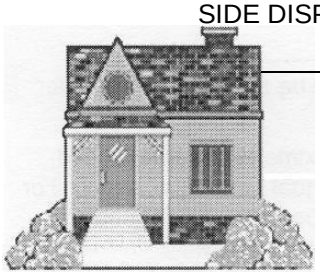
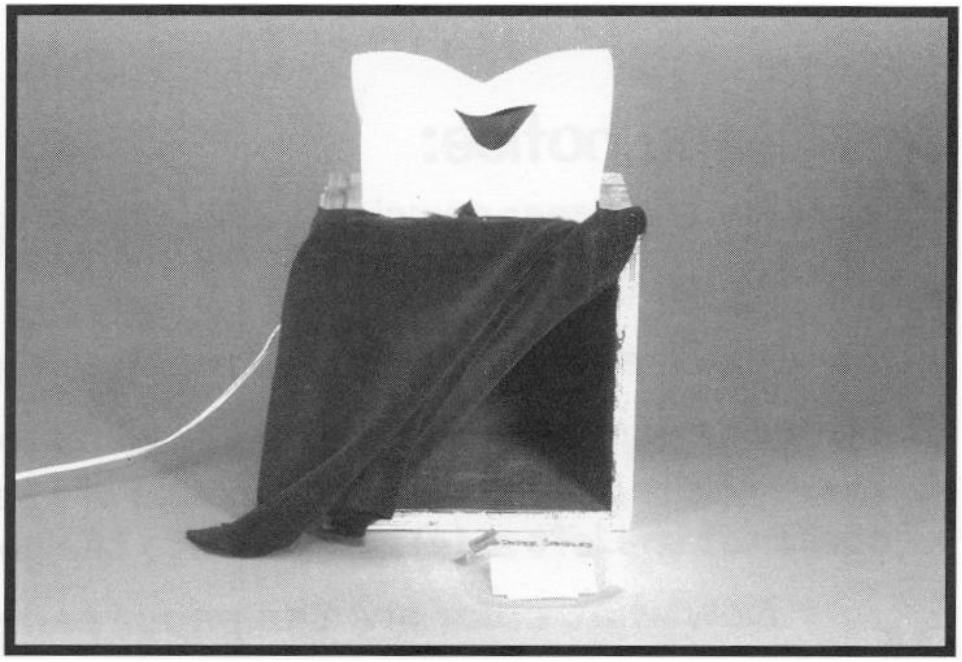
SIDE DISPLAY



Paper Whites

Visitors observe different paper samples under ordinary room light and under a black light.

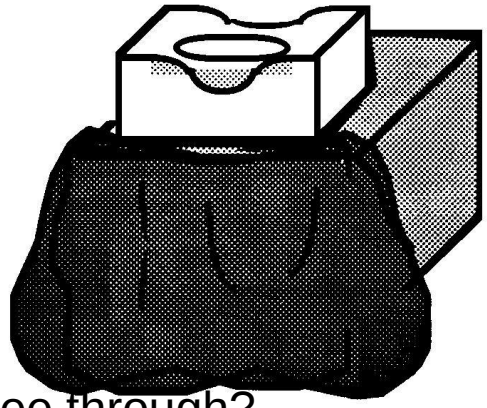


OBJECTIVES:

Visitors learn some of the chemical differences between different types of paper. They also learn that some chemicals can be identified by how they appear under a black light.

SCIENCE TOPICS	PROCESS SKILLS	VOCABULARY
Properties of Chemicals	Observing	Electron
Ultraviolet Light	Comparing	Molecule
Identification Techniques	Inferring	

Paper Whites



To do and notice:

1. Examine the paper samples.
   - Which samples are whiter?
   - Which samples are easier to see through?
2. Place the paper samples inside the view box.
3. Press the red button on the outside of the box (upper back corner of the left side) and look into the box through the viewer.

   Now what color are the paper samples?

What is going on?

Titanium dioxide (TiO_2) is often added to paper to whiten it, brighten it, or make it more opaque (harder to see through). Inside the box is an ultraviolet (black) light. Paper with titanium dioxide looks reddish-purple under this light.

Chemical compounds that look the same under normal light may appear very different under ultraviolet light. Electrons in compounds such as titanium dioxide absorb ultraviolet light and then re-emit the light in a different color. Fibers that can be seen only under ultraviolet light can be added to paper for security reasons. This process is often used to make checks harder to copy or forge.

MATERIALS

(with amounts to have on hand)

- One view box (see Materials Prep, Unit 6 Experiment "Light and Dark")
- Four 1-in. by 4-in. pieces of paper; each strip should be from a different type of paper that glows a different hue when placed under black light. (We used Boise Cascade Papers: Summit Form Bond (White Hi-Opaque), White 25% Cotton Laser, White Laser Opaque, and White OCR Laser Bond.)
- String or nylon fishing line
- Spray cleaner (such as Formula 409™) (from general storage)
- Tissues (from general storage)

Setup/Takedown Procedures

ORIGINAL SETUP

- ❑ Construct the view box (see Materials Prep, Unit 6 Experiment "Light and Dark").
- ❑ Weave the papers together in a cross pattern so that each paper is next to each of the others at some point in the pattern. Laminate the papers in place.
- ❑ Label the laminated woven paper "Paper Samples."
- ❑ Attach the paper sample to the copy holder with 2 ft of string or nylon fishing line.

WEEKLY SETUP

- ❑ Set out the public copy in the Plexiglas holder with the attached paper sample.
- ❑ Set out the view box.
- ❑ Set out the spray cleaner and tissues.

DAILY SETUP

- ❑ Plug in the view box, and check that the bulb is working.
- ❑ Replace the bulb as needed.
- ❑ Check and restock the supply of spray cleaner and tissues.

DAILY TAKEDOWN

- ❑ Unplug the view box.

WEEKLY TAKEDOWN

- ❑ Return the spray cleaner and tissues to general storage.
- ❑ Return the view box and copy to unit storage.

RUNNING SUGGESTIONS

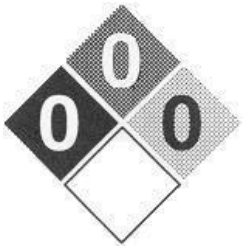
◊ If visitors have checks or other formal papers with them, they can check them (both sides) in the view box for fluorescent imprints.

EXTENSIONS

Relate this side display to the “Crime Lab” exhibit if it’s available.

Compare a white cloth that has been washed in detergent with phosphates with a white cloth that has been washed in detergent without phosphates. The phosphates will cause the white cloth to glow a purplish color under black light.

SAFETY & DISPOSAL



No special precautions are needed; follow standard lab safety procedures.