

# CURRICULUM FOR PRACTICAL WORK IN CHEMISTRY

Objectives of the present course in practical work are as follows:

1. To develop and inculcate laboratory skills and techniques
2. To enable the student to understand the basic chemical concepts.
3. To develop basic competence of analysing and synthesising chemical compounds and mixtures.

To meet these objectives three different types of laboratory experiments are provided in the present practical course.

1. Experiment for developing laboratory skills/techniques
2. Concept based experiments
3. Traditional experiments (for analysing and synthesising chemicals)

## List of Practicals

1. (i) General safety measures with special reference to safe handling of chemicals.  
(ii) Acquaintance with chemistry laboratory and basic laboratory techniques (cutting, bending and boring of glass tubes, sealing of apparatus, filtration, distillation, crystallisation, preparation calibration, cleaning of glass apparatus and use of burner etc.)  
(iii) Measurement of volume, length, mass and density and common errors therein.
2. Preparation, collection and study of some important physical and chemical properties of at least three gases, one each from the following groups.
  - (a) Hydrogen and oxygen
  - (b) Carbon dioxide and hydrogen sulphide
  - (d) Chlorine, hydrogen chloride, and sulphur dioxide
3. Preparation of dilute solutions of known concentration of sulphuric acid, hydrochloric acid and nitric acid. (Dilution should be carried out strictly under the supervision of a teacher).
4. Study of interaction of metals (any four) with salt solution and arranging them according to their activity (to form activity series). Metals and salts may be selected from the following  
Mg, Zn, Fe, Sn, Pb, Cu and Al and their salts. (Checking the order of metals in series based on the electrode potential will be desirable).
5. (a) Determination of pH of following substances by using a universal indicator solution or pH papers.
  - (i) Salt solution
  - (ii) Acids and bases of different dilutions
  - (iii) Vegetable and fruit juices  
(b) Study of pH change by common-ion effect in case of weak acids and weak bases by above

method (specific examples of  $\text{CH}_3\text{COOH}$  and  $\text{CH}_3\text{COONa}$  and  $\text{NH}_4\text{OH}$  and  $\text{NH}_4\text{Cl}$  may be taken).

6. Determination of melting point of a solid substance of low melting point (below  $100^\circ\text{C}$ ) by glass capillary tube method (Paraffin oil may be used as bath).
7. Study of solubility of solid substances in water at different temperatures and plotting of a solubility curve.
8. Study of the shift in equilibrium between ferric ions and thiocyanate ions by increasing/decreasing the concentration of their ions.
9. Study of:
  - (a) the effect of concentration on the rate of reaction between sodium thio-sulphate and hydrochloric acid.
  - (b) the effect of temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.
10. Separation of coloured substances by paper chromatography, and comparison of their  $R_f$  values.
  - (a) a mixture of red and blue ink or a black ink.
  - (b) juice of a flower or grass.
11. Detection of nitrogen, sulphur and halogens in an organic compound (combinations of halogens to be avoided). Not more than two of the above elements should be present in the given organic compound.
12. Study of simple reactions of carbohydrates; fats and proteins. in pure form and detection of their presence in given food stuffs.
13. Preparation of soap by using different oils and its comparison with the market soap by determining the foaming capacity and cleaning effect.
14. Use of chemical balance to demonstrated.
  - (a) preparation of solution of oxalic acid and ferrous ammonium sulphate of known molarity by weighing (non-evaluative)
  - (b) A study of (i) acid-base and (ii) redox titrations (single titration only) (both the solutions to be provided).
    - (i) Oxalic acid
    - (ii) Ferrous ammonium sulphate and potassium permanganate.
15. Elementary qualitative analysis of a salt involving detection of one cationic and one anionic species from the following groups. (Salts insoluble in hydrochloric acid excluded).

**Cations:**

$\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Zn}^{2+}$   
 $\text{Mn}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{NH}_4^+$

**Anions:**

$\text{CO}_3^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{PO}_4^{3-}$

16. Functional groups in organic compounds
  - (i) Test of unsaturation
  - (ii) Test for Carboxylic, phenolic, aldehydic and ketonic groups.

# PRACTICAL EXAMINATION

There will be a practical examination of 20 marks and 3 hours duration.

The distribution of marks is as follows.

	Marks
1. Salt Analysis (one cation + one anion)	4
2. Volumetric Analysis	6
(i) write-up in which student may be asked to write brief method, indicator, equation, end point.	2
(ii) Set-up of experiment	2
(iii) Results	2
3. (i) Detection of elements in an organic compound	2
(ii) Detection of functional group	2
OR	
Setting up of one experiment from experiments at serial number 2 to 10, 12 and 13.	4
4. Viva-voce	3
5. Record book	3
Total	<u>20</u>