2021

B.A./B.Sc. Part III Honours Examination

University of Calcutta

CHEMISTRY

Paper: VIII B (CHP 35b)

PRACTICAL

F.M. 50

FAKIR CHAND COLLEGE CENTRE (551)

[Use A4 pages and black ink only for writing answers. Write Roll number and Registration number at the top and page number at the bottom of each page. Scan the current admit card and upload in a single pdf file along with the answer script]

1. Write briefly the theory for the experiment, "Using a pH-meter, titrate the supplied solution "PH" against a standardized NaOH solution. Find the pK_2 and pK_3 of PH", covering the following points.

(i) Representation of the experimental cell.

(ii) Expression for electrode potential of glass electrode and its relation with pH.

(iii) Principle of determination of 'pK_1', 'pK_2'and 'pK_3' of a tribasic acid from the pH-metric titration curve with explanation. 2+6+12 =20

2. Answer all the questions briefly: 2×15 = 30

a) Draw the conductometric titration plot of a) HCl vs NH_4OH b) CH_3COOH vs NaOH

b) What is dilution error? How it can be rectified?

c) Can the following solution be considered as buffer? Explain briefly.

2ml 0.1(N) NaOH + 10 ml 0.1(N) oxalic acid

d) What is the light absorbing species of KI + $K_2S_2O_8$ reaction? Calculate the change in oxidation number of Sulphur in this reaction.

e) Name one example of each pair of solution for which i) only lower consolute temperature is obtained and ii) only upper consolute temperature is obtained.

f) State two factors on which molar extinction coefficient of a species depends?

g) Write down the theoretically possible minimum and maximum value of absorbance A.

h) The equivalence conductance of 0.1 mol L^{-1} acetic acid is 39 $ohm^{-1}cm^2eq^{-1}$. The equivalent conductance of acetic acid at infinite dilution is 390 $ohm^{-1}cm^2eq^{-1}$. Calculate the degree of dissociation of 0.1 mol L^{-1} acetic acid.

i) In pH metric titration of phosphoric acid with strong alkali why $CaCl_2$ / $BaCl_2$ is added ~ pH 10?

j) Write the cell representation of a glass electrode. Mention the inner solution present.

k) Can pH metric titration can be carried out with a potentiometer? Which electrode can be used in that case?

l) Write down the Nernst equation at 30^0C temperature for the potentiometric titration of $AgNO_3$ with KCl.

m) In potentiometric titration of Mohr salt with $K_2Cr_2O_7$ why jump in potential occur at the equivalence point?

n) What is the role of salt bridge? Write its composition.

o) What type of light source is used in polarimetry and why?