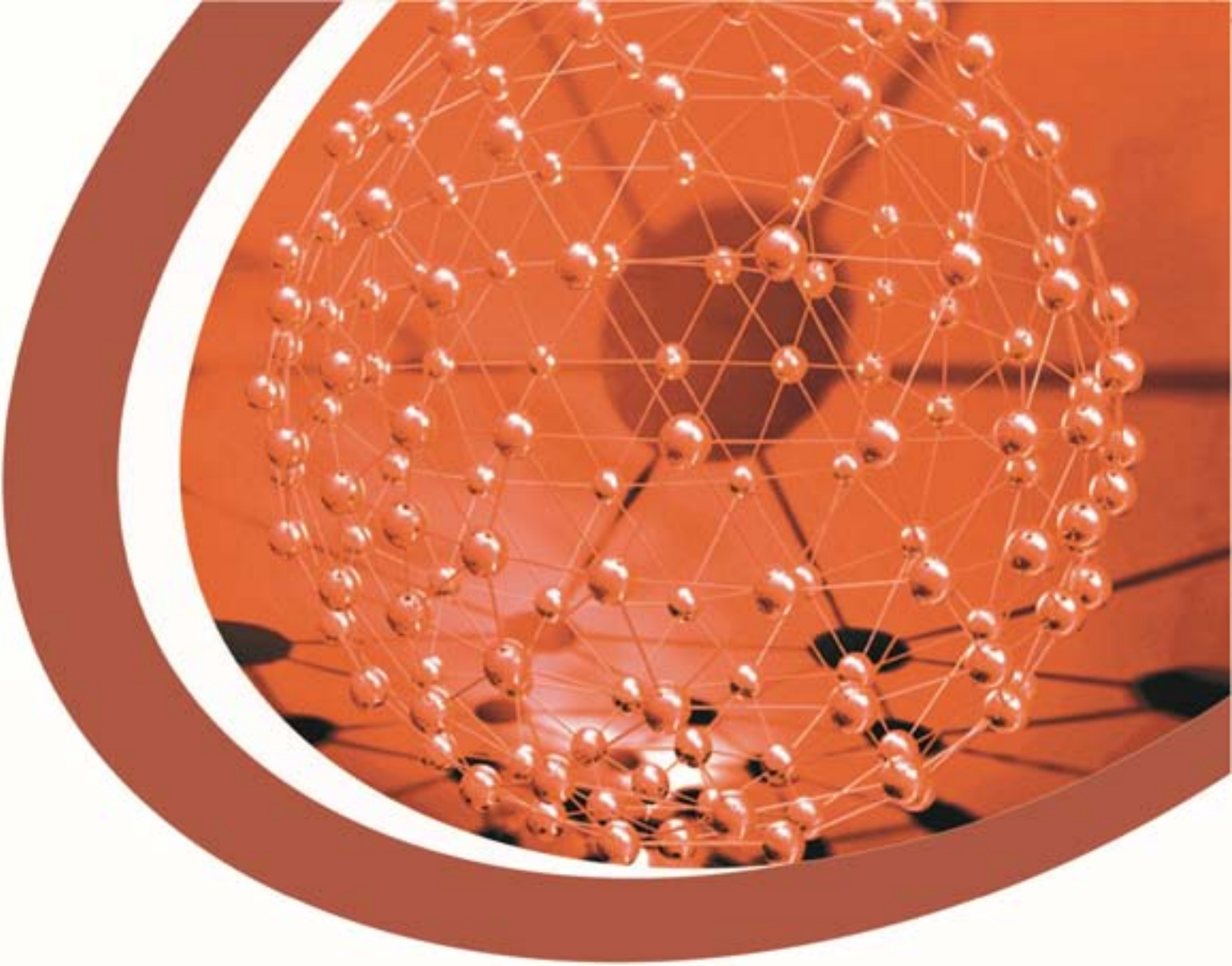

Saraswati

LAB MANUAL

CHEMISTRY

NEW SARASWATI HOUSE

11

Strictly in accordance with the latest core syllabus

Saraswati

LAB MANUAL
CHEMISTRY

FOR CLASS XI

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ISBN: 978-81-7335-550-9

SYLLABUS

Marks: 30 **Periods: 60**

Evaluation Scheme for Examination

Volumetric Analysis	8 Marks
Salt Analysis	8 Marks
Content Based Experiment	6 Marks
Project Work	4 Marks
Class Record and Viva	4 Marks
Total	**30 Marks**

Micro-chemical methods are available for several of the practical experiments. Wherever possible such techniques should be used.

Total Periods 60

Basic Laboratory Techniques **(Periods 2)**

(a) Cutting a glass tube and glass rod.
(b) Bending of a glass tube.
(c) Drawing out a glass jet.
(d) Boring a cork.

Characterization and purification of chemical substances **(Periods 6)**

(a) Determination of melting point of organic compound
(b) Determination of boiling point of organic compound
(c) Crystallization involving impure sample of any one of the following:
Alum, Copper sulphate, Benzoic acid.

Experiments based on pH **(Periods 6)**

(a) Anyone of the following experiments:
- Determination of pH of some solutions obtained from fruit juices, solutions of known and varied concentrations of acids, bases and salts using pH paper or universal indicator.
- Comparing the pH of solutions of strong and weak acid of same concentration.
- Study the pH change in the titration of a strong base using universal indicator.

(b) Study of pH change by common-ion in case of weak acids and weak bases.

Chemical equilibrium **(Periods 4)**

One of the following expriments:
(a) Study the shift in equilibrium between ferric ions and thiocynate ions by increasing/decreasing the concentration of either ions.
(b) Study the shift in equilibrium between $[Co(H_2O)_6]^{2+}$ and chloride ions by changing the concentration of either of the ions.

Quantitative estimation **(Periods 16)**

(a) Using a chemical balance.
(b) Preparation of standard solution of oxalic acid.
(c) Determination of strength of a given solution of sodium hydroxide by titrating it against standard solution of oxalic acid.
(d) Preparation of standard solution of sodium carbonate.
(e) Determination of strength of a given solution of hydrochloric acid by titrating it against standard sodium carbonate solution.

Qualitative analysis **(Periods 16)**

(a) Determination of one anion and one cation in a given salt :
Cations — Pb^{2+}, Cu^{2+}, As^{3+}, Al^{3+}, Fe^{3+}, Mn^{2+}, Ni^{2+}, Zn^{2+}, Co^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Mg^{2+}, NH^{4+}
Anions — CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$, CH_3COO^-
Note : Insoluble salts excluded.
(b) Detection of nitrogen, sulphur, chlorine in organic compounds.

Project **(Periods 10)**

Scientific investigations involving laboratory testing and collecting information from other sources.

A Few Suggested Projects

(a) Checking the bacterial contamination in drinking water by testing sulphide ions.
(b) Study of the methods of purification of water.
(c) Testing the hardness, presence of iron, fluoride, chloride, etc. depending upon the regional variation in drinking water and the study of causes of presence of these ions above permissible limit (if any)
(d) Investigation of the foaming capacity of different washing soaps and the effect of addition of sodium carbonate on them.
(e) Study of the acidity of different samples of the tea leaves.
(f) Determination of the rate of evaporation of different liquids.
(g) Study of the effect of acids and bases on the tensile strength of fibres.
(h) Study of acidity of fruit and vegetable juices.

Note: Any other investigatory project, which involves about 10 periods of work, can be chosen with the approval of the teacher.

CONTENTS

1 CHEMISTRY LABORATORY

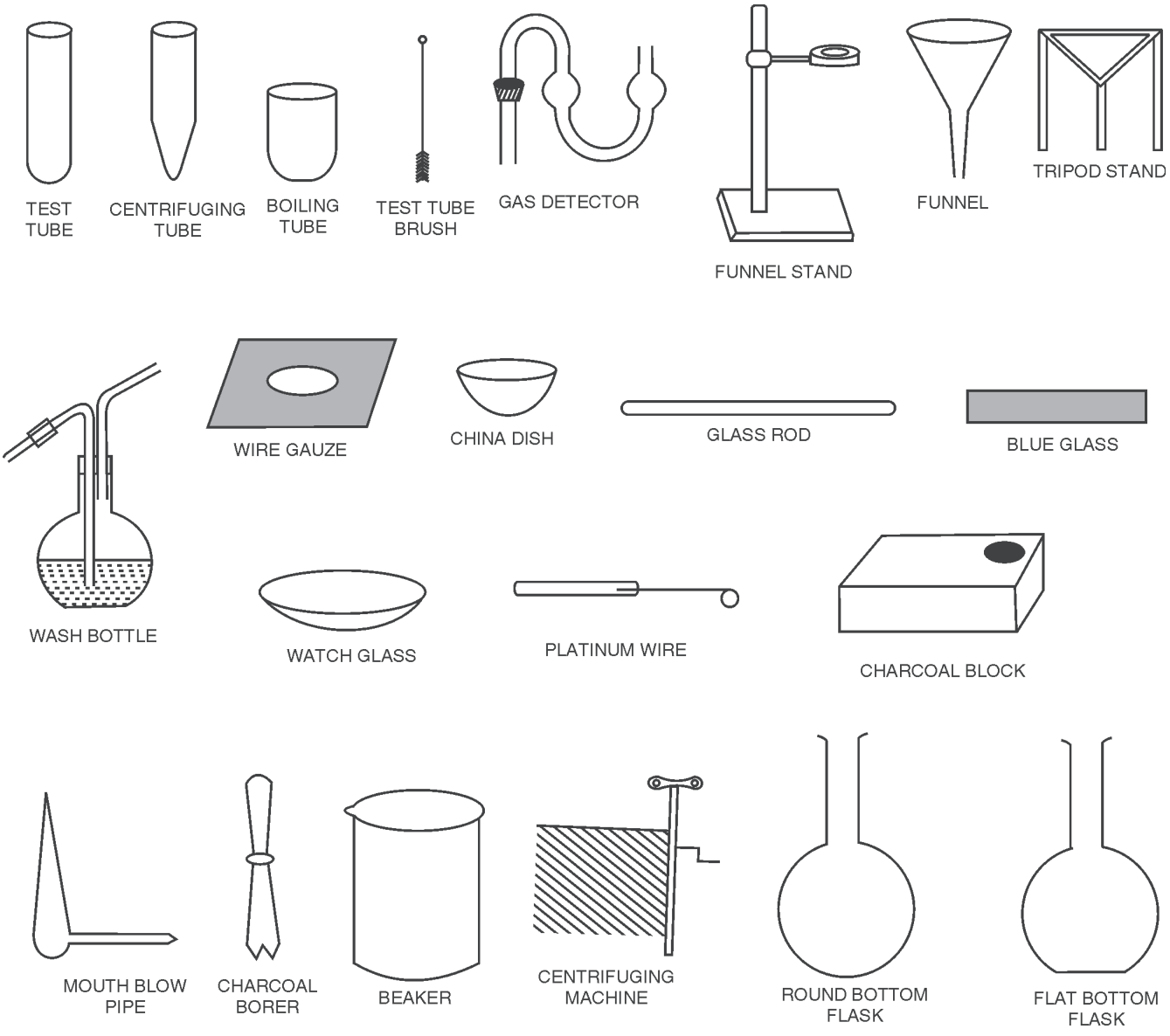
Chemistry is science of experiments. Scientific concepts can be easily understood by performing experiments. Laboratory experiments are being influenced by the modern techniques and electronic devices and there is adequate blending of information and communication technology and practical laboratory experiments.

A chemistry laboratory is a place where experiments in chemistry are performed. A student need to understand the proper way of working in chemistry laboratory. A student must know the proper use of each equipment and the precautions to be observed while working in the laboratory.

A brief introduction of important features of every chemistry laboratory, some safety and laboratory rules are as follows:

1. **Lab Coat.** A student must bring white lab coat made of cotton up to proper length (below knees).
2. **Observation Notebook.** A student must bring a notebook for writing brief notes about experiment, observations, inferences, write experiment number, date of performing the experiment, aim of experiment and materials required before writing observations.

COMMON LABORATORY APPARATUS



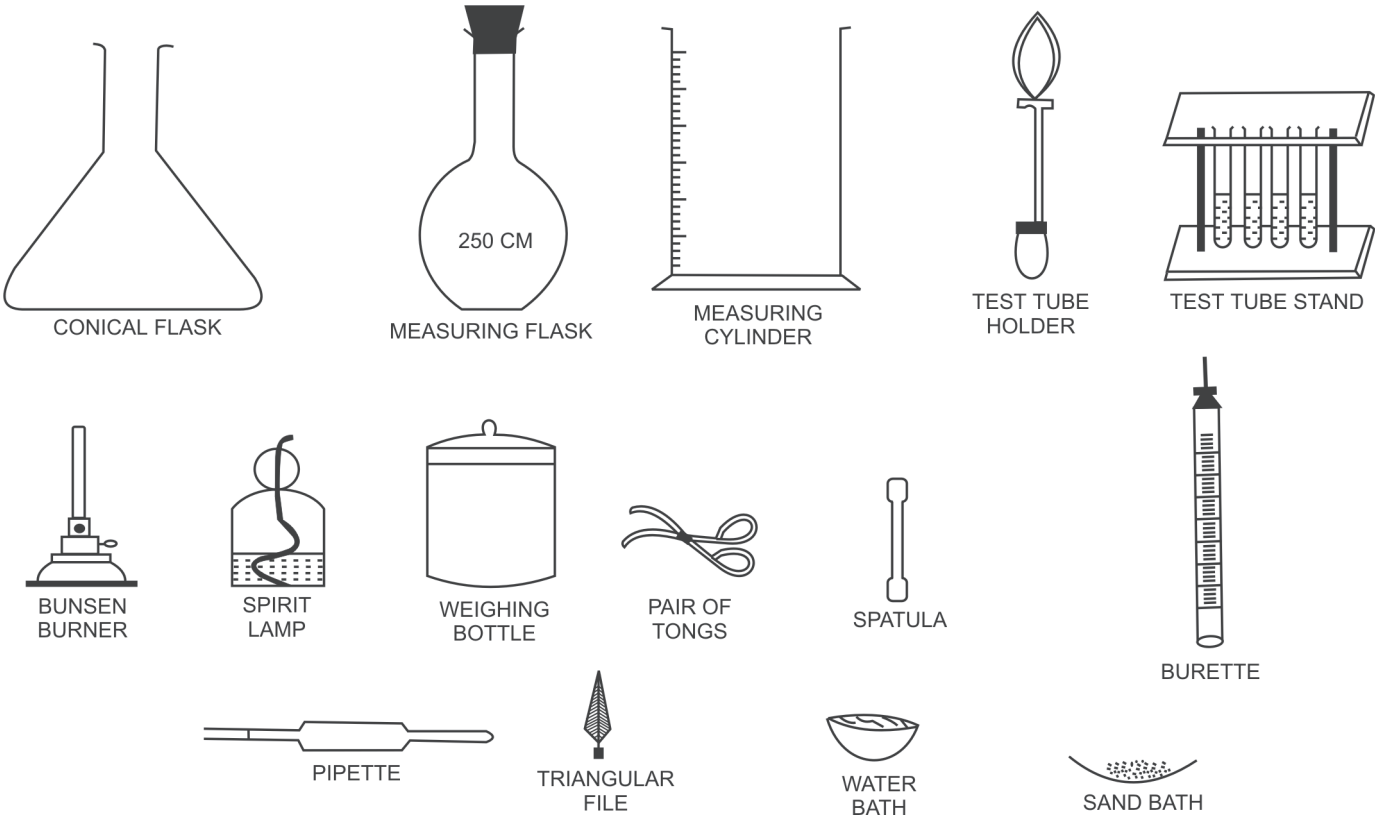


Fig. 1.1 COMMON LABORATORY APPARATUS USED IN CHEMISTRY LABORATORY

The students can work in laboratory and do experiments if they are familiar with the apparatus commonly used in the laboratory. Some such apparatus are shown in Fig 1.1 and described as follows:

1. **Test tube.** It is glass tube closed at one end. It is used for carrying out reactions and various tests.
2. **Centrifuging tube.** It is triangular at the bottom and used for obtaining precipitate if centrifuging machine is available. It will save time required for filtration.
3. **Boiling tube.** It is bigger in size than the test tube for carrying out various tests where strong heating of substances is required. It is made up of hard glass or pyrex glass.
4. **Test tube brush.** It is used for cleaning test tube.
5. **Gas detector.** It is U-shaped tube as shown in diagram and is very useful for detecting a gas evolved.
6. **Funnel stand.** It is a stand having circular clamp to hold the funnel. If it is not available, tripod stand can be used.
7. **Funnel.** It is cone shaped wide glass tube drawn into long narrow neck. It is used for filtration purpose or for pouring liquids into narrow mouthed reagent bottles.
8. **Wash bottle.** It is made of plastic or glass as shown in above diagram. It has jet through which water can be used under pressure for washing or dissolving purposes. Distilled water should be used for purpose of dissolving.
9. **Tripod stand.** It is made of cast iron and is used as a support for heating beakers, porcelain dishes etc. which are placed over a wire gauze placed over tripod stand. It can also be used as funnel stand.
10. **Wire gauze.** It is a gauze made of fine iron wires fitted with a thin asbestos sheet in the centre. It helps in heating the glass apparatus evenly and, therefore, reduces the chances of breakage.
11. **China dish or Porcelain dish.** It is shallow bowl of porcelain as shown above in figure. It is used for heating or evaporation of substances. It should also be heated on wire gauze.
12. **Glass rod.** It is a cylindrical thin stick of glass. It is used for stirring solutions or mixing of substances.
13. **Blue glass.** It is blue coloured glass strip so as to see the colour of flame produced by inorganic salts.
14. **Watch glass.** It is made of glass having concave shape. It is used for weighing accurate amount of solids with the help of chemical balance.
15. **Platinum wire.** It is used for performing flame tests in qualitative analysis.
16. **Charcoal block.** It is made up of charcoal. It is used for charcoal cavity test.
17. **Mouth blow pipe.** It is made up of iron. It is used to direct the flame towards the cavity in the charcoal cavity test.
18. **Charcoal borer.** It is made up of iron. It is used to make cavity in charcoal.

19. **Beaker.** It is flat bottomed cylindrical vessel made up of glass with a beak. These are available in various capacities generally 50 ml, 100 ml, 250 ml, 500 ml and 1000 ml. Beaker is used for storing, mixing and heating of substances.
These days, plastic beakers are also being used but they should not be heated. Oxidizing agents and organic solvents cannot be stored in them.
20. **Glass tube.** It is hollow thin cylindrical tube made of glass. It is used for transporting liquids or gases.
21. **Round bottom flask.** It is made up of glass having round bottom and a long narrow neck. It is used in the experiments where reaction requires heating of substances.
22. **Flat bottom flask.** It is made up of glass having a round body which is flat at the bottom and a long narrow neck. It is used for storing solution or carrying out reactions in cold.
23. **Conical flask.** It is made up of glass having conical shape. It is usually used for carrying out titrations. It can be heated if made up of corning or borosil glass.
24. **Measuring cylinder.** It is graduated glass cylinder used for the approximate measurement of volume of liquids. They are available in capacity of 10 ml, 50 ml, 100 ml and 250 ml.
25. **Air condenser.** It is about 50 cm long glass tube with a wide mouth at one end. It is used for condensing vapours to liquid, but only for those substances whose boiling points are more than 150°C.
26. **Water condenser.** It is long glass tube surrounded by outer glass jacket which has two openings, one is inlet which is connected to the tap and outlet through which water goes out to the sink with the help of rubber pipe. It is used for condensing vapours into liquid form.
27. **Dropper.** It is a short glass tube drawn into a fine jet at one-end and fixed with a rubber teeth on the other. It is used for pouring of solution in drops.
28. **Test tube holder.** It is for holding the test tube during heating. It is made up of metal strip or thick wire. It must be used while heating.
29. **Iron stand.** It is long iron rod mounted on a heavy iron base. It is used to hold, support or suspend such apparatus which would fall otherwise. A ring or clamp with boss of iron or brass is used to fix the apparatus with the iron rod of the stand.
30. **Triangular file.** It is long triangular shape rod made of hard alloy steel having a series of ridges on its surface. It is used for reducing or smoothing surfaces of glass, rubber corks, wood, metals etc.
31. **Sand bath.** It is flat plate of iron containing sand. It is used when heating is to be done slowly and uniformly.
32. **Water bath.** It is copper vessel and is used for heating at low temperature. It limits the temperature to the boiling point of water. If an oil is used in place of water, it is called oil bath which is used for heating at higher temperature.
33. **Test tube stand.** It is made of wood or plastic and is used for keeping test tubes. There are wooden or plastic pegs fitted on the stand and are used to keep the clean test tube upside down.
34. **Spatula.** It is a sort of spoon made of plastic, nickel or steel. It is used to transfer powdered or solid substances.
35. **Centrifuging.** It is used for separating precipitate. It is used to save time required for filtration.
36. **Pair of tongs.** It is used to hold hot china dish. It is made up of steel or iron.
37. **Burette.** It is made up of glass. It is long graduated tube from 0 to 50 having least count 0.1 ml having a knob at the bottom so as to regulate the flow of liquid. It is used in titration.
38. **Pipette:** It is used to measure fixed volume of solution by sucking and controlling with the help of finger up to the mark. It is available in capacities of 10 ml, 20 ml and 25 ml.
39. **Weighing bottle.** It is small bottle made up of glass having a lid. It is used for weighing small amount of liquids.
40. **Spirit lamp.** It is used for heating purposes at the places where gas burners are not available. It can be used in class room for demonstration purposes. It is made up of glass or iron, having a cotton wick dipped in spirit. It can not be used for strong heating. It should be handled with care.

VIVA VOCE QUESTIONS

Q1. When would you use lab coat?
Ans. Lab coat is used while doing experiments in chemistry laboratory.
Q2. Which colour lab coat should be used?
Ans. White.
Q3. Why?
Ans. It does not absorb heat.
Q4. When will you switch on exhaust fan?
Ans. When there are fumes in the lab, we switch on exhaust fan.
Q5. When would you make use of fume cupboard?
Ans. It is used while performing experiments in which poisonous gases or vapours are evolved.
Q6. Should we taste chemicals in the laboratory?
Ans. No, chemicals should never be tasted. They may be poisonous and thus harmful.

Q7. What will you do if your skin comes in contact with acid?
Ans. Wash it with running water continuously, then apply Burnol.
Q8. What will you do if you inhale a poisonous gas?
Ans. Go out in open air.
Q9. What will you do if your clothes catch fire?
Ans. Lie down on the floor and roll.
Q10. What will you do if you swallow dilute alkali?
Ans. Drink lot of water. Drink lemon juice or orange juice.
Q11. If you get acid in eye, what will you do?
Ans. Wash it thoroughly with running water and then wash it with 10% solution of boric acid and use clean handkerchief.
Q12. Which type of flame is hottest?
Ans. Non-luminous.
Q13. Why?
Ans. It is because it involves complete combustion of fuel.
Q14. What is the colour of luminous flame?
Ans. Yellow.
Q15. Why?
Ans. It is due to presence of unburnt carbon particles which absorb heat and glow.
Q16. On which page of practical file will you write observations?
Ans. Observations must be written on white page in pencil.
Q17. Can we heat beaker or china dish directly on flame?
Ans. No, it should be heated on wire gauze.
Q18. How do we prepare dilute H_2SO_4?
Ans. We add acid to water very slowly with constant cooling.
Q19. Why should we cool NH_3 bottles before opening?
Ans. NH_3 is liquified at high pressure. It should be cooled so as to reduce the pressure, otherwise it may burst.
Q20. Can we touch conc. H_2SO_4?
Ans. No, we should not touch conc. H_2SO_4. It is corrosive.

❑❑

2 BASIC LABORATORY TECHNIQUES

INTRODUCTION

The very first step for performing experiment is to know and collect the materials required for a particular experiment.

The second step is to set the apparatus which involves simple operations like cutting a glass tube and glass rod and rounding off its edges, bending of glass tube at a desired angle, drawing jets, boring holes in corks and fitting glass tube into the bored cork etc.

Students must learn how to perform these operations before taking up other experiments.

EXPERIMENT NO. 2.1

Cutting a Glass Tube

To cut a glass tube and glass rod.

BRIEF THEORY

Numerous experiments in chemistry, *e.g.,* preparation of gases and some solid substance, determination of melting and boiling point of compounds, setting of apparatus for volumetric analysis, etc., require certain basic laboratory techniques which are discussed here.

MATERIALS REQUIRED

Glass tube, glass rod, triangular file, burner and sand paper, asbestos sheet, a wire gauze.

PROCEDURE

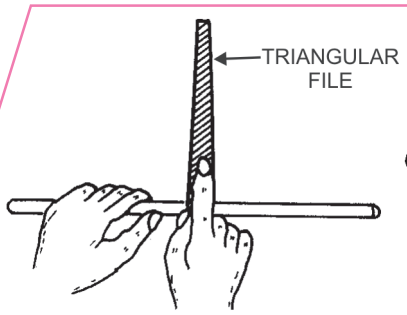


Fig. 2.1 MAKING A GROOVE

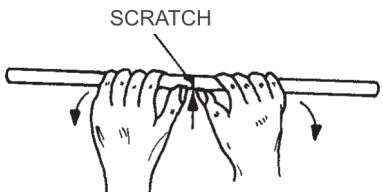


Fig. 2.2 BREAKING THE GLASS-TUBE AT THE SCRATCH

Fig. 2.3 REMOVING THE SHARP SPLINTS

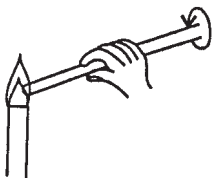


Fig. 2.4 ROUNDING OFF EDGES

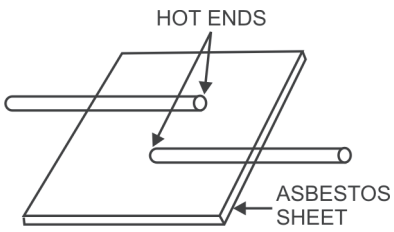


Fig. 2.5 COOLING THE ROUND EDGES

1. Place the glass tubing on the table such that the whole of the tubing is in contact with the top of the table.
2. Make a small mark on the tubing at a desired length with the help of marker.
3. Make a deep scratch on the glass tube at desired length with the help of triangular file on mark, keeping the tubing pressed on the table with left hand as shown in Fig. 2.1. The file should be at right angles to the glass tubing.
4. Hold the above tube with both the hands such that one thumb is on either side of the scratch but on the opposite sides of the scratch (Fig. 2.2). The scratch will be on the side away from you.

   Now slightly press the tube with the thumbs. The tube will break at the scratch.
5. The tube as cut above has sharp edges which may cut the finger or hand if touched, therefore, it needs to be rounded off as follows:

   (*a*) Rub the edges with wire gauze to remove the sharp splints as shown in Fig. 2.3.

   (*b*) Place the ends in the flame of Bunsen burner, keeping the tube rotating as shown in Fig. 2.4.

   (*c*) As soon as the edges start becoming red hot, take it out of flame.

   (*d*) Place it on asbestos sheet for cooling as shown in Fig. 2.5.

TO CUT A GLASS ROD

1. Place a glass rod on the table such that whole of it is in contact with the top of the table.
2. Make a small mark on the glass rod at the desired length with the help of a marker.

3. Make a deep scratch mark on glass rod with the help of triangular file on the mark, keeping the rod pressed on the table with left hand as shown in Fig 2.1. The file should be at right angles to glass rod.
4. Hold the above rod with both the hands such that one thumb is on opposite side of the scratch but on the opposite sides of the scratch (Fig. 2.2). The scratch will be on the side away from you. Now slightly press the rod with the thumbs. The rod will break at the scratch.

PRECAUTIONS

1. The scratch should be made on the glass tube or rod in one single stroke. Do not use file like a saw.
2. The file should be moved always in backward direction.
3. Do not press the file on the tube to such an extent that the tube may smash.
4. If there is difficulty in breaking the glass tube with mild pressure, put another scratch on the earlier point.
5. Do not keep the edges of tube in the flame for very long time, otherwise the end will be sealed.

RESULT

The glass tube and rod have been obtained of desired length.

VIVA VOCE QUESTIONS

Q1. Why do we need to cut a glass tube?

Ans. The tubes available in chemistry lab are usually longer than required, therefore, we need to cut them.

Q2. Can we use knife instead of file?

Ans. No, a knife cannot be used to cut glass tube. It will slip over glass.

Q3. Why should we use triangular file?

Ans. It makes deep scratch on the desired place and helps in cutting the tube easily.

Q4. Mention the various steps which are involved in cutting of a glass tube.

Ans. (*i*) Scratching, (*ii*) Breaking, (*iii*) Heating freshly cut edges in flame and (*iv*) Cooling it on asbestos sheet.

Q5. Why is it necessary to round off freshly cut edges of the glass tube?

Ans. Sharp edges may cause injury.

Q6. Why should hot tube not to be placed on table?

Ans. Table may be cold and sudden change in temperature may lead to breaking of tube.

Q7. Why should we keep the glass tube rotating in the flame?

Ans. It is necessary for heating smoothly. If we heat at one point, the tube may melt.

Q8. Why should we avoid heating sharp edges for long time?

Ans. The tube may be sealed if it is heated for long time.

Q9. Which flame of burner would be produced if air holes are partially open?

Ans. Oxidising flame.

Q10. Name two types of glass tubes which you use in chemistry lab.

Ans. Glass tubes are made up of: (*i*) Soda glass and (*ii*) Pyrex glass.

Q11. What is composition of soda glass?

Ans. Its composition is $Na_2SiO_3 \cdot CaSiO_3 \cdot 4SiO_2$.

Q12. Which glass is used for heating purposes?

Ans. Pyrex glass.

Q13. Name one important component of pyrex glass which makes it heat resistant?

Ans. Borax, $Na_2B_4O_7 \cdot 10H_2O$.

Q14. What is popular name of pyrex glass?

Ans. Borosil or corning glass.

Q15. Can we heat apparatus made up of soda glass?

Ans. No, they will break on heating.

EXPERIMENT NO. 2.2

To bend a glass tube at a given angle.

BRIEF THEORY

We need glass tube for delivery of gases and for carrying out distillation. It is required to be bent at a desired angle depending upon the purpose for which it is to be used.

When we heat a glass tube at a particular place, it becomes soft and can be bent at a desired angle.

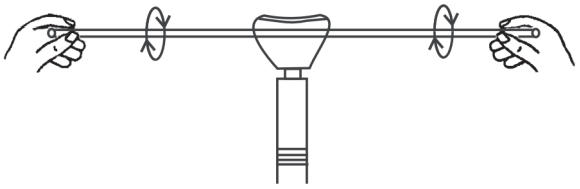


Fig. 2.6 HEATING OF GLASS TUBE

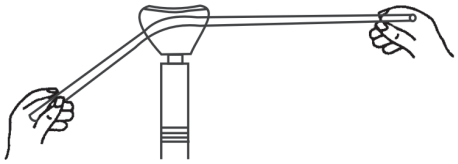


Fig. 2.7 ALLOWING THE TUBE TO BEND UNDER ITS OWN WEIGHT

MATERIALS REQUIRED

Glass tubing, burner, asbestos sheet.

PROCEDURE

1. Draw two lines on the asbestos sheet at angle at which the tube is to be bent.
2. Hold the tube horizontally with both the hands, heat it in the non-luminous part of flame at least 4–5 cm length of the tube, at a point of bending.
3. Keep on rotating the tube with the help of thumbs and fingers while heating the tube so that the tube is heated uniformly from all sides as shown in Fig. 2.6.
4. When the tube starts softening at the point of heating (as felt by hands), keep one side of the tube held firmly in one hand and let the tube bend under its own weight, the second hand simply guiding the direction of bending as shown in Fig. 2.7.
5. Shift the tube immediately on the asbestos sheet while the tube is soft and make the minor adjustments in the bending process so as to get the exact angle of bending according to the lines drawn on asbestos sheet as shown in Fig. 2.8.
6. If whole of the bent tube does not touch the asbestos sheet, press one side of the bent tube while it is soft so that the bent tube lies in one plane.
7. Cool down the bent tube on asbestos sheet. The bent tubes at angle of 60°, 90° and 120° are shown in Fig. 2.9.

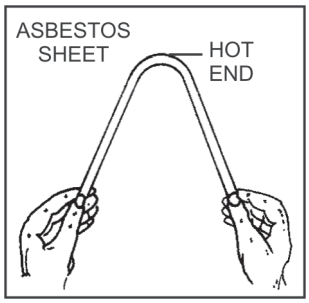


Fig. 2.8 ADJUSTING THE EXACT ANGLE AND MAKING THE BENT TUBE COPLANAR

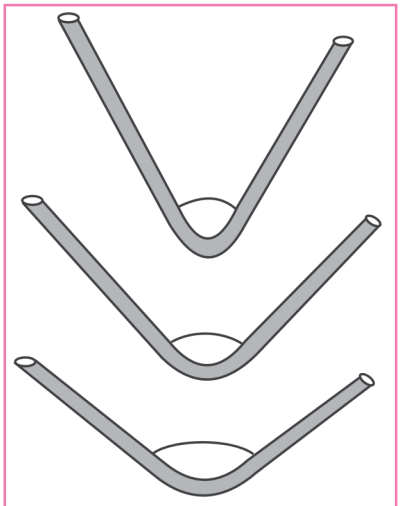


Fig. 2.9 BENT TUBES AT 60°, 90° AND 120°

PRECAUTIONS

1. Heat at least 4-5 cm length of the tube at the point of bending.
2. Keep on rotating the tube while being heated.
3. Do not bend the tube by force. Let it bend under its own weight.
4. If the tube becomes hard, not even a slightest pressure is to be applied to bend it or set it, otherwise it may break.
5. Do not place the hot bent tube on the cold table, otherwise it may break.

RESULT

The glass tube has been bent at the desired angle.

VIVA VOCE QUESTIONS

Q1. Why should we draw lines on asbestos sheet?
Ans. It helps in bending the tube at the exact angle which is required.
Q2. Why is sudden cooling of hot part of the tube not advisable?
Ans. It may break on sudden cooling.
Q3. Why is red hot glass tube bent slowly?
Ans. If it is not bent slowly, the uniformity in shape will not be attained.
Q4. Why do we keep on rotating the glass tube while heating?
Ans. It is done so that tube is uniformly heated from all sides.
Q5. Why should we not apply the force when the tube becomes hard?
Ans. It is because the tube will break, when we apply pressure when the tube is hard.
Q6. Why should we not put the hot tube on table?
Ans. It is because table may be cold and sudden cooling may result in breaking of the tube.

EXPERIMENT NO. 2.3

To draw a jet.

BRIEF THEORY

A glass tube, when heated at the centre, it becomes soft and can be drawn into the jet.

MATERIALS REQUIRED

Glass tubing, burner, asbestos sheet, triangular file.

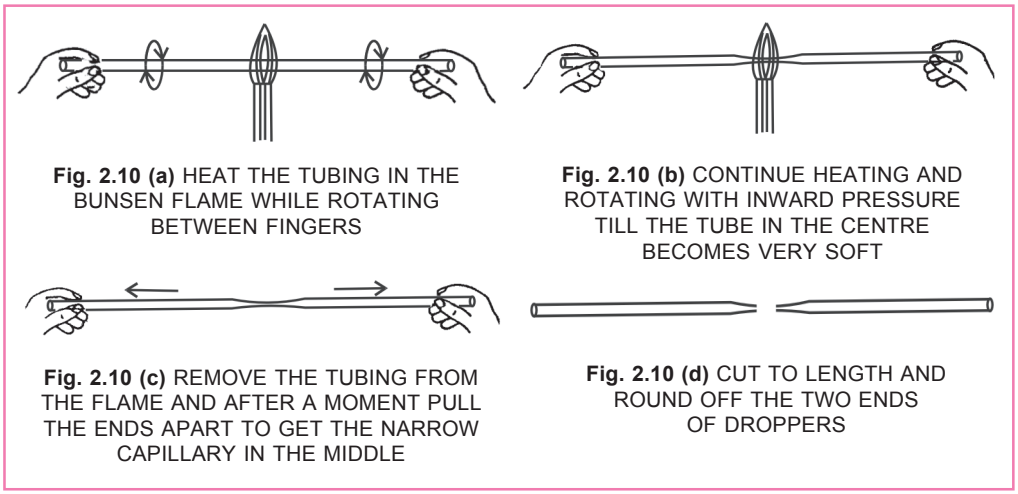


Fig. 2.10 (a) HEAT THE TUBING IN THE BUNSEN FLAME WHILE ROTATING BETWEEN FINGERS

Fig. 2.10 (b) CONTINUE HEATING AND ROTATING WITH INWARD PRESSURE TILL THE TUBE IN THE CENTRE BECOMES VERY SOFT

Fig. 2.10 (c) REMOVE THE TUBING FROM THE FLAME AND AFTER A MOMENT PULL THE ENDS APART TO GET THE NARROW CAPILLARY IN THE MIDDLE

Fig. 2.10 (d) CUT TO LENGTH AND ROUND OFF THE TWO ENDS OF DROPPERS

PROCEDURE

1. Take a glass tubing about 30 cm long.
2. Round off the edges of the tube.
3. Hold the tube horizontally.
4. Heat the glass tube in the middle by holding the tube on both sides.
5. Rotate the tube slowly until the portion which is kept on the flame becomes red hot and soft as shown in Fig. 2.10 (*a*) and Fig. 2.10 (*b*).
6. Remove the tube from the flame and pull the ends apart slowly and smoothly until the centre has become narrow and then stretch into fine jet as shown in Fig. 2.10 (*c*).
7. Cut the tube from the middle with the help of triangular file and make the jet uniform as shown in Fig. 2.10 (*d*).
8. Smooth it by rubbing with sand paper or by heating the cut part gently on the flame.

PRECAUTIONS

1. Do not heat glass tube at one point. Keep on rotating the tube.
2. Take a long glass tube (about 30 cm) for drawing out a jet so that hands do not get burnt.
3. Diameter of the tube for drawing out a jet should be appropriate.
4. Keep your face away while filing and breaking the glass tube.
5. While drawing out a jet, the pulling of the two ends of the red hot glass tube should be done slowly.

RESULT

A jet has been prepared from the glass tubing.

EXPERIMENT NO. 2.4

Boring a cork

To bore a hole in the cork and fit a glass tube in the hole and to fit this assembly into the mouth of a flask.

BRIEF THEORY

A borer of suitable size is used to make a hole in cork so that a glass tube can be inserted into it for the delivery of gases or for distillation purposes.

MATERIALS REQUIRED

A cork, a cork presser, a cork borer set, glass tubing, flask, NaOH solution, water.

PROCEDURE

(i) **Selection of a proper cork.** Select a cork which is free from cracks and holes having a size such that the narrow end when pressed gently into the mouth of the flask fits one fourth of it into the flask as shown in Fig. 2.11(*a*).

(ii) **Wetting and Pressing.** Wet the cork with water and press it on the cork presser as shown in Fig. 2.11(*b*). Lift the handle and then slip the cork into it and then lower the handle. The cork will be pressed. To take out the cork lift the handle again.
If the cork presser is not available, the wetted cork may be wrapped in a piece of cloth and then pressed by rolling under the shoes as shown in Fig. 2.12.

(*iii*) Selection of a proper borer. Select the borer of diameter slightly less than that of the outer diameter of the glass tubing to be fitted (Fig. 2.13).

(*iv*) Boring the hole in the cork:

1. Place a rubber cork on the table with its small end in the upward direction as shown in Fig. 2.14(*a*).
2. Hold the cork with the left hand and put a suitable borer dipped in NaOH solution in a position where hole is to be drilled.
3. Hold the borer vertically and drill the cork by rotating the borer and applying the pressure gently.
4. Add a few drops of dilute NaOH solution into the boring tube to make the boring smooth and quicker.
5. Boring of cork should be done from both sides of the cork as shown in Fig. 2.14(*b*) so that the bore is vertical as shown in Fig. 2.15(*a*).

Fig. 2.11(a) SELECTION OF A PROPER CORK

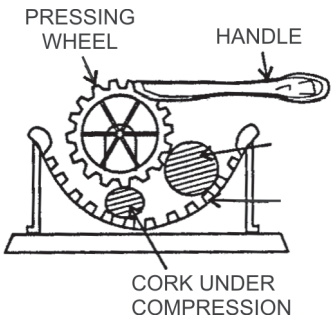


Fig. 2.11(b) PRESSING THE WETTED CORK IN A CORK PRESSER

(*v*) Fitting the glass tube in the bore:

1. Wet the cork with water.
2. Wet the end of the tube which is to be inserted in the bore with water.
3. Hold the tube closely from the wetted end in the right hand with a handkerchief.
4. Hold the cork in the left hand.
5. Insert the tube into the bore giving a rotatory motion slowly as shown in Fig. 2.16(*a*).
6. The hole of rubber cork should be dipped in caustic soda or glycerine so as to make rubber cork soft and then glass tube should be inserted.

Fig. 2.12 PRESSING THE WETTED CORK UNDER THE SHOES

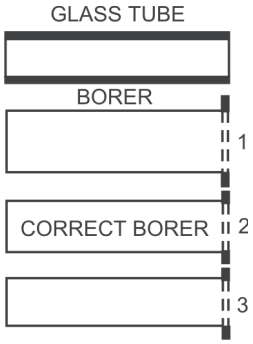


Fig. 2.13 PROPER SELECTION OF THE BORER

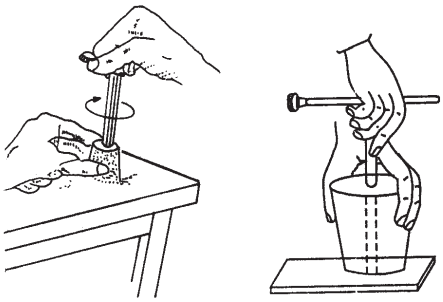


Fig. 2.14 BORING OF CORK

PRECAUTIONS

1. Select a cork of appropriate size.
2. The cork should be free from cracks and holes.
3. It is essential to make marks on both the sides of the cork and the circular marks must be exactly opposite to each other.
4. Select the borer of suitable size, slightly less than the diameter of the hole.
5. The boring should be done vertically downward.

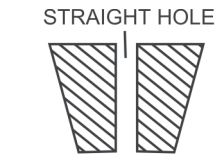


Fig. 2.15(a) RIGHT HOLE IN CORK

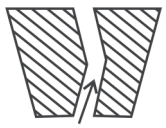


Fig. 2.15(b) WRONG HOLE

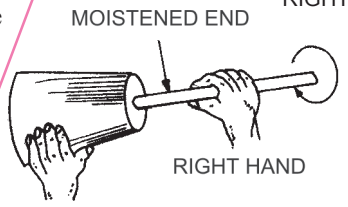


Fig. 2.16(a) CORRECT HOLDING OF THE TUBE FOR INSERTING THE TUBE INTO HOLE OF CORK

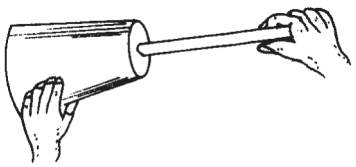


Fig. 2.16(b) WRONG HOLDING OF THE TUBE FOR INSERTING INTO HOLE OF THE CORK

RESULT

A cork has been bored and a tube has been inserted into it.

Cleaning of Glass Apparatus

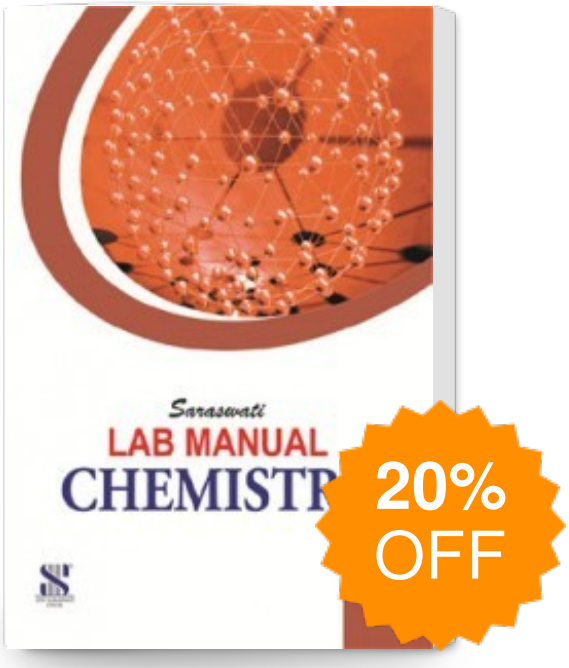
We can get accurate results if glass apparatus are cleaned properly before use. Water is generally used for cleaning but sometimes water alone does not serve the purpose if the apparatus has dirt, grease, spots. It should be rinsed with conc. HCl or conc. HNO_3. Then it should be washed with running water under the tap. Chromic acid, prepared by dissolving 5 g of $K_2Cr_2O_7$ in 100 g of sulphuric acid is best for removing grease and dirt. Leave the apparatus in chromic acid and then clean it in running water. **Do not touch chromic acid as conc.H_2SO_4 is corrosive.**

VIVA VOCE QUESTIONS

Q1. Why is NaOH solution used for boring of a rubber cork?
Ans. It is used so as to make it soft and make boring smooth and quicker.
Q2. Why is it necessary to put marks on both the sides of the cork?
Ans. It is done so as to get a vertical hole.
Q3. Why is boring of cork essential from both the sides?
Ans. It is done so as to get smooth hole.
Q4. What is meant by striking back of Bunsen burner?
Ans. When there is too much of air or less of gas, the flame travels down and gases burn at the nozzle near the base. This is known as striking back at the nozzle near the base.
Q5. What do you do when striking back of burner take place?
Ans. First step is to put off the burner. Let it cool and then light it carefully again, keeping the air holes partially opened.
Q6. Why is bunsen burner provided with air holes?
Ans. Air is required for complete combustion of fuel so as to get non-luminous flame, therefore air holes are provided.
Q7. Which type of flame do we use mostly for heating purposes?
Ans. Oxidising or non-luminous flame is used for heating purpose.
Q8. Why do we use oxidising flame for heating purpose?
Ans. It is because it has highest temperature.
Q9. Why should we avoid multiple scratches on tube for cutting purpose?
Ans. This will give irregular cut.
Q10. Why should we not keep the freshly cut end of the tube in the flame for long time while rounding off the edges?
Ans. The open end of the tube will become soft and will get deformed or sealed if heated for long time.
Q11. Why is reducing flame not used for heating?
Ans. It has lower temperature and a soot will be deposited on the apparatus.
Q12. Why do we select a tube for bending which is neither too thin nor too thick?
Ans. It is because thin tube will break easily whereas thick tube will not bend easily and will take more time.
Q13. Why is soot deposited when glass tube is heated in reducing flame?
Ans. It is due to deposition of unburnt carbon particles which are formed as incomplete combustion of fuel takes place in limited supply of air.
Q14. Why is broad flame used for bending of a glass tube?
Ans. It is because if narrow flame is used, folds are formed at the bend.
Q15. Why is cork moistened and pressed before boring?
Ans. It is done so as to avoid cracking and to get smoother bore.
Q16. What is meant by spoiled bend?
Ans. If the bend tube does not lie in the one plane, the bend is called spoiled bend.
Q17. Can we use round file for cutting a glass tube? Give reason.
Ans. No, round file cannot be used for the purpose because round file would not give a sharp cut.
Q18. How is the bent tube made coplanar?
Ans. It is done by placing it on an asbestos sheet and pressing it in such a way that whole of it touches the sheet.
Q19. While inserting the glass tube into bored cork, why should glass tube be held close to the cork?
Ans. Otherwise, it may break which may cause injury.
Q20. What is wash bottle?
Ans. A wash bottle is container of distilled water with the help of which a fine stream of water can be obtained for washing the precipitate or for making a solution.
Q21. Why should all connections be airtight?
Ans. If connections are not airtight, there will be leakage of water and air blown will not exert pressure to bring water out.
Q22. Which is better: glass wash bottle or polythene wash bottle? Why?
Ans. Polythene wash bottle is better because it does not break.
Q23. What is the disadvantage of polythene wash bottle?
Ans. It should be kept away from the flame otherwise it may melt or catch fire.
Q24. Why should round file not be used for cleaning a bore?
Ans. It may increase the size of the bore.
Q25. Which borer is of right size for boring?
Ans. The borer whose outer diameter is equal to inner diameter of the glass tube.

❑❑

Saraswati Lab Manual Chemistry Class-XI



Publisher : SChand Publications ISBN : 9788173355509 Author : R. P. Manchanda