MAHATMA GANDHI UNIVERSITY KOTTAYAM
Semester 3 & 4 Complementary (Supplementary) Physical Chemistry
Practical Examination, June 2022

INSTRUCTIONS

1. Select experiments such that an experiment is not given to more than 3 students
2. Direct the students to write the procedure/theory of the experiment given to him/her in the first 5 minutes in a separate sheet of paper and to submit to the examiners.
3. Instruct the student how to do the experiment.

P1. Solvent: Naphthalene (MP = 80.1 ^{0}C, K_f = 6.95) and (a) Solute: acetanilide (MW = 135) or (b) biphenyl (MW = 154).
P2. Give 8 - 12 ml of 1N HCl and N/10 NaOH.
P3. Give 20 - 24 ml N/2 Mohr's salt and N/10 $KMnO_4$/$K_2Cr_2O_7$.
P4. 0.5 N HCl and 0.5 N NaOH solutions may be given.
P5. About 8 - 10g crystals of salt hydrate (eg: sodium thiosulphate: TT = 48.2 °C, sodium acetate: TT = 58 °C).
P6. Give water and phenol system.
P7. Give iodine in CCl_4 and sodium thiosulphate for titration.
P8. Give crystals of potassium nitrate or ammonium chloride.
P9. Prepare 15% sucrose solution. Unknown: between 5-10%

SCHEME OF VALUATION

Total Marks: 40

Q1. Determination of molar mass of solute – Rast's method

Brief procedure	- 4
Tabular columns and data	- 4
Cooling curve (solvent freezing point)	- 4
Cooling curve (solution freezing point)	- 4
Calculation	- 4
Accuracy	- 16
Viva-voce	- 4

Up to 5% - 16, 5.1 – 7.0 % - 12, 7.1 – 9.0 % - 8
9.1 – 12.0% - 4, above 12% - 0

Solvent	k_f	Solute	molar mass
Naphthalene (80^{0}C)	6.9	Biphenyl	154
Naphthalene (80^{0}C)	6.9	Acetanilide	135

(Exactly weighed quantity of solvent and packets of solute (0.3 to 0.5g) should be supplied)

Q2 Conductometric titration

Brief Procedure	- 4
Presentation of data	- 4
Graph	- 8
Calculation	- 4
Accuracy	- 16
Viva-voce	- 4

Up to 5% - 16, 5.1 – 7.0 % - 12, 7.1 – 9.0 % - 8
9.1 – 12.0% - 4, above 12% - 0
(0.1 N HCl and 0.1 N NaOH shall be given)

Q3. Potentiometric titration

Brief procedure	- 4
Presentation of data	- 4
Graph ($\Delta E/\Delta V$ vs volume of $KMnO_4$))	- 8
Calculation	- 4
Accuracy	- 16
Viva-voce	- 4

Up to 5% - 16, 5.1 – 7.0 % - 12, 7.1 – 9.0 % - 8
9.1 – 12.0% - 4, above 12% - 0
(0.1 N $KMnO_4$ and 0.1 N Fe^{2+} solutions can be given)

Q4. Enthalpy of neutralization

Brief procedure	- 4
Tabular columns and data	- 4
Graph	- 4
Water equivalent	- 4
Calculation	- 4
Accuracy	- 16
Viva-voce	- 4

Up to 5% - 16, 5.1 – 7.0 % - 12, 7.1 – 9.0 % - 8
9.1 – 12.0% - 4, above 12% - 0

Q5. Determination transition temperature

Give sodium thiosulphate (48^0C) or sodium acetate (58^0C)

Weightage for:

Brief procedure	- 4
Tabular columns and data	- 4
Cooling curve (8 points – A)	- 8
Accuracy	- 20
Viva-voce	- 4

Up to 5% - 20, 5.1 – 7.0 % - 15, 7.1 – 9.0 % - 10
9.1 – 12.0% - 5, above 12% - 0

Q6. Determination of CST of phenol-water system

Weightage for:

Brief procedure	- 4
Tabular columns and data	- 4
Graph	- 8
Accuracy	- 20
Viva-voce	- 4

(CST of Phenol-water – 68^0C)
Up to 5% - 20, 5.1 – 7.0 % - 15, 7.1 – 9.0 % - 10
9.1 – 12.0% - 5, above 12% - 0

Q7. Determination of Partition coefficient

Weightage for:

Brief procedure	- 4
Tabular columns and data	- 8
Calculation	- 4
Accuracy	- 20
Viva-voce	- 4

(Partition coefficient 85-90)
Up to 5% - 20, 5.1 – 7.0 % - 15, 7.1 – 9.0 % - 10
9.1 – 12.0% - 5, above 12% - 0

Q8. Determination of heat of solution

KNO_3 (36 kJ mol^{-1})

Brief procedure	- 4
Tabular columns and data	- 4
Graph	- 4
Water equivalent	- 4
Accuracy	- 20
Viva-voce	- 4

Up to 5% - 20, 5.1 – 7.0 % - 15, 7.1 – 9.0 % - 10
9.1 – 12.0% - 5, above 12% - 0

Q9. Viscometry

Brief procedure	- 4
Tabular columns and data	- 4
Graph	- 8
Accuracy	- 20
Viva-voce	- 4

Up to 5% - 20, 5.1 – 7.0 % - 15, 7.1 – 9.0 % - 10
9.1 – 12.0% - 5, above 12% - 0