Aakash
+ BYJU'S

Answers & Solutions

for

Time : 45 min.   **M.M. : 200**

CUET UG-2022

(Chemistry)

IMPORTANT INSTRUCTIONS:

1. The test is of 45 Minutes duration.

2. The test contains 50 Questions out of which 40 questions need to be attempted.

3. Marking Scheme of the test:

    a. Correct answer or the most appropriate answer: Five marks (+5)

    b. Any incorrect option marked will be given minus one mark (–1).

    c. Unanswered/Marked for Review will be given no mark (0).

Choose the correct answer :

Question ID: 692741

The total number of atoms in body centred cubic unit cell (bcc) is

(A) 2   (B) 4

(C) 9   (D) 1

Answer (A)

Sol. For bcc unit cell,

- 8 corners $\times \dfrac{1}{8}$ per corner atom = $8 \times \dfrac{1}{8}$ = 1 atom

- 1 body centre atom = 1 atom

∴ Total number of atoms per unit cell = 2

Question ID: 692742

Molarity of solution containing 8 g of NaOH in 200 mL solution is

(molar mass of NaOH : 40 g mol^{-1})

(A) 25 M   (B) 1 M

(C) 0.001 M   (D) $\dfrac{1}{25}$ M

Answer (B)

Sol. $\text{Molarity} = \dfrac{\text{Mole of NaOH} \times 1000}{\text{Volume of solution in mL}}$

$\text{Molarity} = \dfrac{8 \times 1000}{40 \times 200} = 1\,M$

Question ID: 692743

Blood cells collapse, when placed in water containing less than 0.9% $\left(\dfrac{\text{mass}}{\text{volume}}\right)$ salt solution.

This is due to

(A) Reverse osmosis

(B) Gain of water by osmosis

(C) Loss of water by osmosis

(D) Diffusion

Answer (B)

Sol. The osmotic pressure associated with the fluid inside the blood cell is equivalent to that of 0.9% (mass/volume) sodium chloride (salt) solution. If the salt concentration is less than 0.9% (mass/volume), the water will flow into the cells if placed in this solution and they will collapse.

Question ID: 692744

The half life of a first order reaction with K value 9.63×10^{14} s^{-1} is

(A) 10^{-15} s^{-1} (B) 10^{15} s

(C) 10^{-15} s   (D) 10^{13} s

Answer (C)

Sol. $t_{1/2} = \dfrac{0.693}{K}$
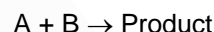
$t_{1/2} = \dfrac{0.693}{6.93 \times 10^{14}}$

$t_{1/2} = 0.1 \times 10^{-14}$

$t_{1/2} = 1 \times 10^{-15}$ s

Question ID: 692745

For an elementary reaction given below :

A + B → Product

the rate law is :

r = K[A]^1[B]^1

Molecularity of above reaction will be

(A) $2\dfrac{1}{2}$ (B) 1

(C) 2   (D) 0

Answer (C)

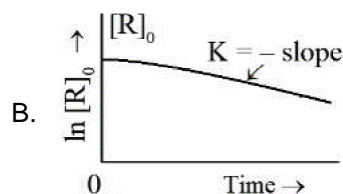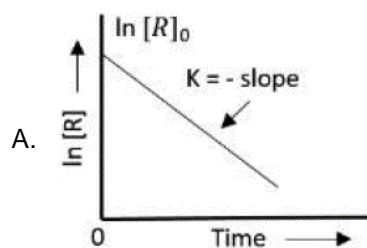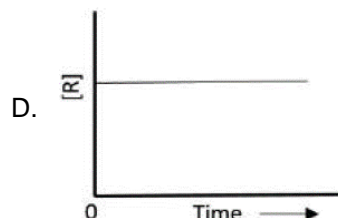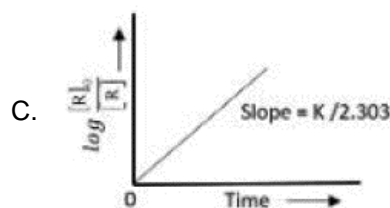**Sol.** For rate law for elementary reaction,

r = K[A]^1[B]^1

Molecularity of reaction = 1 + 1 = 2

Question ID: 692746

Which of the following graphs are correct for the first order reaction?

C.

D.

Choose the correct answer from the options given below.

(A) B and C only

(B) A and B only

(C) A and C only

(D) C and D only

Answer (C)

Sol. First order reaction,

$$Kt = \ln\frac{[R]_0}{[R]} \qquad \ldots(i)$$

or, $Kt = \ln[R]_0 - \ln[R]$
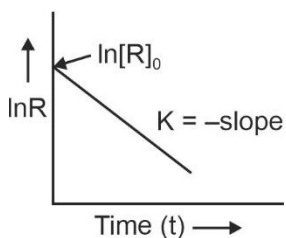
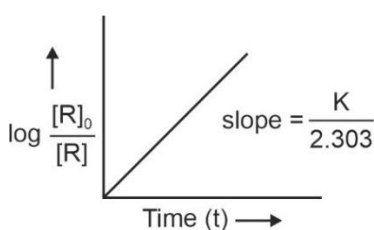or, $\ln[R] = \ln[R]_0 - Kt \qquad \ldots(ii)$

From (i), we can write

$$2.303\log\frac{[R]_0}{[R]} = Kt$$

or, $\log\frac{[R]_0}{[R]} = \frac{K}{2.303}t \qquad \ldots(iii)$

- $\ln[R]$ versus t graph will be; from equation (ii),

- $\log\frac{[R]_0}{[R]}$ versus t graph from equation (iii), will be

Question ID:692747

Match List-I with List-II.

	List-I		List-II
A.	Order of complex reaction is determined by	I.	Instantaneous rate
B.	Rate of zero order reaction is equal to	II.	Rate law
C.	Relationship between rate of reaction and concentrations of reactants	III.	Order of slowest step
D.	Rate at particular moment of time	IV.	Rate constant

Choose the correct answer from the options given below:

(A) A-III, B-II, C-IV, D-I

(B) A-III, B-IV, C-II, D-I

(C) A-III, B-IV, C-I, D-II

(D) A-II, B-III, C-IV, D-I

Answer (B)

Sol. A. Order of complex reaction is determined by the order of slowest step.

B. Rate of zero order reaction is equal to its rate constant. For zero order reaction, $A \rightarrow P$
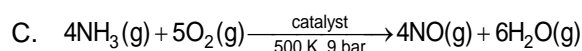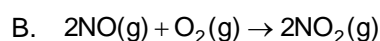
Rate = $K[A]^0$

Rate = K

C. Relationship between rate of reaction and concentration of reactants is called rate law.

D. Rate at a particular moment of time is called instantaneous rate.

Question ID:692748

Ostwald's process for the manufacture of nitric acid involves three steps. Arrange them in correct sequence:

A. $3NO_2(g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO(g)$

B. $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

C. $4NH_3(g) + 5O_2(g) \xrightarrow[\text{500 K, 9 bar}]{\text{catalyst}} 4NO(g) + 6H_2O(g)$
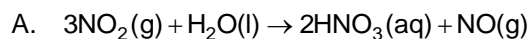
Choose the correct answer from the options given below:

(A) A, B, C   (B) C, A, B

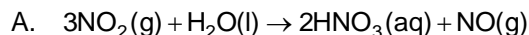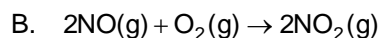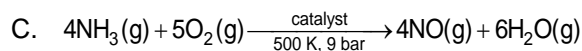(C) B, C, A   (D) C, B, A

Answer (D)

Sol. Sequence of reactions for Ostwald process is

C. $4NH_3(g) + 5O_2(g) \xrightarrow[\text{500 K, 9 bar}]{\text{catalyst}} 4NO(g) + 6H_2O(g)$

B. $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

A. $3NO_2(g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO(g)$

Question ID:692749

Match List-I with List-II.

	List-I Colloid type		List-II Example
A.	Gel	I.	Fog
B.	Solid sol	II.	Whipped cream
C.	Foam	III.	Jellies
D.	Aerosol	IV.	Foam rubber

Choose the correct answer from the options given below:

(A) A-III, B-II, C-IV, D-I   (B) A-III, B-IV, C-II, D-I

(C) A-IV, B-III, C-II, D-I   (D) A-I, B-IV, C-II, D-III

Answer (B)

Sol. A.   Gel → Jellies (III)

B.   Solid sol → Foam rubber (IV)

C.   Foam → Whipped cream (II)

D.   Aerosol → Fog (I)

Question ID:6927410

When KI solution is added to $AgNO_3$ solution, then

A. Ag^+ ions form dispersion medium get adsorbed on AgI

B.   Positively charged sol is formed

C.   Negatively charged sol is formed

D. K^+ ions of dispersed phase get adsorbed on AgI

Choose the correct answer from the options given below:

(A) A and C only   (B) D and B only

(C) C only   (D) A and B only

Answer (D)

Sol. When KI solution is added to $AgNO_3$ solution, positively charged sol results due to adsorption of Ag^+ ions from dispersion medium on AgI.

Question ID:6927411

Which one of the following is NOT applicable to the phenomenon of adsorption?

(A) It is an endothermic process

(B) Entropy change is negative

(C) Gibb's free energy change is less than zero

(D) Enthalpy of chemisorption is higher than that of physisorption

Answer (A)

Sol. Adsorption results in release of energy hence it is an exothermic process.

Question ID:6927412

Match List-I with List-II.

	List-I Process		List-II Metal
A.	Van Arkel method	I.	Ga
B.	Mond process	II.	Al
C.	Hall-Heroult process	III.	Ni
D.	Zone refining	IV.	Zr

Choose the correct answer from the options given below:

(A) A-IV, B-II, C-III, D-I   (B) A-I, B-II, C-III, D-IV

(C) A-IV, B-III, C-II, D-I   (D) A-IV, B-I, C-II, D-III
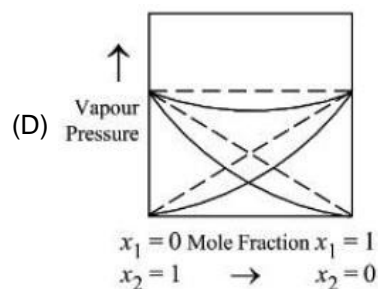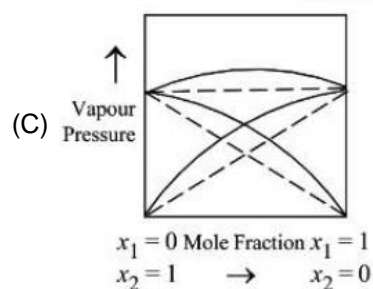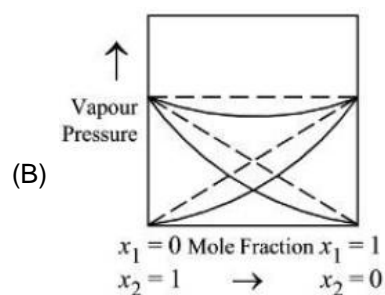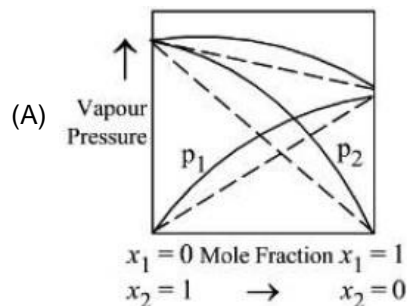
Answer (C)

Sol. A.   Van Arkel method → Zr (IV)

B.   Mond process → Ni (III)

C.   Hall-Heroult process → Al (II)

D.   Zone Refining → Ga (I)

Question ID 6927413

The vapour pressure of a two components system as a function of composition shows positive deviation from Raoult's Law. Identify the correct curve to show the positive deviation

(A)

(B)

(C)

(D)

Answer (A)

Sol. For Positive deviation, A – B interactions are weaker than those between A – A or B – B interactions. This means that in such solutions, molecules of A(or B) will find it easier to escape than in pure state. This will increase the vapour pressure and result in positive deviation.

Question ID 6927414

The affinity for hydrogen decreases in the group from fluorine to iodine. Which of hydrogen halides should have lowest bond dissociation enthalpy?

(A) HCl   (B) HBr

(C) HI   (D) HF

Answer (C)

Sol.

Compounds	$\Delta_{diss} H°(kJ\ mol^{-1})$
HF	574
HCl	432
HBr	363
HI	295

HI bond is weakest, hence its dissociation enthalpy is minimum

Question ID 6927415

NH_4NO_3 on heating liberates and oxide of nitrogen. Oxidation state of nitrogen in that oxide will be

(A) +4   (B) +3

(C) +2   (D) +1

Answer (D)

Sol. $NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$

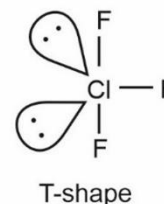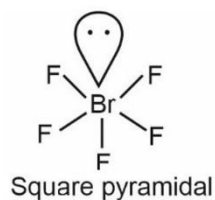Oxidation state of N in N_2O is +1

Question ID 6927416

Which of the following has square pyramidal structure?

(A) IBr   (B) IF_7

(C) CIF_3(D) BrF_5

Answer (D)

Sol.

Square pyramidal

T-shape

Pentagonal bipyramidal

I — Br

Linear

Question ID 6927417

Stereoisomers that are non-superimposable mirror images are called :

(A) Enantiomers   (B) Racemic mixtures

(C) D-isomers   (D) L-isomers

Answer (A)

Sol. Stereoisomers that are non-suprimposable mirror images are called enantiomers.

Question ID 6927418

$KMnO_4$ acts as an oxidising agent in acidic medium. When acidic $KMnO_4$ reacts with KI, then I^- gets converted to

(A) IO_3^- (B) IO^-

(C) I_2 (D) IO_4^-

Answer (C)

Sol. $10I^- + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5I_2$

I^- is oxidized by MnO_4^- to I_2 in acidic medium.

Question ID: 6927419

The atomic radii of Zr and Hf are similar. This is because:

(A) of Actanoid contraction

(B) of Lanthanoid contraction

(C) they lie in same period

(D) they lie in same group

Answer (B)

Sol. Due to lanthanoid contraction, the radii of the members of the third transition series to be very similar to those of the corresponding members of the second series. The almost identical radii of Zr (160 pm) and Hf(159 pm) is a consequence of lanthanoid contraction.

Question ID: 6927420

Which of the following bases is not present in DNA?

(A) Adenine   (B) Thymine

(C) Cytosine   (D) Uracil

Answer (D)

Sol. • The bases present in DNA are : adenine, guanine, cytosine and thymine

• Uracil is absent in DNA.

Question ID: 6927421

Magnetic moment of a divalent ion in aqueous solution with atomic number 25 is:

(A) $\sqrt{5(5+1)}$ BM   (B) $\sqrt{5(5+2)}$ BM

(C) $\sqrt{7(7+2)}$ BM   (D) $2\sqrt{5(5+1)}$ BM

Answer (B)

Sol. Element having atomic number 25 in Mn.

Mn^{2+} contains five unpaired electrons (n) in $3d$ orbitals

Spin only magnetic moment $(\mu) = \sqrt{n(n+2)}$ BM

$(\mu) = \sqrt{5(5+2)}$ BM

Question ID: 6927422

Which of following will be coloured in aqueous solution?

A. Mn^{2+}

B. Sc^{3+}

C. Zn^{2+}

D. Co^{2+}

E. Fe^{3+}

Choose the correct answer from the options given below:

(A) B, C only   (B) A, D, E only

(C) A, C, D only   (D) B, E only

Answer (B)

Sol. • The metals ions which contain d electron(s) will show colour in aqueous medium

• Mn^{2+}, Co^{2+} and Fe^{3+} are coloured species as they will undergo d-d transition in aqueous medium.

Question ID: 6927423

The oxidation state of Cobalt in the diamagnetic octahedral complex $[Co(NH_3)_6]^{3+}$ is

(A) −3   (B) +1

(C) +2   (D) +3

Answer (D)

Sol. NH_3 is neutral ligand hence oxidation state of cobalt in $[Co(NH_3)_6]^{3+}$ is +3

Question ID: 6927424

Out of the following complex ions, identify hetroleptic complexes:

A. $[Co(NH_3)_5(CO_3)]^+$

B. $[Co(NH_3)_4Cl_2]^+$

C. $[Co(NH_3)_6]^{3+}$

D. $[CoCl_2(en)_2]^+$

E. $[Co(en)_3]^{3+}$

Choose the correct answer from the options given below:

(A) C, E only   (B) A, B, D only

(C) D, E only   (D) A, B, C only

Answer (B)

Sol. • Complexs in which a metal is bound to more than one kind of donor groups are known as hetroleptic.

• Complex A, B and D are hetroleptic complex

Question ID: 6927425

Which of following is the most stable complex species?

(A) $[Ni(NH_3)_6]^{2+}$ (B) $[Fe(CN)_6]^{3-}$

(C) $[Fe(C_2O_4)_6]^{3-}$ (D) $[Ni(H_2O)_6]^{2+}$

Answer (B)

Sol. Stronger is the ligand more in the crystal field stabilisation energy (CFSE). $\overline{CN}$ is the strongest field ligand among the given options hence CFSE is highest for $[Fe(CN)_6]^{3-}$

Question ID: 6927426

Which kind of isomerism exists between $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$?

(A) Solvate isomerism

(B) Linkage isomerism

(C) Coordination isomerism

(D) Ionisation isomerism

Answer (C)

Sol. • Coordination isomerism arises from the interchange of ligands between cationic and anionic entities of different metal ions present in a complex.

• $[Co(NH_3)_6](Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$ Exhibit coordination isomerism

Question ID: 6927427

Match List I with List II

List I Complex	List II Hybridisation, Spin state
A. $[CoF_6]$	I. d^2sp^3, low spin
B. $[NiCl_4]^{2-}$	II. sp^3d^2, high spin
C. $[Co(NH_3)_6]^{3+}$	III. sp^3, high spin
D. $[Ni(CO)_4]$	IV. sp^3, no unpaired electron

Choose the correct answer form the options givens below :

(A) A-III, B-IV, C-I, D-II   (B) A-II, B-III, C-I, D-IV
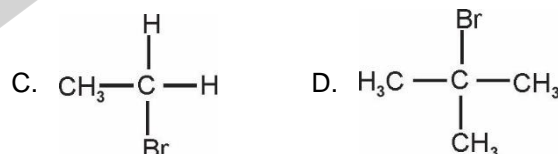
(C) A-III, B-II, C-IV, D-I   (D) A-II, B-I, C-IV, D-III

Answer (B)

Sol. A. $[CoF_6] \to sp^3d^2$, high spin (II)

B. $[NiCl_4]^{2-} \to sp^3$, high spin (III)

C. $[Co(NH_3)_6]^{3+} \to d^2sp^3$, low spin (I)

D. $[Ni(CO)_4] \to sp^3$, no unpaired electron (IV)

Question ID: 6927428

Arrange the following compounds in order of decreasing boiling points

A. $CH_3CH_2CH_2CH_2Br$ B. $CH_3–CH_2–CH_2Br$

C. $CH_3-\overset{\overset{H}{|}}{\underset{\underset{Br}{|}}{C}}-H$ D. $H_3C-\overset{\overset{Br}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_3$

Choose the correct answer form the options given below :

(A) C, B, D, A   (B) A, D, B, C

(C) B, D, C, A   (D) D, C, B, A

Answer (B)

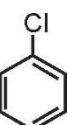**Sol.** • More is the molar mass more is the boiling point.

• For isomeric alkyl halides more is the branching, lesser is the surface area and smaller will be Vander Waals' force of attraction and lower will be the boiling point

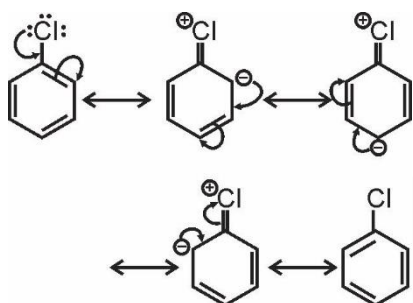• Correct order of decreasing boiling point :

A, D, B, C

Question ID: 6927429

Identify correct resonance structure of chlorobenzene

(A) (B) (C) (D)
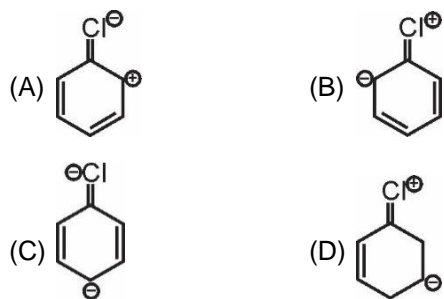
Answer (B)

Sol. Resonance structures of are

Question ID: 6927430

Given below are three steps which are involved for conversion of alkene into alcohol. Arrange them in correct sequence.

A. Nucleophilic attack of water on carbocation resulting in deprotonation

B. Deprotonation to form an alcohol

C. Protonation of alkene to form Carbocation by electrophilic attack of H_3O^+

Choose the correct answer form the options given below :

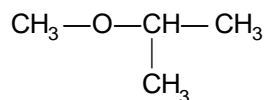(A) A, C, B (B) A, B, C

(C) C, A, B (D) C, B, A

Answer (C)

Sol. The sequence of steps involved in conversion of alkene to an alcohol is

(C). Protonation of alkene to form carbocation by electrophilic attack of H_3O^+

(A) Nucleophilic attack of water on carbocation
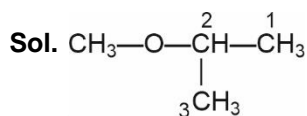
(B). Deprotonation to form an alcohol.

Question ID:6927431

IUPAC name of the compound given below is:

$$CH_3—O—CH—CH_3$$
$$|$$
$$CH_3$$

(A) Methyl isopropyl ether

(B) 1-methoxy-1-methylethane

(C) 2-Methoxypropane

(D) Isopropoxy methane

Answer (C)

Sol. $CH_3—O—\overset{2}{CH}—\overset{1}{CH_3}$
      $\underset{3}{|}$
      $\underset{}{CH_3}$

IUPAC Name : 2-Methoxypropane

Question ID:6927432

Arrange the following compounds in increasing order of their acid strengths:

A. o-Cresol, pka = 10.2

B. m-Nitrophenol, pka = 8.3

C. Phenol, pka = 10

Choose the correct answer from the options given below:

(A) B, C, A (B) A, B, C

(C) C, B, A (D) A, C, B

Answer (D)

Sol. • Lower in the pK_a, stronger in the acid

• Correct increasing order of acid strength: A, C, B

Question ID:6927433

Match List I with List II

List-I	List-II
A. Antiseptic	I. Saccharin
B. Synthetic progesterone	II. Mixture of chloroxylenol and terpineol
C. Food preservative	III. Norethindrone
D. Artificial sweetening agent	IV. Sodium benzoate

Choose the correct answer from the options given below:

(1) A – IV, B – III, C – I, D – II

(2) A – II, B – III, C – IV, D – I

(3) A – III, B – II, C – I, D – IV

(4) A – II, B – IV, C – III, D – I

Answer (B)

Sol.

A. Antiseptic	II. Mixture of chloroxylenol and terpineol
B. Synthetic progesterone	III. Norethindrone
C. Food preservative	IV. Sodium benzoate
D. Artificial sweetening agent	I. Saccharin

Question ID:6927434
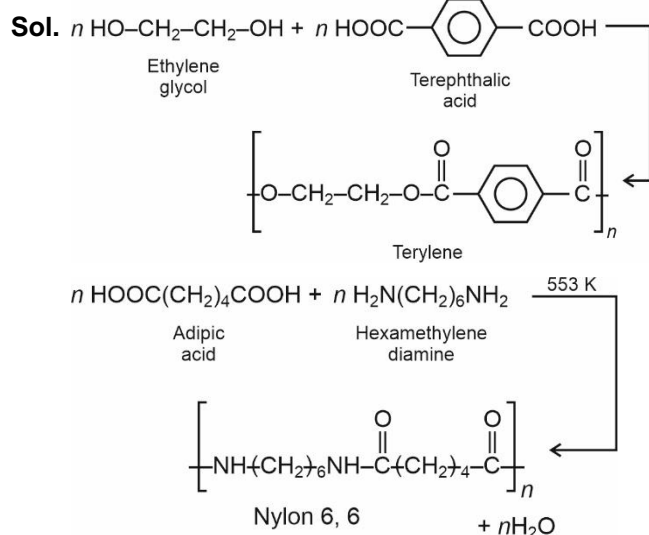
Which of the following polymers are obtained by condensation polymerisation?

A. Terylene   B. Poly ethene

C. Teflon   D. Nylon

Choose the correct answer from the options given below:

(A) B and C only   (B) A and B only

(C) A and C only   (D) A and D only

Answer (D)

Sol. n HO–CH$_2$–CH$_2$–OH + n HOOC—⬡—COOH

Ethylene glycol   Terephthalic acid

$\left[\text{O–CH}_2\text{–CH}_2\text{–O–C(=O)—⬡—C(=O)} \right]_n$

Terylene

n HOOC(CH$_2$)$_4$COOH + n H$_2$N(CH$_2$)$_6$NH$_2$ →553 K

Adipic acid   Hexamethylene diamine

$\left[\text{NH(CH}_2)_6\text{NH–C(=O)(CH}_2)_4\text{–C(=O)} \right]_n$

Nylon 6, 6   + nH$_2$O

Terylene and Nylon 6, 6 are examples of condensation polymers. These are obtained by condensation polymerisation with loss of simple molecules water.
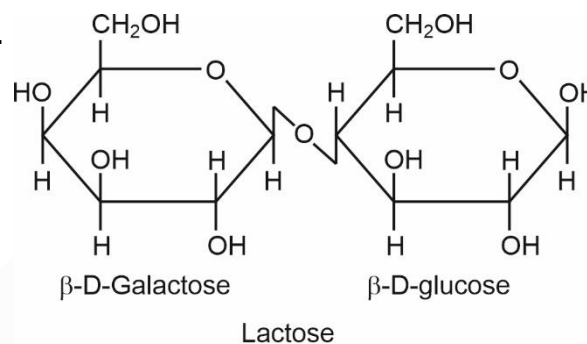
Question ID:6927435

Lactose is composed of:

(A) β-D galactose and β-D glucose

(B) α-D glucose and β-D galactose

(C) α-D glucose and β-D fructose

(D) β-D glucose and α-D galactose

Answer (A)

Sol.

β-D-Galactose   β-D-glucose

Lactose

Lactose is composed of β-D-galactose and β-D-glucose.

Question ID: 6927436

The presence of carbonyl group in glucose is confirmed by treating it with

(A) HI

(B) Mild Oxidising agent Br$_2$ water
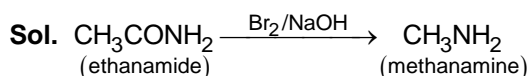
(C) NH$_2$OH

(D) HNO$_3$

Answer (B)

Sol. Bromine water oxidises glucose to gluconic acid thus the reddish brown colour of bromine water is decolourised.

Question ID: 6927437

The convert ethanamide into methenamine which of the following reagents can be used?

(A) LiAlH$_4$, H$_2$O

(B) H$_2$/Ni, Na(Hg)/C$_2$H$_5$OH

(C) Br$_2$ and NaOH

(D) Sn and HCl

Answer (C)

Sol. $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{Br}_2/\text{NaOH}} \text{CH}_3\text{NH}_2$

(ethanamide)   (methanamine)

Hoffmann Bromamide degradation

Question ID: 6927438

To convert aniline into p-Nitroaniline, three steps are taken. Arrange following given steps in correct sequence.
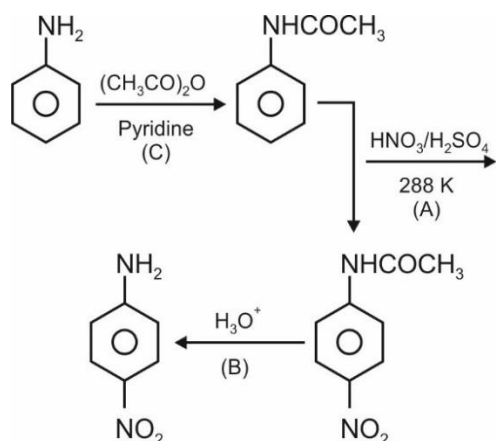
A. N-Phenyl ethanamide is treated with HNO_3, H_2SO_4 and heated at 288 K.

B. p-Nitroacetanilide undergoes acidic or basic hydrolysis to give p-Nitroaniline.

C. Aniline is treated with acetic anhydride in pyridine.

Choose the correct answer form the options given below;

(A) A, C, B   (B) C, A, B

(C) A, B, C   (D) B, A, C
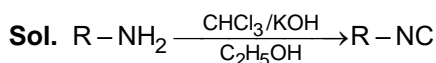
Answer (B)

Sol.

Question ID: 6927439

Aliphatic and aromatic primary amines on heating with chloroform and ethanolic KOH form isocyanides. Identify name of reaction

(A) Gabriel Phthalimide reaction

(B) Hoffmann bromamide degradation reaction

(C) Carbylamine reaction

(D) Sandmeyer reaction

Answer (C)

Sol. $R-NH_2 \xrightarrow[C_2H_5OH]{CHCl_3/KOH} R-NC$

Carbylamine reaction

Question ID: 6927440

Aniline on nitration yield 47% m-nitroaniline also. This is due to

(A) +M or +R effect of $-NH_2$ group attached with benzene

(B) –M or –R effect of $-NH_2$ group attached with benzene

(C) Formation of anilinium ion by protonation of aniline

(D) Very strong reducing nature of HNO_3 acid

Answer (C)

Sol. Aniline on nitration yield 47% m-nitroaniline due to the formation of anilinium ion by the protonation of aniline which is a meta directing group.
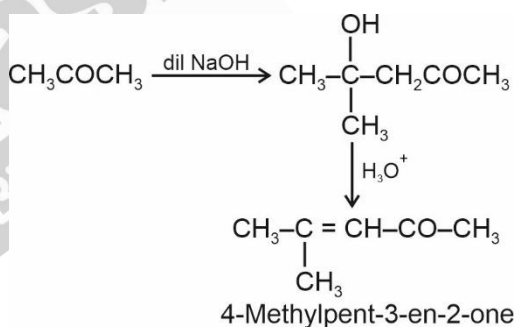
Question ID:6927441

Identify name of reaction which is used to convert Propanone to 4-Methylpent-3-en-2-one

(A) Aldol reaction

(B) Cannizaro reaction

(C) Aldol condensation

(D) Cross aldol condensation

Answer (C)

Sol. The name of reaction is aldol condensation

Question ID:6927442

Out of following given compounds, identify which carbonyl compound gives aldol reaction?

Answer (C)

Sol. Aldehydes having α-hydrogens give aldol reaction e.g. CH_3CHO

Question ID:6927443

Ethanal undergoes nucleophilic addition reaction at faster speed than acetone, this is because of

(A) Acetone has 6 α-hydrogen atoms

(B) Electrophilicity of carbon of carbonyl group is high in ethanal

(C) Electrophilicity of carbon of carbonyl group is less in ethanal

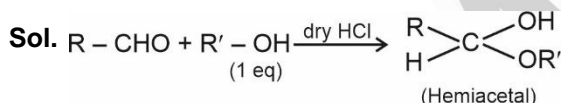(D) Nucleophilicity of carbon of carbonyl group in ethanal is high

Answer (B)

Sol. As the electrophilicity of carbon of carbonyl group is high in ethanal, it undergoes nucleophilic addition reaction at faster speed than acetone.
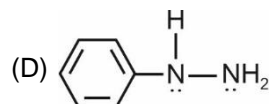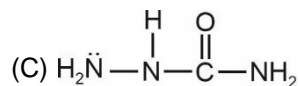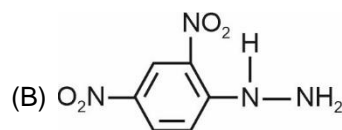
Question ID:6927444

Aldehydes react with one equivalent of monohydric alcohols in the presence of dry hydrogen chloride to give

(A) An acetal

(B) A hemiacetal

(C) An oxime

(D) A ketal

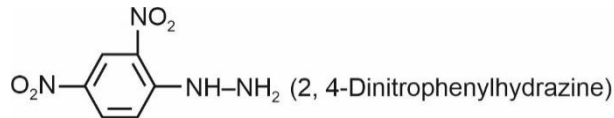**Answer (B)**

Sol.
$$R - CHO + R' - OH \xrightarrow[(1\ eq)]{dry\ HCl} \underset{(Hemiacetal)}{R \underset{H}{\overset{}{>}} C \overset{OH}{\underset{OR'}{<}}}$$

Question ID:6927445

Identify the reagent which is used to check the presence of an aldehyde or a keto group in an organic compound

(A) $H_2\ddot{N}\ddot{N}HOH$

(B) $O_2N-\underset{(NO_2)}{\underset{}{\bigcirc}}-\underset{H}{\overset{}{N}}-NH_2$

(C) $H_2\ddot{N}-\underset{H}{\overset{}{N}}-\overset{O}{\overset{\|}{C}}-NH_2$

(D) $\underset{}{\bigcirc}-\underset{\cdot\cdot}{\overset{H}{N}}-NH_2$

Answer (B)

Sol. 2, 4-Dinitrophenyl hydrazine reacts with aldehydes or ketones to form yellow, orange, or reddish-orange precipitates,

$O_2N-\underset{(NO_2)}{\bigcirc}-NH-NH_2$ (2, 4-Dinitrophenylhydrazine)

Passage:

Read the sentence and answer the questions

Paragraph on Electrochemistry

Electrochemical cells consists of two metallic electrodes (anode and cathode) dipping in electrolytic solutions. At anode oxidation takes place while at cathode reduction takes place. These cells are of two types

1. Galvanic cell in which chemical energy of spontaneous redox reaction is converted into electrical energy. E°(Cells) = E° Cathode-E° anode where E° cell is standard potential of the cell. $\Delta_rG° = - nFE°$ cell where $\Delta_rG°$ is standard Gibbs energy change.

2. Electrolytic cells in which electrical energy is used to carry out non-spontaneous redox reactions. The amount of substance produced at a particular electrode depends upon quantity of electricity passed; Q = I × t (where I is current in ampere and t-time in seconds) one faraday in the quantity of electricity. If is the charge carried by 1 mole of electrons = 96500 C is conductivity K of an electrolytic IF solution depends on concentration of electrolyte, nature of Kohlrausch Law of independent migration of ions $\Lambda_m^° (NaCl) = \lambda_{Na}^° + \lambda_{Cl}^° -$

Where $\lambda_m^°$ represent limiting molar conductivity. This can be used for calculation of molar conductivity for weak electrolytes.

Questions ID : 6927446

$\Lambda_m^°$ for NH_4OH is equal to;

(A) $\Lambda_m^° NH_4OH + \Lambda_m^° NH_4Cl - \Lambda_m^° HCl$

(B) $\Lambda_m^° NH_4Cl + \Lambda_m^° NaOH - \Lambda_m^° NaCl$

(C) $\Lambda_m^° NH_4Cl + \Lambda_m^° NaCl - \Lambda_m^° NaOH$

(D) $\Lambda_m^° NaOH + \Lambda_m^° NaCl - \Lambda_m^° NH_4Cl$

Answer (B)

Sol. $\Lambda_m^\circ(NH_4OH) = \lambda_m^\circ(NH_4^+) + \lambda_m^\circ(OH^-)$

$\Lambda_m^\circ(NH_4Cl) = \lambda_m^\circ(NH_4^+) + \lambda_m^\circ(Cl^-) - (i)$

$\Lambda_m^\circ(NaOH) = \lambda_m^\circ(Na^+) + \lambda_m^\circ(OH^-) - (ii)$

$\Lambda_m^\circ(NaCl) = \lambda_m^\circ(Na^+) + \lambda_m^\circ(Cl^-) - (iii)$

Using (i) + (ii) − (iii)

$\Lambda_m^\circ(NH_4OH) = \Lambda_m^\circ(NH_4Cl) + \Lambda_m^\circ(NaOH) - \Lambda_m^\circ NaCl$

Questions ID : 6927447

A cell represented as $Al_{(s)}\big|Al^{3+}_{(aq)}\big\|Ni^{2+}_{(aq)}\big|Ni_{(s)}$ has a standard electrode potential 1.41 V. Calculate the standard Gibb's energy for the cell reaction occurring at this cell

(A) −136065 J mol^{-1} (B) −272130 J mol^{-1}

(C) −408195 J mol^{-1} (D) −816390 J mol^{-1}

Answer (D)

Sol. $2Al + 3Ni^{2+} \rightleftharpoons 2Al^{3+} + 3Ni$ (n = 6)

$\Delta G^\circ = -nFE^\circ$

$= -6 \times 96500 \times 1.41$

$= -816390$ J mol^{-1}

Questions ID : 6927448

How much charge is required for the reduction of one mole of MnO_4^- to Mn^{+2}?

(A) 2 F (B) 3 F

(C) 5 F (D) 6 F

Answer (C)

Sol. $\because MnO_4^- + 5e^- \longrightarrow Mn^{2+}$
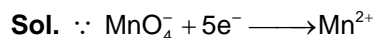
$\therefore$ Charge required to reduce 1 mol

MnO_4^- into Mn^{2+} is 5F

Questions ID : 6927449

Λ_m° for NaCl, HCl and CH$_3$COONa are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. Calculate Λ_m° for CH$_3$COOH

(A) 516.9 S cm^2 mol^{-1} (B) 653.3 S cm^2 mol^{-1}

(C) 390.5 S cm^2 mol^{-1} (D) 460.9 S cm^2 mol^{-1}

Answer (C)

Sol. $\Lambda_m^\circ(CH_3COOH) = \Lambda_m^\circ(CH_3COONa) + \Lambda_m^\circ(HCl) - \Lambda_m^\circ NaCl$

$= 91 + 425.9 - 126.4$

$= 390.5$ cm^2 mol^{-1}

Questions ID : 6927450

In electrolysis of an aqueous solution of sodium sulphate, 2.4 L of oxygen at STP was liberated at anode. The volume of hydrogen at STP liberated at cathode would be

(A) 1.2 L (B) 2.4 L

(C) 2.6 L (D) 4.8 L

Answer (D)

Sol. Equivalents of O$_2$ = $\dfrac{2.4}{5.6} = \dfrac{3}{7}$

Equivalents of H$_2$ = Equivalents of O$_2$ = $\dfrac{3}{7}$

Volume of H$_2$ liberated at STP = $\dfrac{3}{7} \times 11.2$

$= 4.8$ L

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