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APRIL ATTEMPT

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

QUESTIONS & SOLUTIONS

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08 APRIL, 2023

9:00 AM to 12:00 Noon

Duration : 3 Hours | Maximum Marks : 300

SUBJECT - CHEMISTRY

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CHEMISTRY

1. The number of d electrons present in CrO_2Cl_2 are same as those present in which of the following?

(A) Fe(III) (B) Mn(VII) (C) Ni(II) (D) Co(II)

Ans. **(B)**

Sol. $CrO_2Cl_2 : d^0$ d electron = 0

$Fe^{3+} : 3d^5$ d electron = 5

$Ni^{2+} : 3d^8$ d electron = 8

$Co^{2+} : 3d^7$ d electron = 7

2. $XeF_4 + SbF_5 \longrightarrow [XeF_m]^{+n} [SbF_p]^{q-}$

The value of m + n + p + q is :

Ans. **11**

Sol. $XeF_4 + SbF_5 \longrightarrow XeF_3^+ \ SbF_6^-$

m = 3

n = 1

p = 6

q = 1

m + n + p + q = 3 + 1 + 6 + 1 = 11

3. The extraction of which of the following metals involves concentration of the ore by leaching ?

(1) Copper (2) Magnesium (3) Gold (4) Potassium

Ans. **(3)**

Sol. $Au + NaCN + H_2O \longrightarrow Na[Au(CN)_2](aq) + NaOH$

(Leachant)

4. Order of Electronegativity of following elements is:

P, Br, At, C

Ans. Br > C > At > P

Sol. Br(2.8) > C(2.5) > At(2.2) > P(2.1)

5. **Statement-1 :** Lithium and Magnesium do not form super oxides.
Statement -2 : Ionic radius of Li^+ is greater than Mg^{2+}.
(1) Both statement-1 & 2 are correct.
(2) Both statement-1 & 2 are incorrect.
(3) Statement-1 is correct but statement-2 is incorrect.
(4) Statement-2 is correct but statement-2 is incorrect.

Ans. **(1)**

6. Consider the reaction
$Cu^{+2} + X^{-1} \longrightarrow Cu_2X_2 + X_2$
product X_2 will be predominantly
(1) only Cl_2 (2) only Br_2 (3) only I_2 (4) All halogens are possible

Ans. (3)

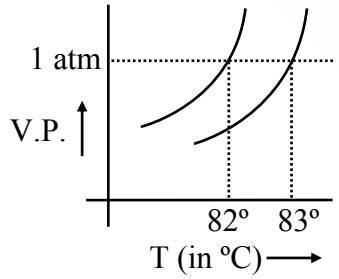
Sol. $Cu^{+2} + I^{-1} \longrightarrow Cu_2I_2 + I_2$

7. How many factors will contribute to major role in covalent character of a compound ?
(a) Polarising power of cation
(b) Polarisibility of the anion
(c) Distortion causd by cation
(d) Polarisibility of cation

Ans. **(3)**

Sol. Covalent character depends on :
(a) Polarising power of cation
(b) Polarisibility of the anion
(c) Distortion caused by cation

8. Given below are the variation of V.P. of solution and solvent with temperature. Determine boiling point of solvent.



Ans. **82°C**

9. 0.5 gram of an organic compound having 60% C evolves $x \times 10^{-1}$ gm CO_2 on complete combustion. Determine x.

Ans. **11**

Sol. Mass of C = $0.5 \times \frac{60}{100}$

Moles of C = $\frac{\frac{0.5 \times 60}{100}}{12} = n_{CO_2}$

Mass of CO_2 = $\frac{0.5 \times \frac{60}{100}}{12} \times 44 = 1.1 \text{ g} = 11 \times 10^{-1} \text{ g}$

x = 11

10. Order of spin only magnetic moment of the following complexes is :

(I) $K_3[CoF_6]$ (II) $[MnBr_4]^{2-}$ (III) $[Fe(CN)_6]^{-4}$ (IV) $[Ni(NH_3)_6]^{2+}$

Ans. **II > I > IV > III**

Sol.

		No. of unpaired electrons
$[CoF_6]^{3-}$	$\Rightarrow 3d^6$	$n = 4$; $\mu = \sqrt{24}$ B.M.
$[MnBr_4]^{2-}$	$\Rightarrow 3d^5$	$n = 5$; $\mu = \sqrt{35}$ B.M.
$[Fe(CN)_6]^{4-}$ (SFL)	$\Rightarrow 3d^6$	$n = 0$; $\mu = 0$
$[Ni(NH_3)_6]^{2+}$	$\Rightarrow 3d^8$	$n = 2$; $\mu = \sqrt{8}$ B.M.

11. Gypsum is added to cement as

(1) It helps in slowing down process of settling of cement.

(2) It helps in fast settling of cement.

(3) It helps in hardening of cement.

(4) It reacts with cement to form stable compound.

Ans. **(1)**

Sol. It helps in slowing down process of settling of cement.

12. How many of the following statements are correct regarding relation between activation energy, rate constant and temperature?

(a) If temperature dependence on rate constant in large, more will be the activation energy.

(b) If activation energy is zero, then rate constant is independent of temperature.

(c) If temperature dependence on rate constant is small, less will be the activation energy.

(d) If activation energy is negative, more will be the temperature dependence on rate constant.

Ans. **(3)**

Sol. a, b, c are correct

13. Which of the following complex is octahedral, diamagnetic and most stable ?

(1) $K_3[Co(CN)_6]$ (2) $[Ni(NH_3)_6]Cl_2$ (3) $[Co(H_2O)_6]Cl_3$ (4) $Na_3[CoCl_6]$

Ans. (1)

Sol. * All are octahedral

* Diamagnetic are

$K_3[Co(CN)_6]$ & $[Co(H_2O)_6]Cl_3$

* Out of these two $K_3[Co(CN)_6]$ is more stable (SFL)

14. $2IO_3^{-1} + xI^{-1} + 12H^+ \longrightarrow 6I_2 + 6H_2O$

x is :

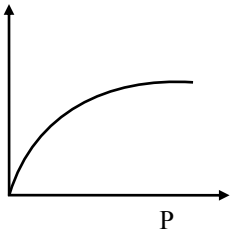
(1) 2 (2) 6 (3) 10 (4) 12

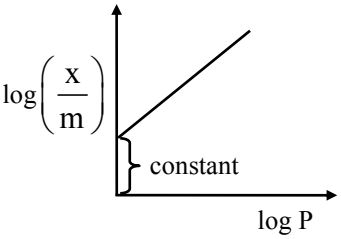
Ans. **(3)**

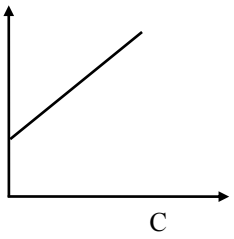
Sol. Balanced chemical reaction is :

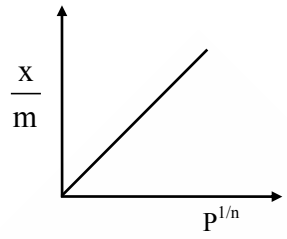
$2IO_3^{-1} + 10I^{-1} + 12H^+ \longrightarrow 6I_2 + 6H_2O$

15. The correct graph regarding Freundlich adsorption isotherm

(A) 

(B) 

(C) 

(D) 

(1) A, B only (2) A, B, D only (3) B, C, D only (4) B, C only

Ans. **(2)**

Sol. As per Freundlich isotherm

$$\frac{x}{m} = k(P)^{1/n} \Rightarrow \log\left(\frac{x}{m}\right) = \log k + \frac{1}{n}\log(P)$$

16. Which cell representation is correct for the reaction given

$H_2 + 2AgCl_{(s)} \longrightarrow 2H^+ + 2Ag + 2Cl^-$

(1) $Pt_{(s)} \mid H_{2(g)} \mid HCl_{(aq)} \mid AgCl_{(s)} \mid Ag_{(s)}$

(2) $Pt_{(s)} \mid H_{2(g)} \mid KCl_{(aq)} \mid AgCl_{(s)} \mid Ag_{(s)}$

(3) $Pt_{(s)} \mid H_{2(g)} \mid HCl_{(aq)} \mid AgNO_{3(aq)} \mid Ag_{(s)}$

(4) $Pt_{(s)} \mid H_{2(g)} \mid KCl_{(aq)} \mid AgNO_{3(aq)} \mid Ag_{(s)}$

Ans. **(1)**

Sol. $Pt_{(s)} \mid H_{2(g)} \mid HCl_{(aq)} \mid AgCl_{(s)} \mid Ag_{(s)}$

Anode: $H_2 \longrightarrow 2H^+ + 2e^-$

Cathode: $AgCl_{(s)} + e^- \longrightarrow Ag + Cl^-$

Net cell reaction:

$H_2 + 2AgCl_{(s)} \longrightarrow 2H^+_{(aq)} + 2Ag + 2Cl^-(aq)$

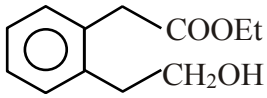
17. Match the following compound with maximum prescribed concentration of metals or ions in drinking water.

(A) F^-	(P) 5 ppm
(B) Zn	(Q) 500 ppm
(C) SO_4^{-2}	(R) 50 ppm
(D) NO_3^-	(S) 1 ppm

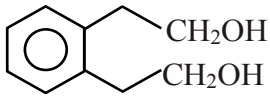
Ans. A → S, B → P, C → Q, D → R

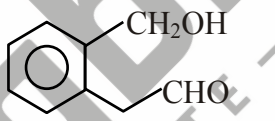
18. 

A is :

(1) 

(2) 

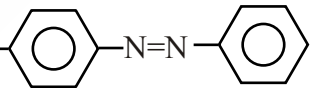
(3) 

(4) 

Ans. **(2)**

Sol. $LiBH_4$ reduce ester to alcohol.

19. Match the products of reactions between benzene diazonium salt with the following reagents.

Reagents	Products
(A) Ph–NH_2	(p) Ph–CN
(B) Cu/HCl	(q) Ph–Cl
(C) CuCN	(r) Ph-F
(D) HBF_4, Heat	(s) 

(1) A-s, B-q, C-p, D-r

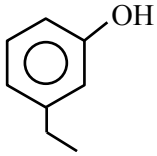
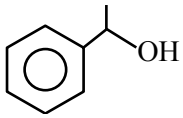
(2) A-q, B-s, C-p, D-r

(3) A-s, B-q, C-r, D-p

(4) A-s, B-p, C-q, D-r

Ans. **(1)**

20. Match the following with their characteristic laboratory tests?

Column–I (Compounds)	**Column–II (Lab test)**
(1) 	(p) Neutral $FeCl_3$
(2) 	(q) Chloroform in alkali potash
(3) 	(r) NaOI + KI
(4)	(s)

Ans. **(1-q) ; (2–p) (3–r)**

21. Match the following

Column-I	**Column-II**
(1) First artificial sweetening agent	(p) Alitame
(2) Stable at cooking temperature	(q) Sucralose
(3) High potency sweetener	(r) Saccharin
(4) Unstable at cooking temperature	(s) Aspartame

Ans. **(1) → (r), (2) → (q), (3) → (p), (4) → (s)**

22. Sulphur containing amino acids among the followings

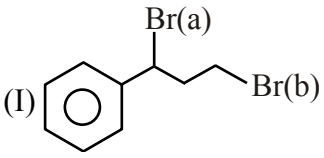
(a) Cysteine (b) Alanine (c) Isoleucine

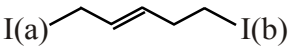
(d) Methionine (e) Proline

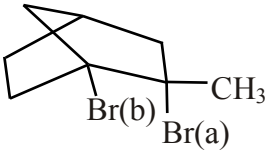
(1) a & b (2) c & d (3) a & d (4) d & e

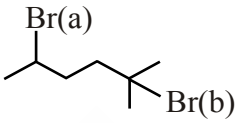
Ans. **(3)**

23. Which of the following will have higher rate towards S_N1 reaction (Site)

(I) 

(II) 

(III) 

(IV 

(1) I → Br(a), II → I(a), III → Br(a), IV → Br(b)

(2) I → Br(b), II → I(b), III → Br(a), IV → Br(b)

(3) I → Br(a), II → I(b), III → Br(a), IV → Br(b)

(4) I → Br(a), II → I(b), III → Br(b), IV → Br(a)

Ans. **(1)**

24. A hydrocarbon gives ethanal and propanone on ozonolysis. Calculate the molecular mass of hydrocarbon.

Ans. **70**

Sol. $CH_3–CH=\underset{\displaystyle CH_3}{\overset{|}{C}}–CH_3 \xrightarrow[2.\ Zn,H_2O]{1.\ O_3} CH_3–CH=O + O=\underset{\displaystyle CH_3}{\overset{|}{C}}–CH_3$

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