

ORIENTATION CUM TRAINING FOR KVS LAB ATTENDENTS

INTRODUCTION

KVS is promoting group-D employees to the post of Lab Attendants .These employees in their new role are expected to discharge several duties for effective organization of practical classes for secondary and senior secondary students. Each lab attendant is expected to possess a set of competencies and skills for successfully discharging his duties. In view of this an orientation programme cum training is required for all the lab attendants at large and for the newly promoted lab attendants in particular.

OBJECTIVES OF THE PROGRAMME- to develop the following generic skills required for a lab attendant.

- Sense of commitment , punctuality and responsibility
- Lab up keep and maintenance
- Knowledge of the materials /equipments / chemicals used
- Ability to carry out minor repairs in apparati, equipments and instruments.
- Expertise in proper handling of apparati, equipments and instruments.
- Identification skills (specimens/ chemicals/ equipments)
- Knowledge of preparing stains /solutions/ reagents /chemical compounds
- Skill of setting up standard experiments.
- Awareness about safety rules.
- Knowledge of basic laboratory techniques.
- Knowledge of stock procurement and stock maintenance
- Knowledge of maintaining issue and breakage registers.
- Knowledge of the life period of equipments / apparatus.
- Knowledge of Condemnation procedure/ methods

DURATION OF THE PROGRAME - FIVE DAYS.

NUMBER OF MODULES- FIVE

METHOD – Two PGTS/ TGTS from each region can be initially trained as master trainers who inturn will train the lab attendants at regional/ cluster level in each region. one education officer/ senior principal can be put in charge of the training process.

LOCATION – The lab attendants should be trained in a venue school where well equipped senior science laboratories are available.

Training modules

PART-A - GENERAL

Module-1

- a) Introduction to nature of work/ expected responsibilities/ Duties.
- b) Introduction to common glass wares and equipments used in Physics, Chemistry and Biology.

Module-2.

- a) Acquaintance with common chemicals used in Physics, Chemistry and Biology.
- b) Acquaintance with common plants and animals as per the practical prescribed -knowing their names in English/Hindi/ local language.
- c) Methods to prepare solutions/ stains in bio-lab.

Module-3

Hands on session- practical session to set up experiments in Physics.

Module-4

Hands on session- practical session to set up few experiments in Chemistry and Biology.

Module-5

- a) Safety rules to be followed in the labs.
- b) Awareness about common type of injury/accidents while handling chemicals /experiments.
- c) General instructions about stock procurement, stock maintenance and verification.

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Training modules

PART-B- SPECIFIC

BIOLOGY LABAROTORY

Suggested module for practical session.

1. Cleaning and maintenance of microscope-

- a) Parts of microscope- cleaning them with cleansing fluid/anti fungal fluids.
- b) Mounting and focusing of permanent/ temporary slides.

2. Preparation of 1% starch solution.-

To 10ml of distilled water add 1g of soluble starch to make into a thick paste. Boil 90 ml of distilled water and to it Add 10 ml of the paste prepared already by gradual stirring. Leave the solution over night and then filter to get 1% starch solution.

3. Preparation of stain.

Dissolve a little quantity of sodium bi carbonate in distilled water and methylene blue powder. Boil for one hour, then cool, filter and store.

4. Identification of plants and collection/ culture of specimens and as required by the practical curriculum.

5. Maintenance of an **aquarium** in the biology laboratory.

CHEMISTRY LABORATORY

Module 1

Nature of duties and Responsibilities

1. Maintenance of Laboratory – cleaning and arrangement
2. Identification of all the apparatus in the Laboratory
3. Identification of Chemicals in the Laboratory.
4. Knowing basic laboratory techniques
 - a. Working of Bunsen burner.
 - b. Cutting of glass tube.
 - c. Bending of a glass tube.
 - d. Drawing a glass jet.
 - e. Boring Cork.
 - f. How to use a wash bottle.
 - g. Cleaning of glass apparatus.
5. Arrangement of reagents in Racks and Shelves in alphabetical order.
6. Preparation of Common Reagents.

Module 2

1. Identification of Common wares/ apparatus in the Lab.
2. Identification of Chemicals

Glass wares and Apparatus

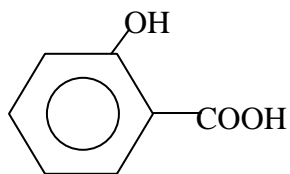
1. Beakers (1000 ml, 500 ml, 250 ml, 150 ml, 100 ml).
2. Test tube
3. Standard flask (1000ml, 250 ml, 100 ml)
4. Conical Flask (250 ml, 100 ml)
5. Burettes
6. Pipettes
7. Wash bottle
8. Tripod stand
9. Wire Gauze
10. Kipps apparatus
11. Round bottomed flask
12. Bent tube, Cork
13. Leibig's Condenser
14. Reagent bottles
15. Spatula
16. Glass rods
17. Gas jar with lid
18. Mortar and Pestle
19. Analytical balance – How to use and repair it.
20. Deflagrating Spoon
21. China dish
22. Sodium fusion tubes
23. Melting point apparatus
24. Boiling Point apparatus
25. Thermometer
26. Calorimeter
27. Funnel
28. Watch glass
29. Burette stand
30. Funnel stand
31. Centrifuging tube
32. Test tube cleaning brush & Bottle cleaning brush

List of Chemicals

1. Lead Nitrate	$\text{Pb}(\text{NO}_3)_2$
2. Lead Carbonate	PbCO_3
3. Magnesium Sulphate	MgSO_4
4. Aluminium Chloride	AlCl_3
5. Aluminium Nitrate	$\text{Al}(\text{NO}_3)_3$
6. Aluminium Sulphate	$\text{Al}_2(\text{SO}_4)_3$
7. Nickel Chloride	NiCl_2
8. Nickel Nitrate	$\text{Ni}(\text{NO}_3)_2$
9. Zinc Nitrate	$\text{Zn}(\text{NO}_3)_2$
10. Zinc Chloride	ZnCl_2
11. Manganous Sulphate	MnSO_4
12. Calcium Chloride	CaCl_2
13. Barium Chloride	BaCl_2
14. Barium Nitrate	$\text{Ba}(\text{NO}_3)_2$
15. Ammonium Nitrate	NH_4NO_3
16. Ammonium Sulphate	$(\text{NH}_4)_2\text{SO}_4$
17. Sodium Hydroxide	NaOH
18. Ferrous Sulphate	FeSO_4
19. Ammonium Molybdate	$(\text{NH}_4)_2\text{MoO}_4$
20. Potassium Iodide	KI
21. Potassium Chromate	K_2CrO_4
22. Potassium Dichromate	$\text{K}_2\text{Cr}_2\text{O}_7$
23. Ferrous Sulphide	FeS
24. Ammonia Solution	NH_4OH
25. Potassium Ferrocyanide	$\text{K}_4[\text{Fe}(\text{CN})_6]$
26. Cobalt Nitrate	$\text{Co}(\text{NO}_3)_2$
27. Blue Litmus solution	
28. Red Litmus solution	
29. Ammonium Chloride	NH_4Cl
30. Silver Nitrate	AgNO_3
31. Manganese Dioxide	MnO_2
32. Lead Dioxide	PbO_2
33. Sodium Carbonate	Na_2CO_3
34. Lead Acetate	$(\text{CH}_3\text{COO})_2\text{Pb}$
35. Ammonium Acetate	$\text{CH}_3\text{COONH}_4$
36. Potassium Thiocyanate	KSCN
37. Ammonium Carbonate	$(\text{NH}_4)_2\text{CO}_3$
38. Disodium Hydrogen Phosphate	Na_2HPO_4
39. Nessler's Reagent	K_2HgI_4
40. Ammonium Oxalate	$(\text{NH}_4)_2\text{C}_2\text{O}_4$

41. Dimethyl Glyoxime	$\begin{array}{c} \text{CH}_3 - \text{C} = \text{NOH} \\ \\ \text{CH}_3 - \text{C} = \text{NOH} \end{array}$
42. Hydrochloric Acid	H Cl
43. Sulphuric Acid	H ₂ SO ₄
44. Nitric Acid	HNO ₃
45. Acetic Acid (Glacial)	CH ₃ COOH
46. Spirit	
47. Ethyl Alcohol	C ₂ H ₅ OH
48. Fehling's Solution A	
49. Fehling's Solution B	
50. Benzoic Acid	C ₆ H ₅ COOH
51. Copper Sulphate	Cu SO ₄
52. Copper Turnings	Cu
53. Filter Paper (ordinary)	(46 x 57 cm)
54. Filter paper Whatman No. 1	(12.5 cm)
55. Oxalic Acid	H ₂ C ₂ O ₄
56. Ferrous Ammonium Sulphate (Mohr's Salt)	FeSO ₄ . (NH ₄) ₂ SO ₄ . H ₂ O
57. Potassium Permanganate	K MnO ₄
58. Sodium Bromide	Na Br
59. Sodium Sulphide flakes	Na ₂ S
60. Sodium Nitroprusside	Na ₂ [Fe (CN) ₅ NO]
61. Zinc Metal Granulated	
62. Benzaldehyde	C ₆ H ₅ CHO
63. Sodium Silicate	Na ₄ SiO ₄
64. Acetic Acid (dried)	CH ₃ COOH
65. Acetone	CH ₃ CO CH ₃
66. Castor oil	
67. Ammonium Phosphate	(NH ₄) ₃ PO ₄
68. Universal Indicator	
69. pH papers	
70. Aluminium Potassium Sulphate	K ₂ SO ₄ . Al ₂ (SO ₄) ₃ . 24 H ₂ O

71. Salicylic Acid



72. Calcium Hydroxide	Ca (OH) ₂
73. Methyl Orange	
74. Sodium Nitrate	Na NO ₃
75. Calcium Carbonate	Ca CO ₃
76. Hydrogen Peroxide	H ₂ O ₂

77. Zinc Sulphate	Zn SO ₄
78. Calcium Nitrate	Ca(NO ₃) ₂
79. Phenol	C ₆ H ₅ OH
80. Formaldehyde	HCHO
81. Aniline	C ₆ H ₅ NH ₂
82. Chloroform	CHCl ₃
83. Iodine	I ₂
84. Sodium Nitrite	Na NO ₂
85. Magnesium Ribbon	
86. Sodium Chloride	Na Cl
87. Potassium Chloride	K Cl
88. Litmus Paper – Blue	
89. Litmus Paper – Red	
90. Phenolphthalein	
91. White Phosphorus	
92. Potassium Ferricyanide	K ₃ [Fe (CN) ₆]
93. Acetic Anhydride	(CH ₃ CO) ₂ O
94. Lead Carbonate	Pb CO ₃
95. Calcium Chloride	Ca Cl ₂
96. Barium Nitrate	Ba (NO ₃) ₂
97. Ferric Chloride	Fe Cl ₃

1. Preparation Of Reagents

$$\text{a) Molarity} = \frac{\text{Number of Moles of Solute}}{\text{Volume of solution in Litres}}$$

$$= \frac{n_B}{V}$$

$$n_B = \frac{\text{Mass of Solute}}{\text{Molar Mass of Solute}}$$

$$\text{b) Normality} = \frac{\text{Number of Gram Equivalents of Solute}}{\text{Volume of solution in Litres}}$$

$$= \frac{n_B}{V}$$

$$\text{Number of Gram equivalents} = \frac{\text{Mass of Solute}}{\text{Equivalent Weight}}$$

How to find equivalent weight

$$1. \text{ Equivalent weight of an acid} = \frac{\text{Molecular weight of acid}}{\text{Basicity of the acid}}$$

$$2. \text{ Equivalent weight of a base} = \frac{\text{Molecular weight of base}}{\text{Acidity of the base}}$$

PREPARATION OF COMMON REAGENTS USED IN THE CHEMICAL LABORATORY

Strengths of Concentrated Acid Solution

<i>Acid</i>	<i>Specific Gravity</i>	<i>Percentage by Mass</i>	<i>Approximate Strength</i>
1. Glacial Acetic Acid (CH ₃ COOH)	1.05	99.5	17 M
2. Hydrochloric Acid (HCl)	1.18	37	12 M
3. Nitric Acid (HNO ₃)	1.41	70	16 M
4. Sulphuric Acid (H ₂ SO ₄)	1.84	96	18 M

Caution : When diluting reagents, add more concentrated reagent to the more dilute reagent (or solvent). **Never add water to a concentrated acid.**

Preparation of Dilute Solutions of Acids

<i>Acid</i>	<i>Preparation</i>	<i>Approximate Strength</i>
1. Acetic Acid (Dil. CH ₃ COOH)	Dilute some 285 ml of conc. CH ₃ COOH to 1 litre of distilled water.	5 M
2. Hydrochloric Acid (Dil. HCl)	Dilute some 430 ml of conc. HCl to 1 litre of distilled water.	5 M
3. Nitric Acid (Dil. HNO ₃)	Dilute some 310 ml of conc. HNO ₃ to 1 litre of distilled water.	5 M
4. Sulphuric Acid (Dil. H ₂ SO ₄)	Pour 140 ml of conc. H ₂ SO ₄ slowly and with constant stirring into 500 ml of distilled water and dilute to 1 litre.	2.5 M

Preparation of Solutions of some Bases

<i>Base</i>	<i>Preparation</i>	<i>Approximate Strength</i>
1. Ammonia Solution (Conc. NH ₄ OH)	Sp. gr. 0.88; 28% of NH ₃	15 M
2. Ammonia Solution (Dil. NH ₄ OH)	Dilute 335 ml of conc. NH ₄ OH to 1 litre with distilled water.	5 M
3. Lime Water	Shake lime with distilled water and allow to	0.02 M

(Ca (OH) ₂)	stand for some time; filter off the liquid. The clear solution is limewater.	
4. Sodium Hydroxide solution (Na OH)	Dissolve 200 g of caustic soda in distilled water and dilute to 1 litre.	5 M

Preparation of Indicators

<i>Indicator</i>	<i>Preparation</i>	<i>Approximate Strength</i>
1. Phenolphthalein	Dissolve 1 g of Phenolphthalein in 100 ml of alcohol.	1 %
2. Methyl Orange	Dissolve 1 g of Methyl Orange in one litre water.	0.1 %
3. Methyl Red	Dissolve 1 g of the solid in one litre of hot water or dissolve in 600 ml of Alcohol and dilute with 400 ml of Water.	0.1 %
4. Starch Solution	Make a paste of 1 g of starch with cold water. Pour this drop by drop into about 100 ml of boiling water and continue to boil for few minutes. Allow to stand until cool. Decant off clear solution. If 100 g of salicylic acid is added to 100 ml of the starch solution the it keeps well for a long time.	1 %
5. Litmus Solution (Blue)	Dissolve 10 g of the solid dye in a litre of water	1 %

Preparation of Solutions of Some Salts

<i>Reagents</i>	<i>Preparation</i>	<i>Approximate Strength</i>
Ammonium Acetate CH ₃ COONH ₄	Dissolve 231 grams of the salt in the distilled water and make the volume one litre.	3 M
Ammonium Carbonate (NH ₄) ₂ CO ₃	Dissolve 160 grams of the salt in a mixture of 140 ml. of conc. Ammonia solution and 860 ml. of distilled water	4 M
Ammonium Chloride NH ₄ Cl	Dissolve 270 grams of the salt in the distilled water and make the volume one litre.	5 M
Ammonium Oxalate (NH ₄) ₂ C ₂ O ₄	Dissolve 35 grams of the salt in the distilled water and make the volume one litre.	0.5 M

Ammonium Sulphate (NH ₄) ₂ SO ₄	Dissolve 132 grams of the salt in the distilled water and make the volume one litre.	2 M
Ammonium Molybdate (NH ₄) ₆ Mo ₇ O ₂₄ . 4H ₂ O	Dissolve 45 grams of the salt in a mixture of 40 ml of conc. Ammonia solution and 60 ml of Water, and 120 grams of Ammonium Nitrate and dilute with water to prepare one litre of the solution.	
Ammonium Thiocyanate NH ₄ CNS	Dissolve 38 grams of the salt in water to get one litre of solution.	0.5 M
Yellow ammonium sulphide solution (NH ₄) ₂ S _x	Saturate 150 ml of concentrated Ammonia solution with H ₂ S keeping the solution cold; add 1 gram of flowers of sulphur and 250 ml of conc. Ammonia solution, shake until the sulphur has dissolved and dilute to one litre.	6 M
Barium Chloride BaCl ₂ . 2 H ₂ O	Dissolve 61 grams of the salt in the distilled water to prepare one litre of the solution.	0.25 M
Calcium Chloride Ca Cl ₂ . 6 H ₂ O	Dissolve 55 grams of the hydrated salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.25 M
Potassium Ferrocyanide K ₄ [Fe(CN) ₆]	Dissolve 55 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	
Potassium Iodide KI	Dissolve 83 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.1 M
Potassium Permanganate K MnO ₄	Dissolve 3.2 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.02 M
Potassium Thiocyanate KCNS	Dissolve 49 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.5 M
Cobalt Nitrate Co(NO ₃) ₂ . 6 H ₂ O	Dissolve 44 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.15 M
Copper Sulphate Cu SO ₄ . 5 H ₂ O	Dissolve 125 grams of the salt in water containing 3 ml of conc. H ₂ SO ₄ and make the volume of the solution one litre by diluting it with water.	0.25 M
Ferric Chloride Fe Cl ₃ . 6 H ₂ O	Dissolve 135 grams of the hydrated salt in distilled water containing 10 ml of conc. HCl and make the volume of the solution one litre by diluting it with water.	0.2 M
Lead Acetate	Dissolve 95 grams of the salt in water	

$(\text{CH}_3\text{COO})_2\text{Pb} \cdot 3 \text{H}_2\text{O}$	containing 15 ml of acetic acid and dilute to one litre.	0.25 M
Mercuric Chloride Hg Cl_2	Dissolve 27 grams of the salt in one litre of distilled water.	0.1 M
Silver Nitrate Ag NO_3	Dissolve 10.8 grams of silver in minimum conc. HNO_3 and dilute to one litre with distilled water or dissolve 17.0 grams of silver nitrate in distilled water and dilute to one litre.	0.5 M
Sodium Acetate $\text{CH}_3 \text{COONa} \cdot 3 \text{H}_2\text{O}$	Dissolve 408 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	3 M
Disodium Hydrogen Phosphate $\text{Na}_2 \text{HPO}_4 \cdot 12 \text{H}_2\text{O}$	Dissolve 120 grams of the salt in distilled water and make the volume of the solution one litre by diluting it with water.	0.5 M
Stannous Chloride $\text{Sn Cl}_2 \cdot 2 \text{H}_2\text{O}$	Dissolve 56 grams of the salt in 100 ml of Conc. HCl and dilute to one litre. Keep a few pieces of tin to prevent oxidation.	0.25 M
Bromine Water Br_2	Prepare saturated solution by shaking 11 ml of liquid bromine with water. Add more bromine, if necessary, to ensure a slight excess.	0.25 M
Chlorine Water Cl_2	Prepare saturated solution by passing Chlorine gas in distilled water	1.5 M
Iodine Solution I_2	Dissolve 12.7 grams of Iodine in a solution of 20 grams of pure KI in 20 ml of water and dilute to one litre with water.	0.05 M
Dimethyl Glyoxime Reagent $\left(\begin{array}{c} \text{CH}_3 - \text{C} = \text{NOH} \\ \\ \text{CH}_3 - \text{C} = \text{NOH} \end{array} \right)$	Dissolve 1 g of the substance in 100 ml of distilled rectified spirit	
Sodium Cobaltinitrite $\text{Na}_3 [\text{Co}(\text{NO}_2)_6]$	Dissolve 17 grams of the salt in 250 ml of water.	
Sodium Nitroprusside $\text{Na}_2 [\text{Fe}(\text{CN})_5 \text{NO}]$	Dissolve a crystal in 5 ml of water.	
Nessler's Reagent Alkaline solution of $\text{K}_2 [\text{HgI}_4]$	Dissolve 10 grams of KI in 10 ml of Ammonia free water. Add saturated HgCl_2 solution (60 grams per litre) in small quantities at a time, with shaking until a	

	slight permanent precipitate forms. Then add 80 ml. of 9 N NaOH solution and dilute to 200 ml. Allow to stand overnight and decant off the clear liquid.	
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Module 3 & 4

Hands on session – Practical Sessions

To set up a few experiments – Gathering materials

1. Salt Analysis – Arranging different reagents for Salt Analysis, Issuing Salts (Help the teacher)
2. Volumetric Analysis – Issuing apparatus and solutions
3. Core Experiments –
 1. Preparation of Crystals
 2. Experiments related to determination of pH
 3. Preparation of Organic Compounds
 4. Organic Analysis
 5. Chromatography
 6. Finding Melting Point
 7. Preparation of Colloids
 8. Calorimetry

List of Common White Salts

<i>Name of the Salt</i>	<i>Basic Radical</i>	<i>Acid Radical</i>
Lead Nitrate	Pb ²⁺	NO ₃ ⁻
Lead Acetate	Pb ²⁺	CH ₃ COO ⁻
Aluminium Acetate	Al ³⁺	CH ₃ COO ⁻
Aluminium Nitrate	Al ³⁺	NO ₃ ⁻
Aluminium Chloride	Al ³⁺	Cl ⁻
Aluminium Bromide	Al ³⁺	Br ⁻
Aluminium Sulphate	Al ³⁺	SO ₄ ²⁻
Zinc Carbonate	Zn ²⁺	CO ₃ ²⁻
Zinc Sulphide	Zn ²⁺	S ²⁻
Zinc Nitrate	Zn ²⁺	NO ₃ ⁻
Zinc Acetate	Zn ²⁺	CH ₃ COO ⁻
Zinc Chloride	Zn ²⁺	Cl ⁻
Zinc Bromide	Zn ²⁺	Br ⁻
Zinc Sulphate	Zn ²⁺	SO ₄ ²⁻
Zinc Phosphate	Zn ²⁺	PO ₄ ³⁻

Calcium Sulphite	Ca^{2+}	SO_3^{2-}
Calcium Carbonate	Ca^{2+}	CO_3^{2-}
Calcium Chloride	Ca^{2+}	Cl^-
Calcium Bromide	Ca^{2+}	Br^-
Calcium Acetate	Ca^{2+}	CH_3COO^-
Calcium Nitrate	Ca^{2+}	NO_3^-
Barium Carbonate	Ba^{2+}	CO_3^{2-}
Barium Chloride	Ba^{2+}	Cl^-
Barium Nitrate	Ba^{2+}	NO_3^-
Strontium Carbonate	Sr^{2+}	CO_3^{2-}
Strontium Chloride	Sr^{2+}	Cl^-
Strontium Nitrate	Sr^{2+}	NO_3^-
Magnesium Carbonate	Mg^{2+}	CO_3^{2-}
Magnesium Acetate	Mg^{2+}	CH_3COO^-
Magnesium Sulphate	Mg^{2+}	SO_4^{2-}
Ammonium Carbonate	NH_4^+	CO_3^{2-}
Ammonium Chloride	NH_4^+	Cl^-
Ammonium Bromide	NH_4^+	Br^-
Ammonium Iodide	NH_4^+	I^-

<i>Name of the Salt</i>	<i>Basic Radical</i>	<i>Acid Radical</i>
Copper Sulphate	Cu^{2+}	SO_4^{2-}
Ferrous Sulphate	Fe^{2+}	SO_4^{2-}
Manganese Chloride	Mn^{2+}	Cl^-
Cobalt Nitrate	Co^{2+}	NO_3^-
Nickel Carbonate	Ni^{2+}	CO_3^{2-}
Cobalt Acetate	Co^{2+}	CH_3COO^-
Copper Phosphate	Cu^{2+}	PO_4^{3-}

Ammonium Nitrate	NH_4^+	NO_3^-
Ammonium Sulphate	NH_4^+	SO_4^{2-}
Ammonium Phosphate	NH_4^+	PO_4^{3-}

Copper Acetate	Cu^{2+}	CH_3COO^-
Manganese Sulphate	Mn^{2+}	SO_4^{2-}
Cobalt Sulphate	Co^{2+}	SO_4^{2-}
Copper Chloride	Cu^{2+}	Cl^-
Nickel Sulphate	Ni^{2+}	SO_4^{2-}
Copper Carbonate	Cu^{2+}	CO_3^{2-}

Module 5

1. Safety rules to be followed in Labs

- a) Handle corrosive chemicals like acids with care.
- b) To dilute an acid, add acid drop wise to the required amount of water with constant stirring. Never put water to acid during the dilution process.
- c) Always wipe off quickly, liquids that are split on the workbenches or on the filter stand paying special attention to strong acids which should be neutralised with sodium carbonate solution before removal.
- d) Never handle chemicals with your fingers, always use a spatula.
- e) When the burner is not being used, lower the flame. As soo as the day's work is over close the gas tap.
- f) Thoroughly clean the apparatus to be used.

- g) Handle the glass apparatus very carefully
- h) Dispose off all waste liquids in the sink and allow the water to run for sometime by opening the water tap.
- i) Never taste any chemical. It may be poisonous.
- j) Do not keep the reagents bottles open.
- k) Do not bring inflammable liquids such as alcohol, ether, etc. near the flame.

2. Accidents

In case of accidents, while inside the laboratory, call or notify the member of staff who is in charge of the day's work.

1. *Clothing on fire*: Wrap the person in a heavy blanket or wet gunny bag.
2. *Fire while burning of reagents*: Extinguish gas burners in the vicinity. Small fires may be smothered by covering the opening with asbestos sheets, wire gauzes or wet towel.
3. *Acid on clothing*: Neutralise with dilute NH_4OH . Then wash thoroughly with water.
4. *Alkali on clothing*: Neutralise with dilute acetic acid. Then wash thoroughly with water.
5. *Acid in eye*: Wash thoroughly with running water. Bathe the eye with a 2% sodium bicarbonate solution using an eyecup. Dry with sterile gauze and put several drops of olive oil into the eye.
6. *Alkali in eye*: Wash thoroughly with running water. Bathe the eye with Boric Acid solution. Dry, and drop olive oil into the eye.
7. *Ordinary Heat burns*: Don't use water. Apply Sodium Bicarbonate Vaseline paste or Burnol and consult a doctor.
8. *Acid burns*: Wash first with running water and then with Sodium Bicarbonate solution. Cover with solid Sodium Bicarbonate for 10 minutes. Wash off and apply Carron oil (an equal mixture of linseed oil and lime water).
9. *Alkali Burns*: Wash first with running water and then with Boric Acid solution. Cover with powdered Boric Acid for 10 minutes. Wash off and apply Sodium Bicarbonate Vaseline paste.

10. *Bromine Burns*: Wash with running water and treat at once with a concentrated solution of Sodium Thiosulphate. Dry and apply Carron Oil.
11. *Bromine or Chlorine poisoning*: Inhale alcohol. Remove to open air.
12. *Cuts*: Remove particles of glass, if any are present. Wash the wound with water. Then apply tincture of iodine and cover with a sterile bandage.

Poisoning

- (a) *By strong acid*: Give plenty of water. Then give 2tablespoons of lime water.
- (b) *By caustic alkalis*: Give plenty of water. Then give orange or lemon juice.
- (c) *By Copper Sulphate*: Immediately give a tablespoon of common salt or Zinc Sulphate in a tumbler of warm water.
- (d) *By Mercury salts*: Give plenty of warm water and induce vomiting.
- (e) *By Arsenic or Antimony salts*: Give large quantities of freshly precipitated Ferric Hydroxide or Magnesium Hydroxide or Castor oil mixed with milk or white of egg.

Inhalation of Gas

- (a) *By Chlorine or Bromine*: Inhale Ammonia or Alcohol vapour.
- (b) *By Carbon Monoxide*: Inhale open fresh air.
- (c) *By Nitrous fumes*: Inhale plenty of fresh air and hot and cold douche.
- (d) *By Chloroform*: Inhale plenty of fresh air. Apply hot and cold douche.
- (e) *By Hydrogen Sulphide or Hydrogen Cyanide*: Inhale Ammonia; give artificial respiration; Apply warm and cold douches to head.

3. General Instructions

1. The Lab attender should be present in the Lab during the practical class.
2. They should know the experiment to be conducted on that day, and set up and arrange all the apparatus and chemicals for that purpose.

3. They should keep the Lab neat and clean.
4. Issue Register should be maintained and should be used while distributing apparatus / articles to students during practical class.
5. Breakage Register should be maintained and breakage of items should be recorded in the required format.
6. Attendance Register should be maintained for the students. The signature of the students who are present should be obtained.
7. Maintenance of Stock Register and procedure for Condemnation should be done.
8. At the end of a practical class, the apparatus / glass wares / chemicals are to be kept back in their appropriate places.
9. All the chemicals and apparatus are to be properly arranged in the working shelves and in the shelves.
10. Repair / Maintenance work in the laboratory has to be done like repairing switches and checking the plug points etc.

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PHYSICS LABAROTORY

MODULE-1

Duties/Responsibilities

1. He/She should be present in the lab during the practical period.
2. He/She should help in maintaining discipline in the lab.
3. He/She should maintain the following registers:
 - (i) Stock register- Consumable & Non consumable articles.
 - (ii) Issue register
 - (iii) Breakages register.
 - (iv) Attendance registers. (to ensure the attendance of the students during practical period).

MODULE-2

IDENTIFICATION OF COMMONLY USED LAB EQUIPMENTS

S.No

Name

Picture

1. Ammeter



2. Voltmeter



3. Galvanometer



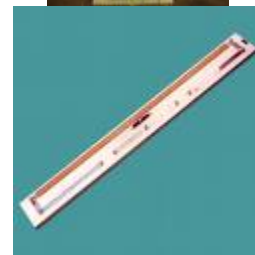
4. Multimeter



5. Potentiometer



6. Meter Bridge



7. Rheostat



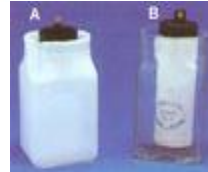
8. Resistance Box



9. Daniel cell



10. Leclanche cell



11. Dry cell



12. Battery eliminator



13. Battery Box



14. Accumulator



15. One way key



16. Two way key (reversing key)



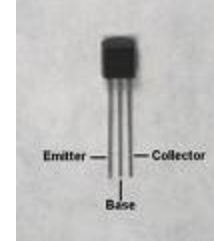
17. Tap key



18. Junction diode



19. Transistor



20. Zener diode



21. Capacitor



22. Carbon Resistor



23. LED,s



24. IC chips



25. Electroscope



26. Step –Down transformer



27. Induction coil



28. Bar magnets



29. Horse shoe magnet



30. Compass needle



31. Electro Magnet



32. Convex lens



33. Concave lens



34. Convex mirror



35. Concave mirror



36. Lens/Mirror holder



37. Glass prism



38. Glass slab



39. Magnifying glass/ Hand lens



40. Optic Bench



41. Stop clock



42. Stop watch



43. Simple Pendulum



44. Sonometer



45. Parallelogram law apparatus



46. Resonance column apparatus



47. Travelling microscope



48. Inclined plane



49. Double inclined plane



50. Beam Balance



51. Spring Balance



52. Electronic Balance



53. Slotted weights



54. Weight Box



55. Tuning Fork



56. Screw Gauge



57. Vernier callipers



58. Spherometer



59. Slinky



60. Helical Spring apparatus



61. Capillary tube



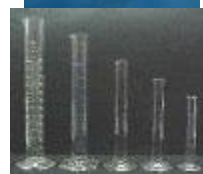
62. Beakers



63. Round Bottom flask



64. Measuring cylinder



65. Overflow can



66. Searle's apparatus



67. Thermometers



68. Barometer



69. Pulleys



70. Hanger weights



MODULE-3&4 (HANDS ON)

EXPERIMENTAL SET UPS (A FEW ILLUSTRATIONS)

Ohm's Law

Aim:

To determine resistance per cm of a given wire by plotting a graph of potential difference versus current.

Apparatus:

A resistance wire, a voltmeter and an ammeter of appropriate range, a battery, a rheostat, a metre scale, one way key, connecting wires and a piece of sand paper.

Arrangement Diagram:

Metre Bridge – To Determine Specific Resistance

Aim:

To find resistance of a given wire using metre bridge and hence determine the specific resistance of its material.

Apparatus:

A metre bridge, a Leclanche cell, a galvanometer, a resistance box, a jockey, a one way key, a resistance wire or resistance coil, a screw gauge, a metre scale, sand paper and connecting wires.

Arrangement Diagram:

MODULE-5

Nature of the work to be done in the lab:-

1. Maintaining the lab neat and clean- the main lab, the store, the furniture and the articles.
2. Arranging the articles/equipments in a systematic way.
3. Displaying the list of articles/equipments kept in various shelves.
4. Checking the condition (working/not working) of the devices, especially those used in electric circuits.
5. Assisting the teacher concerned in the practical period whenever required.
6. Issuing the articles to the students and getting their signature.
7. Keeping the articles (experiment wise) ready before the commencement of practical.
8. Taking back the used articles and keep them in respective places after practical.
9. Reporting and recording the breakages if any, in the breakage register.
10. Getting the counter signature from the head of the institution in the stock register for each entry.

-prepared by

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