NIMA TECHNOLOGY

Surfactant Check List

Making Langmuir-Blodgett films is easy on your Nima LB trough - provided that you know how to keep surface active agents (surfactants) at bay. The following list should help eliminate any contamination.

Water source

Use a commercial de-ioniser such as those made by Vivendi (ELGA UHQII), Millipore (Milli-Q) or Barnstead (Nanopure). These units are capable of producing 18M-ohm.cm water with organic content of less than 20ppb. They have 4 stages of purification, reverse osmosis and organic removal. If you use distilled water, please be aware that conductivity won't be much better than 1M-ohm.cm. This will affect your work if you are working with, for example, fatty acids where the mineral ions in the distilled water will combine with any dissociated fatty acids.

Water storage

Only store water in good quality borosilicate glass bottles with ground glass stoppers. Ideally, the water should not be stored for more than 30 minutes, as after this time significant quantities of mineral ions will leach out of the glass.

Never use plastic bottles or even 'Teflon' bottles, as these can contain surfactants which will seriously contaminate your surface. Don't even use plastic stoppers on glass bottles. We recommend a 2litre round-bottomed, long-necked Pyrex glass bottle with glass stopper for your trough work.

Solvents

Always buy small volumes of the best quality solvents. Free radicals can form in the solvent after 3 - 6 months (depending on temperature and light exposure), so store them in the fridge. If free radicals do form, they will cut your long chain molecules into smaller pieces and you will get some very strange isotherms.

Always dispense the solvent into an intermediate glass bottle, to prevent back-contamination of your source bottle. Keep all glassware exclusively for Langmuir film work and never use plastic bottles or stoppers. And never, ever parafilm!

Always use a balance to measure weights of solvents - and work out the volume from the solvent density. Make a note of the weight before storing your solution in the fridge and measure it again before the next time you use it - in this way you can work out the concentration despite any solvent evaporation.

Trough cleaning

Always use the Kimwipe tissues (type 7105, or Kimtech type 75512 supplied with the trough - or type EX-L No 34256 in the USA) soaked in chloroform wearing polythene gloves (also supplied). Other tissues and gloves may contain surfactants which will make the trough dirtier than when you started.

Make sure you are working in a well ventilated room and ask your laboratory supervisor about safety regulations and toxic solvents. Keep a separate bottle of chloroform for cleaning, to prevent back-contamination of the source bottle.

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Soak the Kimwipe with the chloroform and gently, but firmly, wipe down the trough's PTFE surface and barriers. Take extra care with the edges, as any aggregates will conglomerate there. The cleanliness of the trough can be checked visually by filling it with water and then using the aspirator pump to empty it again. Hold the pump nozzle at one corner of the trough and watch the water pull away from the PTFE. A good indication of cleanliness is if the water pulls away cleanly from the PTFE without leaving any droplets behind.

If a simple wipe with a Kimwipe does not clean it well enough, stand the trough in a fume cupboard and fill it with chloroform. Allow it to stand for about 10mins and give all inside edges a good scrub with a 'cotton bud' (the little sticks used for cleaning out your ears). Then remove the chloroform, taking care to dispose of it safely, and rinse the trough several times with pure water. Note that the chloroform must not be allowed to evaporate away, otherwise the dissolved contaminant will be left in the trough.

If you are using materials that are insoluble in chloroform, use other suitable solvents to wipe the trough down. If there are no suitable solvents, then use a detergent (see below). Never use strong acids or alkalis and never experiment for the sake of it - it is very easy to contaminate a trough and very difficult to eliminate unknown contaminants.

Detergent Cleaning

If there is no suitable solvent available for your trough contamination, it will have to be washed with detergent. Commercially-available detergents include Decon-90, Helmanex and Tikopur. These need to be used sparingly and the trough has been thoroughly rinsed (10 times with warm water) afterwards.

Full details are available in the 'Langmuir-Blodgettry' section of this manual.

Remember to use the detergent sparingly and to rinse the trough thoroughly afterwards!

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