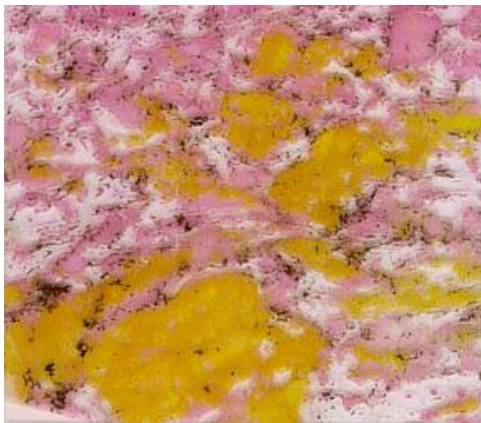


Staining feldspars in thin section

by Kurt Hollocher



Unstained thin sections are best for identification of mafic minerals, optical properties, and most textural characteristics. In many cases, however, it is difficult to distinguish between the colorless feldspars and quartz, particularly if the feldspars are untwinned. This is especially problematic if quantitative mineral proportions are desired (e.g., point counts); it is rarely possible to determine the mineralogy of every grain, small grains in particular.



Staining makes it easy to distinguish between colorless quartz, yellow K-feldspars, and pink plagioclase, making quantitative work (e.g., point counting) quick and accurate. On the other hand, staining obscures details of the stained minerals, and sometimes also of other minerals too, and therefore makes routine petrographic work more difficult. It is therefore best to have both stained and unstained thin sections of the same rock, or do the routine petrographic work first, and stain when you need to.

Thin sections to be stained must be uncovered and clean. Covered sections can be uncovered, but the rock surface must be thoroughly cleaned of any coverslip adhesive before staining can be successful.

Mixing reagents

Most things needed for staining are in a labeled tray in room Olin 330 somewhere.



1. To a 125 ml plastic bottle, add 1.4 g of powdered amaranth stain (red). Add 100 ml of DI water and shake until dissolved.
2. To a 125 ml plastic bottle, add 5.5 g of BaCl_2 . Add 100 ml of DI water and shake until dissolved.
3. To a 250 ml plastic bottle add 60 g of sodium cobaltinitrite. Add 100 ml of water and shake until dissolved.
4. Obtain a bottle of reagent grade ~50% HF. Beware of HF and take all appropriate safety precautions. HF must be used in a hood.

The amaranth, BaCl_2 , and sodium cobaltinitrite solutions should not be stored for long periods (months). Amaranth slowly loses its staining effectiveness, BaCl_2 gradually precipitates as BaCO_3 because CO_2 diffuses through the plastic, and the sodium cobaltinitrite damages the plastic bottle, and doubtless undergoes other changes. Remake the reagents after a few months.

Set-up

Set things up at a sink, with containers in sequence for the three reagents, and a rinsing station in the sink. It is best to set up next to a working fume hood, because the HF etching **MUST** be done in a hood.



1. In a hood, set up the plastic petri dish and the cover with the appropriate hole size for your thin sections. Put $\sim 1/8$ " of HF into the dish bottom, and put the cover on it. Cover the dish with an upside-down plastic bowl to keep air currents off. Note that the thin sections will never actually touch the HF liquid, only the vapor. Plastic petri dish tops can be cut to accommodate sections of different sizes. The plastic bowl is to cover the HF-containing dish when you aren't putting on or taking off a section.
2. Near a sink, set up three ~ 100 ml plastic containers of appropriate size and shape to hold the chemical baths into which your thin sections will be dipped. Fill the first container with the sodium cobaltinitrite solution, the second with the BaCl_2 solution, and the third with the amaranth solution.
3. Fill a large beaker or bowl with water and put it in the sink. This is for rinsing the thin sections between steps. A gentle stream of water should flow out of the tap to gradually replace the water. DI water is best but tap water will do. Do not rinse the sections directly under the stream from the tap, as the stained surfaces are fragile and can be washed off.
4. Set up paper towels with something to rest the sections against so that the sections dry on edge rather than flat.

Procedure

Samples can be stained in a sequential process, where one section is brought through each step, or in a batch process, where all sections are brought through each step before proceeding to the next step. Some procedures recommend drying the samples between steps, but some do not. I suggest that it doesn't make any difference. Once you start, don't touch the thin section surface until the coverslip is mounted. The stained surface is very fragile and your fingers, or even fast streams of water, will rub the stain off. ONLY handle the sections with tweezers, preferably plastic ones! Don't go sticking your fingers into the HF and such. Wear gloves, too!

1. Put a thin section over the hole in the HF-containing plastic petri dish, rock side down (of course). Put the plastic bowl upside down over the dish to reduce drafts that result in uneven staining. Let it sit for 40 seconds. Adjust the time as needed after the first sample is stained.
2. Put the section in the sodium cobaltinitrite solution for 60 seconds.
3. Rinse section.
4. Put the thin section in the BaCl_2 solution for 15 seconds.
5. Rinse the section.
6. Put the section in the amaranth solution for 30 seconds.
7. Rinse the section and let it dry on its edge, not flat.

When dry, the section should be covered with a coverslip like any other thin section.

Staining rock slabs

Rock slabs can be stained the same way, except that the slab surface is actually immersed in the HF for 15 seconds, and then rinsed. Everything else is the same, though you may need more of the reagents and larger dipping containers. For the most even staining, slabs should be impregnated with epoxy, wax, or varnish to seal cracks and porous areas, and then ground flat to remove the excess sealant from the surface. Stained surfaces should be covered with a clear varnish or lacquer for protection. Spray-type is easiest and least likely to mess up the stained surface.