Raw Fiber Analyzer

Model L-807

USER MANUAL

Beacon Innovation International Inc.

Table of Content

1. Introduction

L-807 Semi-automatic Raw Fiber Analyzer can process 6 samples at a time. The digestion process is automatic time control. Its user-friendly interface makes it easy to operate. The machine is equipped with solvent pre-heating system, and the temperature is controllable. Pre-heating of solvents improves efficiency of the entire process.

L-807 is suitable for fiber determinations in rough fiber, acid-washed fiber, neutral-washed fiber, lignin and other plant materials, animal feed and foodstuff. After sample is loaded, all steps including acid digestion, base digestion, filter, wash, etc., can be done on the same spot safely and quickly.

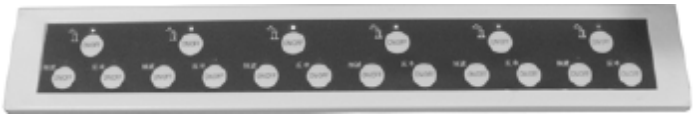
2. Operation of Front Panel

(1) Solvent Pre-Heating: Individual pre-heat button, turn switch for heating power adjustment. There are three individual pre-heat buttons, will light up when depressed. Heating start by turning the heating control clockwise. Adjust heating power level as needed. Three solvents can be pre-heated altogether.

(2) Add Solvent: The three individual Add Solvent buttons interlock each other, only one solvent can be added at a time.

(3) Digestion: Time control, adjustable heating power level, end-point beeping.
After digestion time is set, press the ON/OFF button to start timing, meanwhile turn the heating control clockwise, hot air starts blowing out. When digestion solvent start boiling, adjust heating control to just maintain slight boiling, so that there is drastic boiling and spill out. Once digestion timing is up, press the ON/OFF button to turn off beeping, and turn the heating control anticlockwise to turn off heating.

(4) Surface Panel Operation:
Push buttons for adding solvent are convenient and accurate. When all the buttons for adding solvents are off, the equipment automatically shut down the add-solvent buttons. Push buttons for filter and flush control are also convenient and accurate. Note that the flush button should be turned on only after all filter buttons are turned off.



3. Operation Preparation

3.1 Installation

(1) The equipment should be installed on a solid counter. The location should have power and water outlets as well as drain.
(2) Plug in the power cord to power outlet (Type: 16A), make sure it is grounded.
(3) Connect the cooling water inlet to the water using the white rubber tube. Link the cooling water outlet, waste water outlet, and surplus water outlet to the drain using rubber tubes.

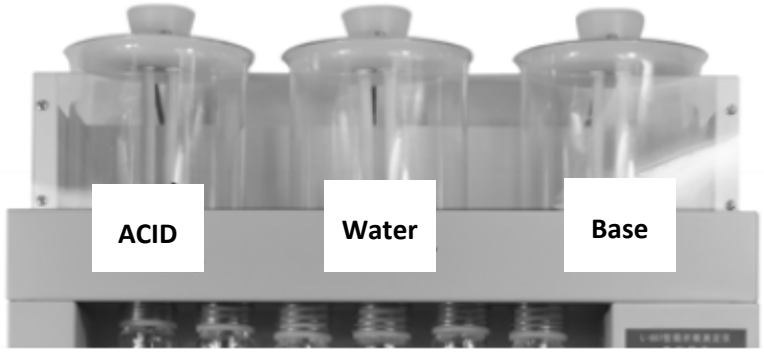
3.2 Required laboratory supplies and reagents

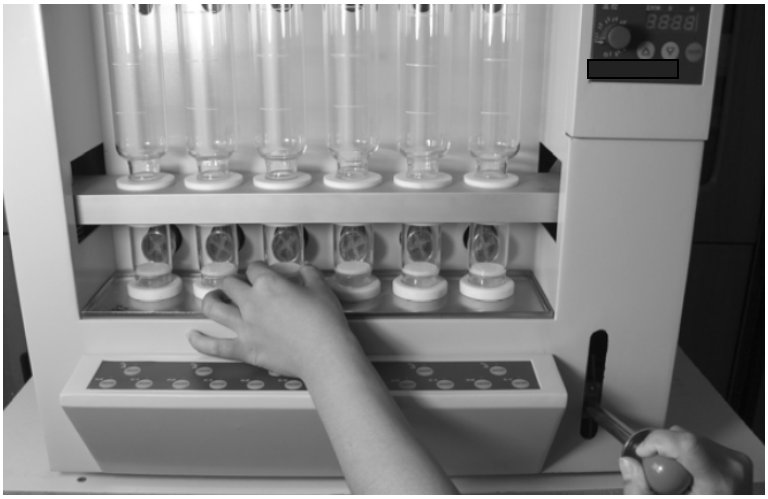
(1) Raw Fiber Analyzer;
(2) Laboratory Sample Grinder;
(3) Sieve: 1 mm diameter hole (18 mesh);
(4) Analytical balance, readable 0.1mg;
(5) Electrical Incubator, able to control temperature at 110°C;
(6) Oven: Adjustable temperature range 200 °C – 800 °C;
(7) Desiccator: Use colored resin as desiccant;
(8) Sulfuric acid solution 0.128 ± 0.005M, standardized using Sodium Hydroxide standard solution;
(9) Sodium Hydroxide standard solution 0.313 ± 0.005M, standardized using potassium hydrogen phthalate;
(10) Ethanol, 95%;
(11) Ethanol;
(12) 1-Octanol (as defoamer);
(13) pH paper.

3.3 Preparation

(1) Degreasing is required if the sample contains over 10% fat.
(2) Grind the samples and pass through an 18 mesh sieve, store each sample in sealed container.
(3) Wash crucibles with distilled water and dry in oven at 110°C. Cool to room temperature in a desiccator.

4. Operation Procedure (suggestion)





(1) Fill the corresponding liquid containers on the top with the prepared acid solution, water and base solution (about 2L each), and cover with the caps. Check power connection.

(2) Load 1 – 2g (±0.0002g) of sample to each numbered crucible, and record the gross weight.

(3) Place each crucible to a pump/filter sit, slightly depress the handle, adjust the crucible position if required and then depress the handle to lock it in. Verify the crucibles are locked properly by rotating each one by hand.

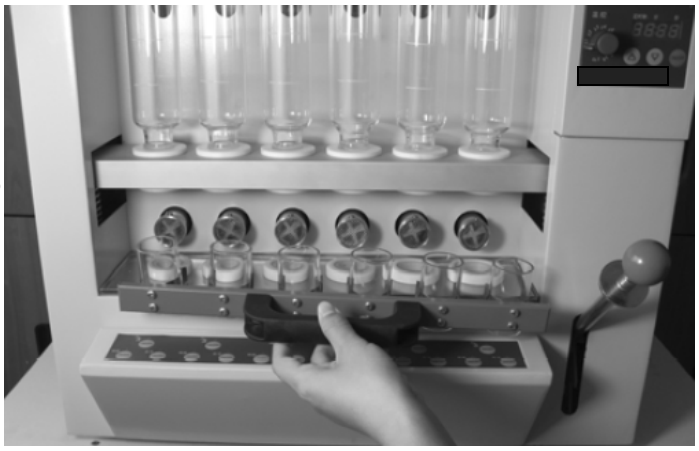
(4) Fill distill water to each crucible to verify the crucibles are installed properly. If there is leaking, rotate the crucible will seal it properly. Once complete, pump out the water by depress the pump/filter key.

(5) Pre-heat the acid solution, water and base solution, which takes about 10 – 15 minutes (the temperature will rise 20°C – 30°C). Once complete, be sure to turn off pre-heat button and the heating control. If the environment temperature is over 30°C, pre-heating is not required, and the heating control system will turn off automatically.
(The heating system control the pre-heating to not more than 100°C, so there is no boiling spill or overflow. Once temperature is over limit, the system will automatically cut off power and stop heating.)

Special Note:
Start pre-heating ONLY AFTER each glass container is filled with solution (2L). DO NOT dry pre-heat, which may cause damage or explosion.

(6) Turn on cooling water valve, water start circulating through the heat-exchange tube.

(7) (a) Acid Digestion: Add 200 mL pre-heated acid solution to each of the 6 samples. Start digestion timing program by pressing the ON/OFF key. Once the solutions start boiling, turn the temperature control anticlockwise to lower the heating power level, so that it just keep boiling slightly. After digesting for 30 minutes, the machine issues beeping sound. Turn off the temperature control anticlockwise fully, and press the ON/OFF key to stop the beeping sound. Press the Pump/Filter key to pump out the acid solution.
(b) Water Wash: Add about 100 mL pre-heated water to each of the 6 samples, pump out, and repeat 2 – 3 times, until the pump out liquid is neutral on pH paper.
(c) Base Digestion: Add 200 mL pre-heated base solution to each of the 6 samples and 2 drops of 1-Octanol to each digestion tube. Start digestion timing program by pressing the ON/OFF key. Once the solutions start boiling, turn the temperature control anticlockwise to lower the heating power level, so that it just keep boiling slightly. After digesting for 30 minutes, the machine issues beeping sound. Turn off the temperature control anticlockwise fully, and press the ON/OFF key to stop the beeping sound. Press the Pump/Filter key to pump out the base solution.
(d) Water Wash: as step (c) above.
(e) Ethanol Wash: Add about 25 mL 95% Ethanol to the up opening of the digestion tube, let immerse for about 15 seconds, pump out.



Special Note:
Start heat digestion ONLY AFTER each glass crucible is filled with solutions (100 mL – 200 mL). DO NOT dry heat the crucible, which may cause damage or explosion.

(8) Use a 6-parallel clamp to hold the 6 crucibles, lift the handle to unlock and move the crucible out and to an incubator. Dry for 2 hours at 110°C±2°C. Move to a desiccator and allow cool to room temperature. Weigh and record each weight (P1).

(9) Transfer the crucibles to an oven and bake at 550°C ±15°C for 1 hour, let cool to room temperature in a desiccator. Weigh and record the weight (P2).

Calculate the result as follow:

Raw fiber amount in dried sample = $\frac{P1-P2}{M} \times 100\%$

Where: P1 = Weight of sample and crucible after drying at 110 °C (g)
P2 = Weight of residual and crucible after baking at 550 °C (g)
M = Weight of dried sample (no degreased) (g)

Important Note:

1. **Make sure the power outlet is grounded.**
2. **After each use, wipe the equipment and remove any water residual inside the pump/filter sits using filter paper.**
3. **DO NOT take out the crucibles immediately after baking at 500°C for 1 hour, the crucibles may crack easily due to the big temperature difference between the inside and outside of the oven.**
4. **Limited one-year warrant of the equipment, excluding the glass parts.**

5. Specification

Function	Specification
Control Mode	PID Microchip program, touch keys, LED display
Pre-heat power	< 900W
Digestion heating power	< 1800W
Pump/Filter Speed	2.5L/min
Overall Power Consumption	< 3000W
Power Outlet	220V/50Hz
Net Weight	45 kg
Dimension (mm)	(L) 560 (water sprout +40) x (W) 350 (Handle +190) x (H) 850

Glass Crucible Parameter Reference

Old Standard Item #	New Item #	Diameter (mm)
C00	P250	160-250
G0-	P160	100-160
G1A	P100	70-100
G1	P70-	50-70
G2	P50	30-50
G3	P30	16-30
G4A	P16	7-16
G4	P7	4-7
G5	P4	2-4
G6	P2	1.2-2.0