

Using the Pneumatic Press and Pellet Die



Figure 1: Prepare your sample.

There are many different procedures for preparing powdered samples for XAFS. In the PNC/XOR lab, materials can be ground by mortar and pestle or ball mill. Several different options are available, depending on the hardness and sensitivity to contamination of your sample.

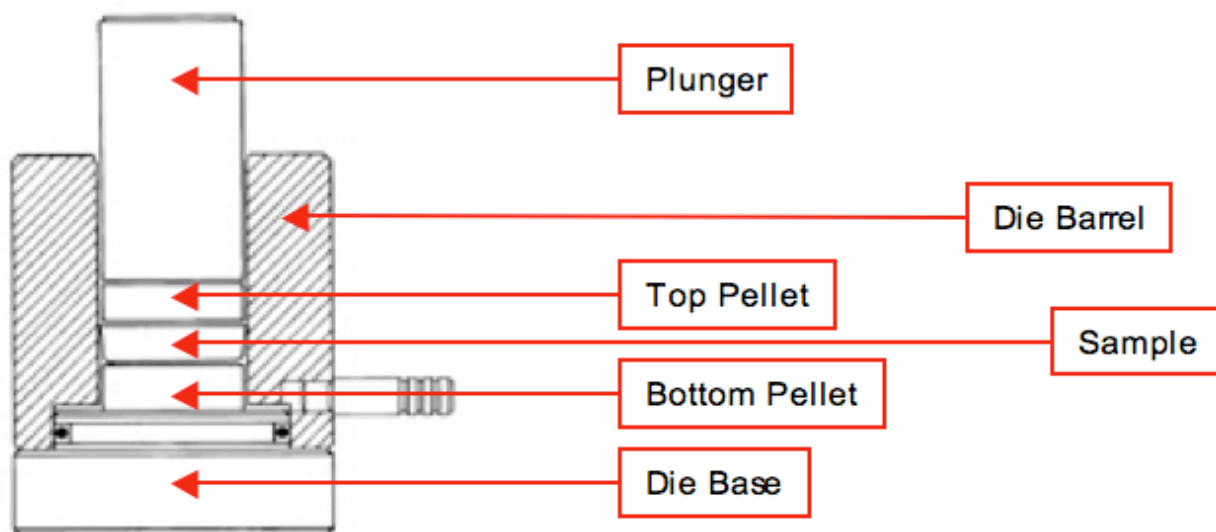


Figure 2: 13 mm Die Set Components.

The 13 mm Pellet Die components are shown in Figure 2. Each pellet is optically polished on the side that faces the sample. The Evacuatable Pellet Die is a precision tool which must be handled carefully and diligently maintained for proper operation. The polished surfaces of the Steel Pellets are fragile, and should be handled like optical components. Any damage to the Pellets should be reported to Julie Cross immediately for correction.

Assembling the Pellet Die

Most pellet dies operate by pressing the sample between two polished steel surfaces. Once the sample is pressed, it should be fairly easy to remove from the die. If your sample does not hold together after pressing, we have several binder materials in the lab that can be mixed with the sample.

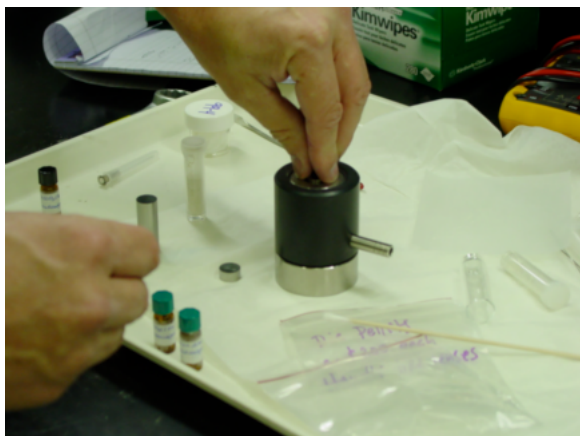


Figure 3: Press the Die Barrel into the Die Base. Insert the Bottom Pellet with the polished side facing UP.



Figure 4: Pour your powder into the bore of the Die Barrel.



Figure 5: Level the sample in the bore and wipe off any spilled powder.



Figure 6: Insert the Top Pellet into the Die Barrel with the shiny side DOWN.

When handling powder samples, always use a Spill Tray and Personal Protective Equipment (PPE) appropriate to the level of hazard (gloves, safety glasses, face mask, etc.). In addition, nanometer scale powders of any kind present special health risks and should always be handled inside the Powder Handling Box.



Figure 7: Put the Plunger into the Die Barrel on top of the Bottom Pellet

Pressing The Pellet

Place the assembled Pellet Die on the lower platform of the Pneumatic Press. The center of the Die Assembly should be aligned as closely as possible to the center of the Piston. If the platform is too high, loosen the Knob at the base of the piston. **Do not loosen the knob all the way or it will fall out and spill a liter of hydraulic oil onto the workbench.** Double check that the Die Assembly is Centered and the Knob is closed (do not over tighten).



Figure 8: Center the assembled Pellet Die on the platform in the Pneumatic Press.



Figure 9: Pump the handle to raise the lower platform.

If needed, the Die Assemble can be evacuated using a small diaphragm pump. Pump the handle to raise the lower platform, and to apply pressure to the Die Assemble. Maximum pressure for the 13 mm Pellet Die is 10 tons.

Removing the Sample Disc

Remove the Die Base from the Barrel. Invert the Die Assemble and press down gently on the plunger. The Bottom Pellet and the Sample Disk should pop out of the Barrel.



Figure 10: Remove the Die Base.



Figure 11: Invert the Pellet Die Assemble and press down gently on the Piston. The Bottom Pellet and the pressed Sample Disk should pop out.

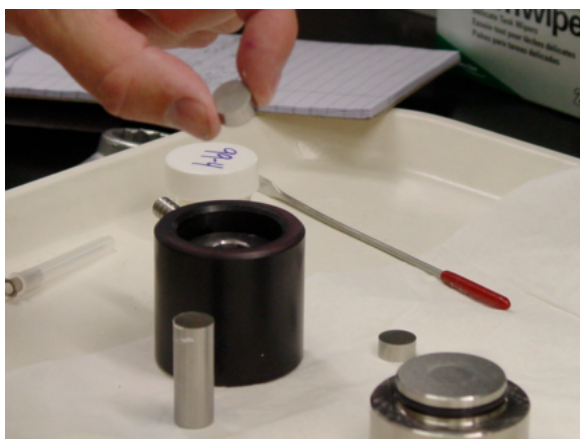


Figure 12: Disassemble the Pellet Die.



Figure 13: Carefully clean all of the parts with cotton tipped applicators and KimWipes.

For more information about making pressed samples, see the section “Pressing and Pelletizing” in the Spex/SamplePrep Handbook of Sample Preparation and Handling located in 435E-020 on the top shelf of the sample preparation workbench.