questions:

1. The kinetics of the reaction: A + 2B -> Products, obeys the rate equation Rate = k[A]X[B]Y.

(i) Find the order of the reaction.

Ans----------

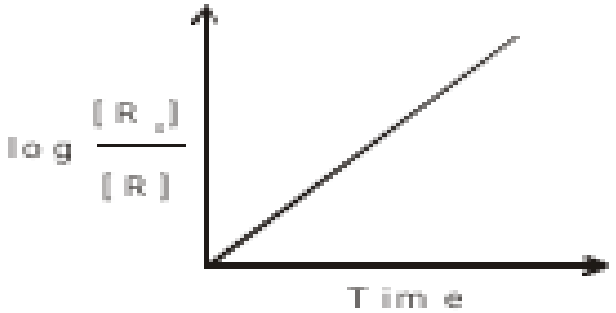
(ii) Determine the apparent molecularity of the reaction.

Ans----------

(iii) What is the order of the reaction when B is in large excess?

Ans----------

2. Answer the following questions on the basis of the given curve for a first-order reaction: A -> P.



(i) What is the relation between the slope of this line and the rate constant?

Ans ----------

(ii) Calculate the rate constant of the above reaction if the slope is $3 \times 10^{-4}\ s^{-1}$.

Ans ----------

3. Answer the following questions

(a) After five half-life periods for a first-order reaction, what fraction of the reactant remains?

Ans ----------

(b) Why are reactions of higher order less in number?

Ans ----------

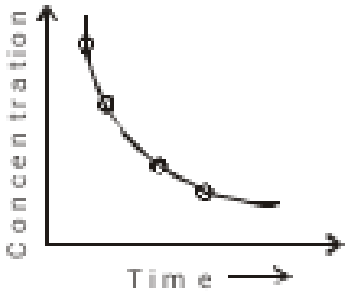
(c) Why can't molecularity of any reaction be equal to zero?

Ans ----------

4. **(a)** The half-life period of a first-order reaction is 60 minutes. What percentage will be left after 240 minutes?

Ans ----------

(b) In the reaction A -> B, if the concentration of A is plotted against time, the nature of the curve obtained will be as shown. What is the order of the reaction?



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5. (a) Catalysts have no effect on the equilibrium constant. Why?

Ans ----------

(b) What is the effect of adding a catalyst on the free energy change (ΔG) of a reaction?

Ans ----------

Long Answer question:

1. Suppose 50 bacteria are placed in a flask containing nutrients for the bacteria so that they can multiply. A study at 35°Cgave the following results:

Time (minutes)	0	15	30	45	60
Number of bacteria	100	200	400	800	1600

Answer the following questions-

(i) What is the order followed by multiplication of bacteria?

Ans ----------

(ii) What will be the rate constant for the reaction ?

Ans ----------

(iii) What will be rate of the reaction initially?

Ans ----------

(iv) What will be the t1/2 for the reaction ?

Ans ----------

(v)What is the expression used for calculating the rate constant value in this experiment ?

Ans ----------

2 (i) A first-order reaction is 15% complete in 20 minutes. How long will it take for its 60% completion.

Ans ----------

(ii) For a chemical reaction A → B, the rate of the reaction is given as Rate = $k[A]^n$. The rate of the above reaction quadruples when the concentration of A is doubled. What is the value of n?

Ans ----------

(c) In a certain first-order reaction, half the reaction was decomposed in 500 seconds. How long will it take for 90% completion?

Ans ----------

Case Based questions:
Read the passage given below and answer the questions that follows.

Chemical kinetics, the branch of physical chemistry that is concerned with understanding the rates of chemical reactions, is to be contrasted with thermodynamics, which deals with the direction in which a process occurs but itself tells nothing about its rate. Thermodynamics is time's arrow, while chemical kinetics is time's clock. Chemical kinetics relates to many aspects of cosmology, geology, biology, engineering, and even psychology, and thus has far-reaching implications. The principles of chemical kinetics apply to purely physical processes as well as to chemical reactions.

The rate of a reaction is defined in terms of the rates with which the products are formed and the reactants (the reacting substances) are consumed. For chemical systems, it is usual to deal with the concentrations of substances, which is defined as the amount of substance per unit volume. The rate can then be defined as the concentration of a substance that is consumed or produced in unit time. Sometimes, it is more convenient to express rates as numbers of molecules formed or consumed in unit time.

Ref: Keith J. Laidler, Former Professor of Chemistry, University of Ottawa, Ontario. Author of *The World of Physical Chemistry.*

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements, and reason is the correct explanation for the assertion.
b) Assertion and reason both are correct statements, but reason is not the correct explanation for the assertion.
c) Assertion is a correct statement, but reason is a wrong statement.
d) Assertion is a wrong statement, but reason is a correct statement.

1. Assertion: The rate of a reaction is the rate of change of concentration of a reactant or a product.
   Reason: The rate of reaction remains constant during the course of the reaction.

Ans---------

2. Assertion: Instantaneous rate is used to predict the rate of reaction at a particular moment of time.
   Reason: Average rate is constant for the time interval for which it is calculated.

Ans----------

3. Assertion: All collisions of reactant molecules lead to product formation.
   Reason: Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to compound formation.

Ans----------

4. Assertion: The enthalpy of reaction remains constant in the presence of a catalyst.
   Reason: A catalyst lowers down the activation energy, but the difference in energy of reactant and product remains the same.

Ans----------

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**
CHAPTER: d & f Block Elements **TIME: 35 MINUTES**

Multiple choice questions

Q.1 Transition elements form alloys easily because they have
(a) Same atomic number (b) Same electronic configuration
(c) Nearly same atomic size (d) None of the above

Q.2 Anomalous electronic configuration in the 3d series are of

(a) Cr and Fe (b) Cu and Zn (c) Fe and Cu (d) Cr and Cu

Q.3 Which of the following does not represent the correct order of the property stated against it?
(b) $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic behaviour
(c) $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size
(d) $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution
(e) Sc < Ti < Cr < Mn : number of oxidation states

Q.4 Which one of the following characteristics of the transition metals is associated wit higher catalytic activity?
(a) High enthalpy of atomization (b) Paramagnetic behaviour
(c) Colour of hydrate ions (d) Variable oxidation states

Q.5 The property which is not characteristic of transition metals is
(b) variable oxidation states. (b) tendency to form complexes.
(c) formation of coloured compounds. (d) natural radioactivity.

Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriateanswer from the options given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.6 **Assertion:** There is a continuous decrease in the size of lanthanoids.
Reason: Lanthanoids shows lanthanoid contraction
Ans----------

Q.7 **Assertion:** Actinoids form relatively less stable complexes as compared to lanthanoids.
Reason: Actinoids can utilise their 5f orbitals along with 6d orbitals in bonding but lanthanoids do not use their 4f orbital for bonding.
Ans----------

Q.8 **Assertion:** It is not possible to obtain anhydrous $ZnCl_2$ by heating $ZnCl_2$.2H2O.
Reason: $ZnCl_2.2H_2O$. undergoes hydrolysis to produce $Zn(OH)_2$ and HCl.
Ans----------

Q.9 **Assertion:** In transition elements, the ns orbital is filled up first and (n-1)d afterwards. During ionization, ns electrons are lost prior to (n-1)d electrons.
Reason: The effective nuclear charge felt by (n-1)d electrons is higher as compared to that by electrons.
Ans----------

<u>Short Answer Type Question</u>

Q.10 Give reason:
(a) Scandium is a transition element but zinc is not.
(b) Actinoid contraction is greater from element to element than lanthanoid contraction.

Ans-(a) ----------

Ans-(b) ----------

Q.11 Give reason:

(a) Transition metals show several (variable) oxidation states.

(b) The enthalpies of atomization of transition metals are high.

Ans-(a) ----------

Ans-(b) ----------

Q.12 The Elements of 3d transition series are given as:

Atomic No	21	22	23	24	25	26	27	28	29	30
Element	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn

Answer the following:

(a) Write the name of element which is not regarded as transition element.

Ans- ----------

(b) Write the element which can show an oxidation state of +1.

Ans- ----------

(c) Why Zinc salts are colourless?

Ans- ----------

(d)Which element shows maximum number of oxidation states.

Ans- ----------

(e)Which element is a strong reducing agent in +2 oxidation state and why?

Ans- ----------

Q13.**CASE STUDY BASED**

The *f*-block elements are those in which the differentiating electron enters the $(n-2)f$ orbital. There are two series of *f*-block elements corresponding to filling of 4*f* and 5*f*-orbitals. The series of 4*f*-orbitals is called lanthanides. Lanthanides show different oxidation states depending upon stability of f^0, f^7 and f^{14} configurations, though the most common oxidation states is +3. There is a regular decrease in size of lanthanides ions with increase in atomic number which is known as lanthanide contraction.

The following questions are multiple choice questions. Choose the most appropriate answer:

1. The atomic numbers of three lanthanide elements X, Y and Z are 65, 68 and 70 respectively, their Ln^{3+} electronic configuration is

   (a) $4f^{8}, 4f^{11}, 4f^{13}$ (b) $4f^{11}, 4f^{8}, 4f^{13}$ (c) $4f^{0}, 4f^{2}, 4f^{11}$ (d) $4f^{3}, 4f^{7}, 4f^{9}$

2. Lanthanide contraction is observed in

   (a) Gd (b) At (c) Xe (d) Te

3. Which of the following is not the configuration of lanthanoid?

   (a) $[Xe]4f^{10}6s^2$ (b) $[Xe]4f^{1}5d^{1}6s^2$

   (c) $[Xe]4d^{14}5d^{10}6s^2$ (d) $[Xe]4f^{7}5d^{1}6s^2$

OR

Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.

(a) Cerium (Z = 58) (b) Europium (Z = 63)

(c) Lanthanum (Z = 57) (d) Gadolinium (Z = 64)

4. Identify the ***incorrect*** statement among the following.

   (a) Lanthanoid contraction is the accumulation of successive shrinkages.

   (b) The different radii of Zr and Hf due to consequence of the lanthanoid contraction.

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: d & f Block Elements **TIME: 35 MINUTES**

Multiple choice questions

Q.1 Lanthanoid Contraction is caused due to:

(a) The shielding on outer electrons by 4f electrons from the nuclear charge.

(b) The shielding on outer electrons by 5d electrons from the nuclear charge.

(c) The same effective nuclear charge from Ce to Lu.

(d) The imperfect shielding on outer electrons by 4f electrons from the nuclear charge.

Q.2 Which of the following salt on heating with $K_2Cr_2O_7$ and conc. H_2SO_4 orange red vapours are evolved which turn aq. NaOH solution yellow.

(a) NaBr (b) NaCl (c) NaI (d) $NaNO_3$

Ans----

Q.3 Which of the following metal does not form a coloured salt?

(a) Thorium (b) Zinc (c) Bronze (d) Cobalt

Ans----

Q.4 What is the end product formed when $KMnO_4$ reacts with HCl?

(a) Brown fume (b) Dark green gas (c) Greenish yellow gas (d) Dense white fumes

Ans----

Q.5 Transition metals, despite high E° oxidation, are poor reducing agents. The incorrect reason is

(a) high heat of vaporization. (b) high ionization energies.

(c) low heat of hydration. (d) complex forming nature.

Ans----

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Q.6 **Assertion (A):** Zn^{2+} is diamagnetic

Reason(R): Two electrons are lost from 4s orbital to form Zn2+

Ans------

Q.7 **Assertion (A):** Zn, Cd, Hg have lowest melting points in their respective periods.

Reason(R): Zn, Cd and Hg have unpaired d-elections for bonding.

Ans--------

<u>Answer the questions in short</u>

Q.8 Why Cr^{2+} acts as a reducing agent whereas Mn^{3+} acts as an oxidizing agent?

Ans:_____

_____

Q.9 One among the lanthanides, Ce (III) can be easily oxidized to Ce (IV)., why?

Ans:_____

_____

Q.10 Why the chemistry of actinoids is not as smooth as lanthanoids.

Ans:_____

_____

Q.11 What is lanthanide contraction? What are the consequences of lanthanide contraction?

Ans:_____

Q.12 When a chromite ore **'A'** is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound **'B'** is obtained. After treatment of this yellow solution with sulphuric acid compound **'C'** can be crystallize from the solution. When compound **'C'** is treated with KCl orange crystals of compound **'D'** is crystallizes out. Identify **'A'** to **'D'** and write the reaction from **'A'** to **'B'**.

Ans:_____

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: COORDINATION COMPOUNDS **TIME: 35 MINUTES**

MULTIPLE CHOICE QUESTION

1. IUPAC NAME OF $K_3[Al(C_2O_4)_3]$ is

(a) Potassium alumino oxalate (b) Potassium aluminium (III) trioxalate
(c) Potassium trioxalato aluminate (III) (d) Potassium tris (oxalato) aluminium.

Ans----------

2. One among the following is an example of hexadentate ligands
(a) 2,2-bipyridyl (b) ethylenediammine tetra acetate ion
(c) dimethyl glyoxime (d) Tetracarbonyl nickel.

Ans----------

3. Which of the following complexes is heteroleptic
(a) $[Cr(NH_3)_6]^{3+}$ (b) $[Ni(CN)_4]^{2-}$ (c)$[Mn(CN)_6]^{4-}$ (d) $[Ni(NH_3)_4Cl_2]$

Ans----------

4. The formula of the complex Tris-(ethane-1,2-diamine)cobalt(III)sulphate is:
(a) $[Co(en)_2 SO_4]$ **(b)** $[Co(en)_3 SO_4]$ **(c)** $[Co(en)_3] SO_4$ **(d)** $[Co(en)_3]_2(SO_4)_3$

Ans----------

5.***The structure*** of diamagnetic nickel complex,$[Ni(CN)_4]^{2-}$ is
(a) trigonal bipyramidal **(b)** tetrahedral **(c)** square planar **(d)** distorted octahedral

In the following questions, two statements are given—one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

(a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
(c) Assertion (A) is correct, but Reason (R) is incorrect statement.
(d) Assertion (A) is incorrect, but Reason (R) is correct statement

6. ***Assertion (A):*** Linkage isomerism arises in the coordination compounds containing ambidentate ligand.
Reason (R): Ambidentate ligand has two different donor atoms.

7. ***Assertion (A):*** Toxic metal ionns are removed by the chelating ligands.
Reason (R): Chelate complexes tend to be mre stable.

Answer the following questions:

8. (i) Write down the IUPAC name of the complex : $[Co(NH_3)_5(NO_2)](NO_3)_2$
(ii) Write the formula of the complex Potassium tetracyanidonickelate(II)

Ans- (i) ----------
(ii)----------

9. A metal complex having composition $Cr(NH_3)_4Cl_2Br$ has been isolated in two forms A & B. The form A reacts with $AgNO_3$ solution to give a white precipitate soluble in aq. Ammonia whereas B gives a pale yellow precipitate soluble in concentrated ammonia. Write the formulae of A&B.

Ans- Compound **A** ----------
Compound **B**----------

10. (a) Write the electronic configuration of d^5 on the basis of Crystal Field Theory when
(i) $\Delta_0 < P$ (ii) $\Delta_0 > P$

(b) Although both $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ have sp^3 hybridisation yet $[NiCl_4]^{2-}$ is paramagnetic and $[Ni(CO)_4]$ is diamagnetic. Give reason.(Atomic No. of Ni=28)

11.Using valence bond theory, explain the following in the relation to the paramagnetic complex $[Mn(CN)_6]^{3-}$

(a) Type of hybridization

Ans----------

(b) Magnetic moment value

Ans----------

(c) Type of complex- inner or outer orbital complex.

Ans:_____

_____

_____

_____

Case Based Question

Read the Passage and Answer the questions given below and answer the questions given below

One of the most important properties of transition metal is that they form coordination or Complex compounds.The coordination complexes are of immense importance on account of the applications in various fields, during complex formation there are drastic changes in the properties of metal atom or ion and these changes in properties are made use of in the applications of metal complexes, the various fields of applications are analytical chemistry metallurgical operations, photography, electroplating and biological processes etc.

1.1. Which compound is used to estimate the hardness of water volumetrically ?

Ans----------

1.2. Name the metal present in the complex compound of ;

(i) Haemoglobin (ii) Vitamin B-12 (iii) Chlorophyll (iv) cis-platin

Ans—(i)----------(ii)----------(iii)----------(iv)----------

1.3. Draw ***cis and trans***(geometrical) isomers of complex **$[Pt(NH_3)_2Cl_2]$**

Ans-

Cis	trans

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: COORDINATION COMPOUNDS **TIME: 30 MINUTES**

Q.1 What is the coordination number of the central metal ions in the following complexes?

(i) $[Cu(NH_3)_4]^{2+}$ **(ii)** $[Fe(C_2O_4)_3]$ **(iii)** $[Pt(en)_2]Cl_2$

(iv) $[Mo(CN)_8]^{4-}$ **(v)** $[Fe(EDTA)]^-$ **(vi)** $[Pd(H_2O)_2(ONO)_2I_2]$

Ans(i)---------- (ii)----------

(iii)---------- (iv)----------

(v)---------- (vi)----------

Q.2 Calculate the oxidation state of the central metal atom in the following:

(i) $[Co(NH_3)_5Cl]$ (ii) $K_4[Fe(CN)_6]$ (iii) $[Co(NO_2)_2(py)_2(NH_3)_2]NO_3$ (iv) $[NI(CO)_4]$

Ans (i)----------(ii)----------

(iii)---------- (iv)----------

Q.3 Give the IUPAC names of the following compounds:

(i)$K_3[Al(C_2O_4)_3]$ (ii) $[Co(H_2O)(NH_3)_4]Cl_3$ (iii) $K[Au(CN)_2]$ (iv) $K_3[Cr(CN)_6]$ (v) $[Cr(NH_3)_5(NCS)[ZnCl_4]$

Ans (i)---------- (ii)----------

(iii)---------- (iv)----------

(v)---------- (vi)----------

Q.4 Write the formulas for the following coordination compounds:

(i) $K_2[Ni(CN)_4]$ (ii) $[Pt(NH_3)BrCl(NO_2)]$ (iii) $[PtCl_2(en)_2](NO_3)_2$

(iv) $[Co(NH_3)_5Cl]Cl_2$ (v) $K_2[PdCl_4]$

Ans (i)---------- (ii)----------

(iii)---------- (iv)----------

(v)---------- (vi)----------

Q.5 Explain on the basis of VBT that $[Ni(CN)_4]^{2-}$ with square planar structure is diamagnetic and $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.

Ans ----------

Q.6(i) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 < P$

(ii) Which of the following will ***not*** behave as ligand ? H_2O, NH_3, CO, CH_4

(iii) Write the ***hybridisation*** and number of ***unpaired*** electrons in the complex $[CoF_6]^{3-}$(Atomic No. of Co=27)

Ans ----------

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: HALOALKANES AND HALOARENES **TIME: 35 MINUTES**

MULTIPLE CHOICE UESTIONS

1.Which of the following can be used for the preparation of 1-chloropropane?

(a) Propene and HCl in the presence of peroxide

(b)Propene and HCl in the absence of peroxide

(c) Propene and Cl_2 followed by treatment with aqueous KOH

(d) Propan-1-ol and $SOCl_2$/pyridine

2 The carbon atom holding halogen in haloarenes is

(a) sp^2 hybridized (b) sp^3 hybridized (c) sp hybridized (d) dsp^2 hybridized

3. Among the following, which one has the highest boiling point?

(a) CH_3CH_2F (b) CH_3CH_2Cl (c) CH_3CH_2Br (d) CH_3CH_2I

4. Which of the following will have maximum dipole moment?

(a) CH_3F (b) CH_3Cl (c) CH_3Br (d) CH_3I

Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below:

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

1. **Assertion**: Presence of nitro group at ortho or para position makes nucleophilic substitution in chlorobenzene easier.

Reason: Nitro group donates electrons to stabilize the intermediate ion formed by the addition of the incoming nucleophile

Ans----------

2. Assertion: Chloroform must be stored in dark coloured bottles.

Reason: Chloroform reacts with air to form phosgene.

Ans----------

Answer the following questions:

1. Write structures of the following organic halogen compounds

(i)4-tert-Butyl-3-iodoheptane **(ii)1-Bromo-4-sec-butyl-2-methylbenzene** (**2**)

Ans (i) ----------(ii)----------

2.***Complete the following reactions by writing major and minor products:*** (1X2=2)

(i) CH_3CH_2Br + KCN → ---------- + ----------

(ii) $CH_3CH_2CH{=}CH_2$ + HBr → ---------- +----------

(iii) Out of chloromethane and Fluoromethane, which has higher dipole moment and why?

3. Haloalkanes react with KCN to form alkyl cyanides as the main product while AgCN forms isocyanides as the main product. Explain.

Ans----------

---

4. **Give Reasons for the following:**

(i) C–X bond length in halobenzene is smaller than C–X bond length in CH_3–X.

(ii) (±) 2–Butanol is optically inactive.

(iii) Although chlorine is an electron withdrawing group, it is *ortho*-, *para*- directing in electrophilic aromatic substitution reactions.

9. In the following pairs of halogen compounds, which would undergo SN^2 reaction faster and why?

(a) CH_3 -CH_2 -CH_2 -CH_2 -Cl and CH_3 -CH_2 -CH_2 -CH_2 –I

(b) cyclohexyl chloromethane and chlorocyclohexane

10. Give chemical reactions involved in the following named reactions:

(a) Sandmeyer's reaction (b) Wurtz-Fittig reaction

Ans (a)----------

(b)----------

Case Based Question (**1X4=4**)

Read the Passage and Answer the questions given below and answer the questions given below

Carbon compounds containing more than one halogen atom are usually referred to as polyhalogen compounds. Many of these compounds are useful in industry and agriculture. chloroform is employed as a solvent for fats, alkaloids, iodine and other substances. The major use of chloroform today is in the production of the freon refrigerant R-22 The chlorofluorocarbon compounds of methane and ethane are collectively known as freons. They are extremely stable, unreactive, non-toxic. DDT the first chlorinated organic insecticides its use has increased due to its effectiveness against the mosquito that spreads malaria and lice that carry typhus.

1.1. What makes chloroform poisonous ? Give chemical reaction. *(1)*

1.2. What is the formula of DDT? *(1)*

1.3. Name the substance which has antiseptic properties but is now not used much due to its bad smell . *(1)*

1.4 What is Freon 12? How it can be obtained from carbon tetrachloride ?*(1)*

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: HALOALKANES AND HALOARENES **TIME: 35 MINUTES**

MULTIPLE CHOICE QUESTIONS

1 Chlorobenzene on treatment with sodium in dry ether gives diphenyl. The name of reaction is :

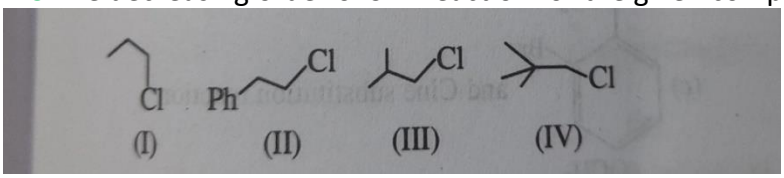
(a) Wurtz reaction **(b)** Wurtz-Fittig reaction

(c) Fittig reaction **(d)** Sandmeyer's reaction

2. Chemical formula of phosgene is

(a) $COCl_2$ **(b)** $CaOCl_2$ **(c)** $CaCO_3$ **(d)** COCl

3 The decreasing order of SN^2 reaction for the given compounds is



(a) I > II> III> IV (b) II > I> III> IV (c) IV > III> II> I (c) IV > III> I> II

Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below:

A .Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not the correct explanation of A

C.A is true but R is false

D.A is false but R is true

1.Assertion: Phosphorous chloride(tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols.

Reason: thionyl chloride give pure alkyl halides.

Ans----------

2. Assertion: KCN reacts with methyl chloride to give methyl isocyanide.

Reason: CN^- is an ambident nucleophile.

Ans----------

1. Match the Columns

Column A	Column B
1. Chloramphenicol	a. Malaria
2. Thyroxine	b. Anaesthetic
3.Chloroquine	c. Typhoid fever
4.Chloroform	d. Goiter

Ans-

Column A	**1**	**2**	**3**	**4**
Column B				

Answer the following questions:

1. Write the formula of the main product formed in the following chemical reactions.

(i) $(CH3)_2\ CH\text{-}Cl \xrightarrow[\text{Dry ether}]{\text{Na}}$

(ii) $CH_3Br + AgF \xrightarrow{\Delta}$

(iii) $CH_3CH_2Br + NaI \xrightarrow{\text{Dry acetone}}$

2. a) An organic compound 'A' on treatment with KCN gave B which on hydrolysis with dil. HCl gave acetic acid. Identify A.

b) An alkyl halide having molecular formula C_4H_9Cl is optically active. What is its structure ?

(c) Which of the following two compounds would react faster by S_N2 path way :

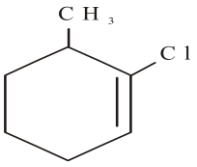
1 - bromobutane or 2 - bromobutane and why.?

(d) Allyl chloride is more reactive than n - propyl chloride towards nucleophilic substitution reactions. Explain why?

(e) Arrange the following halides in the order of increasing S_N2 reactivity:

CH_3Cl, CH_3Br, CH_3CH_2Cl, $(CH_3)_2CHCl$

(f) Write the IUPAC name of the following:



3. Why is sulphuric acid not used during the reaction of alcohols with KI?

4. Read the passage given below and answer the following questions:

Nucleophilic substitution reaction of haloalkane can be conducted according to both SN^1 and SN2 mechanisms. However, which mechanism it is based on is related to such factors as the structure of haloalkane, and properties of leaving group, nucleophilic reagent and solvent.

Influences of halogen : No matter which mechanism the nucleophilic substitution reaction is based on, the leaving group always leaves the central carbon atom with electron pair. This is just the opposite of the situation that nucleophilic reagent attacks the central carbon atom with electron pair. Therefore, the weaker the alkalinity of leaving group is , the more stable the anion formed is and it will be more easier for the leaving group to leave the central carbon atom; that is to say, the reactant is more easier to be substituted. The alkalinity order of halogen ion is $I^- < Br^- < Cl^- < F^-$ and the order of their leaving tendency should be $I^- > Br^- > Cl^- > F^-$. Therefore, in four halides with the same alkyl and different halogens, the order of substitution reaction rate is RI> RBr > RCl > RF . In addition, if the leaving group is very easy to leave, many carbocation intermediates are generated in the reaction and the reaction is based on the SN^1 mechanism. If the leaving group is not easy to

leave, the reaction is based on the SN^2 mechanism.

Influences of solvent polarity: In SN^1 reaction, the polarity of the system increases from the reactant to the transition state, because polar solvent has a greater stabilizing effect on the transition state than the reactant, thereby reduce activation energy and accelerating the reaction.
In SN^2 reaction, the polarity of the system generally does not change from the reactant to the transition state and only charge dispersion occurs. At this time, polar solvent has a great stabilizing effect on NUCLEOPHILE than the transition state, thereby increasing activation energy and slow down the reaction rate. For example, the decomposition rate (SN^1) of tertiary chloro butane in 25°C water (dielectric constant 79) is 300000 times faster than in ethanol (dielectric constant 24). The reaction rate (SN^2) of 2-bromopropane and NaOH in ethanol containing 40% water is twice slower than in absolute ethanol. In a word, the level of solvent

polarity has influence on both SN1 and SN^2 reactions, but with different results. Generally speaking, weak polar solvent is favorable for SN^2 reaction, while strong polar solvent is favorable for S_N^1 reaction, because only under the action of polar solvent can halogenated hydrocarbon dissociate into carbocation and halogen ion and solvents with a strong polarity is favorable for solvation of carbocation, increasing its stability. Generally speaking, the substitution reaction of tertiary haloalkane is based on the SN^1 mechanism in solvents with a strong polarity (for example, ethanol containing water).

1. S_N^1 mechanism is favoured in which of the following solvents:
   i. benzene
   ii. carbon tetrachloride
   iii. acetic acid
   iv. carbon disulphide
2. Nucleophilic substitution will be fastest in case of:
   v. 1-Chloro-2,2-dimethylpropane
   vi. 1-Iodo-2,2-dimethyl propane
   vii. 1-Bromo-2,2-dimethyl propane
   viii. 1-Fluoro-2,2-dimethyl propane

3. S_N^1 reaction will be fastest in which of the following solvents?
   A. Acetone (dielectric constant 21)
   B. Ethanol (dielectric constant 24)
   C. Methanol (dielectric constant 32)
   D. Chloroform (dielectric constant 5)
4. Polar solvents make the reaction faster as they:
   A. destabilize transition state and decrease the activation energy
   B. destabilize transition state and increase the activation energy
   C. stabilize transition state and increase the activation energy
   D. stabilize transition state and decrease the activation energy
5. SN^1 reaction will be fastest in case of:
   1. 1-Chloro-2-methylpropane
   2. 1-Iodo-2-methylpropane
   3. 1-Chlorobutane
   4. 1-Iodobutane

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 03**

CHAPTER: HALOALKANES AND HALOARENES **TIME: 30 MINUTES**

REASONING BASED QUESTIONS

1. Grignard reagents should be prepared under anhydrous conditions.

_____

_____

2. Preparation of alkyl chloride from alcohols by treating it with Thionyl chloride $SOCl_2$ is the best method.

_____

_____

3. Alkyl halides are generally not prepared in the laboratory by free radical halogenations of alkanes.

_____

_____

4. The treatment of alkyl chlorides with aq.KOH leads to the formation of alcohols but in the presence of alc.KOH alkenes are major products.

_____

_____

5. P-Dichlorobenzene has higher m.p and solubility than those of o- and m- isomers.

_____

_____

6. Although chlorine is an electron withdrawing group, it is *ortho*-, *para*- directing in electrophilic aromatic substitution reactions.

_____

_____

7. n- butyl bromide has higher boiling point than tert.- butyl bromide.

_____

_____

8. The presence of nitro group ($-NO_2$) at ortho and para positions in haloarenes increases the reactivity of haloarenes towards Nucleophilic substitution reaction.

9. Alkyl halides, though polar, are immiscible with water.

10. Electrophilic aromatic substitution reactions in haloarenes occur slowly.

WORD PROBLEMS

11. Primary alkyl halide C_4H_9Br (A) reacted with alcoholic KOH to give compound (B). Compound (B) is reacted with HBr to give (C) which is an isomer of (A). When (A) is reacted with sodium metal it gives compound (D), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium. Identify A, B, C and D and write the equations for all the reactions.

12. A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound C_5H_9Cl in bright sunlight. Identify the hydrocarbon.

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: ALCOHOL, PHENOLS AND ETHERS **TIME: 30 MINUTES**

MULTIPLE CHOICE QUESTIONS

1. The most suitable reagent for the conversion CH_3CH_2OH can be converted into CH_3CHO by……
(a) catalytic hydrogenation (b) treatment with $LiAlH_4$
(c) treatment with pyridinium chlorochromate (d) treatment with $KMnO_4$

2 Which of the following give positive iodoform test?
(1) Ethanol (2) Ethanal (3) Butan-1-ol (4) Butan-2-ol (5) Phenyl ethanol
(a) 1,2 and 4 **(b)** 1,3 and 4 **(c)** 1,2 and 3 **(d)** 1,2 and 5

3 Which of the following is most acidic?
(a) Benzyl alcohol **(b)** Cyclohexanol **(c)** Phenol **(d)** m-Cholorophenol

4. Arrange the following compounds in increasing order of boiling points:
Propan-1-ol, Butan-1-ol, Butan-2-ol, Pentan-1-ol
(a) Propan-1ol, Butan-2-ol, Butan-1-ol, Pentan-1-ol
(b) Propan-1-ol, Butan-1-ol, Butan-2-ol, Pentan-1-ol
(c) Propan-1ol, Pentan-1-ol, Butan-2-ol, Butan-1-ol,
(d) Pentan-1-ol, Butan-1-ol, Butan-2-ol, Propan-1ol

Match the items of column I with items of column II.

column I	column II
(i) Antifreeze used in car engine	(a) Iodofarm test
(ii) Solvent used in perfumes	(b) Glycerol
(iii) Starting material for picric acid	(c) Methanol
(iv) Wood spirit	(d) Phenol
(v) Reagent used for detection of CH_3CO group	(e) Ethlene glycol
(vi) By product of soap industry used in cosmetics	(f) Ethanol

Ans-

column I	(i)	(ii)	(iii)	(iv)	(v)	(vi)
column II						

1Mark Question

1. What is a lucas reagent?

……

2. Out of o- nitro phenol and p- nitro phenol which is more acidic and why ?

……

3. Name the reagent needed for oxidation of primary alcohol to carboxylic acid.

……..

4. What is usually added to ethyl alcohol to make it unfit for drinking purposes ?

…….

5. Give a chemical test to distinguish between Methanol and Ethanol

Answer the following questions

1. (i) Arrange the following compounds in increasing order of acidic strength:
p-cresol,p-nitrophenol,phenol
(ii) How wil you prepare picric acid from phenol?

Ans(i) ----------

Ans(ii) ----------

2.How are following conversions carried out?
(i) Propene to propan-2-ol
(ii) Ethyl magnesium chloride to propane-1-ol

Ans(i) ----------

Ans(ii) ----------

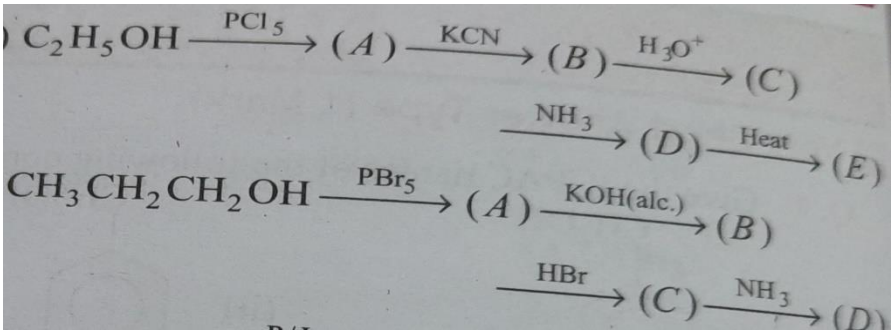
3. Account for the following
(I) o-nitrophenol is steam volatile whereas p-nitrophenol is not.
(ii) picric acid is stronger acid than phenol.
(iii) phenols are much more acidic than alcohols.

Ans(i) ----------

Ans(ii) ----------

Ans(iii) ----------

4. Write the structure of the major organic product in the following reactions:



Ans(i) A ----------B----------C----------D----------E--------

Ans(ii) -A----------B----------C----------D----------

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: Aldehydes, Ketones and Carboxylic Acids TIME: 30 MINUTES

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Q.1 Assertion (A): Benzaldehyde undergoes Aldol condensation.

Reason (R): It does not have α- hydrogen

Q.2 Assertion (A): Formic acid reduces Tollen's test.

Reason (R): Formic acid has acidic hydrogen.

Q.3 Assertion (A): Benzaldehyde is less reactive than Ethanal towards nucleophilic addition reactions.

Reason (R): Ethanal is more sterically hindered.

Q.4 Assertion (A): The boiling points of aldehydes and ketones are higher than hydrocarbons of Comparable molar masses.

Reason (R): The boiling points of aldehydes and ketones are lower than the alcohols of similar molar Masses.

Q.5 **CASE STUDY BASED**

The C=O bond in aldehydes and ketones are polarized. So they undergo nucleophilic addition reactions with a number of nucleophiles. Aldehyde are easily oxidized by mild oxidizing agents as compared to ketones. Carboxylic acids are more acidic than alcohols and most of simple phenols.

(a) Write the name of the product when obtained when an aldehyde is reacts with excess of alcohol in presence of dry HCl.

_____

(b) Why Carboxylic acid is stronger acid than phenol?

_____

(c) Give one simple chemical test to distinguish between Ethanal and Propanone.

_____

(d)Arrange the following compounds in the increasing order of their reactivity towards nucleophilic addition reactions.

Propanone, Acetaldehyde, Formaldehyde, Acetophenone.

_____

Q.6 Give Reasons:

Boiling point of aldehyde and ketones are higher than hydrocarbons and ethers of comparable molecular masses.

_____

_____

Q.7 Give Reason:

Aldehyde and Ketones are miscible with water in all proportions.

_____

_____

Q.8 Give a chemical test to distinguish between following pair of compounds.

(a) ETHANAL AND BENZALDEHYDE		
(b) PROPANAL AND PROPANONE		
(c) **Ethanoic acid and Ethyl ethanoate**		

Q.9 Give the following name reactions.

(a) WOLF-KISHNER REDUCTION

_____

(b) CANNIZARO REACTION

_____

Q.10 Draw the Structure and write the IUPAC name of following compounds:

(a) Salicylic acid (c) Aspirin

(b) Acetophenone (d) Benzoyl Chloride

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: Aldehydes, Ketones and Carboxylic Acids TIME: 30 MINUTES

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Q.1 **Assertion (A):** All aldehydes turn Schiff's reagent pink.

Reason (R): Ketones do not react with Schiff's reagent.

Q.2 **Assertion (A):** Acetaldehyde cyanohydrin is optically active.

Reason (R): It has chiral carbon atom.

Q.3 **Assertion (A):** All aldehydes do not take part in aldol condensation.

Reason (R): In aldol condensation, carbanion is generated by abstraction of α- H atom by the base.

Q.4 **Assertion (A):** Acetophenone and Benzaldehyde can be distinguished by Iodoform test.

Reason (R): Acetophenone gives Iodoform test, Benzaldehyde does not .

Q.5 **CASE STUDY BASED**

Aldehydes and ketones both contain carbonyl group. Carboxylic acids contain -COOH group butdo not give reactions of carbonyl group except formic acid. Aldehydes and ketones having α -Hatom undergo aldol condensation. Acids having α -H atom undergo HVZ reaction. Aldehydes and ketones undergo nucleophilic addition reactions. Aldehydes are more easily oxidized than ketones.

(a) Out of Acetic acid and Propanoic acid, which is more acidic and why?

_____

(b) Why both the C-O bonds in carboxylate ions are equivalent?

_____

(c) What happens when Ethanal reacts with dil. NaOH followed by heating?

_____

(d) Among Benzoic acid and p- Nitro benzoic acid which is more acidic? Give reason.

_____

Q.6 Give reasons

(a) Carboxylic Acids have lower pKa value than Phenols.

_____

_____

(b) Aldehydes undergo nucleophilic addition reaction more readily than Ketones.

_____

_____

Q.7 Give a chemical test to distinguish between following pair of compounds.

(a) BUTAN-2-ONE AND 2-METHYLPROPAN-2-OL		

(b) PHENOL AND ACETIC ACID		

Q.8 A compound X (C_2H_4O) on oxidation gives "Y ($C_2H_4O_2$). X undergoes haloform reaction. On treatment with HCN ,X forms a product Z which on hydrolysis gives 2-hydroxy propanoic acid.

(i) Write down structures of X and Y Name the product when X reacts with dil NaOH.

_____

(ii) Write down the equations for the reactions involved.

_____

_____

Q.9 An organic compound with molecular formula $C_9H_{10}O$ forms 2, 4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1, 4-benzene dicarboxylic acid. Identify the compound.

_____

_____

Q10. Convert the following

(a) ETHYL CHLORIDE TO PROPANOIC ACID

_____

_____

(b) PROPANONE TO PROPENE

_____

_____

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: Amines TIME: 30 MINUTES

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

1. Assertion : Aromatic 1° amines cannot be prepared by Gabriel Phthalimide Synthesis.
Reason : Aryl halides undergo nucleophilic substitution with anion formed by phthalimide.

2. Assertion : Ammonolysis of alkyl halide is not a suitable method for the preparation of pure primary amines.
Reason : Ammonolysis of alkyl halide yields mixture of amines.

3.Assertion : Carbyl amine reaction cannot be used to differentiate aniline and ethanamine
Reason : An offensive smell is obtained in carbyl amine test

4. Assertion: Aniline can give Fridel craft reaction
Reason: An AlCl3 is used as catalyst in Fridel craft reaction

5 Assertion: Benzene diazonium chloride reacts with phenol to form orange dye
Reason: sandmeyer reaction introduces nuclophiles in the benzene ring by Cu (I) ion

MULTIPLE CHOICE QUESTIONS

1. Which of the following compound will give secondary amine on the reduction?
   a) Alkyl nitrile b) Carbylamine
   c) Primary amine d) Secondary nitro compound

2. In order to prepare a 1° amine from an alkyl halide with simultaneous addition of one CH_2 group in the carbon chain, the reagent used as source of nitrogen is:
   (a) Sodium amide, $NaNH_2$ (b) Sodium azide, NaN_3
   (c) Potassium cyanide, KCN (d) Potassium phthalimide, $C_6H_4(CO)_2N^-K^+$

3. The best reagent for converting 2-phenylpropanamide into 2-phenylpropanamine is:
   (a) excess H_2 (b) Br_2 in aqueous NaOH
   (c) iodine in the presence of red phosphorus (d) $LiAlH_4$ in ether

4. The best reagent for converting, 2-phenylpropanamide into 1-phenylethanamine is:
   (a) excess H_2/Pt (b) NaOH/Br_2
   (c) $NaBH_4$/methanol (d) $LiAlH_4$/ether

5 Best method for preparing primary amines from alkyl halides without changing the number of carbon atoms in the chain is
   (a) Hoffmann Bromamide reaction (b) Gabriel phthalimide synthesis
   (c) Sandmeyer reaction (d) Reaction with NH_3

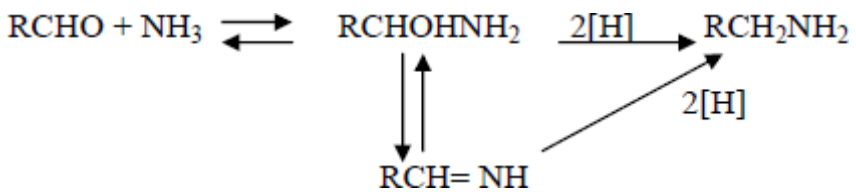
Very Short Answers

1	Why It is difficult to prepare pure amines by ammonolysis of alkylhalides?
2	Why Amines have higher boiling points than hydrocarbons of similar molecular mass?
3	Why Aniline is weaker base than cyclohexylamine?
4	Why Methylamine is a stronger base than aniline?
5	Why Before nitration, aniline is converted to acetanilide?

Case Based Question

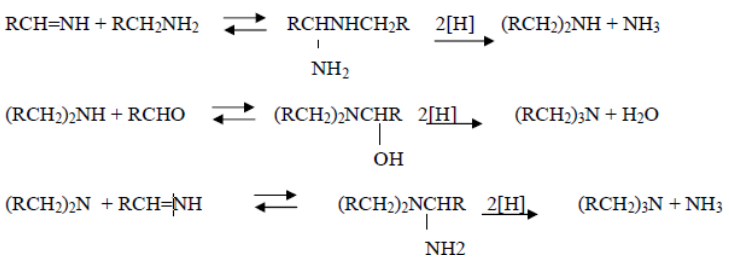
Reductive alkylation is the term applied to the process of introducing alkyl groups into ammonia or a primary or secondary amine by means of an aldehyde or ketone in the presence of a reducing agent. The present discussion is limited to those reductive alkylations in which the reducing agent is hydrogen and a catalyst or "nascent" hydrogen, usually from a metal acid combination; most of these reductive alkylations have been carried out with hydrogen and a catalyst. The principal variation excluded is that in which the reducing agent is formic acid or one of its derivatives; this modification is known as the Leuckart reaction. The process of reductive alkylation of ammonia consists in the addition of ammonia to a carbonyl compound and reduction of the addition compound or its dehydration product. The reaction

usually is carried out in ethanol solution when the reduction is to be effected catalytically



Since the primary amine is formed in the presence of the aldehyde it may react in the same way as ammonia, yielding an addition compound, a Schiff's base (RCH= NCH_2R) and finally, a secondary amine. Similarly, the primary amine may react with the imine, forming an addition product which also is reduced to a secondary amine Finally, the secondary amine may react with either the aldehyde or the imine to give products which are reduced to tertiary amines.

Similar reactions may occur when the carbonyl compound employed is a ketone.



i.) Ethanal on reaction with ammonia forms an imine (X) which on reaction with nascent hydrogen gives (Y). Identify 'X' and 'Y'.

ii) Acetaldehyde is reacted with ammonia followed by reduction in presence of hydrogen as a catalyst. The primary amine so formed further reacts with acetaldehyde. Name the Schiff's base formed during the reaction.

OR

Name the type of reaction of ammonia and its derivatives with aldehydes

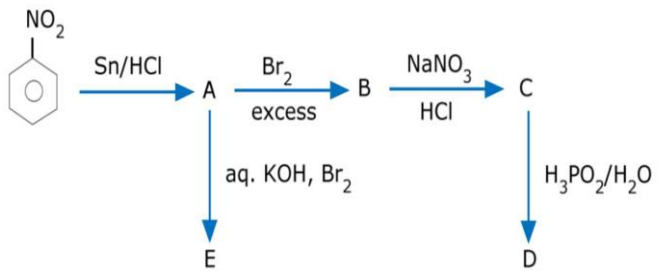
iii). What is produced on the reductive alkylation of ammonia by means of an aldehyde in presence of hydrogen as reducing agents?

Match the following

Column A	Column B
1. Primary Amine	A. Distinguishes between primary, secondary and tertiary
2. Gabriel phthalimide	B. (R-NH-R)
3. Secondary Amine	C. ($R-NH_2$)
4. Hinsberg reagent	D. (R_3N)
5. Tertiary Amine	E. used to prepare primary amines

Short Answer Type

1. Identify A to E (Structures and names)



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2. A compound (X) having formula C_3H_7NO reacts with Br_2 in the presence of NaOH to give another compound (Y). Compound (Y) reacts with HNO_2 to form ethanol and N_2 gas . Identify (X) and (Y) . Write the reaction involved.

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3. How can you differentiate following pair of compounds chemically-

a) N,N dimethyl ethanamine and Aniline

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b) Aniline and ethanamine

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: Amines TIME : 30 MINUTES

MULTIPLE CHOICE QUESTIONS

1. Aniline is less basic than ethylamine.This is due to
(a) Conjugation of lone pair of nitrogen with the ring
(b) The insoluble nature ofaniline
(c) More Kb value of aniline
(d) Hydrogen bonding

2. $-NH_2$group in aniline is
(a)Ortho directing (b) Meta directing
(c) Ortho and para directing (d) Para directing

3. Reduction of nitrobenzene by which of the following reagent gives aniline?
(a) Sn/HCl (b) Fe/HCl (c) H_2 -Pd (d) all the above

4. Identify the correct IUPAC name
a. (CH3CH2)2NCH3=N-Ethyl-N-methyl ethanamine
b. (CH3)3CNH2= methylpropan-2-amine
c. CH3NHCH(CH3)2=N-Methylpropan-2-amine
d. (CH3)2CHNH2=2,2-Dimethyl-N-propanamine

5. Arrange the following compounds in increasing order of basicity in aqueous medium
CH_3NH_2, $(CH_3)_2NH$, NH_3, $C_6H_5NH_2$
(a) $C_6H_5NH_2 < NH_3 < (CH_3)_2NH < CH_3NH_2$,
(b) $CH_3NH_2 < (CH_3)_2NH < NH_3 < C_6H_5NH_2$
(c) $C_6H_5NH_2 < NH_3 < CH_3NH_2 < (CH_3)_2NH$
(d) $(CH_3)_2NH < CH_3NH_2 < NH_3 < C_6H_5NH_2$

Very Short Answer Type

1	It is easier to brominate aniline as compared to benzene .Explain
2	Reduction of nitro compound to aniline using iron scrap and HCl is preferred. Why?
3	Aromatic amines cannot be prepared by Gabriel Phthalimide synthesis. Give reason
4	During acylation of amines, pyridine is added. Explain its role in acylation.
5	Why Aniline does not undergo Friedel – Craft's reaction.

SHORT ANSWER

1. An organic compound A (C_3H_5N) on boiling with alkali gives NH_3 and sodium salt of an acid B ($C_3H_6O_2$). The compound A on reduction gives C (C_3H_9N) which on treatment with nitrous acid gives an alcohol D (C_3H_8O). Identify A to D.

---

2. An organic compound benzamide on reaction with phosphorus pentaoxide gives A which on catalytic reduction gives B,B on reaction with HNO_2 gives C .Identify A B and C and write the reactions involved

---

---

3. Write Hinsberg Test to identify 1,2,3 degree amines

Match the following

Column A	Column B
1. Coupling reaction	A. Converts amides to primary amines
2. Gattermann reaction	B. Evolution of nitrogen gas in primary amines
3. Hoffmann bromamide reaction	C. converts aromatic amines to Ar X/ ArCN with CuCl/ CuCN
4. Nitrous acid	D. Forms dyes
5. Sandmayer reaction	E. converts benzene diazonium halide to ArX with Cu/ HX

Case Based Questions

Pure aliphatic and alkyl amines can be prepared by Gabriel phthalimide reaction. In this reaction, phthalimide is treated with ethanolic KOH solution followed by heating with a suitable alkyl or aralkyl halide to give N-substituted phthalimides. These upon hydrolysis with dil HCl under pressure give primary amines. Primary amines can also be prepared from amides by treatment with Br2 and KOH by a reaction known as Hoffmann bromamide degradation method. Like ammonia, amines behave as Lewis bases because of the presence of a lone pair of electrons. The basicity of aliphatic amines in aqueous solution depends upon the +I effect of alkyl group as well as the extent of hydrogen bonding with water molecules and the steric effect of the alkyl group. However, aromatic amines are weaker bases than aliphatic amines.

i). Gabriel phthalimide reaction cannot be used to prepare aniline. Why?

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or

(i) What are the factors on which the basicity of aliphatic amine depends?

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ii) Which one has more pKb value; aliphatic amines or ammonia?

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iii) What is produced when Ethanamide reacts with Br_2 and KOH?

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iv) In Gaseous state which will be more basic 3 degree or 2 degree amine. Why?

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 01**

CHAPTER: Biomolecules TIME: 30 MINUTES

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

1. **Assertion (A):** D(+) – Glucose is dextrorotatory in nature.
   Reason (R): 'D' represents its dextrorotatory nature.
2. **Assertion (A):** Vitamin D can be stored in our body.
   Reason (R): Vitamin D is fat soluble vitamin.
3. **Assertion (A):** All naturally occurring ?-amino acids except glycine are optically active.
   Reason (R): Most naturally occurring amino acids have L-configuration.

4 **Assertion (A):** Glycine must 'be taken through diet.
   Reason (R): It is an essential amino acid.

5. **Assertion (A):** In presence of enzyme, substrate molecule can be attacked by the reagent effectively.
   Reason (R): Active sites of enzymes hold the substrate molecule in a suitable position.

Very short answer type

1 Name the linkage that holds two monosaccharide units together.

Ans: …….....

2 Name the linkage that is present in DNA or RNA or polynucleotide.

Ans: ……..

3 Out of two components of starch namely amylose and amylopectin which one is water soluble?

Ans …….

4 Name the nitrogenous base which is present in DNA but not found in RNA

Ans: ……

5 Deficiency of which vitamin causes Increase in blood clotting time

Ans: ……..

Short answer type

1. What are carbohydrates? How are they classified on the basis of hydrolysis?

Ans:……
……
……..

2. What is meant by denaturation of proteins? What is its effect?

Ans_____
_____
_____

3. Explain how vitamins are classified depending upon their solubility? Give the example of each type

Ans :
_____
_____
_____
_____

4.(i)Why cannot vitamin C be stored in our body?

Ans _____

(ii) What are the different types of RNA found in the cell?

Ans _____

5. Answer the following

(i) What are Zwitter ions?

(ii) Define anomers. Give examples.

(iii) Ratio of nitrogenous bases is fixed in DNA but not in RNA. Explain

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Match the following

Column A	Column B
1. Uracil	A. Cellulose
2. β- Glycosidic Linkage	B. Amide Linkage
3. Zymase	C. RNA
4. Polypeptide	D. Glucocorticoid
5. Adrenaline	E. Starch

CASE STUDY BASED (A-R)

Read the passage given below and answer the following questions:

Complete hydrolysis of DNA (or RNA) yields a pentose sugar, phosphoric acid and nitrogen containing heterocyclic compounds (called bases). In DNA molecules, the sugar moiety is β-D-2-deoxyribose whereas in RNA molecule, it is β-D-ribose. DNA contains four bases viz. adenine (A), guanine (G), cytosine (C) and thymine (T). RNA also contains four bases, the first three bases are same as in DNA but the fourth one is uracil (U). A unit formed by the attachment of a base to 1′ position of sugar is known as nucleoside. In nucleosides, the sugar carbons are numbered as 1′, 2′, 3′, etc. in order to distinguish these from the bases. When nucleoside is linked to phosphoric acid at 5′-position of sugar moiety, we get a nucleotide. Nucleotides are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of the pentose sugar. Information regarding the sequence of nucleotides in the chain of a nucleic acid is called its primary structure. Nucleic acids have a secondary structure also. James Watson and Francis Crick gave a double strand helix structure for DNA. Two nucleic acid chains are wound about each other and held together by hydrogen bonds between pairs of bases. The two strands are complementary to each other because the hydrogen bonds are formed between specific pairs of bases. Adenine forms hydrogen bonds with thymine whereas cytosine forms hydrogen bonds with guanine. In secondary structure of RNA single stranded helices is present which sometimes folds back on itself. RNA molecules are of three types and they perform different functions. They are named as messenger RNA (m-RNA), ribosomal RNA (r-RNA) and transfer RNA (t-RNA)

Q. 1**. Assertion**: On hydrolysis of DNA, the quantity of adenine produced is equal to that of thymine and similarly, the quantity of cytosine is equal to that of guanine.

Reason: A DNA molecule is double-stranded in which the pairing of bases occurs. Adenine always pairs with thymine, while cytosine always pairs with guanine.

Q. 2. **Assertion**:: When a nucleotide from the DNA containing thymine is hydrolyzed, thymine β-D- 2-deoxyribose and phosphoric acid are obtained as products.

Reason:: When a nucleotide from the DNA containing thymine is hydrolyzed, β-D- 2- ribose and phosphoric acid are obtained as products.

Q. 3. **Assertion**: When RNA is hydrolysed, there is no relationship among the quantities of different bases obtained.

Reason:: when RNA is single-stranded.

Q. 4. **Assertion**:: The two strands of DNA are complementary to each other.

Reason: The two strands of DNA contain covalent bonds formed between specific pairs of bases.

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS: XII **WORKSHEET No: 02**

CHAPTER: Biomolecules TIME: 30 MINUTES

Multiple choice questions

1. Two monosaccharides are joined through a _____ bond to form a disaccharide.
a) ionic b) peptide c) glycosidic d) phosphodiester

2. Which of the following statement is not true for glucose?
a) The pentaacetate of glucose does not react with hydroxylamine to give oxime
b) Glucose gives Schiff's test for aldehyde
c) Glucose exists in two crystalline α and β forms
d) Glucose reacts with hydroxylamine to form oxime

3. Nucleotides are joined together by
a) Peptide linkage b) Disulphide linkage c) Glycosidic linkage d) Phosphodiester linkage

4. Sucrose consists of which of the following monosaccharide units?
a) Fructose, galactose b) Fructose, glucose
c) Galactose, glucose d) Glucose, glucose

5. Identify the saccharide from the Haworth projection shown below.
a) Lactose b) Maltose c) Sucrose d) Trehalose

Very Short Answer

6. What are the hydrolysis products of (i) Maltose and (ii)lactose
Ans: (i)_____
(ii)_____

7. Write the important two structural differences between DNA and RNA?
Ans:_____
_____
_____

Q.8 (a) Explain the formation of peptide linkage in protein?
Ans:_____
_____

(b)What are the two types of protein on the basis of molecular shape? Differentiate between them.
Ans:_____
_____
_____
_____
_____
_____

Q.9 (a)What are reducing and non-reducing sugar? Give one example of each?
Ans:_____
_____

_____
_____

(b)What are anomers?
Ans:_____
_____
_____
_____

Q.10 (a) Explain Cyclic structure of Fructose?
Ans:_____
_____
_____

(b) Explain Inversion of cane sugar.
Ans:_____
_____
_____

(c) What is Chargaff Rule? Explain using example of DNA?
Ans:_____
_____
_____

(d) Justify that cyclic structure of glucose does not reduce Tollen's reagent?
Ans:_____
_____
_____

CASE STUDY BASED (A-R)

Read the passage given below and answer the following questions

When a protein in its native form, is subjected to physical changes like change in temperature or chemical changes like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix gets uncoiled and protein loses its biological activity. This is called denaturation of protein. The denaturation causes change in secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curding of milk, and formation of cheese when an acid is added to milk.

Q. 1. **Assertion**: Amino acids are known as α-amino acids.

Reason: Amino acids are organic compounds containing an amino group and a carboxylic group as substituent on the α-carbon.

Q. 2. **Assertion**: Proteins are a hetero-polymer.

Reason: Dietary proteins are the source of non-essential amino acids.

Q. 3. **Assertion**: The long protein chain folds upon itself like a hollow ball giving rise to the tertiary structure.

Reason: Tertiary structure gives a 3-dimensional view of a protein.

Q. 4. **Assertion**: Amino acids are amphoteric in their function.

Reason: All amino acids are necessary for our body.