Determination of crude fiber (CF) in food sample:

Crude fiber: known as the part of carbohydrate in food called non-soluble carbohydrate (Insoluble carbohydrates), which is not digested by the digestive juices and do not degrade at the treatment by (acids and bases) diluted and in specific concentrations for a period of time is limited.

The treatment of some food such as legumes, grains, and seeds, for example in weak acid and weak base results is Soluble sugars and protein leaving behind the non-dissolved part like (Cellulose and hemicellulose) and (Lignin) of the composition, name this (Crude fiber).

*The importance of determination of fiber:*

Estimate the quantity of fiber in foods, especially celluloses for the following reasons:

1- The proportion of fibers in diets of chickens and some other animals, a good indicator of the level of the nutritional value of these feeds. Like if the seeds high in the proportion of fiber are low in nutritional value, the human and animal eaters meat is not able to digest cellulose in her digestive system because they do not have the (Celulase) enzyme is necessary for the digestion process.

2- Estimated crude fiber in order to ensure that no deceive of food and products due to additives or other alternatives.

3- Estimated fiber in foods to know the quality and specifications for these foods.

4- Fiber estimate is considered a good indicator on the amount of food freshness like vegetables, the increase in the age and maturity lead to the large increase in the percentage of fiber in it.

5- Estimate the fiber and not the color and ash is a real indicator of purity of the flour.
*The scientific basis of the experience:

The sample free of moisture and fat is digested first by a weak acid and then by a weak base.

*There are some points that must be taken into account in food sample when estimating the crude fiber: -

1. The sample of food should be ground finely or crushed for easy interaction with chemicals.
2. Extract the fat from food before estimating the crude fiber, to facilitate the process of digestion and filtration.
3. Partially drying the sample from moisture if the rate high in the sample.

Method

1. Weigh out 2 to 3 g of defatted, dry sample. Place in the flask and add 200 ml boiling sulphuric acid solution concentration (1.25%), when the acid concentration 5% should be taken (50 ml) of acid and (150 ml) of distilled water until the concentration reduces.
2. Attach the condenser and bring to boiling point in one minute; if necessary, add antifoam. Boil for exactly 30 minutes, maintaining the volume of solution constant by add heat distilled water and swirling the flask periodically to remove particles adhering to the sides.
3. Lining the Buchner funnel with the filter paper and boiling water. At the same time, at the end of the boiling period, remove the flask, let rest one minute and filter the contents carefully, using suction or vacuum. Filtration should be carried out in less than 10 minutes. Wash the filter paper with boiling water.
4. Transfer the residue to the flask using a retort containing 200 ml of boiling NaOH solution and boil for 30 min. as in step (ii). The usefulness of the base solution is to analyze the parts of nitrogen in proteins and making Saponification with the fat.
5. Preheat the filtration crucible with boiling water and carefully filter the hydrolyzed mixture after letting it rest for 1 min.
6. Wash the residue with boiling water, with the HCI solution and then again with boiling water, finishing with three washes.
with petroleum ether. Place the crucible in an oven set at 105°C for 12 hours then cool in dryer.

7- Quickly weigh the crucible with the residue inside (do not handle them) and place in the crucible furnace at 550°C for 3 hours. Leave to cool in a dryer and weigh them again.

**Calculations**

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\text{Crude fibre content (\%) } = 100 \times \frac{A - B}{C}
\]

Where:  
A = weight of crucible with dry residue (g)  
B = weight of crucible with ash (g)  
C = weight of sample (g)
* Affected the results of this method by several factors, including 1- The degree of smoothness of sample. 2- Heating method used to access the boiling point. 3- Speed boiling.

* Apportion or classify food according to the amount of fiber into two parts:
  1- Fillers (Roughage) :- this materials contain a high proportion of fiber and therefore contain a limited amount of food ingredients of easy to digest.
  2- (Concentrates) :- the materials that contain a high proportion of food ingredients are easy to digest and contain a limited amount of fiber.

* Fibers and their relationship to the size of food:
  1- The size of food depend on the proportion of fiber content. The higher proportion of fiber in food is greater the volume occupied unit weight of the food and called these Bulky Feeds.
  2- Increasing the volume of food not depend only to the proportion of fiber content, but also the viability of food to absorb the water.

* The advantages of the size of a proper diet:
  A- The size of fiber a proper in diet helps not knead the food in the gastrointestinal tract.
  B- Helps with the passage of the food in the gastrointestinal tract.
  C- Helps to take the gastrointestinal tract the natural capacity and can be easy to disposal the remains of digestion of food.
  D- The high in proportion of fiber increased laxative effect.
  E- The greater of fibers in food are readiness on absorption of water, greater the impact of laxative.

* Different size of adequate food for the animal depend on:
  1- Type of animal.
  2- Capacity the gastrointestinal tract.
  3- Production capacity