

**Environmental Health and Safety
Florida Atlantic University**

**SAFETY AND DISPOSAL GUIDELINES
FOR THE USE OF
PHOTOGRAPHIC CHEMICALS**

I. I. Introduction

Both Federal and State government agencies regulate the handling and disposal of photographic chemicals. These agencies are the Environmental Protection Agency (EPA), State of Florida Department of Environmental Protection (DEP) and the Occupational Safety and Health Administration (OSHA). These guidelines address the different types of photo chemicals encountered in the darkroom and provide information on proper safety procedures. There are many hazards associated with photographic chemicals. It is important that personnel involved with photo processing be aware of these hazards and that every effort is made to minimize exposure to these chemicals and to ensure proper disposal. Familiarize yourself with hazards of photo chemicals by reading Material Safety Data Sheets (MSDS) before use. When using any photo chemical, the following safety procedures should always be observed (for more information consult the FAU *Chemical Hygiene Plan*):

- MSDS's for chemicals must be readily available in your area
- An eyewash fountain and emergency shower facilities should be available where photo chemicals are used or mixed due to their corrosive and/or toxic properties. In case of eye or skin contact, rinse for at least 15-20 minutes
- A fume hood should be used when mixing powdered, toxic, volatile or corrosive chemicals
- Ensure the dark room has adequate ventilation. At least, 10 air changes per hour
- Wear appropriate Personal Protective Equipment i.e. gloves, goggles, and aprons
- Cover or close all solutions when not in use to suppress toxic vapors and gases
- Keep darkroom uncluttered
- Wet and dry areas should be clearly separated
- Store chemicals compatibly
- Do not eat, drink or smoke in the storage areas, darkroom or studio
- Do not use Respirators unless you have been entered into the FAU Respiratory Protection Program. (medical clearance, training, fit testing).
- Wash hands with soap and water after working with photographic chemicals
- Label all containers of photo chemicals

- Keep a spill kit in the darkroom (for spill kit information contact EH&S or refer to Appendix G of the *Chemical Hygiene Plan* (CHP))
- Follow the disposal guidelines outlined in the sections that follow. EH&S can supply proper labels and containers for waste disposal

II. II. Developers

Developer solutions and powders are often alkaline with moderate to high toxicity. They are also sources of the most common health problems in photography; skin disorders and allergies. Developers are skin and eye irritants and many are strong allergic sensitizers. Some common ingredients in developers are:

- Hydroquinone
- Sodium sulfite
- Monomethyl para-aminophenol sulfate
- Phenidone

Precautions

- Avoid using developers containing para-phenylene diamine or diaminophenol hydrochloride (amidol)
- Also avoid using toxic developers such as pyrogallol and catechol. Phenidone makes a good substitute
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used developer should be collected and containerized with a Hazardous Waste Label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

III. III. Stop Baths

Stop baths are acidic and can cause dermatitis; skin ulceration and can severely irritate the respiratory system. Contamination of the stop bath by developer components can increase inhalation hazards. Common ingredients in stop baths include:

- Acetic acid (dilute or concentrated)

- Potassium chrome alum sometimes used as a stop hardener contains chromium, a possible carcinogen that can also cause skin and nasal irritation, ulceration and allergies.

Precautions

- Purchase dilute solutions of acetic acid rather than concentrated ones
- Use a water rinse step between developer and stop bath to reduce the formation of sulfur dioxide gas
- Always add acid to water when diluting
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent Stop Bath should be flushed with large quantities of water to the sanitary sewer system.
- Un-used/concentrated solutions of Stop Bath or solutions containing potassium chrome alum - should be collected and containerized with a Hazardous Waste Label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

IV. IV. Fixer

Fixer solutions slowly release sulfur dioxide gas as they age. However, when these solutions are contaminated with acid from the stop bath, the sulfur dioxide gas is released at a more rapid rate. Common ingredients in Fixer solutions include:

- Sodium thiosulfate
- Sodium sulfite
- Sodium bisulfite
- Potassium aluminum sulfate
- Boric acid

Precautions

- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent fixer, due to the photographic paper releasing silver into solution, should be collected and containerized with a Hazardous Waste Label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup
- Any un-used fixer can be collected along with the spent fixer

V. V. Hypo Eliminators

Many hypo eliminators are skin and respiratory irritants. Some are corrosive to the skin, eyes, nose and throat. Common ingredients in Hypo Eliminators include:

- Hydrogen peroxide
- Ammonia
- Potassium permanganate
- Bleaches
- Potassium persulfate

Precautions

- Hypo eliminators are oxidizers and should be kept away from flammable or combustible substances
- Keep away from sources of heat
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used/concentrated Hypo Eliminator solutions - should be collected and containerized with a Hazardous Waste Label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

VI. VI. Intensifiers

Several intensifiers contain extremely hazardous components such as mercuric chloride, mercuric iodide, potassium cyanide, sodium cyanide or Uranium nitrate. The more common intensifier ingredients include:

- Hydrochloric Acid
- Potassium dichromate or potassium chlorochromate

Precautions

- Potassium dichromate and chlorochromate are probable human carcinogens and potassium chlorochromate can release toxic chlorine gas if heated or exposed to acids.
- Hydrochloric acid is corrosive
- Mercury, cyanide or uranium intensifiers are extremely toxic. Uranium is radioactive while cyanide compounds can react with acids to produce toxic cyanide gas. Avoid using these types of intensifiers.
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used/concentrated Intensifiers - should be collected and containerized with a Hazardous Waste label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

VII. VII. Reducers

Reduction of negatives is usually done with Farmer's reducer, consisting of potassium ferricyanide and hypo eliminators. Reduction has historically been done with iodine/potassium cyanide, ammonium persulfate, and potassium permanganate/sulfuric acid.

Precautions

- Do not heat or add acid to cyanide compounds because toxic cyanide gas can be released
- Persulfate and permanaganates are oxidizers and can cause fire or explosions in the presence of solvents and other organic material
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used/concentrated Reducers - should be collected and containerized with a Hazardous Waste label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

VIII. VIII. Toner

Toning a print usually involves replacement of silver by another metal, for example, gold, selenium, uranium, platinum, or iron. In some cases, the toning involves replacement of silver metal by brown silver sulfide, for example, in the various types of sulfide toners.

Precautions

- Uranium, Lead, Selenium, Gold and Platinum or toxic compounds
- Sulfides and Selenium can release highly toxic gas during toning, or if treated with acids
- Gold and platinum salts are strong sensitizers and can produce allergic skin reactions
- Avoid using toners containing thiourea due its probable cancer status
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used/concentrated Toner - should be collected and containerized with a Hazardous Waste label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

IX. IX. Hardeners

Hardeners often contain formaldehyde (suspected human carcinogen), which is toxic, very irritating to the eyes, throat and breathing passages. It can also cause dermatitis.

Precautions

- Formaldehyde is a sensitizer, so the more a person is exposed to it, the smaller a dose it takes to have an effect on a person.
- Ensure good ventilation
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Spent and un-used/concentrated Hardener - should be collected and containerized with a Hazardous Waste label (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*). Call EH&S for pickup

X. X. Color Processing

Color processing is much more complicated than black and white processing, using a wide variety of reagents and entailing a wide variation in processes. Lab managers are required to notify EH&S before beginning color processing to discuss and incorporate safety and waste disposal procedures based on reagents used. Some common chemicals associated with color processing include:

- Solvents –including benzyl alcohol, ethylene glycol, ethoxydiglycol
- Various types of amines
- Color coupling agents
- Hydroquinone
- Bleaching which uses a number of chemicals, including potassium ferricyanide, potassium bromide, ammonium thiocyanate, and acids

Precautions

- Ensure good ventilation (color processing requires more ventilation than black and white due to solvents and other toxic components used at elevated temperatures)
- Wear gloves and goggles
- If a splash occurs, flush affected area (15-20 minutes for eyes) immediately with water using eyewash or safety shower
- Cover or close all solutions when not in use

Disposal

- Color processing material - Contact EH&S to discuss waste collection procedures and as with all hazardous waste disposal (refer to EH&S *Hazardous Materials and Waste Manual*, Appendix B of the *Chemical Hygiene Plan*).

Reference

McCann, Michael. *Photographic Processing Hazards*, Art Hazard News, Published by Safety in the Arts. New York, NY