Flocculation and Deflocculation of Decorating Slips

Vince Pitelka, 2021

If you are unfamiliar with these terms, see the handout on flocculation and deflocculation in claybodies. Some decorating slips work fine with just the raw materials specified in the recipe, while others seem to benefit from adjusting the ionic charge of the particles. Deflocculation causes particles in water suspension to repel and thus to flow more easily with less water content and thus less drying shrinkage. Flocculation causes the particles to attract and thus to stay in place better, but a flocculated slip shrinks far more in drying, and that can cause problems. When deflocculated liquid slips are laid down directly next to each other, as in feather-combing, there can be a slight mingling of colors that some people don't like. It's a balance depending on your personal preferences and the decorating techniques you prefer. It's best to experiment with both, and to do so you should start with a quantity of dry-mixed slip recipe, divide it into two batches. Deflocculate one and flocculate the other as you hydrate the slip, adjusting water content for each. Keep in mind that if you attempt to deflocculate a slip with neutral ionic charge that is already mixed to an appropriate consistency, it will become far too watery for use and can be adjusted only by adding more dry materials.

Once you have prepared small batches of flocculated and deflocculated slips, try out your decorating techniques, and see which version works best for you. Divide off smaller batches and further adjust the water content for the different techniques. If you are interested in the raised-relief slip techniques used by Steven Hill, Matt Long, and others, where the slip is applied thickly with a rib or the hand, you must use a deflocculated slip, because that technique simply will not work with a flocculated slip due to the shrinkage, and is often problematic even with a neutral slip.

The amount of flocculant or deflocculant is given as a percentage of the dry materials weight of the slip recipe. To flocculate any neutral slip recipe, dissolve 0.5% (1/2 of 1% of the dry batch weight) Epsom salts in hot water and add as part of the water to hydrate the slip. To deflocculate the recipe, add 0.25% (1/4 of 1% of the dry batch weight) each of soda ash (sodium carbonate) and sodium silicate in the same fashion. Sodium silicate is a liquid but is weighed as you would a dry material. Dissolve both in hot water and add as above. Both sodium silicate and soda ash work as deflocculants, but for reasons no one seems to be able to explain, they work best in combination.

Mixing a Flocculated or Deflocculated Slip

For a flocculated slip, dissolve the Epsom salts in a little warm water, add to an appropriate bucket, and add water to give a weight equaling 70% of the dry materials batch. This will give a slip containing 41% water and 59% dry ingredients. Weigh out the dry ingredients and add to the water, mixing regularly with a large whisk, hand blender, or drill-mounted mixer, and blend thoroughly when done. For best results, let the slip stand overnight before thinning (if necessary) to the desired consistency. Be sure to avoid over-thinning.

For a deflocculated slip, dissolve the sodium silicate and soda ash in a little warm water, add to an appropriate bucket, and add water to give a weight equaling 50% of the dry materials batch. This will give a slip that is 33.3% water and 66.7% dry ingredients. You can see the great contrast in water content between a deflocculated and a non-deflocculated slip. As above, blend thoroughly and let the slip sit overnight before thinning to the desired consistency, and be careful of over-thinning.