

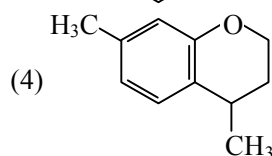
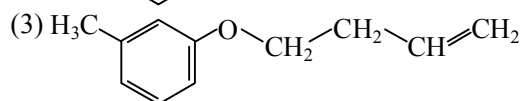
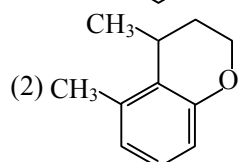
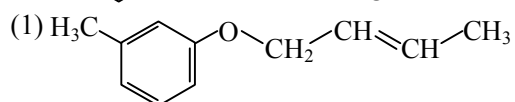
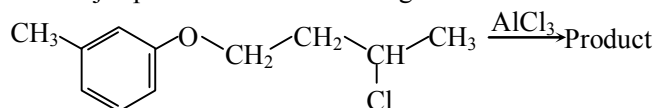
JEE Main Online Exam 2019

Questions & Solutions

10th April 2019 | Shift - II

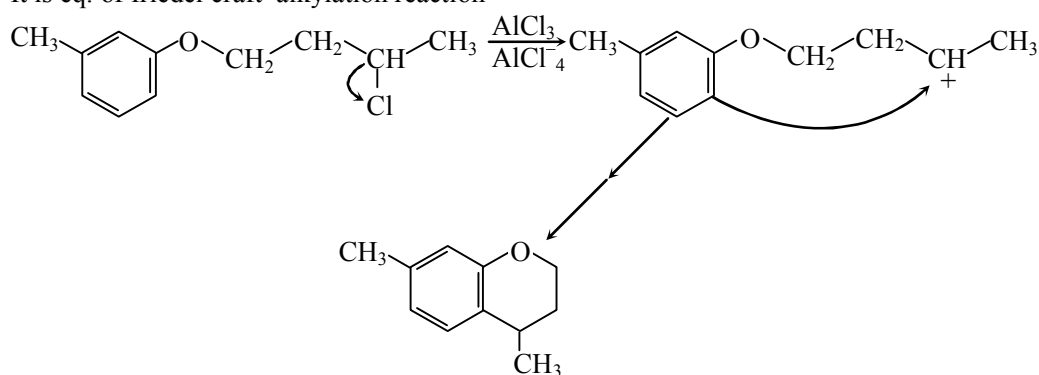
Chemistry

Q.1 The major product obtained in the given reaction is :



Ans. [4]

Sol. It is eq. of Friedel-Craft alkylation reaction

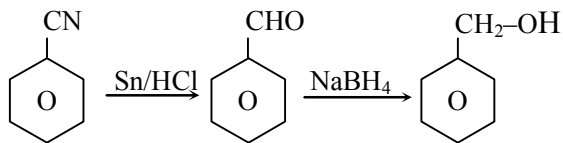


Q.2 Which of the following is not a correct method of the preparation of benzylamine from cyanobenzene ?

- | | |
|--|-----------------------------|
| (1) (i) $\text{SnCl}_2 + \text{HCl}(\text{gas})$ | (ii) NaBH_4 |
| (2) H_2/Ni | |
| (3) (i) LiAlH_4 | (ii) H_3O^+ |
| (4) (i) $\text{HCl}/\text{H}_2\text{O}$ | (ii) NaBH_4 |

Ans. [4]

Sol.



Q.3 The noble gas that does not occur in the atmosphere is :

- (1) Ne (2) He (3) Kr (4) Ra

Ans. [4]

Sol. Radon is not naturally occurring in the atmosphere. Because radon is produced by the radioactive decay of radium – 226

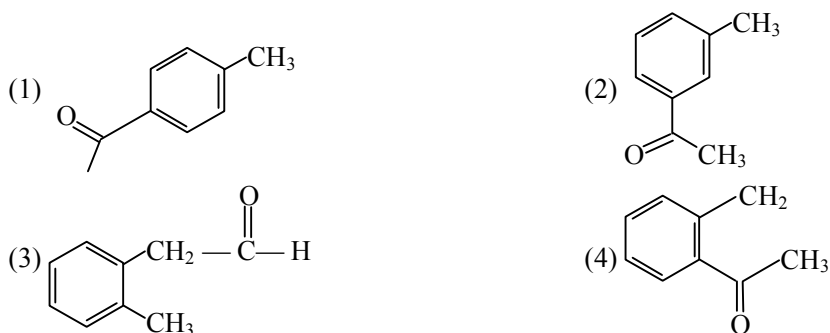
Q.4 The correct statement is :

- (1) zincite is a carbonate ore.
(2) Sodium cyanide cannot be used in the metallurgy of silver.
(3) aniline is a froth stabilizer.
(4) zone refining process is used for the refining of titanium.

Ans. [3]

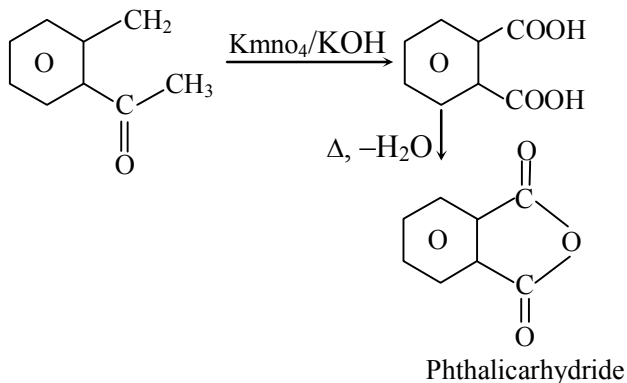
Sol. Aniline is a froth stabiliser

Q.5 Compound A(C₉H₁₀O) shows positive iodoform test. Oxidation of A with KMnO₄/KOH given acid B(C₈H₆O₄). Anhydride of B is used for the preparation of phenolphthalein. Compound A is:



Ans. [4]

Sol.

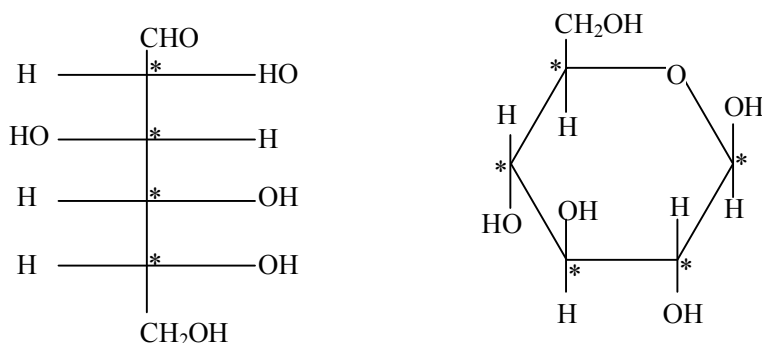


- Q.6** The correct option among the following is :
- (1) Addition of alum to water makes it unfit for drinking.
 - (2) Colloidal medicines are more effective because they have small surface area.
 - (3) Colloidal particles in lyophobic sols can be precipitated by electrophoresis.
 - (4) Brownian motion in colloidal solution is faster if the viscosity of the solution is very high.

Ans. [3]
Sol. fact.

- Q.7** Number of stereo centers present in linear and cyclic structures of glucose are respectively :
- (1) 4 & 4
 - (2) 4 & 5
 - (3) 5 & 4
 - (4) 5 & 5

Ans. [2]
Sol.



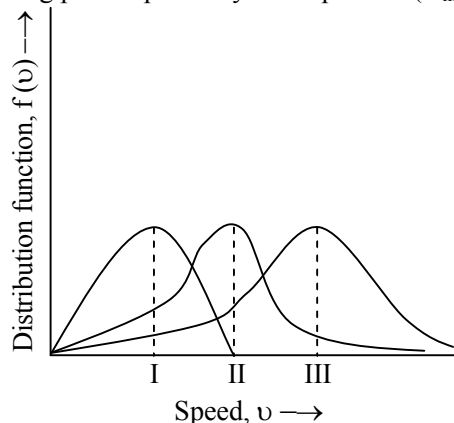
- Q.8** The highest possible oxidation states of uranium and plutonium, respectively are :
- (1) 4 and 6
 - (2) 6 and 4
 - (3) 7 and 6
 - (4) 6 and 7

Ans. [4]
Sol. This highest oxidation state of uranium is +6 whereas of plutonium is +7

- Q.9** In chromatography, which of the following statements is incorrect for R_f ?
- (1) R_f value depends on the type of chromatography.
 - (2) Higher R_f value means higher adsorption.
 - (3) R_f value is dependent on the mobile phase.
 - (4) The value of R_f can not be more than one.

Ans. [2]
Sol. Low polarity compounds are weakly absorbed and has greater R_f value

- Q.10** Points I, II and III in the following plot respectively correspond to (V_{mp} : most probable velocity)

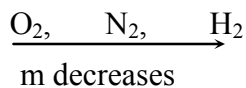


- (1) V_{mp} of O_2 (400 K); V_{mp} of N_2 (300 K); V_{mp} of H_2 (300 K)
- (2) V_{mp} of N_2 (300 K); V_{mp} of H_2 (300 K); V_{mp} of O_2 (400 K)
- (3) V_{mp} of H_2 (300 K); V_{mp} of N_2 (300 K); V_{mp} of O_2 (400 K)
- (4) V_{mp} of N_2 (300 K); V_{mp} of O_2 (400 K); V_{mp} of H_2 (300 K)

Ans. [4]

Sol. $V_{mp} = \sqrt{\frac{2RT}{m}}$

$$V_{mp} \propto \frac{1}{\sqrt{m}}$$



So $V_{mp} \longrightarrow$ increases

$$V_{mp} \text{ of O}_2 = \sqrt{\frac{2 \times R \times 400}{32}}$$

$$V_{mp} \text{ of N}_2 = \sqrt{\frac{2 \times R \times 300}{28}}$$

$$V_{mp} \text{ of H}_2 = \sqrt{\frac{2 \times R \times 300}{2}}$$

$$V_{mp} \text{ of O}_2 < V_{mp} \text{ of N}_2 < V_{mp} \text{ of H}_2$$

I II III

Q.11 The incorrect statement is :

- (1) the color of $[\text{CoCl}(\text{NH}_3)_5]^{2+}$ is violet as it absorbs the yellow light.
- (2) the gemstone, ruby, has Cr^{3+} ions occupying the octahedral sites of beryl.
- (3) the spin-only magnetic moment of $[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$ is 2.83 BM.
- (4) the spin-only magnetic moments of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ are nearly similar.

Ans. [2]

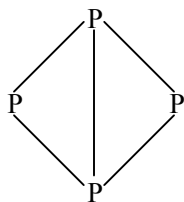
Sol. Because option-4 is incorrect because the hybridisation of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ is sp^3d^2 whereas the hybridisation of $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ is d^2sp^3

Q.12 The number of pentagons in C_{60} and trigons (triangles) in white phosphorus, respectively, are :

- (1) 12 and 3
- (2) 20 and 3
- (3) 20 and 4
- (4) 12 and 4

Ans. [4]

Sol. Because there are almost 12 pentagons in C_{60} and 4 triangles in white phosphorus



Q.13 For the reaction of H_2 with I_2 , the rate constant is $2.5 \times 10^{-4} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 327°C and $1.0 \text{ dm}^3 \text{ mol}^{-1}$ at 527°C . The activation energy for the reaction, in kJ mole^{-1} is : ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)

- (1) 59
- (2) 166
- (3) 72
- (4) 150

Ans. [2]

Q.16 The correct match between Item-I and Item-II is :

	Item-I		Item-II
(a)	High density polythene	(I)	Peroxide catalyst
(b)	Polyacrylonitrile	(II)	Condensation at high temperature & pressure
(c)	Novolac	(III)	Ziegler-Natta Catalyst
(d)	Nylon 6	(IV)	Acid or base catalyst

- (1) (a) → (IV), (b) → (II), (c) → (I), (d) → (III)
(2) (a) → (III), (b) → (I), (c) → (IV), (d) → (II)
(3) (a) → (II), (b) → (IV), (c) → (I), (d) → (III)
(4) (a) → (III), (b) → (I), (c) → (II), (d) → (IV)

Ans. [2]

Sol. Nylon -6 is condensation polymer of capzalocation at higher temp and presser. Novalac is obtained by acid or base catalyored polymerization of phenol and termaldehyde high-density plythere is obtained by using Ziegler natta catalyst. Polyacrylonitrile is obtained by acrylonitrile using peroxide or catalyst

Q.17 The ratio of the shortest wavelength of two spectral series of hydrogen spectrum is found to be about 9. The spectral series are :

- (1) Paschen and Pfund (2) Balmer and Brackett
(3) Lyman and Paschen (4) Brackett and Pfund

Ans. [3]

Sol. Ratio of shortest wavelength of two spectral series wavelength shortest means energy maximum

$$\frac{(\Delta E_{\text{lyman}})_{\text{max}}}{(\Delta E_{\text{pascmen}})_{\text{max}}} = \frac{13.6 \times 2^2 \left(\frac{1}{2} - \frac{1}{\infty} \right)}{13.6 \times 2^2 \left(\frac{1}{9} - \frac{1}{\infty} \right)}$$

$$\frac{(\Delta E_{\text{lyman}})_{\text{max}}}{(\Delta E_{\text{pascmen}})_{\text{max}}} = \frac{9}{1}$$

Q.18 The correct order of the first ionization enthalpies is :

- (1) Ti < Mn < Zn < Ni (2) Zn < Ni < Mn < Ti
(3) Mn < Ti < Zn < Ni (4) Ti < Mn < Ni < Zn

Ans. [4]

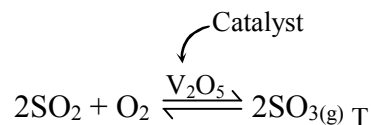
Sol. From theory we locus that Zn > Ni > Mn > Ti

Q.19 For the reaxtion, $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) = 2\text{SO}_3(\text{g})$, $\Delta H = -57.2 \text{ kJ mol}^{-1}$ and $K_C = 1.7 \times 10^{16}$
Which of the following statement is incorrect ?

- (1) The equilibrium will shift in forward direction as the pressure increase.
(2) The addition of inert gas at constant volume will be not affect the equilibrium constant.
(3) The equilibrium constant is large suggestive of reaction going to completion and so no catalyst is required.
(4) The equilibrium constant decreases as the temperature increase.

Ans. [3]

Sol.



Q.20 1 g of a non-volatile non-electrolyte solute is dissolved in 100 g of two different solvents A and B whose ebullioscopic constants are in the ratio of 1 : 5. The ratio of the elevation in their boiling points, $\frac{\Delta T_b(A)}{\Delta T_b(B)}$, is :

(1) 5 : 1

(2) 1 : 0.2

(3) 10 : 1

(4) 1 : 5

Ans. [4]

Sol.
$$\frac{\Delta T_{b(A)}}{\Delta T_{b(B)}} = \frac{(k_b \times m)_A}{(k_b \times m)_B}$$

Molality is same for both the solution

$$= \frac{1}{5} \times 1$$

$$= 1 : 5$$

Q.21 The difference between ΔH and ΔU ($\Delta H - \Delta U$), when the combustion of one mole of heptane (i) is carried out at a temperature T, is equal to :

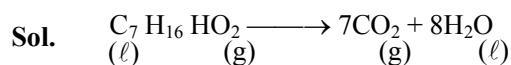
(1) 3 RT

(2) 4 RT

(3) - 3 RT

(4) - 4 RT

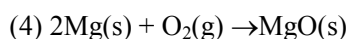
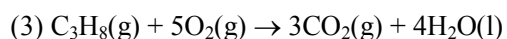
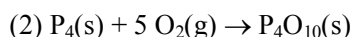
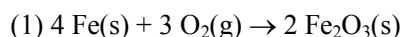
Ans. [4]



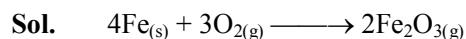
$$\Delta H = \Delta U + \Delta n_g RT$$

$$\Delta H - \Delta U = (7 - 11) RT = - 4RT$$

Q.22 The minimum amount of $\text{O}_2(\text{g})$ consumed per gram of reactant is for the reaction : (Given atomic mass : Fe = 56, O = 16, Mg = 24, P = 31, C = 12, H = 1)



Ans. [1]



$$4 \times 56 \text{ gm} = 3 \times 32 \text{ gm}$$

$$1 \text{ gm} = \frac{3 \times 32}{4 \times 56} = 0.42 \text{ gm}$$

Which is least amount

Q.23 The pH of a 0.02 M NH_4Cl solution will be [given $K_b(\text{NH}_4\text{OH}) = 10^{-5}$ and $\log 2 = 0.301$]

(1) 2.56

(2) 5.35

(3) 4.35

(4) 4.65

Ans. [2]

Sol. pH of 0.02 mNH₄Cl

$$\begin{aligned} \text{pH} &= 7 - \frac{P}{2} - \frac{\log C}{2} \\ &= 7 - \frac{5}{2} - \frac{\log^2 \times 10^{-2}}{2} \\ &= 7 - 2.5 + \frac{1.7}{2} \\ &= 4.50 + 0.85 \\ &= 5.35 \end{aligned}$$

Q.24 Which of these factors does not govern the stability of a conformation in acyclic compounds ?

- (1) Angle strain (2) Torsional strain
(3) Electrostatic forces of interaction (4) Steric interactions

Ans. [1]

Q.25 The correct statements among (a) to (d) are :

- (a) saline hydrides produce H₂ gas when reacted with H₂O.
(b) reaction of LiAlH₄ with BF₃ leads to B₂H₆.
(c) PH₃ and CH₄ are electron - rich and electron - precise hydrides, respectively.
(d) HF and CH₄ are called as molecular
(1) (a), (b), (c) and (d)
(2) (a), (c) and (d) only
(3) (c) and (d) only
(4) (a), (b) and (c) only

Ans. [1]

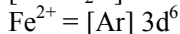
Sol. Statement a, b, c and d are the correct statements as per the facts

Q.26 The crystal field stabilization energy (CFSE) of [Fe(H₂O)₆]Cl₂ and K₂[NiCl₄] respectively, are :

- (1) - 0.4Δ_o and - 0.8Δ_t (2) - 0.6Δ_o and - 0.8Δ_t
(3) - 2.4Δ_o and - 1.2Δ_t (4) - 0.4Δ_o and - 1.2Δ_t

Ans. [1]

Sol. [FeCH₂O]²⁺

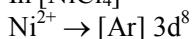


H₂O is a weak field ligand so pairing do not take place

$$\begin{array}{cc} T_{2g} & e_g \\ 2, 1, 1 & 11 \end{array}$$

$$\therefore \text{C.F.S.F} = -0.4 \times 4\Delta_0 + 0.6 \times 2\Delta_0 = -0.4\Delta_0$$

In [NiCl₄]²⁻



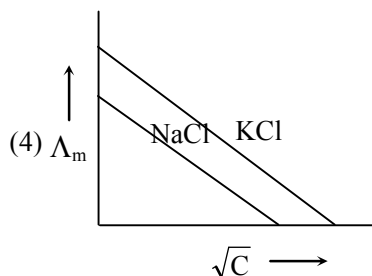
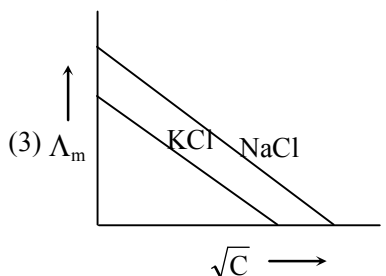
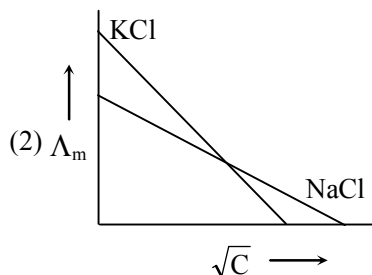
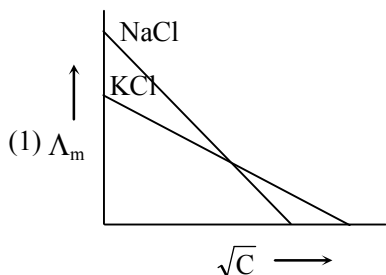
Cl⁻ → weak field ligand, Δ_o pairing do not takes place and have tetrahedral geometry

$$\begin{array}{cc} e_g & t_{2g} \\ 2, 2 & 2, 11 \end{array}$$

$$\text{C.F.S.E} = -0.6 \times 4 \Delta_t + 0.4 \times \Delta_t$$

$$= -2.4 \Delta_t + 1.6 \Delta_t = -0.8\Delta_t$$

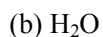
Q.27 Which one of the following graphs between molar conductivity (Λ_m) versus \sqrt{C} is correct



Ans. [4]

Sol. At infinite dilution molar conductivity of KCl is greater than the molar conductivity of NaCl

Q.28 The increasing order of nucleophilicity of the following nucleophiles is :



(1) (b) < (c) < (a) < (d)

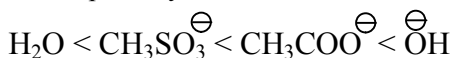
(2) (b) < (c) < (d) < (a)

(3) (a) < (d) < (c) < (b)

(4) (d) < (a) < (c) < (b)

Ans. [1]

Sol. Nucleophilicity order



Q.29 Air pollution that occurs in sunlight is :

(1) oxidising smog

(2) reducing smog

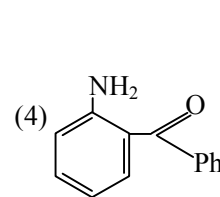
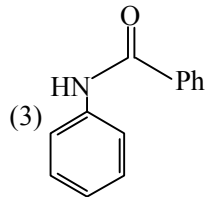
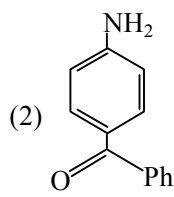
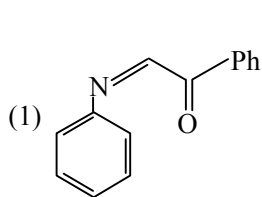
(3) fog

(4) acid rain

Ans. [1]

Sol. A/C to the fact that Oxidizing smog form when the primary pollutants are transformed through photochemical reaction into secondary pollutants the most important of which are oxidant gases, ozone and peroxyacetyl nitrate

Q.30 The major product 'Y' in the following reaction is : $\text{Ph}-\text{C}(=\text{O})-\text{CH}_3 \xrightarrow{\text{NaOCl}} \text{X} \xrightarrow[\text{(ii) aniline}]{\text{(i) SOCl}_2} \text{Y}$



Ans. [3]

Sol.

