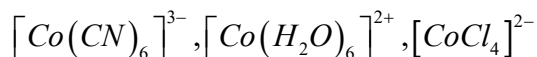


1. Arrange the following complex in increasing order of intensity of colour.



Ans: 1

Sol:

|    | Complex             | Colour |
|----|---------------------|--------|
| 1. | $[Co(CN)_6]^{3-}$   | Yellow |
| 2. | $[Co(H_2O)_6]^{2+}$ | Pink   |
| 3. | $[CoCl_4]^{2-}$     | Blue   |

2. Which of the following does not disproportionate



Ans: 4

Sol: In  $BrO_4^-$ , Br is in maximum oxidation state. So it can only reduce

3. A metal M on reaction with excess oxygen give  $MO_2$  type oxide (as main product) then possible metal is.



Ans: 3

Sol:  $K + O_2 (excess) \rightarrow KO_2$

Potassium on reaction with excess oxygen given superoxide

4. Identify the correct increasing order of 1<sup>st</sup> ionization energy of following

Al, Mg, Si, S, P

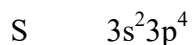
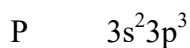


Ans: 2

Sol: Mg  $3s^2$

Al  $3s^2 3p^1$

Si  $3s^2 3p^2$



So correct order : Al<Mg<Si<S<P

5. Four moles of a diatomic gas is heated from  $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ , find the heat supplied to the gas if work done by it is zero.

- (1) 780 R                      (2) 500 R                      (3) 100 R                      (4) 650 R

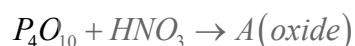
Ans: 2

Sol:  $w=0$

$$\Delta E = q_v = nC_v\Delta T$$

$$4 \times \frac{5R}{2} \times 50 = 500R$$

6.  $\text{HNO}_3$  an reaction with  $\text{P}_4\text{O}_{10}$  gives an oxide 'A'



Nature of oxide A is

- (1) acidic                      (2) Basic                      (3) Neutral                      (4) Amphoteric

Ans: 1

Sol:  $\text{P}_4\text{O}_{10} + 4\text{HNO}_3 \rightarrow 2\text{N}_2\text{O}_5 + 4\text{HPO}_3$

'A'

Nature of oxide 'A' is "acidic"

7. An equimolar mixture of benzene ( $P_{\text{Benzene}}^0 = 70$  torr and methyl benzene ( $P_{\text{Methyl Benzene}}^0 = 20$  torr) is prepared, then find mole fraction of benzene is vapour phase.

Ans: 0.7

Sol:  $P_{\text{Total}} = P_{\text{Benzene}}^0 X_{\text{Benzene}} + P_{\text{Toluene}}^0 X_{\text{Toluene}}$

$$= (70)\frac{1}{2} + (20)\frac{1}{2}$$

$$= 35 + 10$$

$$= 45$$

$$\frac{1}{P_{\text{Total}}} = \frac{Y_{\text{Benzene}}}{P_{\text{Benzene}}^0} + \frac{Y_{\text{Toluene}}}{P_{\text{Toluene}}^0}$$

$$\frac{1}{45} = \frac{Y_{\text{Benzene}}}{70} + \frac{1 - Y_{\text{Benzene}}}{20}$$

$$\frac{1}{45} = \frac{2Y_{Benzene} + 7(1 - Y_{Benzene})}{140}$$

$$\frac{1}{45} = \frac{2Y_{Benzene} + 7 - 7Y_{Benzene}}{140}$$

$$\frac{1}{45} = \frac{7 - 5Y_{Benzene}}{140}$$

$$\frac{1}{9} = \frac{7 - 5Y_{Benzene}}{28}$$

$$28 = 63 - 45Y_{Benzene}$$

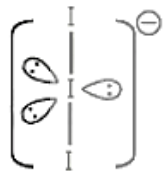
$$Y_{Benzene} = \frac{35}{45} = \frac{7}{9}$$

$$Y_{Benzene} = 0.7$$

8. Find total number of lone pair of electron on central atom in  $I_3^-$

Ans: 3

Sol:



Total lone pair on central atom=3.

9. Which of the following have positive electrode potential for reaction  $M_{(aq)}^{2+} + 2e^- \rightarrow M$ .

(1) Co

(2) Ni

(3) Cu

(4) Zn

Ans: 3

Sol:

10. Which of the following is most easily economically refined by Fractional distillation.

(1) Zn

(2) Ni

(3) Cu

(4) Fe

Ans: 1

Sol: "Theory Based"

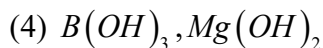
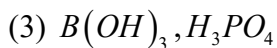
Fractional distillation process utilizes the boiling point difference between metal and that of impurity.

Using this process, crude zinc containing Cd, Fe and Pb as impurities can be refined.

11. Among the following pairs which is incorrect regarding similarity in properties.

(1)  $Be(OH)_2, Al(OH)_3$

(2)  $NaOH, Ca(OH)_2$



Ans: 1

Sol:  $B(OH)_3$  is  $H_3BO_3$  is acidic in nature.

$Mg(OH)_2$  is basic in nature.

12. Statement-1: Dihedral angle of  $H_2O_2$  in gas is around  $90^\circ$ .

Statement-2: Dihedral angle of  $H_2O_2$  in solid is around  $111.5^\circ$ .

(1) True, True

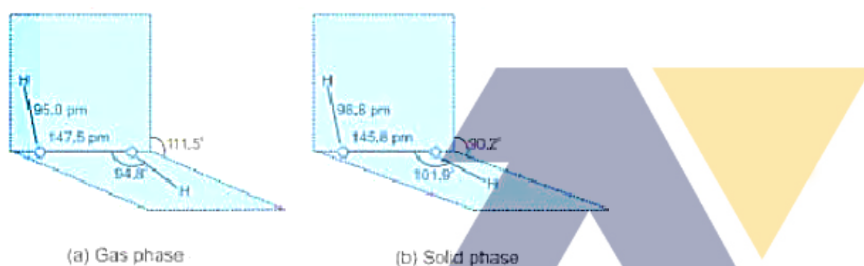
(2) True, False

(3) False, True

(4) False, False

Ans: 4

Sol:



(a)  $H_2O_2$  structure in gas phase, dihedral angle is  $111.5^\circ$ . (b)  $H_2O_2$  structure in solid phase at 110 K dihedral angle is  $90.2^\circ$ .

The dihedral angle of  $H_2O_2$  in gaseous phase is approximate  $111.5^\circ$ . While dihedral angle in solid  $H_2O_2$  is affected by hydrogen bonding and it is  $90.2^\circ$  in solid state.

13. 4.5 gram mass of a substance [molar mass = 90 g/mol] is dissolved in 250 ml solution, then molarity of solution is-

Ans: 0.2

Sol: Molarity (M) =  $\frac{W_{solute} \times 1000}{GMM_{solute} \times V_{sol}^l}$

$$M = \frac{4.5 \times 1000}{90 \times 250} = \frac{4.5 \times 4}{90} = 0.2M .$$

14. What is the magnetic moment (Spin only) of complex  $[Co(CN)_6]^{4-}$

[Report your answer to nearest integer]

Ans: 2

Sol:

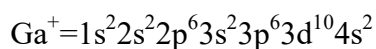
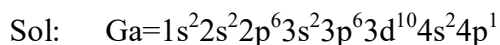
15. 10000 KJ energy is needed per day, if heat of combustion of glucose is 2700 KJ/mole. Then how many gram of glucose is needed per day for this: [Report your answer to nearest integer].

Ans: 667

Sol:

16. The value of  $\ell$  (azimuthal quantum number) for valence shell electron of  $\text{Ga}^+$  ion is \_\_\_\_.

Ans: 0



Azimuthal Quantum number ( $\ell$ ) for valence shell electron is 0.

17. What is the difference in energy between 2<sup>nd</sup> and 3<sup>rd</sup> orbit  $\text{He}^+$  ion (in eV) is-

[Report your answer to nearest integer]

Ans: 8

Sol:  $(E_{\text{He}^+})_{n=2} = -13.6 \times \frac{(2)^2}{(2)^2} = -13.6 \text{ eV}$

$$(E_{\text{He}^+})_{n=3} = -13.6 \times \frac{(2)^2}{(3)^2} = -13.6 \times \frac{4}{9}$$

$$(E_{\text{He}^+})_{n=3} - (E_{\text{He}^+})_{n=2} = 13.6 \left[ 1 - \frac{4}{9} \right]$$

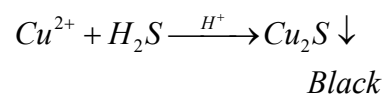
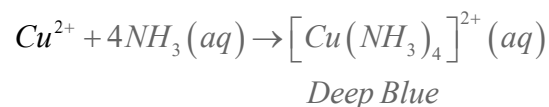
$$= 13.6 \left[ \frac{5}{9} \right] = 7.55 \text{ eV}$$

18. Anion of a compound 'x' gives brown ring test and cation gives deep blue coloration with  $\text{NH}_4\text{OH}$  and also gives precipitate with  $\text{HCl}$  &  $\text{H}_2\text{S}$ , then compound 'x' is

- (1)  $\text{Cu}(\text{NO}_3)_2$       (2)  $\text{Pb}(\text{NO}_3)_2$       (3)  $\text{Pb}(\text{NO}_2)_2$       (4)  $\text{Zn}(\text{NO}_3)_2$

Ans:

Sol: Nitrates give brown ring test.

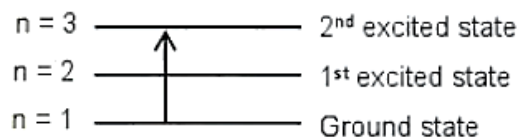


19. What is the value of second excitation energy of  $\text{Li}^{2+}$

- (1) 108.8 eV      (2) 81.6 eV      (3) 13.6 eV      (4) 95.2 eV

Ans: 1

Sol:

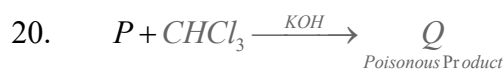


$$|\Delta E_{n=2+}|_{1 \rightarrow 3} = 13.6 \times 2^2 \left[ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$$

$$= 13.6 \times (3)^2 \left[ \frac{1}{1} - \frac{1}{9} \right]$$

$$= 13.6 \times 9 \left[ \frac{8}{9} \right]$$

$$= 13.6 \times 8 = 108.8 eV$$

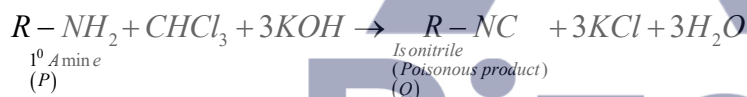


Identify compound P and Q respectively

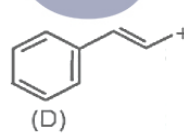
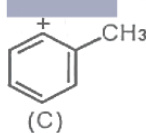
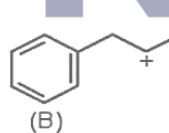
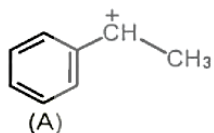
- (1) Primary amine, secondary amine      (2) Primary amine, Primary amine  
 (3) Primary amine, Isonitrile              (4) Secondary amine, Isonitrile

Ans: 3

Sol: Only 1<sup>0</sup> amines give carbylamines reaction



21. In which of the following carbocation are resonance stabilized



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

Ans:

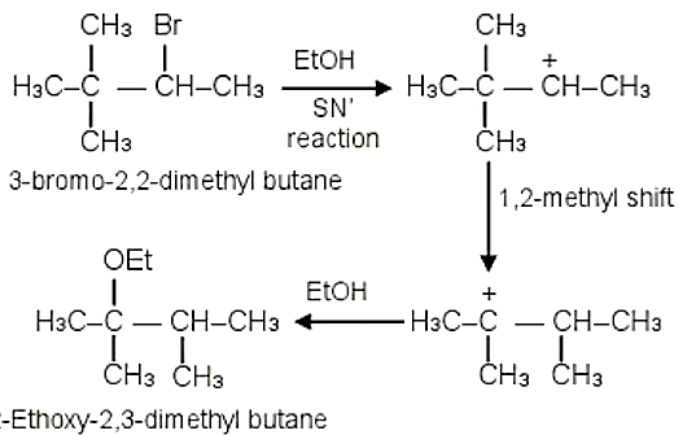
Sol:

22. When ethanol reacts with 3-Bromo-2,2-dimethyl butane then product formed is:

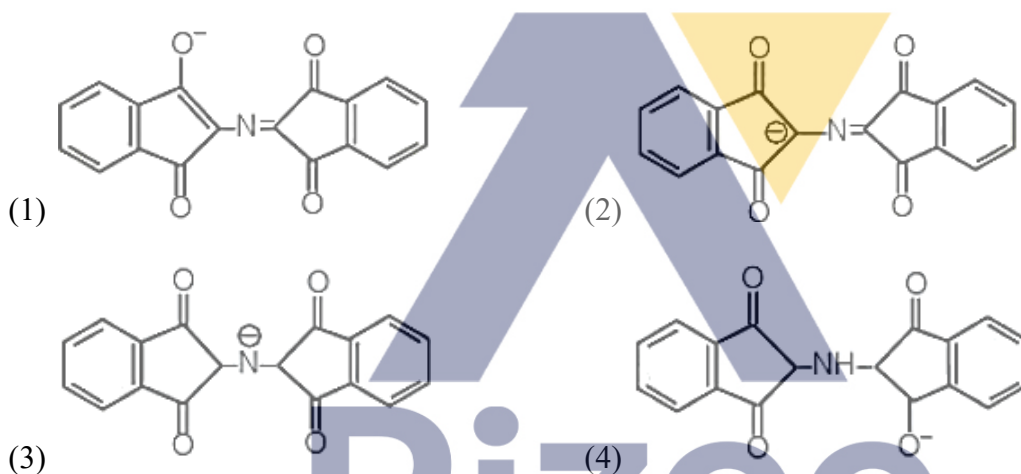
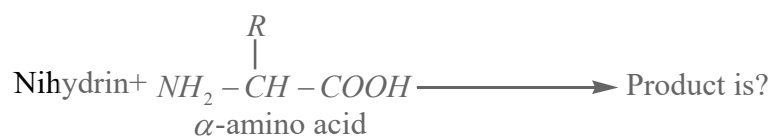
- (1) 2,2-Dimethyl-3-ethoxybutane              (2) 2-Ethoxy-2,3-dimethyl butane  
 (3) 2-Ethoxy-2-methyl pentane              (4) 3-Ethoxy-2,2-Dimethyl butane

Ans: 2

Sol:

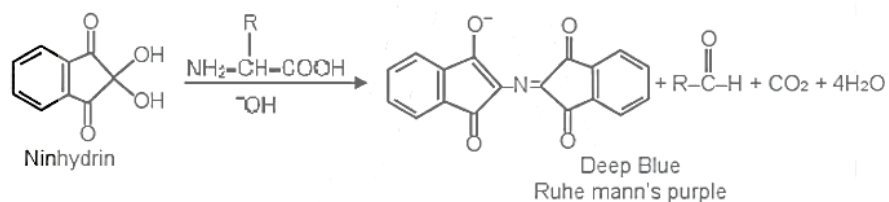


23.



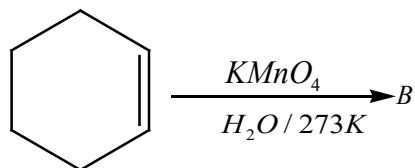
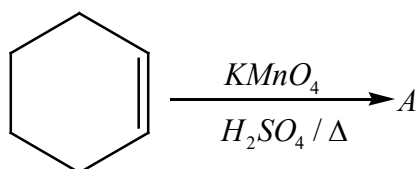
Ans: 1

Sol:



Ninhydrin is useful for identification of  $\alpha$ -amino acid which react with ninhydrin and give deep blue colour.

24.

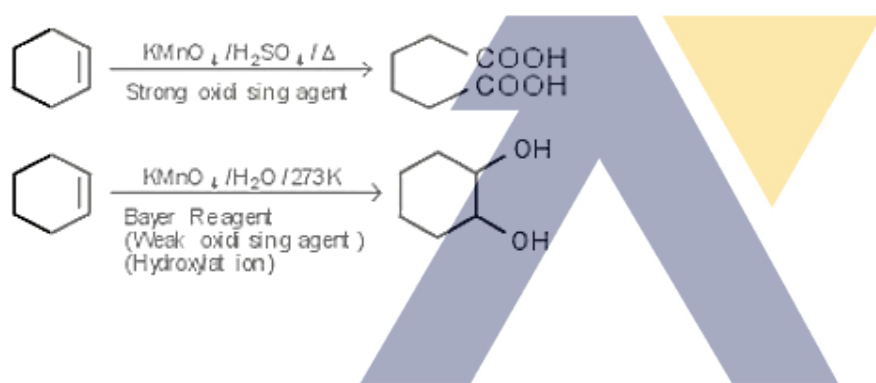


A, B are respectively.

- (1) Both diol (2) Both dicarboxylic acid  
 (3) A is dicarboxylic acid and B is diol (4) A is diol and B is dicarboxylic acid

Ans: 3

Sol:

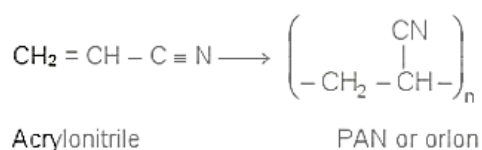


25. Orlon is a:

- (1) Polyamide (2) Polyester (3) Polyacrylonitrile (4) Polycarbonate

Ans: 3

Sol: Orlon is a polymer of acrylonitrile also known as PAN



26. Which of the following is better for green chemistry in day to day life (Domestic Purpose)

- (1)  $\text{Cl}_2\text{C}=\text{CCl}_2$  as dry cleaning agent liquid (2) Liquid  $\text{CO}_2$  for cloth cleaning  
 (3)  $\text{Cl}_2$  gas a bleaching agent of paper (4)  $\text{CCl}_4$  as dry cleaning agent

Ans: 2

Sol:  $\text{CCl}_2=\text{CCl}_2$  was earlier used as solvent for dry cleaning agent but it is carcinogen. So liquid  $\text{CO}_2$  is used. Replacement of halogenated solvent by liquid  $\text{CO}_2$  will result in less harm to ground water.

27. Which of the following incorrect:

- (1) Amylose is branched (2) Starch is made up of  $\alpha$ -glucose



(3) Glycogen is also called animal starch (4)  $\beta$ -glycosidic linkage for cellulose

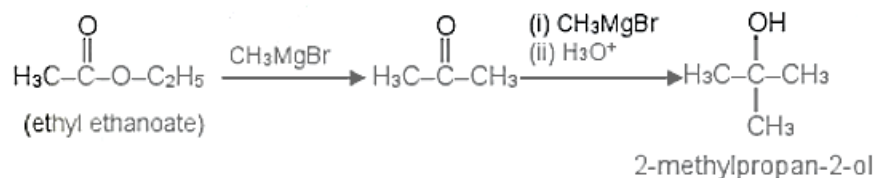
Ans: 1

Sol:

28. How many mole of  $CH_3MgBr$  are required to convert ethylethanoate to 2-methylpropan-2-ol

Ans: 2

Sol:



29. Which condition is required to show tyndall effect by colloidal solution

- (1) The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.
- (2) The refractive indices of dispersed phase and the dispersion medium are exactly same in magnitude.
- (3) The refractive indices of the dispersed phase and the dispersion medium do not differ much in magnitude.
- (4) None of these

Ans: 1

Sol:

  
Rizee