Tramfloc Polymer Testing Tips

Laboratory Polymer Handling and Dissolution Storing Polymer Samples

Polymer samples, especially liquid and emulsion polymers, should never be stored inside your car or in your trunk. Exposing polymer samples to temperature extremes, whether very hot or very cold, can cause chemical and/or physical changes. These changes can affect how and whether the polymer samples perform during lab testing.

When preparing solutions from emulsion polymers, always agitate the neat sample to ensure that the aliquot is homogenous and representative.

Dissolving Polymers In Advance:

Dissolving polymers beforehand, for example, the night before using them, can affect polymer selection and performance. In general, you should always use the water actually used in the customer's polymer feed system to dissolve your own polymer samples.

The shelf lives of dissolved polymers vary.

Anionic and nonionic polymers have longer shelf lives once dissolved but the presence of contaminants like ferrous iron can reduce their shelf life significantly.

Cationic polymers have the shortest shelf lives once dissolved. Cationic polymers will slowly or quickly hydrolyze once dissolved. Hydrolysis reduces cationicity.

If polymer samples must be dissolved in advance of use, these "rules of thumb" will minimize any chemical or physical changes that might result from storing dissolved polymers:

Stronger polymer solutions have longer shelf lives than weaker polymer solutions
Polymer solutions made with purer water have longer shelf lives than those made with impure water (tap water vs. refinery fire water, for example).
Polymer solutions stored at colder temperatures have longer shelf lives than polymer solutions stored at warmer temperatures

If polymers must be dissolved in advance, the final polymer selection should be re-confirmed by visiting the customer and dissolving the polymer samples with water that is used in the polymer feed system.

Dissolving Dry Polymers

In general, laboratory solutions of dry polymers are produced by slowly adding the powder aliquot to agitated water using a magnetic stirrer, a gang stirrer set to maximum RPM, and so on. The mixing period require to dissolve the dry polymer aliquot will vary from 15 minutes to 2 hours depending on the type of polymer and the concentration being prepared. Adding powder aliquots to a beaker or bottle that is not stirred or agitated will usually result in the formation of "gels" that may not fully dissolve.

Three "rules of thumb" for dissolving dry polymers are:

Strongly charged polymers dissolve more quickly than weakly charged polymers and polymers with lower molecular weights dissolve more quickly than those with higher molecular weights. Warm water will increase the dissolution rate but do not use water warmer than 120 ˚F.

The best way to measure a dry powder aliquot is with a laboratory balance. Small, low cost, portable balances are available now with sensitivities of +/- 0.01 grams.

Frequently, the customer will have a portable or analytical balance available that can be used for weighing powder aliquots.

Dissolving Liquid Polymers

Generally, an aliquot of liquid polymer is added to agitated water. The best way to measure the aliquot is by using plastic, disposable syringes. Be sure to buy bulk, non-sterile, "Slip Tip" syringes without needles in order to get the best value for your money. Avoid using "Luhr Lock" disposable syringes due to the cavity at the syringe tip.

When measuring liquid polymer aliquots, always wipe the syringe tip before adding the polymer aliquot to the agitated dilution water. The polymer attached to the outside of the syringe can be drawn into the aliquot as it is added to the dilution water thus making the polymer solution stronger than desired. The difference can be as much as 10-15%.

There are three ways to add liquid polymer aliquots to agitated water using a syringe:

The least accurate way is to measure the amount desired, 2 ml for example, and add to the dilution water without wiping the syringe tip. A more accurate method is to fill the syringe with the desired amount of liquid polymer, wipe the tip, and then add to the agitated dilution water.

Be sure to check the Specific Gravity of the polymer you are using and correct the polymer volume to be used. For example, Tramfloc 864 has a SG of 1.16. If 2 mls of 864 are added to 198 mls of dilution water, the dilute polymer solution strength is 1.16% not 1%, a 16% difference.

Adding Dissolved Polymer Aliquots

Dissolved polymer solutions usually have a Specific Gravity very close to water so the volumetric addition of polymer aliquots is reasonable accurate.

In most cases, it is best to measure and add the polymer aliquot using a disposable, plastic syringe. These are available in 1, 3, 5, 10, 20, 30, and 60 ml capacities. It is best to carry a variety of sizes. Two more "rules of thumb": Adding by difference is more accurate than emptying the syringe from the target amount.

For example, adding 6 ml by filling a 10 ml syringe and then injecting to the 4 ml mark on the syringe is more accurate than filling the syringe to the 6 ml mark and then injecting the contents.

Adding the polymer aliquot with a single syringe is more accurate then using several syringes. For example, adding 18 ml is best accomplished using a 20 or 30 ml syringe and adding the 18 ml by difference. Using a 5 ml syringe to add three 5 ml and one 3 ml aliquot is less accurate.