# Reducing Resin Viscosity by Solvent

One of the samples encountered this expedition was diamictons, which are extremely poorly sorted with very little pore space, and are not very well lithified. When lapped, the rock is unable to maintain structure and crumbles away creating an undercut or gouges as larger pieces cut along the axis of travel on the abrasive.

There are many methods used to combat these sorts of difficulties. The foremost is to use a vacuum to maximize resin intrusion into the sample. Another is heat; resin becomes less viscous when heated, and tends to better fill voids. However, the issue with heat is that since resin is a thermoset plastic, it also encourages faster curing. The most promising technique is to use a solvent that allows the resin to cure properly, while reducing the viscosity. The experiment in this case was to compare two different solvents at different concentrations to ensure that they do not affect the hardening reactions.

The materials used in the experiment was Epotek epoxy, model 301: Parts A (the resin), and Part B (the curing agent, or hardener). All the measurements for the experiment were done with disposable 1mL transfer pipets with demarcations in 0.25mL increments. The alcohol used was reagent alcohol from Fisher Chemical A962P-4, where the acetone used was catwalk acetone. The samples were dispensed into aluminum weigh boats, and they were all placed into a KemVac vacuum impregnator, where a vacuum of at least 600mmHg (approx. absolute pressure of 21.3068kPa) was drawn. A chip of porous IW scrapings was used as an analogue for diamicton samples due to low porosity, high friability, and poorly sorted sediment composition. The scraping had a whole disc which was chosen to have come from a semi-lithified portion of the squeezed sediments which was manually cut into chips approx. 1cm x 1cm x 0.75cm, and was dried in an oven at 65C for over an hour.

The weigh boats were labeled and 0.75mL of resin (Part A) at room temperature were deposited into each. Then 0.25mL of curing agent (Part B) was added. The control sample was mixed immediately, where samples with added solvents sat until the requisite solvent could be added, then they were mixed. Once the resin and hardener were homogenous, the chip of porous rock was added, and the sample was moved to the vacuum chamber. Once all the samples were prepared in this way, the vacuum was drawn and was maintained for several hours. At some point overnight the vacuum became released, but since it is likely that since it happened uniformly for all samples it should not affect the results.

After 24h had elapsed, the chamber was opened and it was noted that the control and ethanol samples (33 and 66) were solid. A steel pick did not leave an indentation on the surface of the resin. On the other hand, the acetone samples had a distinct “gummy” texture and did leave indentations from the pick. Because of this, the acetone samples were placed on a 93c hotplate to stimulate the evaporation of the

solvent/curing of the resin. This did improve the result but the acetone adhesives were always softer and stringier.

Based on these results, reagent alcohol seems to be an excellent solvent. In subsequent usage, the ratio was moves to 100% (3:4:1 resin:alcohol:cure) without any immediately apparent ill effects. This method was indispensable to making thin sections of the diamictons samples encountered during x400.