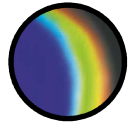


THERMOCOLOUR SHEETS

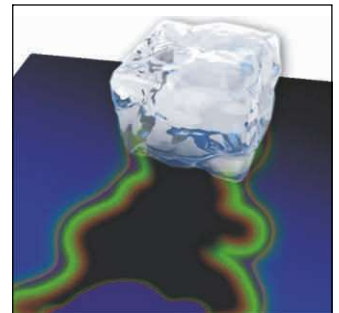
Thermocolour Liquid Crystal sheets change colour depending on temperature and are an exciting way to see those changes through colour. The sheets are a valuable resource for teachers to use in Key Stages 1 through to 4 to demonstrate;

CONDUCTION, INSULATION, CONVECTION, RADIATION, FRICTION and many other experiments involving temperature change.

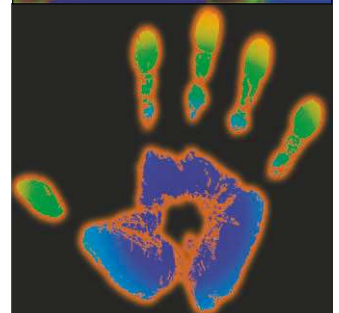
Standard sheets use a substrate of 100 micron clear polyester. The sheets are printed on one side, with microencapsulated Thermochromic Liquid Crystal (TLC) coating, then with a black backing ink. The colour change properties of the TLC coating are viewed through the clear, uncoated side of the sheet. The sheets come with a pressure-sensitive adhesive backing and the protective release-liner can be removed for easy adhesion to a variety of flat surfaces. The sheet size is 150 mm x 300 mm however you can cut the sheet as most experiments can be conducted using much smaller pieces. The thermocolour sheets turn from black to red at a given temperature and, as the temperature is increased, pass through the other colours of the visible spectrum in sequence (orange, yellow, green, blue, violet) before turning black again at a higher temperature. The colour changes are reversible and on cooling the colour change sequence is reversed.



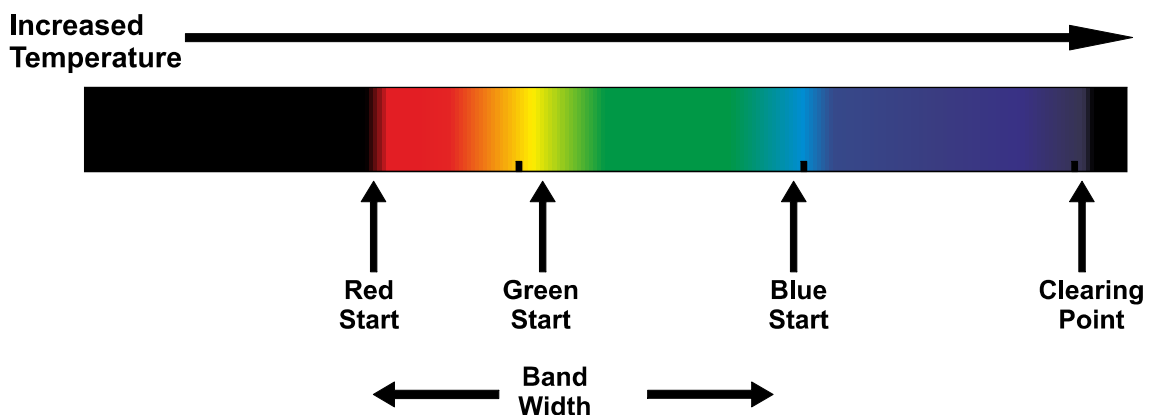
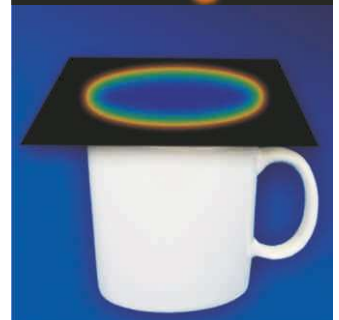
20-25°C



25-30°C
(Hand Touch)



30-35°C



Part No.	°C	Size	Backing
SH1LCRR20C05WA05	20°C TO 25°C	150MM X 300MM	Adhesive
SH1LCRR25C05WA06	25°C TO 30°C	150MM X 300MM	Adhesive
SH1LCRR30C05WA03	30°C TO 35°C	150MM X 300MM	Adhesive
SH1LCRR35C05WA03	35°C TO 40°C	150MM X 300MM	Adhesive
SH1LCRR40C05WA02	40°C TO 45°C	150MM X 300MM	Adhesive
SH1LCRR29C04WA01	STRESS 29°C	450MM X 300MM	Adhesive

USAGE INSTRUCTIONS

1. Clean surface thoroughly to remove all dirt, grease, etc. Acetone, petroleum ether and similar organic solvents may be used. Ensure that the surface is completely dry before proceeding.
2. Remove protective backing from adhesive and place sheet lightly in position on surface. Press down firmly with fingers in centre of sheet and smooth outward, in each direction in turn, to ensure that no air bubbles are trapped between the sheet and the surface.
3. The sheet is now ready for use as a temperature indicating film.

REMOVAL

After use, the sheet may be removed from the surface by pulling it off, although it may be destroyed in the process. Residual adhesive can be removed by washing with a suitable solvent. The choice of solvent will depend on the nature of the surface to which the sheet was attached.

STORAGE

Unused sheets should be stored out of direct sunlight at room temperature (20-25°C), in a solvent-free environment. Sheets in position on test surfaces should also be protected from UV light and organic solvents wherever possible. The colour play properties of the sheets should be checked at regular intervals. If stored correctly, the sheets should have shelf lives of up to a year or more.

LIFETIMES

TLC coated sheets should retain their colour play characteristics for many months under normal handling conditions. Continued submersion and temperature cycling in hot (40°C+) water baths will accelerate degradation, as will continued temperature cycling at elevated temperatures in general, and exposure to UV light.

SIMPLE EXPERIMENT IDEAS

1. Dampen the tip of a small cloth or sponge with water and "write" with it on the surface of the R20C5W sheet. The evaporative cooling that takes place will cause colour changes.
2. Place the R20C5W film in a refrigerator and observe the change in colours (from blue to red to black). Remove it from the refrigerator and observe the reverse order of colour as the temperature rises (black to red to blue). In the winter time, a window pane may also be used to cool the film.
3. Using the R25C5W, R30C5W sheets, you can determine the relative hand temperatures of a group of people. Due to variations in blood circulation, a wide range of temperature results may be obtained in the group. Even though normal body temperature is 37°C, you will note immediately that skin temperatures fluctuate considerably. Should a person not be able to cause a colour reaction on even the R25C5W, move the sheet away from the fingertips to the wrist area. You will eventually find a warmer temperature.
4. Place a metal coin and a plastic button next to each other on the sheet. Put a finger on each and apply a small amount of pressure. You will see the thermocolour film changing colour faster underneath the metal coin as it is a better conductor of heat than plastic.
5. Using the R35C5W, touch the sheet to see that it does not change colour. Then rub it with a finger or cloth to create friction and you will quickly see the sheet change colour due to the quick rise in temperature.

Note: As with all TLC applications, the better the incident lighting, the brighter the colours reflected by the TLC. However, the use of incandescent lamps too close to the TLC sheet should be avoided, as the materials are sensitive to UV light and the colour play properties will change with prolonged exposure.