





- Stopping hydration by solvent exchange
- Polishing samples for SEM
- Coating

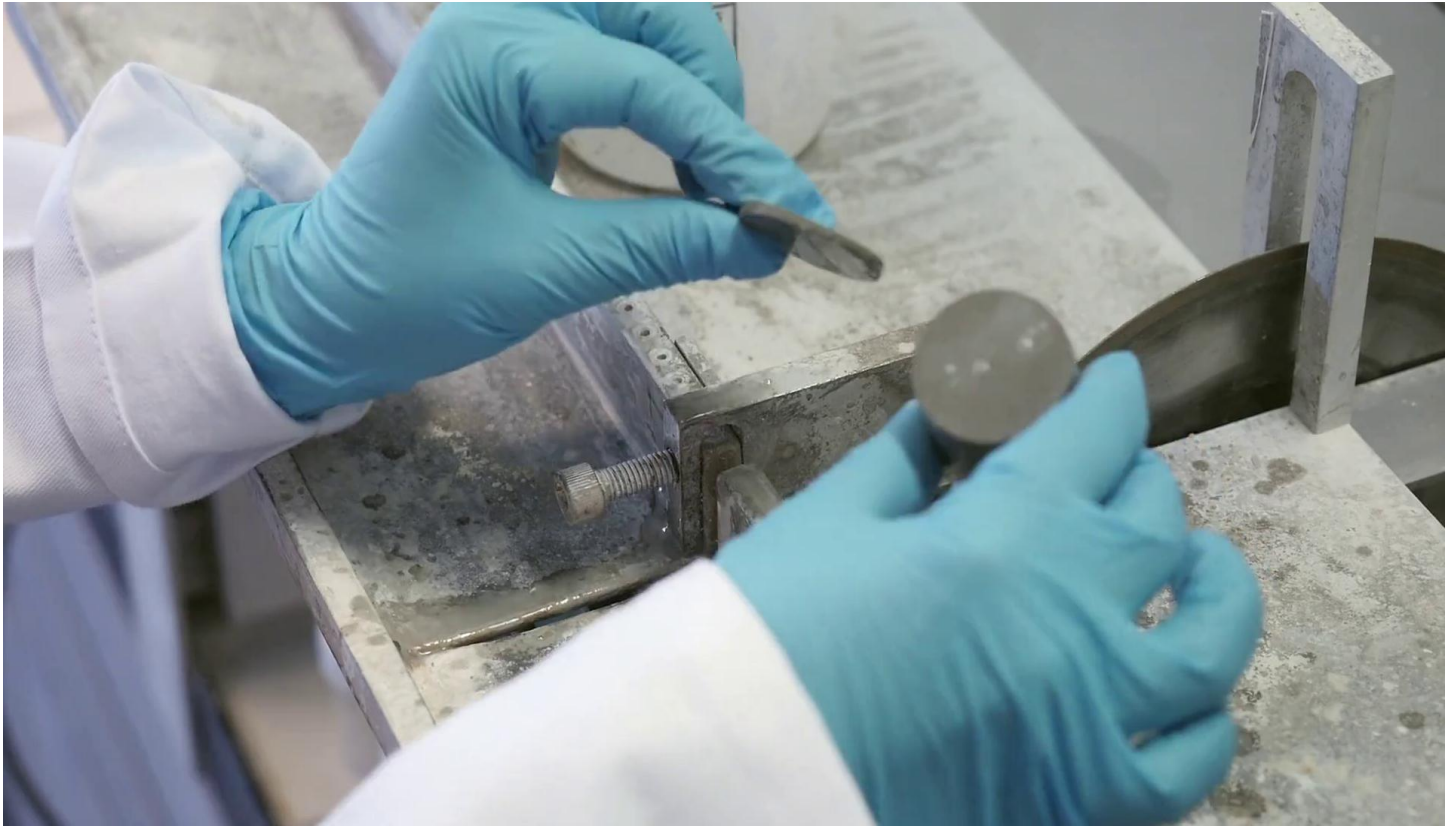
Hi. I am Aurélie Favier and this tutorial will explain how to stop hydration by solvent exchange and how to prepare polished section for scanning electron microscopy.

Notes

Summary



0m 04s



After preparation of the sample of cement paste, mortar or concrete, you want to test it at specific times: 1 day, 3 days, 28 days. Today I will show you how to stop hydration on a sample of cement paste.

Notes

Summary



0m 13s



First the sample must be strong enough to be sawn. If the sample is not strong enough, then you will definitely stop the hydration using freeze drying or filtration under isopropanol. Once the slice is cut it must be immersed in a sufficient amount of isopropanol with a 99% purity. It is necessary to renew this solution regularly the first 24 hours and then every 24 hours for 4 to 7 days maximum.

Notes

Summary



0m 25s



The disc will then dry in the desiccator for 48 hours. Your slice is finally ready to be put in resin and polished. It will first be polished with 1200 grain size sand paper until a flat, shiny surface is obtained.

Notes

Summary



0m 50s



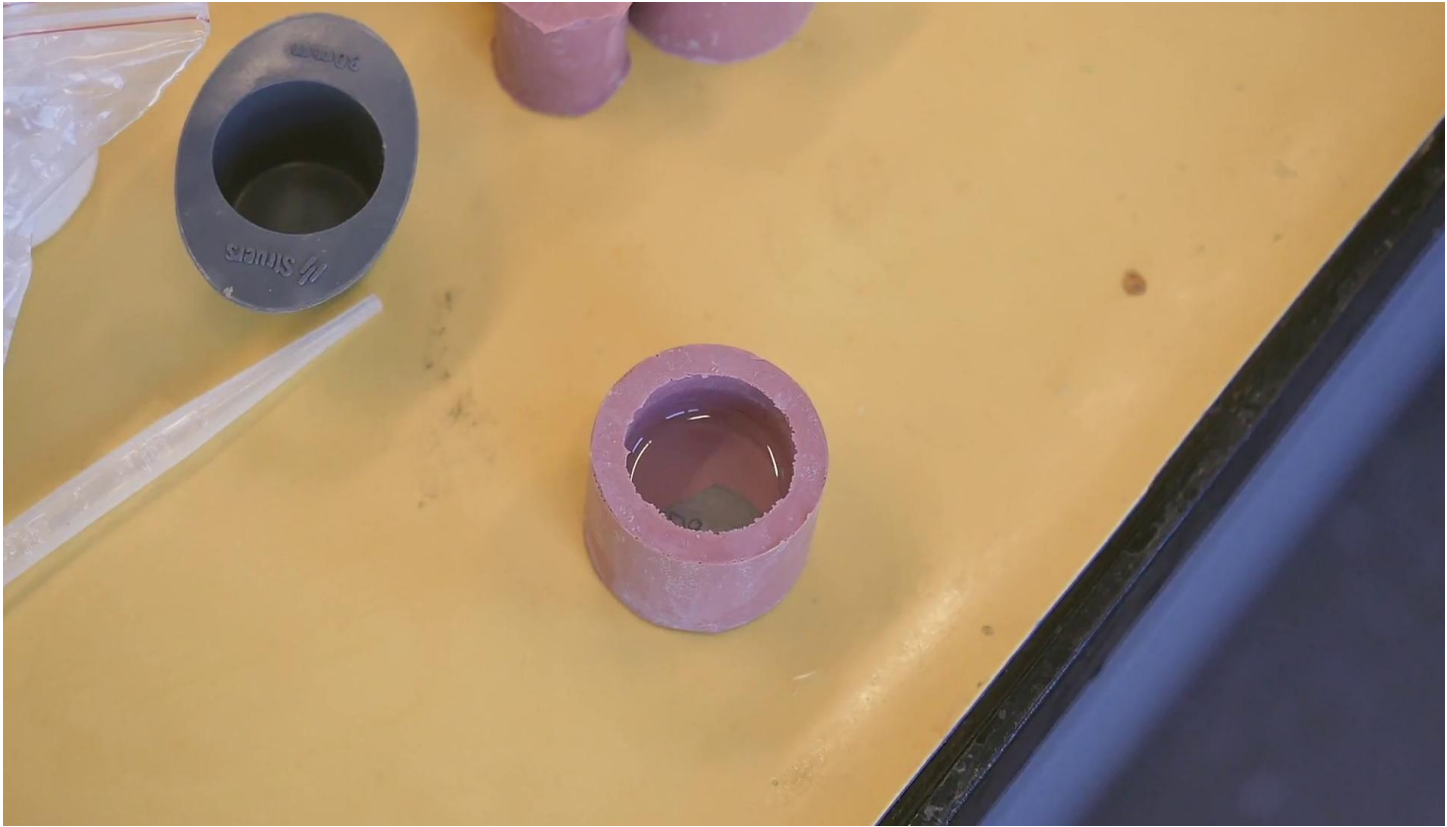


You can then cut a small piece and residual dust must be blown. The sample is then placed in the mould to be resin coated. The moulds here are homemade silicon moulds but commercial moulds can be used. In order to avoid air bubbles, the samples are kept under vacuum during the introduction of the resin.

Notes

Summary





However, you can also pour the resin first and then vacuum it to remove any air bubbles. We are going to prepare the resin. It is a mixture of 80% resin with 20% hardener. This resin is well mixed and sucked through the pipe to fill the moulds.

Notes

Summary



1m 23s



The amount of resin can be adjusted so that our samples have the same height. And hold them a few minutes under the vacuum again. The resin hardens within 24 hours and then it is possible to de-mould the samples. I will now show you how to polish the samples. First of all we will slightly discover the sample with a 1200 sand paper. A few seconds of polishing to remove a thin layer of resin at 150 RPM.

Notes

Summary

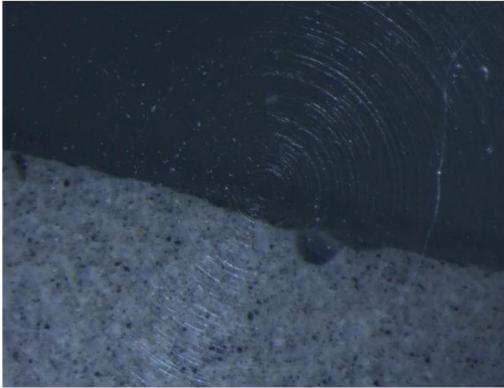


1m 38s



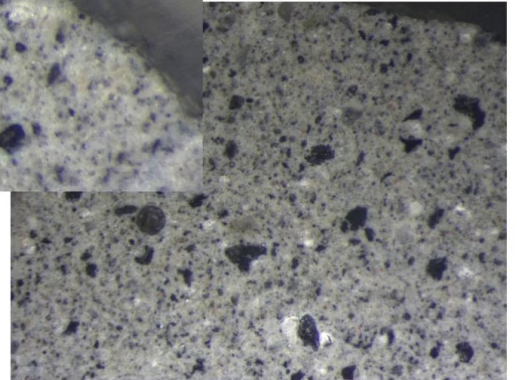
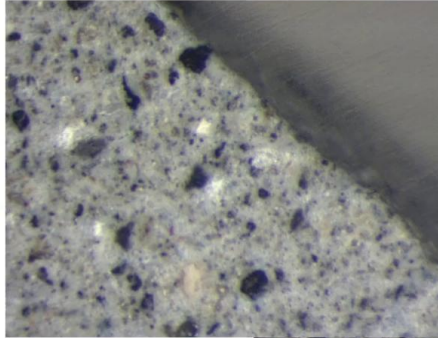
# Prepolishing

- Before prepolishing



- After prepolishing

- No continuous stripes
- No mold marks



The trace of the mould must be no longer observed and continuous lines must not be observed between the sample and the resin as it is shown on the right picture.

Notes

Summary



2m 05s

# Force and Time

- As a rough guide

Diamond Spray Finesse	Anhydrous	Cement paste	Mortar	Concrete
9 $\mu\text{m}$	15 min, 20-25 N	30 min, 15-20 N	3h, 25-35 N	4h, 40 N
3 $\mu\text{m}$	3h, 20-30 N	2h, 20-25 N	3h, 25-35 N	4h, 40 N
1 $\mu\text{m}$	3h, 20-30 N	3h, 20-25 N	6h, 25-35 N	8h, 40 N

Then the polishing is carried out using a spray containing particles of diamonds and a lubricant, petroleum. There are at least three steps corresponding to a diamond particle size. We always start with the biggest one, 9 microns and then the finest one, 1 micron. In this slide I will show you some indicative times of each step depending on the sample types: mortar, paste, concrete. Of course these times must be adapted to your samples and sample ages. It is recommended not to rush and control regularly the first time.

Notes

Summary



2m 14s



At least one drop every two-three seconds of lubricant is needed and the diamond particles must be renewed every 45 minutes. Samples should be cleaned with an ultrasonic bath in isopropanol between each step. It is recommended to have one polishing disc per size.

Notes

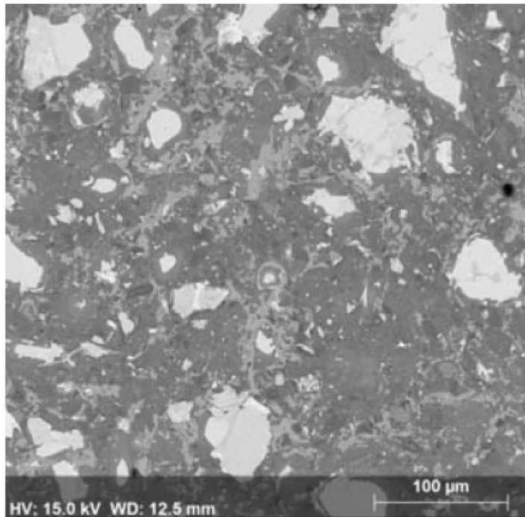
Summary



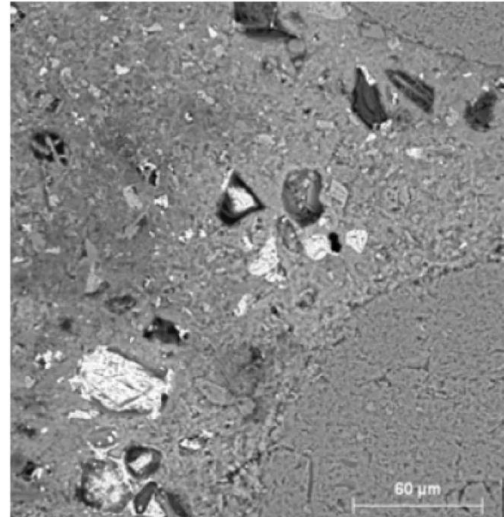


# Good or Bad Polishing

- The Good



- The Ugly



Finally we put the sample under vacuum and we can apply high current to pulverize the carbon on the sample surface. Your sample is finally ready.

Notes

Summary



3m 22s