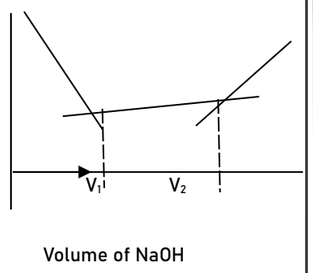
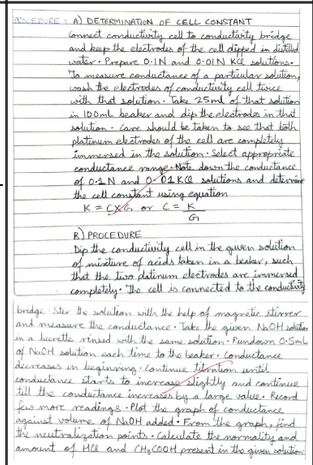
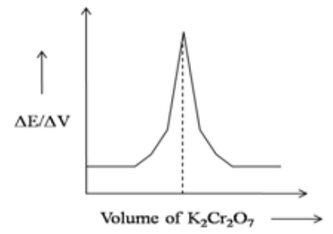
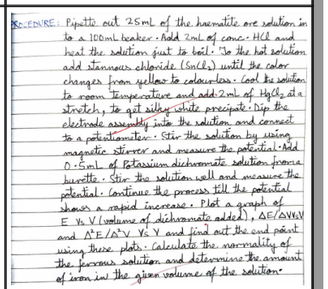
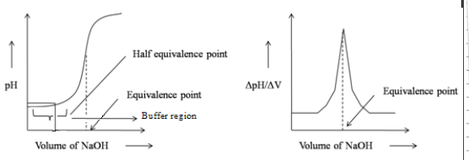
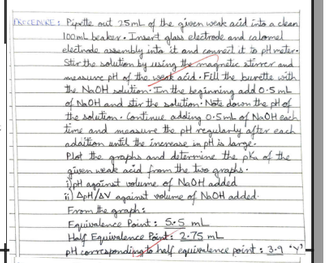
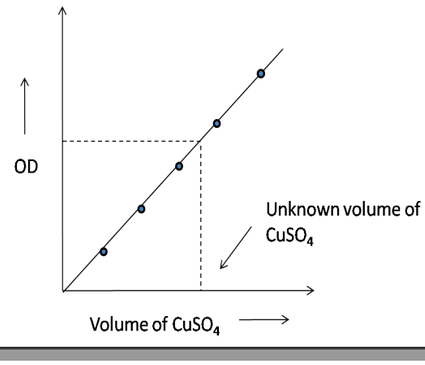
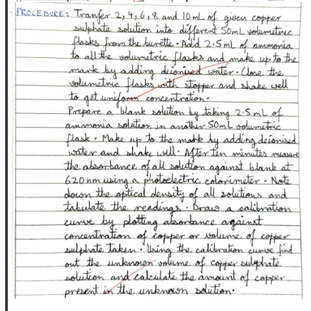
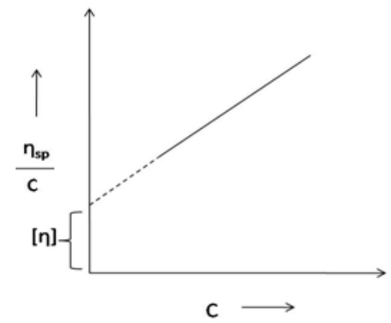
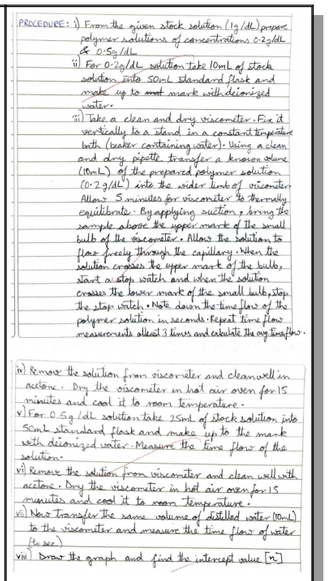
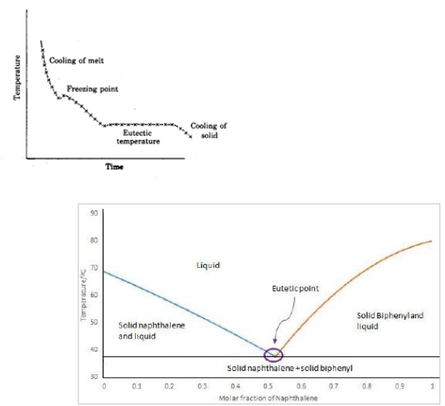
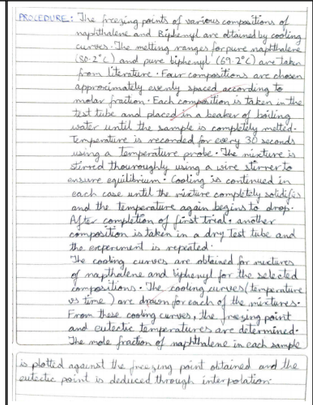
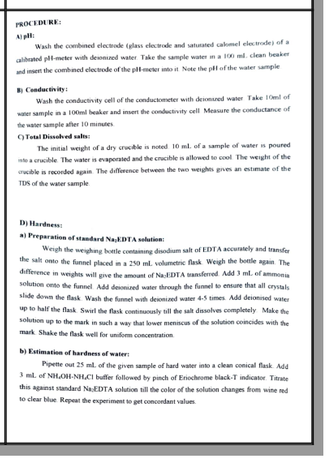
Experiment	Aim	Chemicals	Glassware & Apparatus	Graph	Procedure
1. **Cell constant**	1.To determine cell constant of a conductivity cell 2.To determine the concentration of a weak acid and strong base in a mixture by conductomertic titration with a strong base	• KCl salt (to make standard solution) • NaOH solution • Acid mixture (HCl + CH_3CHOOH solution) • Distilled water	• 2x Beaker • Burette • 10 mL pipette • 2x 100mL Volumetric flask • Spatula • Conductometer • Small funnel • Magnetic Stirrer		
2. **Potentiometric Titration**	**AIM:** To determine the amount of iron present in FAS solution by potentiometric titration method.	• 0.1 N FAS Solution • 0.05 N $K_2Cr_2O_7$ • 2N H_2SO_4 • Distilled Water	• Burette • Beaker • Test Tube + Holder • Magnetic Stirrer [includes magnetic bid]		
3. **pK_a value of weak acid by pH-titration**	To determine pKa value of a weak acid by pH titration method	• Acetic/Formic Acid • NaOH solution	• Beaker (2?) • Burette • Digital pH-meter • Magnetic Stirrer • Combined electrode (calomel electrode + glass electrode)		
4. **Colorimetry**	To estimate the amount of copper present in a given solution by colorimetric method	• Standard $CuSO_4$ solution • NH_3 solution	• 2 Burettes • 7 50mL Flasks • Cuvette • Colorimeter		

5. PVA [polymer viscosity average]	To determine the molecular weight of a polymer by viscosity measurements using Mark-Houwink equation	• Polyvinyl alcohol (stock solution with concentration of 1gm/dL) • Acetone	• Viscometer • Volumetric flask • Water Bath • Pipette • Pipette Head • Stop Watch • Stand • Burette		
6. Eutectic system	To construct a phase diagram for a simple eutectic system using cooling curves	• Biphenyl • Naphthalene	• Electronic wight balance • Spatula • Temperature Probe • Stop Watch • Water Bath • Boiling Tube • Stand with a Clamp to hold the boiling tube		
7. Complexometric Titration	To determine the water quality parameters 1. pH 2. Conductivty 3. Total Dissolved Salts 4. Total Hardness associated with the given water sample	• Hard Water • NH_3 • Buffer solution • Erio-chrome Black-T [EBT] • Na_2EDTA (Sodium ethylenediamine tetra acetic acid)	• Burette • 25ml Pipette • 250ml volumetric flash • Small and Big funnel • Crucible • Wash Bottle • Conical Flask • Beaker • Weighing Balance • Bunsen Burner • pH-meter • Conductivity Meter	N/A	

8. COD [Redox Titration]	TO ESTIMATE CHEMICAL OXYGEN DEMAND OF A GIVEN INDUSTRIAL WASTE WATER SAMPLE	• Industrial waste water solution • $K_2Cr_2O_7$ solution • Ferroin indicator • H_2SO_4 solution (1:1)	• 250ml Volumetric Flask • 25ml Pipette • 10ml Pipette • 250ml Conical Flask • Big Small Funnel • Burette • Test Tube with Holder	N/A	**PROCEDURE:** **A) Preparation of Standard Ferrous Ammonium Sulphate (FAS) Solution:** Weigh accurately the given FAS crystals and transfer it into a 250mL volumetric flask using a funnel. Add 1/2 test tube of 1:1 sulfuric acid followed by small amount of water. Dissolve the salt and make up to the mark and shake well for uniform concentration. **B) Blank titration:** Pipette out 10mL of potassium dichromate solution into a clean conical flask. Add 3/4th test tube of 1:1 sulfuric acid. Add 3-4 drops of Ferroin indicator. Titrate this against standard FAS solution taken in the burette until the colour changes from bluish green to reddish brown. Note the burette reading and repeat the titration to get concordant values. **C) Back Titration:** Pipette out 25mL of industrial waste water in to a clean conical flask. Add 10mL of potassium dichromate solution. Add 3/4th test tube of 1:1 sulfuric acid. Add 3-4 drops of Ferroin indicator. Titrate this against standard FAS solution taken in the burette until the colour changes from bluish green to reddish brown. Note the burette reading and repeat the titration to get concordant values.
9. α-Al_2O_3	**AIM:** To synthesise α-Al_2O_3 Nano Metal Oxide by combustion method.	• 20.0 g of Aluminium nitrate [$(Al(NO_3)_3.9H_2O$; Mol. Wt = 375.134 g/mole] • 5.0 g of urea [NH_2CONH_2; Mol. Wt = 60] • Distilled Water	• 250 mL beaker • Weighing Balance • Magnetic Stirrer • Furnace	N/A	**PROCEDURE:** Weigh exactly 20.0 g of Aluminium nitrate [$(Al(NO_3)_3.9H_2O$; Mol. Wt = 375.134 g/mole] and 5.0 g of urea [NH_2CONH_2; Mol. Wt = 60] in 250 mL beaker and dissolve the salts by adding minimum quantity of distilled water and stirring on a magnetic stirrer for 10 min. The uniformly dissolved redox mixture is kept in a pre-heated furnace maintained at 500° C. The redox solution undergoes evaporation and finally results in viscous-gel containing uniformly mixed Aluminium nitrate and urea. After some time it catches fire with the liberation of gases and heat energy, finally results in highly porous, white powder of nano α-Al_2O_3 $2Al(NO_3)_3(aq) + 5CH_4N_2O(aq) \xrightarrow{500^\circ C} \alpha\text{-}Al_2O_3(s) + 5CO_2(g) + 8N_2(g) + 8H_2O(g)$