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# Systematic Analysis of a Carboxylic Acid

Experiment 5 - Practical Notes

Name: \_\_\_\_\_ Roll no.: \_\_\_\_\_ Date: \_\_\_\_\_

## Aim

To organise an illustrative unknown-identification record and show how the assigned candidate is supported.

## Principle

This is a worked teaching case, not an observation to copy into a laboratory record. An actual unknown is assigned by the instructor and may give different findings. A candidate is supported by consistent preliminary, elemental, functional and physical evidence.

## Requirements

- Instructor-assigned unknown and the corresponding known control; the method notes in this subject.
- Prepared test reagents, separate test portions and calibrated physical-constant apparatus.

## Procedure

### 1. Preliminary examination

Record the actual state and water behaviour at the prescribed quantity and temperature. Compare with the illustrative pattern below.

### 2. Solubility classification

Test fresh portions in the assigned acid/base reagents. Describe dissolution or effervescence before inferring a class.

### 3. Elements

Use the instructor-prepared extract or provided elemental report. Distinguish an element finding from a functional-group conclusion.

### 4. Functional confirmation

Bicarbonate reaction supports a carboxylic acid; confirm a coherent acid pattern

### 5. Physical confirmation

Measure the dried solid melting range and compare with verified benzoic acid; perform the assigned derivative or mixed-melting comparison.

### 6. Conclude

Write the candidate only after reviewing all evidence; list a plausible alternative and the test that distinguishes it.

## Observations and Record

| Evidence                | Illustrative finding                                                             |
|-------------------------|----------------------------------------------------------------------------------|
| State / water behaviour | White crystalline solid; Low water solubility at room temperature                |
| Acid-base pattern       | Dissolves in bicarbonate with carbon-dioxide evolution and in hydroxide          |
| Elements                | Nitrogen, sulphur and halogens negative in the teaching pattern                  |
| Functional pattern      | Bicarbonate reaction supports a carboxylic acid; confirm a coherent acid pattern |
| Physical constant       | Typical melting region about 121-123°C, dependent on purity and method           |
| Supported candidate     | Benzoic acid                                                                     |

## Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Record the candidate as Benzoic acid only if your own results support the pattern. An anomalous physical constant should be investigated before final assignment.

## Result

Complete the actual unknown record with its identification evidence and justified candidate.

## Precautions

- Use instructor-assigned quantities and prepared test reagents in the designated laboratory; wear eye protection and use the required fume hood.
- Do not taste unknowns, smell containers directly, burn unknown halogenated material or heat sealed vessels.
- Use fresh separate portions for independent tests. A single colour reaction does not establish molecular identity.
- Phenols may dissolve in hydroxide but usually do not show the same bicarbonate response.

## Viva Questions and Answers

### 1. Can the title identify an actual unknown?

No. The title describes this worked case; the actual material must be analysed.

### 2. Why perform a confirmatory measurement?

Different molecules can share solubility and functional-group reactions.

### 3. What belongs in the result?

The observed evidence, proposed identity and any unresolved limitation.

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