Don’t Lick Your Collections:

How to Handle Hazardous Materials in Collections

“My cousin licked an airplane.”

WE ARE NOT EXPERTS (well Brian is)

THE DYING OF THE GREEN

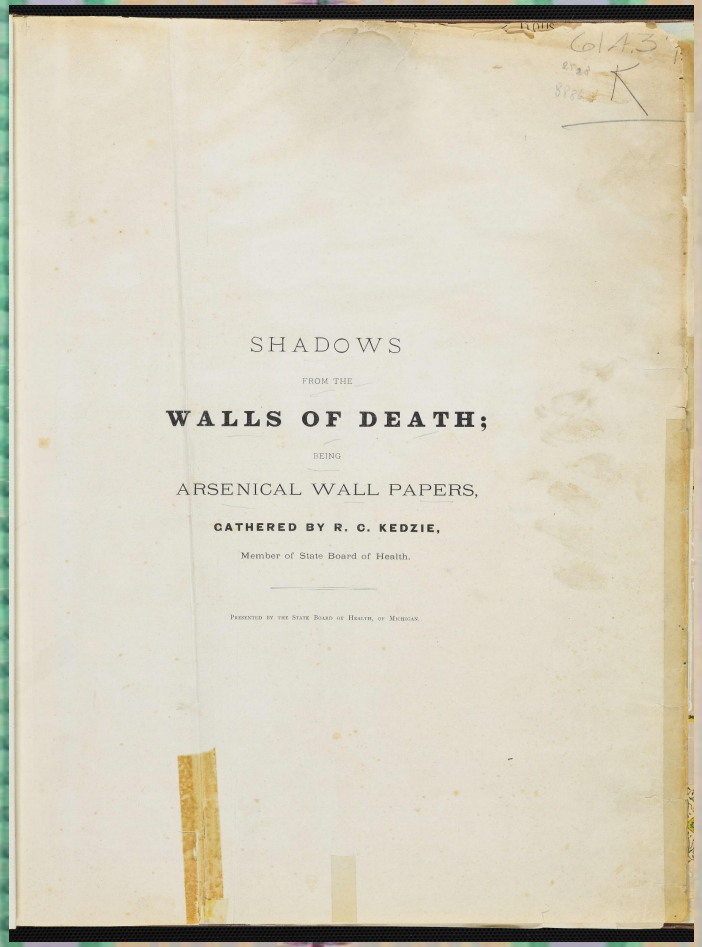
Arsenic in Collections

Arsenic:
What, When, How

- Naturally occurring heavy metal in the earth's crust
- "White Arsenic" or Arsenic Trioxide (As203)
- Used from 1700s-1970s in various things
- Poisons for vermin, pesticides for gardens and wood, and well…murder most foul, "Inheritance" or "Royal" poison
- Used as a preservative and desiccant in taxidermy since 1700s
- Dyes, paints, & ink
- Medicines, beauty products, candy

The Wearing of the Green

- 1775 Carl Scheele, Swedish chemist, developed a brilliant emerald green pigment dye from copper arsenite, called Scheele's Green (aka: Schloss Green, Emerald Green, Paris Green, Schweinfurt Green, and Vienna Green)
- 1814 replaced with cobalt green or zinc green, which was less toxic
- Textiles/Clothing:
  - Dresses
  - Shoes
  - ribbons
  - gloves
  - coats
  - Flannel
  - Carpet & Upholstery
  - Faux flowers in hair ornaments
  - If it's green, it's probably not clean (1700s-1890s)



SHADOWS

FROM THE

WALLS OF DEATH;

BEING

ARSENICAL WALL PAPERS,

GATHERED BY R. C. KEDZIE,

Member of State Board of Health.

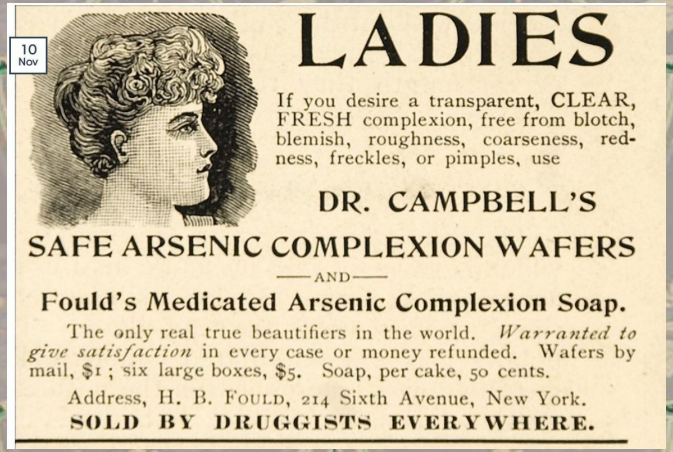
PRESENTED BY THE STATE BOARD OF HEALTH, OF MICHIGAN.

Your Daily Greens

- Paint (up to 1960s)
- Top hats (1700s-late 1800s)
- Victorian beauty products/medicines—produced that nice pale pallor every woman was dying for
- Candles (1810s-1830s) ; was esp. dangerous when burnt
- Wallpaper, esp. flocked (1800s- poss. early 1900s)

Natural History Collections

- Used as a pesticide/desiccant from the 1700s-1970s/1980s
- Will leach out over time
- Can contaminate other collections nearby
- Victorian dome cases



How do you know?

- Age/time period of piece
- For historical collections: is it green?
- Natural History collections: prep date, white powder
- Testing
- Can't test? Then ASSUME to play it safe!

Testing

- XRF (X-ray Fluorescence) handheld:
  - Pros: No chemicals, fast, immediate results
  - Cons: Expensive! Units cost $12,000-$40,000 to buy approx. $700/day to rent, does use X-rays=low levels of radiation
- Quantofix:
  - Pros: cheaper $90-$100/box of supplies, easy to use
  - Cons: time & labor intensive, chemicals to dispose of, involves using a minimal amount of water on a swab to get sample

Handling & Storage

- Don’t panic!
- PPE: nitrile gloves, lab coat, goggles/safety glasses, N95
- Enclose: archival boxes, poly bags—try to make as least staticky as possible
- Hazard label
- Air tests/keep away from blowing fans/vents
- Always discard gloves, wash hands afterwards, BEFORE handling other collections

Pharmaceuticals

Manufactured Medicines

Botanical Drugs

Tinctures

Apothecary Bottles

Pharmaceuticals may contain materials that were once legal but now illegal

1906 Pure Food & Drug Act-Banned manufacturers from selling mislabeled products, from adulterating food with unacceptable ingredients

Active and dangerous ingredients had to be placed on the label

1970-Controlled Substance Act

Illegal to possess medicinal chemicals that are controlled substances as defined by the Controlled Substances Act of 1970. Contact law enforcement is they are found in your collection.

Ex: Marijuana, Cocaine, Opium, Morphine

https://www.deadiversion.usdoj.gov/schedules/orangebook/c_cs_alpha.pdf

Some material may be hazardous because of its makeup

Contains Strychnine & Belladonna

Contains Radium

Poison-Stramonium Leaves

Some Material Becomes Hazardous Over Time Due to Degradation

- Ether-When it has crystallized
- Nitroglycerin
- Hydrogen Peroxides
- Ether or nitroglycerine becomes unstable over time and can form explosive peroxides that are sensitive to movement.
- Picric Acid

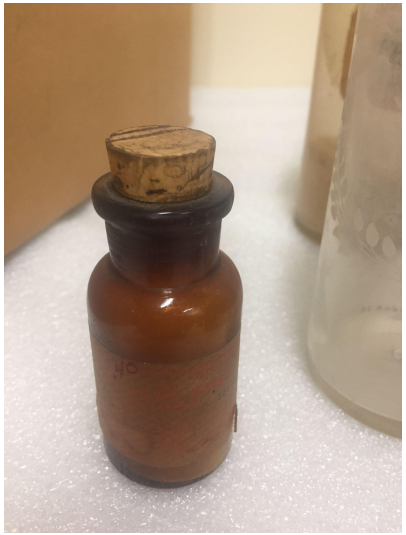
Picric Acid

What is it?

- Used in bombs & grenades during WWI
- Used as an early antiseptic
- can be found in bandage gauze, bottles, early first aid kits, and some feminine products (thru the 1960s)

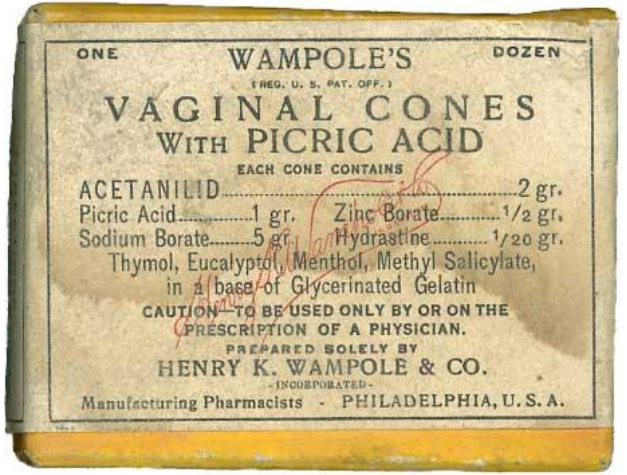
Why is it dangerous ?

- It is flammable as a liquid
- Explosive when it forms picrate salts after evaporation, especially when in contact with heat, shock or friction.



From the Collection of the GRPM

Courtesy of The National Museum of American History



Courtesy of the Museums of Menstruation and Women's Health

You may have to call the bomb squad….

Handling Pharmaceuticals

- Properly Fitted Respirator
- Apron
- Nitrile Gloves

Know What You Have

- Name of Medicine
- List of Ingredients and Quantities (if known)
- Dimensions
- Material of Container & Contents (Cardboard, Metal, Glass, liquid, pills, granules)
- Amount of Materials (grains, grams, fl oz)
- How full/complete the container is (full, trace amounts, empty, ¾ full)
- Condition (cracks, broken seal, corrosion at cap, leaking, type of cap etc.)
- Date (if known)
- Photograph

Pharmaceutical, Cresolene (156232)
Description: This glass pharmaceutical bottle contains cresolene and is labeled "Poison".
Materials: <not defined>
Condition Report: 1; July 9 2019; Contains liquid.; Good
Dimensions: 4.5; 1.5; 1.5; inches
Date: <not defined>

Apothecary Jar (156266)
Description: This glass apothecary jar contains beans. It is from Hartman's Drugstore in Lowell, Michigan and was donated by Kent County Medical Society.
Materials: Glass
Condition Report: 1; July 8 2019; Contains what appears to be dried beans. ; Fair
Dimensions: 12.5; 4.5; 4.5; inches
Date: <not defined>

Apothecary Jar, Eng. Vermillion. (156267)
Description: This glass apothecary bottle has a red coating on the inside and is labeled "Eng. Vermillion.". It is from Hartman's Drugstore in Lowell, Michigan and was donated by Kent County Medical Society.
Materials: Glass
Condition Report: 1; ; Empty, inside of bottle lined with dried substance.; Poor
Dimensions: 13; 5; 5; inches
Date: <not defined>

set:"DP_2020" 315 items 09/24/2022 at 18:26:29

Identify

- Partner with local colleges & universities
- Work with local pharmacists and retired pharmacists
- Local Police/Fire Departments

Identify

Raman Spectroscopy Machine

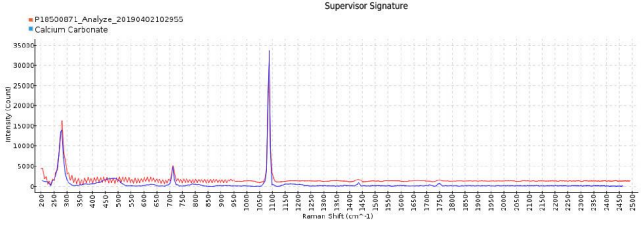
Raman spectroscopy is a technique which allows fast, non-destructive chemical analysis of solids, powders, liquids, and gases-Check with your local fire or police department

Application Name:	Analyze
User Name:	Admin
Device ID:	P18500871
File ID:	RS20190402102955_P18500871
File Name:	P18500871_Analyze_20190402102955
Scan Date:	04/02/19
Scan Time:	10:29:55
Power (mW):	340
Exposure (ms):	1000
Averages:	1
Last Calibration:	PASS 2019-01-31 20:13:46
Last Verification:	PASS 2019-01-31 20:17:54
Memo:	N/A

Selected Sample:	N/A
Selected Sample CC:	N/A
Barcode:	N/A
Result:	Match
Search Algorithm:	Rigaku Mixture
Searched Library:	All
Top Match:	Calcium Carbonate
Top Match CC:	0.99
Threshold:	0.80
Result Library:	All

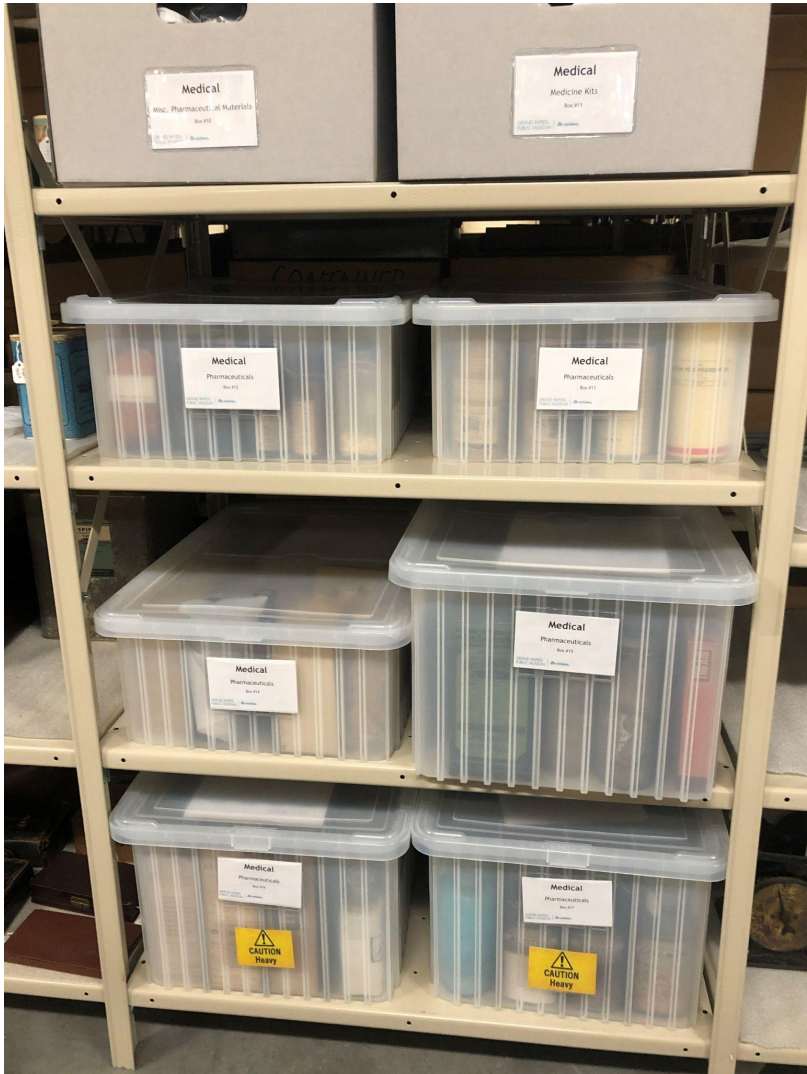
User Signature

Supervisor Signature



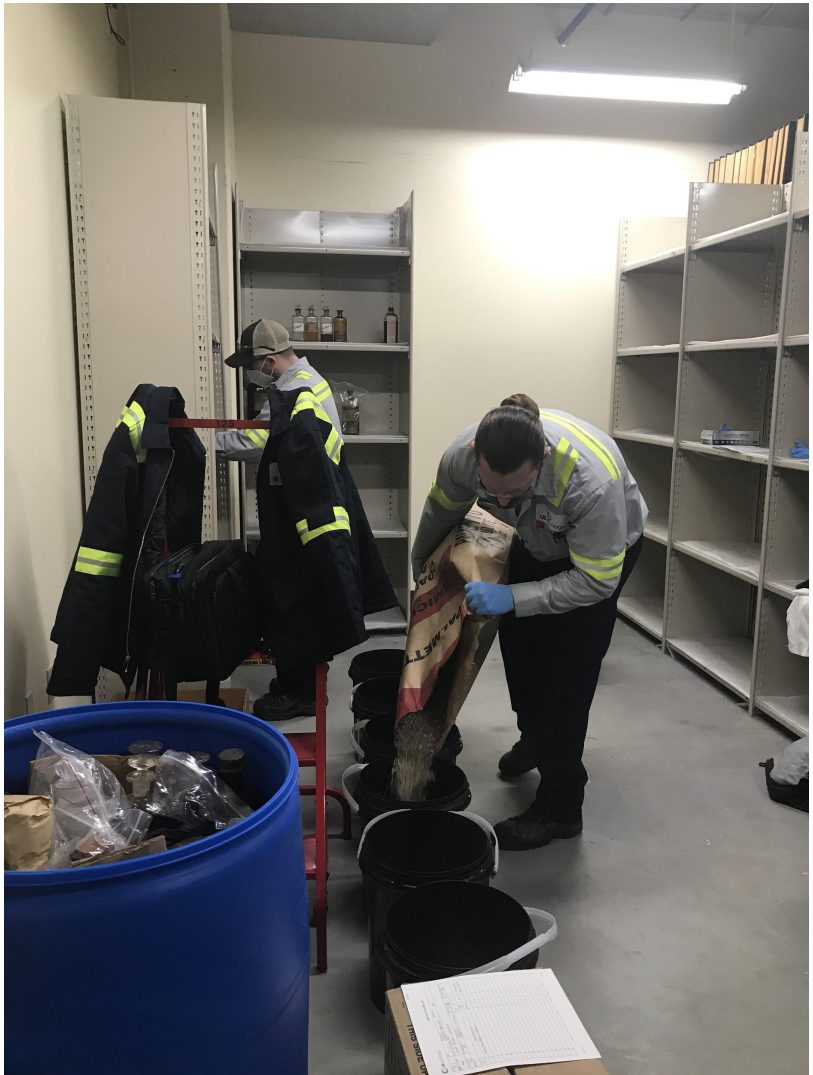
Storage

- Store upright in polyethylene bags or containers
- Properly label hazardous material
- Secure
- Stable environment (RH, Temperature, and Light)
- Handle with gloves



Disposal

- Work with local Colleges & Universities
- Midwest Art Conservation Center
- Work with you local hazardous waste disposal agency
- Drug-take back programs
- Contract with a hazardous waste disposal company



Radium, since 1898

Christy Kincaid, Collections and Library Manager, Air Zoo

ckincaid@airzoo.org or christy.m.kincaid@gmail.com

Supported by the Michigan Arts & Culture Council, administered by the Art Council of Greater Kalamazoo

arts council of greater kalamazoo

MICHIGAN ARTS & CULTURE COUNCIL

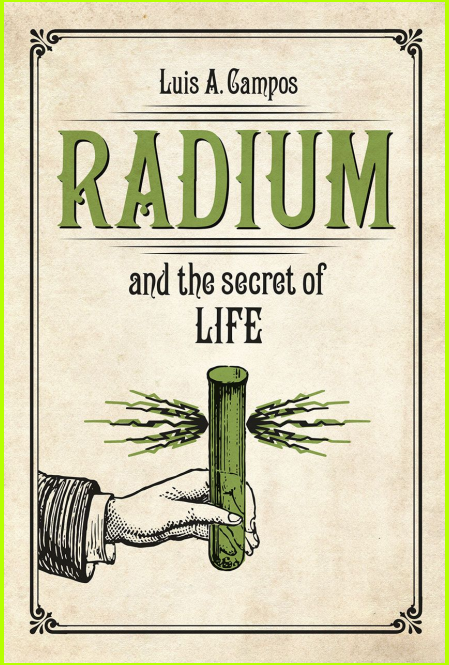
Radium- What is it?

RA-226 and RA-228

Radium (chemical symbol Ra) is **a naturally occurring radioactive metal**. Radium is a radionuclide formed by the decay of uranium and thorium in the environment. - EPA.GOV

Discovered by Marie Curie and husband Pierre Curie on December 21, 1989

Emits alpha particles, beta particles and gamma rays



Where was it used?

Commonly used in the 1920-1950's self-luminous paints. Also found in uranium glassware, medicines, therapeutic creams and salts

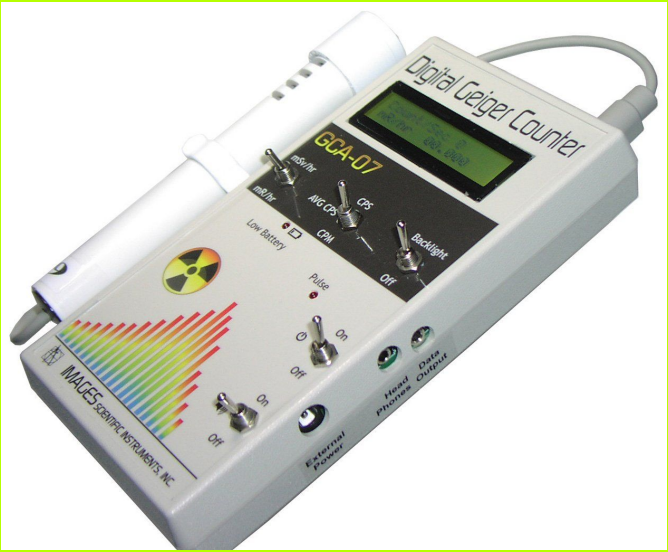
Photo credit: Eckert & Ziegler

Photo credit: Etsy

Photo credit: EPA

How to Detect it?

Using a properly calibrated Geiger Counter.



https://www.amazon.com/GCA-07W-Professional-Radiation-Detection-External/dp/B000796XSC

Rules and Regulations

- As a general licensee, museums are allowed to hold 100 pieces/artifacts with radium
- If holding more, there is specialized biohazard training and building requirements to to get a higher.

https://www.nrc.gov/reading-rm/doc-collections/cfr/part031/full-text.html

Radium- Why is it dangerous?

Radium can enter system through particles (alpha and beta) or gamma rays

- High levels of direct and long-indirect exposure can lead to cancer, effects on the blood, eyes, teeth and bones

Radium- How do we store it?

- Stored throughout the collection to avoid “hot spots” with large amount of gamma rays
- Stored in archival boxes with a warning sign that the material contains radium

Radium- Disposal

- Initially we were contacted by the NRC to do a site inspection to make sure we were in compliance… news flash… we weren't, but had no idea.
- Called four places, finally found US Ecology
- Packed up in barrels
- Hauled to Utah

Hazardous Materials, Museums & First Responders

Michigan Museums Association
October 11, 2022
Brian S. Jaeschke
Curator of Collections, Mackinac State Historic Parks
Lieutenant Mackinaw City Fire Department

Proper Storage

Approved Hazardous Material Cabinets

- Locking Mechanism
- Clearly marked

Put Objects in Specific location

- Room for firearms
- Freezer
- Quarantine area

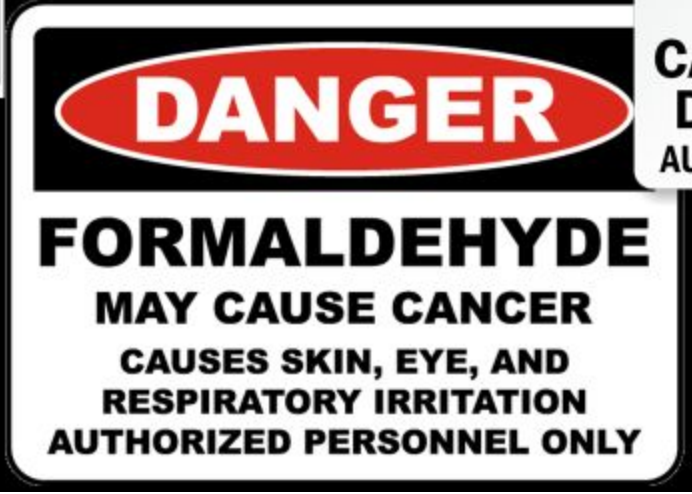
Fire Suppression System

- Sprinklers and/or nearby fire extinguishers

Marking Hazardous Materials

- Labels on boxes
- Safety tags
- Reflective Tape

Placards and Symbols



Parts of a DOT Placard

Vehicle Placard 10 x 10 inches

Package Sticker 4 x 4 inches

DOT Placard Color Codes

Explosive

Oxidizer

Flammable

Health Hazard

Water Reactive

Nonflammable Gas

DOT Symbols

Explosive

Oxidizer

Radioactive

Flammable

Poison

Corrosive

Nonflammable Gas

NFPA 704

(1 of 8)

NFPA 704

- Provides a method for indicating the presence of hazardous materials at:
  - Commercial facilities
  - Manufacturing facilities
  - Institutional facilities
  - Other fixed-storage facilities

(2 of 8)

NFPA 704

- Not designed for the following situations:
  - Transportation
  - General public use
  - Nonemergency occupational exposures
  - Explosive and blasting agents
  - Chronic health hazards
  - Etiologic agents, and other similar hazards

(3 of 8)

NFPA 704

- Benefits of NFPA 704
  - Provides an appropriate signal to first responders that hazardous materials are present
  - Identifies the general hazards and degree of severity for health, flammability, and instability
  - Provides immediate information necessary to protect lives of the public and emergency response personnel

  - www.nfpa.org/704

(4 of 8)

Firefighter Right-to-Know

Section 5P of the Michigan Fire Prevention Code (Act 207) requires that a firm handling hazardous chemicals provide the following information upon request of the fire chief:

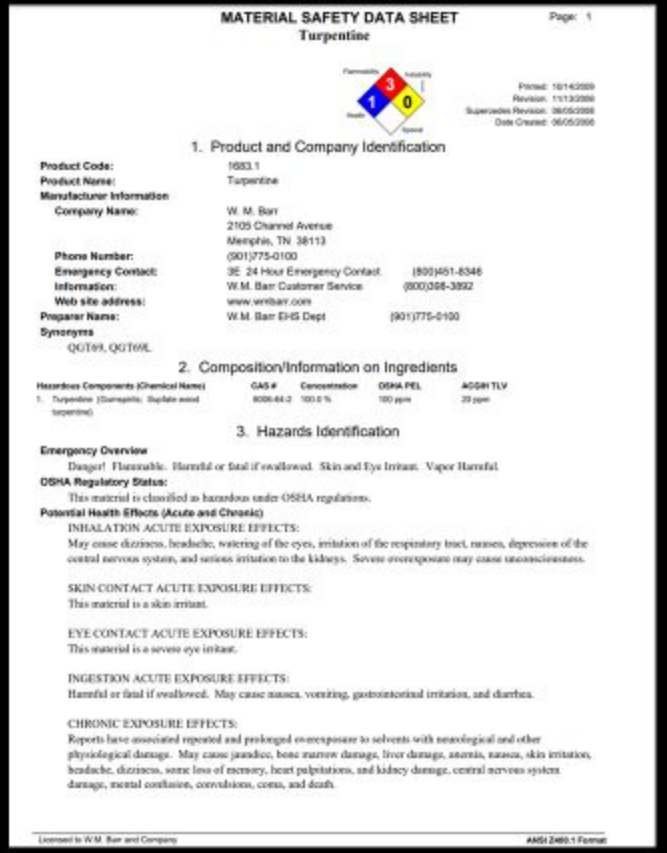
- A list of the hazardous chemicals on site and a material safety data sheet (MSDS) for each chemical on the list
- A description of the quantity and location of any hazardous chemical specified by the fire chief after a review of the list.

Material Safety Data Sheets (MSDS or SDS)

Sheet should come with chemical when you purchase

Can find sheets online by chemical name

Several important pieces of information on sheet



MATERIAL SAFETY DATA SHEET Page: 1

Turpentine

Printed: 10/14/2009
Revision: 11/13/2008
Supersedes Revision: 06/05/2006
Date Created: 06/05/2006

1. Product and Company Identification

Product Code: 1683.1
Product Name: Turpentine
Manufacturer Information
Company Name: W. M. Barr
2105 Channel Avenue
Memphis, TN 38113
Phone Number: (901)775-0100
Emergency Contact: 3E 24 Hour Emergency Contact (800)451-8346
Information: W.M. Barr Customer Service (800)398-3892
Web site address: www.wmbarr.com
Preparer Name: W.M. Barr EHS Dept (901)775-0100
Synonyms
QGT69, QGT69L

2. Composition/Information on Ingredients

Hazardous Components (Chemical Name)	CAS #	Concentration	OSHA PEL	ACGIH TLV
1. Turpentine (Oversplits: Baptale wood turpentine)	8006-64-2	100.0 %	100 ppm	20 ppm

3. Hazards Identification

Emergency Overview
Danger! Flammable. Harmful or fatal if swallowed. Skin and Eye Irritant. Vapor Harmful.
OSHA Regulatory Status:
This material is classified as hazardous under OSHA regulations.
Potential Health Effects (Acute and Chronic)
INHALATION ACUTE EXPOSURE EFFECTS:
May cause dizziness, headache, watering of the eyes, irritation of the respiratory tract, nausea, depression of the central nervous system, and serious irritation to the kidneys. Severe overexposure may cause unconsciousness.

SKIN CONTACT ACUTE EXPOSURE EFFECTS:
This material is a skin irritant.

EYE CONTACT ACUTE EXPOSURE EFFECTS:
This material is a severe eye irritant.

INGESTION ACUTE EXPOSURE EFFECTS:
Harmful or fatal if swallowed. May cause nausea, vomiting, gastrointestinal irritation, and diarrhea.

CHRONIC EXPOSURE EFFECTS:
Reports have associated repeated and prolonged overexposure to solvents with neurological and other physiological damage. May cause jaundice, bone marrow damage, liver damage, anemia, nausea, skin irritation, headache, dizziness, some loss of memory, heart palpitations, and kidney damage, central nervous system damage, mental confusion, convulsions, coma, and death.

Licensed to W.M. Barr and Company ANSI Z400.1 Format

SDS / MSDS Information

- Top — Chemical Identity
- Section I — Manufacturer's ID and Information
- Section II — Hazardous Ingredients
- Section III — Physical and Chemical Characteristics
- Section IV — Fire and Explosion Hazard Data
- Section V — Reactivity (Instability) Data

(1 of 2)

SDS / MSDS Information

- Section VI — Health Hazard Data
- Section VII — Precautions for Safe Handling and Use
- Section VIII — Control Measures

(2 of 2)

Pre-Incident Planning
• What is Pre-Incident Planning?
• How does a museum go about Pre-Incident Planning?

Building Partnership with Local Fire/Public Safety Departments

- Share disaster plan and salvage priority list for collections
- Invite them to your institution for a tour or special event
- Add them to your mailing list

Thank You and Acknowledgement

Bryce Tracy and the Mackinaw City Fire Department

Michigan Museums Association

Mackinac State Historic Parks

Brian S. Jaeschke
Curator of Collections-Mackinac
State Historic Parks
JaeschkeB@michigan.gov

Christy Kincaid
Collections & Library Manager
Air Zoo Aerospace & Science Center
Christy.m.kincaid@gmail.com

Sarah Humes
Associate Registrar
Grand Rapids Public Museum
shumes@grpm.org

Angela Riedel
Registrar
Michigan History Center
RiedelA1@michigan.gov