

Darkroom Safety and Your Health

Why You Should Read This



Chemicals used frequently in our darkroom

Working in the darkroom exposes you to many toxic chemicals in a short time period, and continued darkroom work could potentially be hazardous to your health. We want you to be healthy.

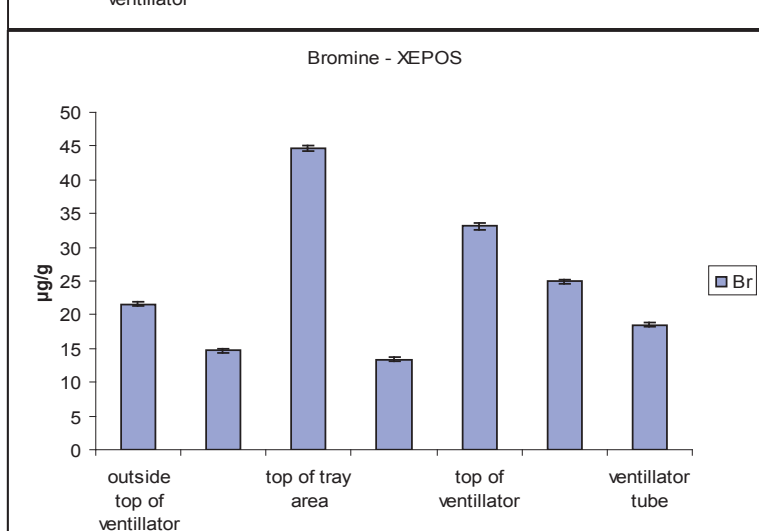
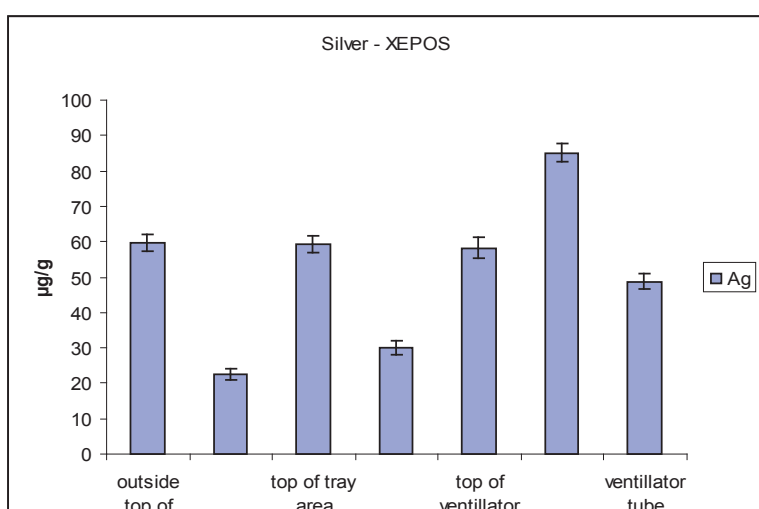
As our final project for Geology 201, we decided to investigate the darkroom and see if we could learn the truth about chemical exposure here. We are both veteran photographers (Zsuzsi more than Brianna) and wanted to know what exactly we were dealing with.

We took dust wipe samples of various places in the darkroom and analyzed them with two different methods:

- 1) a Niton XRF handheld analyzer and
- 2) the XEPOS XRF spectrometer.

A number of elements, including silver, bromine, and lead were found in the darkroom dust wipe samples. Silver and bromine are two elements that are toxic when exposure is chronic.

What Our Instruments Found



We have found traces of silver and bromine in the dust wipe samples we took to approximate air quality in the darkroom.

- Bromine Threshold Limit Value (TLV) of Air = 0.1ppm
- Silver TLV of Air = 0.01 mg/m3 (OSHA)

Suggestions

- Wear eye goggles
- Wear a protective respiratory device
- Use a water rinse step between developer and stop bath to reduce the formation of sulfur dioxide gas.
- Dust off surfaces regularly



Chemicals and Their Health Effects

Chemical	Found in	Hazards
<i>Acetic Acid</i>	Sprint Block Stop Bath, Spring Record Speed Fixer, Ilford Stop Bath	Chronic inhalation of acetic acid vapors from dilute solutions such as stop baths may cause chronic bronchitis.
<i>Ammonium Thiosulfate</i>	Sprint Record Speed Fixer	Can be toxic by inhalation. When heated or treated with acid it becomes sulfur dioxide gas which is highly toxic and can cause chronic bronchitis and emphysema. <i>Ammonia</i> gas can also be released from heating or adding acid. <i>Ammonia</i> is highly toxic by inhalation and ingestion and can cause severe respiratory irritation and chronic lung problems. Highly irritating to eyes. Wear gloves when handling ammonia solutions. Do not heat or add acid. Cover solutions between printing to prevent evaporation and contamination. Do not use old fixing solutions.
<i>Boric Acid</i>	Spring Record Speed Fixer	Moderately toxic by skin contact, inhalation and ingestion and can cause severe gastrointestinal symptoms and skin rash. Chronic exposure can cause borism, a disease in which dry skin, skin eruptions and gastrointestinal upsets are prevalent.
<i>Ethylene Glycol</i>	Sprint B&W Film Developer, Sprint Archive Fixer Remover	Slightly toxic by inhalation, moderately toxic by skin contact and highly toxic by ingestion. It has low volatility unless heated.
<i>Hydroquinone</i>	Sprint B&W Film Developer	Probable mutagen. Moderately toxic by skin contact and inhalation and highly toxic by ingestion. Skin contact can cause irritation and allergies. Inhalation and ingestion may cause ringing in the ears, dizziness, nausea, muscular twitching, increased respiration, headaches, blue lips and nails, delirium and coma.
<i>Sodium Bisulfite</i>	Kodak Professional T-Max Developer	Slightly toxic by skin contact, moderately toxic by inhalation. Heating or adding acid creates sulfur dioxide gas. Store away from acids.
<i>Sodium Metaborate</i>	Sprint Record Speed Fixer and Sprint B&W Film Developer	Moderately toxic by skin contact and highly toxic by inhalation. Concentration forms are corrosive to skin, mucous membranes and eyes.
<i>Sodium Sulfite, Sodium Metabisulfite</i>	Sodium Sulfite found in Sprint Record Speed Fixer, Spring Archive Fixer Remover; Sodium Metabisulfite found in Sprint Archive Fixer Remover	Not significantly toxic by skin contact but moderately toxic by inhalation and ingestion. Heating and mixing with acid causes sulfur dioxide gas to form. Store away from acids.

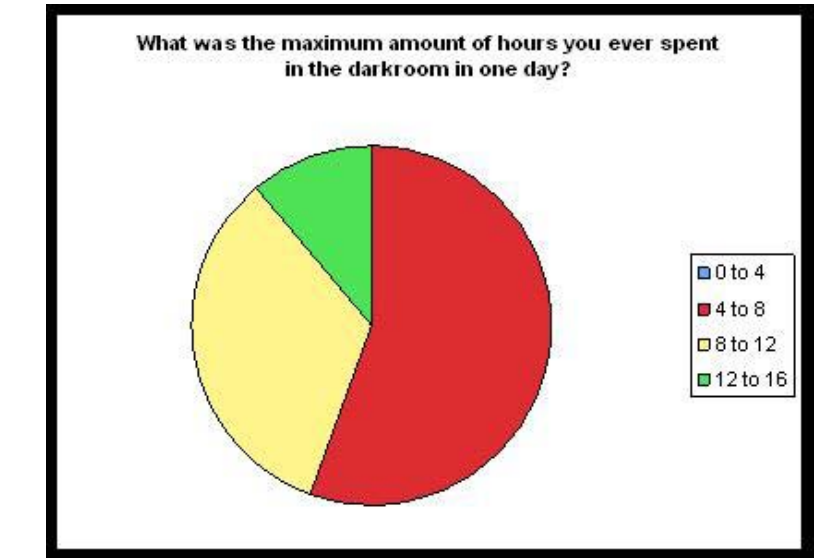


Zsuzsi points out a spill in the darkroom. It is imperative to ALWAYS clean up a spill. Chemicals can evaporate into the air and your lungs.

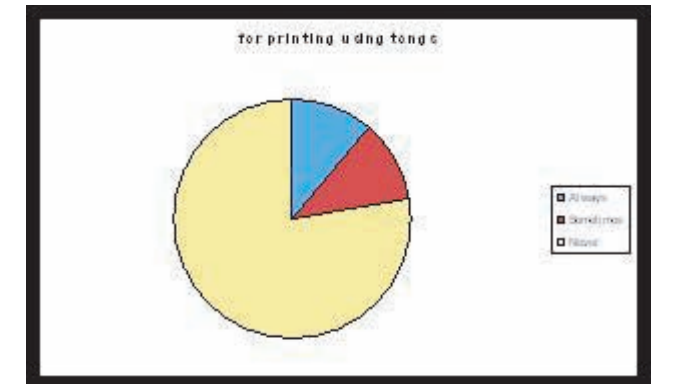
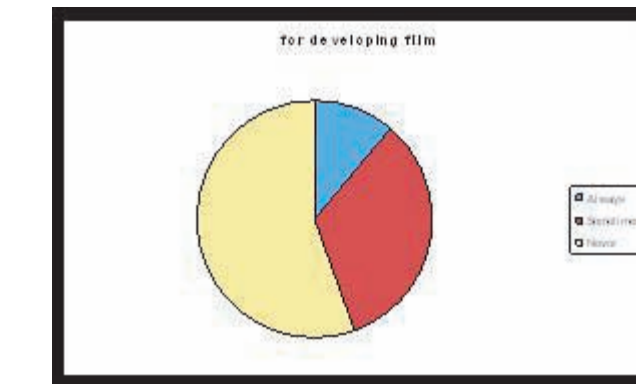
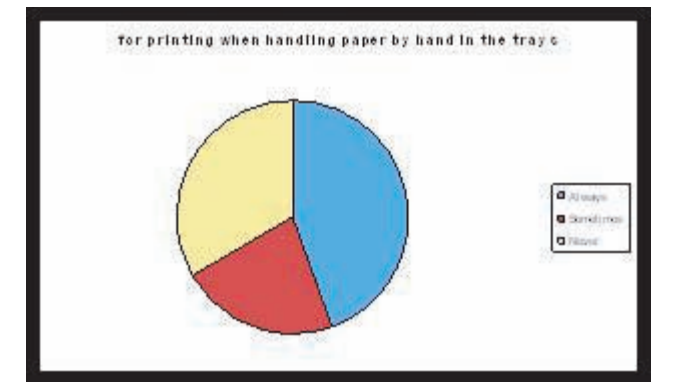
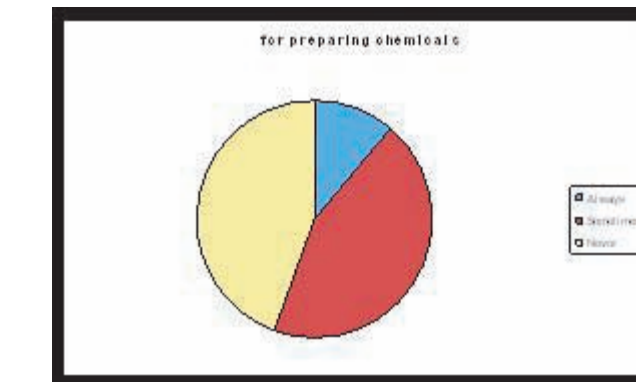
Darkroom Musts

- Wear gloves at all times!
- Clean up spills immediately
- Clean up after you work
- Cover solutions when not in use
- Use the built-in ventilator at all times
- No food or drink in the darkroom area
- Label chemicals
- Wear old clothes

YOUR survey results



Do you use the rubber gloves provided by the college in the darkroom?



Cheering Squad and References



- Judith B. Black – Art Department
- Susan Howard – Office of Environmental Health and Safety
- Dan Brabander – Department of Geosciences
- The ATSDR (Agency for Toxic Substances and Disease Registry) ToxFaq's™ <http://www.atsdr.cdc.gov/toxfaqs.html>. 05/08/2006.
- Caveman Chemistry – Photography. <http://cavemanchemistry.com/oldcave/projects/photo/index.html>. 05/08/2006.
- Health & Safety in the Arts. City of Tucson. <http://www.ci.tucson.az.us/arthazards/photo2.html>. 05/09/2006.
- Kodak – Material Safety Data Sheets. http://www.kodak.com/eknec/PageQuerier.jhtml?pq-path=4648&pq-locale=en_US. 05/09/2006.
- Photographic Materials: Safety Issues and Disposal Procedures. University of Florida. <http://www.ehs.ufl.edu/HMM/photo.htm>. 03/30/2006.
- Rempel, Siegfried; Wolfgang Rempel. Health Hazards for Photographers. Lyon and Burford, Publishers, New York. 1992.
- Scorecard - The Pollution Information Site. <http://www.scorecard.org/>. 05/08/2006.
- Shaw, Susan. Overexposure – Health Hazards in Photography. The Friends of Photography. 1983.
- SPRINT – Systems of Photography Inc – Material Safety Data Sheets. <http://sprintsystems.com/safety.html>. 05/09/2006.
- U.S. Department of Labor. Occupational Safety and Health Administration. Occupational Hazard – Photography. http://www.osha.gov/pls/oshaweb/searchresults.relevance?p_text=photography&p_title=&p_oshaweb_filter=SLTC_STATIC&p_status=CURRENT&p_logger=1. 03/30/2006.

Photographic Paper Chemistry 101

Almost all photographic paper used today consists of a silver bromide emulsion on a paper base.

Silver - This is what “tarnishes” on the paper, turning black when exposed to light. Fixer then dissolves unused silver parts and the silver is removed from the paper. It can be disposed safely with the fixer according to environmental regulations. If left standing too long, however, it can evaporate.

Silver compounds can cause some areas of the skin to turn blue-gray. This affliction, *argyria*, can occur in people who eat or breathe in silver compounds for several months to many years. Exposure to dust containing relatively high levels of silver compounds may cause breathing problems, lung and throat

irritation and stomach pain. Skin contact with silver compounds has been found to cause mild allergic reactions, such as rash, swelling, and inflammation.

Bromine - Bromide, too, breaks down to bromine during the developing process and can also evaporate into the air if left standing long in the fixer. It is highly toxic by skin contact, inhalation and ingestion and is a severe irritant to the skin, eyes, mucous membranes and lungs. Acute inhalation or ingestions can result in symptoms of poisoning such as dizziness, headache, nosebleeds, cough, abdominal pain, diarrhea and measles-like contusions on the face, trunk and extremities.