Protocol for Mineral Separation: Feldspar/Quartz - Quartz/Heavy Minerals

The separation is done in two steps, first to remove the feldspar and then to remove the heavy minerals.

Dense liquids of 2 different densities are used. LMT with density 2.62g/ml to separate feldspar, and LMT with density 2.75g/ml to separate heavy minerals.

The liquid is the same, but the dilution in water is higher or lower.

The sample is immersed in the liquid in a falcon tube and goes to centrifuge to expedite the separation process.

Each process is done with 4 samples at a time, which is the number of tubes that fit in the centrifuge. Each tube has a capacity of 50ml.

All the liquid used must be reused, including washing, and should be stored in a large beaker.

The following process is detailed for reproduction.

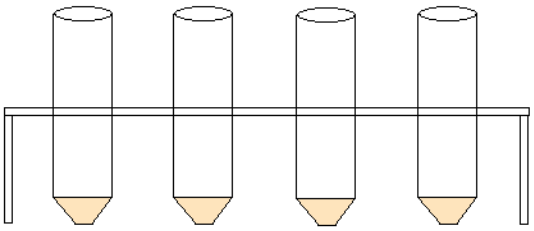
Material used:

1. Rack for 4 tubes
2. 4 falcon tubes graduated 50ml with lid
3. LMT at density 2.62 g/ml
4. LMT at density 2.75 g/ml
5. Big beaker for storing washing LMT
6. At least 2 erlenmeyer with funnel and filter
7. 4 pasteur pipettes
8. Distilled water
9. Centrifuge

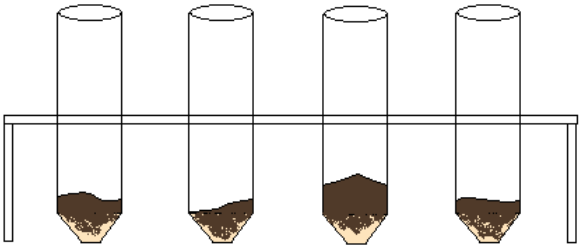
Consideration: samples should be well dried and loose.

Step 1 - Feldspar Separation

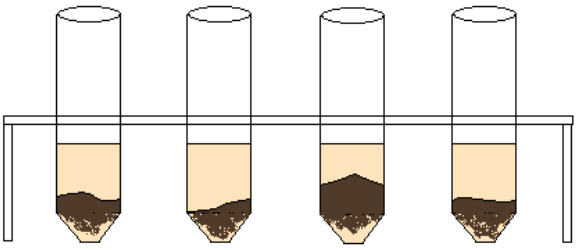
1. Identify tubes with sample names
2. Place LMT 2.62 in the empty tubes only until filled with tapered bottom



3. Put sample in the tube to the maximum 5ml mark (if you have less than that, no problem). If you have too little sample, be very careful not to lose the sample in the process.

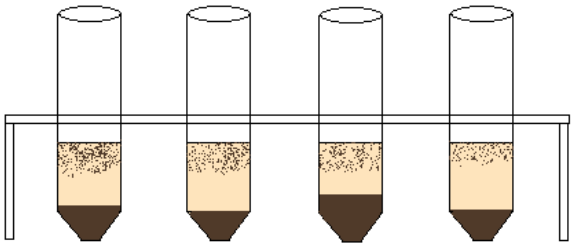


4. Fill with LMT 2.62 preferably up to the 20ml mark, or 15ml if you do not have enough liquid. Don't shake. If you need to mix, use the tip of the pasteur pipette to stir, careful not to change the level of the mixture (do not shake). If the tube is shaken, the grains stick to the tube wall above the level, and this compromises the process.

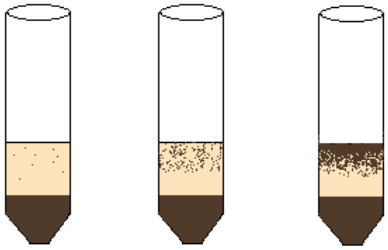


5. All tubes must be filled at the same level for balance of the centrifuge.
6. Place in pre-programmed centrifuge and press start (on/start).
7. The centrifuge will accelerate up to 1000 rpm and rotate for 3 minutes, then slow down and beep. Snaps mean the lid has been unlocked.

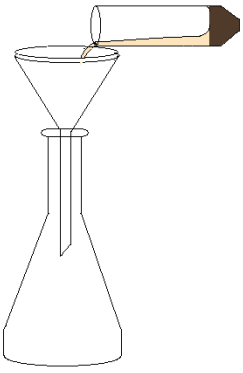
8. After the round, the sample should be separated, with the quartz at the bottom and the feldspar on the surface.



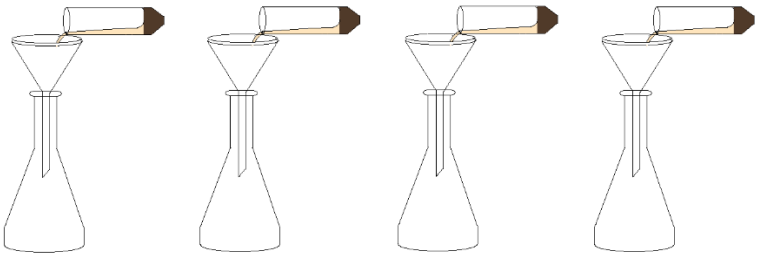
The sample may have a lot of feldspar, very little or none, as shown in the figure below:



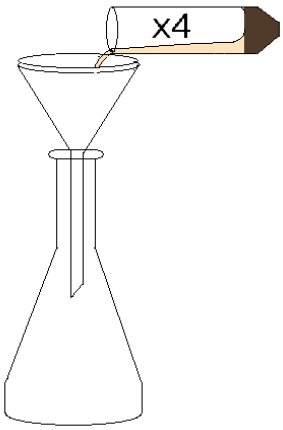
9. Turn the tube into the filter, to drain as much liquid as possible, the quartz will stick to the bottom and will not fall.



10. If it is necessary to save the feldspar, assemble an erlenmeyer with funnel and filter for each sample, and pour separately one in each. After the liquid has finished draining, move the feldspar to a beaker and rinse as described at the end of Step 2. The lmt-soaked filter should be soaked in the stored water as described in the Process Completion.



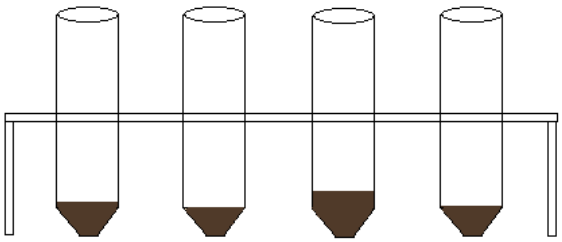
If it’s not necessary to save the feldspar, you can dump them all in the same filter.



11. In case you have too much feldspar it is recommended to complete up to 15ml again and rotate again. Repeat the process.
12. Do not touch the sample that was left in the tube. It's still in the process.
13. The LMT that passes through the filter will be ready for reuse as long as it is not mixed with water. Wait for all the liquid to go through the filter, and then store the LMT that stays in the erlenmeyer back in the corresponding bottle. But this can be done at the end of the process.
14. Back to the sample, it is ready for the next step.

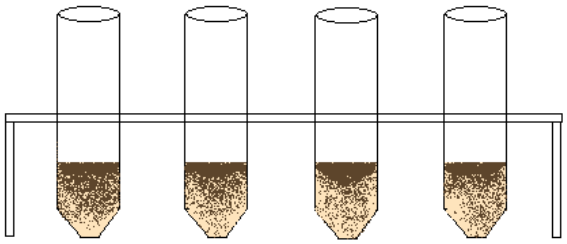
Step 2 - Separation of Heavy Minerals

15. At this point you should have this result:

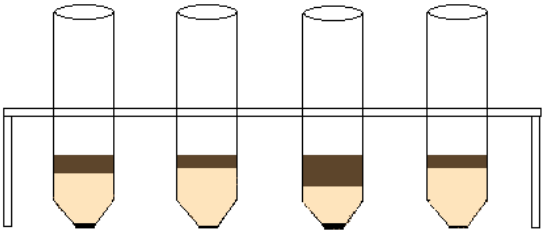


Sample without feldspar stuck to the bottom of the tube, with remnant of LMT that was absorbed in the sample.

16. On top of that add the LMT at density 2.76, until complete 15ml.



17. It is not necessary to stir, take it straight to the centrifuge.
18. After spinning, the result will be quartz on the surface, and heavy minerals at the bottom of the tube.



19. Remove the heavy ones from the bottom with the pasteur pipette dry and clean, and deposit on another filter.
20. After removing the heavy minerals, remove all possible liquid in the same way, with the pipette at the bottom of the tube, until it pulls only air. When you remove the pipette and a little hole is left in its place, that is the right point. If you have little sample, be careful not to pull the sample into the pipette.
21. So far there's been no washing. The sample at the bottom of the tubes can be removed with the distilled water pisseta, and poured back into the beaker. After that, rinse, putting 50ml of distilled water in each beaker, stirring a little and pouring the water into the large beaker(1000ml), repeating until using the entire contents of the

full pisseta (1 liter). That's about five rinses. All rinse water should be deposited in the large beaker for subsequent recovery of LMT. If you feel the samples are still a bit sticky, rinse more times.

22. After washing, place the beakers in the oven to dry the sample.

Process Completion

After all LMT 2.62 and 2.76 pass through the filters, store them back in the bottles. Filters, hoppers and erlenmeyers must be washed with distilled water, and the water (with dilute LMT) also must be stored in the large beaker. For this:

1. Pass the contents of the filters (feldspar, heavy) to a beaker. Rinse in the same way you rinsed the sample. Save rinse water. Put to dry and then discard.
2. Filters already free of grains, but soaked with LMT, must be put inside the beaker along with the water, leave to soak.
3. Funnels and erlenmeyers, rinse once with distilled water, save that water, and then wash normally with tap water and detergent.
4. The large beaker should rest until the next day, to dilute the LMT of the filters, after that, filter, and put in another glass beaker on the heating plate at a maximum of 200 degrees Celsius. When forming a film on the surface, take off the plate. Allow to cool.
5. Measure density, and add distilled water until you reach the desired density.