

SAMPLE GRINDING PROCEDURE

Up-dated September 2013

The primary objective of grinding samples is to ensure that each analytical aliquot represents the initial sample. This objective may be attained only with a complete understanding of the methodology and close attention to detail.

Generally, all analytical samples should be ground. However, for some samples a judgment must be made on the benefit gained from grinding. Normally, all samples must be dry or have been dried to less than 12% moisture. In special cases, a freeze grinding procedure using dry ice may be used for samples that must be ground wet.

The laboratory is equipped with 4 grinding mills. Each machine is suited for a particular type of sample.

Cyclotec: 0.5, 1.0 mm screens

Standard Wiley, Model No. 3: 0.5, 1.0, 2.0, 3.0 mm screens

Masticate: 4.0, 6.0 8.0 mm screens

Intermediate Wiley: 10, 20, 40 mesh screens

U.S. No.* mm. in.

4	4.76	0.1870
12	1.68	0.0661
16	1.19	0.0469
20	0.84	0.0331
30	0.59	0.0232
40	0.42	0.0165
50	0.297	0.0117
80	0.177	0.0070
100	0.149	0.0059

*U.S. No. is the same as mesh per linear inch.

The two Wiley Mills are normally used for analytical preparation. Most laboratory samples are ground in the Standard Wiley, Model No. 3. Therefore, the operational procedure for this machine will be described in detail. These general procedures may also be used with the other machines.

I. Personal Protective Equipment:

A. Safety glasses/goggles

II. Procedure:

- A. Before introducing a sample, the entire machine must be cleaned and free of residual material. An air hose, vacuum, paintbrush, and spatula are available in the grinding room for this purpose.
- B. Once clean, the parts are assembled. Close the slide plate on the upper hopper, slide the screen into position, secure a quart jar to the collection hopper, and slide into place. Close the grinder door and firmly secure with the wing nut assembly. Position the catch pan beneath the quart jar on the support brackets.

- C. Turn the motor on and place the sample in the upper hopper. Gradually open the hopper slide plate and allow the sample to flow into the chamber at a constant rate. Opening the slide too rapidly will result in an overload and stall the motor. The sample should require about seven minutes to be ground. If it takes longer, your sample is either unnecessarily large or too wet. When it appears that the entire sample has passed the screen, turn off the motor.
- D. The collection hopper and quart jar are set aside. The door is opened and all residual material is brushed from the screen, knives and chamber into the catch pan.
- E. Place the contents of the catch pan in the center of a sheet of clean wrapping paper (20" x 30"). Add to this the contents of the collection hopper and quart jar. With a brush ensure that all material is transferred.
- F. Thoroughly mix the material on the paper by rolling it from side to side. Half fill a sample storage bag with randomly selected portions of the mixed sample. Once the container has been sealed and properly identified, discard the excess material.
- G. Thoroughly clean all parts of the grinder. Take care in removing caked material. Special attention should be given to the knives. You are then ready to proceed with the next sample. When finished with the last sample, **clean the machine and general area** for the next person to use.

III. Helpful Hints:

- A. Large samples may be uniformly divided with the slide separator.
- B. If at all possible, even apparently dry samples should be considered for pre-laboratory dry matter analysis.
- C. Normally, samples should be ground through a 1-mm mesh.
- D. Do not force a sample into the mill.
- E. If a sample goes too slow, stop the machine and regrind with a larger screen.
- F. It is desirable to pre-grind hard coated grains through a 2-mm mesh before grinding through a 1-mm mesh.
- G. Roughage samples, which are difficult to divide, may be ground through a large screen, uniformly divided and reground through a smaller screen. Samples such as corn stalks need to be run through the Masticate before running through the Standard Wiley mill.
- H. To facilitate sample mixing in the storage container prior to use, fill it only half full.
- I. Do not attempt the freeze grinding procedure without specific instructions.
- J. Use common safety sense in operating the various machines. The mills can be very

dangerous.

K. Turn on the ventilation system before grinding samples. This will help cut down the dust in the air.

PLEASE CLEAN THE MACHINE AND GENERAL AREA WHEN FINISHED. GIVE THE NEXT GUY A BREAK.

1. Eye protection is required. Ear protection is highly recommended. (Use of dust masks is recommended.) Keep your fingers and hands away from the cutting blades.
-Standard Wiley mill does not have a safety “off” switch and will not shut off if the mill is running.
2. The electric motors and ovens are **not** explosion proof! Airborne dust **must** be kept to a minimum to avoid any hazard of a flash explosion.
3. Please close the door to the oven room and open the doors to the hallway when grinding.
-This may not be relevant now that we have a ventilation system in place. Just

aware.