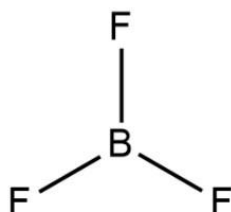# NEET 2021

Chemistry

1. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are
   A. Sp^2 and 6
   B. Sp^2 and 8
   C. Sp^3 and 4
   D. Sp^3 and 6
   Answer: (a)
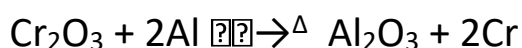   **Solution:**

   Hybridisation - sp^2
   Number of electrons around the central atom = 6

2. Which of the following reactions is the metal displacement reaction? Choose the right option.
   A. $Fe + 2HCl \longrightarrow FeCl_2 + H_2\uparrow$
   B. $2Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2\uparrow$
   C. $2KClO_3 \rightarrow 2KCl + 3O_2$
   D. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

   Answer: (d)

   Solution: Metal displacement reactions are the ones in which more reactive metal displaces a less reactive metal from its compound. Thus, out of the given reactions, the metal displacement reaction is:
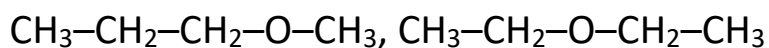 $Cr_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Cr$

3. The compound which shows metamerism is
   A. C_3H_6O
   B. $C_4H_{10}O$
   C. C_5H_{12}
   D. C_3H_8O

   Answer: (b)

   Solution: Metamers are the isomers having the same molecular formula but different alkyl groups on two sides of functional groups.
   $CH_3–CH_2–CH_2–O–CH_3$, $CH_3–CH_2–O–CH_2–CH_3$

4. The pK_b of dimethylamine and pK_a of acetic acid are 3.27 and 4.77 respectively at T(K). The correct option for the pH of dimethyl ammonium acetate solution is:
   A. 7.75
   B. 6.25
   C. 8.50
   D. 5.50

   Answer: (a)

   Solution: The given salt is a salt of weak acid + weak base.
   pH = 0.5 [pK_w + pK_a – pK_b] pH = 0.5 [14 + 4.77 – 3.27]
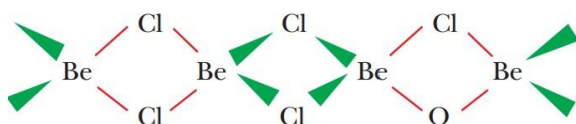   pH = 0.5 [15.5]
   pH = 7.75

5. The structure of beryllium chloride in solid state and vapour phase, are:
   A. Dimer and Linear, respectively
   B. Chain in both
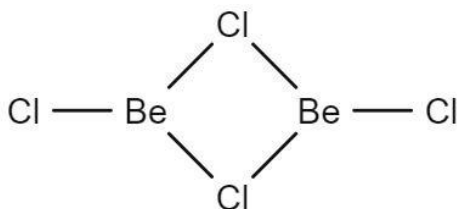   C. Chain and dimer, respectively
   D. Linear in both

   Answer: (c)

   Solution:

In solid state:

In vapour phase:

6. Zr (Z = 40) and Hf (Z = 72) have similar atomic and ionic radii because of:
   A. lanthanoid contraction
   B. having similar chemical properties
   C. Belonging to same group
   D. diagonal relationship

   Answer: (a)

   Solution: Due to presence of 4f electrons in Hf it's Z_{eff} increases, size remains the same. This is also known as lanthanoid contraction.

7. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 KHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is: [Speed of light, $c = 3 \times 10^8$ ms^{-1}]

   A. 2192 m
   B. 21.92 cm
   C. 219.3 m
   D. 219.2 m

   Answer: (c)

   Solution:
   Wavelength = speed of light / Frequency

Wavelength = $3 \times 10^8 / 1368 \times 10^3$

Wavelength = 219.298 m ≈ 219.3 m

8. An organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. Of C is 12, H is 1]

A. CH_3

B. CH_4

C. CH

D. CH_2

Answer: (a)

Solution:

Element	Percentage	Moles	Relative
C	78	6.5	1
H	22	22	3.38

Thus, empirical formula is CH_3.

9. Ethylenediaminetetraacetate (EDTA) ion is

A. Bidentate ligand with two "N" donor atoms

B. Tridentate ligand with three "N" donor atoms.

C. Hexadentate ligand with four "O" and two "N" donor atoms

D. Unidentate ligand

Answer: (c)

Solution: Ethylenediaminetetraacetate ion ($EDTA^{4-}$) is an important hexadentate ligand. It can bind through two nitrogen and four oxygen atoms to a central metal ion.
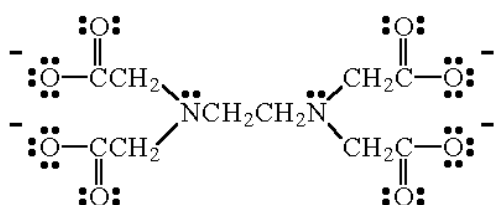
10. Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is:

A. Magnesium chloride

B. Beryllium chloride

C. Calcium chloride

D. Strontium chloride

Answer: (b)

Solution: Beryllium halides are essentially covalent and soluble in organic solvents.

11. The right option for the statement "Tyndall effect is exhibited by" is:

A. Starch solution

B. Urea Solution

C. NaCl solution

D. Glucose Solution

Answer: (a)

Solution: Starch is a colloid.

12. The molar conductance of NaCl. HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91.0 S cm^2 mol^{-1} respectively. The molar conductance of CH_3COOH at infinite dilution is.

Choose the right option for your answer.

A. 698.28 S cm^2 mol^{-1}

B. 540.48 S cm^2 mol^{-1}

C. 201.28 S cm^2 mol^{-1}

D. 390.71 S cm^2 mol^{-1}

Answer: (d)

Solution:

$\lambda^\infty(CH_3COOH) = \lambda^\infty(CH_3COONa) + \lambda^\infty(HCl) - \lambda^\infty(NaCl)$

= (91 + 426.16 - 126.45) S cm^2 mol^{-1}

= 390.71 S cm^2 mol^{-1}

13. The correct structure of 2,6-Dimethyl-dec-4-ene **Options:**
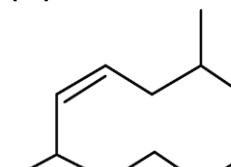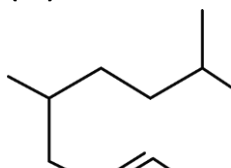
(A)
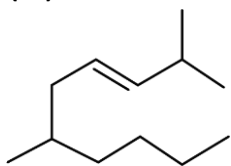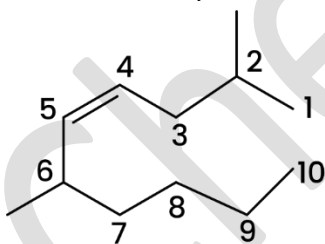

(B)
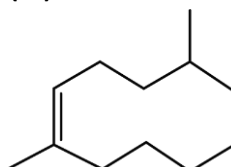
(C)

(D)

Answer: (c)

Solution: 2,6-Dimethyl-dec-4-ene

14. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is:

A. 2

B. 3

C. 7

D. 5

Answer: (b)

Solution:

Body centred unit cells are possible in Cubic, Tetragonal and Orthorhombic crystal system.

15. Which one of the following polymers is Prepared by addition polymerisation?
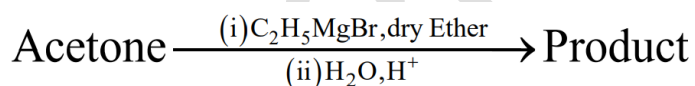   A. Novolac
    B. Dacron
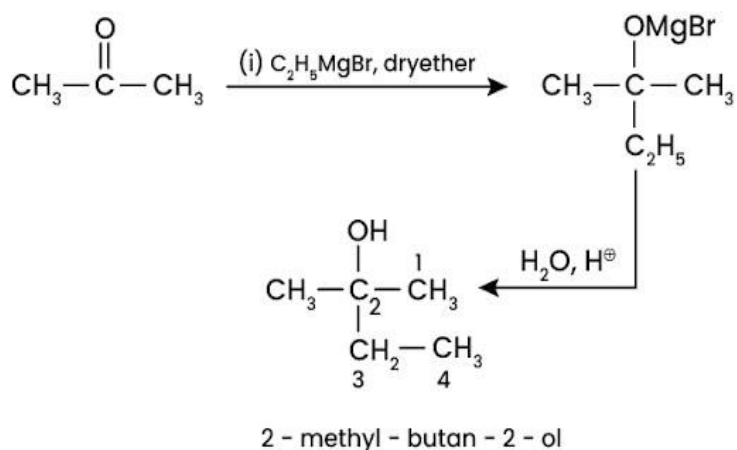   C. Teflon
    D. Nylon-66

Answer: (C)
Solution:

Tetra fluoroethylene

16. What is the IUPAC name of the organic compound formed in the following chemical reaction?

$$\text{Acetone} \xrightarrow[\text{(ii)}H_2O, H^+]{\text{(i)}C_2H_5MgBr, \text{dry Ether}} \text{Product}$$

    A. pentan-3-ol
    B. 2-methyl butan-2-ol
    C. 2-methylpropan-2-ol
    D. pentan-2-ol
Answer: (B)
Solution:

2 - methyl - butan - 2 - ol

17. Match List-I with List-II

List-I	List-II
(a) PCl_5	(i) Square pyramidal
(b) SF_6	(ii) Trigonal planar
(c) BrF_5	(iii) Octahedral
(d) BF_3	(iv) Trigonal bipyramidal

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

Answer: (C)

Solution:
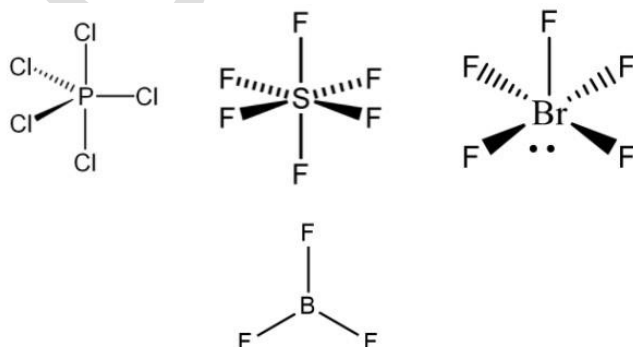
18. The incorrect statement among the following is:

A. Lanthanoids are good conductors of heat and electricity
B. Actinoids are highly reactive metals, especially when finely divided.
C. Actinoid contraction is greater for element to element than Lanthanoid contraction
D. Most of the trivalent Lanthanoid ions are colorless in the solid state.

Answer:

Solution:

Many trivalent lanthanoid ions are coloured both in the solid state and in aqueous solutions.

Colour of these ions may be attributed to the presence of f-electrons.

19. Dihedral angle of least stable conformer of ethane is
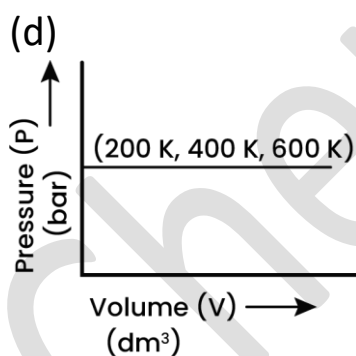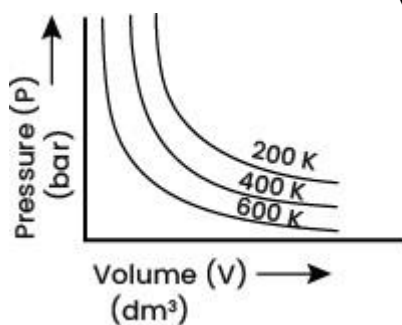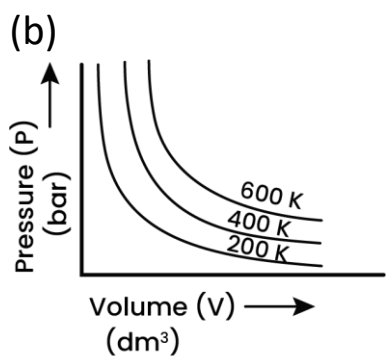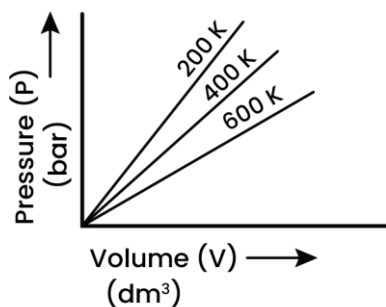   A. 60°
   B. 0°
   C. 120°
   D. 180°

Answer: (B)

Solution:

In this position, the dihedral angle (also called the angle of rotation or the angle of torsion or torsional angle) is zero degree.

20. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. Volume of a gas at different temperature.
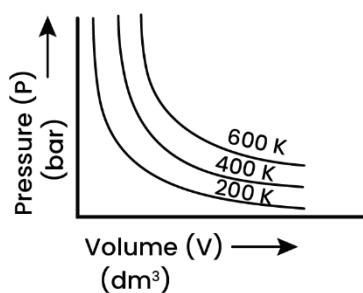   (a)

(b)

(c)

(d)

Answer: (B)

Solution:

The pressure varies with volume at constant temperature as P = K/V. Thus, the graph should be hyperbolic. Also, on increasing the temperature at constant volume, the pressure should increase. Thus, the correct graph is (B).

21. The correct sequence of bond enthalpy of 'C-X' bond is
    A. $CH_3–F < CH_3 – Cl > CH_3 – Br > CH_3 – I$
    B. $CH_3 – Cl > CH_3–F > CH_3 – Br > CH_3 – I$
    C. $CH_3–F < CH_3 – Cl < CH_3 – Br < CH_3 – I$
    D. $CH_3–F > CH_3 – Cl > CH_3 – Br > CH_3 – I$

    Answer: (d)
    Solution:

    Due to high bond length C-I has less bond strength and has less bond dissociation enthalpy.
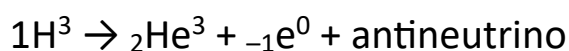
    Because of short bond length C-F has high bond dissociation enthalpy so that increasing order of bond dissociation enthalpies

22. Tritium, a radioactive isotope of hydrogen, emits which of the following particles?
    A. Gamma (γ)
    B. Neutron (n)
    C. Beta (β^-)
    D. Alpha (α)

    Answer: (C)
    Solution: Tritium, a radioactive isotope of hydrogen, emits beta(β^-) particles.
    $1H^3 \rightarrow {}_2He^3 + {}_{-1}e^0 + $ antineutrino

23. Statement I: Acid strength increases in the order given as
    $HF << HCl << HBr << HI$.

Statement II: As the size of the elements F, Cl, Br, I increases down the group, the bond strength of HF, HCl, HBr and HI decreases and so the acid strength increases.

   A. Statement I is correct but Statement II is false.

   B. Statement I is incorrect but Statement II is true.

   C. Both Statement I and Statement II are true

   D. Both Statement I and Statement II are false.

Answer: (C)

Solution:

The acidic strength of these acids varies in the order:

HF < HCl < HBr < HI. The stability of these halides decreases down the group due to decrease in bond (H–X) dissociation enthalpy in the order: H–F > H–Cl > H–Br > H–I.

24. Given below are two statements:

Statement I: Aspirin and Paracetamol belong to the class of narcotic analgesics.

Statement II: Morphine and Heroin are non-narcotic analgesics. In the light of the above statements, choose the correct answer from the options given below.

   A. Statement I is correct but Statement II is false

   B. Statement I is incorrect but Statement II is true

   C. Both Statement I and Statement II are true

   D. Both Statement I and Statement II are false

Answer: (D)

Solution:

Aspirin and Paracetamol belong to the class of non narcotic analgesics. Morphine and Heroin are narcotic analgesics.

25. Which one among the following is the correct option for right relationship between C_P and C_V for one mole of ideal gas?

A. $C_P = RC_V$

B. $C_V = RC_P$

C. $C_P + C_V = R$

D. $C_P - C_V = R$

Answer: (D)

Solution: $C_p = C_v + R$

26. The maximum temperature that can be achieved in blast furnace is:

   A. Upto 1900 K

   B. Upto 5000 K

   C. Upto 1200 K

   D. Upto 2200 K
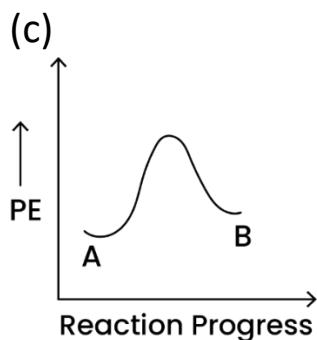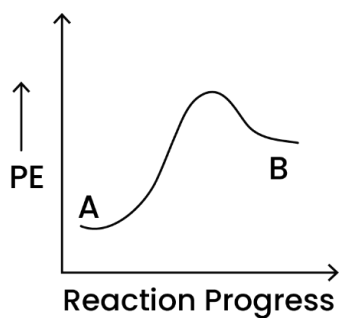
   Answer: (d)

   Solution:

   In the Blast furnace, reduction of iron oxides takes place in different temperature ranges. Hot air is blown from the bottom of the furnace and coke is burnt to give temperature upto about 2200K in the lower portion itself

27. For a reaction A → B, enthalpy of reaction is −4.2 kJ mol⁻¹ and enthalpy of activation is 9.6 kJ mol⁻¹. The correct potential energy profile for the reaction is shown in option.
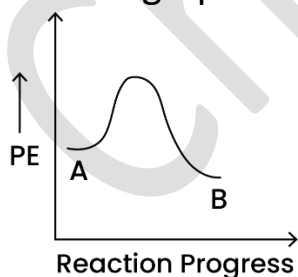
   (a)

   (b)

(c)

(d)
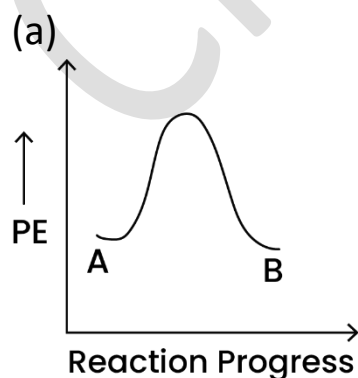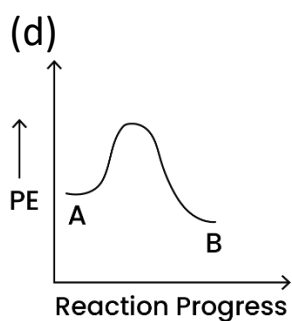
Answer: (D)

Solution:

Since the enthalpy of reaction is negative, it means product has lesser potential energy than the reactant. Thus, the correct graph would be (D)

28. Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?

    A. Distillation

    B. Zone refining

    C. Electrolysis

D. Chromatography

Answer: (A)

Solution:

Distillation:

This is very useful for low boiling metals like zinc and mercury. The impure metal is evaporated to obtain the pure metal as distillate.

29. The RBC deficiency is deficiency disease of
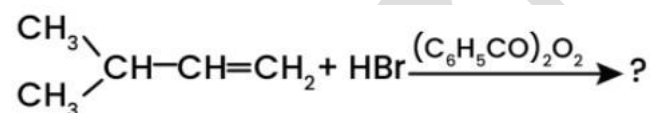   A. Vitamin B_1
    B. Vitamin B_2
    C. Vitamin B_{12}
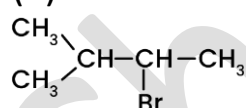   D. Vitamin B_6

Answer: (c)

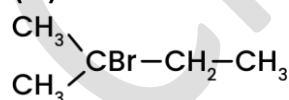**Solution:** Vitamin B_{12} : Deficiency disease - Pernicious anaemia (RBC deficient in haemoglobin)

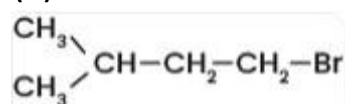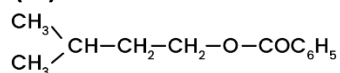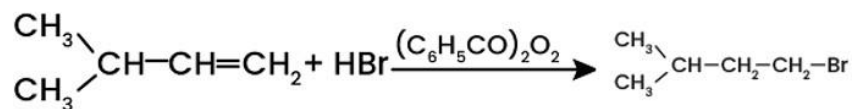30. The major product of the following chemical reaction is:

$$\underset{CH_3}{\overset{CH_3}{>}}CH-CH=CH_2 + HBr \xrightarrow{(C_6H_5CO)_2O_2} ?$$

(a)

$$\underset{CH_3}{\overset{CH_3}{>}}CH-\underset{\underset{Br}{|}}{CH}-CH_3$$

(b)

$$\underset{CH_3}{\overset{CH_3}{>}}CBr-CH_2-CH_3$$

(c)

$$\underset{CH_3}{\overset{CH_3}{>}}CH-CH_2-CH_2-Br$$

(d)

$$\underset{CH_3}{\overset{CH_3}{>}}CH-CH_2-CH_2-O-COC_6H_5$$

Answer: (c)

Solution:

In the presence of peroxide anti markovnikov addition of HBr take place.

$$CH_3\text{--}CH\text{--}CH=CH_2 + HBr \xrightarrow{(C_6H_5CO)_2O_2} CH_3\text{--}CH\text{--}CH_2\text{--}CH_2\text{--}Br$$

31. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are

    A. 2, 1
    B. 12, 6
    C. 8, 4
    D. 6, 12

    Answer: (b)

    Solution:

    HCP has effectively 6 atoms per unit cell. Now, Number of tetrahedral voids = 2n = 12

    Number of octahedral voids = n = 6

32. Noble gases are named because of their inertness towards reactivity. Identify an incorrect statement about them.

    A. Noble gases have weak dispersion forces
    B. Noble gases have large positive values of electron gain enthalpy
    C. Noble gases are sparingly soluble in water
    D. Noble gases have very high melting and boiling points

    Answer: (D)

    Solution: They have very low melting and boiling points because the only type of interatomic interaction in these elements is weak dispersion forces.

33. The major product formed in dehydrohalogenation reaction of 2-Bromopentane is pent2-ene. This product formation is based on?
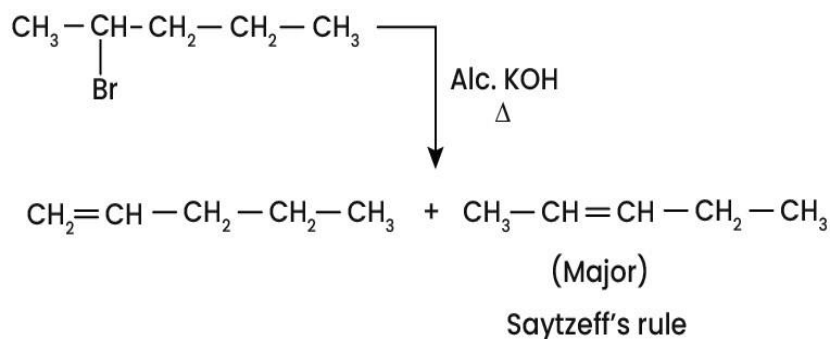
    A. Hofmann Rule
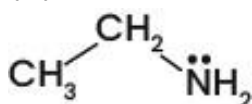   B. Huckel's Rule

C. Saytzeff's Rule

D. Hund's Rule

Answer: (c)

Solution:

$$CH_3 - CH - CH_2 - CH_2 - CH_3$$

Br

Alc. KOH
Δ

$$CH_2 = CH - CH_2 - CH_2 - CH_3 \quad + \quad CH_3 - CH = CH - CH_2 - CH_3$$
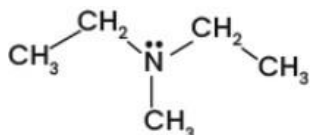
(Major)

Saytzeff's rule

34. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali.

(a)

CH₂

CH₃   NH₂

(b)

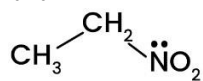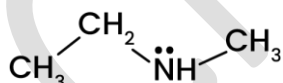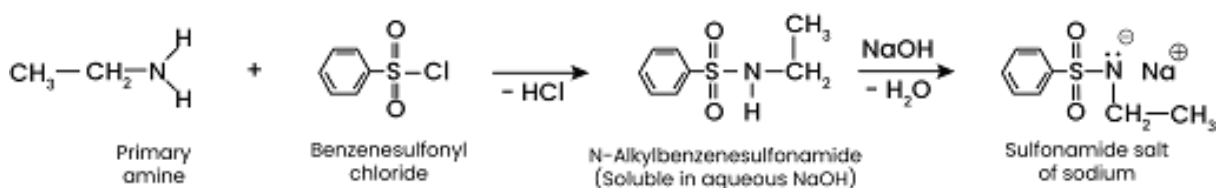CH₂   CH₂

CH₃   N   CH₃

CH₃

(c)

CH₂

CH₃   NO₂

(d)

CH₂   CH₃

CH₃   NH

Answer: (a)

Solution:

Primary amine on reaction with Hinsberg's reagent give a solid which dissolves in alkali.

$$CH_3 - CH_2 - N\overset{H}{\underset{H}{}} \quad + \quad \text{(Benzenesulfonyl chloride)} \xrightarrow{- HCl} \text{(N-Alkylbenzenesulfonamide)} \xrightarrow[- H_2O]{NaOH} \text{(Sulfonamide salt of sodium)}$$

Primary amine   Benzenesulfonyl chloride   N-Alkylbenzenesulfonamide (Soluble in aqueous NaOH)   Sulfonamide salt of sodium

35. The following solutions were prepared by dissolving 10 g glucose ($C_6H_{12}O_6$) in 250 ml of water (P_1) 10 g of urea (CH_4N_2O) in 250 ml of water (P_2) and 10 g of sucrose ($C_{12}H_{12}O_{11}$) in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is.
    A. $P_2 > P_3 > P_1$
    B. $P_3 > P_1 > P_2$
    C. $P_2 > P_1 > P_3$
    D. $P_1 > P_2 > P_3$

Answer: (c)

Solution: $\Pi = wRT/MV$

Here, all the given solutions have the same volume and mass of solute. Thus, the osmotic pressure will decrease with increase in molar mass of solute.

Thus, the order should be: $P_2 > P_1 > P_3$

36.   Match List - I with List – II

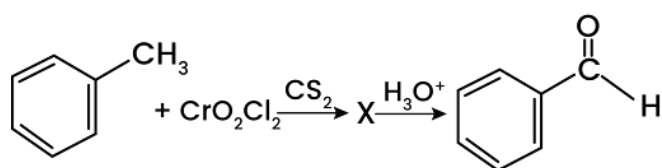| List – I	List - II
(a) $2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$	(i) Acid rain
(b) $HOCl(g) \xrightarrow{hv} \dot{O}H + \dot{C}l$	(ii) Smog
(c) $CaCO_3 + H_2SO_4 \longrightarrow CaSO_4 + H_2O + CO_2$	(iii) Ozone depletion
(d) $NO_2(g) \xrightarrow{hv} NO(g) + O(g)$	(iv) Tropospheric pollution

Choose the correct answer from the options given below:

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

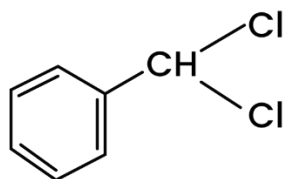**Answer:** (a)

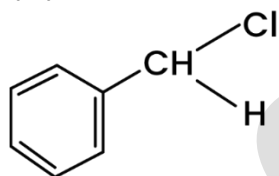**Solution:** (c) represents effect of acid rain on marble.

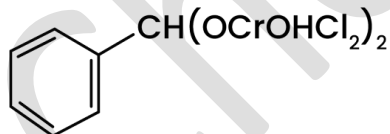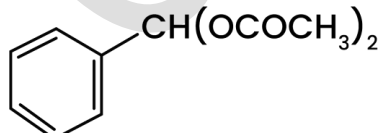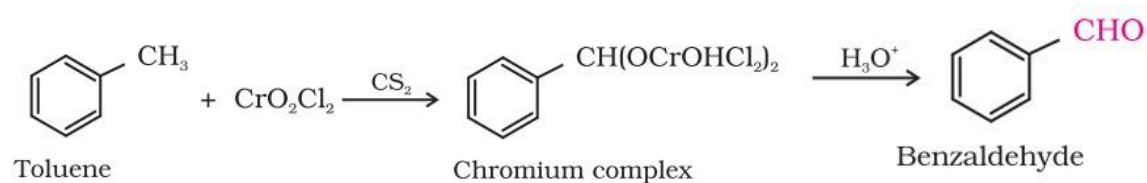37. The intermediate compound "X" in the following chemical reaction is


(a)

(b)

(c)

$CH(OCrOHCl_2)_2$

(d)

$CH(OCOCH_3)_2$

Answer: (c)

Solution:

Toluene   Chromium complex   Benzaldehyde

38. Match List - I with List - II

List - I	List - II
(a) ⬡ $\xrightarrow[\text{Anhy.AlCl}_2/\text{CuCl}]{\text{CO,HCl}}$ CO, HCl Anhy. AlCl₃/CuCl	(i) Hell-Volhard-Zelinsky reaction
(b) $R-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3 + NaOX \rightarrow$	(ii) Gattermann-Koch

|	
(c) R - CH₂-OH + R'COOH $\xrightarrow{\text{Conc.H}_2\text{SO}_4}$	(iii) Haloform reaction
(d) R - CH₂COOH $\xrightarrow[\text{(ii)H}_2\text{O}]{\text{(i)X}_2/\text{Red P}}$	(iv) Esterification

Choose the correct answer form the options given below.

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

Answer: (B)

Solution:

(ii) Gattermann-Koch reaction

(b)

$$R-\overset{O}{\overset{\|}{C}}-CH_3 + \xrightarrow{NaOX} R-\overset{O}{\overset{\|}{C}}-\overset{\ominus}{O} + CHX_3$$

(iii) Haloform reaction

(C)

$$R-CH_2-OH + R'COOH \xrightarrow{Conc.\ H_2SO_4} R-CH_2-O-\overset{O}{\underset{\|}{C}}-R' + H_2O$$

(iv) Esterification

(d)

$$R-CH_2COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2/\text{Red P}} R-\underset{X}{\overset{|}{C}}H-COOH$$
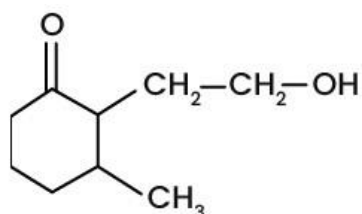
(i) Hell-Volhard- Zelinsky reaction
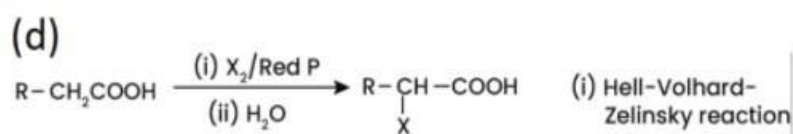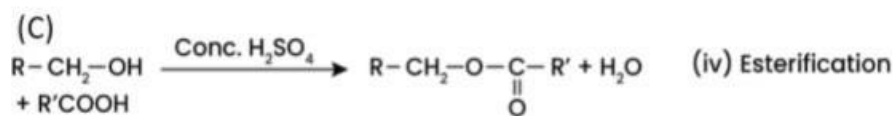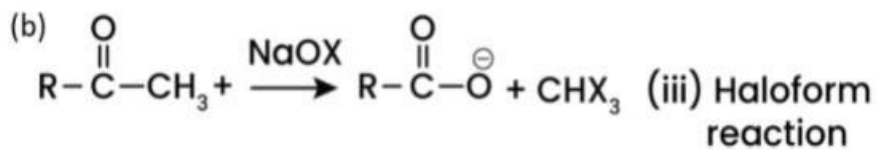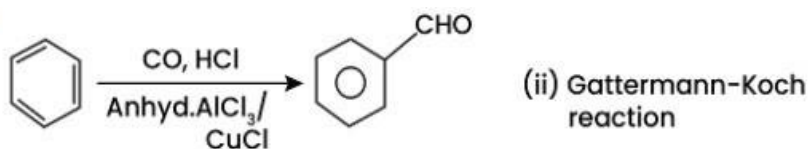
39. The product formed in the following chemical reaction is
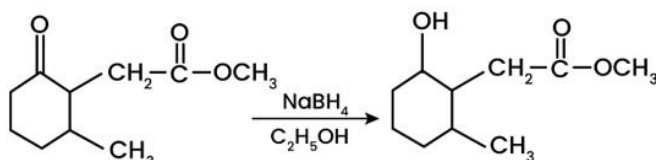

(a)

(b)

(c)

(d)
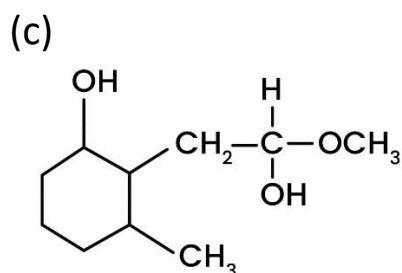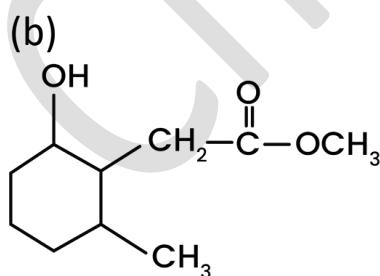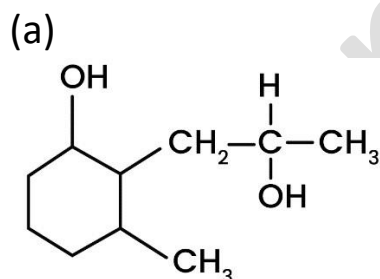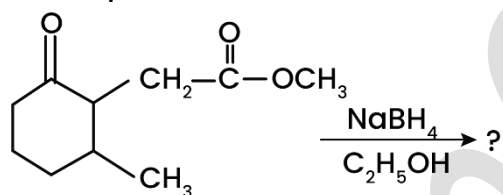
Answer: (b)

Solution:

40. Choose the correct option for the total pressure (in atm.) in a mixture of 4 g O_2 and 2 g H_2 confined in a total volume of one litre at 0° C is:

    A. 25.18

    B. 26.02

    C. 2.518

    D. 2.602

Answer: (A)

Solution: Moles of O_2 = 4/32 = 0.125

Moles of H_2 = 2/2 = 1

Total moles = 1.125 Now, PV = nRT

P = 1.125 × 0.082 × 273 = 25.18 atm

41. The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in molar ratio 3 : 2 is: [At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]

    A. 336 mm of Hg

    B. 350 mm of Hg

    C. 160 mm of Hg

    D. 168 mm of Hg

Answer: (A)

Solution:

Let benzene is B and octane is O

$X_B = 3/5 = 0.6$

$X_O = 2/5 = 0.4$

Now, $PT = P_B^0 X_B + P_O^0 X_O = 0.6(280)+0.4(420) = 336$ mm Hg

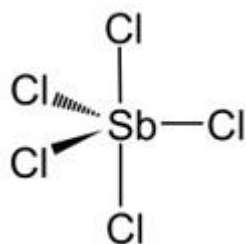42. Which of the following molecules is non-polar in nature?
    A. $SbCl_5$
    B. NO_2
    C. $POCl_3$
    D. CH_2O

Answer: (A)

Solution:

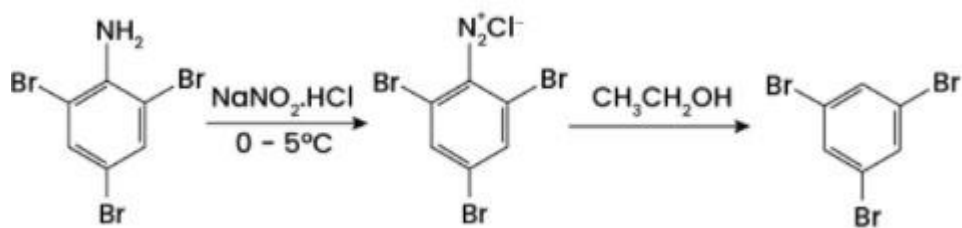43. The reagent 'R' in the given sequence of chemical reaction is:

    A. HI
    B. CuCN/KCN
    C. H_2O
    D. CH_3CH_2OH

   Answer: (d)

   Solution:

44. Match List - I with List - II.

List – I	List – II
(a) $[Fe(CN)_6]^{3-}$	(i) 5.92 BM
(b) $[Fe(H_2O)_6]^{3+}$	(ii) 0 BM
(c) $[Fe(CN)_6]^{4-}$	(iii) 4.90 BM
(d) $[Fe(H_2O)_6]^{2+}$	(iv) 1.73 BM

Choose the correct answer from the options given below.
A. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
B. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
C. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
D. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

Answer: (b)

Solution:

$[Fe(CN)_6]^{4-}$: Fe^{2+} = [Ar] $3d^6$

In the presence of strong field CN^- ligand, electrons will be paired and magnetic moment = 0 B.M.

45. From the following pairs of ions which one is not an iso-electronic pair?
A. Mn^{2+}, Fe^{3+}
B. Fe^{2+}, Mn^{2+}
C. O^{2-}, F^-
D. Na^+, Mg^{2+}

Answer: (B)

Solution: Isoelectronic pairs have the same number of electrons. The number of electrons in Fe^{2+} = 24

Mn^{2+} = 23
Thus, these ions are not isoelectronic.