

# **EXPERIENTIAL LEARNING ACTIVITY**

**SUBJECT: CHEMISTRY**

**GRADE: XI**

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| <b>CHAPTER</b>                | <b>ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>TOPIC/CONCEPT</b>          | <b>METHODS OF PURIFICATION OF ORGANIC COMPOUNDS (12.8)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>NAME OF THE ACTIVITY</b>   | <ul style="list-style-type: none"><li>• Demonstrations on Scientific Apparatus;</li><li>• Laboratory Demonstrations involving experiments such as-<ul style="list-style-type: none"><li>(1) Crystallization involving impure sample of Blue Vitriol (<math>\text{CuSO}_4</math>)</li><li>(2) Hands on Training on various apparatus like Simple Distillation, Thin Layer Chromatography and Column Chromatography.</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>TYPE OF ACTIVITY</b>       | <b>GROUP ACTIVITY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>LEARNING OUTCOME</b>       | <p><b>After the completion of this activity, the students will be able to-</b></p> <ul style="list-style-type: none"><li>• <b>Learn and apply basic techniques used in the organic laboratory for the purification and identification of organic compounds.</b></li><li>• <b>Enumerate various methods used for the purification of organic compounds such as melting point determination, extraction, chromatography, Sublimation, distillation and Crystallization.</b></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>PROCEDURE/ METHODOLOGY</b> | <p><b>Experiment- Crystallization of pure copper sulphate from an impure sample of blue vitriol.</b></p> <p><b>Brief Procedure-</b></p> <ol style="list-style-type: none"><li>1. Preparation of Solution: To about 25-30 ml of water, add impure sample of copper sulphate. Stir well to dissolve it and make a saturated solution. Now, add 2-3 ml of dilute sulphuric acid to make the solution clear.</li><li>2. Filtration of the Solution and Concentration of the Filtrate to Crystallisation point: Filter the solution and collect the filtrate in a china dish. Impurities are left as residue on the filter paper. Heat the china dish on a sand bath till the solution is reduced to about one-third of its original volume. Identify the crystallisation point. Then transfer the hot saturated solution in a crystallising dish.</li><li>3. Cooling the Hot Saturated Solution: Place the crystallisation dish containing hot saturated solution on a beaker containing water filled to the brim and allow it to cool slowly for some time. Deep blue crystals of copper sulphate will appear.</li></ol> |

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|                                | <p>4. Separation of Crystals and Drying: Decant off the mother liquor carefully and dry them by pressing gently between the folds of the filter papers to obtain the pure copper sulphate crystals.</p> <p><b>Experiment: Demonstrating Simple Apparatus like: Simple Distillation, Thin Layer Chromatography and Column Chromatography.</b></p> <p><b>Requirements for:</b></p> <p><b>Simple Distillation:</b> Two- necked round bottomed flask, Adapter, Condenser, Rubber pipes (for water inlet and outlet), Collection flask.</p> <p><b>Thin Layer Chromatography:</b> TLC plate, glass capillaries, solvent chamber</p> <p><b>Column Chromatography:</b> Glass column, Cotton, Silica Gel, Solvents (as per requirement), Test tubes for collection.</p> |
| <p><b>QUESTIONS</b></p>        | <ul style="list-style-type: none"> <li>• What is the principle of Crystallisation?</li> <li>• Describe the basic requirement for separating two miscible liquids by Simple Distillation Method?</li> <li>• Give an example of the mixture that can be separate by simple Distillation method.</li> <li>• What type of Chromatography is Column Chromatography- Ascending or Descending?</li> <li>• What is the difference between column and thin layer chromatography?</li> </ul>                                                                                                                                                                                                                                                                             |
| <p><b>SOLUTIONS/ HINTS</b></p> | <ul style="list-style-type: none"> <li>• It is based on the difference in the solubilities of the compound and the impurities in a suitable solvent.</li> <li>• (i) Liquids should be volatile and impurities should be non- volatile and (ii) the liquids should have sufficient difference in their boiling points.</li> <li>• Chloroform and aniline.</li> <li>• Descending Chromatography.</li> <li>• Column chromatography is Descending Chromatography and Thin Layer Chromatography is Ascending Chromatography.</li> </ul>                                                                                                                                                                                                                             |