

MAKING RADIATION PHOTOGRAPHS

Supplies List

- Polaroid Type 57 (3000 speed) 4x5 packet film (sometimes photo stores sell outdated film for much less than the full price, which is about \$2 per sheet in boxes of 20).
- radiation sources
 - ✓ lantern mantles can be found at hardware and sports stores;
 - ✓ Fiesta ware at flea markets and some antique stores;
 - ✓ old radium-dial watches
 - ✓ smoke-detector part
 - ✓ assortment of rocks (e.g., samarskite) from science materials suppliers such as Fisher.
- rubber or plexiglass photo developing roller or sturdy wooden or plastic ruler.
- sheet of aluminum foil, lead

The Polaroid film packets at this Learning Center have been exposed to various common radioactive items by placing the item on top of the film packets (on "this side toward lens" side) for about a week. The items are displayed here.

Background for making radiation photographs

In autoradiography, an image is produced in a photographic emulsion by the radiation from some substance. Henri Becquerel first did this experiment in 1896. This principle is the basis of film badge monitoring. Film badges are worn by many radiation workers to measure personal radiation doses received over a period of time.

The recommended radiation sources below can be matched to the image appearing on the film. For example:

- radiation discs give off beta and gamma radiation;
- samarskite rock (contains uranium and thorium, which give off alpha, beta, and gamma radiation; found in North Carolina and California in the United States);
- some camping lantern mantles (mesh bag dipped in thorium oxide) can give off alpha, beta, and gamma radiation;
- a piece of orange Fiesta Ware (colored using uranium to get a bright look) gives off beta radiation;
- a radium-dial watch face gives off alpha and gamma radiation.

Since a sheet of paper can block alpha radiation and the film is covered by paper, this film will only detect beta and gamma radiations, not alpha.



By placing aluminum or lead between the radiation source and the film packets, you will also block beta, or gamma radiation. Therefore, you can identify the type of radiation coming from the source according to whether or not you get a "picture" of the source when various "shielding" items are used.

Question 1

Choose a film packet. Using the roller or ruler, place it behind the raised area containing developer (marked to show "do not press here"). Push the roller or ruler firmly over the developer area and straight back to the metal clip at the end of the film packet. Go back and forth a few times to spread the developer evenly. Wait about 25 seconds. Peel open the film packet (avoid getting the developer on your hands). The area exposed to a radiation source will be shaded lighter than the rest of the photograph. Match the radiation sources to your photograph and identify the source used.

Question 2

There are three (3) types of radiation:

- Alpha** a sheet of paper blocks this radiation
- Beta** a sheet of lead or a foot of concrete is needed to block this
- Gamma** several inches of lead or a foot of concrete is needed to block this

Which type(s) or radiation will be detected by this film?

Question 3

If you placed metal (like a paper clip, aluminum, or lead) between the radioactive item and the film packet, what could you tell about the radiation source after several days?

