SARDAR PATEL UNIVERSITY
B. Sc. (Fourth Semester Examination)
US04CCHE22–Analytical Chemistry

Monday
Date:11/04/2022   Time:3.00 – 5.00 p.m.   Total Marks : 70

Q.1.   Choose the correct option for the following :   [10]

i.   The substance used for the detection of end point by color change is...
(a)Strong acid
(b) buffer
(c)reagent
(d) indicator

ii.   Which solution is used to maintain constant pH, if a small amount of acid or base is added to it?
(a) strong acid
(b) strong base
(c) buffer
(d) standard solution

iii.   Ligand in complex salt is_____.
(a) Lewis acid
(b) Lewis base
(c) buffer
(d)simple salt

iv.   EDTA is_____ ligand.
(a) monodentate
(b) bidentate
(c)tridentate
(d) hexadentate

v.   Which of the following acid is added in the titration of $KMnO_4$?
(a)H_2SO_4
(b) HCl
(c) HNO_3
(d) phosphoric acid

vi.   Which of the following is a redox titration?
(a) titration of HCl with NaOH
(b) titration of iodine with sodium thiosulphate
(c) titration of oxalic acid with $KMnO_4$
(d) titration of silver nitrate with NaCl

vii   Alizarin red solution and zirconyl chloride octahydrate is used in analysis of_____.
(a)Fluoride
(b)Chloride
(c)Acidity
(d)Alkalinity

viii   Indicator used to determine sulphate in hard water by EDTA titration is _____.
(a)phenolphthalein
(b) diphenyl amine
(c) Eriochrome black T
(d)Eosin

ix   Molarity is _____.
(a)number of moles of solute dissolved per liter of solution
(b) number of moles of solute dissolved per liter of solvent
(c) number of moles of solute dissolved per Kg of solvent
(d) number of moles of solute dissolved per Kg of solution
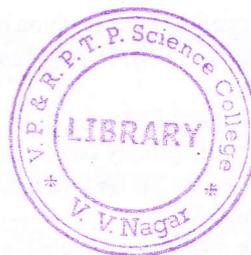
(P.T.O)

x Oxidation involves _____.
   (a)gain of electrons
   (b)addition of hydrogen
   (c)decrease in oxidation number
   (d)loss of electrons

Q.2 State whether the following statements are TRUE or FALSE [08]
1. Normality is the number of moles of solute dissolved per liter of solution.
2. The pH range at which indicator changes its color is useful range of indicator.
3. Labile complex does not undergo substitution of ligand very rapidly.
4. Generally hardness of water is determined in ppm unit.
5. Potential difference across closed circuit is electromotive force.
6. Nernst equation gives relation between the potential of single electrode and the activities of reactants.
7. Any non toxic material in water which changes either its chemical or physical properties cause water pollution.
8. Forel – ule scale gives qualitative recognition of the color of sample.

Q.3. Answer in SHORT(ANY TEN): [Each Question Carries 2 marks] [20]
i. Define: Titrant and Titrand.
ii. Define: Equivalence point and End point.
iii. Define: complexing agent &Stability constant.
iv. Discuss back titration used for EDTA titration.
v. Define: Oxidizing agent & Voltage
vi. Explain single electrode potential with suitable example.
vii How waste water is originated?
viii Explain the principle of measurement of electrical conductivity of water.
ix Give method and calculation to determine chloride in water.
x Calculate molarity of solution which contains 6.00 g of NaCl (MW 58.44) in 200 mL of solution.
xi Draw structures of any two complexones.
xii Calculate equilibrium constant of the cell Fe/Fe^{+2}(a=0.1)//Cd^{+2}(a=0.001)/Cd where E$^O_{cell}$ =+0.04 V.

Q.4. Attempt ANY FOUR from the following: [Each Question Carries 8 marks] [32]
1 a By taking example of strong acid and strong base titration, discuss the neutralization curve.
  b With the help of W. Ostwald theory, show how an indicator changes its color.
2 a Show that at the color change interval, pH of the system is pH= pK$_{In}$±1.
  b Discuss classification of reactions in titrimetric analysis.
3 a Explain stability constant and formation of complex ion by taking proper example.
  b How will you determine hardness of water sample?
4 a What are the requirements for metal ion indicator for use in visual detection of end point?
  b How will you determine calcium in calcium gluconate sample?
5 a Explain titration curve for iron (ll) &cerium (IV) in detail.
  b Write a note on Formal potential.
6 a Write in detail on internal redox indicators, explaining working of Diphenyl amine indicator.
  b Write a note on types of redox indicators.
7 a What do you understand by water pollution? Write down about the water pollution caused due to natural sources and agricultural waste.
  b Define water pollutants and discuss the effects of water pollutants in water pollution?
8 a Discuss the methods to analyze acidity and alkalinity in water sample.
  b Discuss the methods and calculations to analyze the presence of total dissolved solid and hardness in water sample.

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