

Photography

Health Hazards and Safe Work Practices

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Black and White Photography:

a) Developing Baths:

The exposed materials are chemically treated to produce a visible image, using:

- Hydroquinone
- Monomethyl Paraaminophenol Sulfate
- Phenidone
- Sodium Carbonate
- Sodium Sulfate
- Potassium Bromide

Health Hazards

- Skin and eye irritation
- Strong sensitizers
- Highly toxic by ingestion
- Inhalation of vapours or dusts cause respiratory irritation and CNS effects

Safe Work Practices

- Wear rubber gloves and chemical splash goggles when handling developers. Wash gloves after use.
- Do not use paraphenyldiimine acid and its derivatives, if possible.
- Immediately rinse eyes and skin if direct contact is made with the developer.
- Addition of heat or acid to sodium sulfite may result in the release of highly toxic SO₂ gas.
- Wear a dust mask or respirator when mixing chemicals from dry powder.

b) Stop Baths:

The developer remaining in the gelatin layer is neutralized with an acid rinse:

- Glacial acetic acid
- Potassium chrome alum (hardener)

Health Hazards

- See Section E, "Solvents, Aerosol Sprays, Acids and Alkalis".
- Potassium chrome alum is highly toxic by inhalation and moderately toxic by skin contact.
- Do not expose sodium sulfite to acid or heat.

Safe Work Practices

- See Section E, "Solvents, Aerosol Sprays, Acids and Alkalis".
- Good general ventilation is required.
- Cover acid baths when not in use.
- Wear chemical splash goggles and rubber gloves when handling concentrated acid solution and potassium chrome alum.

c) Fixing Baths:

A fixing solution is used to remove the unexposed and undeveloped grains of silver halides, thus making the image permanent. Chemicals usually used include:

- Sodium Thiosulphate
- Ammonium Thiosulphate
- Sodium sulfite
- Potassium aluminum sulfate
- Boric Acid
- Acetic Acid

Health Hazards

- See Section E, "Solvents, Aerosol Sprays, Acids and Alkalis".
- Addition of heat or acid to sodium thiosulphate, ammonium thiosulphate and sodium sulfite may result in the release of highly toxic SO₂ gas.

Safe Work Practices

- See Section E, "Solvents, Aerosol Sprays, Acids and Alkalis".
- Good general ventilation is required.
- Cover fixing baths when not in use.
- Wear chemical splash goggles and rubber gloves when handling fixing baths.

d) Hypodiminator:

The water solubility of the fixer may be increased by using such chemicals as:

- Household bleaches
- Hydrogen Peroxide
- Potassium Persulphate

Health Hazards

- Addition of heat or acid to household bleach may result in the release of highly toxic chlorine

gas.

- Hydrogen peroxide, potassium sulfate are strong oxidizers which may be explosive when in contact with oxidizable solvents.

Safe Work Practices

- Do not add acid or heat to household bleaches.
- Do not use or strong oxidizers in the presence of flammable substances.

e) Intensifiers:

The density or contrast of the silver halide image may be increased by using intensifiers such as:

- Mercuric Chloride
- Ammonia or Sodium Sulfite
- Silver Nitrate/ Potassium Cyanide
- Potassium Dichromate Solution

Health Hazards

- Mercuric chloride is highly toxic by all routes of exposure.
- Addition of heat or acid to potassium dichromate solution may result in the release of highly toxic chlorine gas.
- Potassium cyanide is highly toxic by ingestion and inhalation.

Safe Work Practices

- Avoid using mercuric chloride and potassium cyanide.
- Do not expose sodium sulfite to acid or heat.
- Wear chemical splash goggles and rubber gloves when handling intensifiers.

f) Reducers:

The silver halide density may be reduced or dissolved using such reducing chemicals as:

- Potassium Ferricyanide and Hypo (Farmer's Reducer)
- Ammonium Persulphate
- Potassium Permanganate, Sulfuric Acid
- Iodine, Potassium Cyanide

Health Hazards

- Addition of heat or acid to Farmer's reducer may result in the release of highly toxic hydrogen cyanide gas.
- See Intensifiers.

Safe Work Practices

- Do not expose Farmer's reducer to heat or acid.
- Wear chemical splash goggles and rubber gloves when handling reducers.
- Good general ventilation is required.

g) Toners:

The silver halide image may be modified during or after the development stage, by the use of such chemicals as:

- Metals: Gold, platinum, uranium, selenium, iron.
- Sodium and Potassium Sulfide Thiourea.

Health Hazards

- Most metals are moderate to high toxicity. Inhalation and ingestion should be avoided.
- Thiourea is a suspected carcinogen.
- Addition of acid or heat to sodium or potassium sulfide results in the release of toxic SO₂ gas.

Safe Work Practices

- Avoid the use of thiourea.
- Do not expose potassium or sodium sulfide to heat or acid.
- Good general ventilation is required.
- Wear chemical splash goggles and rubber gloves when handling reducers.

Colour:

Colour processing is more complicated than black and white. Some of the chemicals used are more hazardous.

All colour processes require the use of generated local exhaust ventilation.

Dye Coupler Process:

The film consists of emulsion layers containing "dye couplers", which produce colour images.

Methods of development:

- Developer forms a silver and colour (dye) image.
- Dye image left with further processing (bleaching and removal of silver image).
- Fixing of dye image.
- One developer to produce negative silver image.
- Second developer to produce positive silver and a positive dye image.
- Bleaching to remove positive and negative silver image.
- Fixing of dye image.

Hazardous Substances Used in Colour Processing

Name and Use	Health Hazards	Safe Work Practices
Cellosolve Developer (2 Ethoxyethanol) Glycol (Monoethyl Ether)	Male and female reproductive system damage in animals. Skin irritation, dermatitis. May cause anemia. May cause kidney damage.	Local exhaust ventilation. Butyl rubber gloves and aprons. Chemical splash goggles. AVOID USE.
Paraphenylene Diamine Developer	Severe skin allergies and eye irritation. Readily absorbed through the skin. Asthma and other respiratory problems. May cause fatal liver damage.	NEVER USE. Local exhaust ventilation. Rubber gloves and apron. Chemical splash goggles.
Tertiary Ditylomine Borane Developer	Skin, eye and respiratory irritation. May cause nervous system damage.	AVOID USE. Local exhaust ventilation. Rubber gloves and apron. Chemical splash goggles.
Formaldehyde Stabilizer Hardener	Severe irritation to eyes and upper respiratory tract. Respiratory and skin allergies.	AVOID USE. Rubber gloves. Local exhaust ventilation. Chemical splash goggles. Air purifying respirator with organic vapours.
Hydroxyl Amino Sulfate Neutralizer	Skin, eye and upper respiratory tract irritation.	Local exhaust ventilation. Rubber gloves. Chemical splash goggles. Dust respirator.
Sulfamic Acid Bleach	Skin, eye and upper respiratory tract irritation.	Do not heat or add acid. Local exhaust ventilation. Rubber gloves. Chemical splash goggles.