

## Hidden Hazards in the Arts

Tweaked for the young children workgroup

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## Caveats

- I'm not an artist
- Therefore I'm helpless at spontaneously answering questions about technique
- The recommendations offered are, primarily, from the professional arts community



## Chemical hazards in General Art

- Paint pigments
- Oil painting
- Pastels
- Acrylics
- Charcoal & graphite dusts
- Markers & inks
- Spray adhesives
- Clean-up solvents



## Paint Pigments

- Found in most art media
- Oil- & water-based media
  - Dyes
  - Inks
  - Paints
- Dry colored media
  - Pastels
  - Crayons



## Read The Labels!

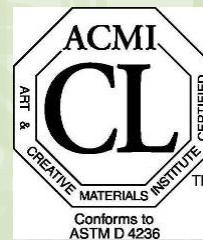


## What's the ASTM D4236 art material labeling standard?

- Look for the words “conforms to D-4236”
- If it conforms to ASTM D-4236:
  - The material has been evaluated by a toxicologist for acute & chronic toxicity
  - The label identifies constituents causing chronic exposure hazards
  - Products containing chronic health hazards come with safe use instructions
- It does **NOT** mean it is non-toxic!

## Clues to safer products

- AP Seal
  - Non-toxic according to certified toxicologist
  - “Won’t cause acute or chronic health problems”
- CL Seal
  - Properly labeled for known health risks
  - Has info on safe & proper use of such materials



## Evaluating Pigments


### Be wary of heavy metals

- Antimony -black & white (toxic by ingestion & inhalation)
- Arsenic -green (poison by ingestion, carcinogen)
- Barium -yellow (toxic by ingestion & inhalation)
- Cadmium -red, yellow, green (carcinogen, teratogen, fetotoxin)
- Chrome -green, orange, yellow (carcinogen, teratogen, fetotoxin)
- Cobalt -blue, violet, yellow (carcinogen, teratogen, fetotoxin)
- Lead -white, red (molybdate orange) teratogen, fetotoxin)
- Mercury -pigments (toxic by ingestion, carcinogen, allergen)
- Silica -white (toxic by inhalation)
- Zinc -yellow (carcinogen)

## Paint Pigments

### Safer Substitutes and Precautions

- Substitutes

- Use premixed paints
- Use CL/AP paints, pastels, emulsions
- Use tempera 



- Precautions

- Read the label!
- Avoid toxic metals
- Wear protective gloves
- Wash hands before exit
- No eating, drinking, applying lip balm, etc.

## Oil Painting

- Not to be done around children
- Toxic & combustible solvents
- Toxic pigments



# Pastels

- Toxic pigments (chrome, cadmium, manganese)
- Dust inhalation
  - Pastel colored snot for days afterwards is a clue!
- Graphite inhalation linked to cancer
- Poor labeling of contents



## Pastels Substitutes and Precautions

- Use pastels without lead, manganese, chromium and other toxic pigments
- Avoid blowing off excess dust
- Tap your drawing to remove dust
- Wet mop or vacuum dust instead of sweeping
- Not for use with little kids



## Acrylics

- Generally a safer substitute for solvent- & oil-based paints
- Gel acrylics can have ammonia & formaldehyde in them
- Use in well ventilated work area
  - Not likely to be available in places where little kids are painting



## Markers and Inks

- Toxic solvents in permanent markers
  - Toluene
  - Xylene
  - Glycol ethers
- Highly volatile so easy to inhale (deliberately or not)
- Sharpies contain alcohols or cresol in small amounts



## Markers and Inks Substitutes and Precautions

- Choose water-based over solvent-based
- Use CP/AP approved markers, not safe, but safer
- Don't use scented markers in elementary school, since kids may want to smell & eat them



## Spray Adhesives





## Adhesive Solvents

- Hexane (flammable/moderately toxic)
- Acetone (flammable/slight toxic)
- Heptane (flammable/slight toxic)
- Propane (flammable)
- Dimethyl ether (flammable)
- Cyclohexane (flammable/toxic)
- Toluene (flammable/high toxic)
- Petroleum naphtha (flammable)
- Methylpentane (isohexane) (flammable)



## Avoid Hexane + Acetone combo!

- Hexane and acetone combine synergistically
  - Becomes a potent mixture
- Causes peripheral neuropathy
- Destroys nerve cells in extremities (hands/feet)
- Poor recovery from damaged nerves



## Spray Adhesives Substitutes and Precautions

- Use glue sticks, waxers, double-sided tape
- Use heptane over hexane-based glues & adhesives
- Use CP/AP certified glues
- Don't use aerosols!!!
- Avoid inhaling vapors by using spray booth
- Wear resistant gloves
- Elmer's Rubber Cement is heptane-based



## Photography

- Darkroom chemicals
  - Developer
  - Fixer
  - Accelerators
  - Equipment cleaners
- Indoor air quality
  - Ventilation
  - Chronic exposures
- Not for young children



# Photography

- Developer - Hydroquinone
  - Severe irritant & toxic by breathing or touching dust
  - OK to sewer post process
- Stop Bath
  - Corrosive Acetic Acid
  - OK to sewer post process
- Fixer (hypo)
  - High in toxic silver
  - Forbidden to sewer untreated
- Toner – highly toxic

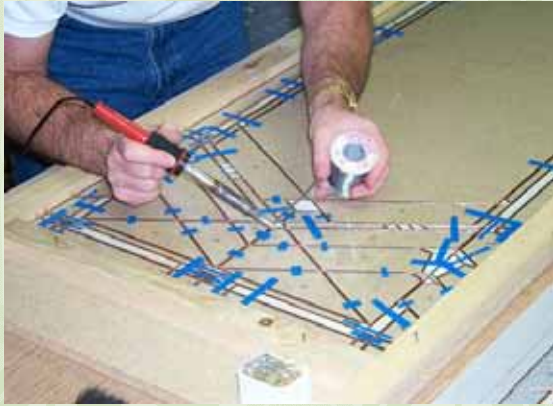


# Photography Kid Safe

- Digital safest
- Polaroid next (don't cut them though)
- Sungrams (blueprint paper & sunlight)



## Jewelry & Stained Glass Making



Pickle: Sulfuric acid or ferric chloride,  
very corrosive vapors & liquid



## Jewelry Soldering

Heavy metal fumes everywhere



## Stained Glass Soldering

Lead fumes up the nostrils



## Jewelry Making

### Keep Toxic Processes Away from Kids

- Solders are toxic
- Fluoride fluxes = toxic
- Sulfuric acid pickling baths are corrosive
- Enamel colorants can be highly toxic
- Avoid casting lead
- Minimize silica dust

### Washup After Use



Immediately remove clothing and take a shower in case of excessive contamination.

Shower at the end of the day before changing into clean clothes.

Wash body and hair thoroughly with soap and water.

## Dyeing

- Formerly involved use of toxic benzidine dyes
- Most dyes are “safe”
- Vat & azoic dyes = toxic
- Leather dyes can be toxic
- Fiber-reactive dyes are inhalation hazards as dust
- Use care with corrosive acids or hydroxides



# Glassblowing

- Many hazards and issues to address
- Silica dust
- Heavy metal dusts and fumes
- Toxic colorants
- Rinsing ground glass to sewer may be unacceptable



## Blown Glass Colorants

Compound Added to the Melt	Color of Produced/Hazards
cobalt oxide	blue (toxic)
magnesium oxide	violet (low hazard)
gold or selenium	red (toxic)
uranium, iron, or silver oxides	yellow (toxic)
cerium oxide	brown (low hazard)
iridium oxide	black (unknown hazard)
copper or chromium oxides	green (toxic)
calcium fluoride or stannic oxide	white (toxic)

## Glassblowing Substitutes and Precautions

- Avoid selenium, uranium, chromium & fluoride in melts
- Use a settling tank to capture solids from grinding rinse water
- Avoid breathing dusts with toxic metals
- Use lead-free pigments
- Have good ventilation to capture fumes
- Use a respirator when sweeping or pouring powders

## Pottery/Ceramics

- Clays
- Glazes & colorants
- Firing
- Raku
- Ventilation





## Clays

- Dust is the big issue
- Silicosis can result from inhaling silica
- Always buy clays that are pre-wetted



## Glazes

- Buy premixed to eliminate dust hazard
- Avoid lead, cadmium, arsenic, nickel, uranium, chromium & talc glazes
- Fritted lead can still leach
- You must test every piece for lead leaching
- Lead-free Raku is available



## Firing

- Smoke can contain heavy metals
- Bricks contaminated
- Contaminated dusts are inhalation toxins
  - Avoid sweeping
  - Mop down area
- Bisque firing can release sulfur dioxide
- Formaldehyde releases



## Raku Pottery

- The red glaze often contains lead
- Reduction burning poses inhalation hazard
- Large amounts of smoke are formed
  - Use straw instead of lawn clippings (pesticides) and treated wood (metals)



## Glass Etching

- Commonly uses ammonium bifluoride (Armour Etch) or hydrofluoric acid (HF)
- Ammonium bifluoride plus water = HF
- Recommend this not be done in secondary school or at home!



## Hydrofluoric Acid

- Anesthetic: acid doesn't burn on contact
- Deep tissue and bone disintegration
- Extreme pain, can cause gangrene, amputation
- Highly corrosive, dissolves glass



Long-term effects of hydrofluoric acid exposure

## Big picture of arts & prenatal-age 6

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- Restrict access to hazards from arts
  - Choking hazards (beads)
  - Metals (contaminated clothes)
  - Dusts (clothes, exhaust, tracked on carpet)
  - Unlocked entrances to workshops
  - Allowing kids near chemicals
- The warnings about metals, dusts & chemicals also pertain to pregnant women

## Questions? Discussion?

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