

UNSEALED SHEAR-SENSITIVE LC MIXTURES
For flow visualization studies on solid surfaces

The use of unsealed shear-sensitive liquid crystal mixtures has now become an established method for diagnostic flow visualization. Experimental techniques have been used to illustrate laminar boundary layer transitions, laminar bubbles, shocks and separation in both flight and wind tunnel environments.

STANDARD MIXTURES

Three standard mixtures are available, details of which are given in the table below. All reflect red light under no shear conditions and should not crystallize above 0°C.

	CLEARING POINT (Ch-I Transition Temperature)	RELATIVE VISCOSITY AT 30°C	FLOW SPEED WORKING RANGE (m/sec)
BN/R50C	50°C ± 1°C	1	<30
BCN/192	49°C ± 1°C	4	30 – 75
CN/R3	53°C ± 1°C	15	75 – 200

CUSTOM MIXTURES

Mixtures with a variety of physical properties can be made. From the performance viewpoint, the physical properties of importance are:

- 1) The color of reflected light
- 2) The viscosity
- 3) The clearing point

These three variables can all be controlled with good accuracy within predetermined limits, and we will be happy to work with the customer to optimize and custom-formulate mixtures to meet precise application and performance requirements

PACK SIZES

25g, 100g and 250g

GUIDELINES FOR USE

1. Clean surface thoroughly to remove all dirt, grease, fingerprints, etc. Acetone, petroleum ether, and other common organic solvents may be used. Ensure that the surface is completely dry before proceeding.
2. Coat surface black. If the surface is already black, or sufficiently dark, the TLC may be applied directly. A black water-based paint (SPB100) is available and will dry in 30-45 minutes when sprayed through a good quality compressed gas sprayer like an artist's airbrush. Applying the black paint by brush is not recommended, as uneven coatings affect the thermal response properties of the TLC. The black paint supplied will isolate the TLC from traces of grease, which may be left on the surface after cleaning. The black backing paint must be dry before applying the TLC. Drying times may vary with ambient temperature and humidity, and can be accelerated by gentle blowing with hot air.
3. Apply the TLC.
 - a) Unsealed Mixtures: Heat the TLC mixture gently on a hot place until it clears (turns [melts] to an isotropic liquid). TLC mixtures are comparatively insensitive to short periods of heating as isotropic liquids; however, care should be taken to avoid excessive heating for prolonged periods of time. The clear liquid can be brushed onto the dry black surface. Gentle warming with a heat gun as the liquid is applied may be necessary to achieve a uniform thin coating.
 - b) Solutions: Apply the TLC solutions through a good quality compressed gas sprayer, such as an artist's airbrush. The colors will not appear until all the solvent has evaporated. Gentle blowing with a fan, hair dryer, or heat gun may speed up the evaporation, but care must be taken not to disturb the TLC film. The TLC coating is now ready for use.

Cleaning Up:

The TLC coating can be removed with acetone, petroleum ether and other common solvents. The SPB100 can be washed off with water. A hot, soapy wash will normally remove both the TLC and the black paint.

Storage:

Unsealed TLC mixtures should be stored out of direct sunlight. Surfaces coated with unsealed TLC should ideally be cleaned (the TLC removed) each day. If coated surfaces are stored overnight, they should be kept out of UV light, and in a solvent and dust-free environment. The color-temperature response of all coated surfaces should be checked at regular intervals to ensure that no loss of calibration has occurred during use, or between experiments, etc..

NOTES ON THE USE OF TLC SOLUTIONS

The preferred solvent for use with TLC mixtures is acetone (CAS Registry No. 67 - 64 - 1). An alternative is petroleum ether, boiling range 40 - 60°C (CAS Registry No. 8032 - 32 - 4). Both solvents are flammable and readily available through laboratory chemical suppliers.

The use of 15% (weight) TLC solutions is recommended, however, it should be possible to increase the liquid crystal concentration to 20% in most cases with no problems.

Because of the nature of the preferred solvents for TLCs and the care that needs to be exercised in their use, it is recommended that the materials are applied as the isotropic melts.