**AGROINDUSTRIAL STRENGTHENING OF QUINOA PROJECT THROUGH THE SCALING OF PROTOTYPES IN RELEVANT ENVIRONMENTS FOR THE INDUSTRY IN THE DEPARTMENT OF CAUCA**

**FIBER DETERMINATION**

**Guide Code: 003**

**INVESTIGATION GROUP:CYTBIA; ASUBAGROIN; GIPA.**

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1. **AIM**

Determine the amount of fiber and soluble carbohydrates present in a sample of animal or vegetable origin, under AOAC 962.09 standard.

1. **BASIS**

Carbohydrates encompass a large number of compounds ranging from simple mono and disaccharide sugars such as glucose and sucrose, to the most complex ones such as starch and cellulose, it is not possible to determine the large group of carbohydrates by means of a simple procedure since It is made up of numerous chemical entities that lack a characteristic in common. Therefore, this fraction has been divided into two large groups: a part insoluble in acid and bases called "crude fiber" and a soluble fraction called "non-nitrogenous extract". The crude fiber is constituted fundamentally by cellulose, lignin and pentoses, suberin, cutin, alginates and pectins.

1. **MATERIALS**

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| **MATERIAL** | **AMOUNT** |
| 10 mL pipettes | 1 |
| 50 mL measuring cylinder | 1 |
| 250 mL beaker | 2 |
| Fibertest Crucibles | 6 |
| crucible tong | 1 |
| Spatula | 1 |
| 100 mL volumetric flask | 2 |

1. **REAGENTS**

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| **Reagent** | **Quantity** |
| sulfuric acid 0.255N | 100ml |
| Sodium hydroxide 0.313N | 100ml |

1. **TEAMS**

|  |  |
| --- | --- |
| **Team** | **Quantity** |
| Fibertest Team | 1 |
| heating iron | 1 |
| Kiln | 1 |
| muffle | 1 |

1. **PROCESS**

The most common method is based on the acid-alkaline digestion of the sample under specific conditions, the purpose of the method is to eliminate protein, soluble carbohydrates, fat residues, vitamins, the method is similar to the process performed by the organism depending on digestive.

* 1. **Preparation of sample**

The sample for fiber determination must be previously dehumidified and defatted.

* 1. **Reagent preparation**
     1. 0.255 N H2SO4 solution: 1.25 g of acid for 100 mL, measure 7.2 mL of conc H2SO4 and make up to one liter with distilled water.
     2. 0.313 N NaOH solution: 1.25 g of sodium hydroxide for 100 mL, weigh 12.39 g of sodium hydroxide, dissolve it with distilled water, wait for the solution to come to room temperature and make up to one liter with distilled water.
  2. **Process**
     1. Quantitatively transfer 1-2 g of the residue obtained from the determination of fat (defatted sample) to the fiber crucibles of the Fibertest equipment, these are located in a rack, in total there are 6 crucibles available.
     2. Move the rack to the Fibertest unit, and fix it at the angle of the front of the unit. Insert the manipulator tongs into the crucibles, and move them onto the supports. Lower the closing lever as far as it will go.
     3. Put the reflective cover in front of the crucibles, fixing it on the front hooks.
     4. Put the 3-way valves in the closed position.
     5. Heat 150 mL of 0.255 N H2SO4 in an Erlenmeyer. When it is boiling, introduce it through the upper part of the refrigerant. When it starts to boil, adjust the heating knob to a point that maintains a gentle boil (point 3 or 4). Let boil for 30 minutes.
     6. Filter
     7. Wash with distilled water, introducing it through the upper part of the refrigerant and sucking it, repeat the operation 3 times using 30 mL of water each time.
     8. Introduce 150 mL of the sodium hydroxide solution preheated to 90°C through the upper part of the refrigerant; bring to a boil maintaining it for another period of 30 minutes.
     9. Filter and wash 3 times with boiling water.
     10. Remove the crucibles from the unit.
     11. Transfer the crucibles to an oven at a temperature of 100-110 °C until a constant weight is obtained (write it down).
     12. Once the constant weight is obtained, transfer the crucibles to the muffle and leave it for 20 minutes at 550 °C in the muffle.
     13. Place the crucibles in the desiccator, allow them to cool to room temperature, and weigh.
* The following image describes the operation of the Fibertest equipment

|  |  |
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| 1. Bring the 0.128 M H2SO4 solution to a boil. | 1. Add 150 mL of boiling 0.128 M H2SO4 to the top of the equipment. |
| 1. The acid digestion of the sample begins for 30 minutes, after which time 4 successive washes are carried out with boiling distilled water. | 1. After carrying out the washing until neutral pH, the basic digestion is carried out with 0.223 M KOH for 30 minutes and the sample is washed with distilled water. |
| 1. They will be incinerated in a muffle at 500 °C for 30 minutes. | 1. Final state of the sample after ashing |

* 1. **Calculations and expression of results**

The loss of weight in the calcination is considered as the crude fiber of the weighed sample before extracting the humidity.

1. **DISPOSAL OF CHEMICAL AND/OR BIOLOGICAL WASTE.**

Add residues to the container of acids and bases number 9

**BIBLIOGRAPHY**

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