

Chemistry

TARGET : JEE 2013

SCORE
JEE (Advanced)
Home Assignment # 03



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PHYSICAL CHEMISTRY

Question Bank

Topic :

Thermodynamics, Thermochemistry, Redox

Only one correct ::

1. The temperature of a definite amount of an ideal monoatomic gas becomes four times in a reversible process for which heat exchange is zero. Which of the following is correct relation between the final and initial parameters of gas?

(A) $V_f = 8V_i$ (B) $P_f = 32P_i$ (C) $V_f = 16V_i$ (D) $P_f = \frac{1}{16}P_i$

2. Calculate the change in Enthalpy for one mole of Vander Waal gas going from **state-I** (1×10^5 Pa, 300K) to **state-II** (2×10^5 Pa, 600K).

Assuming “a” to be negligible and “b” as 50 ml mol^{-1} . C_p for the gas is $20 \text{ J K}^{-1} \text{ mol}^{-1}$.

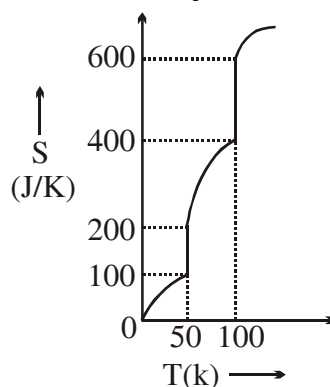
[Given: $\left(\frac{\partial H}{\partial P}\right)_T = -T\left(\frac{\partial V}{\partial T}\right)_P + V$]

(A) 6000 J (B) 11000 J (C) 1000 J (D) 6005 J

3. Three samples of the same gas A, B & C ($\gamma = 3/2$) have initially equal volume. Now the volume of each sample is doubled. The process is reversible adiabatic for A, isobaric for B & isothermal for C. If the final pressure are equal for all three samples, the ratio of their initial pressure are:

(A) $2\sqrt{2} : 1 : 2$ (B) $2\sqrt{2} : 2 : 1$ (C) $\sqrt{2} : 1 : 2$ (D) $2 : 1 : \sqrt{2}$

4. For 1 mole substance variation of absolute entropy with temperature is given by following graph. What is **molar enthalpy of vapourisation** (ΔH_{vap}).



(A) 2 kJ (B) 5 kJ (C) 20 kJ (D) 10 kJ

5. KMnO_4 reacts with oxalic acid according to the equation
 $2\text{MnO}_4^- + 5\text{C}_2\text{O}_4^{2-} + 16\text{H}^+ \longrightarrow 2\text{Mn}^{2+} + 10\text{CO}_2 + 8\text{H}_2\text{O}$
 Here, 20 mL of 0.1 M KMnO_4 is equivalent to :-
 (A) 120 mL of 0.25 M $\text{H}_2\text{C}_2\text{O}_4$ (B) 150 mL of 0.10 M $\text{H}_2\text{C}_2\text{O}_4$
 (C) 25 mL of 0.20 M $\text{H}_2\text{C}_2\text{O}_4$ (D) 50 mL of 0.20 M $\text{H}_2\text{C}_2\text{O}_4$
6. How many milli grams of $\text{Fe}_{0.9}\text{O}$ reacts completely with 10 mL 0.1 M KMnO_4 solution in acidic conditions. (Fe = 56)
 (A) 47 (B) 474 (C) 514 (D) 570

$$\text{m mole of Fe}_{0.9}\text{O required} = \left(\frac{5}{0.7}\right)$$

$$\text{mass} = \left(\frac{5}{0.7}\right) \times (0.56 \times 0.9 + 16) \text{ mg}$$

7. A solution of $\text{Na}_2\text{S}_2\text{O}_3$ is standardized iodometrically against 0.167 g of KBrO_3 where BrO_3^- changes to Br^- . This process requires 45 mL of the $\text{Na}_2\text{S}_2\text{O}_3$ solution. What is the strength of the $\text{Na}_2\text{S}_2\text{O}_3$?
[Mw. of $\text{KBrO}_3 = 167$]

(A) $\frac{2}{15}\text{N}$ (B) $\frac{2}{30}\text{N}$ (C) $\frac{1}{30}\text{N}$ (D) $\frac{1}{60}\text{N}$

8. 20 ml of a solution of H_2O_2 is diluted to 100 ml and 50 ml of this solution is titrated with 0.02 M KMnO_4 solution in acidic medium and required 50 ml. The volume strength of original H_2O_2 solution is -
 (A) 0.285 V (B) 1.12 V (C) 2.80 V (D) 2.28 V
9. The enthalpy of tetramerization of X in gas phase ($4\text{X}(\text{g}) \rightarrow \text{X}_4(\text{g})$) is -100 kJ/mol at 300 K. The enthalpy of vaporisation for liquid X and X_4 are respectively 30 kJ/mol and 72 kJ/mol respectively. ΔS for tetramerization of X in liquid phase is -125 J/K mol at 300 K.
 What is the ΔG at 300 K for tetramerization of X in liquid phase ?
 (A) -52 kJ/mol (B) -89.5 kJ/mol (C) -14.5 kJ/mol (D) None of these

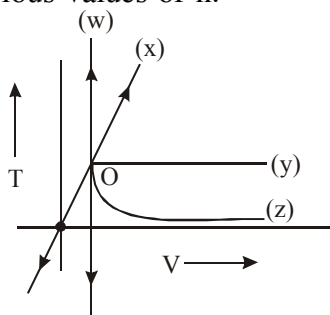
10. An insulated container of gas has two chambers separated by an insulating partition. One of the chambers has volume V_1 and contains ideal gas at pressure P_1 and temperature T_1 . The other chamber has volume V_2 and contains same ideal gas at pressure P_2 and temperature T_2 . If the partition is removed without doing any work on the gas, the final equilibrium temperature of the gas in the container will be :-

(A) $\frac{T_1 T_2 (P_1 V_1 + P_2 V_2)}{P_1 V_1 T_2 + P_2 V_2 T_1}$ (B) $\frac{P_1 V_1 T_1 + P_2 V_2 T_2}{P_1 V_1 + P_2 V_2}$ (C) $\frac{P_1 V_1 T_2 + P_2 V_2 T_1}{P_1 V_1 + P_2 V_2}$ (D) $\frac{T_1 T_2 (P_1 V_1 + P_2 V_2)}{P_1 V_1 T_1 + P_2 V_2 T_2}$

One or more than may be correct ::

11. Choose the **incorrect** statement(s)-
- (A) 1 mole of MnO_4^- ion can oxidized 10 moles of Fe^{2+} ion in acidic medium
 (B) 1 mole of $\text{Cr}_2\text{O}_7^{2-}$ ion can oxidized 12 moles of Fe^{2+} ion in acidic medium
 (C) 2 mole of Cu_2S can be oxidized by 2.6 moles of MnO_4^- ion in acidic medium ($\text{Cu}_2\text{S} \rightarrow \text{Cu}^{2+} + \text{SO}_2$)
 (D) 2 mole of Cu_2S can be oxidized by 2.66 moles of $\text{Cr}_2\text{O}_7^{2-}$ ion in acidic medium ($\text{Cu}_2\text{S} \rightarrow \text{Cu}^{2+} + \text{SO}_2$)
12. A solution of $\text{Na}_2\text{S}_2\text{O}_3$ is standardized iodometrically against 0.1262 g of KBrO_3 where BrO_3^- changes to Br^- . This process requires 45 mL of the $\text{Na}_2\text{S}_2\text{O}_3$ solution. What is the strength of the $\text{Na}_2\text{S}_2\text{O}_3$? [Mw. of $\text{KBrO}_3 = 167$]
- (A) 0.2 M (B) 0.1 M (C) 0.05 N (D) 0.1 N
13. Select the correct options(s):
- (A) $\Delta H_f^\circ [\text{H}_2\text{O}(l)]$ is zero at 25°C
 (B) $\Delta S_f^\circ [\text{O}_2(\text{g})]$ is zero at 25°C
 (C) $S^\circ [\text{O}_2(\text{g})]$ is zero at 25°C
 (D) Entropies of aqueous ions can be negative or positive
14. Select the correct statement(s).
- (A) In a reversible process ΔG is always zero in a closed system.
 (B) In a reversible process ΔS_{univ} is always zero in a closed system.
 (C) In a reversible process ΔS_{sys} is always zero in a closed system.
 (D) In a reversible process ΔS_{sys} is always zero in an isolated system.
15. Select the correct option(s):
- (A) $q = nC_v dT$ is applicable to all substances during heating/cooling at constant 'v'.
 (B) $q = nC_v dT$ is applicable to ideal gas during heating/cooling at constant 'v' only.
 (C) $dU = nC_v dT$ is applicable for real gas at constant 'v'
 (D) $dU = nC_v dT$ is applicable for ideal gas at constant 'v' only
16. For the process: $\text{H}_2\text{O} (l, \text{TK}, \text{P bar}) \rightarrow \text{H}_2\text{O} (\text{g}, \text{TK}, \text{P bar})$
- (A) $\Delta G = 0$, If $P = \text{vapour pressure of } \text{H}_2\text{O}(l) \text{ at TK}$
 (B) $\Delta G = +ve$, If $P = \text{vapour pressure of } \text{H}_2\text{O}(l) \text{ at a temperature above TK}$
 (C) $\Delta G = +ve$; If $P > \text{vapour pressure of } \text{H}_2\text{O}(l) \text{ at TK}$
 (D) $\Delta G = -ve$; If $P < \text{vapour pressure of } \text{H}_2\text{O}(l) \text{ at TK}$

21. For a polytropic process given by $PV^n = \text{constant}$, choose the correct statements. The TV graph of the process is shown, for various values of n .



- (A) for $n = \infty$, the curve may be 'oz' (B) for $n = \infty$, the curve may be 'ow'
(C) for $n = 1$, the curve may be 'oy' (D) for $n = 0$, the curve may be 'ox'

Paragraph ::

Paragraph for Question 22 to 24

Formation of $AB_2(s)$ is highly endothermic and energetically unfavourable from the following data –

Heat of sublimation of A	=	109 kJ/mol
1 st IE of A	=	494 kJ/mol
1 st IE of A^+	=	4563 kJ/mol
Bond energy of B_2	=	242 kJ/mol
Electron gain enthalpy of B	=	– 347 kJ/mol
Lattice energy of AB_2	=	2560 kJ/mol
Enthalpy of hydration of $A_{(g)}^{+2}$	=	– 2000 kJ/mol
Enthalpy of hydration of $B_{(g)}^-$	=	– 1000 kJ/mol
Lattice energy of AB	=	– 1500 kJ/mol
Enthalpy of hydration of $A_{(g)}^+$	=	– 1000 kJ/mol

Using Born-Haber cycle calculate –

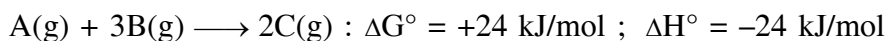
[Consider existence A to be solid and B as $B_2(g)$ naturally.]

22. Enthalpy of formation of AB_2 is –
(A) 2154 (B) 7274 (C) 4714 (D) None of these
23. Enthalpy of solution of AB_2 is –
(A) – 2440 (B) – 6560 (C) – 440 (D) – 1440
24. Which is correct statement –
(A) AB_2 is more soluble
(B) AB is more soluble
(C) Enthalpy of formation of $AB(s)$ is – 1123 kJ/mol
(D) None of these

Paragraph for Question 25 to 27

The reactions whose ΔG° are positive can not take place under standard state conditions. However another reaction whose ΔG° is negative can be coupled with the former type of reaction to give overall spontaneous process.

Consider the given reactions whose ΔG° at 300 K are provided to answer following questions.



All data at 300 K temperature.

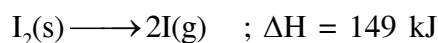
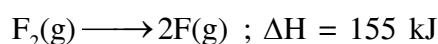
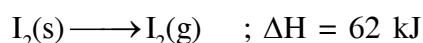
25. What is ΔS° at 300 K of reaction (in J/Kmole) :
- $$3A(g) + 9B(g) \longrightarrow 4D(g)$$
- (A) -640 (B) -480 (C) +640 (D) -240
26. Assuming ΔH° and ΔS° do not vary with temperature - at what temperature reaction $A(g) + 3B(g) \longrightarrow 2C(g)$ become spontaneous-
- (A) 6250 K (B) 625 K (C) 150 K (D) 1000 K
27. To convert 3 mole of A into C at 300 K under standard condition the mole of D which needs to forms is :-
- (A) $\frac{10}{3}$ (B) 2.4 (C) $\frac{5}{3}$ (D) none of these

Match the column ::

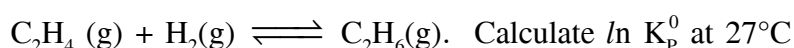
- | 28. | Column-I | Column-II |
|-----|---------------------------------------------------|--------------------|
| (A) | Isothermal vaporisation of water at 100°C & 1 atm | (P) $\Delta T = 0$ |
| (B) | Isothermal reversible expansion of an ideal gas | (Q) $\Delta E = 0$ |
| (C) | Adiabatic free expansion of ideal gas | (R) $\Delta H = 0$ |
| | | (S) $q = 0$ |

Integer ::

29. The standard molar enthalpies of formation of $\text{IF}_3(\text{g})$ and $\text{IF}_5(\text{g})$ are -470 kJ and -847 kJ , respectively. Valence shell electron-pair repulsion theory predicts that $\text{IF}_5(\text{g})$ is square pyramidal in shape in which all I-F bonds are equivalent while $\text{IF}_3(\text{g})$ is T-shaped (based on trigonal-bipyramidal geometry) in which I-F bonds are of different lengths. It is observed that the axial I-F bonds in IF_3 are equivalent to the I-F bonds in IF_5 . Calculate the equatorial I-F bond strength (in kJ/mol) in IF_3 . Some other informations given are:



30. For the reaction,



for the reaction given that :

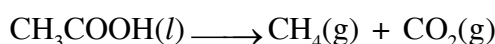
$$\Delta_f H^\circ [\text{C}_2\text{H}_4(\text{g})] = 52 \text{ kJ mol}^{-1} \quad ; \quad \Delta_f H^\circ [\text{C}_2\text{H}_6(\text{g})] = -84 \text{ kJ mol}^{-1}$$

$$S^\circ[\text{C}_2\text{H}_4(\text{g})] = 219 \text{ JK}^{-1} \text{ mol}^{-1} \quad ; \quad S^\circ[\text{C}_2\text{H}_6(\text{g})] = 229 \text{ JK}^{-1} \text{ mol}^{-1}$$

$$S^\circ[\text{H}_2(\text{g})] = 130 \text{ JK}^{-1} \text{ mol}^{-1}$$

[Round off your answer to nearest integer]

31. Calculate ΔH (in kJ) for the reaction given at 25°C



Given: $\Delta H_{\text{vap}}[\text{CH}_3\text{COOH}(\text{l})] = 50 \text{ kJ/mol}$

Resonance energy of $\text{CH}_3\text{COOH}(\text{g}) = -50 \text{ kJ/mol}$

Resonance energy of $\text{CO}_2(\text{g}) = -25 \text{ kJ/mol}$

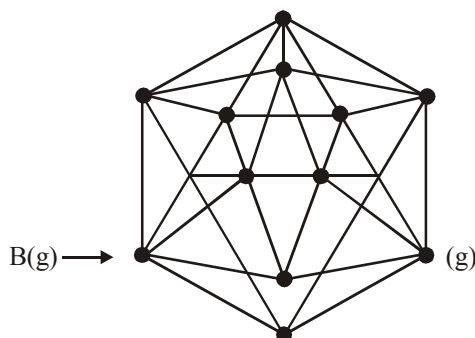
Bond enthalpies (kJ/mol)

$$\text{C} - \text{H} \rightarrow 400 \quad \text{C} - \text{O} \rightarrow 350 \quad \text{O} = \text{O} \rightarrow 500$$

$$\text{C} - \text{C} \rightarrow 350 \quad \text{O} - \text{H} \rightarrow 450$$

$$\text{C} - \text{O} \rightarrow 800 \quad \text{H} - \text{H} \rightarrow 400$$

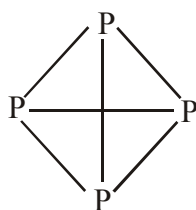
32. Boron exist in different allotropic forms. All allotropic form contains icosahedral units (icosahedral is a regular shape with 12 corners & 20 faces) with boron atoms at all 12 corners and all bonds are equivalent.



Calculate heat evolved at constant pressure (in kJ) per mole of boron atoms undergoing above change if $\Delta H_{BE} = (B - B) = 200$ kJ/mol.

Sol. Heat evolved per mol of 'B' atoms = $\frac{5}{2} \times 200 = 500$ kJ

33. White phosphorus is a tetra-atomic solid P_4 (s) at room temperature.



Find average (P -P) bond enthalpy in kJ/mol.

Given : $\Delta H_{\text{sublimation}}$ of P_4 (s) = 59 kJ/mol

$\Delta H_{\text{atomisation}}$ of P_4 (s) = 1265 kJ/mol

34. $H_2(g) + \frac{1}{2} O_2(g) \longrightarrow H_2O(g) \quad \Delta H = -50$ K cal at $25^\circ C$

Calculate magnitude of ΔH (in K cal) at $65^\circ C$. Assume gases behave like an ideal gas.

[Given: $R = 2$ Cal/ mol/ K]

(Report your answer by multiplying it with 100)

39. One mole of ideal gas undergoes following cyclic process:

- (I) Isochoric heating from (P_1, V_1, T_1) to double temperature.
- (II) Isobaric expansion from to double volume.
- (III) Linear expansion (on PV curve) to $(P_1, 8V_1)$.
- (IV) Isobaric compression to initial state.

Calculate the magnitude of work done in calories if initial temperature of the gas is 300 K?

$$\text{Given: } R = 2 \frac{\text{Cal}}{\text{mol} \cdot \text{K}}$$

40. Container A containing one mole of He is connected with Container B containing 2 moles of Ne at the same temperature and pressure. Calculate ΔS_{mixing} .

[Given: $R = 2 \text{ Cal K}^{-1}$; $\ln 3 = 1$; $\ln 2 = 0.70$]

[Report your answer by multiplying it with 100]

41. 5 moles of an ideal monatomic gas undergoes adiabatic free expansion from 10L, (e^4) atm to (e) atm. The change in entropy (in Cal/K) of the system is

[Answer as xyzvz, in which x = 1 if $\Delta S = +ve$ and x = 0 if $\Delta S = -ve$ and y,v& z are numbers from 0 to 9]

42. Calculate magnitude of enthalpy change of formation for (in kJ/mol) for $\text{MgF}_2(\text{s})$ at 300K & 1 bar from following data.

$$\Delta H_f^\circ[\text{Mg}^{+2}(\text{g})] = 5\text{kJ/mol}$$

$$\Delta H_f^\circ[\text{F}^-(\text{g})] = 3\text{kJ/mol}$$

$$\Delta H_{\text{hydration}}^\circ[\text{Mg}^{2+}(\text{g})] = -20\text{kJ/mol}$$

$$\Delta H_{\text{hydration}}^\circ[\text{F}^-(\text{g})] = -7.5\text{kJ/mol}$$

$$\Delta H_{\text{solution}}^\circ[\text{MgF}_2(\text{s})] = -3\text{kJ/mol}$$

43. Calculate $|\Delta H_{\text{neutralisation}}|$ of $\text{HCl}(\text{g})$ with $\text{NH}_3(\text{g})$ to form $\text{NH}_4\text{Cl}(\text{s})$ form following data

$$\Delta H_{\text{neutralisation}} \text{ of } \text{NH}_4\text{OH}(\text{aq}) \text{ with } \text{HCl}(\text{aq}) = -13\text{kcal/mol.}$$

$$\Delta H_{\text{solution}}(\text{HCl}(\text{g})) = -20\text{kcal/mol.}$$

$$\Delta H_{\text{solution}}(\text{NH}_3(\text{g})) = -30\text{kcal/mol.}$$

$$\Delta H_{\text{solution}}(\text{NH}_4\text{Cl}(\text{s})) = -30\text{kcal/mol.}$$

44. 45 gm $\text{Ba}(\text{MnO}_4)_2$ sample containing some inert impurity is treated with 100 ml, "33.6 V" H_2O_2 in acidic medium, then % purity of $\text{Ba}(\text{MnO}_4)_2$ in the sample.
 (Atomic mass of Ba = 137, Mn = 55)
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.
45. A 1.0 g sample containing Fe_3O_4 and inert impurity was dissolved and treated chemically to reduce all iron to Fe(II). The final solution required 6 mL of a 1/29M acidified KMnO_4 solution for complete oxidation of Fe(II). Hence percentage of Fe_3O_4 in the original sample is.
46. Pressure over 1000 mL of a liquid is gradually increases from 1 bar to 1001 bar under adiabatic conditions. If the final volume of the liquid is 990 mL, calculate ΔU and ΔH of the process, assuming linear variation of volume with pressure.
47. At 500 kilobar pressure, density of diamond and graphite are 3 g/cc and 2 g/cc respectively, at certain temperature 'T'. Find the value $|\Delta H - \Delta U|$ (kJ/mole) for the conversion of 1 mole of graphite to 1 mole of diamond at temperature 'T' :
48. The polymerisation of ethylene to linear polyethylene is represented by the reaction

$$n \text{CH}_2 = \text{CH}_2 \rightarrow (-\text{CH}_2 - \text{CH}_2)_n$$
 where n has a large integral value. Given that the average enthalpies of bond dissociation for C=C & C-C at 298 K are +590 & +331 kJ mol⁻¹ respectively. Calculate the enthalpy of polymerisation per mole of ethylene at 298 K.
49. The standard enthalpy of formation of FeO & Fe_2O_3 is -65 kcal mol⁻¹ and -197 kcal mol⁻¹ respectively. A mixture of two oxides contains FeO & Fe_2O_3 in the mole ratio 2 : 1. If by oxidation, it is changed into a 1 : 2 mole ratio mixture, how much of thermal energy will be released per mole of the initial mixture ?
50. The enthalpies of neutralization of a weak acid HA & a weak acid HB by NaOH are -6900 Cal/equivalent & -2900 Cal/equivalent respectively. When one equivalent of NaOH is added to a solution containing one equivalent of HA & one equivalent of HB, the enthalpy change was -3900 Calories. In what ratio is the base distributed between HA & HB ?

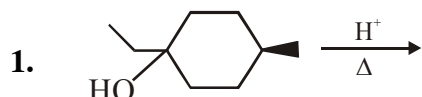
ORGANIC CHEMISTRY

Question Bank

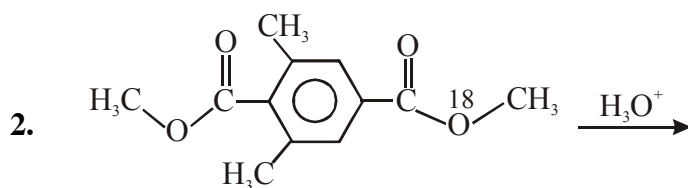
Topic :

Halogen derivative, alcohol & ether, Carboxylic acid, Ester, Amines

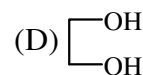
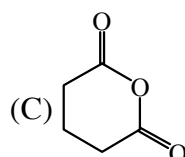
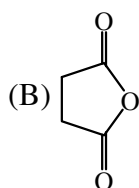
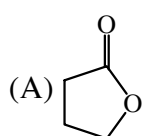
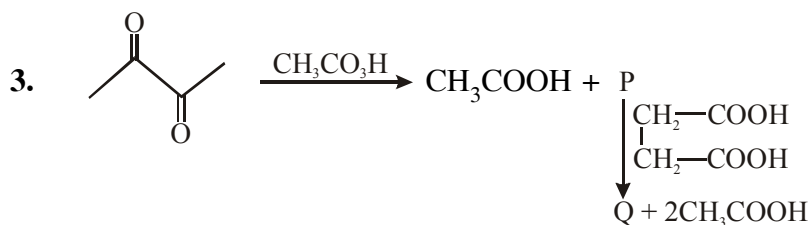
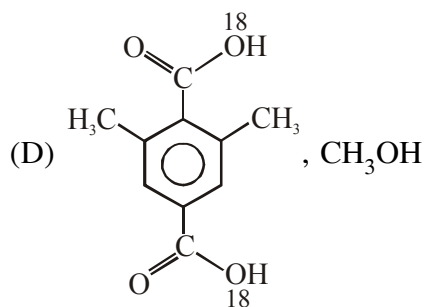
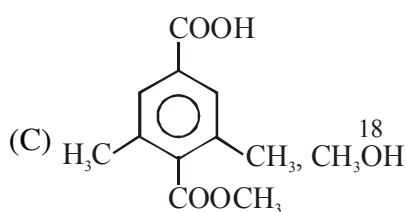
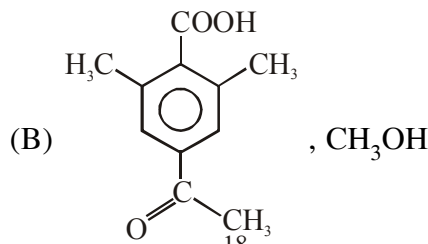
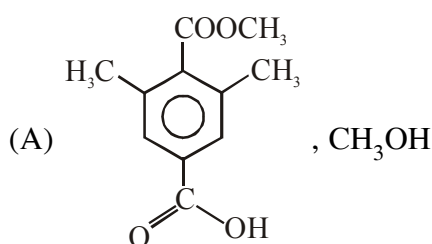
Only one correct ::

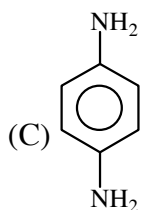
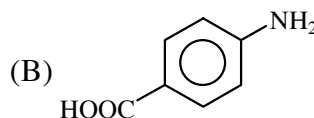
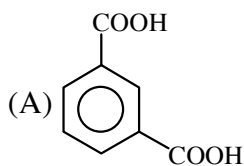
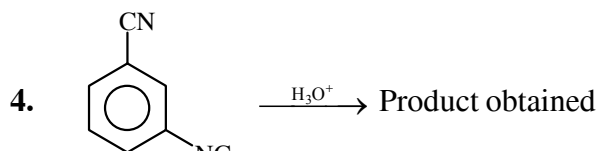


How many total number of alkenes are possible as products in the above reaction-
 (A) 2 (B) 3 (C) 4 (D) 6



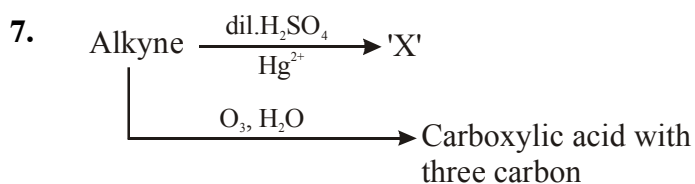
Product during reaction ,





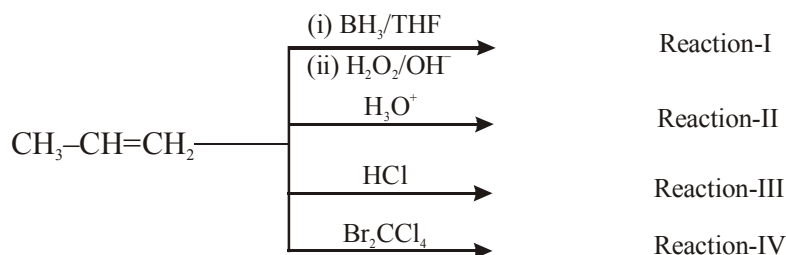
5. 1° alcohol is obtained as a major product in reaction -
 (A) Reaction-I (B) Reaction-II (C) Reaction-III (D) Reaction-IV

6. Major product product can show stereoisomerism -
 (A) Reaction-I (B) Reaction-II (C) Reaction-III (D) Reaction-IV



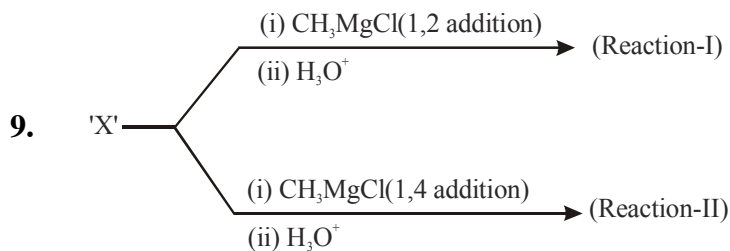
Correct statement regarding 'X' is -

- (A) Aldehyde (B) Acid (C) Alcohol (D) 3-hexanone
8. Reactions following are :

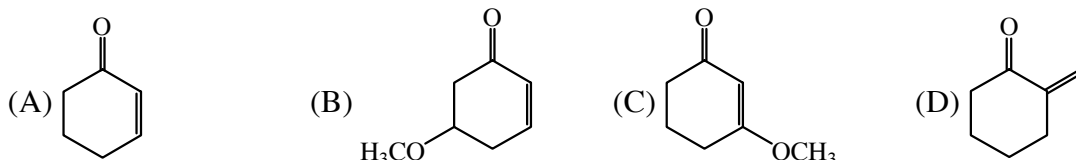


Which is example of oxidation of propene

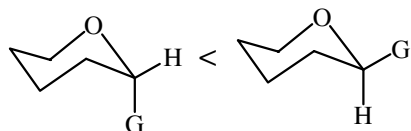
- (A) Reaction-I (B) Reaction-II (C) Reaction-III (D) Reaction-IV



Same cyclic product is obtained in both reaction then X may be -

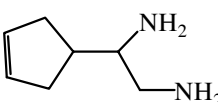


10. Stability order



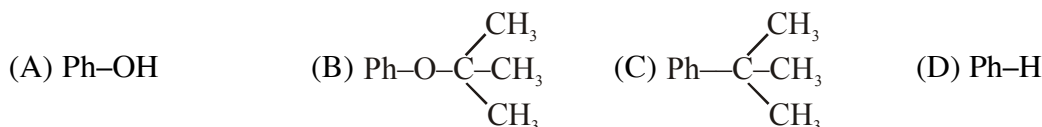
Is correct when G is -



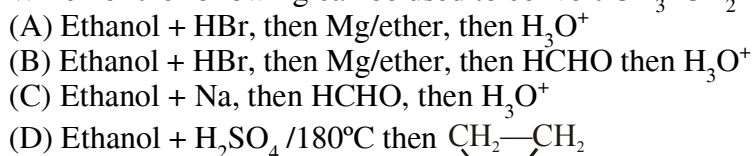
11. Product obtained on ozonolysis of  $\xrightarrow[\text{Zn, H}_2\text{O}]{\text{O}_3}$



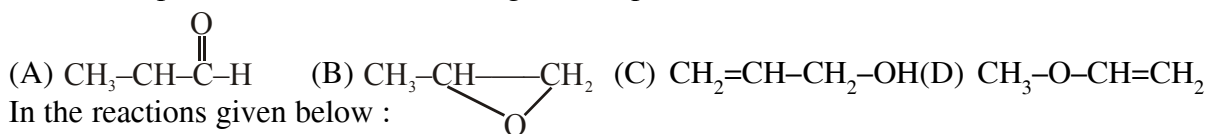
12. Phenyl magnesium bromide reacting with t-butyl alcohol gives



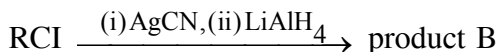
13. Which of the following can be used to convert $\text{CH}_3-\text{CH}_2-\text{OH}$ into $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$



14. An organic compound contains 62.07% carbon 8.10% hydrogen & rest oxygen. Its vapour density is 29. This compound does not react with sodium metal, but its 2.9 g combines with 8.0 g of bromine. What is the probable structure of the original compound -




15. In the reactions given below :



the compounds A and B are -



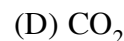
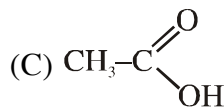
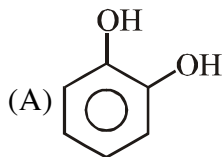
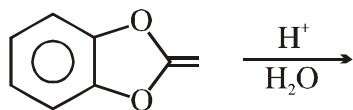
16.  $\xrightarrow{\text{NBS}}$ $\text{P}_1 \xrightarrow[\text{D.E.}]{\text{Mg}}$ $\text{P}_2 \xrightarrow[\text{H}^\oplus/\Delta]{\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}}$ P_3 (major product).

Identify P_3

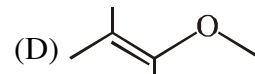
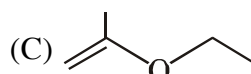
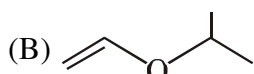
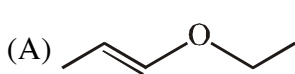


One or more than may be correct ::

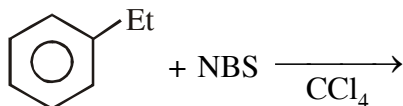
17. Major product/s of reaction is/are



18. An organic compound P ($C_5H_{10}O$) reacts faster than ethylene with dil. H_2SO_4 to give two products Q and R both Q and R give positive iodoform test. P is/are—



19. Correct statement regarding following reaction.

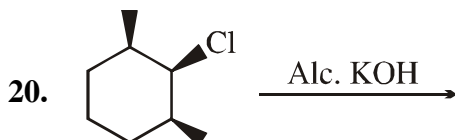


(A) One of the product can show haloform reaction.

(B) One of the reactant can show Hofmann Bromamide degradation

(C) Reaction is an example of free radical substitution.

(D) One of the product can show Bromamide degradation



Correct statement regarding reaction.

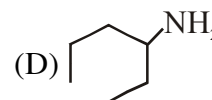
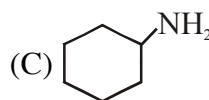
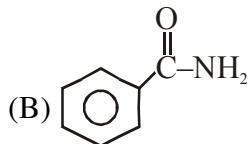
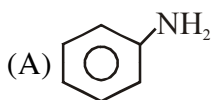
(A) Product can show geometrical isomerism

(B) It is a example of E_2 mechanism

(C) (\pm) 1,3-Dimethyl cyclohexene is obtained as a product

(D) Racemic mixture of alcohols are obtained as product

21. Which of the following compounds will produce a compound with offensive smell when treated with $CHCl_3/KOH$?



22. $H_2N-NH-C(=O)-NH_2$; Which of the following option is correct regarding [X] ?



(A) [X] gives semicarbazone when reacts with propanal in mild acidic medium

(B) Na-extract of [X] gives prussian blue color with $FeSO_4$ & $FeCl_3$

(C) [X] acts as base

(D) [X] acts as nucleophile

23. Example of degradation reaction -

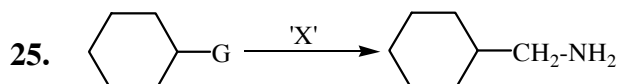
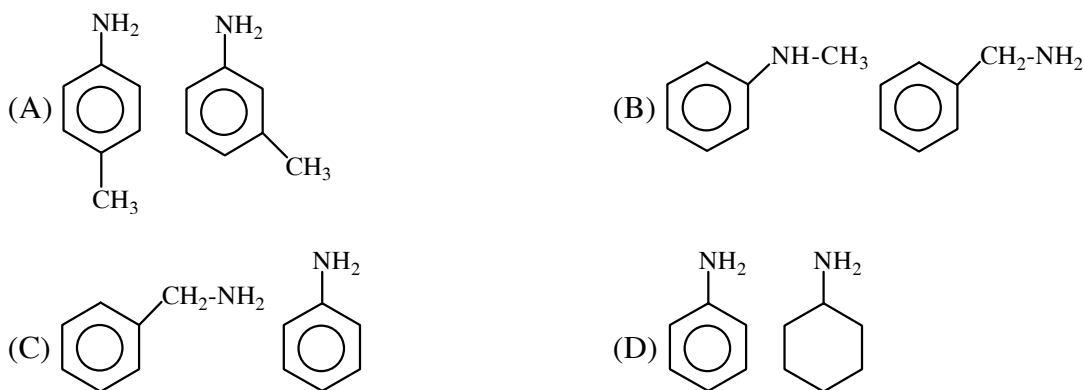
(A) Haloform reaction

(B) Reimer tiemann reaction

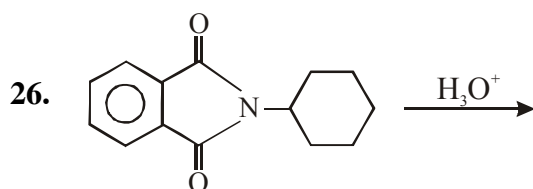
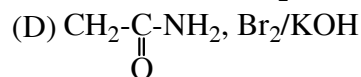
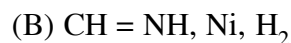
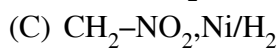
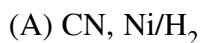
(C) Hofmann bromoamide degradation

(D) Fridel craft alkylation

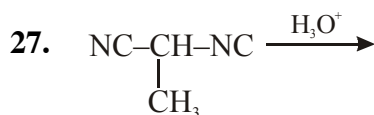
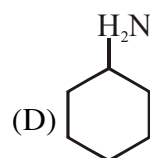
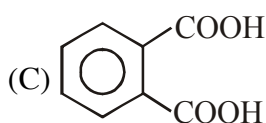
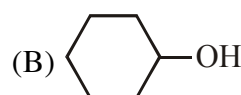
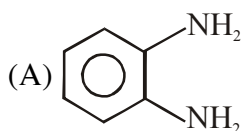
24. Which pair can be distinguished by NaNO_2/HCl followed by β -naphthol -



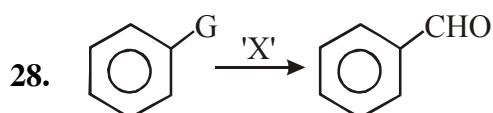
G & X is/are -



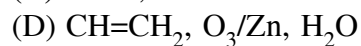
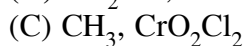
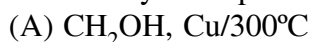
Product obtained during reaction -



Compound obtained on hydrolysis is /are -



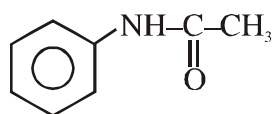
G & X may be respectively -



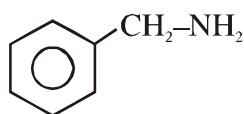
Paragraph ::

Passage for Q.29 to Q.31

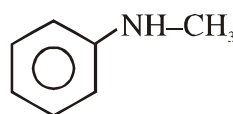
For given compounds.



(P)



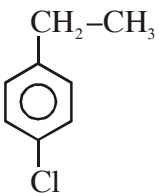
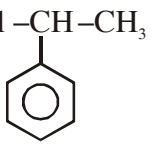
(Q)



(R)

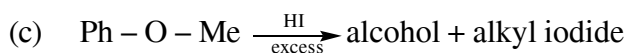
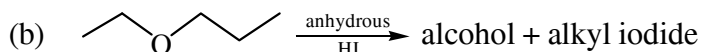
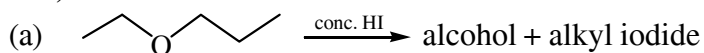
29. Basic strength order is.
 (A) $P > Q > R$ (B) $Q > R > P$ (C) $R > Q > P$ (D) $R > P > Q$
30. Incorrect statements is
 (A) QR is a functional isomer pair
 (B) PQ & PR are functional isomers respectively
 (C) P, Q & R all are aromatic compound
 (D) $\text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NHCH}_3$ is a metamer of P
31. Which compound can show positive carbylamine reaction.
 (A) P (B) Q (C) R (D) None

Match the column ::

- | 32. | Column-I
(Compounds) | Column-II
(Can be differentiated by) |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| (A) | $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$ & $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$ | (P) Lucas reagent |
| (B) | $\text{CH}_2=\text{CH}-\text{CH}_2-\text{OH}$ & $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{OH}}{\text{C}}}-\text{CH}_3$ | (Q) Victor mayor test |
| (C) |  &  | (R) Iodoform test |
| (D) | $\text{CH}_2=\text{CH}-\text{Cl}$ & $\text{CH}_2=\text{CH}-\text{CH}_2-\text{Cl}$ | (S) Aqueous AgNO_3 |
| | | (T) Atleast one of them gives red colour with ceric ammonium nitrate |

Integer ::

33. Sum of molecular mass of alkyl iodides produced in following reaction is (At. weight of Iodine = 127)

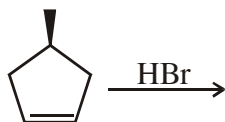


34. 0.436 gm of acetyl derivative of a polyhydric alcohol require 0.336 gm KOH for hydrolysis. Calculate number of hydroxy groups in alcohol. (Molecular weight of polyhydric alcohol = 92)

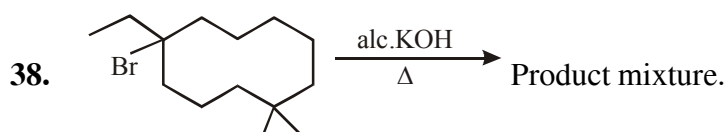
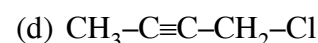
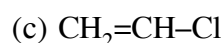
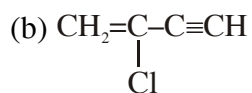
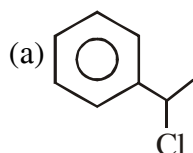


Number of organic products in the given reaction.

36. Total number of possible products in the following reactions.



37. Number of compounds in which white ppt is obtained on reaction with ammonical AgNO_3



Number of possible alkenes formed in product mixture.

ANSWERS KEY-ORGANIC CHEMISTRY

- | | | | |
|------------------------------------------------|-----------------------------|---------------|---------------|
| 1. (C) | 2. (C) | 3. (B) | 4. (D) |
| 5. (A) | 6. (D) | 7. (D) | 8. (D) |
| 9. (C) | 10. (B) | 11. (B) | 12. (D) |
| 13. (B) | 14. (D) | 15. (C) | 16. (B) |
| 17. (A,C) | 18. (B,C) | 19. (A,B,C,D) | 20. (B,C) |
| 21. (A,C,D) | 22. (A,B,C,D) | 23. (A,C) | 24. (C,D) |
| 25. (A, B, C, D) | 26. (C, D) | 27. (B, D) | 28. (A,B,C,D) |
| 29. (B) | 30. (B) | 31. (B) | |
| 32. (A)-P,Q,R,T (B) Q,T (C) Q,R,S , (D) - Q, S | 33. (a) 156 (b) 156 (c) 142 | | |
| 34. (3) | 35. (2) | 36. (4) | 37. (3) |
| 38. (6) | | | |

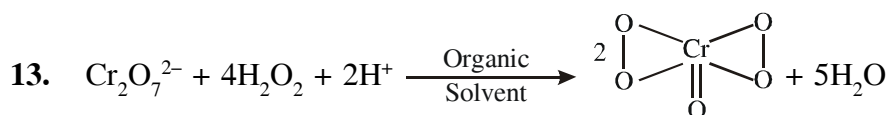
INORGANIC CHEMISTRY

HOME ASSIGNMENT # 03

Topic : SALT ANALYSIS

Only one correct ::

- Which of the following is not group-I cation though the chlorides of all cations are sparingly soluble in water.
 (A) Ag^+ (B) Hg_2^{2+} (C) Cu^+ (D) Pb^{2+}
- What is the group-III reagent is generally used for group analysis.
 (A) $\text{NH}_4\text{OH} + \text{NH}_4\text{NO}_3$ (B) $\text{NH}_4\text{Cl} + (\text{NH}_4)_2\text{CO}_3$
 (C) $\text{NH}_4\text{OH} + (\text{NH}_4)_2\text{SO}_4$ (D) $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$
- Which of the following cation gives ppt in two groups during group analysis.
 (A) Hg^{2+} (B) Hg_2^{2+} (C) Pb^{2+} (D) Cu^{2+}
- Which of the following ppt is not soluble in NH_4Cl solution.
 (A) $\text{Zn}(\text{OH})_2$ (B) $\text{Mg}(\text{OH})_2$ (C) BaCO_3 (D) $\text{Ni}(\text{OH})_2$
- The auxiliary reagent in group-IV reagent is
 (A) H_2S (B) dil.HCl (C) NaOH (D) NH_4OH
- CrCl_3 solution + Na_2S solution \longrightarrow ppt(A)
 The correct formula and colour of A are
 (A) Cr_2S_3 , Black (B) $\text{Cr}(\text{OH})_3$, Green
 (C) $\text{Na}[\text{Cr}(\text{OH})_4]$, Green (D) None of these
- Which of the following yellow coloured sulphide is insoluble is yellow ammonium sulphide.
 (A) SnS_2 (B) As_2S_5 (C) CdS (D) Bi_2S_3
- Which of the following statement is incorrect?
 (A) Using KI, group-I cations can be distinguished
 (B) Using $(\text{Na}_2\text{CrO}_4 + \text{AcOH})$ solution, group-V cations can not be distinguished
 (C) Addition of CuSO_4 into the KSCN solution produces yellow ppt
 (D) All are incorrect
- Find the number of water of crystallization in microcosmic salt -
 (A) 5 (B) 4 (C) 6 (D) 10
- What is the colour of K^+ through cobalt/double blue glass -
 (A) Lilac, (B) Violet (C) Brick red (D) Crimson red
- What is the colour of $\text{CoO} \cdot \text{Al}_2\text{O}_3$ is -
 (A) pink (B) Thenard blue (C) Bluish white (D) None of these
- If barium sulphate is precipitated in a solution containing potassium permanganate it is coloured pink (violet) by -
 (A) Absorption of some of the permanganate (B) Adsorption of some of the permanganate
 (C) Both (A) and (B) (D) None of these



In above reaction amyl alcohol is recommended.

Dimethyl ether is not recommended for general use owing to its -

- (A) Highly non-flammable character (B) Highly inflammable character
 (C) Highly poisonous character (D) None of these
14. CO_3^{2-} and $\text{S}_2\text{O}_3^{2-}$ can be distinguished by
 (A) CuSO_4 solution (B) BaCl_2 solution
 (C) $\text{Pb}(\text{OAc})_2$ solution (D) All of these
15. $\text{S}_2\text{O}_3^{2-}$ and S^{2-} can not be distinguished by
 (A) $\text{Pb}(\text{OAc})_2$ solution (B) BaCl_2 solution
 (C) Acidic KMnO_4 solution (D) dil. HCl solution
16. **Statement-1** : When H_2S gas is passed through Na-nitroprusside solution it gives purple colouration
Statement-2 : H_2S is an weak acid
 (A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
 (B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
 (C) Statement-1 is true, statement-2 is false.
 (D) Statement-1 is false, statement-2 is true.
17. SO_3^{2-} and $\text{S}_2\text{O}_3^{2-}$ can be distinguished by which of the following reagent.
 (A) CaCl_2 solution (B) BaCl_2 solution
 (C) (A) and (B) both (D) none of these two
18. Solutions of sodium azide (NaN_3) and iodine (as KI_3) do not react but on addition of a trace of X ion, which acts as a catalyst there is an immediate vigorous evolution of nitrogen. Then X may be:
 (A) $\text{S}_2\text{O}_3^{2-}$ (B) S^{2-}
 (C) $\overset{\ominus}{\text{S}}\text{CN}$ (D) All are correct.
19. When a neutral or slightly alkaline solution of thiosulphate is treated with the $[\text{Ni}(\text{en})_3](\text{NO}_3)_2$ complex. Then
 (A) Green precipitate is obtained (B) Brown precipitate is obtained
 (C) Violet precipitate is obtained (D) Yellow precipitate is obtained
20. When $\text{S}_2\text{O}_3^{2-}$ react with solution of X reagent then reaction is redox followed by precipitation then X is:
 (A) FeCl_3 solution (B) AgNO_3 solution
 (C) CuSO_4 solution (D) None of these
21. Which of the following gives a suffocating gas when treated with dilute HCl ?
 (A) carbonate (B) sulphite
 (C) sulphate (D) borate
22. The colour developed, when sodium sulphide is added to sodium nitroprusside is:
 (A) Purple (B) yellow
 (C) red (D) black

23. In the test for iodine, when I_2 is treated with sodium thiosulphate, $Na_2S_2O_3$:
- $$Na_2S_2O_3 + I_2 \longrightarrow NaI + \dots$$
- (A) $Na_2S_4O_6$ (B) Na_2SO_4 (C) Na_2S (D) Na_3ISO_4
24. Which of the following sulphides is yellow in colour?
- (A) CuS (B) CdS (C) ZnS (D) CoS
25. A sodium salt of unknown anion when treated with $MgCl_2$ gives white precipitate only on boiling. The anion is:
- (A) SO_4^{2-} (B) HCO_3^- (C) CO_3^{2-} (D) NO_3^-
26. S^{2-} and SO_3^{2-} can be distinguished by using:
- (A) $(CH_3COO)_2Pb$ (B) $Na_2[Fe(CN)_5NO]$ (C) both (a) and (b) (D) none of these
27. Identify the correct statement
- (A) The ppt of $BaCO_3$ is insoluble in dil HCl
 (B) $Hg(NO_3)_2 + Na_2S \rightarrow$ white ppt of HgS
 (C) $Na_2CO_3 + Hg(NO_3)_2 \rightarrow$ Reddish-brown ppt of $3HgO.HgCO_3$
 (D) H_2S turns lime water milky
28. When the soda extract containing thiosulphate ion treated with excess of $AgNO_3$ solution followed by boiling, then.
- (A) White precipitate is formed (B) Black precipitate is formed
 (C) brown precipitate is formed (D) No ppt precipitate is formed
29. Which of the following thermal decomposition yields a basic as well as an acidic oxide
- (A) Na_2CO_3 (B) $CaCO_3$ (C) $NaNO_3$ (D) All are correct
- On heating $CaCO_3$ gives acidic and basic oxide.
30. An aqueous solution of gas (X) gives the white turbidity on passing H_2S in the solution. Identify (X)
- (A) NH_3 (B) SO_2 (C) CO_2 (D) None of these
31. "Cacodyl oxide" is formed in the specific test of -
- (A) Formate (B) Oxalate (C) Acetate (D) Nitrate
32. NO_2^- ion can be not destroyed by -
- (A) Sulphanillic acid (B) Thiourea
 (C) Urea (D) None of these
33. Choose the correct statement from the following -
- (A) When KI is added to $Pb(OAc)_2$ solution produces scarlet red ppt. of PbI_2
 (B) Using $AgNO_3$, acetate and oxalate can be distinguished
 (C) 'AgCl' is insoluble in $Na_2S_2O_3$ solution
 (D) Using (conc. $H_2SO_4 + MnO_2$), Cl^- and Br^- can be distinguished
34. Chromyl chloride test is given by -
- (A) CH_3Cl (B) $AgCl$ (C) Hg_2Cl_2 (D) NH_4Cl
35. Which of the following cation produces coloured ppt with Na_2SO_4 solution -
- (A) Pb^{2+} solution (B) Ba^{2+} solution (C) Hg^{2+} solution (D) Ca^{2+} solution

36. Choose the correct options form the following -
 (I) Borate + conc. HCl (cold) → white ppt.
 (II) Borate + conc. HCl (hot) → white fumes
 (III) Borate + conc. H₂SO₄ (cold) → white ppt.
 (IV) Borate + conc. H₂SO₄ (hot) → white fumes
 (A) TTFT (B) TFFT (C) FFFT (D) TFFF
37. The correct formula of Canary yellow ppt and it is the test ----- acid radical-
 (A) (NH₄)₂ [PMo₁₂O₄₀] and phosphate (B) (NH₄) H [P(Mo₃O₁₀)₄] and sulphate
 (C) (NH₄)₃ [P(Mo₃O₁₀)₄] and phosphate (D) Na₃ [P(Mo₃O₁₀)₄] and phosphate
38. When CH₃COONa heated with solid As₂O₃ then compound X is formed. The smell of compound X is -
 (A) Pungent smell (B) Rotten Fish smell (C) Nauseating smell (D) Rotten egg smell
39. In layer test of I⁻ and Br⁻. If reddish -brown layer comes first then -
 (A) Br⁻ present (B) I⁻ absent (C) Both (A) and (B) (D) None of these
40. CaC₂O₄ + AcOH $\xrightarrow[\text{Solution}]{\text{Na}_2\text{CO}_3}$ (X) ; then X is -
 (A) Clear solution (B) White ppt. of CaCO₃ is obtained
 (C) No reaction (D) Yellow ppt. is obtained
41. FeSO₄ solution can absorb “_____” gas.
 (A) CO (B) NO (C) CO and NO both (D) Neither CO nor NO
42. NO₂⁻ and NO₃⁻ can be distingnished by which of the following reagent.
 (A) dil. H₂SO₄ (B) conc. H₂SO₄
 (C) Devarda’s alloy + conc.NaOH (D) None of these

Assertion & Reason ::

43. **Statement-1** : Test of NH₄⁺ can not be done within group analysis
Statement-2 : During group analysis several times NH₄⁺ - compound is added at the different steps.
 (A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1
 (B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1
 (C) Statement-1 is false, statement-2 is true.
 (D) Statement-1 is true, statement-2 is false.
44. **Statement-1** : (KMnO₄ + ZnSO₄) solution + BaCl₂ solution → white ppt. of BaSO₄
Statement-2 : In ZnSO₄ and BaSO₄ both, SO₄²⁻ ion has tetrahedral shape.
 (A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1
 (B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1
 (C) Statement-1 is false, statement-2 is true.
 (D) Statement-1 is true, statement-2 is false.

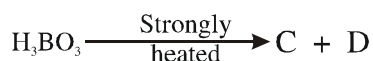
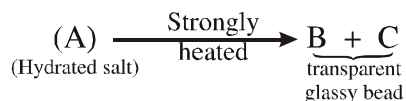
One or more than may be correct ::

45. When AgNO₃ react with X ion then initially no visible change occurs due to formation of water soluble complex. Then ion X may be:
 (A) SO₃²⁻ (B) S₂O₃²⁻ (C) S²⁻ (D) CO₃²⁻

46. Which of the following reagent(s) can show colour change when SO_2 gas is passed through it.
 (A) Bromine water (B) Acidic potassium dichromate solution
 (C) Acidic ferric chloride solution (D) Chlorine water
47. What are the following steps are to be done before adding group-III reagent into the group-II filtrate.
 (A) Group-II filtrate is to be evaporated to dryness
 (B) Group-II filtrate is to be boiled of first
 (C) After boiling 2-3 drops of dil. H_2SO_4 is added and boiled again.
 (D) After boiling 2-3 drops of conc. HNO_3 is added and boiled again.
48. Type of sulphide ppt may be obtained in the group-II ppt during group analysis.
 (A) M_2S_3 (B) M_2S (C) MS (D) MS_2
49. If reddish brown ppt (only) is obtained in group-III during group analysis, then oxidation state of Fe in the original sample may be
 (A) +2 (B) +3 (C) +2 and +3 both (D) Neither +2 nor +3
50. If NH_4Cl is not added to the group-III reagent which of the following ppt could be obtained
 (A) $\text{Cr}(\text{OH})_2$ (B) $\text{Fe}(\text{OH})_3$ (C) $\text{Mn}(\text{OH})_2$ (D) $\text{Mg}(\text{OH})_2$
51. NH_4^+ and K^+ ions can be distinguished by the use of following reagent
 (A) $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$ (B) $\text{Na}_2[\text{PtCl}_6]$ (C) HClO_4 or NaClO_4 (D) Boiling with NaOH
52. In which of the following cases blue ppt is obtained
 (A) $\text{Fe}^{2+} + [\text{Fe}(\text{CN})_6]^{3-} \longrightarrow$ (B) $\text{Fe}^{2+} + [\text{Fe}(\text{CN})_6]^{4-} \longrightarrow$
 (C) $\text{Fe}^{3+} + [\text{Fe}(\text{CN})_6]^{4-} \longrightarrow$ (D) $\text{Fe}^{3+} + [\text{Fe}(\text{CN})_6]^{3-} \xrightarrow{\text{SnCl}_2}$
53. Sodium carbonate bead test generally used forcompounds.
 (A) Mn (B) Cr (C) Zn (D) Cu
54. $\text{Na}_2\text{HPO}_4 + \text{Reagent 'M'} \rightarrow$ white ppt. The reagent 'M' is -
 (A) BaCl_2 solution (B) AlCl_3 solution (C) MnSO_4 solution (D) FeCl_3 solution
55. KI solution + starch + solution of salt 'X' \rightarrow Deep blue solution. 'X' is/are -
 (A) Na_2CO_3 (B) NaNO_2 (C) $\text{Ba}(\text{MnO}_4)_2$ (D) FeCl_3
56. $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$ is unstable because -
 (A) It liberates NO gas on warming
 (B) It liberates NO gas on shaking
 (C) The charge of central atom is +1 (relatively low enough)
 (D) None of these
57. $\text{Na}_2\text{C}_2\text{O}_4 + \text{conc. H}_2\text{SO}_4 \xrightarrow{\text{Warmed}}$ gases evolved -
 Which of the following characteristic(s) is/are correct regarding gases evolved above -
 (A) It can turn the lime water milky (B) It can decolorise the acidic KMnO_4 solution
 (C) It can burn with blue flame (D) It can turn the PdCl_2 solution black
58. Unknown salt + Al-powder + NaOH (conc.) \rightarrow gas comes out which turns Nessler's reagent brown. The salt may be -
 (A) NaNO_2 (B) NaNO_3 (C) NH_4Cl (D) NH_4HCO_3

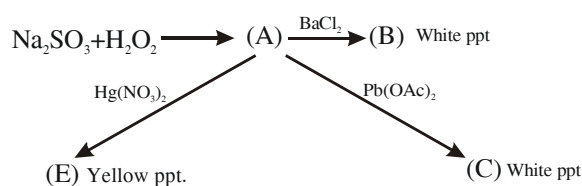
Paragraph ::

Paragraph for Q. 59 to Q. 62



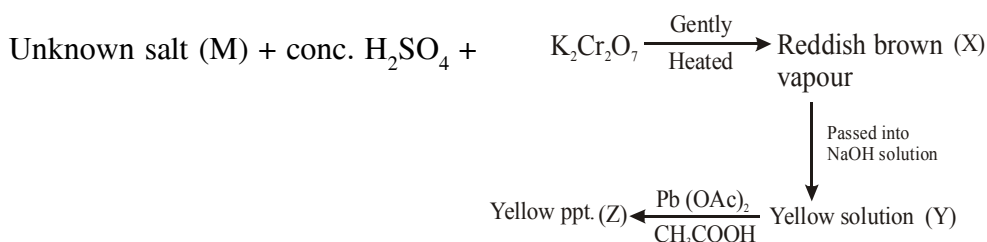
59. Identify C-
 (A) $(\text{BN})_x$ (B) NaPO_3 (C) B_2O_3 (D) $\text{Mg}(\text{NH}_4)\text{PO}_4$
60. Find the number of water of crystallizations in (A)-
 (A) 4 (B) 5 (C) 10 (D) 24
61. How many X–O–X linkages are present in structure of A (X = central atom)-
 (A) 4 (B) 3 (C) 5 (D) 2
62. Find the number of tetrahedral and trigonal planar units in structure of A -
 (A) 2,1 (B) 2,2 (C) 2,4 (D) 5,2

Paragraph for Q. 63 to Q. 65



63. Identify A-
 (A) $\text{Na}_2\text{S}_2\text{O}_3$ (B) Na_2SO_4 (C) Na_2S (D) None of these
64. What is the formula of yellow ppt. (E)-
 (A) HgSO_4 (B) $2\text{HgSO}_4 \cdot \text{HgO}$ (C) $2\text{HgO} \cdot \text{HgSO}_4$ (D) None of these
65. What is the shape of Anionic part of (C)
 (A) Trigonal planar (B) Tetrahedral (C) TBP (D) Square planar

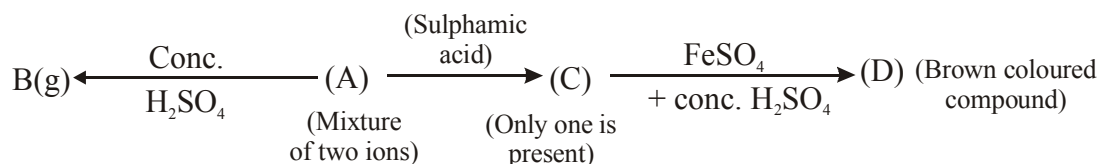
Paragraph for Q. 66 to Q. 68



66. The salt (M) is/are-
 (A) AgCl (B) $\text{NH}_4\text{Cl} + \text{NaBr}$ (C) NaBr (D) CaClO_4

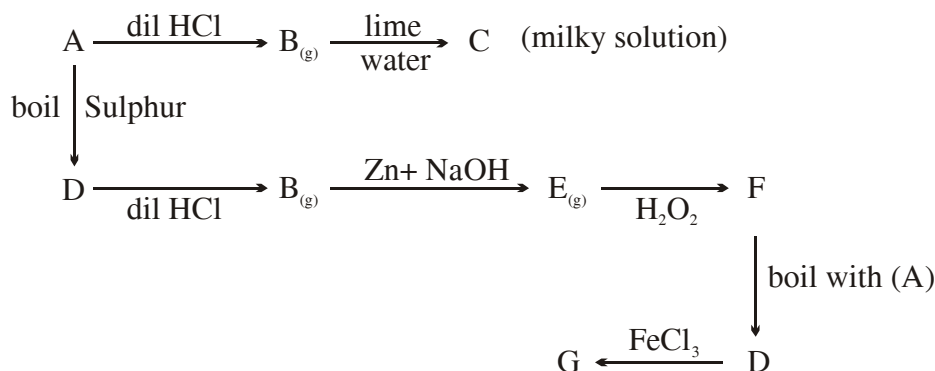
67. How many non axial d-orbitals are involved in hybridisation of central atom of compound (X)-
 (A) 2 (B) 3 (C) 4 (D) None of these
68. What is the formula of yellow ppt (Z)-
 (A) BaCrO_4 (B) Na_2CrO_4 (C) Ag_2CrO_4 (D) PbCrO_4

Paragraph for Q. 69 to Q. 72



69. Identify mixture of ions (A) -
 (A) NO_2^- and Br^- (B) NO_2^- and I^- (C) NO_2^- and NO_3^- (D) None of these
70. What is oxidation state of central atom of (D)
 (A) +3 (B) +2 (C) +1 (D) Zero
71. Identify gas B-
 (A) Br_2 (B) $\text{Br}_2 + \text{NO}_2$ (C) Only NO_2 (D) None of these
72. What is the hybridisation of central atom of D-
 (A) d^2sp^3 (B) sp^3d^2 (C) sp^3d (D) sp^3

Paragraph for Q. 73 to Q. 75



73. Identify A
 (A) CO_3^{2-} (B) SO_3^{2-} (C) $\text{S}_2\text{O}_3^{2-}$ (D) none of these
74. When A react with $\text{Pb}(\text{NO}_3)_2$ then compound X is formed. Compound X is oxidized by atmospheric oxygen on boiling, then Y is formed what is the colour of Y
 (A) yellow (B) White (C) Black (D) Green
75. When gas E react with sodium nitroprusside then compound Z is formed. The colour of compound Z is:
 (A) Green (B) purple (C) Reddish brown (D) Black

Paragraph for Q. 76 to Q. 78

FeCl_3 solution + $(\text{NH}_4)_2\text{S} \rightarrow$ Black ppt (A) $\xrightarrow{\text{dil. H}_2\text{SO}_4}$ white ppt. (B) + gas (C)

while AlCl_3 solution + $(\text{NH}_4)_2\text{S} \rightarrow$ white ppt (D).

76. What is the formula of black ppt (A)
 (A) Fe_2S_3 (B) FeS (C) $2\text{FeS} + \text{S}$ (D) $\text{FeS} + \text{Fe}(\text{OH})_3$
77. White ppt (D) is -
 (A) Al_2S_3 (B) $\text{Al}_2\text{S}_3 + \text{S}$ (C) $\text{Al}(\text{OH})_3$ (D) $\text{Al}(\text{OH})_3 + \text{Al}$
78. White ppt (B) and gas (C) are -
 (A) S and SO_2 (B) H_2S and S (C) $\text{Fe}(\text{OH})_2$ and H_2S (D) S and H_2S

Match the column ::

79. Match the column

Column-I

- (A) S^{2-}
 (B) HSO_3^-
 (C) SO_3^{2-}
 (D) $\text{S}_2\text{O}_3^{2-}$

Column-II

- (P) Produces white ppt. with AgNO_3
 (Q) Evolves gas with dil. HCl which turns lime water milky
 (R) Evolves gas with dil. H_2SO_4 which does **not** turn Baryta water milky
 (S) Produces ppt. with $\text{Pb}(\text{OAc})_2$ solution.
 (T) Produces white ppt with BaCl_2 solution.

80. Match the column:

Column I

(Radicals)

- (A) $\text{C}_2\text{O}_4^{2-}$
 (B) Br^-
 (C) CH_3CO_2^-
 (D) NO_3^-

Column II

(Incorrect characteristics)

- (P) Produces white ppt. with AgNO_3 solution
 (Q) Produces coloured gas with hot conc. H_2SO_4
 (R) Produces colourless gas with dil. H_2SO_4
 (S) Produces no ppt. with AgNO_3 solution.
 (T) Produces white ppt. with BaCl_2 solution.

81. Match the column -

Column-I

(Element)

(A) Ba

(B) Pb

(C) Ag

(D) Ca

Column-II

(Correct characteristics)

(P) cation in solution produces brick red ppt. with CrO_4^{2-}

(Q) cation in solution produces yellow ppt. with CrO_4^{2-}

(R) corresponding salt produces apple green colour in the flame test

(S) corresponding salt produces brick red colour in the flame test

(T) cation in solution produces no ppt. with CrO_4^{2-} ion

82. **Column-I**

Cation in solution

(A) Ag^+ and Pb^{2+}

(B) Zn^{2+} and Mg^{2+}

(C) Pb^{2+} and Hg_2^{2+}

(D) Ag^+ and Fe^{3+}

Column-I

Correct characteristics when no where excess reagent is used

(P) can be distinguished by Na_2HPO_4 solution

(Q) can be distinguished by dil. HCl

(R) can be distinguished by KI solution

(S) can be distinguished by NaOH solution

(T) can not be distinguished by NH_4OH solution

Integer ::

83. Find the number of acidic radical(s) which can form coloured gas when treated with concentrated H_2SO_4

CO_3^{2-} , NO_2^- , Br^- , I^- , SO_3^{2-}

84. Find total number of conditions in which oxidation of Fe^{+2} (aq) ions to iron(III) takes place

(i) On exposure to air

(ii) On addition of conc. HNO_3

(iii) On reaction with SnCl_2

(iv) On reaction with H_2O_2

(v) On reaction with $\text{MnO}_4^- / \text{H}^+$

(vi) On reaction with KI

(vii) On reaction with $\text{Cr}_2\text{O}_7^{2-} / \text{H}^+$

85. $\text{Cu}^{2+} + \text{KCN}$ (in excess) \rightarrow soluble complex (X). How many statements are correct regarding complex (X) -
- (i) the central atom has the co-ordination number of 6
 - (ii) the central atom has the co-ordination number of 4
 - (iii) the complex is sq.planar
 - (iv) the complex is diamagnetic
 - (v) the complex is paramagnetic
86. Sn^{2+} and Sn^{4+} can be distinguished by how many of the following methods -
- (i) by passing H_2S in their solution
 - (ii) by addition of NaOH in their solution
 - (iii) by addition of excess NaOH in their solution
 - (iv) by addition of dil. HCl in their solution
 - (v) by addition of HgCl_2 solution in their solution
87. How many of the following gives green ppt.
- (i) $\text{CrCl}_3 + \text{NaOH} \rightarrow$
 - (ii) $\text{CrCl}_3 + \text{excess NaOH} \rightarrow$
 - (iii) $\text{NiCl}_2 + \text{excess NaOH} \rightarrow$
 - (iv) $\text{NiCl}_2 + \text{excess NH}_4\text{OH} \rightarrow$
 - (v) $\text{Hg}_2^{2+} + \text{KI} \rightarrow$
88. $\text{BiCl}_3 \xrightarrow{\text{KI}}$ black ppt (M) $\xrightarrow{\text{excess KI}}$ soluble complex (N)
- Find the number of d-orbitals involved for the hybridisation of central atom of N.
89. Find the no. of cation which gives white ppt with $\text{K}_4[\text{Fe}(\text{CN})_6]$
- Sr^{2+} Ca^{2+} , Zn^{2+} , Fe^{3+} , Cu^{2+}

ANSWER KEY

- | | | | |
|-----------------------------------------------------------------|------------------------|-------------------|-------------------|
| 1. (C) | 2. (D) | 3. (C) | 4. (C) |
| 5. (D) | 6. (B) | 7. (C) | 8. (D) |
| 9. (B) | 10. (D) | 11. (B) | 12. (B) |
| 13. (B) | 14. (A) | 15. (C) | 16. (D) |
| 17. (A) | 18. (D) | 19. (C) | 20. (C) |
| 21. (B) | 22. (A) | 23. (A) | 24. (B) |
| 25. (B) | 26. (C) | 27. (C) | 28. (B) |
| 29. (B) | 30. (B) | 31. (C) | 32. (A) |
| 33. (D) | 34. (D) | 35. (C) | 36. (A) |
| 37. (C) | 38. (C) | 39. (C) | 40. (C) |
| 41. (B) | 42. (A) | 43. (A) | 44. (C) |
| 45. (A), (B) | 46. (A), (B), (C) | 47. (B), (D) | 48. (A), (C), (D) |
| 49. (A), (B), (C) | 50. (B), (C), (D) | 51. (C), (D) | 52. (A), (C), (D) |
| 53. (A), (B) | 54. (A), (B) | 55. (B), (C), (D) | 56. (C), (D) |
| 57. (A), (C), (D) | 58. (A), (B), (C), (D) | 59. (C) | 60. (C) |
| 61. (C) | 62. (B) | 63. (B) | 64. (B) |
| 65. (D) | 66. (B) | 67. (B) | 68. (D) |
| 69. (C) | 70. (C) | 71. (C) | 72. (B) |
| 73. (B) | 74. (B) | 75. (B) | 76. (C) |
| 77. (C) | 78. (D) | | |
| 79. (A)- R,S ; (B) - Q; (C) - P,Q,S,T; (D) - P,Q, S, T | | | |
| 80. (A)-Q, R, S; (B) - P, R, T, S ; (C) - Q, T, S (D) - P, R, T | | | |
| 81. (A)- Q,R; (B)-Q; (C)-P; (D)-S,T | | | |
| 82. (A) - P,S ; (B) - T (C) R, S , (D) - Q, R, S, T | | | |
| 83. 3 | 84. 5 | 85. 2 | 86. 2 |
| 87. 3 | 88. Zero | 89. 2 | |