

## Permanent Oil Slick

**Introduction:** A thin layer of clear nail polish on a black background will create interference colors.

### **Materials:**

Clear Nail polish (Sally Hansen – Hard as Nails) works best

Black construction paper – make sure it doesn't bleed colors in water

Aluminum pans – large enough to submerge the construction paper in the water

Water

### **What to do?**

Pour water into the aluminum pan about half way. Place a sheet of black construction paper in the pan and submerge it completely.

Use one drop of nail polish and let it drop on the center of the water inside of the pan.

### **Notice:**

The drop of nail polish stays together for a second and then spreads into a layer on the surface of the water displaying beautiful colors. Carefully lift the construction paper out of the water capturing the layer of nail polish on the construction paper. Place it on the top of a paper towel to dry. Look at all the beautiful colors that have appeared on the black paper.

### **What's going on?**

When the nail polish spreads on the construction paper it becomes very thin, in fact as thin as a wavelength of light. Light reflects from the top surface of the thin layer and from the bottom surface too. Light waves reflecting from the top and bottom surfaces will add together.

When the thickness of the nail polish is a half-wavelength of blue light thick, then blue light from the front and back surfaces will be out of phase (cancel out) and will not reflect blue. At this same thickness red light will be in phase (add constructively) and will reflect strongly giving the reflected light as a red color. Half a wavelength of blue light in the nail polish is about 250 nanometers.

When the thickness is a half-wavelength of red light then red will not reflect but blue will, giving the reflected blue color. Half a wavelength of red light in nail polish is about 450 nanometers.

**For more information: Check out the book "The Science Explorer" published by the Exploratorium under, Soap Film Interference Model and Soap Film color.**

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Adapted by Kathy Holt June 2014