NEET 2022

Chemistry

1. Gadolinium has a low value of third ionisation enthalpy because of
   A. small size
   B. high exchange enthalpy
   C. high electronegativity
   D. high basic character
   Answer: (2)
   Solution: Gd has low value of third ionisation enthalpy because of high exchange energy

2. Which one is not correct mathematical equation for Dalton's Law of partial pressure? Here p = total pressure of gaseous mixture
   A. $p = p_1 + p_2 + p_3$
   B. $p = n_1RT/V+n_2RT/V+n_3RT/V$
   C. $p_i = \chi_i p$, where p_i = partial pressure of i^{th} gas; χ_i = mole fraction of i^{th} gas in gaseous mixture
   D. $p_i = \chi_i p_i^o$, where χ_i = mole fraction of i^{th} gas in gaseous mixture p_i^o = pressure of i^{th} gas in pure state
   Answer: (D)
   Solution: $p_i = \chi_i p_i^o$ is not correct expression for Dalton's law

3. **Assertion (A):** In a particular point defect, an ionic solid is electrically neutral, even if few of its cations are missing from its unit cells.
   Reason(R): In an ionic solid, Frenkel defect arises due to dislocation of cation from its lattice site to interstitial site, maintaining overall electrical neutrality.
   Choose the most appropriate answer from the options given below:

A. Both (A) and (R) are correct and (R) is the correct explanation of (A)
B. Both (A) and (R) are correct but (R) is not the correct explanation of (A)
C. (A) is correct but (R) is not correct
D. (A) is not correct but (R) is correct

Answer: (B)

Solution: Both (A) and (R) are correct, but (R) is not correct expression of (A)

4. The pH of the solution containing 50 mL each of 0.10 M sodium acetate and 0.01 M acetic acid is
[Given pK_a of CH_3COOH = 4.57]
A. 5.57
B. 3.57
C. 4.57
D. 2.57

Answer: (A)

Solution:

Salt pH = pKa + log Salt /Acid

= 4.57 + log 0.10/0.01
= 4.57 + log10
pH= 4.57 + 1 = 5.57

5. Identify the incorrect statement from the following
A. Alkali metals react with water to form their hydroxides
B. The oxidation number of K in KO_2 is + 4.
C. Ionisation enthalpy of alkali metals decreases from top to bottom in the group.
D. Lithium is the strongest reducing agent among the alkali metals.

Answer: (B)

Solution: Oxidation number of K in KO_2 is not +4 but it is +1

6. **Statement I:** The acidic strength of monosubstituted nitrophenol is higher than phenol because of electron withdrawing nitro group.
   Statement II: o-nitrophenol, m-nitrophenol and p-nitrophenol will have same acidic strength as they have one nitro group attached to the phenolic ring.
   Choose the most appropriate answer from the options given below:

   A. Both Statement I and Statement II are correct.
   B. Both Statement I and Statement II are incorrect.
   C. Statement I is correct but Statement II is incorrect.
   D. Statement I is incorrect but Statement II is correct.

   Answer: (3)
   Solution: S-I is correct but S-II is incorrect as o-, m- and p-nitrophenol are more acidic than phenol. o-,p- and m-nitrophenol have different acidic strength.

7. What mass of 95% pure $CaCO_3$ will be required to neutralise 50 mL of 0.5 M HCl solution according to the following reaction?
   $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + 2H_2O(l)$
   [Calculate upto second place of decimal point]

   A. 1.25g
   B. 1.32g
   C. 3.65g
   D. 9.50g

   Answer: (2)

   Solution: $n_{HCl} = \frac{0.5 \times 50}{1000} = 0.025$ mole
   $W_{HCl} = 0.025 \times 36.5 = 0.9125$ g
   $M.M_{CaCO_3} = 100$ g/mol

2×36.5 g HCl requires $CaCO_3 = 100$ g

0.9125 g HCl requires $CaCO_3 = \frac{100}{2 \times 36.5} \times 0.9125 = 1.25$ g

Mass of 95% pure $CaCO_3 = \frac{1.25 \times 100}{95} = 1.32$ g

8. The IUPAC name of an element with atomic number 119 is

A. ununennium
B. unnilennium
C. unununnium
D. ununoctium

Answer: (A)

Solution: IUPAC name of an element with atomic number 119 is ununennium

9. Choose the correct statement:

A. Diamond and graphite have two dimensional network.
B. Diamond is covalent and graphite is ionic.
C. Diamond is sp^3 hybridised and graphite is sp^2 hybridized.
D. Both diamond and graphite are used as dry lubricants.

Answer: (C)

Solution: Diamond - sp^3 hybridised

Graphite – sp^2 hybridised

10. **Statement I:** In the coagulation of a negative sol, the flocculating power of the three given ions is in the order –

$Al^{3+} > Ba^{2+} > Na^+$

Statement II: In the coagulation of a positive sol, the flocculating power of the three given salts is in the order

$NaCl > Na_2SO_4 > Na_3PO_4$

Choose the most appropriate answer from the options given below :

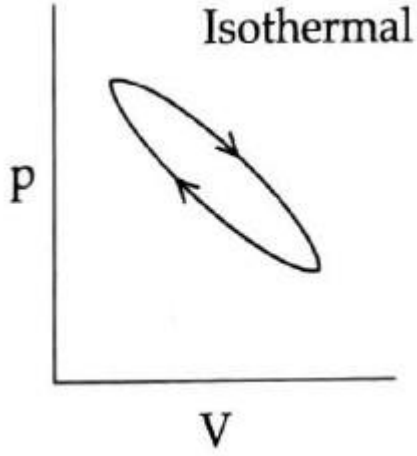
A. Both Statement I and Statement II are correct.
B. Both Statement I and Statement II are incorrect.
C. Statement I is correct but Statement II is incorrect.
D. Statement I is incorrect but Statement II is correct.

Answer: (C)

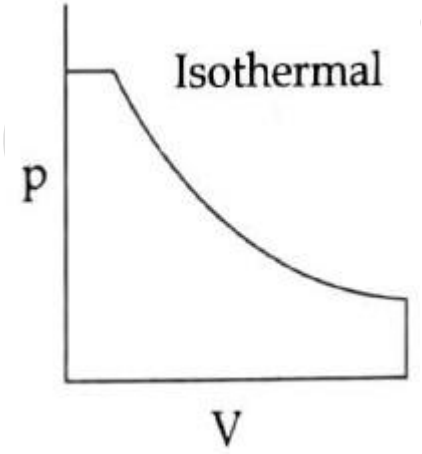
Solution: Statement-I is correct but S-II is incorrect as per Hardy Schulze law.

11. Which of the following p-V curve represents maximum work done?

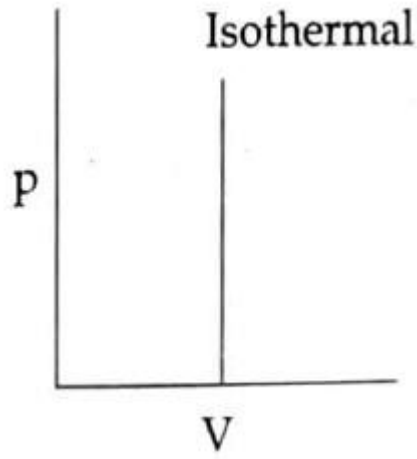
(A)



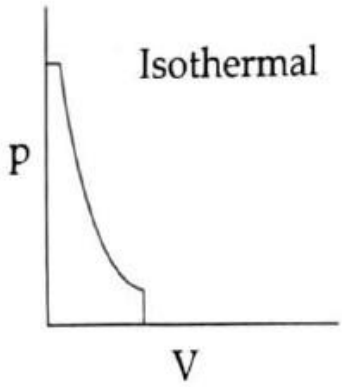
(B)



(C)



12. (D)



Answer: (B)

Solution: Option (2), represents maximum work done

13. Statement I: Primary aliphatic amines react with HNO_2 to give unstable diazonium salts.
Statement II: Primary aromatic amines react with HNO_2 to form diazonium salts which are stable even above 300 K.
Choose the most appropriate answer from the options given below :
    A. Both Statement I and Statement II are correct.
    B. Both Statement I and Statement II are incorrect.
    C. Statement I is correct but Statement II is incorrect.
    D. Statement I is incorrect but Statement II is correct.

Answer: (C)

Solution: Primary aliphatic amines form highly unstable diazonium salts as they decompose even at low temperature

and primary aromatic amines are unstable above 0-5°C i.e., 273-278 K

14. Which amongst the following is incorrect statement?
    A. The bond orders of O_2^+, O_2, O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1, respectively.
    B. C_2 molecule has four electrons in its two degenerate $\pi\pi$ molecular orbitals.
    C. H_2^+ ion has one electron.
    D. O_2^+ ion is diamagnetic.

    Answer: (D)

    Solution: O_2^+ ion is paramagnetic due to presence of unpaired electrons

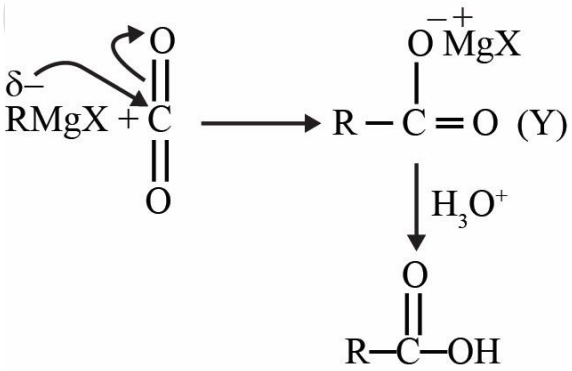
15. $$RMgX + CO_2 \xrightarrow[\text{ether}]{\text{dry}} Y \xrightarrow{H_3O^+} RCOOH$$

    What is Y in the above reaction?

    A. $RCOO^-Mg^+X$
    B. $R_3CO^-Mg^+X$
    C. $RCOO^-\ X^+$
    D. $(RCOO)_2Mg$

    Answer: (1)

    Solution:



∴ The correct answer is option 1

16. Which statement regarding polymers is not correct?
    A. Elastomers have polymer chains held together by weak intermolecular forces.
    B. Fibers possess high tensile strength.
    C. Thermoplastic polymers are capable of repeatedly softening and hardening on heating and cooling respectively.
    D. Thermosetting polymers are reusable.

    Answer: (D)

    Solution: Thermosetting polymers cannot be reshaped and reused.

17. Given below are half cell reactions:

    $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$,

    $E^o_{Mn^{+2}/MnO4^-} = -1.510$ V

    $\frac{1}{2} O_2 + 2H^+ + 2e^- \rightarrow H_2O$,

    $E^o_{O/H2O} = +1.223$ V

    Will the permanganate ion, MnO_4^- liberate O_2 from water in the presence of an acid?

    A. Yes, because $E^o_{cell} = +0.287V$
    B. No, because $E^o_{cell} = -0.287V$
    C. Yes, because $E^o_{cell} = +2.733$ V
    D. No, because $E^o_{cell} = -2.733$ V

    Answer: (A)

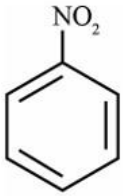
    Solution: For the liberation of O_2, the required reaction is \$MnO_4^- + 4H_2O \rightarrow Mn^{2+} + H^+ + O_2$ For the reaction to be spontaneous, the E^o_{cell} is to be positive

    $E^o_{cell} = E^o_{MnO4-/Mn+2} + E^o_{H2O/O2} = 1.510 + (-1.223) = 0.287$ V

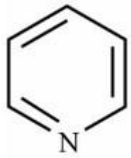
    Therefore, correct option is (A)

18. The Kjeldahl' s method for the estimation of nitrogen can be used to estimate the amount of nitrogen in which one of the following compounds ?

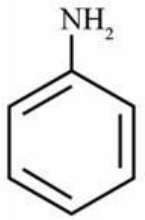
(A)



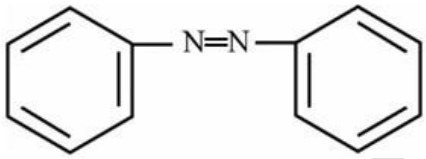
(B)



(C)



(D)



Answer: (C)

Solution:

Kjeldahl method can't be used for compound containing nitrogen in the form of NO_2, azo groups or if the nitrogen is a part of ring as N of these compounds do not change to ammonium sulphate under these conditions.

Hence it can be only used for option 3.

19. The incorrect statement regarding enzymes is
    A. Enzymes are biocatalysts.
    B. Like chemical catalysts enzymes reduce the activation energy of bio processes .
    C. Enzymes are polysaccharides.

D. Enzymes are very specific for a particular reaction and substrate.

Answer: (C)

Solution:

Enzymes are globular proteins and not polysaccharides

20. The IUPAC name of the complex $[Ag(H_2O)_2][Ag(CN)_2]$ is:
    A. dicyanidosilver(II) diaquaargentate(II)
    B. diaquasilver(II) dicyanidoargentate(II)
    C. dicyanidosilver(I) diaquaargentate(I)
    D. diaquasilver(I) dicyanidoargentate(I)

Answer: (D)

Solution: The IUPAC name of the complex $[Ag(H_2O)_2][Ag(CN)_2]$ is diaquasilver(I)dicyanidoargentate(I)

21. **Question 70:** Match List - I with List- II.

List-I (Drug class)	**List-II (Drug molecule)**
(a) Antacids	(i) Salvarsan
(b)Antihistamines	(ii) Morphine
(c) Analgesics	(iii) Cimetidine
(d) Antimicrobials	(iv) Seldane

A. (a)-(iii), (b)-(ii), (c)-(iv), (d) - (i)
B. (a)-(iii), (b)-(iv), (c)- (ii), (d)-(i)
C. (a)-(i), (b)-(iv), (c)- (ii), (d)-(iii)
D. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Answer: (B)

Solution:

Antacids-Cimetidine

Antihistamines-Seldane
Analgesics-Morphine
Antimicrobials-Salvarsan

22. Amongst the following which one will have maximum 'lone pair- lone pair' electron repulsions?
    A. ClF_3
    B. IF_5
    C. SF_4
    D. XeF_2
    Answer: (D)
    Solution: XeF_2 has two bond pair and three lone pair that gives it maximum lone pair-lone pair repulsion.

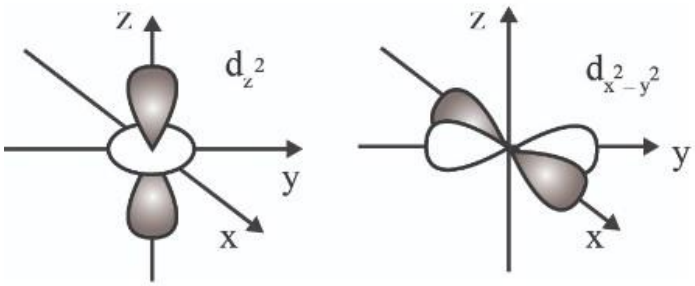
23. At 298 K, the standard electrode potentials of Cu^{2+}/Cu, Zn^{2+}/Zn, Fe^{2+}/Fe and Ag^{+}/Ag are 0.34 V, - 0.76 V, - 0.44 V and 0.80 V, respectively.
    On the basis of standard electrode potential, predict which of the following reaction cannot occur ?
    A. $CuSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Cu(s)$
    B. $CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$
    C. $FeSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Fe(s)$
    D. $2CuSO_4(aq) + 2Ag(s) \rightarrow 2Cu(s) + Ag_2SO_4(aq)$
    Answer: (D)
    Solution: $2CuSO_4(aq) + 2Ag(s) \rightarrow$ No reaction

24. Identify the incorrect statement from the following.
    A. All the five 5d orbitals are different in size when compared to the respective 4d orbitals.
    B. All the five 4d orbitals have shapes similar to the respective 3d orbitals.
    C. In an atom, all the five 3d orbitals are equal in energy in free state.

D. The shapes of d_{xy}, d_{yz}, and d_{zx} orbitals are similar to each other; and $d_{2\,2}$ and d_{2} are d_{x2-y2} *and* d_{z2} similar to each other.

Answer: (D)

Solution:



25. In one molal solution that contains 0.5 mole of a solute, there is

A. 500 mL of solvent

B. 500 g of solvent

C. 100 mL of solvent

D. 1000 g of solvent

Answer: (B)

Solution:

$$m = \frac{\text{Moles of solute}}{\text{Mass of solvent(kg)}}$$

$$1 \text{ molal} = \frac{0.5}{\text{w of solvent in (kg)}}$$

$$\text{w of solvent (kg)} = \frac{0.5}{1} = 0.5 \text{ kg} = 500 \text{ g}$$

26. **Assertion (A):** ICl is more reactive than I_2

Reason(R): I-Cl bond is weak than I-I bond

Choose the most appropriate answer from the options given below:

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

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

(A) is correct but (R) is not correct

(A) is not correct but (R) is correct

Answer: (1)

Solution: Both (A) and (R) are correct and (R) is correct explanation of (A)

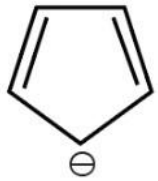
Interhalogen species are more reactive than halogens, so A is right.

In general, interhalogens compounds are more reactive than halogens (except F).

This is because X-X′ bond in interhalogens in weaker than X-X bond in halogens except F-F bond.

27. Which compound amongst the following is not an aromatic compound?

(A)



B)

(C)

(D)

Answer: (4)

Solution: This is not an aromatic compound as it is non-planar.

28. **Statement I:** The boiling points of the following hydrides of group 16 elements increases in the order-

$H_2O < H_2S < H_2Se < H_2Te$

Statement II: The boiling points of these hydrides increases with increase in molar mass. In the light of the above statements, choose the most appropriate answer from the options given below

A. Both Statement I and Statement II are correct.
B. Both Statement I and Statement II are incorrect.
C. Statement I is correct but Statement II is incorrect.
D. Statement I is incorrect but Statement II is correct.

Answer: (2)

Solution: Boiling point of H_2O is maximum due to hydrogen bonding So, both S-I and S-II are false

29. Match List-I with List-II.

List-I	**List-II**
(a) Li	(i) absorbent for carbon dioxide
(b) Na	(ii) electrochemical cells
(c) KOH	(iii) coolant in fast breeder reactors
(d) Cs	(iv) photoelectric cell

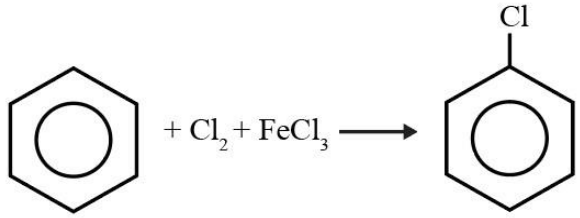
Choose the correct answer from the options given below :

A. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
B. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

C. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
D. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
Answer: (D)
Solution:
Li ⇒ electrochemical cells
Na ⇒ coolant in fast breeder reactors
KOH ⇒ absorbent for carbon dioxide
Cs ⇒ photoelectric cell

30. Which of the following sequence of reactions is suitable to synthesize chlorobenzene?
    A. Benzene, Cl_2, anhydrous $FeCl_3$
    B. Phenol, $NaNO_2$, HCl, CuCl
    C. Benzene, HCl
    D. Aniline , HCl heating

    Answer: (A)
    Solution:



31. **Statement I:** The boiling points of aldehydes and ketones are higher than hydrocarbons of comparable molecular masses because of weak molecular association in aldehydes and ketones due to dipole - dipole interactions
    Statement II: The boiling points of aldehydes and ketones are lower than the alcohols of similar molecular masses due to the absence of H-bonding.
    In the light of the above statements choose the most appropriate answer from the options given below:
    A. Both Statement I and Statement II are correct.

B. Both Statement I and Statement II are incorrect.
C. Statement I is correct but Statement II is incorrect.
D. Statement I is incorrect but Statement II is correct.

Answer: (A)

Solution: Both S-I and S-II are correct

32. **Question 81:** Match List - I with List- II.

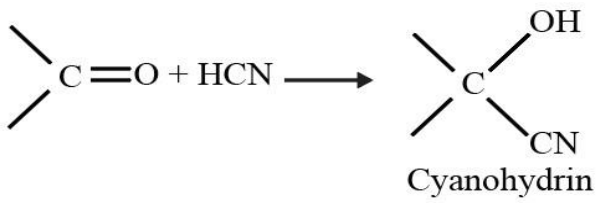
List-I (Products formed)	**List-II (Reaction of carbonyl compound with)**
(a) Cyanohydrin	(i) NH_2OH
(b) Acetal	(ii) RNH_2
(c) Schiff's base	(iii) alcohol
(d) Oxime	(iv) HCN

Choose the correct answer from the options given below :

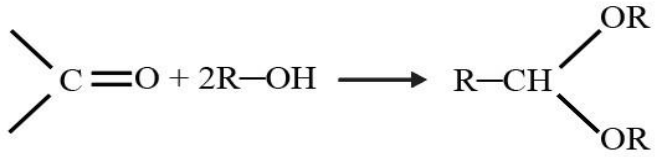
A. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
B. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
C. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
D. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

Answer: (D)

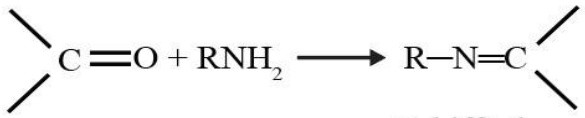
Solution:



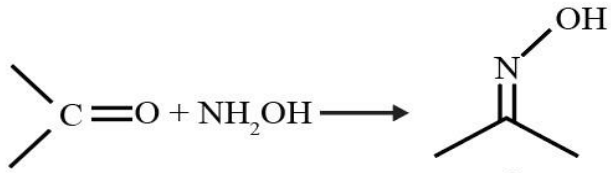
Cyanohydrin



Acetal



Schiff's base



Oxime

33. The incorrect statement regarding chirality is:
    A. S_N1 reaction yields 1 : 1 mixture of both enantiomers.
    B. The product obtained by S_N2 reaction of haloalkane having chirality at the reactive site shows inversion of configuration.
    C. Enantiomers are superimposable mirror images on each other.
    D. A racemic mixture shows zero optical rotation.

    Answer: (C)

    Solution: Enantiomers are non-superimposable mirror images on each other.

34. Match List - I with List- II.

    Choose the correct answer from the options given below :

List-I (Hydrides)	**List-II (Nature)**

(a) MgH_2	(i) Electron precise
(b) GeH_4	(ii) Electron deficient
(c) B_2H_6	(iii) Electron rich
(d) HF	(iv) Ionic

A. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
B. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
C. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
D. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

Answer: (A)

Solution:

MgH_2-Ionic

GeH_4-Electron precise

B_2H_6-Electron deficient

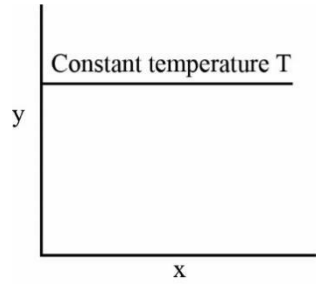
HF-Electron rich

35. Which of the following statement is not correct about diborane?
A. There are two 3-centre-2-electron bonds.
B. The four terminal B-H bonds are two centre two electron bonds.
C. The four terminal Hydrogen atoms and the two Boron atoms lie in one plane.
D. Both the Boron atoms are sp^2 hybridised.

Answer: (D)

Solution: Each boron atom in diborane is sp^3 hybridised

36. The given graph is a representation of kinetics of a reaction.



The y and x axes for zero and first order reactions, respectively are

A. zero order (y = concentration and x = time), first order (y = $t_{1/2}$, and x = concentration)
B. zero order (y = concentration and x = time), first order (y = rate constant and x = concentration)
C. zero order (y = rate and x = concentration), first order (y = $t_{1/2}$ and x = concentration)
D. zero order (y = rate and x = concentration), first order (y = rate and x = $t_{1/2}$)

Answer: (C)

Solution: Zero order = Rate is independent of concentration.
First order = Half life is independent of concentration.

37. **Question 86:** Match List-I with List-II.

List-I (Ores)	**List-II (Composition)**
(a) Haematite	(i) Fe_3O_4
(b) Magnetite	(ii) $ZnCO_3$
(c) Calamine	(iii) Fe_2O_3
(d) Kaolinite	(iv) $[Al_2(OH)_4Si_2O_5]$

Choose the correct answer from the options given below :

A. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
B. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

C. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
D. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
Answer: (B)
Solution:
Fe_3O_4 ⇒ Magnetite
$ZnCO_3$ ⇒ Calamine
Fe_2O_3 ⇒ Haematite
$[Al_2(OH)_4Si_2O_5]$ ⇒ Kaolinite

38. A 10.0 L flask contains 64 g of oxygen at 27°C. (Assume O_2 gas is behaving ideally). The pressure inside the flask in bar is (Given R = 0.0831 L bar K^{-1} mol^{-1})
    A. 2.5
    B. 498.6
    C. 49.8
    D. 4.9

Answer: (D)
Solution: PV = nRT

$P = \frac{2 \times 0.0831 \times 298}{10}$ = 4.95bar

39. For a first order reaction A → Products, initial concentration of A is 0.1 M, which becomes 0.001M after 5 minutes. Rate constant for the reaction in min^{-1} is
    A. 1.3818
    B. 0.9212
    C. 0.4606
    D. 0.2303

Answer: (B)
Solution:

$$K = \frac{2.303}{t}\log\left(\frac{[A_0]}{[A]}\right)$$
$$= \frac{2.303}{t}\log\left(\frac{0.1}{0.001}\right)$$
$$= \frac{2.303}{5}\log 10^2 = 0.9212$$

40. The order of energy absorbed which is responsible for the color of complexes

$Ni(H_2O)_2(en)_2]^{2+}$

$[Ni(H_2O)_4(en)]^{2+}$

$[Ni(en)_3]^{2+}$

A. A > B > C (
B. C > B > A
C. C > A > B
D. B > A > C

Answer: (3)

Solution: Higher the no. of strong field ligand, more is the Δ_o, more will be the energy absorbed by electrons, that further impart colour while jumping to lower energy orbitals.

41. $3O_2$ (g) ⇌ $2O_3$(g) for the above reaction at 298 K, K_c is found to be 3.0×10^{-59}. If the conc. of O_2 at equilibrium is 0.040 M then concentration of O_3 in M is.

A. 4.38×10^{-32}
B. 1.9×10^{-63}
C. 2.4×10^{31}
D. 1.2×10^{21}

Answer: (2)

Solution:

$K_c = 3.0 \times 10^{-59}$

$K_c = \frac{[O_3]^2}{[O_2]^3}$ Let concentration of $O_3 = x$

$3.0 \times 10^{-59} = \frac{x^2}{(0.04)^3}$

On solving

$x = 4.38 \times 10^{-32}$

42. Find the emf of the cell

Ni(s) + 2 Ag^+ (0.001 M) → Ni^{2+} (0.001 M) + 2Ag(s)

(Given that E^ocell = 1.05 V, 2.303RT/F = 0.059 at 298 K)

A. 1.0385 V

B. 1.385 V

C. 0.9615 V

D. 1.05 V

Answer: (C)

Solution:

$Ni(s) + 2Ag^+ \rightarrow Ni^{2+} + 2Ag$

Anode: $Ni \rightarrow Ni^{2+} + 2e^-$

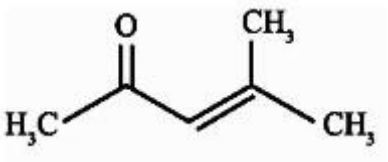
Cathode: $2Ag^+ + 2e^- \rightarrow 2Ag$

$$E_{cell} = E^o_{cell} - \frac{0.059}{n} \log \frac{[Ni^{2+}]}{[Ag^+]^2}$$

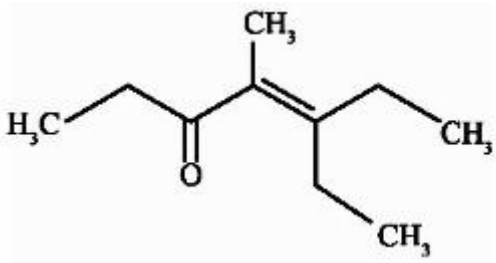
$$= 1.05 - \frac{0.059}{2} \log \frac{(0.001)}{(0.001)^2} = 0.9615\,V$$

43. Which one of the following is not formed when acetone reacts with 2- pentanone in the presence of dilute NaOH followed by heating?

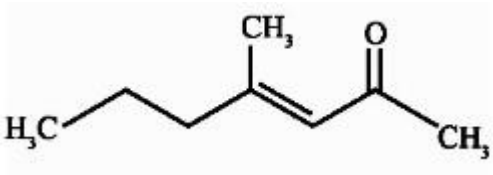
(A)



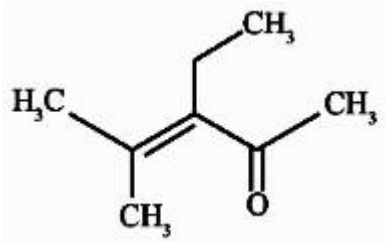
B)



(C)

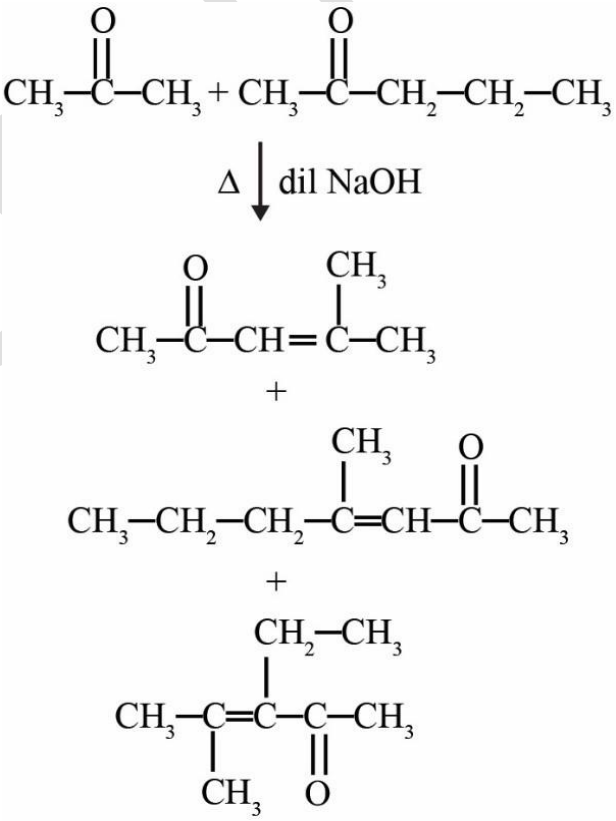


(D)

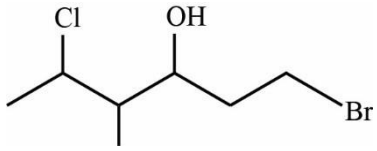


Answer: (B)

Solution:

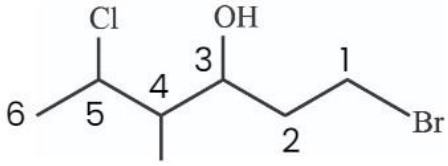


44. The correct IUPAC name of the following compound is



A. 1 - bromo - 5 - chloro - 4 - methyl hexan - 3- ol
B. 6 - bromo - 2 - chloro - 4 - methyl hexan - 4- ol
C. 1 - bromo - 4 - chloro - 5 - chloro hexan - 3- ol
D. 6 - bromo - 4 - chloro - 4 - chloro hexan - 4- ol

Answer: (A) **Solution:**



45. If radius of second Bohr orbit of the He^{+} ion is 105.8pm, What is the radius of third Bohr Orbit of Li^{2+} ion ?

A. 158.7 pm
B. 15.87 pm
C. 1.587 pm
D. 158.7 Å

Answer: (1)

Solution:

$$r \propto \frac{n^2}{Z} \Rightarrow \frac{r_1}{r_2} = \frac{n_1^2}{n_2^2} \times \frac{Z_2}{Z_1}$$

$$\Rightarrow \frac{105.8}{Li^{+2}} = \frac{4}{9} \times \frac{3}{2}$$

$$r_{Li^{+2}} = \frac{3 \times 105.8}{2} = 158.7\,pm$$