

## 7.10 Determination of crude fibre – Muslin cloth method

### Principle

The feed sample is subjected to acid digestion followed by alkali digestion and the remaining residue is weighed and ashed. The loss of weight after ashing is the crude fibre content of the feed.

### Apparatus

- Liplless beaker 600 ml capacity
- Condensing flask
- Electric heater/hot plate
- Crucible
- Muslin cloth
- Spatula
- Porcelain tile

### Reagents

- 0.255 N  $\text{H}_2\text{SO}_4$  : 7 ml of conc.  $\text{H}_2\text{SO}_4$  is dissolved in distilled water to get one litre of solution.
- 0.313 N NaOH : 12.78 g of sodium hydroxide is dissolved in distilled water to get one litre of solution.

### Procedure

Two gram of feed is accurately weighed. Accurately measure 200 ml of 0.255 N  $\text{H}_2\text{SO}_4$  in a 600 ml liplless beaker. Place it on an electric heater and keep a suitable condensing flask (round bottom) over the beaker. See that the condensing flask fixes well over the beaker leaving no space. The condensing flask is filled with cold water. Now switch on the heater. The purpose of keeping a condensing flask filled with cold water is for condensing back the evaporating acid to the beaker. This maintains the volume of the acid without any reduction.

### Digestion in acid

The beaker is heated to bring the acid (0.255 N  $\text{H}_2\text{SO}_4$ ) to boiling stage. Then 2 g of substance is transferred to the boiling acid. The acid boils and the feed is digested in acid. This boiling and digestion is continued for 30 minutes. After the end of 30 minutes stop the boiling and remove the condenser.

### Filtration

Set up a funnel in a large conical flask. Fix a linen cloth over the funnel. Transfer the contents from the beaker to the filtering funnel. After all the acid and acid digested residues are transferred to the linen cloth, wash the beaker with distilled water and transfer the contents to the filtering funnel. Continue the washing till the residue is made acid-free.

### Test

This is tested simply by catching one or two drops of filtrate over blue litmus. If the blue litmus remains blue, that means the residue is washed free of acid. After complete washing take the filter cloth along with the residue, squeeze well to remove the water from the residue. Place the cloth over porcelain slab. Scrap gently the adhering residue from the filter cloth and keep the residue in the centre of the filter cloth.

### Digestion in alkali

The acid digested residue is then subjected to alkali digestion. For this 0.313 N sodium hydroxide solution is used. As in the acid digestion, pour 200 ml of sodium hydroxide (0.313 N) into a liplless beaker (600 ml capacity). Place over the heater and fix a condensing flask over this. Bring the alkali solution to boiling stage by heating. When it starts boiling, remove the condensing flask and transfer the acid digested residue to the boiling alkali.

Replace the condensing flask and continue the heating. The residue should be digested in the boiling NaOH for a period of 30 minutes. After 30 minutes, remove the condenser; transfer the contents of the beaker to a filtering funnel. The residue is washed repeatedly with distilled water till it is alkali free.

### **Test**

This is tested by catching one or two drops of the filtrate over red litmus. If it remains red it indicates that the residue is free from alkali. When the residue is free from alkali squeeze the cloth well to dry the residue. Transfer the residue, without any loss, to a clean silica crucible.

Note: The cold water in the condensing flask should never be hot at any time. If the water is hot replace it with cold water. Before removing the condensing flask care should be taken to avoid the loss of any residue sticking to the bottom of the flask.

## Drying and Washing

The crucible is placed in preheated hot air oven (110°C) over night. This is to drive off the moisture completely. After complete drying, the crucible is cooled in desiccator. It is weighed along with the residue. Heat the crucible with electrical bunsen in order to ash the residue. Continue the heating till you obtain a whitish ash. Cool the crucible to room temperature and find out the weight.

## Calculation

The difference in weight of the crucible before and after ashing is reported as the crude fibre content of the feed taken.

$$\begin{aligned} \text{Weight of the sample} &= c \\ \text{g Weight of crucible with dry residue} &= a \\ \text{g Weight of crucible with ash} &= b \\ \text{Per cent crude fibre} &= \frac{a - b}{c} \times 100 \end{aligned}$$

**Reference:** AOAC, 962.09, 16<sup>th</sup> edition.