

# RAFT IDEAS

**Topics:** Chemical Reactions, Light Energy

## Materials List

- ✓ Blueprint paper
- ✓ Opaque cover (2) (e.g. – cardstock)
- ✓ Items to print (leaves, lace, keys)
- ✓ Developing container with cover (clear, quart food container or equivalent)
- ✓ Ammonia, ~5ml (~1 teaspoon)
- ✓ Small sponge or cotton ball
- ✓ Goggles

This activity can be used to teach:

Next Generation Science Standards:

- Energy can be transferred from place to place and converted (Grade 4, Physical Science 3-2)
- Structure of matter (Grade 5, Physical Science 1-1; Middle School, Physical Science 1-1)
- Property of materials (Grade 5, Physical Science 1-3)
- Chemical reactions (Middle School, Physical Science 1-2)



# Blueprints from the Sun

## Taking Pictures Using Sunlight and Blueprint Paper



Use the energy from the Sun to make shadow prints of everyday objects.

## To Do and Notice

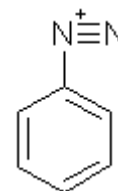
**Note:** The developing process uses **ammonia**. Practice safe lab procedures during this activity: **wear goggles**, develop blueprints in a **well-ventilated area**, and **wash hands** after the activity. Consider having adults only perform the developing steps if younger students are involved.

1. Prepare the “developing chamber” by adding about 5 ml (~1 teaspoon) of ammonia onto a sponge or cotton ball and placing it inside the container. Close the container until needed, and keep it closed whenever possible.
2. Gather desirable materials to print (ferns, leaves, transparent pictures, paper clips, lace).
3. In dim light, place the blueprint paper yellow-side-up onto a piece of cardstock.
4. Working quickly, place materials to print on top of the blueprint paper and then cover with a second sheet of cardstock.
5. Take the sandwiched blueprint paper to a sunny area. Remove the top cardstock sheet and expose the blueprint paper. As soon as the blueprint paper turns white, re-cover with the top cardstock sheet.
6. In a very shady or indoor area that is well ventilated, place the exposed blueprint paper into the developing chamber and shut the container. Try to avoid the blueprint paper touching the ammonia sponge.
7. Watch as the shadows of the printed items appear as blue lines, shapes, or areas. When paper is fully developed, remove the blueprint paper from the container and reseal.

**Blueprint paper is light sensitive!! Store in a dark area and keep away from bright light until ready to expose.**

## The Science Behind the Activity

Modern blueprint paper uses the diazotype method to produce dark blue images (e.g.- lines) onto a white background. The paper is light-sensitized with diazonium salt, a reactant, and an acid that inhibits the reactant and salt from reacting with each other. Light destroys the diazonium salt, so any area covered when the paper is exposed will still contain both the reactant and diazonium salt. Ammonia neutralizes the acid during the developing stage, allowing the remaining diazonium salt and reactant to combine and create a blue dye.



**Diazonium Salt**

**Web Resources** (Visit [www.raft.net/raft-idea?isid=308](http://www.raft.net/raft-idea?isid=308) for more resources!)

For information about blueprinting, see “How Stuff Works” at: <http://people.howstuffworks.com/question321.htm>