

Thermochromic Leuco Dye Test Kit Users Guide

BACKGROUND

Thermochromic (TC) products predominantly change color in response to temperature fluctuations. There are two primary types of TC's, *liquid crystals* and *leuco dyes*.

The most famous TC application ever, the "mood" ring of the 1970's, was a liquid crystal. Today, liquid crystals are used in many products including forehead thermometers, room thermometers, game pieces, stress testers, and other applications. While liquid crystal TC's are extremely capable materials, they are difficult to work with and require highly specialized manufacturing techniques.

The other type of TC is called a leuco dye and is commonly used in advertising, consumer packaging, product labels, security printing, novelty applications such as temperature sensitive plastics, mugs, promotional items, toys and textiles.

DEFINITION

Leuco Dyes (LD's) change color with changes in temperature. LD's are reversible, meaning they change color back and forth as the temperature fluctuates. It takes about a 5°F (3°C) temperature change for the LD to change color.

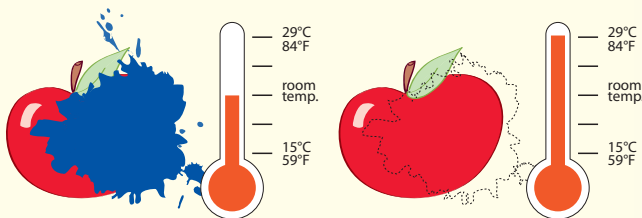
Activation temperature points range from low refrigeration type temperatures through normal body temperatures to high temperatures that exceed the pain threshold.

2 TYPES OF LEUCO DYES

COLOR TO CLEAR

- **Touch Activated Thermochromic Ink** will vanish when rubbed or touched to reveal an image or another color painted or printed beneath. (Color to Clear at 29°C / 84°F)

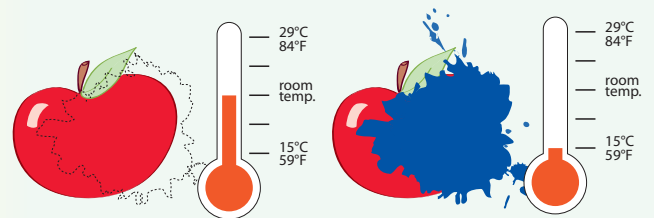
Think of an apple drawn or printed on a piece of paper. The touch activated ink is painted on top of the apple. When the newly applied ink dries and is heated (touched, rubbed, put near a heat source), it disappears showing the apple beneath.



CLEAR TO COLOR

- **Cold Activated Thermochromic Ink** is used on labels and packaging to create a color change when cooled. (Clear to Color at 15°C / 59°F)

Think of the same drawn or printed apple on a piece of paper. This time the cold activated ink is painted on top of the apple. The cold based ink will dry clear. When the painted piece of paper is stimulated with cold (refrigerator or freezer, icy liquid) the clear ink on the apple turns to a color thus hiding the apple.



Leuco Dye products are available in a wide variety of colors, temperatures and forms, which include powder, slurry, water and solvent based ink, epoxy, and master batch.

CONTENTS OF KIT

With the contents of this kit you will be able to experiment with both heat and/or cold activated ink.

TOUCH ACTIVATED LEUCO DYE KIT

Qty	Size	Slurry Color	Activation Temperature
1	50g	Black Slurry	29°C/84°F
1	50g	Binder	
1	50g	Blue Slurry	29°C/84°F
1	50g	Binder	
1	50g	Red Slurry	29°C/84°F
1	50g	Binder	

COLD ACTIVATED LEUCO DYE KIT

Qty	Size	Slurry Color	Activation Temperature
1	50g	Black Slurry	15°C/59°F
1	50g	Binder	
1	50g	Blue Slurry	15°C/59°F
1	50g	Binder	
1	50g	Red Slurry	15°C/59°F
1	50g	Binder	

MAKING THE INK

Mix all the contents of the binder bottle with the contents of the slurry bottle. This is a correct weight ratio of 1 to 1 and will make approximately 1/4 C thermochromic leuco dye screen ink. Stir until you see a unified mixture.

MIXING COLORS

Thermochromic ink colors can be mixed with other thermochromic ink colors. The resulting "Touch Sensitive" mixed ink color will turn to clear when touched (heated). For cold activated ink, the clear ink will transform into the stated mixed color when chilled.

TOUCH ACTIVATED LEUCO DYES

Mixed { Red Thermochromic Ink
Black Thermochromic Ink

NORMAL → **TOUCHED (HEAT)**

Red thermochromic ink and black thermochromic ink combine to make dark red. At room temperature, all colors show.

When touched (heated), red, black and mixed colors disappear.

COLD ACTIVATED LEUCO DYES

Mixed { Red Thermochromic Ink
Black Thermochromic Ink

NORMAL → **COOLED**

Red thermochromic ink, and black thermochromic ink and mixed dark red both dry clear at room temperature.

When cooled, red, black and mixed colors appear.

Thermochromic ink colors can also be mixed with colored acrylic house paint or artist's quality acrylic paint. The result would be that only the thermochromic ink color would change with heat, leaving the original acrylic color behind.

TOUCH ACTIVATED LEUCO DYES

Mixed { Blue Thermochromic Ink
Yellow Acrylic Paint

NORMAL → **TOUCHED (HEAT)**

Blue Thermochromic Ink and yellow acrylic paint mix to make green. At room temperature, all colors show.

Blue Thermochromic Ink disappears when touched (heated) leaving only yellow acrylic.

COLD ACTIVATED LEUCO DYES

Mixed { Blue Thermochromic Ink
Yellow Acrylic Paint

NORMAL → **COOLED**

Blue Thermochromic Ink and mixed green dry clear showing yellow acrylic only.

When cooled, blue and mixed green appear.

DILUTION

Dilute with water. Inks work when thinned. To keep a more opaque look, do not dilute.

APPLYING INK

Ink can be applied with a brush, pad, roller or used as a screen ink (silk screening).

FINISHED LOOK

Paint dries to a matte finish. Ink will not come off on skin. Use laminate or over varnish (spot or spray) for more glossy look.

PAINT ON ANY SURFACE

Best on absorbent paper and board substrates. Plastics, glass, wood, and ceramic all make good surfaces as well.

DRYING

Use hot air dryers or IR lamps set to a maximum temperature of 70°C/158°F. Air drying time varies depending on ink thickness.

FADING

UV light will break down the ink over time. Protect painted surface with a UV protective varnish if painted item is to be used outdoors.

CLEAN UP

Thermochromic ink is water based and can be cleaned with water only.

Use with adequate ventilation.

APPLICATION IDEAS

Rub and Reveal

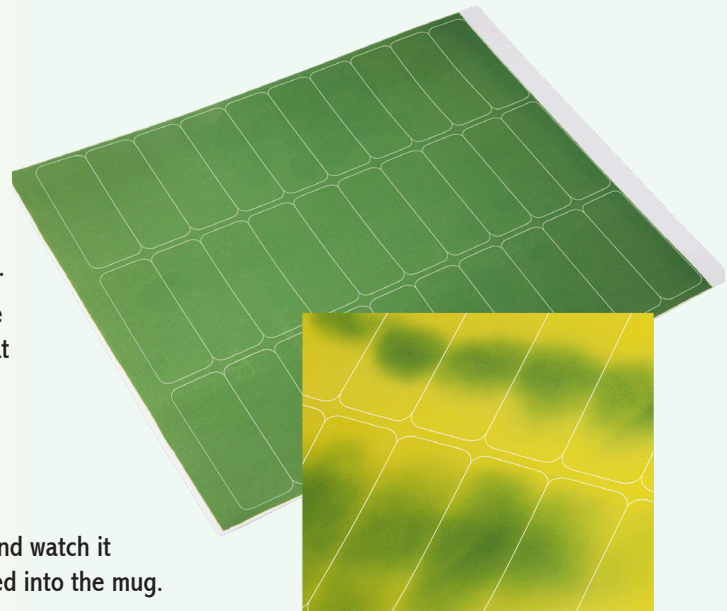
Paint over your message.
Rub dry ink to reveal message.



Touch Activated

Art Projects

Paint labels with a base color and cover with a thermochromic ink to create dramatic effect labels for craft projects



Heat Activated

Unique Decorations

Painted hurricane candle holders turn colors when warmed by a flame.

*Hint-Keep thermochromic ink above or close to the flame to increase heat and color shift effect.



Home Projects and Crafts

Paint mug with Thermochromic ink and watch it disappear when hot drinks are poured into the mug.

*Hint-Mix thermochromic ink and acrylic paint to make even more dramatic color changes!

Applications are only limited by the imagination!

See [PDS 012 Rev01 Thermochromic Water Based Screen Ink](#) for additional product information including cleaning and storage instructions.