

## CHEMISTRY

### JEE (MAIN AND ADVANCED) CHEMISTRY

#### REVISION EXERCISE

#### Solutions

1. The density (in  $\text{g mL}^{-1}$ ) of a 3.6M sulphuric acid solution that is 29%

$\text{H}_2\text{SO}_4$  by mass will be

A. 1.88

B. 1.22

C. 1.45

D. 1.64

**Answer:**

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2. 3.92 g. of Mohr salt [mol. wt = 392] is present in 100 ml of an aqueous solution. The sulphate ion concentration of the resulting solution is

A. 1M

B. 2M

C. 0.2M

D. 0.02M

**Answer:**

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3. 100 ml of 1M HCl, 200 ml of 2M HCl and 300 ml of 3M HCl are mixed with enough water to get 1M solution. The volume of water to be added is (in ml)

A. 600

B. 700

C. 800

D. 125

**Answer:**



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4. A solution is 0.1M with respect to KCl and 0.2M with respect to  $MgCl_2$  .

The molarity of  $Cl^-$  ions in the solution is

A. 0.1M

B. 0.3M

C. 0.2M

D. 0.1M

**Answer:**



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5. The number of milli equivalents of solute present 10 ml of 0.1N solution are

- A. 1
- B. 10
- C. 100
- D. 0.1

**Answer:**



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6. The volume of 0.05N  $Na_2CO_3$  solution required to neutralise 200ml of 0.02M  $H_2SO_4$  solution is

- A. 80ml

B. 140ml

C. 160ml

D. 240ml

**Answer:**



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7. The weight of  $KMnO_4$  that can oxidise 100 ml of. 0.2M oxalic acid in acidic medium is

A. 1.58 g

B. 1.264 g

C. 12.64g

D. 15.8g

**Answer:**



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8. 0.84 g, of an acid of Molecular weight 225 is present in 100ml of the solution. 25ml of this solution required 28 ml of N/10 NaOH solution for complete neutralisation. The basicity of the acid is

- A. 1
- B. 2
- C. 3
- D. 4

**Answer:**



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9. A tablet of vitamin 'C' is analysed for its ascorbic acid content. One tablet reacts exactly with 20ml of 0.1 N NaOH solution. The equivalent weight of ascorbic acid is 176. The tablet contains \_\_\_ mg of ascorbic acid

A. 0.352

B. 3.52

C. 35.2

D. 352

**Answer:**



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**LIST - 1**

A) 0.5M  $\text{H}_2\text{SO}_4$  solution

B) 0.1M  $\text{NaCl}$  solution

C) 0.2M  $\text{AlCl}_3$  solution

D) 0.5M  $\text{H}_3\text{PO}_4$  solution

**LIST - 2**

1) 0.1N solution

2) 1N solution

3) 1.5N solution

4) 2.0N solution

5) 0.6N solution

The correct match is

| A | B | C | D |
|---|---|---|---|
| 2 | 5 | 1 | 3 |
| 2 | 1 | 5 | 3 |

| A  | B | C | D |
|----|---|---|---|
| 2) | 4 | 2 | 1 |
| 4) | 5 | 4 | 2 |

10.



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11. A sample of NaOH weighing 0.4 g. is added to 100 ml of 0.1N  $H_2SO_4$  solution. The nature of the resulting solution is

- A. acidic
- B. basic
- C. neutral
- D. amphoteric

**Answer:**



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12. Density of a 2.05 M solution of acetic acid in waer is  $1.02 \text{ g } ml^{-1}$ .

The molarity of the solution si

- A. 2.3
- B. 0.49



C. 0.06

D. 0.43

**Answer:**



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**13.** Which of the following solutions is more concentrated in each pair

I: 0.5 M KCl (or) 0.5 wt% in water

II: 1.75 M glucose (or) 1.75 m glucose in water

**I**

1) 0.5 M KCl

2) 0.5 Wt% KCl

3) 0.5 M KCl

4) 0.5 Wt% KCl

**II**

1.75 M glucose

1.75 M glucose

1.75 m glucose

1.75 m glucose



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14. The vapour pressure of a pure liquid 'A' is 60mm, at  $25^{\circ}C$ . It forms an ideal solution with another liquid 'B'. The mole fraction of 'B' is 0.6 and the total Pressure is 64mm. Then the vapour pressure of 'B' at  $25^{\circ}C$  is

A. 66.6mm

B. 75 mm

C. 52mm

D. 120mm

**Answer:**



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15. Two liquids A and B form an Ideal solution. At 300K, the V.P of solution containing one mole of 'A' and 4 mole 'B' is 560mm Hg. At the same temp. If one mole of 'B' is taken out from the solution the V.P of the solution has decreased by 10mm Hg, the V.P, of pure A & B are (in mm)

A. 400, 600

B. 500, 500

C. 300, 700

D. 200, 800

**Answer:**



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**16.** At certain temperature, the solution of benzene in toluene exhibits the vapour pressure (in m bar) represented as  $P = 150x + 65$ , where 'x' is mole fraction of benzene, the vapour pressure of pure benzene is

A. 150 m bar

B. 65 m bar

C. 90 m bar

D. 215 m bar

**Answer:**



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17. A solute has 2:3 molar ratio of toluene to benzene. The vapour pressure of benzene and toluene at  $25^{\circ}C$  are 95 and 28 bar respectively.

The mole fraction of Toluene vapour is

A. 0.658

B. 0.326

C. 0.548

D. 0.855

**Answer:**



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18. If 2 moles of A and 3 moles of B are mixed to form an ideal solution vapour pressure of A and B are 120 and 180 mm of Hg respectively, then the composition of A and B in the Vapour phase when the first traces of vapour are formed in the above case is

A.  $X_A^1 = 0.407$

B.  $X_A^1 = 0.8$

C.  $X_A^1 = 0.109$

D.  $X_A^1 = 0.307$

**Answer:**



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19. A solution has 1:4 molar ratio of pentane and hexane. The vapour pressure of pure hydro-carbons at  $20^\circ C$  are 440 mm Hg for pentane and 120 mm of Hg for hexane. The mole fraction of pentane in vapour phase would be

A. 0.200

B. 0.478

C. 0.547

D. 0.786

**Answer:**



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**20.** If two substance A and B have  $P_A : P_B = 1 : 2$  and also  $X_A : X_B$  in solutions as 1 : 2, then mole fraction of A in vapours is

A. 0.33

B. 0.25

C. 0.52

D. 0.2

**Answer:**

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21. 6 g. of a non volatile solute is dissolved in 90g. of water, such that the lowering in vapour pressure is 2%. The molecular weight of the solute is

A. 65

B. 92

C. 69

D. 80

**Answer:**

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22. The vapour pressure of water at  $20^{\circ}C$  is 17.54mm Hg. then the vapour pressure of the water in the apparatus shown after the piston is lowered, decreasing the volume of the gas above the liquid to one half of its initial volume (temp. constant) is

A. 8.77 mmHg

B. 17.54mm Hg

C. 35.08 mm Hg

D. between 8.77 and 17.54 mmHg

**Answer:**



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**23.** An aq. solution containing 64% by weight of volatile liquid 'A' (molecular mass 128) has pressure of 145mm, then vapour pressure of 'A' is (V.P. of  $H_2O$  is 155 mm)

A. 150mm

B. 145mm

C. 105mm

D. 21mm



**Answer:**



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**24.** The percentage composition by weight of an aqueous solution of a solute (molecule mass 150) which boils at  $373.26$  is

- A. 5
- B. 15
- C. 7
- D. 10

**Answer:**



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**25.** 'x' gm of solute (M. mass = 342) should be dissolved in 500gm of water so as to get a solution having difference of  $105^{\circ}C$  between freezing

point and boiling point, then 'x' is

A. 159

B. 259

C. 359

D. 459

**Answer:**



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**26.** Two solutions of glucose have osmotic pressures 1.5 and 2.5 atm. 1L of first is mixed with 2L of second solution, the osmotic pressure of the resultant solution is

A.  $2.5 + 1.5 \text{ atm}$

B.  $2.5 - 1.5 \text{ atm}$

C.  $\frac{2.5 + 1.5}{2} \text{ atm}$

D.  $2.16\text{atm}$

**Answer:**



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27. 18 g glucose and 6 g urea are dissolved in 1L of solution at  $27^{\circ}\text{C}$ , the osmotic pressure in atm of the solution will be

A. 1.9

B. 2.9

C. 3.9

D. 4.9

**Answer:**



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**28.** The osmotic pressure of blood is 7.40 atm. at  $27^{\circ}C$  . Number of mole of glucose to be used per liter for an intravenous injection that is to have the same osmotic pressure as blood is

A. 0.2

B. 0.1

C. 0.3

D. 0.4

**Answer:**



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**29.** The osmotic pressure of a phenol solution in an organic solvent is determined to be 20% less than expected, it is due to

A. Phenol is 20% ionised

B. Phenol is 20% dimerised

C. Phenol is 40% dimerised

D. Phenol is 80% dimerised

**Answer:**



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**30.** The amount of ice that will separate out on cooling the solution containing 50g of ethylene glycol ( $CH_2OH$ )<sub>2</sub> in 200 g of water at  $-9.3^\circ C$  is

A. 276 g

B. 188 g

C. 138 g

D. 38.71 g

**Answer:**



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31. A 5.25% solution of a substance is isotonic with 1.5% solution of urea in the same solvent. If the densities of both the solutions are assumed to be equal to  $1 \text{ g cm}^{-3}$  the molar mass of the substance will be

A.  $115 \text{ g mol}^{-1}$

B.  $105 \text{ g mol}^{-1}$

C.  $210 \text{ g mol}^{-1}$

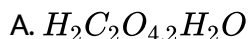
D.  $90 \text{ g mol}^{-1}$

**Answer:**



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32. 3.15 grams of solute is present in 200ml of 0.25 M solution. The solute may be



B.  $\text{HCl}$

C.  $\text{H}_2\text{SO}_4$

D.  $\text{HNO}_3$

**Answer:**



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**33.** The amount of  $\text{K}_2\text{SO}_4$  (in gms) present in dissolved state of 100ml of solution whose K concentration is 0.075M

A. 0.65

B. 6.5

C. 65

D. 650

**Answer:**



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**34.** A 0.01 M ammonia solution is 5% ionised. The concentration of  $OH^-$  ions is

A.  $5 \times 10^{-3} M$

B.  $5 \times 10^{-4} M$

C.  $1 \times 10^{-4} M$

D.  $5 \times 10^{-2} M$

**Answer:**



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**35.** On dissolving 1 mole of each the following acids, in 1 litre water, the acid which does not give a solution of strength 1N

A. Hydrochloric acid

B. Perchloric acid



C. Nitric acid

D. Phosphoric acid

**Answer:**



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**36.** The density of  $NH_4OH$  solution is found to be 0.6 g/ml. It contains 34% by weight of  $NH_4OH$ . Calculate the normality of the solution.

A. 4.8 N

B. 10N

C. 0.5N

D. 5.8N

**Answer:**



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37. A sample of  $Na_2CO_3 \cdot H_2O$  weighing 0.62 is added to 100 ml of 0.1N  $H_2SO_4$  solution. What will be the resulting solution?

- A. Acidic
- B. Neutral
- C. Basic
- D. Both 1 and 3

**Answer:**



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38. The number of moles of  $KMnO_4$  that will be needed to react completely with one mole of ferrous oxalate in acidic solution is

- A.  $3/5$
- B.  $2/5$
- C.  $4/5$

D. 1

**Answer:**



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**39.** The number of moles of  $KMnO_4$  that will be needed to react with one mole of sulphite ion in acidic solution is

A.  $2/5$

B.  $3/5$

C.  $4/5$

D. 1

**Answer:**



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40. An aqueous solution of 6.3g oxalic acid dihydrate is made upto 250 ml. the volume of 0.1 N NaOH required to completely neutralise 10 ml of this solution is

- A. 40ml
- B. 20ml
- C. 10ml
- D. 4ml

**Answer:**



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41. To convert 12 g of  $NaH_2PO_4$  completely into  $Na_3PO_4$ , the volume of 1 molar NaOH required is

- A.  $200cm^3$
- B.  $100cm^3$

C.  $80\text{cm}^3$

D.  $120\text{cm}^3$

**Answer:**



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**42.** The molarity and molality of a solution of sulphuric acid are 11.07 and 21.91 respectively. The density of the solution in g/ml is

A. 4.36

B. 0.795

C. 2.18

D. 1.59

**Answer:**



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**43.** The vapour pressure of pure benzene is 640 mm at 298K. A solution of a solute in benzene shows a vapour pressure of 630 mm at the same temperature. Then the mole fraction of the solute is

A. 0.016

B. 0.18

C. 0.2

D. 0.25

**Answer:**



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**44.** The vapour pressure of a solvent decreased by 10 mm of mercury, when a non-volatile solute was added to the solvent. The mole fraction of the solute in the solution is 0.2. What should be the mole fraction of the solvent, if the decrease in the vapour pressure is to be 20 mm of mercury ?

A. 0.2

B. 0.4

C. 0.6

D. 0.8

**Answer:**



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**45.** The molal elevation constant of water is 0.51. The boiling point of 0.1 molal aqueous NaCl solution is nearly:

A.  $100.05^{\circ}C$

B.  $100.1^{\circ}C$

C.  $100.2^{\circ}C$

D.  $101.0^{\circ}C$

**Answer:**

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46. 0.004M  $\text{Na}_2\text{SO}_4$  is isotonic with 0.01M glucose. Degree of dissociation of  $\text{Na}_2\text{SO}_4$  is :

- A. 0.5
- B. 0.25
- C. 0.75
- D. 0.85

**Answer:**

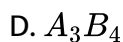
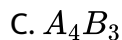
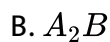
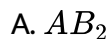
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**Solid State**

1. In a solid AB having the NaCl structure. 'A' atoms occupy the corners of the cubic unit cell. If all the edge-centred atoms along one of the axes are



removed, then the resultant stoichiometry of the solid is



**Answer: C**



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2. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1g ? (atomic masses : Na = 23, Cl=35.5)

A.  $1.71 \times 10^{21}$

B.  $2.57 \times 10^{21}$

C.  $5.14 \times 10^{21}$

D.  $1.28 \times 10^{21}$

**Answer: B**



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3. A Binary solid has rocksalt structure The edge length is 400 pm and the radius of cation is 75 pm, the radius of anion is

A. 100pm

B. 125pm

C. 250pm

D. 325pm

**Answer: B**



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4. NaCl is doped with  $2 \times 10^{-2}$  mole% of  $SrCl_2$  then the number of cation vacancies per mole

A.  $10.046 \times 10^{18}$

B.  $12.046 \times 10^{19}$

C.  $12.046 \times 10^{21}$

D.  $6.023 \times 10^{21}$

**Answer: B**



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5. If one mole of  $\text{AgCl}$  is doped with  $10^{-5}$  mole of  $\text{CaCl}_2$  then number of  $\text{Ag}^+$  ions lost from the lattice

A.  $10^{-5}$

B.  $6 \times 10^{18}$

C.  $1.2 \times 10^{19}$

D.  $3 \times 10^{18}$

**Answer: C**

6. Correct statements regarding F-centres are (a) they impart magnetic properties to the crystal (b) they impart colour to crystals (c) they increases the conductivity of crystals The correct answers are

- A. only b
- B. only c
- C. only b and c
- D. a, b and c

**Answer: D**

7. If one mole of  $\text{AgCl}$  is dopped with  $10^{-5}$  mole of  $\text{AlCl}_3$ , the number of cation vacancies created are

A.  $10^{-5}$

B.  $6 \times 10^{18}$

C.  $12 \times 10^{18}$

D.  $12 \times 10^{19}$

**Answer: C**



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8. In which of the following the electric dipoles are spontaneously polarised even in the absence of electric field.

A. Rochelle salt

B.  $TbTiO_3$

C.  $SiO_2$

D.  $PbZrO_3$

**Answer: A**



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9. The electricity produced on applying stress on the crystals is called

- A. Pyroelectricity
- B. Piezoelectricity
- C. Ferroelectricity
- D. Anti-ferroelectricity

**Answer: B**



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## Chemical Kinetics

1.  $N_2 + 3H_2 \rightarrow 2NH_3$ . The rate of disappearance of nitrogen is  $0.02 \text{ mol L}^{-1} \text{ s}^{-1}$ . What is the rate of appearance of ammonia ?

A. -0.02 mol

B. Zero

C. 0.1132g

D. 0.17 g

**Answer: C**



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2. For  $A \rightarrow B$ ,  $[A]$  changed from  $4.4 \times 10^{-2}M$  to  $3.2 \times 10^{-2}M$  in 25 min. Now  $\frac{-\Delta[A]}{\Delta t}$  will be

A.  $4.8 \times 10^{-4} \text{min}^{-1}$

B.  $4.8 \times 10^{-4}M \cdot s^{-1}$

C.  $9.6 \times 10^{-3}M \cdot s^{-1}$

D.  $2.4 \times 10^{-4}M \cdot \text{min}^{-1}$

**Answer: A**

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3. A gaseous phase reaction  $A_2 \rightarrow B + 0.5C$  shows an increase in pressure from 100 mm to 120 mm in 5 min. Now,  $-\frac{\Delta[A_2]}{\Delta t}$  should be

A.  $8\text{mm} - \text{min}^{-1}$

B.  $4\text{mm} - \text{min}^{-1}$

C.  $16\text{mm} - \text{min}^{-1}$

D.  $2\text{mm} - \text{min}^{-1}$

**Answer: A**

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4. For  $N_2O_5 \rightarrow 2NO_2 + 1/2O_2$ , it is found that

$$\frac{-d}{dt}[N_2O_5] = k_1[N_2O_5], \frac{d}{dt}[NO_2] = k_2[N_2O_5], \frac{d}{dt}[O_2] = k_3[N_2O_5] \quad ,$$

then



A.  $k_1 = 2k_2 = 3k_3$

B.  $2k_1 = 4k_2 = k_3$

C.  $2k_1 = k_2 = 4k_3$

D.  $k_1 = k_2 = k_3$

**Answer: C**



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5. In the process  $nA(g) \rightarrow mB(g)$  , rate of disappearance of A is  $5 \times 10^3 M - \text{min}^{-1}$  & rate of appearance of B is  $10^{-2} M - \text{min}^{-1}$  at same instant. Then values of n & m respectively are

A. 2,3

B. 1,2

C. 2,1

D. 4,3

**Answer: B**



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6. For the process  $2A \rightarrow \text{products}$ , rate of reaction w.r.t A at 10th second is  $2 \times 10^{-2} M - s^{-1}$  then rates of same process at 5th & 15th seconds (order  $\neq 0$ ) respectively are (in M/s)

A.  $10^{-4}$  &  $4 \times 10^{-2}$

B.  $2.7 \times 10^{-2}$  &  $1.6 \times 10^{-2}$

C.  $1.6 \times 10^{-2}$  &  $2.7 \times 10^{-2}$

D.  $2 \times 10^{-2}$  &  $2 \times 10^{-2}$

**Answer: B**



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7. For  $N_2 + O_2 \rightarrow 2NO$ , initially  $N_2$  &  $O_2$  are at pressures 500mm & 700 mm at  $t = 0$ . If the pressure of  $N_2$  is 480 mm at  $t = 20$  min average rate of reaction is

A. 5

B. 1

C. 2

D. 4

**Answer: B**



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8.  $H_2O_2$  decomposes with first order kinetics in a 3 lit. container. If the pressure developed in 10 min. is 380 mm, the average rate at  $27^\circ C$  is

A.  $0.01M. \text{min}^{-1}$

B.  $0.002M. \text{min}^{-1}$

C.  $0.05M \cdot \text{min}^{-1}$

D.  $0.06M \cdot \text{min}^{-1}$

**Answer: B**



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9. For  $H_2 + Cl_2 \xrightarrow{h\nu} 2HCl$ , rate of reaction at  $t=0$  is given by rate=  
 $-\frac{d}{dt}[H_2] = 6 \times 10^{-3}M - \text{min}^{-1}$  then rate of the reaction at  $t = 30$   
min is

A.  $\frac{-d}{dt}[Cl_2] = 2 \times 10^{-4}M - \text{min}^{-1}$

B.  $\frac{1}{2} \frac{d}{dt}[HCl] = 12 \times 10^{-3}M - \text{min}^{-1}$

C.  $\frac{-d}{dt}[Cl_2] = 6 \times 10^{-3}M - \text{min}^{-1}$

D. zero

**Answer: C**



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10. For  $SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$ , Pressure of  $SO_2Cl_2$  changed from 5 atm to 4 atm in 10 min. Then, pressure of  $SO_2Cl_2$  at the end of 30 minutes will be (in atm)

A. 2.56

B. 3.56

C. 4.56

D. 5.56

**Answer: A**



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11. In the process  $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ , at  $t = 10$  rate of reaction w.r.t  $N_2O_5$ ,  $NO_2$  &  $O_2$  respectively are

| $\text{N}_2\text{O}_5$ | $\text{NO}_2$ | $\text{O}_2$ |
|------------------------|---------------|--------------|
| 1) 500mm/min           | 400mm/min     | 200mm/min    |
| 2) 1000mm/min          | 1000mm/min    | 500mm/min    |
| 3) 1000mm/min          | 2000mm/min    | 4000mm/min   |
| 4) 400mm/min           | 400mm/min     | 400mm/min    |

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12.  $K$ ,  $A$  &  $E_a$  of a process at  $25^\circ\text{C}$  respectively are  $5 \times 10^{-4}\text{s}^{-1}$ ,  $6 \times 10^{14}\text{s}^{-1}$  &  $108\text{ kJ/mol}$ . Then the value of rate constant as time  $\rightarrow \infty$  will be

A.  $1.2 \times 10^{18}$

B. 0

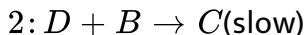
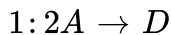
C.  $6 \times 10^{14}$

D.  $5 \times 10^{-4}$

**Answer: D**

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13. The process  $2A + B \rightarrow C$  taking place in two steps:



then rate of reaction gets

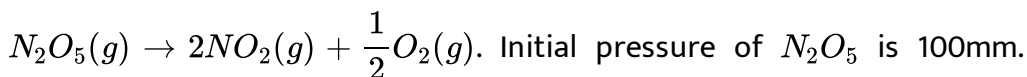
- A. doubled when [B] is halved
- B. doubled when [A] is doubled
- C. doubled when [B] is doubled
- D. quadrapled when [A] is doubled

**Answer: C**



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14. Thermal decomposition for  $N_2O_5(g)$  follows 1st order kinetics as per



After 10 minutes, the pressure developed is 130mm, what is rate constant?

A.  $0.693\text{min}^{-1}$

B.  $0.025\text{min}^{-1}$

C.  $2.303 \times 10^{-4}\text{min}^{-1}$

D.  $0.03\text{min}^{-1}$

**Answer: B**



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**15.** For  $\text{SO}_2\text{Cl}_2(g) \rightarrow \text{SO}_2(g) + \text{Cl}_2(g)$  Pressures of  $\text{SO}_2\text{Cl}_2$  at  $t = 0$  and  $t = 20$  minutes respectively are 700 mm & 350 mm. When  $\log (P_0/p)$  is plotted against time (t), slope equals to

A.  $1.505 \times 10^{-2}\text{s}^{-1}$

B.  $1.202 \times 10^{-3}\text{min}^{-1}$

C.  $1.505 \times 10^{-2}\text{min}^{-1}$

D.  $0.3465\text{min}^{-1}$



**Answer: C**



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**16.** Decomposition of  $NH_3$  on Pt surface follows zero order kinetics. If the initial pressure is 4 atm, the product of  $t_{1/2}$  and  $k$  equals to

A. 2atm

B. 4atm

C. 16atm

D. 1.414 atm

**Answer: A**



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**17.** Thermal decomposition of  $HI(g)$  on Gold surface follows Zero order kinetics. With initial pressure 1000 mm. If the pressure after 20 sec is 960

mm w.r.t HI(g) rate constant is

- A. 40
- B. 20
- C. 2
- D.  $\sqrt{28}$

**Answer: C**



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**18.** For  $2SO_2 + O_2 \rightarrow 2SO_3$  , rate of disappearance of  $SO_2$  is  $4 \times 10^{-3} M - s^{-1}$  at  $t=10$  sec. Then, the amount of  $SO_3$  formed & amount of  $O_2$  consumed at  $t = 10$  sec respectively are

- A. 0.1g, 0.1g
- B. 0.1g, 0.2 g
- C. 0.0169, 0.064g

D. 0.32g, 0.064g

**Answer: D**



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**19.** For  $2A \rightarrow B$ ,  $[A]$  changed from 0.08M to 0.04M in 100 seconds. Now

$\frac{\Delta[B]}{\Delta t}$  will be

A.  $2 \times 10^{-4} M s^{-1}$

B.  $4 \times 10^{-4} M s^{-1}$

C.  $8 \times 10^{-4} M s^{-1}$

D.  $1.2 \times 10 M s^{-1}$

**Answer: A**



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20. For  $N_2O_4(g) \rightarrow 2NO_2(g)$ , pressure is found to be increased from 700 mm to 800 mm in 10 min. Then  $\frac{-\Delta[P]}{\Delta t}$  with respect to  $N_2O_4$  is

A. 10 mm/min

B. 70 mm/min

C. 80 mm/min

D. 150 mm/min

**Answer: A**



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21. For  $2H_2O_2 \rightarrow 2H_2O + O_2$ . If

$$\frac{-d}{dt}[H_2O_2] = K_1[H_2O_2]$$

$$\frac{+d[H_2O]}{dt} = K_2[H_2O_2]$$

$$\frac{+d[O_2]}{dt} = K_3[H_2O_2]$$

A.  $k_1 = k_2 = k_3$

B.  $k_1 = k_2 = 2k_3$

C.  $2k_1 = 2k_2 = k_3$

D.  $k_1 = k_2 = 4k_3$

**Answer: B**



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22. For  $CH_4 + Cl_2 \xrightarrow{h\nu}$  product, rate of reaction at  $t=0$  is given by rate  $= \frac{-d}{dt}[CH_4] = 2 \times 10^{-4} M - \text{min}^{-1}$ , then rate of the reaction at  $t = 20 \text{ min}$  is

A. rate  $= \frac{-d}{dt}[CH_4] = 10^{-4}$

B. rate  $= \frac{-d}{dt}[Cl_2] = 2 \times 10^{-4}$

C. rate  $= \frac{-d}{dt}[CH_4] = 4 \times 10^{-4}$

D. rate  $= \frac{-d}{dt}[Cl_2] = 0$

**Answer: B**

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23. For the process  $X(g) \rightarrow$  products, (order  $\neq 0$ ), rates of disappearances of X at  $t = 0, t = 50\text{sec}$  &  $t = 30\text{ sec}$  respectively are  $p, q$  &  $r$  mol/lit/sec then

A.  $p < q < r$

B.  $r < p < q$

C.  $q > r > p$

D.  $p > r > q$

**Answer: D**

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24.  $A \rightarrow B, K_1 = 0.693 \text{ sec}^{-1}$

$C \rightarrow D, K_2 = 0.693 \text{ min}^{-1}$ .

If  $t_1$  and  $t_2$  are half lives of two reactions, then

A.  $t_1 = t_2$

B.  $t_1 = 60t_2$

C.  $t_2 = 60t_1$

D.  $t_2 = 2.303t_1$

**Answer: C**



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**25.**  $A \rightarrow B$  and  $C \rightarrow D$  are first order reactions. Ratio of  $t_{99.9\%}$  values is 4:1, then, ratio of rate constants  $K_1$  to  $K_2$  is

A. 4:1

B. 2:1

C. 1:1

D. 1:4

**Answer: D**

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26. For a first order reaction temperature coefficient is 2. If the value of  $K$  at 310K is  $2 \times 10^{-2} \text{ min}^{-1}$ ,  $t_{1/2}$  of reaction at 300K will be (in min)

- A. 69.3
- B. 23.03
- C. 46.06
- D. 69.1

**Answer: A**

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27. For a first order process,  $\frac{-E_a}{RT}$  value is -23.03, then value of  $\frac{K}{A}$  is

- A.  $10^{2.303}$
- B.  $10^{-10}$



C.  $10^{-23.03}$

D.  $10^{10}$

**Answer: B**



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**28.** For  $2H_2O_2 \rightarrow 2H_2O + O_2$ ,  $t_{0.5} = 0.301hr$ . When  $[H_2O_2]$  at  $t = 0$  is 0.5 M, initial rate is

A.  $2.303M \cdot h^{-1}$

B.  $1.151M \cdot h^{-1}$

C.  $4.606M \cdot h^{-1}$

D.  $0.301M \cdot h^{-1}$

**Answer: B**



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29. For  $2NH_3(g) \xrightarrow[\Delta]{Pt}$  products follows zero order kinetics. If  $t_{1/2}$  at  $p = 4$  atm is 25 sec,  $t_{1/2}$  at  $p = 16$  atm will be (in sec)

A. 6.25

B. 625

C. 100

D.  $(25)^{\frac{1}{4}}$

Answer: C



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30. The rate constant of a reaction at 200K is 10 times less than rate constant at 400K. Value of  $E_a$ ? [R = gas constant]

A. 1842.4R

B. 921.2R

C. 460.6R

**Answer: B****Watch Video Solution**

31. The chemical reaction  $2O_3 \rightarrow 3O_2$  proceeds as follows :

$O_3 \xrightarrow{\text{Fast}} O_2 + O$  and  $O + O_3 \xrightarrow{\text{Slow}} 2O_2$  the rate law expression should be

A.  $r = K[O_3]^2$

B.  $r = K[O_3]^2[O_2]^{-1}$

C.  $r = K[O_3][O_2]^2$

D.  $r = K[O_3][O_2]^2$

**Answer: B****Watch Video Solution**

32. For producing the effective collisions the colliding molecules must have

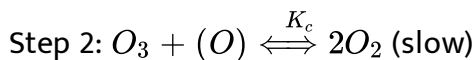
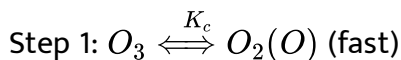
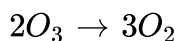
- A. a certain minimum amount of energy
- B. energy equal to or greater than threshold energy
- C. proper orientation
- D. both threshold energy and proper orientation

**Answer: D**



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33. Depletion of ozone occurs as :



What is the order of the reaction

A. 1

B. 2

C. 3

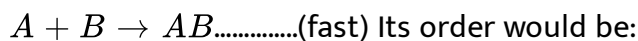
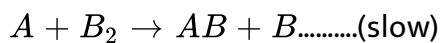
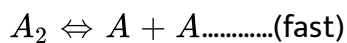
D. 0.5

**Answer: A**



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**34.** A reaction  $A_2 + B_2 \rightarrow 2AB$  occurs by the following mechanism:



A. 2

B. 1

C. 1.5

D. 0

**Answer: C**



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**35.** For  $2A(g) + B(g) \rightleftharpoons 3C(g)$ , Pressure of A at  $t = 0$  is 500 mm, then total pressure of A, B & C at  $t = 10$  min is( in mm)

A. 100

B. 400

C. 540

D. 250

**Answer: C**



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**36.** 900 ml of pure & dry  $O_2$  is subjected to  $O_2$  silent electric discharge, so that after a time 10 min. volume of ozonized oxygen is found to be 870

ml. Now, average rate of reaction in this interval is (in ml/min)

- A. 3
- B. 9
- C. 90
- D. 60

**Answer: B**



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**37.** 90% of first order process  $X \rightarrow Y$  is completed in a time equals to 99% of another first order process  $Y \rightarrow Q$ . If K value of  $Y \rightarrow Q$  is  $0.09 \text{ sec}^{-1}$ , K value of  $X \rightarrow Y$  will be

- A. 0.27
- B. 0.3
- C. 0.03

D. 0.045

**Answer: D**



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**38.** For a first order process  $A \rightarrow B$ , rate constant  $k_1 = 0.693\text{min}^{-1}$  & another first order process  $C \rightarrow D$ ,  $k_2 = x\text{min}^{-1}$ . If 99.9% of  $C \rightarrow D$  requires time same as 50% of reaction  $A \rightarrow B$ , value of  $x$ ?

A. 0.0693

B. 6.93

C. 23.03

D. 13.86

**Answer: B**



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39. For Products, the concentration of sucrose changes from 0.06 M to 0.03 M in 30 minutes. Then, concentration of sucrose at the end of 60 minutes will be

- A. Zero
- B. 0.015 M
- C. 0.09 M
- D. 0.12 M

**Answer: B**



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## Electrochemistry

1. Same amount of electric current is passed through solutions of  $AgNO_3$  and HCl. If 1.08 g of silver is obtained in the first case, the volume of hydrogen liberated at S.T.P. in the second case is

A.  $112\text{cm}^3$

B.  $22400\text{cm}^3$

C.  $224\text{cm}^3$

D.  $1.008\text{g}$

**Answer: A**



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2. 965 amp current is passed through molten metal chloride for one minute and 40 seconds during electrolysis. The mass of metal deposited is 9 gm at the cathode. The valency of metal atom (at. wt = 27) is

A. 4

B. 3

C. 2

D. 1

**Answer: B**



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3. Three Faraday's of electricity are passed through molten  $Al_2O_3$ , aq. solution of  $CuSO_4$  and molten NaCl taken in three different electrolytic cells. The amounts of Al, Cu and Na deposited at the electrodes will be

A. 1 mole : 2 moles: 3 moles

B. 1 mole : 1.5 mole: 3 moles

C. 3 moles: 2 moles: 1 mole

D. 1 mole : 1.5 mole : 2 moles

**Answer: B**



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4. What is the time in sec) required for depositing all the silver present in 125 ml of 1M  $AgNO_3$  solution by passing a current of 241.25 amperes ?  
(1F=96500 coulombs)

- A. 10
- B. 50
- C. 1000
- D. 100

**Answer: B**



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5. When  $6 \times 10^{22}$  electrons are used in the electrolysis of a metallic salt, 1.9 gm of the metal is deposited at the cathode. The atomic weight of that metal is 57. So oxidation state of the metal in the salt is

- A. +2

B. +3

C. +1

D. +4

**Answer: B**



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6. The density of copper is 8 gm/cc. Number of coulombs required to plate an area of 10 cm x 10 cm on both sides to a thickness of  $10^{-2}$  cm using  $CuSO_4$  solution as electrolyte is

A. 48250

B. 24125

C. 96500

D. 10000

**Answer: A**

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7. During the electrolysis of acidulated water, the mass of hydrogen obtained is 'x' times that of  $O_2$  and the volume of  $H_2$  is 'y' times that of  $O_2$ . The ratio of 'y' and 'x' is

A. 16

B. 8

C. 0.125

D. 0.25

**Answer: A**

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8. The number of Faradays of electricity required to decompose 100 ml water (density = 0.99 gm/ml) is

A. 2

B. 11

C. 100

D. 5.5

**Answer: B**



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9. If three faradays of electricity are passed through the solutions of  $AgNO_3$ ,  $CuSO_4$  and  $AuCl_3$ , the molar ratio of the cations deposited at the cathodes will be

A. 1:1:1

B. 1:2:3

C. 3:2:1

D. 6:3:2

**Answer: D**



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10. The specific conductance of 0.1N KCl solution at  $23^{\circ}C$  is  $0.012\text{ ohm}^{-1}\text{cm}^{-1}$ . The resistance of cell containing the solution at the same temperature was found to be 55 ohm. The cell constant will be

A.  $0.142\text{cm}^{-1}$

B.  $0.66\text{cm}^{-1}$

C.  $0.918\text{cm}^{-1}$

D.  $1.12\text{cm}^{-1}$

**Answer: B**



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11. Resistance of a conductivity cell filled with a solution of an electrolyte of concentration 0.1M is  $100\Omega$ . The conductivity of this solution is  $1.29Sm^{-1}$ . Resistance of the same cell when filled with 0.02M of the same solution is  $520\Omega$ . The molar conductivity of 0.02M solution of the electrolyte will be

A.  $12.4 \times 10^{-4}Sm^2 \cdot mol^{-1}$

B.  $124 \times 10^{-4}Sm^2 \cdot mol^{-1}$

C.  $1240 \times 10^{-4}Sm^2 \cdot mol^{-1}$

D.  $1.24 \times 10^{-4}Sm^2 \cdot mol^{-1}$

**Answer: B**



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12.  $\lambda^\infty$  of  $NH_4OH$  at infinite dilution is \_\_\_\_\_  $Scm^2eq^{-1}$  given  $\lambda^\infty$  of  $OH^- = 174$ ,  $\lambda^\infty$  of  $OH^- = 174$ ,  $\lambda^\infty$  of  $Cl^- = 66$  and  $\lambda^\infty$  of  $NH_4Cl = 130Scm^2eq^{-1}$

A. 140

B. 218

C. 328

D. 198

**Answer: C**



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**13.** At  $25^{\circ}\text{C}$  the molar conductances at infinite dilution for the strong electrolytes  $\text{NaOH}$ ,  $\text{NaCl}$  and  $\text{BaCl}_2$  are  $248 \times 10^{-4}$ ,  $126 \times 10^{-4}$  and  $280 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$  respectively,  $\lambda_m^{\circ} \text{Ba}(\text{OH})_2$  in  $\text{Sm}^2 \text{ mol}^{-1}$  is

A.  $52.4 \times 10^{-4}$

B.  $524 \times 10^{-4}$

C.  $402 \times 10^{-4}$

D.  $262 \times 10^{-4}$

**Answer: B**



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14. The conductivity of saturated solution of AgCl is found to be  $1.86 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$  and that of water is  $6 \times 10^{-8} \text{ ohm}^{-1} \text{ cm}^{-1}$ . If  $\lambda^0 \text{ AgCl}$  is

A.  $1.3 \times 10^{-5}$

B.  $1.69 \times 10^{-10}$

C.  $2 \times 10^{-10}$

D.  $2.7 \times 10^{-10}$

**Answer: B**



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15. At  $25^{\circ}\text{C}$ , the ionic mobility of  $\text{CH}_3\text{COO}^-$ ,  $\text{H}^+$  are respectively  $4.1 \times 10^{-4}$ ,  $3.63 \times 10^{-3}$  cm/sec. The conductivity of  $0.001\text{MCH}_3\text{COOH}$  is  $5 \times 10^{-5}\text{S.cm}^{-1}$ . Dissociation constant of  $\text{CH}_3\text{COOH}$  is

A.  $1.64 \times 10^{-5}$

B.  $3 \times 10^{-4}$

C.  $3 \times 10^{-5}$

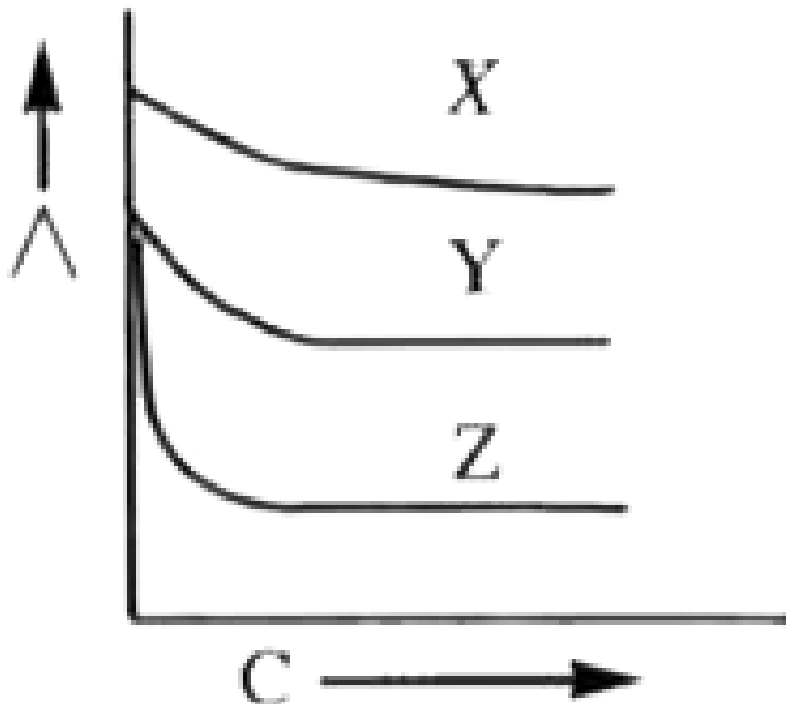
D.  $3 \times 10^{-6}$

**Answer: A**



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16. Equivalent conductance ( $\Lambda$ ) vs concentration graphs are given for some electrolytes X, Y and Z. Here X, Y and Z are



A.  $NiSO_4$ ,  $KCl$ ,  $CH_3COOH$

B.  $KCl$ ,  $NiSO_4$ ,  $CH_3COOH$

C.  $KCl$ ,  $CH_3COOH$ ,  $NiSO_4$

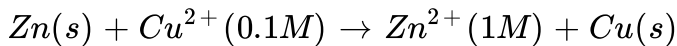
D.  $CH_3COOH$ ,  $NiSO_4$ ,  $KCl$

**Answer: B**



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17. For the redox reaction :



taking place in a cell,  $E_{\text{cell}}^{\circ}$  is 1.10 volt.  $E_{\text{cell}}$  for the cell will be

A. 2.14 volt

B. 1.07 volt

C. 1.80 volt

D. 0.82 volt

Answer: C



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18.  $E_{\text{Cu}^{2+}|\text{Cu}}^{\circ} = +0.337V$ ,  $E_{\text{Zn}^{2+}|\text{Zn}}^{\circ} = -0.762V$ . The EMF of the cell ,

$\text{Zn}|\text{Zn}^{2+}(0.01M)||\text{Cu}^{2+}(0.01M)|\text{Cu}$  is

A. +1.099 V

B. - 1.099 V

C. +1.069 V

D. - 1.069 V

**Answer: C**



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**19.** For a cell reaction involving a two-electron change, the standard e.m.f. of the cell is found to be 0.295 V at  $25^{\circ}C$ . The equilibrium constant of the reaction at  $25^{\circ}C$  will be

A.  $1 \times 10^{-10}$

B.  $29.5 \times 10^{-2}$

C. 10

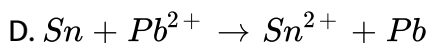
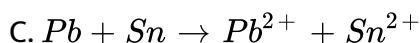
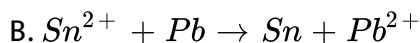
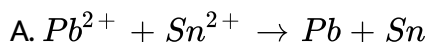
D.  $1 \times 10^{10}$

**Answer: D**



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20.  $E_{Sn^{2+} | Sn}^{\circ} = -1.14V$ ,  $E_{Pb^{2+} | Pb}^{\circ} = 0.126$  The cell reaction of the cell constructed from these two electrodes is

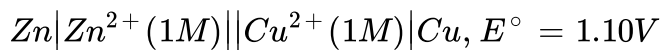
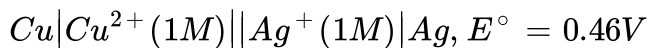


**Answer: D**



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21. The EMF of the following cells are



The EMF of the cell





A. 1.56V

B. 0.64V

C.  $-1.56V$

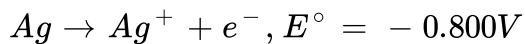
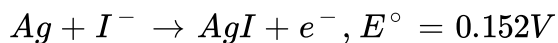
D. 2.02V

**Answer: A**



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**22.** Given the data at  $25^{\circ}C$



What is the value of  $\log K_{sp}$  for AgI

A.  $-16.13$

B.  $-8.12$

C.  $+8.612$

D.  $-37.83$

**Answer: A**



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**23.** The potential of the cell containing two hydrogen electrodes as represented below

$Pt, H_2(g) | H^+ (10^{-6} M) || H^+ (10^{-4} M) | H_2(g), Pt$  at 298 K is

A.  $-0.118V$

B.  $-0.0591V$

C.  $0.118V$

D.  $0.0591V$

**Answer: C**



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24. For the following cell  $Zn / Zn^{2+} / Cd^{2+} / Cd$

$E_{\text{cell}} = 0.30V$  and  $E_{\text{cell}}^{\circ} = 0.36V$ . Then the value of  $[Cd^{2+}] / [Zn^{2+}]$  is

A. 10

B. 1

C. 0.1

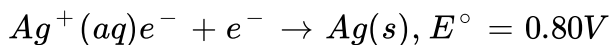
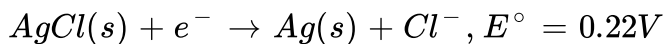
D. 0.01

**Answer: D**



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25. The standard reduction potentials for two reactions are given below:



The solubility product of AgCl under standard conditions of temperature (298 K) is given by

A.  $1.5 \times 10^{-10}$

B.  $1.5 \times 10^{-8}$

C.  $3.2 \times 10^{-10}$

D.  $3.2 \times 10^{-8}$

**Answer: A**



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**26.** What is the approximate quantity of electricity in 500 ml 1M  $AgNO_3$  aqueous solution (At. wt. of Ag = 108) ?

A. 96500

B. 24125

C. 48250

D. 12062.5

**Answer: C**

27. The cell ,  $Zn / Zn^{2+} (1M) / Cu^{2+} (1M) / Cu$  ( $E_{\text{Cell}}^{\circ} = 1.10V$ ), was allowed to be completely discharged at 298 K. The relative concentration of  $Zn^{2+}$  to  $Cu^{2+}$  is

A. 37.3

B.  $10^{37.3}$

C.  $9.65 \times 10^4$

D. antilog (24.04)

**Answer: B**

28. If the number of moles of electrons involved in a reaction is doubled by multiplying all of the species appearing in the overall reaction by 2 then the potential is

- A. halved
- B. doubled
- C. unchanged
- D. squared

**Answer: C**



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**29.** The standard EMF of Daniel cell is 1.10 volt. The maximum electrical work obtained from the Daniel cell

- A. 212.3 KJ
- B. 175.4KJ
- C. 106.15KJ
- D. 53.07 KJ

**Answer: A**

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30. If the  $Pb^{2+}$  concentration is maintained at 1.0M what is the  $[Cu^{2+}]$ , when the cell potential drops to zero ?

$$E_{\text{cell}}^{\circ} = 0.473V, Pb(s) / Pb^{2+} / Cu^{2+} / Cu(s)$$

A.  $1 \times 10^{-16} M$

B.  $1 \times 10^{15} M$

C.  $1 \times 10^{-14} M$

D.  $1 \times 10^{14} M$

**Answer: A**

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31. The standard e.m.f. for the cell reaction,

$2Cu^{+}(aq) \rightarrow Cu(s) + Cu^{2+}(aq)$  is + 0.36V at 298 K. The equilibrium constant of the reaction is

A.  $5 \times 10^6$

B.  $1.4 \times 10^{12}$

C.  $7.4 \times 10^{12}$

D.  $1.3 \times 10^6$

**Answer: D**



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**32.** The standard e.m.f. of a galvanic cell involving cell reaction with  $n = 2$  is found to be 0.295 V at  $25^\circ \text{C}$ . The equilibrium constant of the reaction would be

A.  $1.0 \times 10^{10}$

B.  $2.0 \times 10^{11}$

C.  $4.0 \times 10^{12}$

D.  $1.0 \times 10^2$



**Answer: A**



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33. Standard electrode potentials of  $Fe^{2+} + 2e \rightarrow Fe$  and  $Fe^{3+} + 3e \rightarrow Fe$  are  $-0.440V$  and  $-0.036V$  respectively. The standard electrode potential ( $E^\circ$ ) for  $Fe^{3+} + e \rightarrow Fe^{2+}$  is

A.  $-0.476V$

B.  $-0.404V$

C.  $+0.404V$

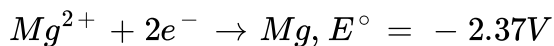
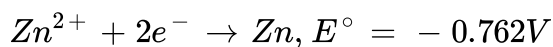
D.  $+0.722V$

**Answer: D**



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34. The standard Potentials at  $25^{\circ}C$  for the half reactions are given against them below:



When Zn dust is added to a solution of  $MgCl_2$

- A. Magnesium is precipitated
- B. zinc dissolves in the solution
- C. Zinc chloride is formed
- D. No reaction takes place

**Answer: D**



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35. For the cell ,  $Hg, Hg_2Cl_2 / Cl^{-} (0.1M) / Cl^{-} (0.01M) / Cl_2, Pt$   $E^{\circ}_{cell}$  is 1.10V , Hence ,  $E_{cell}$  is

A. 1.1591V

B.  $-1.1591V$

C. 1.0409 V

D.  $-1.0409V$

**Answer: A**



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**36.** For the following cell reaction,



$$\Delta G_f^0(AgCl) = -109kJ/mol$$

$$\Delta G_f^0(Cl) = -129kJ/mol$$

$$\Delta G_f^0(Ag^+) = 78kJ/mol$$

$E^\circ$  of the cell is

A.  $-0.60v$

B.  $0.60v$

C. 6.0v

D. none

**Answer: B**



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37. For copper half cell, the graph between reduction potential (Y-axis) and  $\log [Cu^{2+}]$  is a straight line with the Y -intercept + 0.34V. Reduction potential of copper electrode with 0.01 M  $CuSO_4$  solution is

A. +0.40V

B. -0.28V

C. + 0.28 V

D. -0.40 V

**Answer: C**



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38. In a fuel cell  $H_2$  and  $O_2$  react to produce electricity. In this process 67.2 lt of  $H_2$  at NTP reacted in 16 min and 5 sec. What is the average current produced.

A. 200 amp

B. 400 amp

C. 500 amp

D. 600 amp

**Answer: D**



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39. The standard reduction potential for  $Cu^{2+} / Cu$  is +0.34V. If  $K_{sp}$  of  $Cu(OH)_2$  is  $1.0 \times 10^{-19}$ , the reduction potential at pH =14 for the above couple is

A. +0.22 V

B. -0.80 V

C. +0.80 V

D. -0.22V

**Answer: D**



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**40.** Adding powdered lead and iron to a solution that is 1M in both  $Pb^{2+}$  and  $Fe^{2+}$  ions, would results to a reaction in which  $(E^\circ Fe^{2+} / Fe = -0.44V, E^\circ Pb^{2+} / Pb = -0.13V)$

A. more amount of Pb and Fe is formed

B. more amount of  $Pb^{2+}$  and  $Fe^{2+}$  formed

C. more amount of Pb and  $Fe^{2+}$  is formed

D. more amount of  $Pb^{2+}$  and Fe is formed.

**Answer: B**

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41.  $E^\circ \text{Cu}^{2+} / \text{Cu}$  is + 0.34V At which one of the following concentrations of  $\text{Cu}^{2+}$ , reduction potential of copper electrode becomes zero

A.  $1.76 \times 10^{-6} M$

B.  $3.12 \times 10^{-12} M$

C.  $2 \times 10^{-8} M$

D.  $3 \times 10^{-14} M$

**Answer: B**

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42. During the charging of lead storage battery, the reaction occurring at cathode is represented by

A. Formation of  $\text{PbSO}_4$

B. Reduction of  $Pb^{+2}$  to Pb

C. Formation of  $PbO_2$

D. Oxidation of Pb to  $Pb^{2+}$

**Answer: B**



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**43.** During the discharge of a lead storage battery, density of  $H_2SO_4$  fell from 1.3 to 1.14 g/mL. Sulphuric acid of density 1.3g/ml is 40W% and that of 1.14g/mL is 20W%. The battery holds two litre of the acid and volume remains practically constant during discharging. The number of ampere-sec used from the battery is.

A.  $3 \times 96,500$

B.  $6 \times 96,500$

C.  $9 \times 96,500$

D.  $12 \times 96,500$



**Answer: B**



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**44.** The standard e.m.f of a cell, involving one electron change is found to be 0.591 V at  $25^{\circ}C$ . The equilibrium constant of the reaction is

A.  $1.0 \times 10^1$

B.  $1.0 \times 10^{30}$

C.  $1.0 \times 10^{10}$

D.  $1.0 \times 10^5$

**Answer: C**



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**45.** The same quantity of electricity is passed through  $0.1M H_2SO_4$  and 0.1 M HCl. The amounts of  $H_2$  obtained at the cathodes are in the ratio

A. 1:1

B. 2:1

C. 1:2

D. 3:1

**Answer: A**



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**46.** On passing  $3F$  electricity through three cells containing fused  $Na_2CO_3$  fused  $Cu(NO_3)_2$  and fused  $Al(NO_3)_3$ , the no. of moles of the metals deposited are in the ratio

A. 1:2:3

B. 3:2:1

C. 6:3:2

D. 3:4:2

**Answer: C**



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47. For the electrolytic production of  $\text{NaClO}_4$  from  $\text{NaClO}_3$  according to the equation  $\text{NaClO}_3 + \text{H}_2\text{O} \rightarrow \text{NaClO}_4 + \text{H}_2$ , the number of Faradays of electricity required to produce 0.5 mole of  $\text{NaClO}_4$  is

A. 1

B. 2

C. 3

D. 1.5

**Answer: A**



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**48.** The quantity of electricity in Faradays required to reduce 1.23 gm of nitro benzene to aniline is

A. 0.12

B. 0.03

C. 0.06

D. 0.6

**Answer: C**



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**49.** When 3.86 amperes current are passed through an electrolyte for 50 minutes, 2.4 gr of a divalent metal is deposited. The gram atomic weight of the metal (in grams) is

A. 24

B. 12

C. 64

D. 40

**Answer: D**



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50. When 965 amp current is passed through aqueous solution of salt X using platinum electrodes for 10 sec, the volume of gasses liberated at the respective electrodes is in 1:1 ratio. Then X is

A.  $MgSO_4$

B.  $AgCl$

C.  $MgCl_2$

D.  $KNO_3$

**Answer: C**



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51. What is the approximate quantity of electricity (in coulomb) required to deposit all the silver from 250 mL of 1 M  $AgNO_3$  aqueous solution?

A. 2412.5

B. 24125

C. 4825

D. 48250

**Answer: B**



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52. Four moles of electrons were transferred from anode to cathode in an experiment on electrolysis of water. The total volume of the two gases (dry and at STP) produced will be approximately (in litres)

A. 22.4

B. 44.8

C. 67.2

D. 89.4

**Answer: C**



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**53.** One Faraday of electricity is passed separately through one litre of one molar aqueous solutions of

(i)  $AgNO_3$  (ii)  $SnCl_4$  and (iii)  $CuSO_4$ . The number of moles of Ag, Sn and Cu deposited at cathode are respectively

A. 1.0, 0.25, 0.5

B. 1.0, 0.5, 0.25

C. 0.5, 1.0, 0.25

D. 0.25, 0.5, 1.0

**Answer: A**



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**54.** The resistance of 0.5 N solution of an electrolyte in a conductivity cell was found to be 45 ohms. If the electrodes in the cell are 2.2 cm apart and have an area of  $3.8\text{cm}^2$  then the equivalent conductance (in  $\text{Scm}^2\text{eq}^{-1}$ ) of a solution is

A. 25.73

B. 15.75

C. 30.75

D. 35.75

**Answer: A**



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55. 0.05M NaOH solution offered a resistance of  $31.69\Omega$  in a conductivity cell at 298K. If the cell constant of the conductivity cell is  $0.367\text{cm}^{-1}$  the molar conductivity of the NaOH solution is

A.  $232\Omega^{-1}\text{cm}^2\text{mol}^{-1}$

B.  $234\Omega^{-1}\text{cm}^2\text{mol}^{-1}$

C.  $231\Omega^{-1}\text{cm}^2\text{mol}^{-1}$

D.  $230\Omega^{-1}\text{cm}^2\text{mol}^{-1}$

**Answer: A**



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56. The resistance of 0.05M KCl solution at  $25^\circ\text{C}$  is 100 ohm in a cell whose cell constant is  $0.3765\text{cm}^{-1}$ . The specific conductivity of KCl solution is

A. 0.004765

B. 0.003455

C. 0.003765

D. 0.003665

**Answer: C**



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57. Aluminium displaces hydrogen from acids, but copper does not. A galvanic cell prepared by combining  $Cu / Cu^{2+}$  and  $Al / Al^{3+}$  has an emf of 2.0 V at 298K. If the potential of copper electrode is +0.34V, that of Aluminium electrode is

A.  $-2.3V$

B.  $+2.34V$

C.  $-1.66V$

D.  $1.66V$

**Answer: C**



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58. When  $E^\circ_{Ag^+|Ag} = 0.80$  volt and  $E^\circ_{Zn^{2+}|Zn} = 0.76$  volt, which of the following is correct?

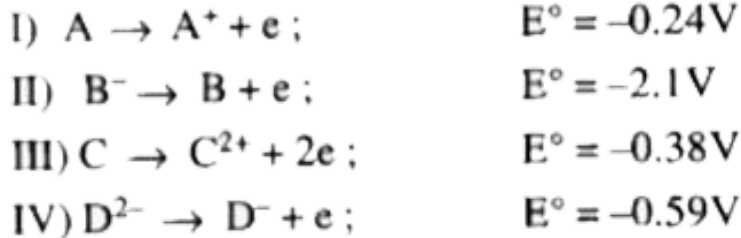
- A.  $Ag^+$  can be reduced by  $H_2$
- B. Ag can oxidise  $H_2$  into  $H^+$  ion
- C.  $Zn^{+2}$  can be reduced by  $H_2$
- D. Ag can reduce  $Zn^{+2}$  ion

**Answer: A**



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59. Deduce from the following  $E^\circ$  values of half cells, what combination of two half cells would result in a cell with the largest potential?



A. I and IV

B. II and III

C. III and IV

D. I and II

**Answer: D**



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60. The half cell reaction for the corrosion are ,  
 $2H^+ + \frac{1}{2}O_2 + 2e^- \rightarrow H_2O, E^0 = 1.23V$  and  $Fe^{2+} + 2e^- \rightarrow Fe(s), E^0 = -0.44V$   
 . Find the  $\Delta G^0$  ( in kj) for the overall reaction

A.  $-76$

B.  $-322$

C.  $-161$

D.  $-152$

**Answer: B**



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**61.** A cell constructed by coupling a standard copper electrode and a standard magnesium electrode has emf of 2.7 volts. If the standard reduction potential of copper electrode is +0.34 volt, that of magnesium electrode is

A. +3.04 volts

B. -3.04 volts

C. +2.36 volts

D. -2.36 volts

**Answer: D**



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62.  $E^\circ$  values of  $Zn^{2+}$ ,  $Zn$  and  $Cu^{2+}$ ,  $Cu$  are respectively  $-0.76V$  and  $+0.34$ . Calculate the EMF of the cell  $Zn / Zn^{2+} (0.1M) // Cu^{2+} (0.1M) / Cu$ .

A. 1.1295

B. 1.0705

C. 1.1

D. 1.041

**Answer: B**



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63.  $E^\circ$  of  $Fe | Fe^{2+}$  is +0.44V,  $E^\circ$  of  $Cu | Cu^{2+}$  is -0.32V. Then in the cell

A. Cu oxidises  $Fe^{2+}$  ion

B.  $Cu^{2+}$  oxidises iron

C. Cu reduces  $Fe^{2+}$  ion

D.  $Cu^{2+}$  ion reduces Fe

**Answer: B**

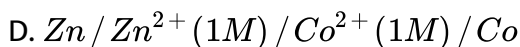
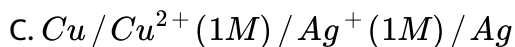


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64. The standard reduction potentials of Ag, Cu, Co and Zn are 0.799, 0.337, -0.277 and 0.762V respectively. Which of the following cells will have maximum cell e.m.f.?

A.  $Zn / Zn^{2+} (1M) / Cu^{2+} (1M) / Cu$

B.  $Zn / Zn^{2+} (1M) / Ag^+ (1M) / Ag$



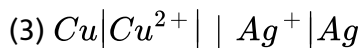
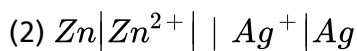
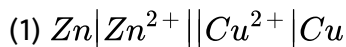
**Answer: B**



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65. The standard reduction potentials of  $Zn^{2+} / Zn$ ,  $Cu^{2+} / Cu$  and  $Ag^+ / Ag$  are respectively -0.78, 0.34 and 0.8

V. The following cells were constructed:



What is the correct order of of these cells?

A.  $b > c > a$

B.  $b > a > c$

C.  $a > b > c$



D.  $c > a > b$

**Answer: B**



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## Surface Chemistry

1. In an adsorption experiment a graph between  $\log x/m$  vs.  $\log p$  is found to be linear with a slope of  $45^\circ$ . The intercept on the  $\log x/m$  axis was found to be 0.3010. What is  $x/m$  if pressure is 0.6 bar

A. 0.6

B. 1.2

C. 2.4

D. 0.3

**Answer: B**



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2. Which are of the following is a case of adsorption?

- A. Anhydrous  $CaCl_2$  in contact with water vapour
- B. Silica gel in contact with water vapours
- C. Ammonia gas in contact with water
- D. Cotton clothes dipped in a dye solution

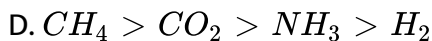
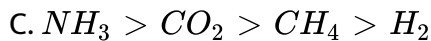
**Answer: B**



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3. The volumes of gases  $H_2$ ,  $CH_4$ ,  $CO_2$  and  $NH_3$  adsorbed by 1gr of charcoal at 288K are in the order

- A.  $H_2 > CH_4 > CO_2 > NH_3$
- B.  $CO_2 > NH_3 > H_2 > CH_4$



**Answer: C**



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**4. Which one of the following is not an application of adsorption ?**

A. Ion exchange process in softening of hard water

B. Chromatographic analysis

C. Clarification of sugar

D. Theory of homogeneous catalysis

**Answer: D**



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5. Which of the following is less than zero during adsorption?

A.  $\Delta G$

B.  $\Delta S$

C.  $\Delta H$

D. all the above

**Answer: D**



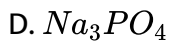
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6. Arsenic (III) sulphide forms a sol with a negative charge which of the following ionic substances should be most effective in coagulating the sol

A. KCl

B.  $MgCl_2$

C.  $Al_2(SO_4)_3$

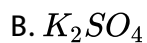


**Answer: C**



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7. A negatively charged suspension of clay in water needs for precipitation the minimum amount of



**Answer: A**



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8. A colloidal sol  $Fe(OH)_3$  in water is

- A. A hydrophilic colloid
- B. A hydrophobic colloid
- C. An emulsion
- D. Not a colloid

**Answer: B**



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9. Ultra microscope works on the principle of

- A. Light reflection
- B. Light absorption
- C. Light scattering
- D. Light polarization

**Answer: C**



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**10.** Ferric chloride on rubbing to a bleeding wound causes

- A. coagulation
- B. peptisation
- C. emulsification
- D. de-emulsification

**Answer: A**



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**11.** Hardy - Schulz rules are based on \_\_ of electrolyte ions coagulating the colloid

- A. Size
- B. Charge
- C. Magnetic nature
- D. Molar mass

**Answer: B**



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**12. Which of the following is a kinetic property of sols?**

- A. Electrophoresis
- B. Brownian movement
- C. Tyndal effect
- D. Peptisation

**Answer: B**



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**13.** Brownian movement is mainly is due to

- A. Attraction between dispersion medium and dispersed phase particles
- B. Unbalanced impact of the dispersion medium on colloidal particles
- C. Scattering of light on sol particles
- D. Repulsion of colloidal particles by protective colloids

**Answer: B**



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**14.** When an electrolyte is added to a colloidal sol it

- A. Gets coagulated
- B. Is ionised

C. Becomes stable

D. Gets purified

**Answer: A**



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15. The coagulation power of an effective ion carrying the charge opposite to the sol particles has been illustrated by

A. Brownian movement

B. Gold number

C. Tyndal effect

D. Hardy-Schulz rule

**Answer: D**



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16. Which electrolyte is least effective in causing coagulation of +ve ferric hydroxide sol?

A.  $KBr$

B.  $K_2SO_4$

C.  $K_2CrO_4$

D.  $K_3[Fe(CN)_6]$

**Answer: A**



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17. The capacity of an ion to coagulate a colloidal sol depends on

A. Its shape

B. Magnitude of its charge

C. The sign of charge

D. Both magnitude and sign of the charge

**Answer: D**



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**18.** Lyophilic sols are more stable than lyophobic sols because

- A. The colloidal particles have positive charge
- B. The colloidal particles have negative charge
- C. The colloidal particles are solvated
- D. There are strong electrostatic repulsions between the negatively charged colloidal particles

**Answer: C**



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**19.** A liquid is found to scatter a beam of light but leaves no residue when passed through the filter paper. The liquid can be described as

A. A suspension

B. Oil

C. A colloidal sol

D. True solution

**Answer: C**



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**20.** Cellulose dispersed in ethanol is called

A. emulsion

B. micelle

C. collodion

D. hydrophilic sol

**Answer: C**



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**21.** At CMC the surfactant molecules

- A. decomposes
- B. becomes completely soluble
- C. associates
- D. dissociates

**Answer: C**



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**22.** Alum helps in purifying water by

- A. forming Si complex with clay particles
- B. sulphate part which combines with dirt and removes it
- C. aluminium which coagulates the mud particle

D. making mud water soluble.

**Answer: C**



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**23.** On addition of 1ml solution of 10% NaCl to 10ml gold sol in the presence of 0.0250gm mof starch, the coagulation is just prevented Starch has the following gold number

A. 0.025

B. 0.25

C. 2.5

D. 25

**Answer: D**



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24. Gelatin protects

A. Gold sol

B.  $As_2S_3$  sol

C.  $Fe(OH)_3$

D. all the above

Answer: D



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25. The coagulation of colloidal particles of the sol can be caused by

A. Heating

B. Adding oppositely charged sol

C. Adding electrolyte

D. All the above



**Answer: D**



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**26.** Gelatin is used as an ingredient in the manufacture of icecreame for

- A. Causing the mixture to solidly
- B. Improving the flavour
- C. Stabilising the colloidal solution and preventing the crystal growth
- D. preventing formation of colloid

**Answer: C**



**View Text Solution**

**27.** Gold number is minimum in case of

- A. Egg albumin

B. Gelatin

C. Hemoglobin

D. Starch

**Answer: B**



**View Text Solution**

**28.** Gold number of a lyophilic solution is such property that

A. The larger its value, the greater is the peptising power

B. The lower its value, the greater is the peptising power

C. The lower its value, the greater is the protecting power

D. The lower its value, the greater is the protecting power

**Answer: C**



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29. In the coagulation of a positive sol, flocculation powers of  $Cl^-$ ,  $SO_4^{-2}$  and  $PO_4^{-3}$  are in the order

A.  $Cl^- > SO_4^{-2} > PO_4^{-3}$

B.  $Cl^- > PO_4^{-3} > SO_4^{-2}$

C.  $PO_4^{-3} > SO_4^{-2} > Cl^-$

D.  $PO_4^{-3} > Cl^- > SO_4^{-2}$

**Answer: C**



**View Text Solution**

30. A colloidal solution is subjected to an electrical field. The particles move towards anode. The coagulation of same sol is studied using  $NaCl$ ,  $BaCl_2$  and  $AlCl_3$  solutions. Their coagulating power should be

A.  $NaCl > BaCl_2 > AlCl_3$

B.  $BaCl_2 > AlCl_3 > NaCl$

C.  $AlCl_3 > BaCl_2 > NaCl$  s

D.  $BaCl_2 > NaCl > AlCl_3$

**Answer: C**



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**31.** Which is used for ending charge on colloidal solution

A. Electrons

B. Electrolysis

C. The Charged ions

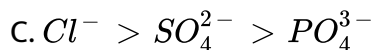
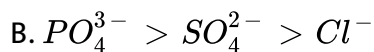
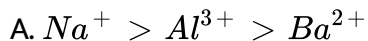
D. Compounds

**Answer: B**



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32. The coagulating power of an electrolyte for arsenious sulphide decreases in the order



Answer: D



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33. Which of the following forms cationic micellus

A. Sod - stearate

B. Urea

C. Cetyl trimethyl ammonium bromide

D. Sod. dodecyl sulphate

**Answer: C**



**View Text Solution**

**34.** 'Lock-key' fit theory is for

- A. homogeneous catalysis
- B. heterogenous catalysis
- C. enzyme action
- D. none of these

**Answer: C**



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**35.** Which of the following is correct about lyophilic sol ?

- A. They are irreversible

- B. They are formed by inorganic substances
- C. They are readily co-ogulated by addition of electrolytes
- D. They are self stablised

**Answer: D**



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**36.** The dispersed phase in colloidal iron (iii) hydroxide and colloidal gold positively and negatively charged respectively which of the following statement is not correct

- A.  $MgCl_2$  soltuion can coagulate the gold sol more readily than the iron (III) hydroxide sol
- B.  $Na_2SO_4$  causes coagulation in both sols.
- C. Mixing the two sols has no effect
- D. Coagulation of both the sols can be brought about by electrophoresis

**Answer: C**



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**37.** The Magnetic moment of Autocatalyst formed in the reaction between Acidified oxalic acid and potassiumpermanganate

A. 5.9 B.M

B. 4.9 B.M

C. 3.9 B.M

D. 2.8 B.M

**Answer: A**



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**38.** Colloidal sols are not purified by



- A. Dialysis
- B. Electro dialysis
- C. Electrophoresis
- D. Ultra filtration

**Answer: C**



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**39.** The zeolites have shape selectivity depending on

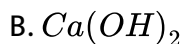
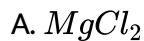
- A. Atomic structure
- B. Pore structure
- C. Molecular structure
- D. None

**Answer: B**



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40. Which of the following is an example of zeolite



**Answer: C**



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41. The process of removing dissolved impurities from a colloidal system, by means of diffusion through suitable membrane under the influence of an electric field is called

A. Electro osmosis

B. Electrophoresis

C. Electrodialysis

D. Peptisation

**Answer: C**



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**42. Peptization denotes**

A. Digestion of food

B. Hydrolysis of proteins

C. Breaking and dispersion into the colloidal state

D. Precipitation of solid from colloidal dispersion

**Answer: C**



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**43.** The migration of colloidal solute particles in a colloidal solution , when an electric current is applied to the solution is known as

- A. Brownian movement
- B. electro osmosis
- C. electrophoresis
- D. electrodialysis

**Answer: C**



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**44.** Sols of metals like Cu, Ag, Au are prepared by

- A. Peptisation
- B. Oxidation
- C. Bredig's arc method
- D. Mechanical grinding

**Answer: C**



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**45.** Blue colour of the sky is due to

- A. Scattering of blue light by dust particles
- B. Scattering of blue light by water
- C. scattering of blue light by dust particles and water
- D. None of the above

**Answer: C**



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**Va Group Elements**

**1.** Mole fraction of nitrogen in air is

A. 0.14

B. 0.28

C. 0.5

D. 0.78

**Answer: D**



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2. Bond energy of N-N is  $x \text{ kJ mol}^{-1}$ . Then bond energy of  $N \equiv N$  is

A.  $x \text{ kJ mol}^{-1}$

B.  $< 3x \text{ kJ mol}^{-1}$

C.  $3x \text{ kJ mol}^{-1}$

D.  $> 3x \text{ kJ mol}^{-1}$

**Answer: B**



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3. White phosphorus molecule ( $P_4$ ) doesn't have

- A. six P-P single bonds
- B. four P-P single bonds only
- C. four lone pairs of electrons.
- D. PPP angle of  $60^\circ$

**Answer: B**



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4. The following statements are about VA group elements:

- i) As and Sb are semimetals
- ii) Only Bi is a metal
- iii)  $N_2$  is nonmetal but  $P_4$  is metal

The correct combination is

- A. All are correct
- B. Only i is correct
- C. i & ii are correct
- D. i & iii are correct

**Answer: C**



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5. 'X' is a neutral oxide. On exposure to air 'X' is converted to 'Y', which is an acidic oxide. Then 'X' and 'Y' are

- A.  $N_2O$ ,  $NO$
- B.  $NO$ ,  $NO_2$
- C.  $NO_2$ ,  $NO$
- D.  $NO_2$ ,  $N_2O_4$

**Answer: B**



*LIST – 1*      *LIST – 2*

6. A)  $N_2O$       1)  $sp^2$  and planar triangle  
 B)  $HNO_2$       2) Nitrite and nitro form  
 C)  $NO_3^-$       3)  $sp^3$  and tetrahedron  
 D)  $HNO_4$       4) Laughing gas  
                          5) Peroxy bond

A.       $A \quad B \quad C \quad D$   
 1)    1    2    3    4

B.       $A \quad B \quad C \quad D$   
 2)    3    2    4    1

C.       $A \quad B \quad C \quad D$   
 3)    2    5    3    4

D.       $A \quad B \quad C \quad D$   
 4)    4    2    1    5

**Answer: D**

7.  $PCl_5 + Cl^- \rightarrow PCl_6^-$ . The wrong statement regarding the above equation is

A. Hybridisation of P changes from  $sp^3d$  to  $sp^3d^2$

B. Oxidation number of P changes +5 to +6

C. Covalency P changes from 5 to 6

D. Here  $PCl_5$  is a Lewis acid

**Answer: B**



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**8. Nitrogen dioxide**

A. dissolves in water forming nitric acid

B. does not dissolve in water

C. dissolves in water to form nitrous acid and gives off oxygen

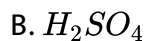
D. dissolves in water to form a mixture of nitrous and nitric acids

**Answer: D**



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9. Which of the following acids possess oxidising, reducing and complex forming properties?



**Answer: D**



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10. One mole of magnesium nitride on reaction with an excess of water gives

A. one mole of ammonia

B. one mole of nitric acid

C. two moles of ammonia

D. two moles of nitric acid

**Answer: C**



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11. Li and Mg both combine with  $N_2$  at high temp. This suggest that the two metals have

A. horizontal relationship

B. vertical relationship

C. diagonal relationship

D. no relationship

**Answer: C**



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12. Freezing of food articles can be done using

- A. solid  $N_2$  at 77K
- B. liquid  $N_2$  at 77K
- C. liquid  $N_2$ , at 298K
- D. gaseous  $N_2$  at 298K

**Answer: B**



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13. Which oxide does not act as a reducing agent ?

- A. NO
- B.  $NO_2$
- C.  $N_2O$
- D.  $N_2O_5$

**Answer: D**



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**14.** The cyanide ion,  $CN^-$  and  $N_2$  are isoelectronic. But in contrast to  $CN^-$ ,  $N_2$  is chemically inert because of

- A. low bond energy
- B. absence of bond polarity
- C. unsymmetrical electron distribution
- D. presence of more number of electrons in bonding orbitals.

**Answer: B**



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**15.** Which one has the highest percentage of nitrogen?

- A. Urea
- B. Ammonium nitrite
- C. Ammonium nitrate
- D. Calcium nitrate

**Answer: A**



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**16.** The following are some statements about oxides of VA group elements

NO readily reacts with  $O_2$  to form reddish brown gas

The formula of Brown ring is  $FeSO_4NO$

$NO_2$  is called laughing gas

The correct combination is

- A. All are correct
- B. i & iii are correct
- C. i & ii are correct

D. ii & iii are correct

**Answer: C**



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17. Atomicity of dimeric phosphorous pentoxide is 'x' and the number of shared electron pairs is 'y'. Then

a)  $y - x = 6$       b)  $2x = y + 8$

c)  $10x - 7y = 0$

A. only 'a' is correct

B. only 'b' is correct

C. only 'c' is correct

D. all the above are correct

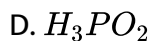
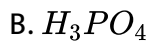
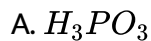
**Answer: D**



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18. Which of the following on heating undergoes disproportionation



Answer: A



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19. The number of P-P bonds in cyclotrimeta phosphoric acid is

A. 3

B. 9

C. 6

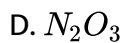
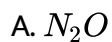
D. zero

**Answer: D**



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**20.** The oxide involved in the formation of brown ring for testing nitrate ion

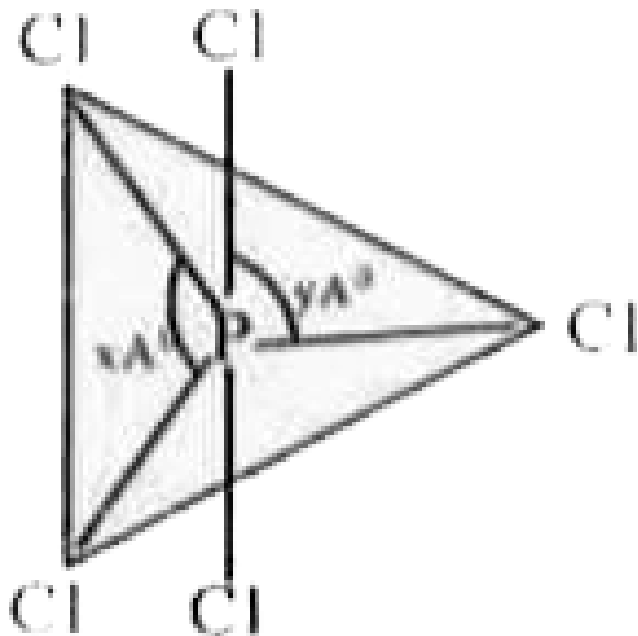


**Answer: B**



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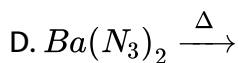
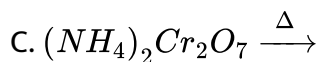
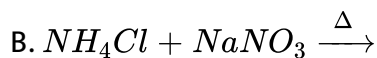
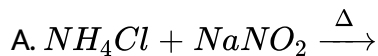
21. The relation between  $x$  and  $y$



- A.  $x > y$
- B.  $x < y$
- C.  $x = y$
- D.  $y = 2x$

Answer: A

22. In which of the following reaction  $N_2$  is not obtained?



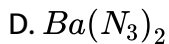
Answer: B



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23. Chemical used as oxidiser in rocket fuels and in the picking of steel is





**Answer: B**



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**24.** One gram atom of zinc can reduce

A. 1 mol conc. $HNO_3$

B. 2 mol conc. $HNO_3$

C. 3 mol conc. $HNO_3$

D. 4 mol conc. $HNO_3$

**Answer: B**



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**25.**  $N_2O$  is obtained by the reaction of

A. Cu with dil  $HNO_3$

B. Cu with conc.  $HNO_3$

C. Zn with dil  $HNO_3$

D. Zn with conc.  $HNO_3$

**Answer: C**



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**26.** In the solid state nitrogen pentoxide exists as

A.  $NO_2^-$  and  $NO_3^+$

B.  $NO^+$  and  $NO_2^-$

C.  $NO_3^-$  and  $NO_2^+$

D.  $NO_2^+$  and  $NO^-$

**Answer: C**



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## Via Group Elements

1. The total number of lone pairs of electrons present in a  $S_8$  molecule.

- A. 8
- B. 16
- C. 12
- D. 4

**Answer: B**



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2. The chalcogen having same number of electrons both in penultimate and antipenultimate shells is

- A. O

B. S

C. Se

D. Te

**Answer: D**



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**3.** The number of paired and unpaired electrons in the valence shell of the members of oxygen family are

A. 4 and 2

B. 2 and 4

C. 3 and 3

D. 2 and 3

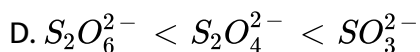
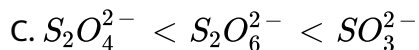
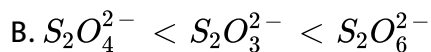
**Answer: A**



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4. The oxidation state of sulphur in the anions follow the order



**Answer: A**



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5. In which allotropic form of sulphur, puckered  $S_8$  rings are not present ?

A. Chair form of sulphur

B. Rhombic sulphur

C. Monoclinic sulphur

D. -monoclinic sulphur

**Answer: A**



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**6. Which of the following order is wrong ?**

A.  $H_2O > H_2S > H_2Se > H_2Te$  (Thermal stability)

B.  $H_2S < H_2Se < H_2Te < H_2O$  (Boiling points)

C.  $H_2O < H_2S < H_2Se < H_2Te$  (pKa value)

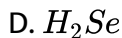
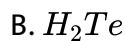
D.  $O - H > S - H > Se - H > Te - H$  (Bond Energy)

**Answer: C**



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**7. The hydride of group 16 elements which shows greater Lewis base character**



**Answer: A**



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**8. Regarding  $H_2O_2$  the wrong statement is**

A.  $H_2O$  is an exothermic compound

B. It is an associated liquid

C. Central atom is  $sp^3$  hybridised

D. It is an excellent solvent for covalent compounds

**Answer: D**



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9. Amongst  $H_2O$ ,  $H_2S$ ,  $H_2Se$  and  $H_2Te$ , the one with the highest boiling point is

- A.  $H_2O$  because of hydrogen bonding
- B.  $H_2Te$  because of higher molecular weight
- C.  $H_2S$  because of hydrogen bonding
- D.  $H_2Se$  because of lower molecular weight

**Answer: A**



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10. Regarding  $SF_6$ , the wrong statement is

- A. It is inert and does not undergo hydrolysis
- B. It is a covalent compound
- C. Hybridisation of S is  $sp^3d^2$  and shape is octahedral

D. S forms  $SF_6$ , in third excited state

**Answer: D**



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11. Sulphur shows maximum coordination number is  $SX_n$ . Where 'X' is

A. F

B. Br

C. I

D. Cl

**Answer: A**



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12. The statements about oxides of chalcogens

i) The solubility of dioxides decreases from  $SO_2$  to  $PoO_2$

ii)  $TeO_2$  is highly acidic in nature

(iii) Trioxides are more acidic than dioxides

The correct combination is

A. Both i & iii are correct

B. All are correct

C. Only iii is correct

D. Both i & ii are correct

**Answer: A**



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13. The molecule having one and two bonds is

A.  $SO_2$

B.  $SO_3$

C.  $CO_2$

D.  $N_2$

**Answer: B**



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**14.** Which of the following is oxidised by  $SO_2$  ?

A. Mg

B.  $K_2Cr_2O_7$

C.  $KMnO_4$

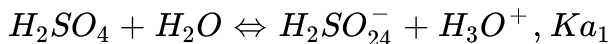
D. All

**Answer: A**



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15. In aqueous solutions  $H_2SO_4$  ionises as:



The relation between  $K_{a_1}$  and  $K_{a_2}$  is

A.  $K_{a_1} < K_{a_2}$

B.  $K_{a_1} > K_{a_2}$

C.  $K_{a_1} = K_{a_2}$

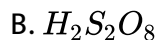
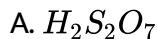
D.  $2K_{a_1} = 3K_{a_2}$

**Answer: B**

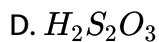
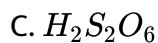


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16. Single bond between sulphure atoms is present in





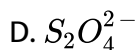
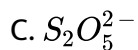
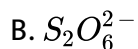
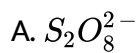


**Answer: C**



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**17. Which of the following ions does not have S-S linkage ?**



**Answer: A**



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18. Which of the following statements regarding the manufacture of  $H_2SO_4$  by Contact process is not true ?

- A. Sulphur is burnt in air to form  $SO_2$
- B.  $SO_2$  is catalytically oxidised to  $SO_3$
- C.  $SO_3$  is dissolved in water to get 100% sulphuric acid
- D.  $H_2SO_4$  obtained by Contact process is of higher purity than that obtained by other methods

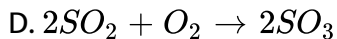
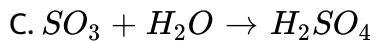
**Answer: C**



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19. In the preparation of  $H_2SO_4$ , by Contact process  $V_2O_5$  is used as a catalyst in the reaction.

- A.  $S + O_2 \rightarrow SO_2$
- B.  $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$



**Answer: D**



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**20. Which statement is correct ?**

A. Ozone is a resonance hybrid of oxygen

B. Ozone is an allotropic modification of oxygen

C. Ozone is an isomer of oxygen

D. Ozone has no relationship with oxygen

**Answer: B**



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21. Which gas is used to improve the atmosphere of crowded places ?

A.  $H_2$

B.  $O_2$

C.  $O_3$

D.  $N_2O$

**Answer: C**



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22. Ozonization of water is carried out to remove

A. Bacterial impurities

B. Bad taste

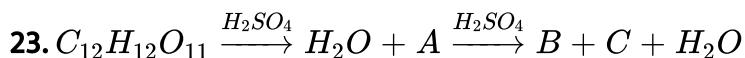
C. Excess of chlorine present

D. Calcium and magnesium salt present in it

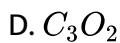
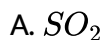
**Answer: A**



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If the compound C is an oxide of group VIA element then the compound B is



**Answer: C**



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24. All of the following decompose easily on heating to give  $O_2$  except

A.  $HgO$

B.  $MnO_2$

C.  $Pb(NO_3)_2$

D.  $NaNO_3$

**Answer: B**



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**25.** In the preparation of  $O_2$  from  $KClO_3$ ,  $MnO_2$  acts as

A. Activator

B. Catalyst

C. Oxidizing agent

D. Dehydrating agent

**Answer: B**



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26. Oxygen is liberated from water using

A. P

B. Na

C.  $F_2$

D.  $I_2$

Answer: C



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27. The gases absorbed by alkaline pyrogallol and turpentine oil respectively are

A.  $O_3$ ,  $CH_4$

B.  $O_2$ ,  $O_3$

C.  $SO_2$ ,  $CH_4$

D.  $N_2O$ ,  $O_3$

**Answer: B**



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**28.** Regarding oxygen the correct statements are

- A) It is an important constituent of rocket fuels
- B) It is used for artificial respiration
- C) It is used in oxyacetylene welding.

A. A,B

B. A,C

C. B,C

D. A,B,C

**Answer: D**



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29. Concentrated  $H_2SO_4$  is not used to prepare HBr from KBr because it

- A. Oxidizes HBr
- B. Reduces HBr
- C. Causes disproportionation of HBr
- D. Reacts too slowly with KBr

**Answer: A**



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30. Most acidic oxide in group VI is formed by

- A. oxygen
- B. sulphur
- C. nitrogen
- D. chlorine

**Answer: B**



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**31.** The element which evolves two gases on reacting with conc.  $H_2SO_4$  is

A. Si

B. C

C. S

D. P

**Answer: B**



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**32.**  $H_2SO_4$  has very corrosive action on skin because

A. It reacts with proteins

B. It acts as an oxidizing agent

C. It acts as dehydrating agent

D. It acts as dehydrating agent and absorption of water is highly exothermic

**Answer: D**



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**33.** A student accidentally splashes few drops of conc.  $\text{H}_2\text{SO}_4$  on his cotton shirt. After a while, the splashed parts blacken and the holes appear. This has happened because sulphuric acid

A. Dehydrates the cotton with burning

B. Causes the cotton to react with air

C. Heats up the cotton

D. Removes the elements of water from cotton

**Answer: D**



**Watch Video Solution**

**34.** Sulphuric acid is used

A) In petroleum refining

B) In galvanising

C) IN making fertilizers

A. A,B

B. B,C

C. A,C

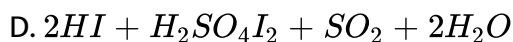
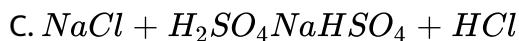
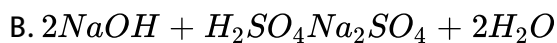
D. A,B,C

**Answer: D**



**Watch Video Solution**

35. Which reaction represents the oxidizing behaviour of  $H_2SO_4$  ?



Answer: D



Watch Video Solution

36. Which substance chars when warmed with conc.  $H_2SO_4$  ?

A. Protein

B. Fat

C. Hydrocarbon

D. Carbohydrate

**Answer: D**



**Watch Video Solution**

**37.**  $\text{HCOOH}$  reacts with conc.  $\text{H}_2\text{SO}_4$  to produce

A.  $\text{CO}$

B.  $\text{CO}_2$

C.  $\text{NO}$

D.  $\text{NO}_2$

**Answer: A**



**Watch Video Solution**

**38.** Ozone oxidises iodide to

A. iodine

B. hypoiodite

C. iodate

D. periodate

**Answer: A**



**Watch Video Solution**

## Via Group Elements

1. Which one of the following ion has the highest value of ionic radius?

A.  $Li^{+}$

B.  $B^{3+}$

C.  $O^{2-}$

D.  $F^{-}$

**Answer: C**



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2. The order of melting point , boiling point and densities of halogens

- A. Gradually decreases from  $F_2 \rightarrow I_2$
- B. Gradually increases from  $F_2 \rightarrow I_2$
- C. Decreases from  $F_2 \rightarrow Br_2$  and then increases
- D. Increases from  $F_2 \rightarrow Br_2$  and then decreases

Answer: B



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3. Poor conductor of electricity is

- A. aq.  $H_2F_2$
- B. aq.HCl
- C. aq.HBr



D. aq.HI

**Answer: A**



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4. Which of the following species has four lone pairs of electrons in its valance shell ?

A. I

B.  $O^-$

C.  $Cl^-$

D. He

**Answer: C**



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5. Which of the following is not correct regarding bond energies

- A. The extent of overlap of the atomic orbitals decreases as the size of the atoms increase
- B. Among the halogens the bond energy of  $F_2$  is abnormally high ( $159 \text{ KJ mol}^{-1}$ )
- C. The  $F_2$ , molecule it self has a notoriously weak bond  $159 \text{ KJ mol}^{-1}$  compared with chlorine  $243 \text{ KJ mol}^{-1}$
- D. According to mulliken in fluorine there are no-d-orbitals in the valence shell and hence  $p\pi - d\pi$  bonding is not possible

Answer: B



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6. Fluorine is a stronger oxidising agent than chlorine in aqueous solution . This is attributed to many factors except

- A. Heat of dissociation
- B. Electron affinity
- C. Ionization potential
- D. Heat of hydration

**Answer: C**



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7. I) Fluorine reacts with cold , dilute alkalies liberating  $O_2$  gas.

II) Chlorine reacts with hot ,conc . Alkalies to form chlorides and chlorates

.

III) Bromine reacts with cold ,dil .alkali to form bromide and hypobromite

The correct combination is

- A. Only I & II are correct
- B. Only II and III are correct
- C. Only I and III are correct

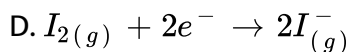
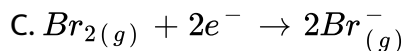
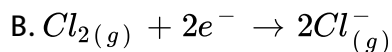
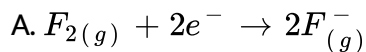
D. Only III is correct

**Answer: B**



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**8. Easiest to perform in the following is**



**Answer: A**



**Watch Video Solution**

**9. Most unstable among the following is**



**Answer: D**



**Watch Video Solution**

**10.** The Incorrect statement regarding Nelson cell process

A.  $\text{H}_2$  and NaOH are the by products in this process

B. at anode  $2\text{Cl}^- \rightarrow 2\text{e}^- + \text{Cl}_2$  liberated

C.  $2\text{H}_2\text{O} + 2\text{e}^- \rightarrow \text{H}_2 + 2\text{OH}^-$  at cathode

D. The passage of steam from the bottom of the tank keeps the solution cool and does not clear the perforations of the U - tube

**Answer: B**



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11.  $NH_3(\text{excess}) + 3CO \rightarrow A + N_2 \uparrow$ , the bonds present in compound A is

- A. Ionic, covalent and dative
- B. Ionic and covalent
- C. Dative and ionic
- D. Dative only

Answer: A



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12. T' shaped interhalogen is

- A.  $ICl$
- B.  $ClF_3$



**Answer: B**



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13. Which of the following is not correct regarding the interhalogen compound bromine pentafluoride

A. It is formed in fifth excited state of bromine

B. Oxidation number of bromine is + 5

C. Hybridisation of bromine is  $sp^3d^2$

D. It has square monopiramidal structure

**Answer: A**



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14. Correct trends from  $\text{ClO}^-$  to  $\text{ClO}_4^-$  are

- A) Oxidation ability decreases
- B) Number of delocalised electrons increases
- C) Number of lone electron pairs on chlorine decreases
- D) O- Cl bond length decreases

A. A, B, C only

B. B, C, D only

C. A, C, D only

D. A, B, C and D

**Answer: D**



**Watch Video Solution**

15.  $\text{Br}_2 + \text{NaOH} \rightarrow \text{NaBrO}_3 + \text{H}_2\text{O}$  In the above balanced chemical equation, number of moles of  $\text{Br}_2$  reduced to bromide is

A. 1.5



B. 2.5

C. 3

D. 5

**Answer: B**



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**16.** The aqueous solution of which of the following salt will have the lowest pH ?

A.  $\text{NaClO}$

B.  $\text{NaClO}_2$

C.  $\text{NaClO}_3$

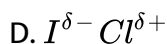
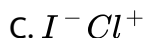
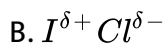
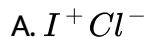
D.  $\text{NaClO}_4$

**Answer: D**



**Watch Video Solution**

17. Charge distribution in iodine monochloride is best represented as



**Answer: B**



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18. No gas is liberated when the following HX is treated with  $MnO_2$  and *con.*  $H_2SO_4$



D. HI

**Answer: B**



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**19.** Gaseous HCl is a poor conductor of electricity while its aqueous solution is a good conductor this is because

- A.  $H_2O$  is a good conductor of electricity
- B. A gas cannot conduct electricity but a liquid can
- C. HCl gas does not obey Ohm's law, where as the solution does
- D. HCl ionises in aqueous solution

**Answer: D**



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20. Which of the following does not form precipitate with  $AgNO_3$  ?

- A. HF
- B. HCl
- C. HBr
- D. HI

**Answer: A**



**Watch Video Solution**

21. Concentrated hydrochloric acid when kept in open air sometimes produces a cloud of white fumes. The explanation for it is that

- A. Oxygen in air reacts with the emitted HCl gas to form a cloud of chlorine gas
- B. Strong affinity of HCl gas for moisture in air results in forming of droplets of liquid solution which appears like a cloudy smoke.

C. Due to strong affinity for water, concentrated hydrochloric acid pulls moisture of air towards itself. This moisture forms droplets of water and hence the cloud

D. Concentrated hydrochloric acid emits strongly smelling HCl gas all the time

**Answer: C**



**Watch Video Solution**

22. Which redical can bring about the highest oxidation state of a transition metal ?

A.  $Br^-$

B.  $Cl^-$

C.  $F^-$

D.  $I^-$

**Answer: C**



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**23.** A substance X when heated with conc.  $H_2SO_4$  , liberates a gas which turns starch paper blue. The substance X is

A.  $NaI$

B.  $NaBr$

C.  $NaCl$

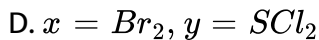
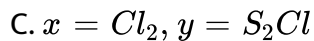
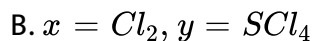
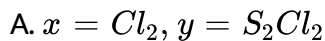
D.  $NaNO_3$

**Answer: 1**



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**24.** A halogen (x) reacts with sulphur gives a compound (y) .(y) reacts with ethylene to give Mustard gas . Then



**Answer: A**



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**25.** If  $Cl_2$  gas is passed into aqueous solution of KI containing some  $CCl_4$  and the mixtures is shaken

A. upper layer become violet

B. homogeneous violet layer is formed

C. orange colour appears

D. lower layer becomes violet

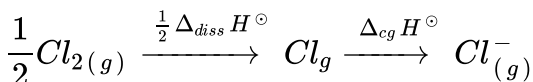
**Answer: D**

26. Which statement is incorrect

- A. Chlorine can bleach a wet piece of cloth
- B. Chlorine in water gives HOCl
- C. Bromine can be prepared from carnalite
- D. Bromine is not liberated when iodine is passed through an acidified KBr solutio

Answer: D

27. Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below :





$\xrightarrow{\Delta_{hyd} H^{\ominus}} Cl^{-} (aq)$  The energy involved in the conversion of  $\frac{1}{2} Cl_{2(g)}$

to  $Cl^{-} (aq)$  (using the data,

$$\Delta_{diss} H_{Cl_2}^{\ominus} = 240 \text{ KJ mol}^{-1},$$

$$\Delta_{eg} H_{Cl}^{\ominus} = -349 \text{ KJ mol}^{-1},$$

$$\Delta_{hyd} H_{Cl^{-}}^{\ominus} = -381 \text{ KJ mol}^{-1}) \text{ will be}$$

A.  $-610 \text{ KJ mol}^{-1}$

B.  $-850 \text{ KJ mol}^{-1}$

C.  $+120 \text{ KJ mol}^{-1}$

D.  $+152 \text{ KJ mol}^{-1}$

**Answer: A**



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**28.** Among the following ion the one that cannot undergo disproportionation





**Answer: A**



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**29.** Interhalogen compounds are more reactive than the corresponding halogens. Explain.

A. Two halogens are present in place of one

B. They are more ionic

C. Their bond polarity is more than that of the halogen molecule

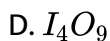
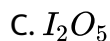
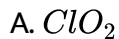
D. They carry more energy

**Answer: C**



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30. Which of the following is used in the estimation of carbon monoxide?



Answer: C



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31. Which of the following is not the characteristic of interhalogen compounds ?

A. They are more reactive than halogens

B. They are quite unstable but none of them is explosive

C. They are covalent in nature

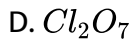
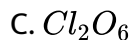
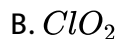
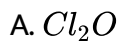
D. They have low boiling points and are highly volatile.

**Answer: D**



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**32.** Oxide that is prepared by dehydration of strongest oxidising agent is



**Answer: D**



**Watch Video Solution**

1. When a Radioactive substance is kept in a vessel, the atmosphere around it is rich with

A. He

B. Ne

C. Ar

D. Xe

**Answer: A**



**Watch Video Solution**

2. Which element disintegrates to give two noble gases

A. Ra

B. Th

C. Rn

D. He

**Answer: A**



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3. The actual density of nitrogen is  $1.2519 \text{ lit}^{-1}$ . The density of nitrogen obtained from the atmosphere is  $1.2572 \text{ g lit}^{-1}$ . This is because of the fact that atmospheric nitrogen contain

A. Argon and other noble gases

B. Carbon dioxide

C. Neon

D. Carbon monoxide

**Answer: A**



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4. Noble gases exists only in monoatomic state. This is due to

A. Non availability of unpaired electrons

B. high ionization energy

C. large size

D. zero electron affinity

**Answer: A**



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5. If one litre of air is passed repeatedly over heated copper and magnesium till no further reduction in volume takes place, the volume finally obtained is

A. 800ml

B. 990ml

C. 10ml

D. 100ml

**Answer: C**



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**6.** The maximum valency (8) is shown by

A. Xe and Os only

B. Xe and Ru only

C. Xe, Os and Ru

D. Xe, Os, Ru and Mn

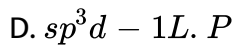
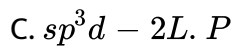
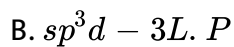
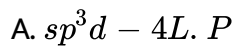
**Answer: C**



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**7.** Regarding  $XeF_2$ , the correct combination is (L.P = lone pairs  $\mu$  = Dipolemoment)





**Answer: B**



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**8. Which of the following is diamagnetic in nature?**



**Answer: C**



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9. The incorrect statement regarding to Noble gases is

- A. Their electronegative values are zero
- B. They are held together by Vanderwaals forces
- C. They occupy the peaks in the graphs of ionisation potential and atomic number
- D. Their boiling points decrease from He to Xe

**Answer: D**



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10. The fact helped the preparation of first compound of Xenon

- A. High bond energy of Xe - F
- B. Low bond energy of F - F in  $F_2$

C. Ionisation energies of  $O_2$  and xenon were almost similar

D. None of these

**Answer: C**



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**11. Noble gases are only sparingly soluble in water due to :**

A. dipole - dipole interactions

B. induced dipole-induced dipole interactions

C. dipole-induced dipole interactions

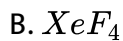
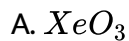
D. hydrogen bonding

**Answer: C**



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12. The noble gas compound iso-structural with bromate ion is:

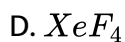
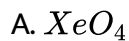


Answer: A



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13. Which of the following has a planar structure?



**Answer: D**



**Watch Video Solution**

**14.** Which of the following is not correct ?

- A. Xe is the most reactive among the rare gases
- B. He is an inert gas
- C. Radon is obtained by decay of radium
- D. The most abundant rare gas found in atmosphere is He

**Answer: D**



**Watch Video Solution**

**15.** Which of the following is more volatile ?

- A. He

B. Xe

C. Kr

D. Ne

**Answer: A**



**Watch Video Solution**

**16. Which of the following cannot be formed ?**

A.  $He^{2+}$

B.  $He^{+}$

C. He

D.  $He_2$

**Answer: D**



**Watch Video Solution**

17. Among the following molecules,

a)  $XeO_3$ , b)  $XeOF_4$  and c)  $XeF_6$ ,

Those having same number of lone pairs on Xe are

A. a and b

B. b and c

C. a, b and c

D. a and c

**Answer: C**



**Watch Video Solution**

18. In a compound of sulphur, the sulphur atom is in second excited state.

The possible hybridisation of sulphur is

A.  $sp^2$

B.  $sp^2$

C.  $sp^3d$

D.  $sp^3$  or  $sp^3d^3$

**Answer: D**



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**19. Bond length order in various xenon fluorides is**

A.  $XeF_6 > XeF_4 > XeF_2$

B.  $XeF_2 = XeF_4 = XeF_6$

C.  $XeF_2 > XeF_4 > XeF_6$

D. cannot be predicted

**Answer: C**



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20.  $\text{XeF}_6$  on partial hydrolysis gives

- A.  $\text{XeOF}_4$  only
- B.  $\text{XeO}_2\text{F}_2$  only
- C. both  $\text{XeOF}_4$  and  $\text{XeO}_2\text{F}_2$
- D.  $\text{XeOF}_4$  or  $\text{XeO}_2\text{F}_2$

Answer: D



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21. Number of  $\sigma$  and  $\pi$  bonds present in  $\text{XeOF}_4$  molecule are

- A.  $5\sigma$  and  $1\pi$
- B.  $4\sigma$  and  $2\pi$
- C.  $2\sigma$  and  $4\pi$
- D.  $3\sigma$  and  $3\pi$

**Answer: A**



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**22.** Number of lone pair and bond pairs present on Xe of  $XeOF_4$  molecule is

A. 1,2

B. 1,4

C. 1,6

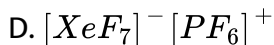
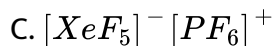
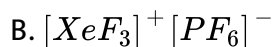
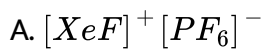
D. 2,4

**Answer: C**



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**23.** Xenon difluoride reacts  $PF_5$  they give which pair of ions



**Answer: A**



**Watch Video Solution**

**24.**  $XeF_6 + MF \rightarrow M^+ [XeF_7]^-$ . Here "M" is

A. Alkali metals

B. Alkaline earth metals

C. Transition metals

D. Inner transition metals

**Answer: A**



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25. The oxidation state of the noble gas element in xenon oxydifluoride

$[XeOF_2]$  is

A. 0

B. +1

C. +4

D. +8

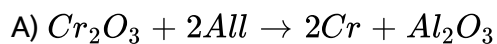
**Answer: C**

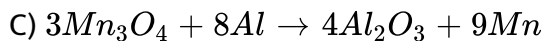
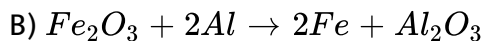


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**Metallurgy**

1. Exothermic reaction among the following is





A. A,B

B. B,C

C. A,C

D. A,B,C

**Answer: D**



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2. Consider the following statements regarding roasting. It is carried out to

A) convert sulphide to oxide and sulphate

B) remove water of hydration

C) melt the ore

D) remove arsenic and sulphur impurities

Of these statements :

A. A, B and C are correct

B. A and D are correct

C. A, B and D are correct

D. B, C and D are correct

**Answer: C**



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**3.** Which of following metal is extracted by the electrolysis of its salt in molten state

(a) Na, (b) Mg, (c) Al, (d) Fe, (e) Ag

The correct answer is

A. Only a and b

B. Only a, b and c

C. Only a, b, c and e

D. All the above

**Answer: B**



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4. Which of following metal oxide (s) can be reduced to the corresponding metal by hydrogen

a)  $MoO_3$  b)  $WO_3$  c)  $Fe_2O_3$  d)  $ZnO$

The correct match is

A. Only a and b

B. a, b and d

C. a and c

D. a only

**Answer: A**



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5. The metal iron obtained for the last furnace contains X' percent of carbon. The maximum value of 'X' is

- A. 1
- B. 2
- C. 3
- D. 4

**Answer: D**



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6. Incorrect statement is

- A. X is anionic complex
- B. In 'X' primary valency and secondary valency of Ag are 1 and 2
- C. IUPAC name of 'X' is sodium dicyano-argentate(I)
- D. IUPAC name of 'X' is sodium dicyanosilver (I)

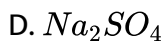
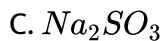
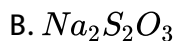
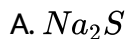


**Answer: D**



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7.  $Ag_2S$  is digested with 1% solution of NaCN and air is blown into the solution, then sulphur in  $Ag_2S$  is finally converted to



**Answer: D**



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8. Sodium cannot be extracted by electrolysis of aqueous solutions due to

- A. Sodium is less reactive
- B. Sodium liberated reacts with  $H_2O$  and forms NaOH and  $H_2$
- C. Sodium has high vapour pressure
- D. Preferential discharge theory

**Answer: D**



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**9. Regarding the electrolysis of Alumina, the correct statements**

- A) Cryolite is added to reduce the fusion temp
- B) Impure aluminium is mixed with copper and silicon to increase the density
- C) Fluorspar is added to reduce the fusion temp
- D) Electrolyte is mixture of fluorides of sodium, Barium and Aluminium saturated with Alumina

**A. Only B, C and D are correct**

B. Only A, C and D are correct

C. Only A , B and D are correct

D. Only C is correct

**Answer: D**



**View Text Solution**

**10.** In froth flotation process which of the following is used as froth stabiliser

A. Pine oil

B. Xanthates

C. Fatty acids

D. Aniline (or) Cresol

**Answer: D**



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11. Silver sulphide is heated in the presence of air and common salt to convert it to sodium sulphate. This is an example of

- A. sulphatising roasting
- B. oxidising roasting
- C. chloridising roasting
- D. calcination process

**Answer: C**



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12. Metal extracted only by electrolysis process is

- A. copper
- B. zinc
- C. sodium

D. silver

**Answer: C**



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**13.** Silver can be precipitated in hydrometallurgy by using aluminium. This is because

- A. silver is more electropositive metal
- B. aluminium is more electronegative metal
- C. silver is a good oxidising agent
- D. aluminium is a good reducing agent

**Answer: D**



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14. At which one of the following condition, a reducing agent is suitable for reducing a metal oxide

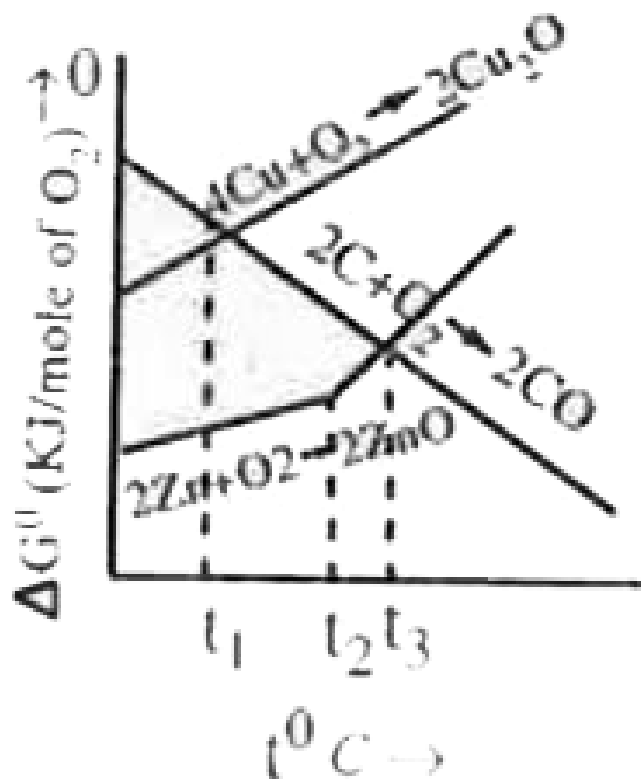
- A. Sum of the  $\Delta G$  values for oxidation of metal and oxidation of reductant should be negative
- B. Sum of the  $\Delta G$  values for oxidation of metal and oxidation of reductant should be positive
- C. Sum of the  $\Delta G$  values for reduction of metal oxide and oxidation of reductant should be negative
- D. Sum of the  $\Delta G$  values for oxidation of metal and reduction of reductant should be negative.

**Answer: C**



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15. From the below Ellingham diagram, incorrect statement among the following is



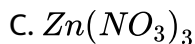
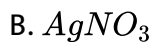
- A. at the temperature above  $t_1^0C$ , carbon can reduce  $Cu_2O$
- B. at the temperature above  $t_3^0C$ , carbon can reduce ZnO
- C. at  $t_2^0C$ ,  $ZnO_{(s)}$  will boil
- D. reduction of  $Cu_2O$  with carbon requires low temperature when compared with the reduction of ZnO by carbon.

**Answer: C**



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**16.** Colourless solutions of the following four salts are placed separately in four different test tubes and a strip of copper is dipped in each one of these. Which solution turn blue.



**Answer: B**



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**17.** Zirconium and titanim are purified by



- A. Electrolysis
- B. Zone refining
- C. Bessemerisation
- D. Van-arkel method

**Answer: D**



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**18.** Pb and Sn are extracted from their chief ore by

- A. Carbon reduction and self reduction
- B. Self reduction and carbon reduction
- C. Electrolysis and self reduction
- D. Self reduction and electrolysis

**Answer: B**



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**19.** Gold and silver are extracted from their respective ores by

- A. Calcination
- B. Smelting
- C. Roasting
- D. Hydrometallurgy

**Answer: D**



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**20.** The process of protecting iron by coating with zinc is called

- A. Corrosion
- B. Galvanisation
- C. Rusting

D. Smelting

**Answer: B**



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**21.** All of the following metals are silvery white except

A. Zn

B. Pb

C. Mg

D. Cu

**Answer: D**



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**22.** A common metal widely used in electrical cables and kitchen ware is

A. Fe

B. Ag

C. Cu

D. Ni

**Answer: C**



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**23.** The percentage of carbon in steel is approx

A. 0.01

B. 0.03

C. 0.02

D. 0.1

**Answer: C**



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24. Which of the following is used in electroplating?

A.  $\text{AgCl}$

B.  $\text{AgNO}_3$

C. Sodium argentocyanide

D. None of these

Answer: C



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25.

List-I

(reaction)

- 1)  $\text{C}_{(s)} + \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)}$
- 2)  $\text{C}_{(s)} + \text{O}_{2(g)} \rightarrow 2\text{CO}_{(g)}$
- 3)  $2\text{CO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{CO}_{2(g)}$
- 4)  $2\text{Fe}_{(s)} + \text{O}_{2(g)} \rightarrow 2\text{FeO}_{(s)}$

List-II

(Slope of the graph in Ellingham diagram)

- a) Positive slope
- b) Negative slope
- b) Almost zero

A.  $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & a & b \end{matrix}$

B.  $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & a & a \end{matrix}$

C.  $\begin{matrix} 1 & 2 & 3 & 4 \\ c & a & b & a \end{matrix}$

D.  $\begin{matrix} 1 & 2 & 3 & 4 \\ a & c & b & a \end{matrix}$

**Answer: B**



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**26.** Neutral refractory material used in furnaces is

A. Graphite

B. CaO

C.  $SiO_2$

D. MgO

**Answer: A**



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27. The process of bringing the metal or its ore into solution by the action of a suitable chemical reagent followed by extraction of the metal either by electrolysis or by suitable precipitating agent is called

- A. Electrometallurgy
- B. Electro-refining
- C. Hydrometallurgy
- D. Zone-refining

**Answer: C**



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28. The removal of impurities from an ore by forming molten mass is called

- A. Calcination

B. Levigation

C. Slagging

D. Refining

**Answer: C**



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**29.** In the froth flotation process for the purification of minerals the particles float because

A. They are light

B. Their surface is hydrophobic (not easily wetted by water)

C. They bear electrostatic charge

D. They are insoluble

**Answer: B**



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30. Cryolite is chemically

- A.  $Na_3AlF_6$  and is used in the electrolysis of alumina for decreasing electrical conductivity
- B.  $Na_3AlF_6$  and is used in the electrolysis of alumina for lowering the melting point of alumina
- C.  $Na_3AlF_6$  and is used in the electrolytic purification of alumina
- D.  $Na_3AlF_6$  and is used in the electrolysis of alumina

Answer: A



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## D Block Elements

1. Which metal has the least melting point

A. Cr

B. Tl

C. Cu

D. Zn

**Answer: D**



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2. Among the transition elements the element with lowest melting point belongs to

A. group IIIB

B. group IB

C. group VIB

D. group IIB

**Answer: B**



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3. Arrange the following in order of their decreasing thermal conductivity

A. Al, Ag, Cu

B. Cu, Ag, Al

C. Ag, Cu, Al

D. Al, Cu, Ag

Answer: C



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4. A) In a group the correct order of melting points is  $3d < 4d < 5d$

B) VI B group have highest melting points in any series

C) In 3d and 4d series, VIIB group elements have exceptionally low melting points

D) The correct order of melting points is  $Cu > Ag > Au$

A. Only A, B, C are correct

B. Only A, B, D are correct

C. Only B, C, D are correct

D. Only A, D, C are correct

**Answer: A**



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5. The reason for the stability of  $Gd^{3+}$  ion is

A. 4f subshell - half filled

B. 4f subshell - completely filled

C. Possesses the general electronic configuration of noble gases

D. 4f subshell empty

**Answer: A**



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6. Electronic configuration of a transition element is  $[\text{Ar}] 4s^{23}d^6$ . A sudden hike is observed between

A.  $IP_1$  &  $IP_2$

B.  $IP_2$  &  $IP_3$

C.  $IP_3$  &  $IP_4$

D.  $IP_4$  &  $IP_5$

**Answer: C**



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7. Transition elements have higher enthalpy of atomisation than alkali metals due to

A. High electropositive nature of transition elements

B. Larger size of transition elements

C. Stronger metallic bond in transition elements

D. Participation of  $ns$  and  $(n-1)d$  electrons in bond formation in alkali metals

**Answer: C**



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**8. Enthalpy of atomisation is lowest in**

A. Sc

B. Mn

C. Ni

D. Zn

**Answer: D**



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9. Which of the following has highest tendency for  $M^{+2} \rightarrow M$

A. V

B. Cr

C. Co

D. Cu

**Answer: D**



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10.  $Cu^{+2}$  can oxidise the halide

A.  $I^{-}$

B.  $Br^{-}$

C.  $Cl^{-}$

D.  $F^{-}$

**Answer: A**



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**11.** In aqueous solution the following undergoes disproportionation reaction



D. All

**Answer: D**



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**12.** d-block elements can act as catalysts due to their ability to



- A. Exhibit variable oxidation states
- B. Coloured ion formation
- C. Paramagnetic nature
- D. Alloy formation

**Answer: A**



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**13. Incorrect statement regarding interstitial hydrides is**

- A. They show metallic conduction
- B. They are harder than pure metal
- C. They have high mp than pure metal
- D. They are denser than pure metal

**Answer: D**



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14. The properties of Zr and Hf are similar because :

- A. both belong to d-block
- B. both belong to same group of the periodic table
- C. both have similar radii
- D. both have same number of electrons

**Answer: C**



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15. The stability of particular oxidation state of a metal in aqueous solution is determined by

- A. Enthalpy of sublimation of the metal
- B. Ionisation energy
- C. Enthalpy of hydration of the metal ion

D. All of these

**Answer: D**



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**16.** Which among FeO and  $Fe_2O_3$  is more basic?

A. FeO

B.  $Fe_2O_3$

C. Both have same basic strength

D. None of them is basic

**Answer: A**



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17. Which of the following properties would you not expect copper to exhibit:

- A. High thermal conductivity
- B. Low electrical conductivity
- C. Ductility
- D. Malleability

**Answer: B**



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18. Identify the incorrect statement among the following

- A. La and Lu have partially filled 'd' orbitals and no other partially filled orbitals
- B. The chemistry of various lanthanoids is very similar
- C. 4f and 5f orbitals are equally shielded

D. d-block elements show irregular and erratic chemical properties among themselves

**Answer: C**



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19. The complex  $K_3[Fe(CN)_6]$  should have a spin only magnetic moment of

A.  $\sqrt{3}$  B.M

B.  $2\sqrt{5}$  B.M

C.  $\sqrt{35}$  B.M

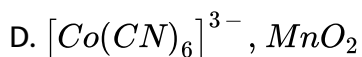
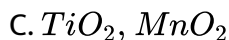
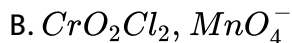
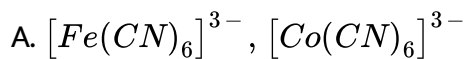
D. 6 BM

**Answer: C**



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20. The pair of the compounds in which both the metals are in the highest possible oxidation state is,

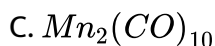
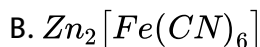


Answer: B



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21. In which of the following complexes the metal ion is in zero oxidation state ?



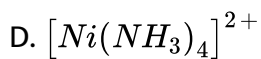
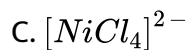
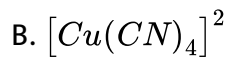
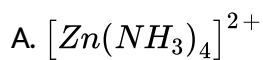


**Answer: C**



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**22. Which of the following is diamagnetic?**

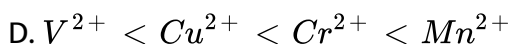
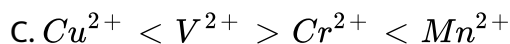
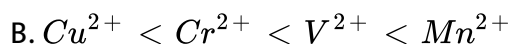
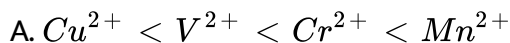


**Answer: A**



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23. Which one of the following sets correctly represents the increase in the paramagnetic property of the ions ?



Answer: A



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24. In the complex  $[Ni(H_2O)_2(NH_3)_4]^{2+}$  the number of unpaired electrons is

A. 0

B. 1

C. 3



D. 2

**Answer: D**



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**25.** Heat of atomization of zinc is lowest among 3d block elements due to

- A. Stronger metallic bond in zinc
- B. (n-1) d electrons do not involve in bonding
- C. (n-1) d electrons involve in bonding
- D. Larger size of zinc

**Answer: B**



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26. The positive standard reduction potential of  $C \frac{u^{+2}}{C} u$  electrode is due to

- A. high heat of atomisation and hydration energies
- B. low heat of atomisation and hydration energies
- C. high heat of atomisation and low heat of hydration
- D. low heat of atomisation and high heat of hydration

**Answer: C**



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27. The observed and calculated  $E^0$  values for  $\frac{M^{+2}}{M}$  are same for

- A. Fe
- B. Co
- C. Ni

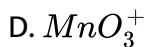
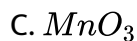
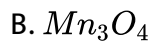
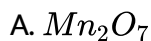
D. Cu

**Answer: A**



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**28.** When a large amount of  $KMnO_4$  is added to concentrated  $H_2SO_4$ , an explosive compound is formed. The formula of the compound is

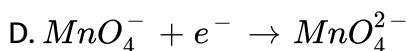
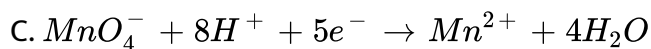
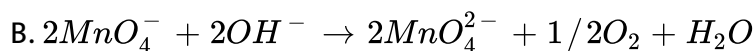


**Answer: A**



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29. Reaction of  $KMnO_4$  in neutral or very weakly acidic solution can be represented as



Answer: A



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30. When  $KMnO_4$  is added to oxalic acid, the decolourisation is slow in the begining but becomes instantaneous after sometime because

A.  $Mn^{2+}$  acts as autocatalyst

B.  $CO_2$  is formed as the product

C. reaction is exothermic

D.  $MnO_4^-$  catalyses the reaction

**Answer: A**



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**31.** A solution of potassium chromate is treated with an excess of dilute nitric acid. Then the observations is

A.  $Cr^{3+}$  and  $Cr_{2O_7^{2-}}$  are formed

B.  $Cr_{2O_7^{2-}}$  and  $H_2O$  are formed

C.  $Cr_{2O_7^{2-}}$  is reduced to +3 state of Cr

D.  $Cr_{2O_7^{2-}}$  is oxidised to +7 state of Cr

**Answer: B**



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32.  $K_2Cr_2O_7$  cannot be used for

- A. preparing azo compounds
- B. tanning leather
- C. as a laboratory oxidant
- D. as a reductant

Answer: D



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33. When acidified solution of potassium dichromate is shaken with aqueous solution of ferrous sulphate then

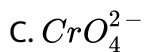
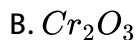
- A.  $Cr_2O_7^{2-}$  ion is reduced to  $Cr^{3+}$  ions
- B.  $Cr_2O_7^{2-}$  ion is reduced to  $Cr_2O_4^{2-}$  ions
- C.  $Cr_2O_7^{2-}$  ion is oxidised to Cr
- D.  $Cr_2O_7^{2-}$  ion is oxidised to  $CrO_3$

**Answer: A**



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**34.** The blue colour produced on adding hydrogen peroxide to acidified  $K_2Cr_2O_7$  is due to the formation of



**Answer: A**



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**35.** Which of the following metals is known to form acidic oxide

- A. iron
- B. manganese
- C. cobalt
- D. mercury

**Answer: B**



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**36. In the dichromate dianion**

- A. Cr-O bonds are equivalent
- B. 6 Cr-O bonds are equivalent
- C. All Cr-O bonds are equivalent
- D. All Cr-O bonds are non-equivalent

**Answer: B**



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**37.** The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is

A. +4

B. +6

C. +2

D. +3

**Answer: D**



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**38.** Which of the following element has f electronic configuration in its +4 state

A. Ac

B. Bk

C. Er

D. Lv

**Answer: B**



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**39.** The natures of the oxides  $\text{CrO}$  and  $\text{CrO}_3$ , respectively

A. acidic and basic

B. basic and amphoteric

C. amphoteric and basic

D. basic and acidic

**Answer: D**



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40. Acedified  $K_2Cr_2O_7$  cannot oxidise

- A. Ferrous to ferric
- B. Sulphide to sulphur
- C. Stanous to stannic
- D. Flouride to flourine

Answer: D



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41. The equilibrium  $Cr_2O_7^{2-} \rightleftharpoons 2CrO_4^{2-}$

- A. exists in acidic medium
- B. exists in basic medium
- C. exists in neutral medium
- D. never exists

**Answer: C**



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**42.** The correct statement among the following is

- A. The colour of  $Cr_2O_7^{-2}$  ion is due to d-d transition of unpaired electrons
- B. Transition elements form a large number of alloys, because of similar boiling points
- C. Bronze is an alloy of Copper and Zinc
- D. Salt of  $Fe^{2+}$  ion has greenish colour

**Answer: C**



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**43.** Identify the correct statements among the following

I) Both Cr and Cu show +1 oxidation state

II) The complementary colour of absorbed green colour of visible radiation is purple.

III)  $Ni^{+2}$  ion in its hydrated state exhibits green colour

IV) Brass is an alloy of copper

A. All

B. I, II, III only

C. I, IV only

D. I, III only

**Answer: A**



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**44.** Which of the following has very high  $IP_2$  value

A. Zn

B. Mn

C. Cu

D. Ti

**Answer: C**



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**45.** Zn, Cd and Hg are only 'd' block elements but not transition elements because

A. They have partly filled 'd' sub shells both in their atomic and ionic states

B. They have completely filled 'd' sub shells both in their atomic and ionic states

C. They have fully filled 'd' sub shells only in their atomic states

D. They have partly filled 'd' sub shells only in their atomic states

**Answer: B**



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**46.** Acidified  $KMnO_4$  oxidizes nitrites to

A.  $N_2$

B.  $NO_3$

C.  $NO_3^-$

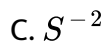
D. NO

**Answer: C**



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**47.** Permanganate ion oxidize  $S_2O_3^{2-}$  in fairly alkaline solutions to give

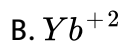


**Answer: A**



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**48.** Which of the following ions is most para-magnetic



**Answer: A**



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49.  $\text{Yb}^{+2}$  and  $\text{Lu}^{3+}$  are diamagnetic due to

- A. Vacant 'f' sub shells
- B. Fully 'f' sub shells
- C. Partly filled 'f' sub shells
- D. Partly filled 'd' sub shells

**Answer: B**



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50. Alloy of Misch metal consists of

- A. 95% of actinoid metal, +5% iron
- B. 95% of alkali metal, 5% iron
- C. 95% of lanthanoid metal, +5% iron

D. 95% of alkaline earth metal, + 5% iron

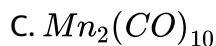
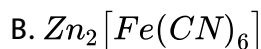
**Answer: C**



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## Complex Compounds

1. In which of the following complexes the metal ion is in zero oxidation state ?



**Answer: C**



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2. Which of the following compounds is paramagnetic ?

- A. Tetracyanonickelate (II) ion
- B. Tetraammine zinc (II) ion
- C. Hexaammine chromium (III) ion
- D. Diammine silver (I) ion

**Answer: C**



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3. The complex  $K_3[Fe(CN)_6]$  should have a spin only magnetic moment of

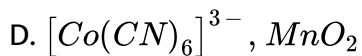
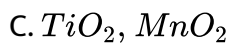
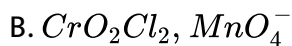
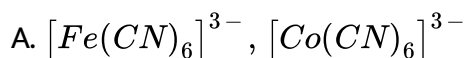
- A.  $\sqrt{3}$  B.M
- B.  $2\sqrt{5}$  B.M
- C.  $\sqrt{35}$  B. M
- D.  $\sqrt{6}$  B. M

**Answer: A**



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**4. The pair of compounds having metals in their highest oxidation state is**

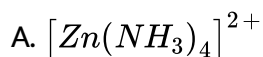


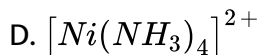
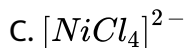
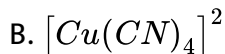
**Answer: B**



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**5. Which of the following is diamagnetic**



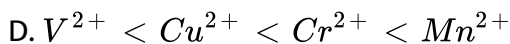
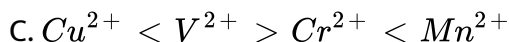
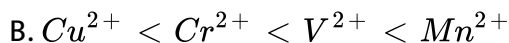
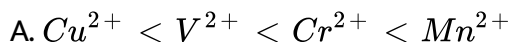


**Answer: A**



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6. Which one of the following sets correctly represents the increase in the paramagnetic property of the ions ?

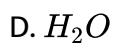
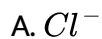


**Answer: A**



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7. Which of the following represents chelating ligand?

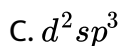
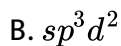
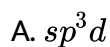


**Answer: B**



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8.  $K_3[CoF_6]$  is high spin complex. What is the hybrid state of Co atom in this complex?



D.  $dsp^2$

**Answer: B**



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9. Tetraamminecopper (II) ion is square planar complex with one unpaired electron. According to valence bond theory the hybrid state of copper should be

A.  $sp^3$

B.  $sp^2$

C.  $dsp^2$

D.  $sp^3d$

**Answer: C**



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10. The hybridisation of nickel in tetracarbonyl nickel is

A.  $dsp^2$

B.  $sp^3$

C.  $sp^3d$

D.  $sp^3d^2$

**Answer: B**



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11. In the complex  $[Ni(H_2O)_2(NH_3)_4]^{2+}$  the number of unpaired electrons is

A. 0

B. 1

C. 3

D. 2

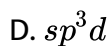
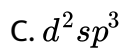
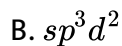


**Answer: D**



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**12.** Which of the following hybrid state is associated with low spin complex ?



**Answer: C**



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List I

List II

1)  $sp^3$

A) Square planar

13. 2)  $dsp^2$

B) Octahedral

3)  $sp^3d$

C) Tetrahedral

3)  $d^2sp^3$

D) Trigonal bipyramidal

A. 

| $A$ | $B$ | $C$ | $D$ |
|-----|-----|-----|-----|
| 3   | 1   | 2   | 4   |

B. 

| $A$ | $B$ | $C$ | $D$ |
|-----|-----|-----|-----|
| 4   | 2   | 1   | 3   |

C. 

| $A$ | $B$ | $C$ | $D$ |
|-----|-----|-----|-----|
| 2   | 4   | 1   | 3   |

D. 

| $A$ | $B$ | $C$ | $D$ |
|-----|-----|-----|-----|
| 2   | 3   | 1   | 4   |

**Answer: C**



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14. Some statements on  $[Co(NH_3)_6]^{3+}$

(a) oxidation number of Co is +3

(b) octahedral shape

(c) high spin complex

d) hybridization of cobalt is  $d^2sp^3$

The correct set of statements

A. a,b,c

B. a,b,d

C. b,c,d

D. a,d

**Answer: B**



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**15.** The incorrect statement with respect to valence bond theory

A. The electrons in the metal orbitals may undergo regrouping even against Hund's rule.

B. The electrons in an incompletely filled orbitals give rise to the resultant magnetic moment.

C. Ligand orbitals overlap the vacant metal orbitals to form a strong coordinate covalent bond to the extent possible.

D. The number of electrons lost is equal to the coordination number of the metal

**Answer: D**



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**16.** When ammonia is added to cupric salt solution, the deep blue colour formed is

A. Due to double salt formed

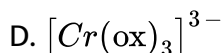
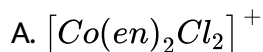
B. Due to complex salt formed

C. Due to mixed salt formed

D. Due to basic salt formed

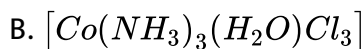
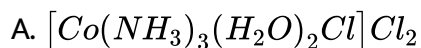
**Answer: B**

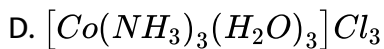
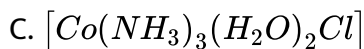
17. Both geometrical and optical isomerisms are shown by



**Answer: A**

18. The hypothetical complex chlorodiaquatriam minecobalt (III) chloride can be presented as



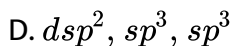
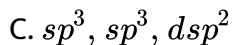
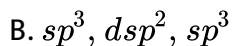
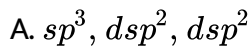


**Answer: A**



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19. Among  $[Ni(CO)_4]$ ,  $[Ni(CN)_4]^{-2}$  and  $[NiCl_4]^{-2}$  species the hybridisation state of the Ni atom are respectively?

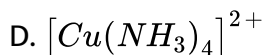
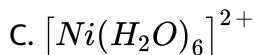
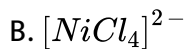
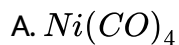


**Answer: B**



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20. Which complex has square planar structure?



Answer: D



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21. Which of the following is not a bidentate ligand?

A. Ethylene diamine

B. Acetyl acetone

C. Carbonate

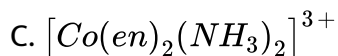
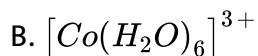
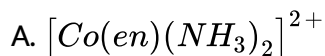
D. Chloro

**Answer: D**



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**22. Which of the following has an optical isomer ?**



**Answer: C**



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**23. Which of the following has magnesium ?**

A. Carbonic anhydrase



B. Haemocyanin

C. Chlorophyll

D. Vitamin  $B_{12}$

**Answer: C**



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**24.** Hybridization of Fe in  $[Fe(H_2O)_5NO]SO_4$  (brown ring complex) is

A.  $dsp^2$

B.  $sp^3d$

C.  $sp^3d^2$

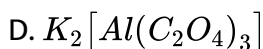
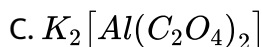
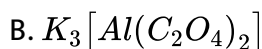
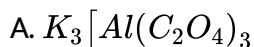
D.  $d^2sp^3$

**Answer: C**



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25. The correct structural formula of potassium tri oxalate aluminate (III) is



**Answer: A**



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26. Which of the following statements is true

A)  $Ma_3b_3$  type of complex exhibits fac-mer isomerism

B) Tetrahedral complexes do not exhibit optical isomerism C)

$[Co(en)_3]^{3+}$  shows optical isomerism

D)  $[Pt(en)_2Cl_2]$  does not exhibit optical isomerism

A. A, B, C are correct

B. B, C, D are correct

C. A, C, D are correct

D. All are correct

**Answer: A**



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**27.** The colour exhibited by one of the iron ions in aqueous solutions is pale green. The primary valency and secondary valency respectively in the green complex are

A. 2,4

B. 2,6

C. 3,4

D. 3,6

**Answer: B**



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**28.** The oxidation state of the metal forming the complex  $K_2[PtCl_6]$  is

A. +1

B. +2

C. +3

D. +4

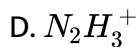
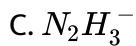
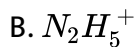
**Answer: D**



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**29.** The liquid hydrazinium is denoted as

A.  $N_2H_4$



**Answer: B**



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**30.** Which of the following are true for the complex  $Ni(CN)_4^{2-}$  ion

- (A) Hybridisation of  $Ni^{2+}$  ion is  $dsp^2$
- (B) Shape of the complex ion is planar square
- (C) Magnetic moment of the complex is 2.83 BM
- (D) The complex is an example for a high spin complex

A. A and B

B. C and D

C. A and C

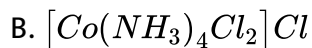
D. B and D

**Answer: A**



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**31. Which of the following is homoleptic complex**



**Answer: A**



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**32. The IUPAC name of  $[Co(NH_3)_4Br_2]^+ [ZnCl_4]^-$  is**

A. dibromo tetraammine cobalt (III)

tetrachlorozinc (II)

B. Tetrammine dibromo cobalt (III)

tetrachlorozinc (II)

C. Tetra ammine dibromocobalt (III)

tetrachlorozincate (II)

D. Tetrachlorozinc (II) tetra ammine dibromo cobaltate (III)

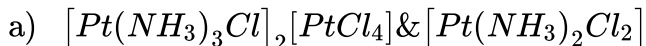
**Answer: C**



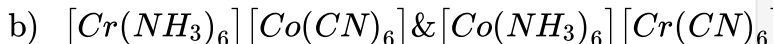
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**33. Type of isomerism Pair of examples**

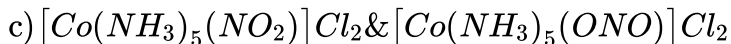
A) Ionisation



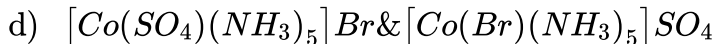
B) Linkage



C) Coordination



D) Polymerisation



A.  $\begin{matrix} A & B & C & D \\ a & b & c & d \end{matrix}$

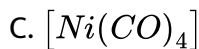
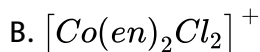
- B.  $\begin{matrix} A & B & C & D \\ b & a & d & c \end{matrix}$
- C.  $\begin{matrix} A & B & C & D \\ d & c & b & a \end{matrix}$
- D.  $\begin{matrix} A & B & C & D \\ d & b & c & a \end{matrix}$

**Answer: C**



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**34.** Which of the following represents largest number of possible isomers?



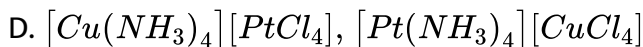
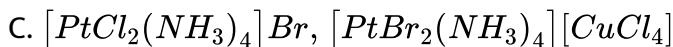
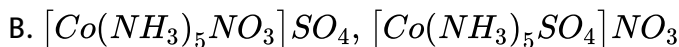
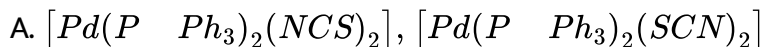
**Answer: B**



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35. Which of the following pairs represents linkage isomers ?

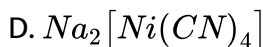
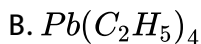
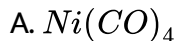


Answer: A



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36. Organometallic compound used in the purification of its metals is



**Answer: A**



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**37. Ziegler - Natta catalyst is**

- A. Solution of  $SnCl_4$  + trialkylaluminium
- B. Solution of  $TiCl_4$  + trialkylaluminium
- C. Solution of  $TiCl_4$  + trialkylchromium
- D. Solution of  $SnCl_4$  + Tollen's reagent

**Answer: B**



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**38. In nitroprusside ion, the iron and NO exist as  $Fe^{II}$  and  $NO^+$  rather than  $Fe^{III}$  and NO. These forms can be differentiated by**

- A. estimatinng the concentration of iron
- B. measuring the concentration of  $CN^-$
- C. measuring the solid state magnetic moment
- D. thermally decomposing the compound

**Answer: C**



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**39.** Tetrahedral complexes are high spin complexes, because

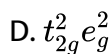
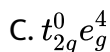
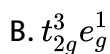
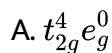
- A.  $\Delta_t < P$
- B.  $\Delta_t > P$
- C.  $\Delta_t = P$
- D.  $\Delta_o > P$

**Answer: A**



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40. If  $\Delta_0 > P$  the correct electronic configuration for  $d^4$  system will be

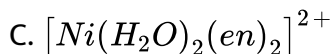
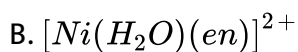
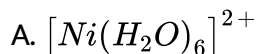


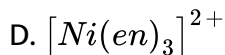
**Answer: A**



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41. Violet coloured complex among the following is

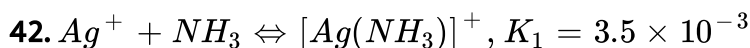




**Answer: D**



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,  $[Ag(NH_3)]^+ + NH_3 \rightleftharpoons [Ag(NH_3)_2]^+, K_2 = 1.7 \times 10^{-3}$  . Calculate the formation constant of  $[Ag(NH_3)_2]^+$  . What is the instability constant ?

A.  $1.7 \times 10^{-3}$

B.  $5.92 \times 10^{-6}$

C.  $1.8 \times 10^3$

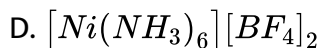
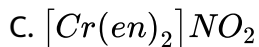
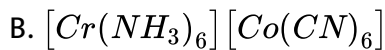
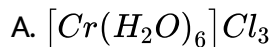
D.  $1.7 \times 10^7$

**Answer: B**



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43. Coordination isomerism is exhibited by



Answer: B



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44. Trans-diglycinatoplatinum (II) has a shape

A. trigonal

B. tetrahedral

C. square planar

D. octahderal

**Answer: C**



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45.  $[Co(en)_2(NH_3)_2]Cl_3$  can exhibit

(A) ionisation isomerism

(B) geometrical isomerism

(C) optical isomerism

A. A,B

B. B,C

C. A,C

D. A,B,C

**Answer: B**



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46. The hybridisation of metal ion in square planar complexes is

A.  $sp^2$

B.  $sp^3$

C.  $dsp^2$

D.  $dsp^3$

Answer: C



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47. Moles of AgCl obtained with one mole of aqueous  $CrCl_3 \cdot 5NH_3$  is

A. 1

B. 2

C. 3

D. 4



Answer: B



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