Reliable INSTITUTE
Unleashing Potential

JEE MAIN 2023

APRIL ATTEMPT

PAPER-1 (B.Tech / B.E.)

SHIFT - 1

QUESTIONS & SOLUTIONS

Reproduced from Memory Retention

13 APRIL, 2023

9:00 AM to 12:00 Noon

Duration : 3 Hours

Maximum Marks : 300

SUBJECT - CHEMISTRY

Reliable Institute : A-10, Road No.1, IPIA, Kota-324005 (Rajasthan), India
Tel. : 0744-3535544, 2665544 I Website : www.reliablekota.com I E-mail : info@reliablekota.com

CHEMISTRY

1. Find the ratio of spin magnetic moment for complexes $[Cr(CN)_6]^{3-}$ & $[Cr(H_2O)_6]^{3+}$

Ans. **1**

Sol. $Cr^{3+} = 3d^3 \rightarrow t_{2g}^{1,1,1}\ e_g^{0,0}$

both complex has 3 unpaired electron.

2. 250 g solution containing 25% sugar and 500 g solution containing 40% sugar are mixed. Find the mass percentage of sugar in the resulting solution.

Ans. **35%**

Sol. Total mass of solution = 750 g

Total mass of sugar $= 250 \times \frac{25}{100} + 500 \times \frac{40}{100}$

$= \frac{250}{4} + 200$

$= 262.5$ g

Mass % of sugar $= \frac{262.5}{750} \times 100 = 35\%$

3. Correct order of first ionisation energy for second period elements :

Li, Be, B, C, N, O, F

Sol. Li < B < Be < C < O < N < F

4. In a container at a constant temperature arrange the following gases in increasing order of RMS velocity?

Ne, Cl_2, UF_6

(1) $UF_6 < Cl_2 < Ne$ (2) $UF_6 < Ne < Cl_2$ (3) $UF_6 > Cl_2 > Ne$ (4) $Ne < UF_6 < Cl_2$

Ans. **(1)**

Sol. $V_{rms} = \sqrt{\frac{3RT}{M}}$

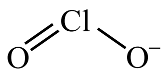
$V_{rms} \Rightarrow UF_6 < Cl_2 < Ne$

5. Match the following species with their shapes :

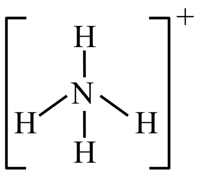
(a) ClO_2^- (p) Linear

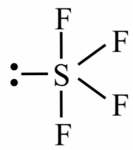
(b)	N_3^-			(q)	Tetrahedral
(c)	NH_4^+			(r)	Bent
(d)	SF_4			(s)	See-saw
	a	**b**	**c**	**d**	
(1)	r	p	q	s	
(2)	p	q	r	s	
(3)	r	s	p	q	
(4)	s	q	r	p	

Ans. **(1)**

Sol. (a) 

(b) $[N{=}N{=}N]^-$

(c) 

(d) 

6. Which of the following set contains ambidentate legends

(1) Cl^-, Br^-, CN^-
(2) Cl^-, OCN^-, NO_2^-
(3) Ox^{2-}, NO_2^-, F^-
(4) OH^-, CN^-, NH_3

Ans. **(2)**

Sol. CN^-, OCN^- and NO_2^- are ambidentate ligand.

7. Given $E^\circ_{Pb^{4+}|Pb} = m$

$E^\circ_{Pb^{2+}|Pb} = n$

The value of $E^\circ_{Pb^{4+}|Pb^{+2}}$ is______.

(1) 2m – n (2) 2m + n (3) 2n – m (4) 2m + n

Ans. (1)

Sol. $Pb^{+4} + 4e^- \longrightarrow Pb \quad \Delta G^\circ = -4\ F\ m$ …..(i)

$Pb^{+2} + 2e^- \longrightarrow Pb \quad \Delta G^\circ = -2\ F\ n$ …..(ii)

on subtraction

$Pb^{+4} + 2e^- \longrightarrow Pb^{+2} \quad \Delta G^\circ = -2F(2m-n) = -2F\ E^\circ_{Pb^{4+}|Pb^{+2}}$

$\Rightarrow E^\circ_{Pb^{+4}|Pb^{+2}} = 2m - n$

8. 0.01 molar aqueous solution of glucose is isotonic with 0.008M aqueous solution of K_2SO_4. Calculate degree of ionisation of K_2SO_4.

Ans. **0.125**

Sol. $\Pi_{glucose} = \Pi_{K_2SO_4}$

$0.01 = i \times 0.008$

$i = \dfrac{0.01}{0.008}$

$i = \dfrac{5}{4} = 1.25$

$i = 1 + \alpha(3 - 1)$

$1.25 = 1 + 2\alpha$

$2\alpha = 0.25$

$\alpha = \dfrac{0.25}{2} = 0.125$

9. Correct statement regarding $GaAlCl_4$.

(1) EN of Ga is greater than Al
(2) Oxidation number of Ga is +3
(3) Ga is co-ordinated with chlorine
(4) Cl is making bond with Ga and Al

Ans. **(1)**

Sol. $Ga^+[AlCl_4]$

Oxidation no. of Ga = +1

10. When a photon of wavelength 'λ' strikes on a metal, the ejected photoelectron has stopping potential = V_0 volt. When another photon of wavelength '2λ' strikes on same metal, the ejected photoelectron has stopping potential of '$\dfrac{V_0}{4}$' volt. The threshold wavelength (λ_0) is

(1) λ
(2) 2λ
(3) 3λ
(4) 4λ

Ans. **(3)**

Sol. $\dfrac{hc}{\lambda} - \dfrac{hc}{\lambda_0} = eV_0$ ……(1)

$\dfrac{hc}{2\lambda} - \dfrac{hc}{\lambda_0} = \dfrac{eV_0}{4}$ ……(2)

$\Rightarrow \dfrac{\dfrac{\lambda_0 - \lambda}{\lambda\lambda_0}}{\dfrac{\lambda_0 - 2\lambda}{2\lambda\lambda_0}} = 4$ $\qquad \Rightarrow \dfrac{\lambda_0 - \lambda}{\lambda_0 - 2\lambda} = 2$

$\Rightarrow \lambda_0 - \lambda = 2\lambda_0 - 4\lambda$ $\qquad \Rightarrow \lambda_0 = 3\lambda$

11. 1 mole each of H_2O and CO react to form CO_2 and H_2 if 40% by weight of H_2O react.

K_C for reaction

$H_2O + CO \rightleftharpoons CO_2 + H_2$

is $x \times 10^{-2}$ find x.

Ans. **44.4**

Sol. $H_2O \quad + \quad CO \quad \rightleftharpoons \quad CO_2 \; + H_2$

$1 - 0.4 \quad 1 - 0.4 \qquad 0.4 \qquad 0.4$

$0.6 \qquad 0.6$

$$K_C = \frac{0.4 \times 0.4}{0.6 \times 0.6}$$

$$= \frac{4}{9}$$

$$= 44.4 \times 10^{-2}$$

12. Which type of copper is formed by the following reactions ?

$$2Cu_2S + 3O_2 \longrightarrow 2Cu_2O + 2SO_2$$

$$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$$

(1) Blister copper
(2) Copper crisp
(3) Reduced copper
(4) Copper slag

Ans. **(1)**

Sol. Blister copper is obtained after self-reduction of copper ore.

13. Find the number of atoms per unit cell if edge length is 408 pm, density = 3 g/cm^3, molar mass = 40 g. (nearest integer)

Ans. **3**

Sol.
$$d = \frac{Z \times 40}{6 \times 10^{23} \times (4.08)^3 \times 10^{-24}}$$

$$3 = \frac{Z \times 40}{6 \times 10^{23} \times 67.92 \times 10^{-24}}$$

$$Z = \frac{3 \times 6 \times 10^{23} \times 67.92 \times 10^{-24}}{40}$$

$$Z = \frac{3 \times 6 \times 67.92}{400}$$

$Z = 3$

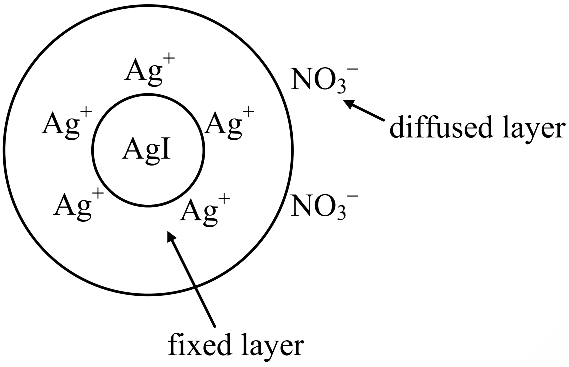
14. To 25 ml of 1M $AgNO_3$, 1.05M KI is added dropwise. In the colloidal solution formed fixed and diffused larger consist of respectively.

(1) I^- and NO_3^- (2) Ag^+ and NO_3^-

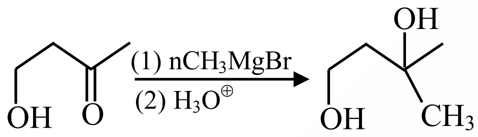
(3) Ag^+ and K^+ (4) K^+ and Ag^+

Ans. 2

Sol.



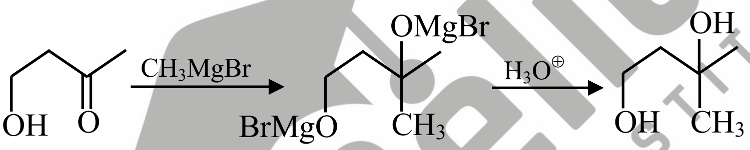
15.



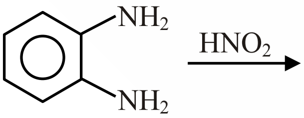
How many moles of CH_3MgBr are used ?

Ans. 2

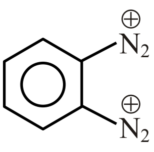
Sol.

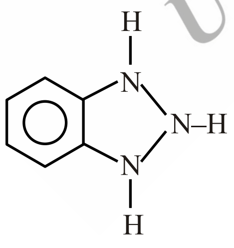


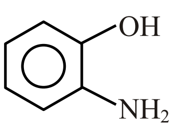
16.

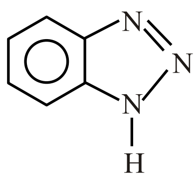


Product is

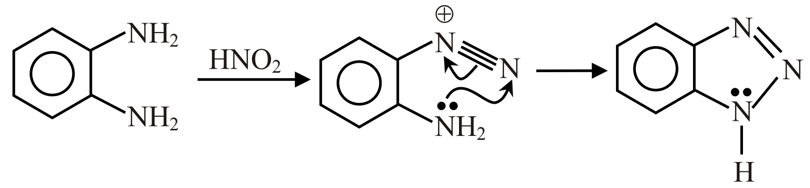
(1) 

(2) 

(3) 

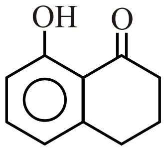
(4) 

Ans. (4)

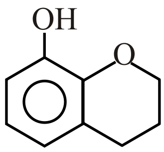
Sol. 

(Aromatic)

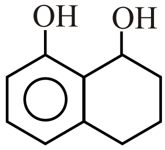
17. The increasing order of electrophilic aromatic substitution reaction is



(I)



(II)



(III)

(1) III > II > I (2) II > III > I (3) I > II > III (4) II > I > III

Ans. (2)

Sol. Rate of electrophilic substitution reaction $\propto$ stability of σ-complex

$\propto$ +I and +m group on benzene ring.

18. Statement-I : If BOD of water body is 4 ppm is a good quality drinking

Statement-II : If Zn and NO_3^- concentration is 5ppm. It is a good quality of drinking water.

(1) Both Statement-I and Statement-II are correct.

(2) Both Statement-I and Statement-II are incorrect.

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

Ans. **(1)**

19. Which of the following polymer formation is catalysed by $A\ell Et_3 + TiC\ell_4$?

(1) Low density polythene (LDPE)

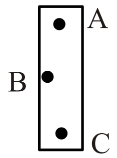
(2) High density polythene consists of linear molecules

(3) Cross linked polymers of phenol & formaldehyde.

(4)

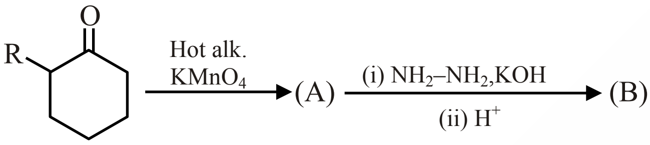
Ans. **(2)**

20. In given chromatograph what is the correct increasing order of eluting power

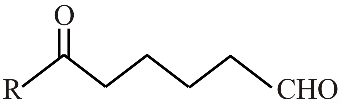


(1) C < B < A (2) B < C < A (3) C < A < B (4) A < C < B

Ans. (1)

21. 

B is :

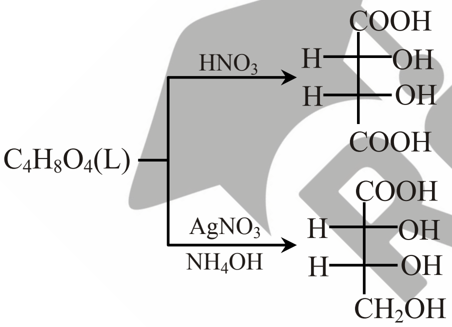
(1) 

(2) 

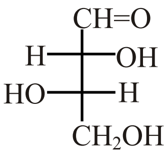
(3) 

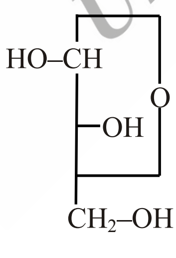
(4) 

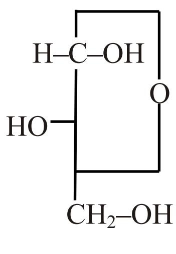
Ans. (4)

22. 

Compound (L) is :

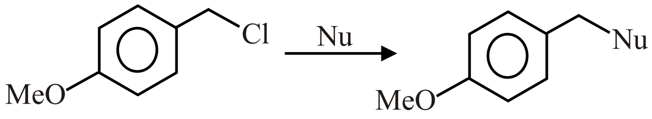
(1) 

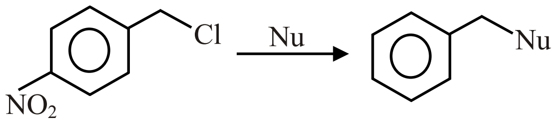
(2) 

(3) 

Ans. (2)

23. Correct option for the given reactions

(i) 

(ii) 

(1) (i) 1st order (ii) 2nd order

(2) (i) 2nd order (ii) 1st order

(3) (i) and (ii) are 1st order

(4) (i) & (ii) are 2nd order

Ans. (1)

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SATYAM CHAKRAVORTY

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