

Kakatiya University, Warangal**B.Sc. III Year Practical Paper IV (Physical Chemistry, 2010-11 onwards)
Experiments - Question Bank**

- I. (1) Study the kinetics of acid catalysed hydrolysis of methyl acetate using the given HCl solution and determine the rate constant graphically.
- (2) Study the kinetics of acid catalysed Iodination of Acetone using the given HCl solution and determine the rate constant graphically.
- (3) Study the kinetics of Persulphate –Iodide reaction and determine the rate constant graphically.
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- II. (4) Determine the molecular state of Iodine in CCl_4 from the distribution study of Iodine between H_2O and CCl_4 .
- (5) Study the distribution of benzoic acid between Toluene and water and determine the molecular state of benzoic acid in Toluene.
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- III. (6) From the conductometric titration of HCl with NaOH solution determine the concentration of the given HCl solution (you are provided with a standard NaOH solution).
- (7) Determine concentration of the given acetic acid from the conductometric titration of acetic acid with NaOH solution (you provided with a standard NaOH solution).
- (8) Standardise the given Ferrous ammonium sulphate solution potentiometrically (you are provided with a standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution).
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- IV. (9) Determine the dissociation constant of acetic acid using a pH meter (you are provided with a standard NaOH solution).
- (10) Verify the Beer-Lambert's law using KMnO_4 solution and find out concentration of the given KMnO_4 solution colorimetrically.
- (11) Verify the Beer-Lambert's law using CuSO_4 solution and find out concentration of the given CuSO_4 solution colorimetrically.
- (12) Verify the Beer-Lambert's law using $\text{K}_2\text{Cr}_2\text{O}_7$ solution and find out concentration of the given $\text{K}_2\text{Cr}_2\text{O}_7$ solution colorimetrically.
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- V. (13) Study the adsorption of acetic acid on activated charcoal at three different acid concentrations and determine the adsorption constant (n).
- (14) Determine the surface tension of the two given liquids using Stalagnometer.
- (15) Determine the viscosities of the two given liquids using Ostwald viscometer.

Practical Paper IV (Physical Chemistry)
(2010-11 onwards)
Scheme of valuation

Time: 3 hours

Total marks: 50

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| 1 | Record | 5 marks |
| 2 | Project report | 5 marks |
| 3 | Objective paper | 5 marks |
| 4 | Experiment | 35 marks |
| | a) Conducting experiment | 10 marks |
| | b) Tabulation of observations | 8 marks |
| | c) Graph | 10 marks |
| | d) Calculation | 5 marks |
| | e) Result/ Report | 2 marks |
| 5 | Submission of spectral data of a minimum of <u>five</u> compounds belonging to different functional groups. | |

Question Paper Sets

| Set – I | Set – II | Set – III | Set – IV | Set – V | Set – VI | Set - VII | Set - VIII |
|---------|----------|-----------|----------|---------|----------|-----------|------------|
| I – 1 | I - 2 | I - 3 | I - 2 | I – 1 | I – 2 | I – 3 | I – 2 |
| II – 5 | II - 5 | II - 4 | II - 4 | II – 5 | II – 5 | II – 5 | II – 4 |
| III – 6 | III - 8 | | III - 6 | III – 8 | III – 7 | III – 7 | III – 6 |
| IV - 9 | IV - 10 | V – 13 | IV - 11 | IV - 11 | IV - 10 | IV - 14 | IV - 15 |

| Set - IX | Set - X | Set – XI | Set – XII | Set – XIII | Set – XIV | Set – XV |
|----------|---------|----------|-----------|------------|-----------|----------|
| I – 1 | I – 1 | I – 2 | I – 2 | I – 3 | I – 2 | I – 1 |
| II – 5 | II – 4 | II – 5 | II – 5 | II – 5 | II – 5 | II – 5 |
| III – 8 | III – 6 | III – 8 | III – 6 | III – 6 | III – 8 | III – 6 |
| IV – 12 | IV - 10 | IV - 9 | IV - 12 | IV - 12 | IV - 10 | IV - 13 |

Note: Ten objective questions from the question bank (randomly) should be given by the examiners at the time of practical examination.

Kakatiya University, Warangal**B.Sc. III Year Practical Paper IV (Physical Chemistry, 2010-11 onwards)
Question Bank-Short Questions**

1. What is distribution coefficient?
2. What is Nernst distribution law?
3. What is the molecular state of iodine in carbon tetrachloride?
4. What is the molecular state of benzoic acid in benzene?
5. Why carbon tetrachloride forms lower layer when it is mixed with water?
6. Why benzene forms upper layer when it is mixed with water?
7. How is concentration of iodine in carbon tetrachloride determined?
8. Write the expression for the distribution coefficient of benzoic acid when it is distributed between water and benzene.
9. Write the expression for the distribution coefficient of benzoic acid when it is distributed between toluene and water
10. How do you determine the concentration of benzoic acid in benzene?
11. What is specific reaction rate?
12. What are the units of first order rate constant?
13. What are the units of second order rate constant?
14. What are the units of zero order rate constant?
15. Write the scheme of acid catalysed iodination of acetone.
16. How do you follow the kinetics of iodination of acetone?
17. How do you follow the kinetics of hydrolysis of methyl acetate?
18. Write the expression for the rate constant of hydrolysis of methyl acetate.
19. Write the expression for the rate constant of a zero order reaction.
20. How do you follow the kinetics of persulphate-iodide reaction?
21. Complete the reaction: $KI + K_2S_2O_8 \longrightarrow \text{-----} + \text{-----}?$
22. Why conductance of HCl decreases on the addition of NaOH?
23. Write Ostwald's dilution law?
24. What is degree of dissociation?
25. What is Kohlrausch's law?
26. Why conductance of 0.1M acetic acid is less than that of 0.1M HCl solution?
27. Write the expression for the degree of dissociation interms of equivalent conductance?
28. What are the units of specific conductance?
29. What are the units of equivalent conductance?
30. What is solubility?
31. What is solubility product.
32. Write the relationship between solubility and solubility product.
33. Write the relationship between solubility and solubility product for $BaSO_4$.
34. Write the relationship between solubility and solubility product for Ag_2SO_4 .
35. Write the relationship between solubility and solubility product for $Al(OH)_3$.

36. Write the Nernst equation of electrode potential.
37. Write the Henderson's equation for acidic buffer solution.
38. What is glass electrode ?
39. How do you prepare the phosphate buffer solution?
40. What is the composition of Calomel electrode.
41. Write redox reaction of Calomel electrode.
42. Define EMF?
43. What are the electrodes used in the potentiometric titration of Fe^{+2} with $\text{K}_2\text{Cr}_2\text{O}_7$?
44. What is an oxidation-reduction electrode?
45. What is the shape of graph is obtained when EMF is plotted against volume of $\text{K}_2\text{Cr}_2\text{O}_7$ in potentiometric titration of Fe^{+2} with $\text{K}_2\text{Cr}_2\text{O}_7$?
46. Name the electrodes used in pH metry.
47. Write the reaction that occurs during the titration of Fe^{+2} by $\text{K}_2\text{Cr}_2\text{O}_7$?
48. What is cell constant.
49. What is standard electrode potential?
50. What are the units of cell constant?
51. What is Beer's law?
52. What is absorbance?
53. Write the relationship between absorbance and concentration of the solution.
54. Write Freundlich adsorption isotherm.
55. What is viscosity?
56. What is surface tension?
57. What are the units of surface tension?
58. What are the units of viscosity?
59. What is adsorption?
60. What is the effect of dilution on absorbance of a solution?
61. Complete the reaction $\text{CH}_3\text{COCH}_3 + \text{I}_2 \longrightarrow \quad + \quad ?$
62. Complete the reaction $\text{I}_2 + \text{Na}_2\text{S}_2\text{O}_3 \longrightarrow ?$
63. The half life period of a first order reaction is 69.3 sec. What is the rate constant?
64. In certain reaction the plot of $(a-x)$ against time is linear with negative slope. What is the order of the reaction?
65. What is molar conductance?
66. The half life period of a first order reaction----- initial concentration of the reactant?
67. What is molecularity of a reaction?
68. Write the electrode reaction of calomel electrode when it acts as a reduction electrode.
69. Write Nernst equation of electrode potential for $\text{Fe}^{+2}-\text{Fe}^{+3}$ electrode?
70. Complete the equation $\eta_1/\eta_2 = ?$
71. Explain the terms used in Freundlich adsorption isotherm?
72. What types of solvents are to be used in the distribution experiment?
73. The rate constant of a zero order reaction is $0.25 \text{ mol l}^{-1} \text{ s}^{-1}$. What is its rate?
74. What happens when the hydrolysis of methyl acetate is conducted in the absence of HCl?
75. What is the titrant used in the kinetics of Persulphate-Iodide reaction?

76. Write the equation for the dissociation constant of acetic acid?
77. Among 0.1M HCl and 0.1M NaOH, which solution has higher conductance?
78. Why 0.1M acetic acid has lower conductance compared to 0.1M HCl?
79. Why 0.1M acetic acid has higher conductance compared to 0.01M HCl?
80. Define pH of a solution?
81. The distribution coefficient of I_2 between water and carbon tetrachloride is less than 1. What does this indicate?
82. What is the absorbance of water?
83. What type of graph is obtained when absorbance of the solutions is plotted against concentration?
84. When absorbance of a solution is plotted against its concentration a linear plot is obtained. What is its slope?
85. Among water and Carbon tetrachloride I_2 is more soluble in-----?
86. What happens to the rate when acetone – iodine reaction is conducted at two different concentrations of iodine?
87. What is the order with respect to acetone in acetone-iodine reaction?
88. What is infinity reading in kinetics?
89. What happens to conductance of 0.1M HCl when 20 c.c. of water is added to it?
90. The half life of a second order reaction is 10min. when the initial concentrations of the reactants are 0.01M. What is its rate constant?
91. What is absorption maximum λ_{max} ?
92. What happens to the rate if acetone-iodine reaction is studied with double the volume of acetone?
93. What is the infinity reading in acetone-iodine reaction?
94. Why do you heat the reaction mixture before taking the infinity reading in a kinetic study?
95. The rate constant of certain reaction is 0.104 s^{-1} . What is its order?
96. The rate constant of certain reaction is $0.034 \text{ l mol}^{-1} \text{ s}^{-1}$. What is its order?
97. How do you prepare 0.2N $K_2Cr_2O_7$ solution?
98. Dissociation constant of Acetic acid is 1.80×10^{-5} . Calculate its pK_a ?
99. What is the total molecularity of persulphate-iodide reaction?
100. What is the intercept obtained by plotting the graph $1/(a-x)$ vs time in the second order reaction.