# XI-XII Practicals

| PRACTICALS | EQUIPMENT | CHEMICALS |
|---|---|---|
| **XI-Practicals**<br>**Chapter 1:**<br>**Introduction to Stoichiometry** | | |
| 1. Estimate the Amount of $Ba^{+2}$ in the Given Solution of $BaCl_2$ Gravimetrically. | analytical balance, oven, funnel, wash bottle, Whatman filter paper # 42, glass rod, beakers, desiccators, pipette, burner, matches, safety goggles | distilled water, potassium chromate solution, barium chloride solution - |
| **Chapter 2:**<br>**Atomic Structure** | | |
| None | None | None |
| **Chapter 3:**<br>**Theories of Covalent Bonding: Theories and Shapes of molecules** | | |
| None | None | None |
| **Chapter 4:**<br>**States of Matter I: Gases** | | |
| 2. Demonstrate that Gases spread by diffusion to Areas of lower Concentration. | glass tube 40cm long and 1cm in internal diameter, ring stand, clamp, clamp holder, cotton balls, forceps, dropper, rubber stoppers, safety goggles | concentrated $NH_3$ solution, concentrated HCl |
| **Chapter 5:**<br>**States of Matter II: Liquids** | | |
| 1. Separate the Given Mixture of Inks by Paper Chromatography. | Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil | Water – alcohol mixture, mixture of inks. |

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| 2. Separate the Following Ions from a given Mixture of their Salts ($Ni^{+2}$, $Co^{+2}$, $Cu^{+2)}$ by Paper Chromatography. | Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil | 1% solutions of the chlorides of Ni, Co, $Cu^{+2}$, spraying solution (0.1% rubeanic acid in ethyl alcohol), solvent mixture (acetone, distilled water and concentrated HCl mixed in ratio 43:3:4) |
| 3. Separate Lead and Cadmium in a mixture solution by Paper Chromatography. | Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil | sample reagent (mixture of solutions of $PbCl_2$ and $CdCl_2$), solvent mixture (n-butanol + 3M $HNO_3$), spraying agent ($H_2S$ gas) |
| 4. Prove that the Loss of Thermal Energy When a Liquid Evaporates Will Lower the Temperature of the Liquid. | beaker, thermometer, safety goggles | acetone |
| **Chapter 6: States of Matter III: Solids** | | |
| ▪ Crystallize Benzoic Acid from water. | China dish, burner, tripod stand, wire gauze, matches, beakers, funnel, filter paper, stirrer, safety goggles | distilled water and benzoic acid |
| **Chapter 7: Chemical Equilibrium** | | |
| 1. Purify a Given Sample of Sodium Chloride by Passing HCl Gas. (Application of common ion effect) | beaker 500ml, funnel, round-bottom flask, glass tubing, wire gauze, thistle funnel, burner, stirrer, graduated flask and physical balance | distilled water, common salt, concentrated $H_2SO_4$ |
| 2. Demonstrate a Shift in the Equilibrium Point of a Reaction by Changing Concentration. (Le Chatelier's Principle) | 3 beakers of 150mL, 4 beakers of 50mL, safety goggles | 0.1M $K_2CrO_4$, 0.1M $K_2Cr_2O_7$, 1M HCl, 1M NaOH, 0.1M $Ba(NO_3)_2$ |

**Chapter 8:**
**Acids, Bases and Salts**

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| 1. Determine the Exact Molarity of the Given Solution of $H_2SO_4$ and the Volume of this Acid Required to Prepare 500 ml of 0.02 M Acid by Volumetric Method | burette, pipette, funnel, conical flask, beakers, iron stand | phenolphthalein, 0.1M NaOH, 0.2M $H_2SO_4$, distilled water |
| 2. Determine the Percentage of NaOH in the Given Solution by Volumetric Method. | burette, pipette, funnel, conical flask, beakers, iron stand | phenolphthalein, 0.1M NaOH, 0.1M HCl, distilled water, solution containing 8gms of a mixture of NaCl and NaOH |
| 3. The given solution contains 6gms of $Na_2CO_3$ dissolved per $dm^3$. Determine the Percentage Purity of the Sample Solution by Volumetric Method. | burette, pipette, funnel, conical flask, beakers, iron stand | methyl orange, 0.1M $Na_2CO_3$, 0.1M HCl, Distilled water, solution of 6 gms of $Na_2CO_3$ in 1 liter |
| 4. Determine the Value of X by Volumetric Method in the Given Sample of 6.3g of $(COOH)_2$. $XH_2O$ Dissolved per $dm^3$. | burette, pipette, funnel, conical flask, beakers, iron stand | phenolphthalein, 0.1M NaOH, 0.1 $(COOH)_2.2H_2O$, Distilled water |
| 5. Determine the Solubility of Oxalic Acid at Room Temperature Volumetrically. | burette, pipette, funnel, conical flask, beakers, iron stand | Phenolphthalein, 0.1M NaOH, 0.1 (COOH) $2.2H_2O$, Distilled water. |

**Chapter 9:**
**Chemical Kinetics**

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| 1. Show that the Addition of a Catalyst Increases the Rate of Reaction. | 500 ml flask, spatula, tray, safety goggles | 10% $H_2O_2$, 0.1gm $MnO_2$, distilled water |

**Chapter 10:**
**Solution and Colloids**

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| None | None | None |

**Chapter 11:**
**Thermochemistry**

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| 1. Determine the Heat of Neutralization of NaOH and HCl. | calorimeter with stirrer, thermometer, balance | 1M NaOH, 1M HCl, distilled water |

**Chapter 12:**
**Electrochemistry**

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| 1. Standardize the Given Solution of $KMnO_4$ and Calculate the Volume of $KMnO_4$ Required for Preparing 1 $dm^3$ of 0.01M $KMnO_4$ Solution Volumetrically. | burette, pipette, funnel, conical flask, beakers, iron stand, test tube | 0.1M $FeSO_4$ solution, 0.02M $KMnO_4$ solution, dilute $H_2SO_4$, distilled water |
| 2. Determine the Amount of Iron in the Given Sample Volumetrically. | burette, pipette, funnel, conical flask, beakers, iron stand, test tube | 0.05M $FeSO_4$ solution, 0.01M $KMnO_4$ solution, dilute $H_2SO_4$, distilled water |
| 3. Determine the Percentage Composition Volumetrically of a Solution Mixture of $K_2C_2O_4$ and $K_2SO_4$. | burette, pipette, funnel, conical flask, beakers, iron stand, test tube | solution mixture of $K_2C_2O_4$ and $K_2SO_4$, 0.01M $KMnO_4$ solution, dilute $H_2SO_4$, distilled water |

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| 4. Determine the Solubility of Mohr's Salt at Room Temperature Volumetrically. | burette, pipette, funnel, conical flask, beakers, iron stand, test tube | 0.05M Mohr's salt solution, 0.01M $KMnO_4$ solution, dilute $H_2SO_4$, distilled water |

**XII-Practicals**
**Chapter 13:**
**s- and p- Block Elements**

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| 1. Prepare Potassium Xanthate | beakers, funnel, filter paper, measuring cylinder, safety goggles | potassium hydroxide, alcohol, carbon disulphide, ether (for washing of crystals), distilled water, copper sulphate solution |
| 2. Detect the Following Cations: $NH_4^+$, $Mg^{2+}$, $Al^{3+}$, $Ca^{2+}$, $Cr^{3+}$, $Mn^{2+}$, $Fe^{2+}$, $Fe^{3+}$, $Cu^{2+}$, $Zn^{2+}$, $Ba^{2+}$, $Pb^{2+}$, Detect the Following Anions: $CO_3^{2-}$, $NO_3^-$, $NO_2^-$, $SO_4^{2-}$, $SO_3^{2-}$, $Cl^-$, $Br^-$, $I^-$, $CrO_4^{2-}$ Perform Tests for the Following Gases: $NH_3$, $CO_2$, $Cl_2$, $H_2$, $O_2$, $SO_2$. | test tubes, test tube holder, test tube rack, delivery tube, measuring cylinder, match box, wooden splint, Bunsen burner, safety goggles, glass rod, filter paper, litmus paper | sodium hydroxide, ammonium hydroxide, dilute acids, barium, lead, silver salt solutions, Al foil, lime water and other necessary chemical solutions for the identification of these ions and gases |

**Chapter 14:**
**d-f- Block Elements**

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| 1. Prepare Nickel Dimethyl Glyoxime. | test tubes, test tube holder, test tube rack, measuring cylinder, Bunsen burner, safety goggles, filter paper, funnel | dimethyl glyoxime solution, nickel salt solution, distilled water and $NH_4OH$ |

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| **Chapter 15: Organic Compounds** | | |
| None | | |
| **Chapter 16: Hydrocarbons** | None | None |
| 1. Prepare Ethylene from Ethylene Bromide | test tubes, test tube holder, test tube rack, delivery tube, measuring cylinder, Bunsen burner, safety goggles | pieces of zinc metal, alcohol, ethylene bromide |
| **Chapter 17: Alkyl Halides and Amines** | | |
| 1. Prepare Azo dye from Amine. | test tubes, test tube rack, test tube holder, measuring cylinder, balance, filter paper, funnel | amine, phenol, hydrochloric acid, ice, sodium nitrite, alcohol, distilled water |
| 2. Identify the Amine Functional Group. | test tubes, test tube rack, test tube holder, measuring cylinder, balance, filter paper, funnel | Hinsberg test: benzenesulfonyl chloride, sodium hydroxide, HCl |
| **Chapter 18: Alcohols, Phenols and Ethers** | | |
| 1. Prepare Iodoform. | test tubes, test tube holder, test tube rack, Bunsen burner, safety goggles | alcohol, sodium hydroxide, water, solution of iodine in potassium iodide |
| 2 Identify the Phenol Functional Group. | test tubes, test tube holder, test tube rack, measuring cylinder, safety goggles | Litmus solution, Ferric Chloride solution |
| **Chapter 19: Carbonyl Compounds I: Aldehydes and Ketones** | | |
| 1. Prepare Glucosazone. | Beakers, test tubes, measuring cylinders, balance, Bunsen burner. match box, funnel, filter papers | glucose solution, 2,4-dinitrophenyl hydrazine solution, distilled water |
| 2. Identify the Aldehyde and Ketone Functional | beakers, test tubes, measuring cylinders, Bunsen burner, match box, funnel, filter papers | Fehling's solution, Tollen's reagent, Benedict solution |

Groups.

**Chapter 20: Carbonyl Compounds II Carboxylic Acids and Functional derivatives**

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| 1. Prepare Benzanilide from Benzoic Acid. | beakers, test tubes, measuring cylinders, Bunsen burner, match box, funnel, filter paper | benzoic acid, phosphorous pentachloride, ice, alcohol, distilled water |
| 2. Identify the Carboxylic Acid Functional Group. | test tubes, beakers, balance, measuring cylinders, funnel, filter paper | Dilute sodium hydroxide, saturated potassium bi carbonate |

**Chapter 21 Biochemistry**

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| 1. Detect glucose as Reducing sugar in urine sample of diabetic patient | test tubes, beakers, conical flask, pipette, | Benedict Reagent, Fehling's Solution |
| 2. Detect Protein Urea denaturation) | test tubes, beakers, conical flask, pipette, | Urea, egg white |
| 3. Observe the digestion of starch with salivary amylase. | test tubes, beakers, conical flask, pipette, slides | Freshly prepared starch solution, iodine solution |
| 4. Detect the presence of different lipid components in an oil sample by TLC | beakers, pipette, slides | Benzene, alcohol, Silica gel Chromatographic Grade |
| 5. Determine the Iodine number of an oil | test tubes, beakers, conical flask, pipette, beakers | Iodine solution, oil |

**Chapter 22: Industrial Chemistry**

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| None | None | None |

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| **Chapter 23: Environmental Chemistry** | | | |
| | None | None | None |
| **Chapter 24: Analytical Chemistry** | | | |
| 1 | Taking Infra Red, Ultra Violet/visible and Mass Spectra | Subject to the availability of the instruments | As required for the experiment |

## XI-XII Chemicals

**(For Group of 20 Students)**

| Chemicals | Quantities |
|---|---|
| Acetone | 5L |
| Ammonium hydroxide | 5L |
| Aluminum foil | 5 Rolls |
| Aniline | 2.5L |
| $Ba(NO_3)_2$ solution 0.1M | 2.5L |
| Barium Chromate Solution | 2.5L |
| Benedict's Reagent | 2.5L |
| Benzoic acid | 500gms |
| Bromine water | 5L |
| Carbon disulphide | 2.5L |
| Common Salt | 5Kg |
| $(COOH)_2.2H_2O$ solution 0.1M | 2.5L |
| Copper sulphate solution | 2.5L |
| Dimethyl glyoxime solution | 2L |
| 2,4-dinitrophenyl hydrazine solution | 2L |
| Distilled water | 20L |
| Ether | 5L |
| Ethyl Alcohol | 2.5L |
| Ethylene bromide | 2L |
| Fehling's Reagent | 2L |
| Ferric Chloride solution | 2L |
| $FeSO_4$ solution 0.05M | 2L |
| $FeSO_4$ solution 0.1M | 2L |
| Glucose | 2Kg |
| HCl solution 0.1M | 5L |
| HCl solution 1M | 5L |
| HCl Concentrated | 2.5L |
| $H_2O_2$ solution 10% | 2L |
| $H_2SO_4$ Dilute | 5L |
| $H_2SO_4$ solution 0.2M | 2.5L |
| $H_2SO_4$ Concentrated | 5L |
| Ink mixture | 500mL |
| Iodine solution in potassium iodide | 10L |
| Iron Sulfide | 1Kg |
| $K_2CrO_4$ solution 0.1M | 2.5L |
| $K_2Cr_2O_7$ solution 0.1M | 5L |
| $KMnO_4$ solution 0.01M | 5L |
| $KMnO_4$ solution 0.02M | 5L |
| Lime water | 2L |
| Magnesium turnings | 1Kg |
| Methyl orange | 100gm |
| $MnO_2$ | 250gm |
| Mohr's salt solution 0.05M | 5L |
| $Na_2CO_3$ solution 0.1M | 5L |
| NaOH solution 0.1M | 5L |

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|---|---|
| NaOH solution 1M | 5L |
| $NH_3$ solution concentrated | 5L |
| Phenol | 2.5L |
| Phenolphthalein | 100gm |
| Phosphorous pentachloride | 1Kg |
| Potassium hydroxide | 2Kg |
| Potassium iodide | 2Kg |
| Potassium oxalate | 1Kg |
| Potassium sulphate | 1Kg |
| Lead Nitrate | 500gm |
| Cadmium Nitrate | 500gm |
| Salts of the following cations: | |
| Ni, Co,$NH_4^+$, $Mg^{2+}$, $Al^{3+}$, $Ca^{2+}$, $Cr^{3+}$, $Mn^{2+}$, $Fe^{2+}$, $Fe^{3+}$, $Cu^{2+}$, $Zn^{2+}$, $Ba^{2+}$, $Pb^{2+}$. | 1Kg each |
| Salts of the following anions: | 1Kg each |
| $CO_3^{2-}$, $NO_3^-$, $NO_2^-$, $SO_4^{2-}$, $SO_3^{2-}$, $Cl^-$, $Br^-$, $I^-$, $CrO_4^{2-}$. | 500gm |
| Silver nitrate | 500mg |
| Sodium nitrite | 1Kg |
| Solvent mixture (Acetone, Distilled Water and Concentrated HCl mixed in ratio 43:3:4) | 2L |
| Solvent mixture (n-butanol + 3M HCl) | 2L |
| Spraying Agent (A Concentrated solution of $H_2S$) | 2L |
| Starch | 1Kg |
| Tollen's reagent | 2L |
| Zinc turnings | 1 Kg |

## XI-XII Equipment/Apparatus

**(For Group of 20 Students)**

| | |
|---|---|
| Analytical balance (Digital) | 05 |
| Beakers 50mL | 25 |
| Beakers 100mL | 25 |
| Beakers 150mL | 25 |
| Burette 50mL | 25 |
| Bunsen burner | 25 |
| Calorimeter | 25 |
| China dish | 25 |
| Clamp | 25 |
| Clamp holder | 25 |
| Conical flask | 25 |
| Cotton bundles | 02 |
| Delivery tube | 25 |
| Desiccators | 10 |
| Dropper | 50 |
| Filter paper | 05 Packets |
| Forceps | 25 |
| Funnel | 25 |
| Glass rod | 25 |
| Glass tubing | 5m |
| Glass tube 40cm long and 1cm in diameter | 25 |
| Graduated flask | 25 |
| Iron stand | 25 |
| Kipps Apparatus | 05 |
| Litmus paper (Red) | 05 Packets |
| Litmus paper (Blue) | 05 Packets |
| Matches Box | 10 |
| Measuring flask 100mL | 10 |
| Measuring flask 500mL | 10 |
| Measuring cylinder 5mL | 10 |
| Measuring cylinder 10mL | 10 |
| Measuring cylinder 100mL | 10 |
| Oven | 4 |
| Pipette 10mL | 25 |
| Pipette 25mL | 25 |
| Pipette filler | 25 |
| Rubber bung | 25 |
| Ring stand | 25 |
| Round bottom flask 250mL | 25 |
| Rubber stoppers | 25 |
| Safety goggles | 20 |
| Soap | 12 Bars |
| Spatula | 25 |
| Stirrer | 25 |
| Test tube | 200 |
| Test tube holder | 40 |

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|---|---|
| Test tube rack | 40 |
| Thermometer | 25 |
| Thistle funnel | 25 |
| Tray | 25 |
| Tripod stand | 25 |
| Wash bottle | 25 |
| Whatman filters paper No. 42 | 05 Packets |
| Whatman filter paper No. 1 | 05 Packets |
| Wire gauze | 25 |
| Wooden splint | 05 Packets |