UAHphoto Darkroom LAB SAFETY Sheet

*All Chemicals should labeled with safety and mixing information. If you mix chemicals they will have to be labeled properly. If you are not sure about mixing or labeling please ask professor or advanced students for guidance.

Do not mix or label anything if you are unsure about how this is done.

Black and White Photographic Processing

A wide variety of chemicals are used in black and white photographic processing. Processes in black and white film developing include developing baths, stop baths and fixers, intensifiers, reducers, and toners.

Developing Baths

The most commonly used developers are hydroquinone, monomethyl para-aminophenol sulfate and phenidone. Other components of developing baths include sodium carbonate or borax, sodium sulfite and potassium bromide.

Hazards Associated with Black-and-White Developing Baths

Developers are skin and eye irritants. Many may also be strong sensitizers. Monomethyl-p-aminophenol sulfate creates many skin problems and allergies. Hydroquinone can cause depigmentation of the skin and eye injury after five or more years of repeated exposure. It is also considered a mutagen. Some developers can also be absorbed through the skin to cause severe poisoning (e.g., catechol, pyrogallic acid). Developers are moderately to highly toxic by ingestion. Ingestion of less than one tablespoon of compounds such as monomethyl-p-aminophenol sulfate, hydroquinone or pyrocatechol being possibly fatal for adults. Symptoms include ringing in the ears (tinnitus), nausea, dizziness, muscular twitching, increased respiration, headache, cyanosis (turning blue from lack of oxygen) due to methemoglobinemia, delirium and coma. Sodium hydroxide, sodium carbonate and other alkalis used as accelerators are highly corrosive through skin contact or ingestion. Potassium bromide is moderately toxic by inhalation or ingestion and slightly toxic by skin contact. Symptoms of systemic poisoning include somnolence, depression, lack of coordination, mental confusion, hallucinations and skin rashes. It can cause bromide poisoning during fetus development in cases of high exposure to pregnant women.

Sodium sulfite is moderately toxic by ingestion or inhalation, causing gastric upset, colic, diarrhea, circulatory problems and central nervous system depression. It is not appreciably toxic by skin contact. If heated or allowed to stand for a long time in water or acid, it decomposes to produce sulfur dioxide, which is highly irritating by inhalation.

Safety Precautions When Working with Black-and-White Developing Baths

The following safety precautions shall be followed when working with black-and-white developing baths:

- Use liquid developers when possible (Most UAHphoto chemicals come as liquids in “stock” form)
- When mixing developing powders, use a glove box, local exhaust ventilation (fume hood), or wear a NIOSH approved toxic dust respirator
- Tongs shall be used in developing baths. Do not put bare hands in developer baths. If developer solution splashes on your skin or in your eyes, immediately rinse with copious amounts of water for a minimum of fifteen minutes; and

Black-White-Stop Baths and Fixers

Stop baths are usually weak solutions of acetic acid. Acetic acid is commonly available as pure glacial acetic acid or 28% acetic acid. Some stop baths contain potassium chrome alum as a hardener. (UAHphoto also uses Ilfostop, with citric acid as its main ingredient. This should be the primary stop bath mixed).

Fixing baths contain sodium thiosulfate ("hypo") as the fixing agent, and sodium sulfite and sodium bisulfite as a preservative. Fixing baths also may contain alum (potassium aluminum sulfate) as a hardener and boric acid as a buffer.

Hazards Associated with Black-and-White Stop Baths and Fixers

Acetic acid, in concentrated solutions, is highly toxic thorough inhalation, skin contact and ingestion. It can cause dermatitis and ulcers, and can strongly irritate the mucous membranes. Continual inhalation of acetic acid vapors may cause chronic bronchitis. Potassium chrome alum or chrome alum (potassium chromium sulfate) is moderately toxic through skin contact and inhalation causing dermatitis and allergies. In powder form, sodium thiosulfate is not significantly toxic through skin contact. Through ingestion, it has a purging effect on the bowels. Upon heating or long standing in solution, it can decompose to form highly toxic sulfur dioxide, which can cause chronic lung problems. Many asthmatics are particularly sensitive to sulfur dioxide. Sodium bisulfite decomposes to form sulfur dioxide if the fixing bath contains boric acid or if acetic acid is transferred to the fixing bath on the surface of the print. Alum (potassium aluminum sulfate) is only slightly toxic. It may cause skin allergies or irritation. Boric acid is moderately toxic through ingestion or inhalation and slightly toxic through skin contact unless the skin is abraded or burned in which case it can be highly toxic.

Safety Precautions When Working with Black and White Developing Stop Baths and Fixers

The following safety precautions shall be followed when working with stop black and white developing baths and fixers:

- Wear eye protection and gloves when necessary, especially when there is close proximity to stock chemicals, and
- Cover all baths when not in use to prevent evaporation or release of toxic vapors and gases.

Intensifiers and Reducers

A common after-treatment of negatives is either intensification or reduction. Intensifiers include hydrochloric acid and potassium dichromate or potassium chlorochromate. Mercuric chloride followed by ammonia or sodium sulfite, Monckhoven's intensifier consisting of a mercuric salt bleach followed by a silver nitrate/potassium cyanide solution, mercuric iodide/sodium sulfite and uranium nitrate are older, now discarded, intensifiers. Reduction of negatives is usually done with Farmer's reducer, consisting of potassium ferricyanide and hypo. Reduction has also been done historically with iodine/potassium cyanide, ammonium persulfate and potassium permanganate/sulfuric acid.

Hazards Associated with Intensifiers and Reducers

(UAHphoto rarely uses intensifiers. Potassium Dichromate is used for Gum Printing. And for Van Dyke Brown but as an optional step for contrast).

Potassium dichromate and potassium chlorochromate are probable human carcinogens, and can cause skin allergies and ulceration. Potassium chlorochromate can release highly toxic chlorine gas if heated or if acid is added. Concentrated hydrochloric acid is corrosive with diluted acid being a skin and eye irritant.

Mercury compounds are moderately toxic through skin contact and may also be absorbed through the skin. They are also highly toxic through inhalation and extremely toxic through ingestion. Uranium intensifiers are radioactive and especially hazardous to the kidneys. Sodium or potassium cyanide is extremely toxic through inhalation and ingestion and moderately toxic through skin contact. Adding acid to cyanide forms extremely toxic hydrogen cyanide gas which can be rapidly fatal. Potassium ferricyanide, although only slightly toxic by itself, will release hydrogen cyanide gas if heated, if hot acid is added, or if exposed to strong ultraviolet light (e.g., carbon arcs).

Cases of cyanide poisoning have occurred through treating Farmer's reducer with acid. Potassium permanganate and ammonium persulfate are strong oxidizers and may cause fires or explosions in contact with solvents and other organic materials.

Safety Precautions When Working with Intensifiers and Reducers

The following safety precautions shall be followed when working with intensifiers and reducers:

- Chromium intensifiers are probably the least toxic intensifiers, even though they are probable human carcinogens. Gloves and goggles shall be worn when preparing and using these intensifiers;
- Mix the powders in a glove box or wear a NIOSH-approved toxic dust respirator;
- Do not expose potassium chlorochromate to acid or heat; and
- Do not use mercury, cyanide or uranium intensifiers or cyanide reducers because of their high or extreme toxicity.

Toners

Toning a print usually involves replacement of silver by another metal (e.g., gold, selenium, uranium, platinum, iron). In some cases, toning involves replacement of silver metal by brown silver sulfide (e.g., in the various types of sulfide toners). A variety of other chemicals are also used in the toning solutions. (UAHphoto uses Selenium toner to alter silver. Other toners should only be used by permission of instructor).

Hazards Associated with Toners

Sulfides release highly toxic hydrogen sulfide gas during toning or when treated with acid. Selenium is a skin and eye irritant and can cause kidney damage. Treatment of selenium salts with acid may release highly toxic hydrogen selenide gas. Selenium toners also give off large amounts of sulfur dioxide gas. Gold and platinum salts are strong sensitizers and can produce allergic skin reactions and asthma, particularly in fair-haired people.

Safety Precautions When Working with Toners

The following safety precautions shall be followed when working with toners:

- Wear gloves and goggles;
- Avoid using metal with Selenium. This means no metal trays, and no metal tongs.
- Mix powders in a glove box or wear a NIOSH-approved toxic dust respirator;
- Toning solutions shall be used with local exhaust ventilation (e.g. slot exhaust hood or working on a table immediately in front of a window with an exhaust fan at work level);
- Take precautions to make sure that sulfide or selenium toners are not contaminated with acids.

Overview

-Following basic safety guidelines helps to make the artist's work in the studio and laboratory safer and healthier.

-In photography classes you will be preparing chemical solutions frequently. Most often this involves diluting a concentrated solution ("stock") into a "working" solution.

-Never mix or pour chemicals in the vicinity of your eyes. Always pour chemistry below eye level.
-Wear safety eyewear when necessary to prevent accidental chemical exposure of eyes.

-Do not put your face in close proximity to chemicals. Chemicals can inadvertently splash on to you.

-Do not inhale chemical vapors.

-Wear respirator when using "stock" powdered chemicals.

-Whenever you are diluting chemical concentrates be certain to pour the water first and then add the chemical concentrate. If your container has water in it a chemical concentrate is less likely to splash or produce strong fumes.

-When handling chemicals be certain to wear protective gloves or use tongs to minimize the risk of exposing your skin to the chemicals.

-If you get a saturation of photographic chemistry on your clothing, you should remove the clothing as soon as possible to avoid exposure to the skin.

-If you get photographic chemistry on your skin flush the affected area with water immediately. Avoid prolonged exposure of the skin to photographic chemicals since they may induce an allergic reaction. This is often seen as a rash on the skin.

-Ventilation equipment must be in use whenever you are using a darkroom or mixing area.

-Be certain not to operate any electrical equipment (timers, enlargers, dryers, etc.) with wet hands. Make certain your hands and your working area are dry before plugging in electrical devices.

Small chemical spills should be wiped up immediately with paper towel and you should be wearing gloves. In the event of a large spill you should contact your instructor or department staff assistant for help with spill kit.

-If you are uncertain about the proper use of any equipment or materials for this course you should always ask for assistance.

-Be careful - do not splash or drip chemicals on your classmates.

-Be considerate of those working near you. Always alert others to any safety concerns you might have. Pay attention to warning signs.

-Clean up completely after you have finished your work. A clean studio environment provides a safer working environment for everyone.

Important phone numbers:

Art Department office: 256-824-6114

UAH Environmental Health & Safety: 824-2171

Non-emergency UAH police: 256-824-6596

Emergency UAH Police: 256-824-6911 or 911

Student Signature_____ Date:_____

Print name:_____