

Shree Manibhai Virani and Smt. Navalben Virani Science College (Autonomous)
Affiliated to Saurashtra University, Rajkot

SEMESTER END EXAMINATION APRIL – 2017

B.Voc. Chemical Technology

BVCT-201 - ANALYTICAL AND ELECTRO CHEMISTRY

Duration of Exam – 2.30 hrs

Semester – II

Max. Marks – 70

Que. 1 (A) – Answer the following Questions

[10]

1. What is a redox reaction?
2. What is the pH of 0.1 M HCl solution?
3. Calculate equivalent weight of KMnO_4
4. Define conductance.
5. Difference between measured value and true value is known as Precision. True or False?
6. Define quantitative analysis.
7. Calculate and answer in significant figures: $8.4 + 0.028 + 7.34 = \underline{\hspace{2cm}}$
8. Voltage fluctuation during an electrochemical analysis can be termed as _____ error.
(determinate, random, significant)
9. Define electrochemical cell.
10. Define P^{H} .

Que. 1 (B) – Answer the following Questions

[20]

1. Define Conductor, Semiconductor and Insulator.
2. 1 gm Ethanol is mixed with 99 gm water to give 100 ml solution. Calculate concentration of resulting solution in terms of % w/w.
3. Give the classification of redox indicators used in volumetric titrations with example.
4. Enlist steps for Minimization of Errors.
5. Calculate limiting molar conductivity of MgSO_4 if limiting molar conductivity of Mg^{+2} and SO_4^{-2} are $106.0 \text{ S cm}^2 \text{ mol}^{-1}$ and $160.0 \text{ S cm}^2 \text{ mol}^{-1}$ respectively.
6. Give Faradays law of electrolysis.
7. Calculate equilibrium constant of the reaction at 298 K temperature.
 $\text{Zn(s)} + \text{Cu}^{+2}(\text{aq}) \rightleftharpoons \text{Zn}^{2+}(\text{aq}) + \text{Cu(s)}; E^\circ_{\text{Cell}} = 1.1 \text{ V}$
8. Calculate range (W) for following observations: 3.3 ml, 3.7 ml, 3.4 ml, 3.2 ml, 3.3 ml.
9. Give only reactions taking place on anode and cathode fuel cell.
10. Define following terms: (i) Accuracy, (ii) Precision.

Que. 2 – Answer the following Questions (Any Four)**[20]**

1. Discuss titration curve of strong acid-weak base in neutralization titration.
2. Describe secondary lead storage cell in detail.
3. Give applications of pH metry.
4. Discuss Ostwald law for acid base indicator.
5. The electric current is produced in an electrochemical cell by the following reaction.
$$\text{Fe(s)} + \text{Cu}^{+2}(\text{aq}) \rightleftharpoons \text{Fe}^{2+}(\text{aq}) + \text{Cu(s)}$$
 If 0.85 faraday electricity is obtained from standard cell, then what maximum work can be done? The value of potential of this standard cell is 0.78 volt.
6. 7.8 gm benzene was treated under required condition to afford 8.2 gm toluene. Draw the chemical reaction and calculate efficiency of this process in % yield.

Que. 3 – Answer the following Questions (Any Four)**[20]**

1. Discuss types of electrodes in electrochemical cell.
 2. The electrolyte in automobile lead storage battery is 3.75 M solution of sulfuric acid. Density of this solution is 1.23 gm/ml. Calculate mass percent, normality and molality of this solution.
 3. Discuss Hydrogen electrode with diagram in detail.
 4. Describe Kohlrausch's law.
 5. In the electrolysis of aqueous solution of CuCl_2 copper is deposited on cathode and Cl_2 gas liberated on anode at 800 K temperature and 1 bar pressure. How much copper and chlorine gas will be liberated if 2.0 ampere current is passed for 1 hour. (atomic mass $\text{Cu}=63.5\text{u}$, $\text{Cl}=35.5\text{u}$) (R is $0.08314 \text{ bar lit mol}^{-1} \text{ K}^{-1}$) ($F=96500 \text{ coulombs}$)
 6. The potential of the following given cell is 1.02 V at 298 K temperature. Calculate the pH of HCl solution. ($E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80\text{V}$)
 $\text{Pt}|\text{H}_2(1\text{bar})|\text{HCl}(x\text{M})||\text{Ag}^+(0.01)|\text{Ag(s)}$
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