



SB-3436

M. Sc. (Part - I) Examination  
March / April - 2011  
Analytical Chemistry : Paper - IV  
(Old Course)

Time : Hours]

[Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. Sc. (Part - 1)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Analytical Chemistry : Paper - 4 (Old)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="3"/> <input type="text" value="6"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,.....) : <input type="text" value="1&amp;2"/>	

- (2) Answer to two sections should be written in separate answer books.  
(3) All questions carry equal marks.

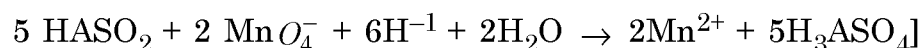
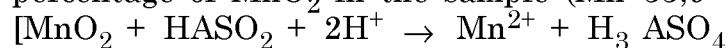
SECTION - I

- 1 (a) Discuss various methods for dissolution of representative analytical samples.  
(b) How will you estimate nitro group in an organic compound.

OR

- 1 (a) Compare the classical and instrumental methods of analysis with their merits and demerits.  
(b) Describe the principle of modern elemental analyser.  
(c) A 0.5248 g sample of pyrolsite ore containing  $MnO_2$  was digested with 0.2670 of pure  $AS_2O_3$  in sulfuric acid until all manganese was reduced to Mn(II)

The excess reducing agent required 30.60 ml of 0.0982 N  $KMnO_4$  for titration in acid medium. Calculate the percentage of  $MnO_2$  in the sample (Mn-55,0-16)



- 2 (a) Explain the use of dithiozone as an organic reagent for metal ion analysis.  
(b) Discuss about the indicating system used in non aqueous titration. Give two typical examples of the indicator.

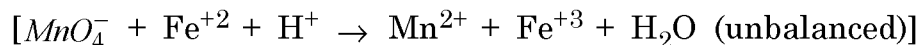
OR

SB-3436]

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[Contd...

- 2 (a) Discuss the selectivity and sensitivity of dimethyl glyoxime in determination of metal ion. Give the structure of complex.  
(b) Describe any one application of non-aqueous titration.  
(c) A 0.7120 g sample of iron ore dissolved in acid and iron reduced to  $\text{Fe}^{2+}$  was titrated with 39.21 ml of 0.02086 M,  $\text{KMnO}_4$ . Calculate % Fe (56 g/mol) in the sample.



- 3 (a) Describe dispersing device used in uv-visible spectrophotometer.  
(b) Explain slope ratio method to determine metal ligand ratio of complex.

OR

- 3 (a) Give advantages of double beam instrument over single beam spectrophotometer. Describe radiation source for UV region in spectrophotometer.  
(b) Compare the relative sensitivities and selectivities of nephelometer and turbidimeter.  
(c) A 0.525 g sample of an alloy steel is dissolved, the manganese is oxidized to permanganate and solution is diluted to 100 ml. The absorbance at 525 nm in a 1.00 cm cell is 0.496. The molar absorptivity of  $\text{MnO}_4^-$  at 525 nm is  $2.24 \times 10^3$ . Calculate % Mn (55 g/mol) in steel.

OR

- 3 A 2.0 ml portion of Cu(II) solution containing 2F  $\text{NH}_3$  is placed in 1.0 cm cell. The absorbance at 750 nm is 0.6. Then a 1.0 ml portion of 0.01 F  $\text{CuSO}_4$  is added to the above solution. The absorbance of resulting solution is 0.8. Calculate the concentration of Cu (II) in the original solution.

## SECTION - II

- 4 (a) Define the following terms :  
(i) Diffusion current  
(ii) Residual current  
(iii) Half Wave potential  
(b) Give the applications of polarography for inorganic and organic compounds.

OR

- 4 (a) Give advantages and disadvantages of DME.  
(b) Discuss the effect of complex formation on polarographic waves.

- (c) A zinc solution of unknown concentration gives a polarographic diffusion current of  $5.00 \mu A$ . A  $5.00 \text{ ml}$  portion of  $0.0010 \text{ M Zn}^{2+}$  is added to  $10.00 \text{ ml}$  of unknown solution. The polarogram is taken again giving a diffusion current of  $12.00 \mu A$ . What is the concentration of  $\text{Zn}^{2+}$  in the unknown solution ?

- 5 (a) Explain primary and secondary coulometric titrations.  
(b) What are the advantages of rotating platinum electrode over dropping mercury electrode ?

OR

- 5 (a) Explain controlled potential coulometry ?  
(b) Describe the nature of amperometric titration curve of a redox system where both oxidising and reducing agent give diffusion current.  
(c) In a coulometric determination of a cyclohexane solution in methanol, a generator current of  $9.2 \text{ mA}$  was used. The time recorded to complete the titration was  $700 \text{ S}$ . What is the concentration of cyclohexane (RMM  $82.146 \text{ g/mol}$ ) bromination of cyclohexane results in trans 1-2 dibromocyclohexane
- $$2\text{Br}^- = \text{Br}_2 + 2e^-$$

- 6 (a) Discuss the principle of Craig's extraction.  
(b) Explain the extraction of metal ions with chelating agent in organic phase is pH dependent.

OR

- 6 (a) Derive equation for multiple extraction. Show its importance for effective extraction.  
(b) Explain the extraction using ion-pair with suitable example.  
(c)  $1 \text{ gm}$  Benzoic acid dissolved in  $100 \text{ ml}$  water was equilibrated with  $100 \text{ ml}$  ether.  $K_D$  value in favour of ether is  $100$  and dissociation constant of Benzoic acid is  $6.5 \times 10^{-5}$ . Calculate the distribution ratio  $D$  if the aqueous layer has  $\text{pH}=5$ .

OR

- (c) Calculate the volume of toluene needed to remove  $99\%$  solute from  $50.0 \text{ ml}$  aqueous phase in a single extraction if  $K_D$  is  $25.0$ .