

# SAMPLE QUESTION PAPER

## Chemistry (Theory) - Class XII (Code-A)

Time : 3 Hours

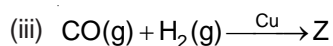
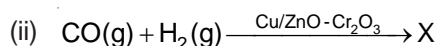
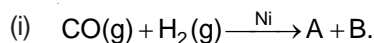
Max. Marks : 70

**General Instructions :**

- (i) All questions are compulsory.
- (ii) Questions number 1 to 8 are very short answer questions and carry **1 marks** each.
- (iii) Questions number 9 to 18 are short answer type questions and carry **2 mark** each.
- (iv) Questions number 19 to 27 are also short answer type questions and carry **3 marks** each.
- (v) Questions number 28 to 30 are long answer type questions and carry **5 marks** each.
- (vi) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choices in such questions.
- (vii) Use log tables if necessary, use of calculator is not allowed.

1. Define F-centres. [1]
2. What is purple of cassius? [1]
3. What is the geometry of  $[\text{FeF}_6]^{3-}$ ? [1]
4. Write the name of two metals which can be extracted by self reduction process. [1]
5. How many tetrahedral and octahedral voids present per unit cell in fcc structure? [1]
6. Write the name of product formed when glucose is oxidised by nitric acid and by  $\text{Br}_2$  water. [1]
7. Give two examples of biodegradable polymers? [1]
8. Name any two fillers present in laundry soap? [1]
9. Calculate the molality of orthophosphoric acid solution in which the mole fraction of orthophosphoric acid is 0.20. [2]
10. Give equation for
  - (i) Preparation of  $\text{KMnO}_4$  from pyrolusite
  - (ii) Action of heat on  $\text{K}_2\text{Cr}_2\text{O}_7$  [2]
11. The initial amount of reactant is 40 gm and its half life period is 10 minutes. If reaction follow zero order kinetics, how much reactant is left after 20 minutes? [2]
12. Write the name and formula of monomers of the following polymers : [2]  
Nylon-6 and Glyptal.
13. (a) What is the main constituent of dettol?  
(b) Give any two examples of broad spectrum antibiotic. [2]
14. How the mixture of  $\text{ZnS}$  and  $\text{PbS}$  are separated by froth floatation method. Write the name of method and equation by which nickel metal is purified? [2]

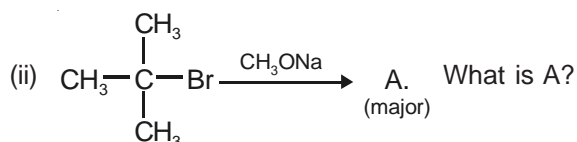
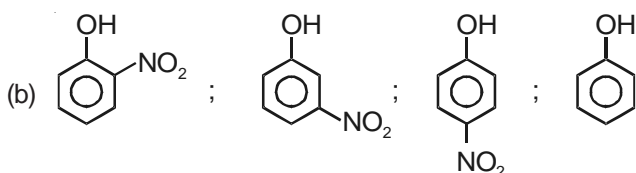
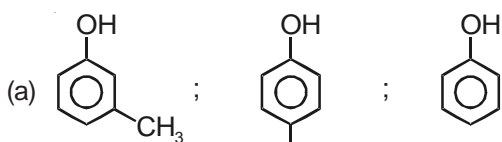
15. Convert phenol to salol. [2]
16. A solid containing three elements x, y and z present at each corner, alternate face centre and alternate edge centre respectively. What is the formula of solid? [2]
17. What is selectivity of a catalyst? Write the product formed in each of the following reaction. [2]



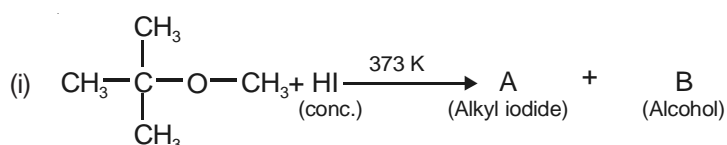
OR

Write the equation of Freundlich adsorption isotherm and plot a graph of  $\log \frac{x}{m}$  versus  $\log P$ ; also write the slope and intercept. Is Freundlich isotherm applicable at high pressure?

18. (i) Write IUPAC name of linkage isomer of  $[\text{CoCl}(\text{en})_2\text{NO}_2]^+$ . [1]
- (ii) Explain nature of bonding in  $[\text{Ni}(\text{CO})_4]$ . [1]
19. (i) Arrange the following in descending order of acidic nature [2]

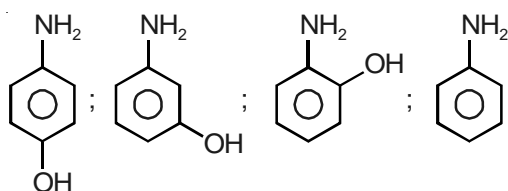


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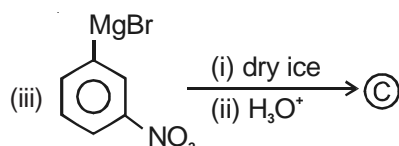
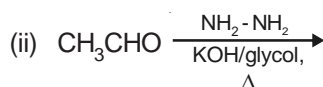
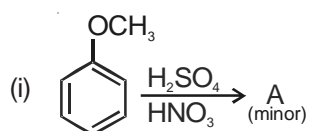


What is A and B and through which mechanism this reaction proceeds?

- (ii) Arrange in increasing order of  $\text{p}K_b$ .



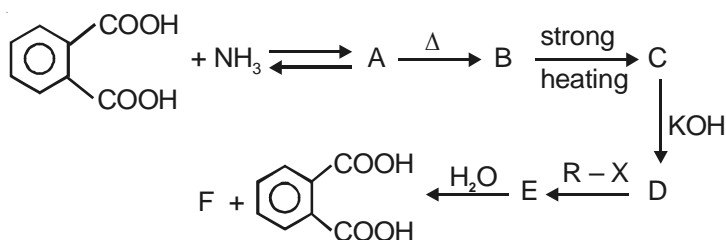
20. (i) Calculate the magnetic moments of the following ions by using the spin only formula [2]  
 $Mn^{2+}$ ,  $Zn^{2+}$ ,  $Fe^{2+}$ ,  $Cr^{3+}$
- (ii) Give reason why a finely divided substance is more effective as an adsorbent? [1]
21. (i) Arrange the following solutions in increasing order of their boiling point. [1]  
 $0.1M$  Glucose,  $0.05M$   $Al_2(SO_4)_3$ ,  $0.20M$  urea,  $0.1M$   $K_2SO_4$ .
- (ii) Write four differences between solution showing positive deviation and negative deviation from Raoult's law and give one example of each. [2]
22. (i) Why aniline on nitration ( $HNO_3 + H_2SO_4$ ) gives ortho-nitro aniline in much lesser amount than meta nitro aniline while  $-NH_2$  group is ortho-para directing? What is the approximate percentage of each isomer formed? [2]
- (ii) Give equation for coupling reaction. [1]
23. (i) Plot a graph of (a)  $\ln[R]$  versus  $t$  and (b)  $\log \frac{[R_0]}{[R]}$  versus time and write the slope in each case of first order reaction. [2]
- (ii) What is collision frequency? [1]
24. (i) Write the structure of DDT and one of its main use. [1]
- (ii) Give reason. [2]
- a. Aryl halides are less reactive than alkyl halide.
- b. Alkyl halides are immiscible with water although they are polar.
25. Complete the following reaction [3]



26. Define [3]
- (i) Mutarotation
- (ii) Inversion of cane sugar
- (iii) Reducing sugar
27. Draw structure of  $XeO_2F_2$ ,  $XeF_4$ ,  $ClF_3$  and write hybridisation. [3]

28. (a) Give mechanism of esterification of carboxylic acid and alcohol.  
 (b) Give equation of Schotten-Baumann reaction. [5]

OR

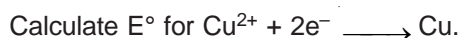
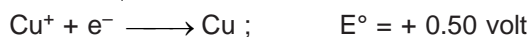
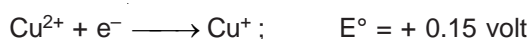


Identify A, B, C, D, E and F.

29. The three electrolytic cells x, y and z connected in series containing  $\text{AlCl}_3$ ,  $\text{AgNO}_3$  and  $\text{MgCl}_2$  electrolytes respectively. A steady current of 10 ampere is passed till 4.5 g Al is deposited at cathode of cell x. Calculate the mass of Ag and Mg deposited and time for passing current (Atomic wt. of Zn = 65, Ag = 108 and Al = 27) [5]

OR

Given,

Does  $\text{Cu}^+$  disproportionate in the solution or not?

30. How sulphuric acid is manufactured by the Contact process? Give the reaction of concentrated sulphuric acid with C, S, Cu and sucrose. [5]

OR

Give equations for preparation of  $\text{HNO}_3$  by Ostwald's process. Give reaction which takes place

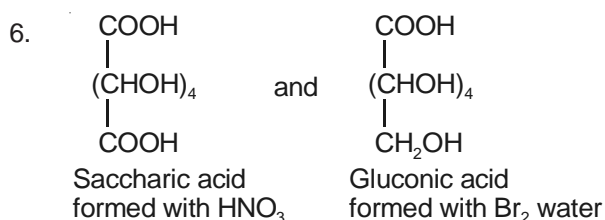
- (a) S and conc.  $\text{HNO}_3$   
 (b) Cu and conc.  $\text{HNO}_3$   
 (c) C and conc.  $\text{HNO}_3$



## Chemistry (Theory) - Class XII

### SOLUTIONS

1. The electron present in anion valency, which impart colour to the crystal.
2. Colloidal gold sol
3.  $sp^3d^2$  (octahedral geometry)
4. Copper and lead
5. Number of tetrahedral voids per unit cell = 8  
Number of octahedral voids per unit cell = 4



7. PHBV, Nylon-2-Nylon-6
8. Four (sodium rosinate, sodium silicate, borax and sodium carbonate)

9. 
$$\frac{n_1}{n_1 + n_2} = 0.20$$

Let  $n_1$  = no. of moles of  $\text{H}_3\text{PO}_4$

$n_2$  = no. of moles of water

$$\therefore \frac{n_2}{n_1 + n_2} = 0.80$$

$$\therefore \frac{n_1}{n_2} = \frac{1}{4}$$

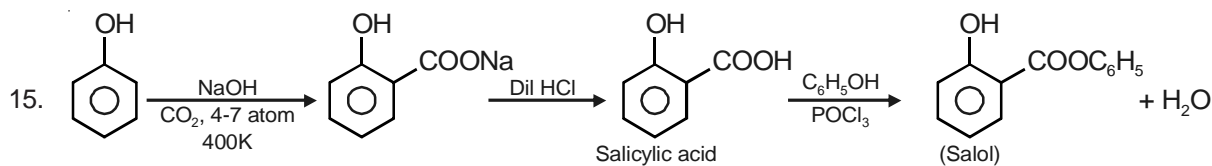
or 
$$\frac{n_1}{\frac{1000}{18}} = \frac{1}{4} \quad [\text{Since molality of solution is the mole of solute } (n_1) \text{ dissolve in 1000 g of solvent (water)}].$$

$$\Rightarrow \frac{n_1}{55.5} = \frac{1}{4}$$

$$\Rightarrow n_1 = \frac{55.5}{4}$$

$$\Rightarrow n_1 = 13.8$$





16. No. of  $x = 8 \times \frac{1}{8} = 1$

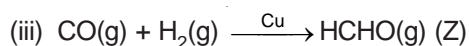
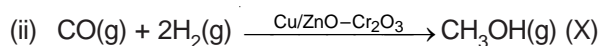
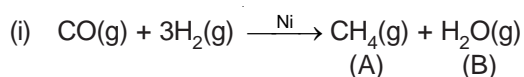
No. of  $y = 2 \times \frac{1}{2} = 1$

No. of  $z = 4 \times \frac{1}{4} = 1$

(Since number of alternate face = 2 and number of alternate edges = 4)

Formula of compound is  $xyz$ .

17. The selectivity of a catalyst is its ability to direct a reaction to yield a particular product.



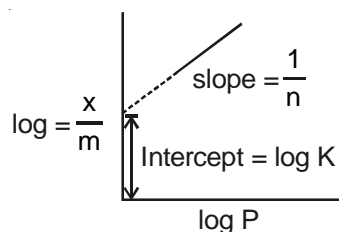
OR

Equation of Freundlich adsorption isotherm is  $\frac{x}{m} = K \cdot P^{1/n}$  ( $n > 1$ )

where  $x$  = mass of the gas adsorbed

$m$  = mass of the adsorbent

$$\log \frac{x}{m} = \log K + \frac{1}{n} \log P$$

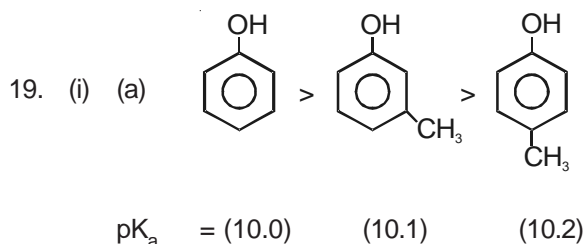


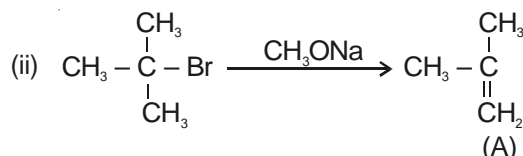
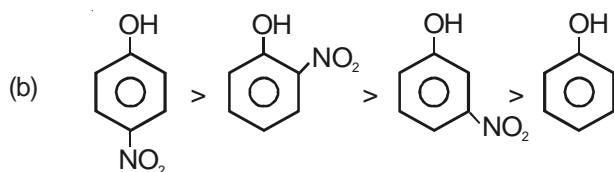
Freundlich adsorption isotherm is not applicable at high pressure.

18. (i) Chloridobis (ethane 1, 2 diamine) nitrito cobalt (III) ion

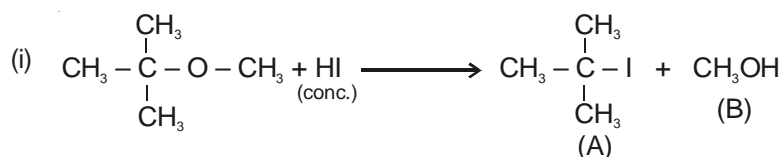
(ii)  $\sigma$  bond is formed by donation of lone pair of electron on carbon of CO into vacant  $d$ -orbital of metal.

$\pi$  bond is formed by donation of filled metal  $d$ -orbital into vacant antibonding  $\pi^*$  orbital of CO.

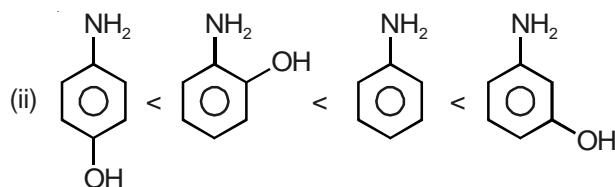




OR



This reaction proceeds through  $\text{S}_{\text{N}}1$  mechanism because more stable  $3^\circ$  carbocation is formed.



20. (i)

Ions	Number of unpaired electrons	Magnetic moment = $\sqrt{n(n+2)}$ B.M.
$\text{Mn}^{2+}$	5	$\sqrt{35}$ B.M.
$\text{Zn}^{2+}$	0	0
$\text{Fe}^{2+}$	4	$\sqrt{24}$ B.M.
$\text{Cu}^{2+}$	1	$\sqrt{3}$ B.M.

(ii) Finely divided substance has large surface area and hence greater adsorption.

21. (i)

	Glucose	<	Urea	<	$\text{Al}_2(\text{SO}_4)_3$	<	$\text{K}_2\text{SO}_4$
Effective concentration & boiling point	0.1 M		0.2M		$0.05 \times 5 \text{ M}$ = 0.25 m		$0.1 \times 3 \text{ M}$ = 0.3 M

(ii)

Solution Showing Positive deviation	Solution showing negative deviation
(a) $P_A > P_A^\circ X_A$ and $P_B > P_B^\circ X_B$	$P_A < P_A^\circ X_A$ and $P_B < P_B^\circ X_B$
(b) $\Delta H = +ve$	$\Delta H = -ve$
(c) $\Delta V = +ve$	$\Delta V = -ve$
(d) Attraction between like particles > Attraction between dislike particles	Attraction between like particles < Attraction between dislike particles
Example : solution of $\text{CS}_2$ and $\text{CH}_3\text{COCH}_3$	Ex:- solution of $\text{CH}_3\text{COCH}_3$ and $\text{CHCl}_3$

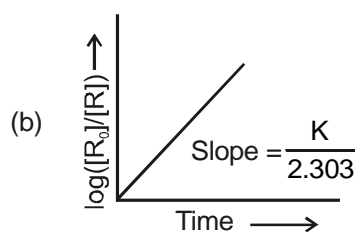
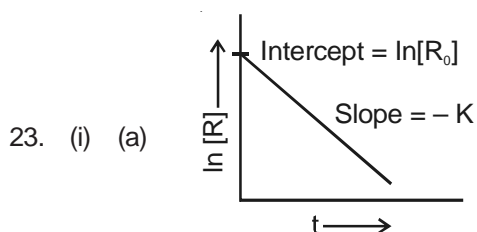
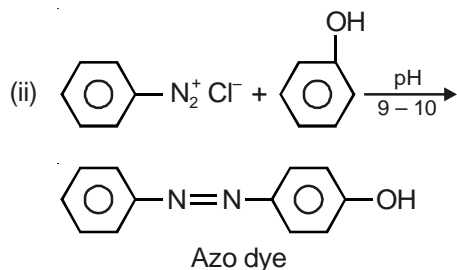


22. (i) In strongly acidic medium aniline is protonated to form the anilinium ion which is meta directing and so meta nitroaniline is formed in much greater amount than ortho nitroaniline

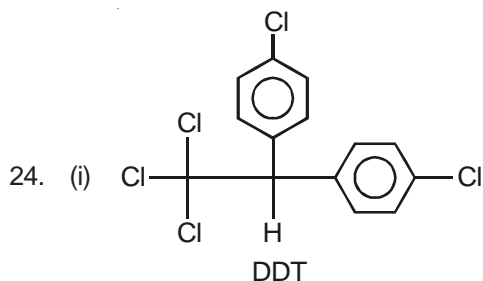
p nitro aniline → 51%

m nitro aniline → 47%

o nitro aniline → 2 %

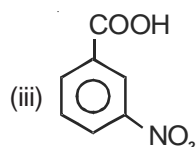
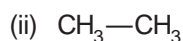
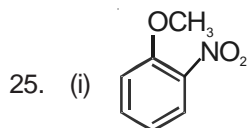


- (ii) The number of collisions per second per unit volume of the reaction mixture is known as collision frequency ( $z$ ).

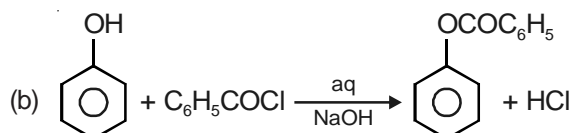
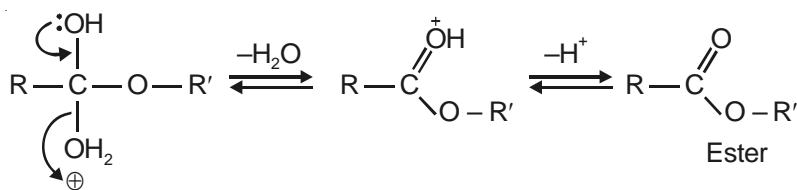
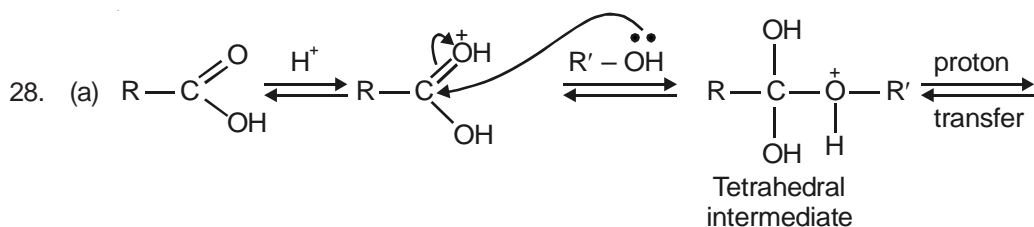
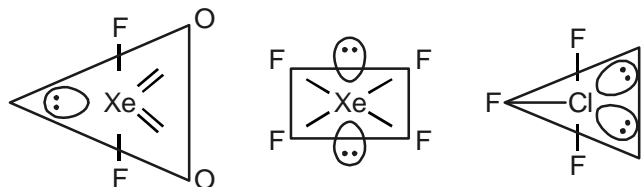


It is used as insecticides.

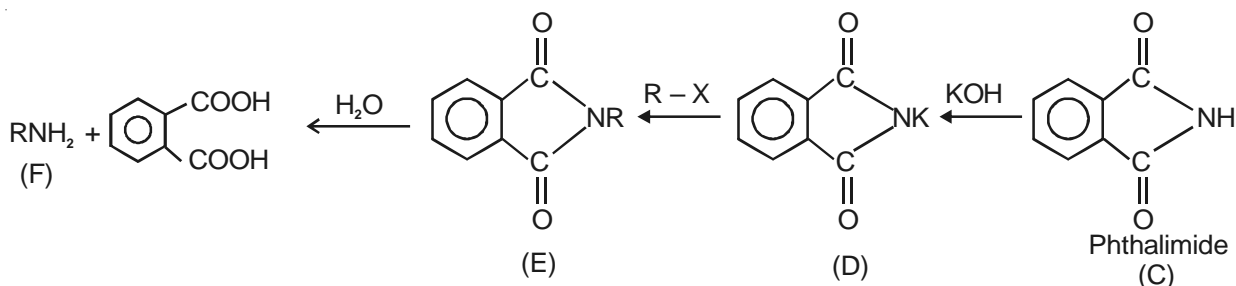
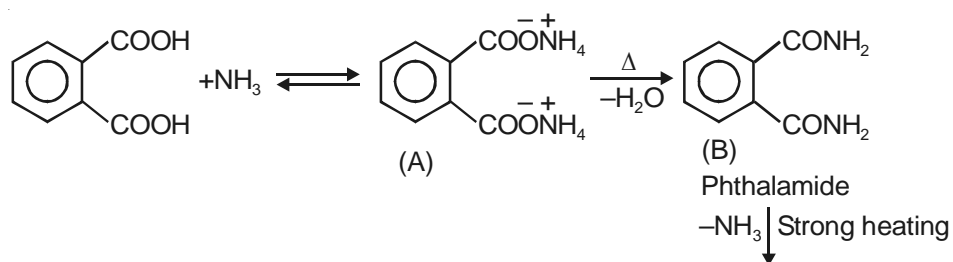
- (ii) a. Aryl halides are resonance stabilised hence partial double bond character is present.  
b. Alkyl halides neither form H-bonding with water nor they can break the existing bonding present, hence insoluble.



26. (i) Spontaneous change in  $sp$ -rotation of optically active compound with time to an equilibrium value.  
 (ii) The overall change in specific rotation of cane sugar on hydrolysis from dextro to laevo.  
 (iii) Carbohydrates with reduces Fehling's solution to red ppt of  $\text{Cu}_2\text{O}$ .



OR



29. Eq. of Al deposited = Eq. of Mg deposited = Eq. of Ag deposited

$$\begin{aligned} \text{Eq. of Al.} &= \frac{4.5}{9} \\ &= 0.5 \end{aligned}$$

eq. of Mg = 0.5

$$\frac{w}{12} = 0.5 \therefore w_{\text{mg}} = 6 \text{ gm}$$

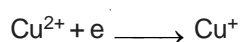
Similarly wt. of Ag deposited =  $0.5 \times 108 = 54 \text{ g}$

$$\text{Further Faraday} = \frac{i \times t}{96500}$$

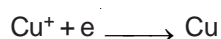
$$0.5 = \frac{10 \times t}{96500}$$

$$\begin{aligned} t &= \frac{0.5 \times 96500}{10} \text{ s} \\ &= 4825 \text{ s} \end{aligned}$$

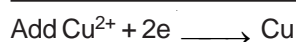
OR



$$E^\circ = 0.15 \text{ V} \therefore \Delta G_1 = -0.15 F$$



$$E^\circ = 0.50 \text{ V} \therefore \Delta G_2 = -0.50 F$$



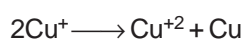
$$E^\circ = ? \Delta G_3 = \Delta G_1 + \Delta G_2$$

$$-2 F.E^\circ = -0.15 F - 0.50 F$$

$$-2F.E^\circ = -F(0.15 + 0.50)$$

$$E^\circ = \frac{0.65}{2} = 0.325 \text{ V}$$

For disproportionation -

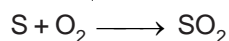


$$\begin{aligned} E_{\text{Cell}}^\circ &= E_{\text{Cathode}}^\circ - E_{\text{Anode}}^\circ = 0.50 - 0.15 \\ & \quad \quad \quad (\text{Cu}^+/\text{Cu}) \quad \quad (\text{Cu}^{2+}/\text{Cu}^+) \\ &= 0.35 \text{ volts} \end{aligned}$$

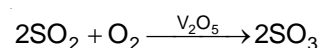
Since  $E^\circ$  positive, hence  $\text{Cu}^+$  disproportionate.

30. It involves the following three steps

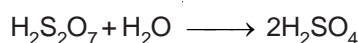
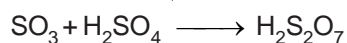
(i) Burning of sulphur or sulphide ores in air generate  $\text{SO}_2$

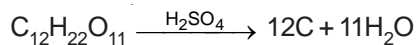
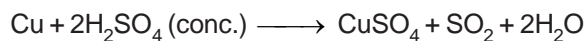
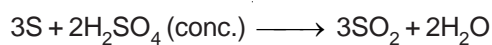
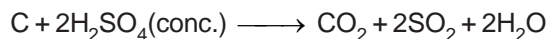
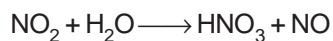
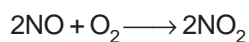
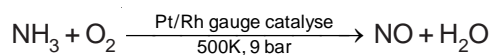
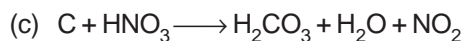
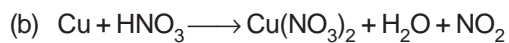
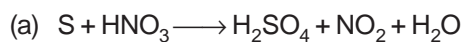


(ii) Conversion of  $\text{SO}_2$  to  $\text{SO}_3$  by the reaction with  $\text{O}_2$  in the presence of catalyst ( $\text{V}_2\text{O}_5$ )



(iii) Absorption of  $\text{SO}_3$  in  $\text{H}_2\text{SO}_4$  to give oleum ( $\text{H}_2\text{S}_2\text{O}_7$ )



**Reaction with C, S, Cu and Sucrose****OR****Ostwald Process :****Chemical reaction :**

□ □ □