

# Exercise 19

**Aim:** To determine the pH of different water and soil samples

**Principle:** The pH value of a water/soil sample can be determined by (i) indicator dye method, (ii) electrometric method using a pH meter and (iii) colorimetric method. For routine purposes the indicator dye method using universal pH indicator solution (containing a wide range of pH indicator dyes) or paper strips containing the pH indicators are preferred though it is not as accurate as the electrometric method.

**Requirement:** Soil or water samples A, B and C collected from different sites (for example soils from road side, garden, humus rich sites; water samples from borewell, handpump, pond, sewage), balance, weights, filter paper, distilled water, measuring cylinder (50 mL), droppers, cavity tile, funnel, beakers (100 mL), funnel stand, universal pH indicator solution and pH indicator paper (narrow range and broad range)

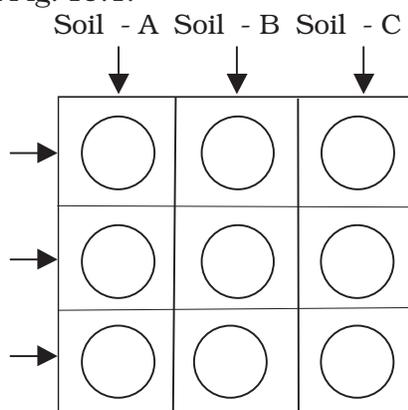
## Procedure

- (i) Weigh 10 g of the soil sample A. Add 50 mL of distilled water to soil sample to make a soil solution.
- (ii) Filter the soil solution through a filter paper and collect the filtrate in a beaker. Label it as soil solution -A.
- (iii) Take a clean dry porcelain cavity tile. Place 5 drops of soil solution A in three cavities of the tile as shown in Fig. 19.1.

Universal pH indicator solution

pH indicator paper (Broad range)

pH indicator paper (Narrow range)



**Fig. 19.1** Porcelain cavity tile

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- (iv) To the 5 drops of soil solution present in one cavity add 5 drops of universal pH indicator solution. Note the colour developed and compare it with the colour chart given on the universal pH indicator solution bottle.
- (v) To the soil solution present in the second cavity, dip a small strip of broad range pH indicator paper (pH 2-11). Note the colour and compare with the colour chart given on the broad range indicator paper and get a rough estimate of pH of the sample solution.
- (vi) Choose a suitable narrow range pH indicator paper (for e.g. If the pH of soil is determined by you as 8.0, choose a narrow range 7.0 to 9.0) and dip a small strip of it in the soil solution present in the third cavity. Note the colour developed and determine the pH to the nearest possible value with the help of the colour chart.

Repeat the same steps for determining the pH of sample B and C. Follow the same procedure for water samples collected from different sites.

### Observation

Record your observations in the given table.

**Table: Measurement of pH of soil samples A, B and C**

| pH value as determined by    | Soil Samples |   |   |
|------------------------------|--------------|---|---|
|                              | A            | B | C |
| Universal indicator solution |              |   |   |
| Broad range indicator paper  |              |   |   |
| Narrow range indicator paper |              |   |   |

### Discussion

Based on the pH values obtained, categorise the samples into acidic, basic, neutral type.

Record the plant species present in the site from which the samples are collected.

**Note for teachers:** The colour developed should be noted against direct sun light. Also, sometimes the soil solution colour may interfere with the readings. Thus one has to be careful while making the observations.

### Questions

1. What will be the pH of chalk (calcareous) soil?
2. pH measurement with indicator paper is not very accurate. Comment.
3. Water logged soils are acidic. Comment.
4. Why are soil around mineral mining areas acidic?

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