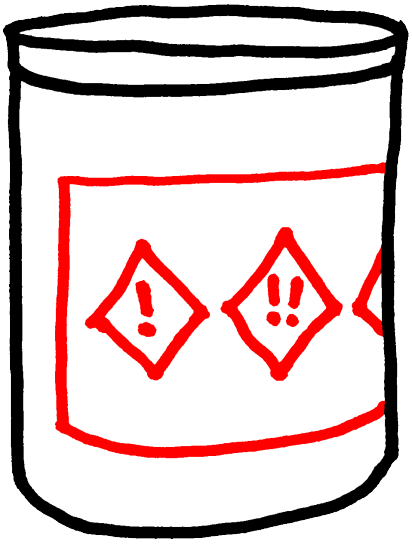
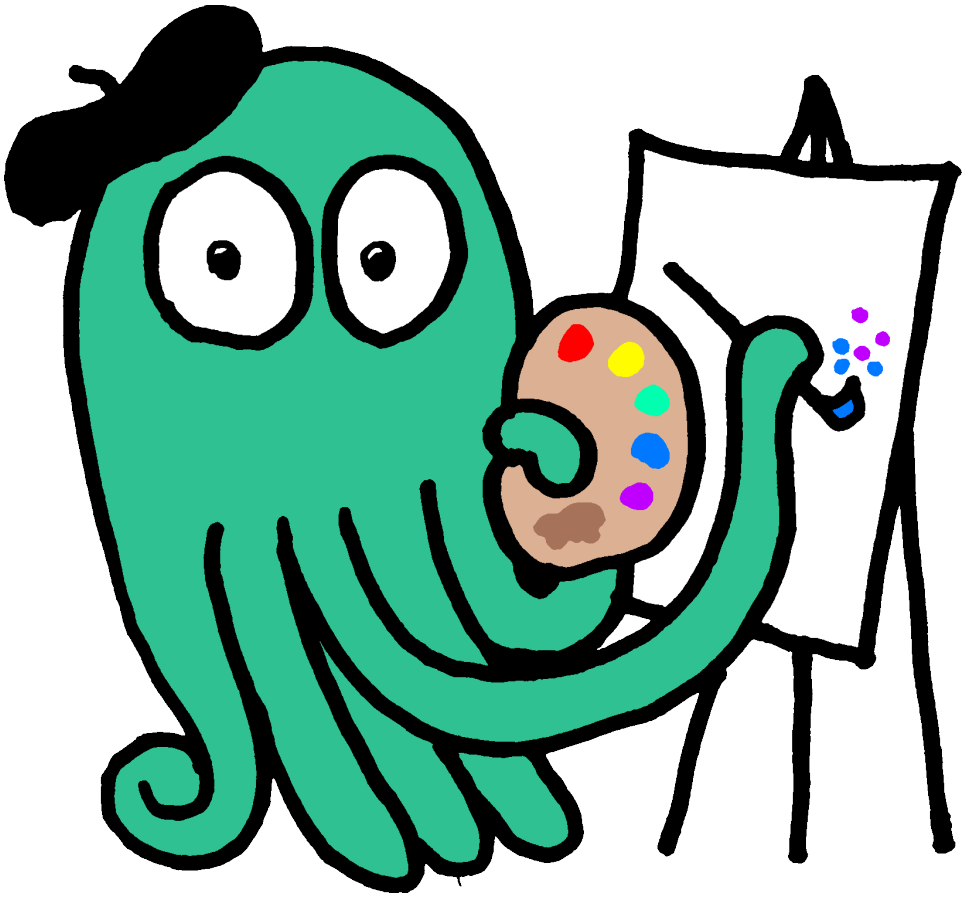
Hazardous Materials Consulting presents:

CHEMICAL SAFETY IN THE ART ROOM

by Becky Andersen & Marek Bennett





Minimizing Health Risks from Art Supplies & Other Hazards

A BASIC PROGRAM OUTLINE for TEACHERS

CHEMICAL SAFETY IN THE ART ROOM

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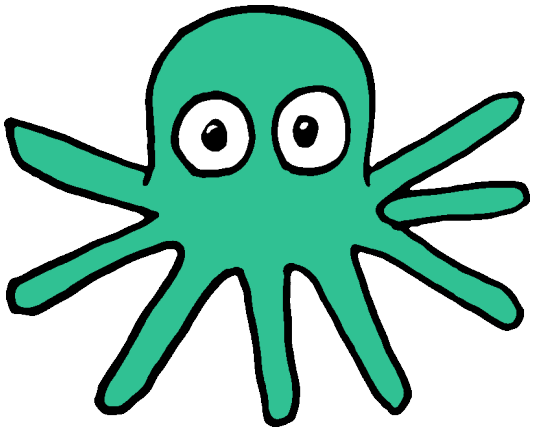
A Note to Teachers:



YES – We have A LOT to do! So many tasks, so many responsibilities... (That's why our artist, Marek, draws teachers as an octopus...)

Teachers & administrators have been overwhelmed with safety requirements for decades. We want to help.

In this book, we've gathered a series of **chemical safety resources** to simplify your risk management process...

Our goals are simple:

1. Keep Students Safe.
2. Keep Employees Safe.
3. Support excellent teaching.

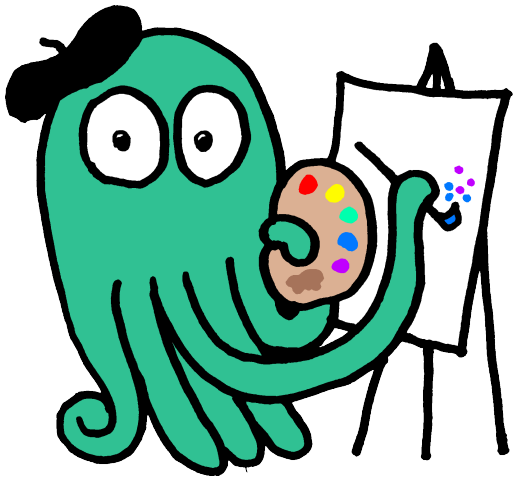
Our program translates the overwhelming regulatory jargon of chemical safety into simple instructions that help you achieve a safe classroom (& better compliance with those regulations).

Together, we can make our schools safer!

~ Becky Andersen, HMC Inc.

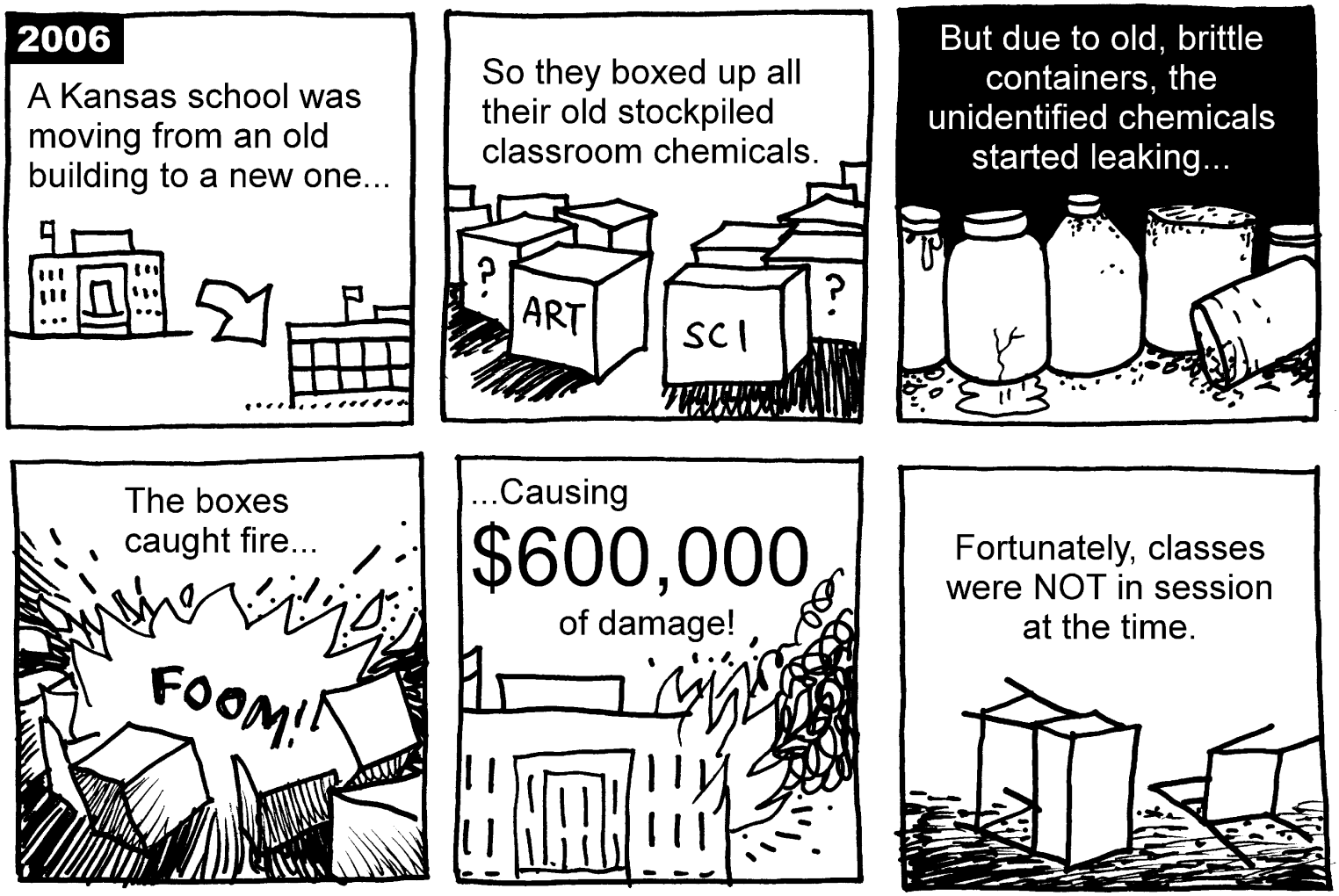
Preventing EMERGENCIES = SUCCESS!

Is Your Classroom Safe?



Art classrooms often present unidentified risks to students and teachers – from working with solvents & aerosols, to the use of acids, to the dangerous **"legacy chemicals"** lurking in our supply closets...

Chemicals in Schools: Kansas, 2006

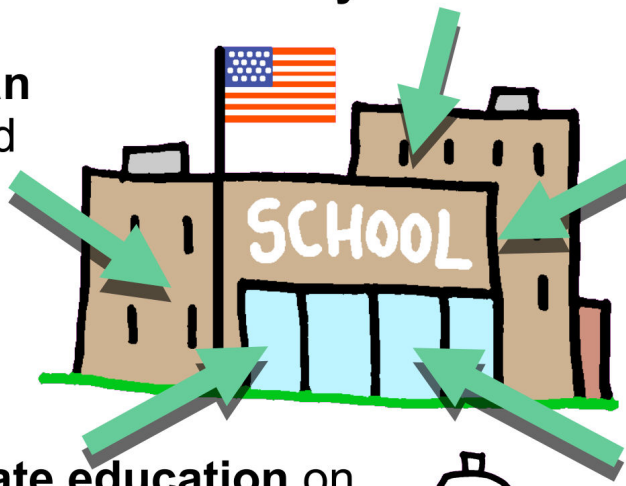


LEGACY CHEMICALS IN SCHOOLS: A Quick Overview

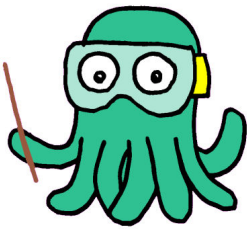
CAUSES:

Multiple departments using **many different chemicals**...

No clear **disposal plan** for unwanted chemicals



Staff turnover w/ no clear succession plan



Inadequate education on acute or chronic health effects or environmental impacts

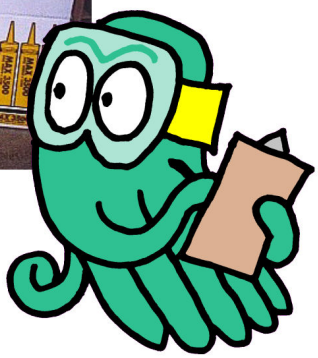
Donations from businesses to schools

RESULTS:

Higher risk of exposure & adverse health effects!

Large quantities of unwanted or unused supplies

No clear disposal process



Unsafe storage

Insufficient personal protective equipment or engineering controls (fume hoods, snorkel hoods, etc.)

Found in Classrooms:

- **Concentrated Acids:** Hydrochloric acid, hydrofluoric acid, etc.
- **Toxic metals:** Lead, mercury, chromium, etc.
- **Carcinogens & inhalation toxins**

- Dangerous or incompatible **storage conditions.**
- **High-risk chemicals** in current classroom use!
- Little understanding of **safety measures...**
- No **waste containers?!**

How Do We Keep Teachers & Students Safe?

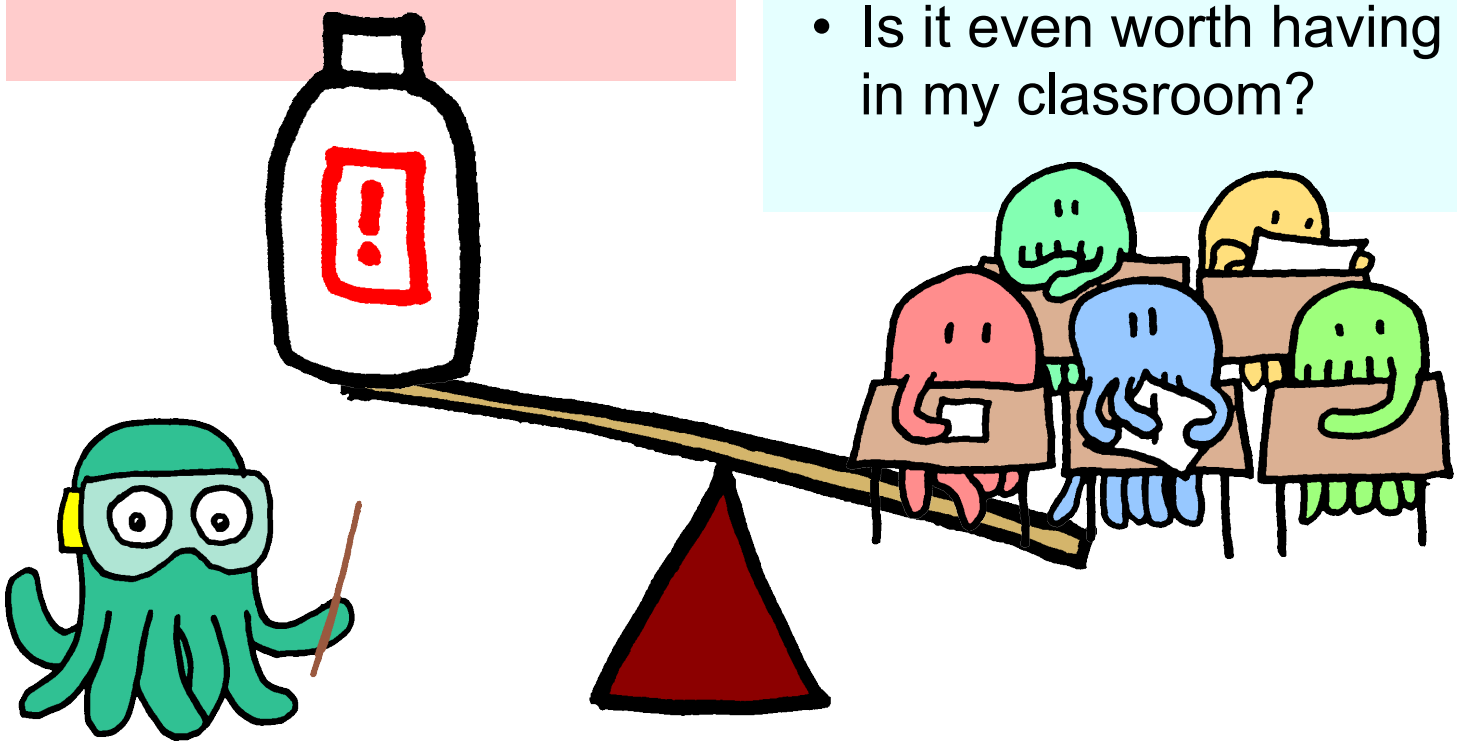
Chemical safety begins when we...

✔ RECOGNIZE chemical hazards...

- How hazardous is this chemical?
- Are there safer alternatives?
- What precautions can we take to keep everyone safe?

✔ ASSESS risks to our health...

- How important is this chemical to our learning goals?
- What are other possible risks of this chemical?
- Is it even worth having it in my classroom?



EVALUATING RISK:

Let's focus on **understanding & minimizing** risk of exposure to hazardous chemicals.

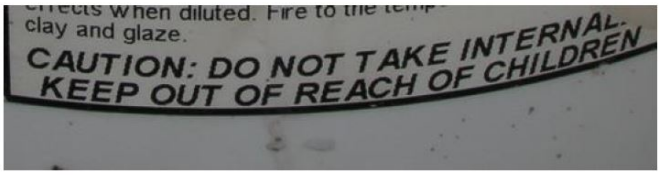
CHALLENGES in Evaluating Health Risks in Art Materials:

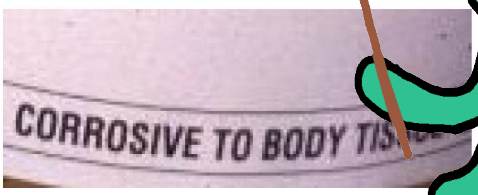
PRODUCT LABELS:

Starting with labels – What should we look for?

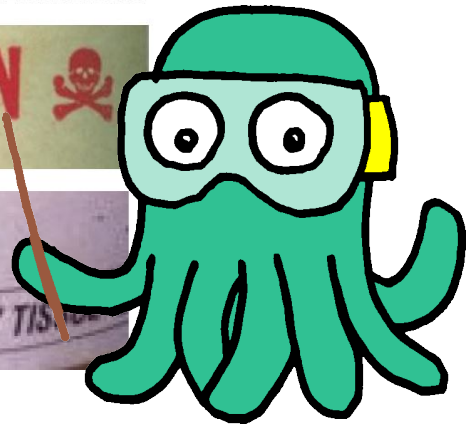
IN LIQUID FORM

IN POWDER FORM





Source: D. Waddell Collection



✔ Look for these **ACMI seals,** indicating a product has been evaluated by board-certified toxicologists:

ACMI
The Art and Creative Materials Institute, Inc.
Certifying Safety Since 1940

ACMI AP ART & CREATIVE MATERIALS INSTITUTE CERTIFIED
Conforms to ASTM D 4236

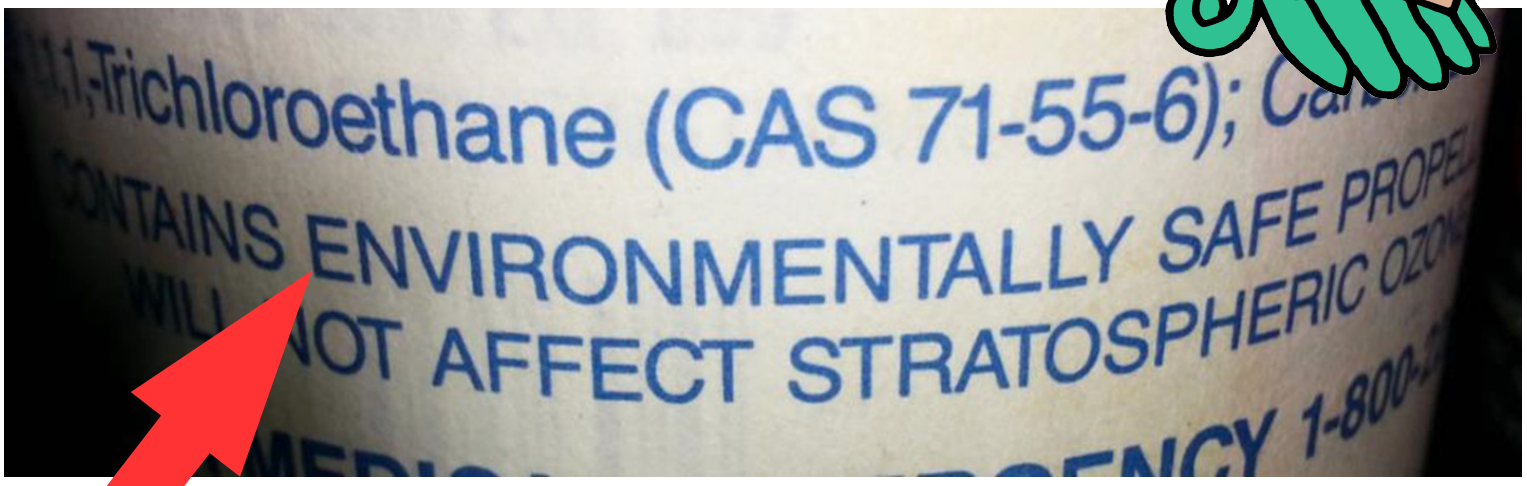
"APPROVED PRODUCT" (AP) = A toxicologist certifies that **children's art materials & products** are considered NON-TOXIC.

ACMI CL ART & CREATIVE MATERIALS INSTITUTE CERTIFIED
Conforms to ASTM D 4236

"CAUTIONARY LABEL" (CL) = CL indicates that additional risk and safety information is required on the label. Further evaluation is required to use this safely!

Limitations of Labels:

Keep an eye out for “greenwashing” & misleading descriptive text!



Despite its label, **1,1,1-Trichloroethane** is actually a **Class 1 Ozone-Depleting Substance** under Section 602 of the Clean Air Act!

- Labels evaluate "STANDARD RISK" for a **25-year-old 180-pound man** – NOT necessarily for your students!
- Not all hazards are chemical-based – How do genetics + sensitivities impact our exposures?

TOXICOLOGY: All About the Dose.

All substances are poisons... The right DOSE differentiates REMEDY from POISON.
~ Paracelsus (pioneer toxicologist, c.1500)

1 espresso = Probably HEALTHY!

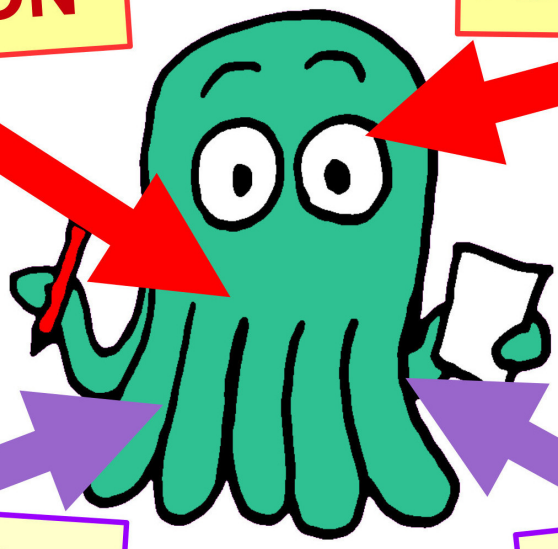
78 espressos = Probably **TOXIC!**

4 Routes of Exposure:

***** = **most frequent concerns** for classroom exposure.

INHALATION*

ABSORPTION*



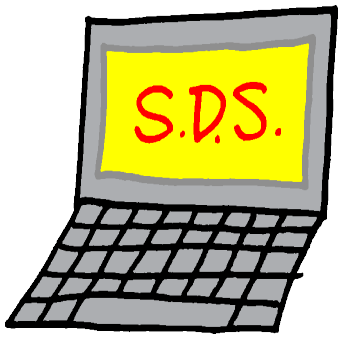
INGESTION

(Less frequent)

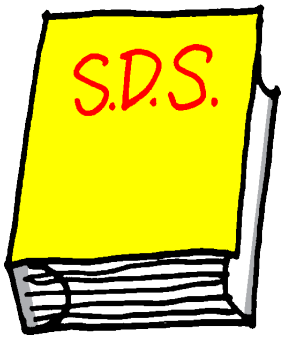
INJECTION

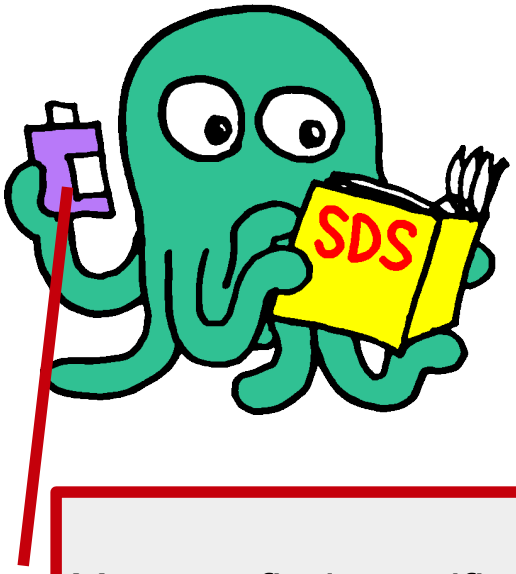
SAFETY DATA SHEETS (SDS):

OSHA / HazCom requires facilities with chemicals to maintain **Safety Data Sheets (SDS)** for all non-household hazardous materials on site...



Your SDS can be either **electronic** or an up-to-date **paper collection** that matches your inventory of chemicals.





You can find specific **chemical names** on a product's labels.

Each SDS...:

- Covers a **single chemical product** found in your classroom products & supplies.
- Contains **16 sections** featuring important information about that chemical.
- Helps you determine **when risk exceeds utility** for specific chemicals.

All ingredients in the chemical product will be listed on the SDS. Be prepared – Take some time to familiarize yourself with the **standard features & format** of your SDS:

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name	:	Methanol anhydrous, 99.8 %
Product Number	:	5.89596
Catalogue No.	:	589596
Brand	:	Millipore
Index-No.	:	603-001-00-X
CAS-No.	:	67-56-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

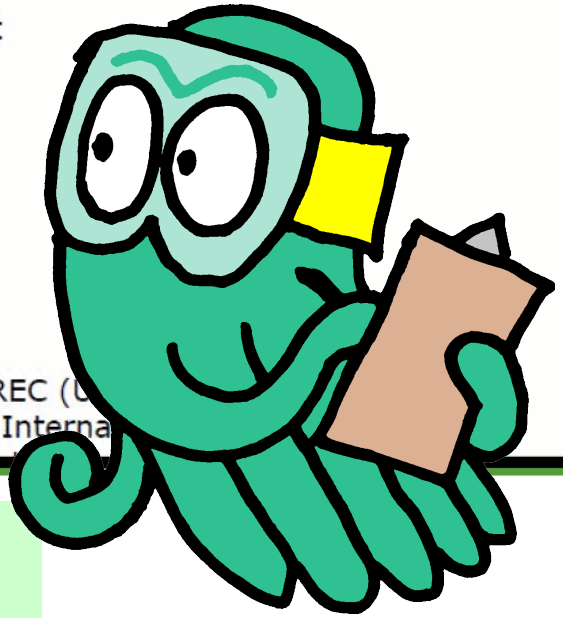
Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

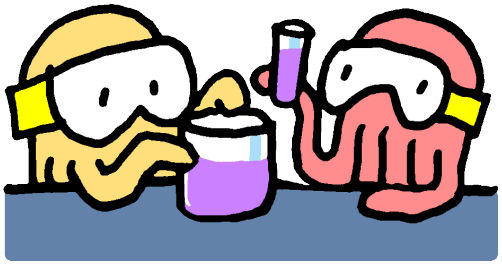
Company	:	Sigma-Aldrich Inc. 3050 SPRUCE ST ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone

Emergency Phone #	:	800-424-9300 CHEMTREC (U 527-3887 CHEMTREC (Interna



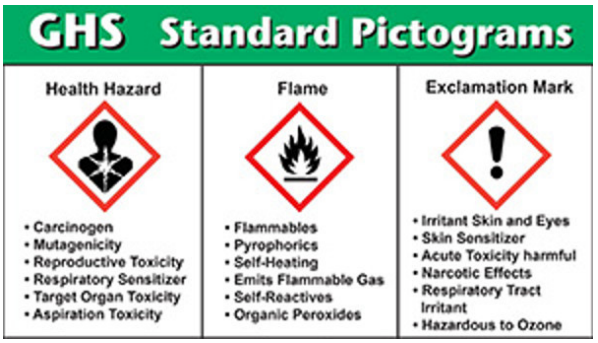
LEARNING TO READ THE SDS
= a useful science skill for all students (& teachers)!



3 Important SDS Sections:

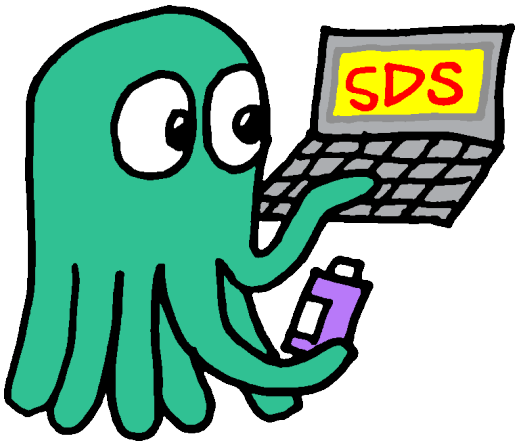
SECTION 2: Hazard ID

Know those standard **hazard pictograms** – They help you evaluate risk at a glance!



SECTION 3: Ingredients

Look at the percentages – Do they add up to 100%?? (IF NOT, you may need to do more sleuthing to uncover proprietary chemicals...)



SECTION 8: Exposure Control & Protection

- This sections contains most of your risk assessment information!
- There are lots of acronyms & toxicology terms, but don't get overwhelmed – Just learn a few key terms...→

Useful Exposure Terms:

TWA

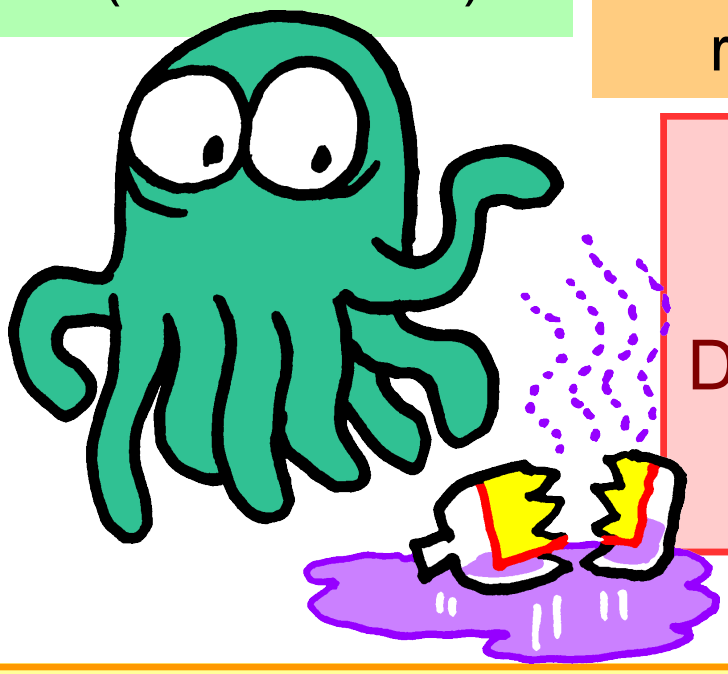
= Time-Weighted Average (= maximum exposure limit over an 8-hour work day)

STEL

= Short-Term Exposure Limit (~15-30 min.)

PEL

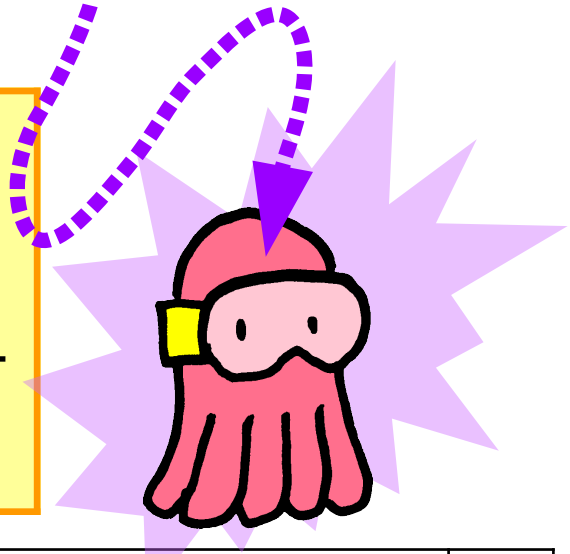
= Permissible Exposure Limit (= what the regulations allow!)



IDLH

= Immediately Dangerous to Life or Health (!!)

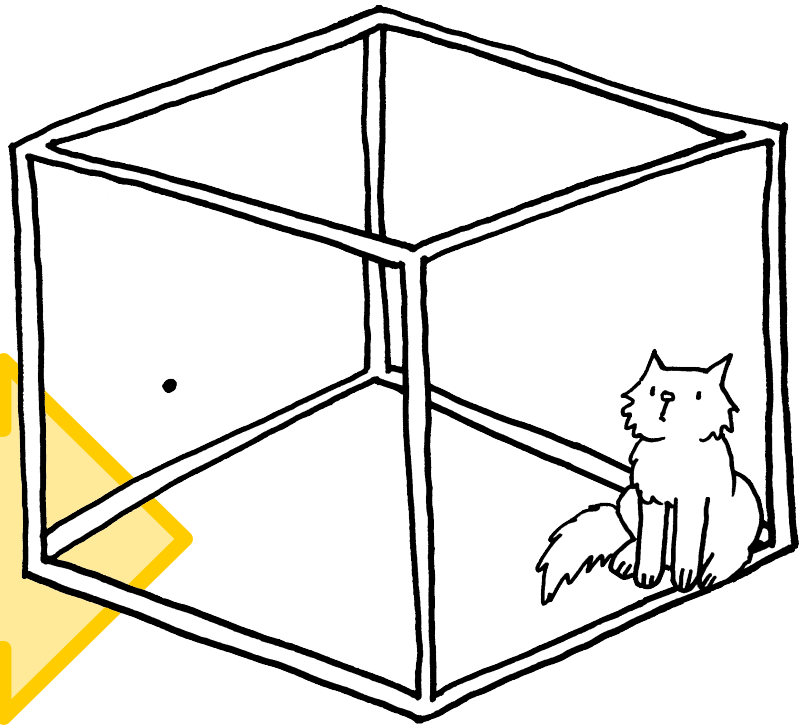
REMEMBER:
SMALL BODY = BIG IMPACT.
The same classroom exposure can have a GREATER IMPACT on students' smaller bodies!

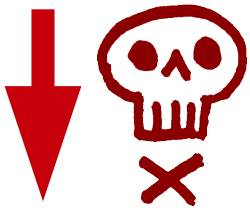


PEL = "Permissible Exposure Limit"

- **1 PPM** = "One Part Per Million"
- = **1 mg/m3** = "One milligram per meter cubed"

= roughly 1 grain of sand in a 3'x3' box



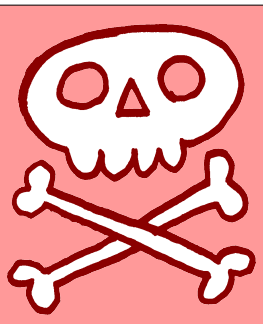


In terms of PERMITTED EXPOSURE:
Lower PPM = HIGHER DANGER!!!
(= higher RISK at lower EXPOSURES)

- You have MANY product choices... If the **information is not available** or the **manufacturer is evasive**, move to the next product.

"WHAT'S RISKY?": Check the PEL!

You can use a chemical's **PEL (Permissable Exposure Limit)** to assess risk... (See SDS/SEC.8)



<50ppm

VERY TOXIC – THIS CHEMICAL IS TRYING TO KILL ME!
DO I REALLY NEED THIS???

<50ppm

DANGEROUS! Is there something safer we can use? Learn & use all available safety controls.

500+ppm

USE CAUTION! It's still a hazardous chemical, & there's still some risk. Learn & use all safety controls.

Minimize Risk with R.A.M.P.:

Managing risk, via the American Chemical Society:

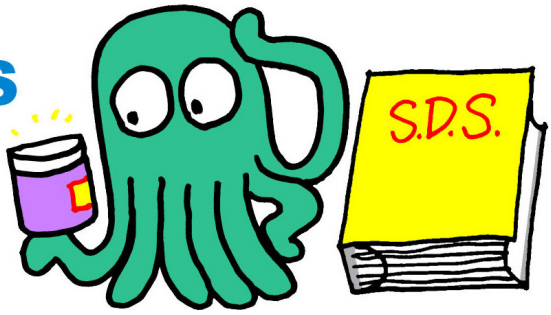
RECOGNIZE HAZARDS

Consider each chemical class:

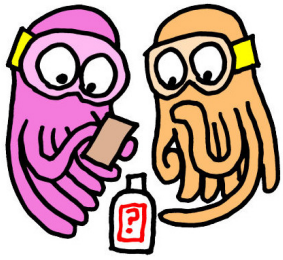
- Solvents (Flammable, VOCs)
- Toxic Metals
- Particulates
- Acids & Corrosives

ASSESS RISKS

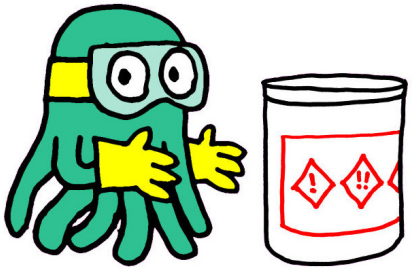
Balance **risk** with **utility**.



MINIMIZE & MANAGE HAZARDS



Make **informed choices** ahead of time...



PREPARE for EMERGENCIES

Consider **hazards** of exposure...

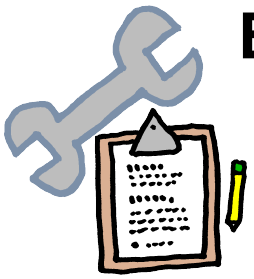
Have a **plan** in place.

OSHA's Hierarchy of Control Measures

Here are the basic types of actions a **Chemical Safety & Hygiene Plan** (CSHP) can prescribe to **minimize risk** & **prepare for emergencies:**
(Listed from **MOST EFFECTIVE** to **LEAST EFFECTIVE**)

ELIMINATION = Disposing of a chemical that's just too hazardous. **(MOST EFFECTIVE)**

SUBSTITUTION = Finding a suitable replacement chemical that's safer...



ENGINEERING CONTROLS
ADMINISTRATIVE CONTROLS
= Rules & systems to protect against & prepare for emergencies.

PERSONAL PROTECTIVE EQUIPMENT (PPE) = Goggles, gloves, etc. – All the gear & equipment that keeps you safe.**(LEAST EFFECTIVE)**

HEALTH & SAFETY: Engineering & Administrative Controls

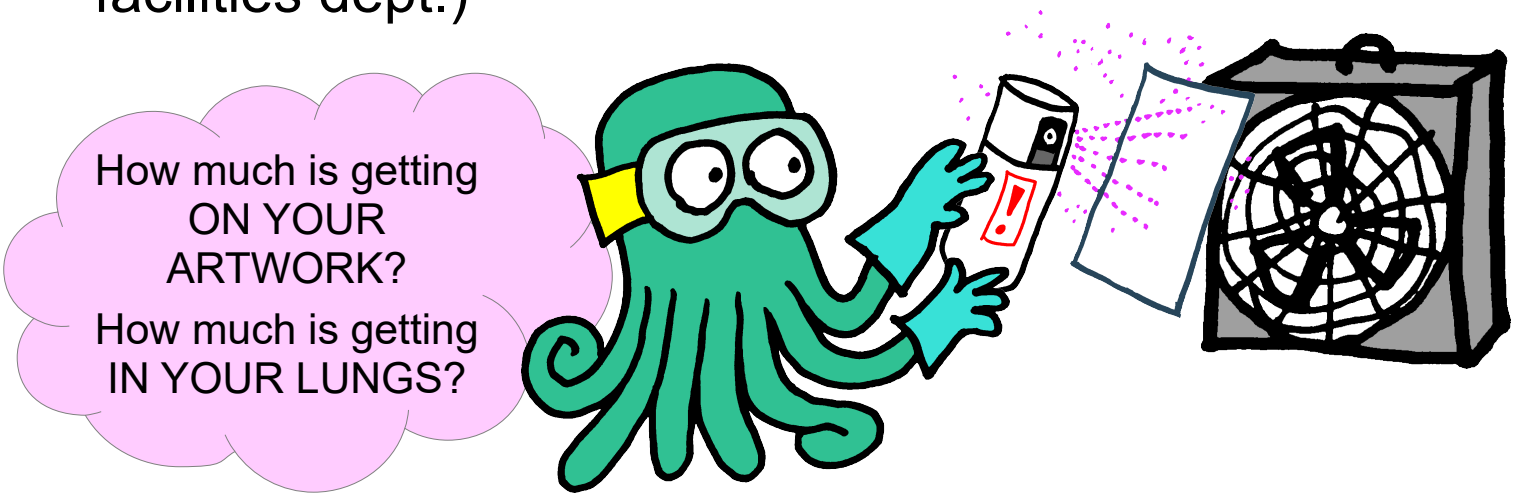
If you can't **ELIMINATE** or **SUBSTITUTE** a hazardous chemical, be sure to use these measures!

Indoor Air Cleaning & Ventilation

- To eliminate particulates, use a High-efficiency (HEPA) filter.
- To eliminate vapors & fumes, use HEPA, then a charcoal filter.
- Keep up with maintenance – Change filters when needed!
- System designs can vary... (Work closely w/ your facilities dept.)

SPRAY ADHESIVES contain hazardous VOC solvents! All are flammable; Toxicity varies.

- Vent outside.
- HEPA/charcoal filter contaminated air.
- Reduce time using chemicals.

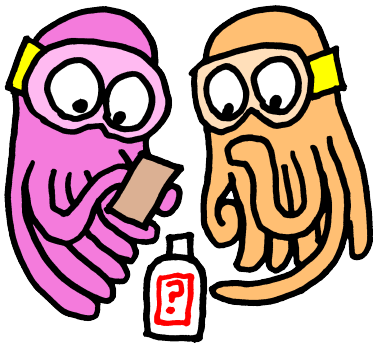


Kiln Exhaust

- Kilns need to be vented outside, or into a filtration system.
- Beware of hose crimping.
- Housekeeping is important – Maintain, & work with your facilities dept. to implement protection.
- Even if you run the kiln overnight, particles can remain suspended in classroom air...

Pigments & ceramic glazes may contain **ground metals** – Many are toxic & bioaccumulative!

HEALTH & SAFETY: Personal Protective Equipment (PPE)



- Protect yourself, students, & co-workers – **Wear PPE** & **don't work alone**.
- Keep in mind vapors & particulates. (= UNSEEN, but hazardous!)

REMEMBER: As control measures, PPE are your LAST RESORT. (= smallest scope, least effective)

REQUIRED CLASSROOM PREP:

✔ Test/check: Fire extinguisher, safety shower, eyewash station

✔ Fully Stocked Spill Kit

✔ Ventilation (Fume Hood or alternative)

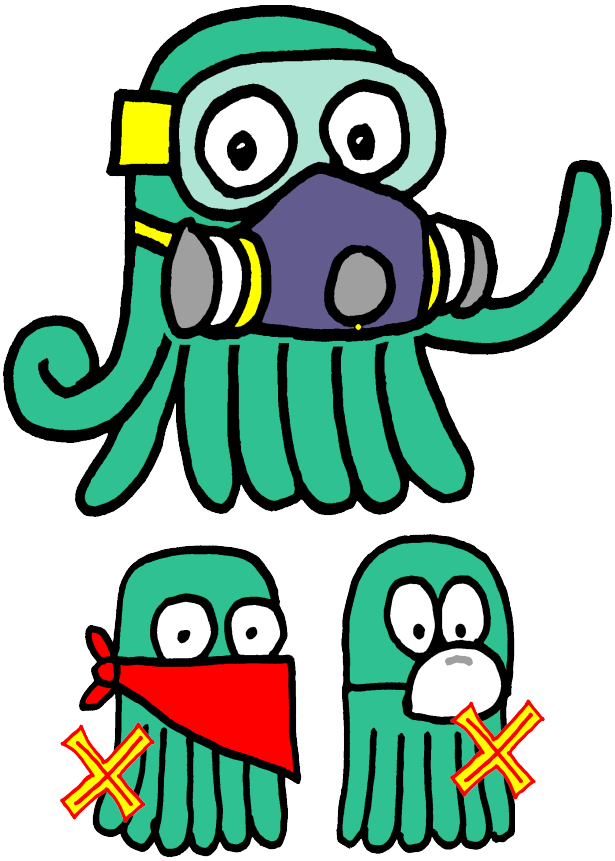
✔ Safety Glasses / Goggles

✔ Chemical-resistant Apron

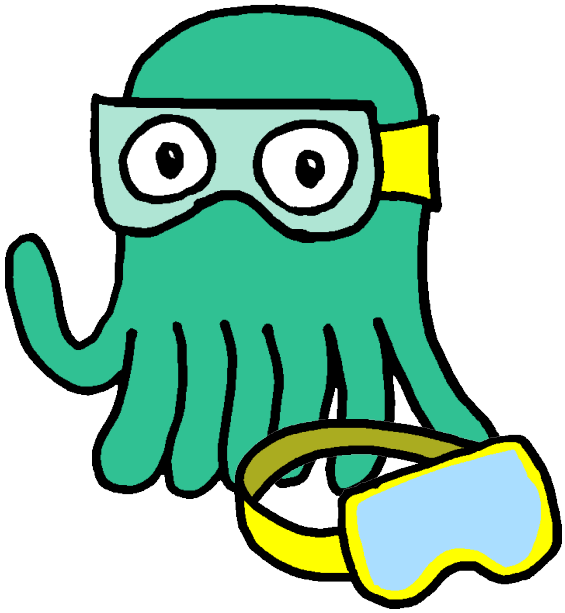
✔ Nitrile / chemical resistant gloves

Protecting Your LUNGS

- If you don't have a fume hood, use chemicals that DO NOT require respiratory protection.
- There are many regulations and requirements for using respirators to protect lungs. Choose a different chemical or different process if lungs are at risk.



Protecting Your EYES



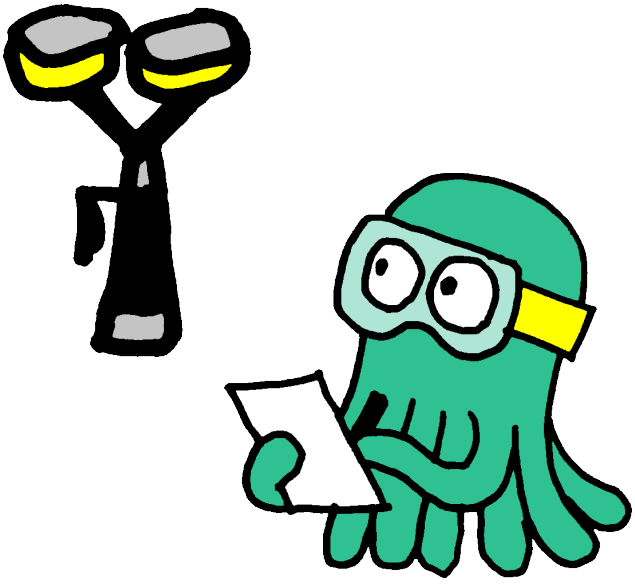
Safety glasses allow chemical vapor exposure; **GOGGLES are REQUIRED for:**

- Photochemistry
- Printmaking
- Glass etching
- Patination of metals
- Pickling of metals
- Zinc plates

EYEWASH & SAFETY SHOWER

SHOWERS

- Test & flush weekly.
- Install a privacy curtain.
- Maintain open access – Don't block! (Must be accessible within 10 seconds.)
- Should be tepid water (not just cold!) and run for 15 minutes.

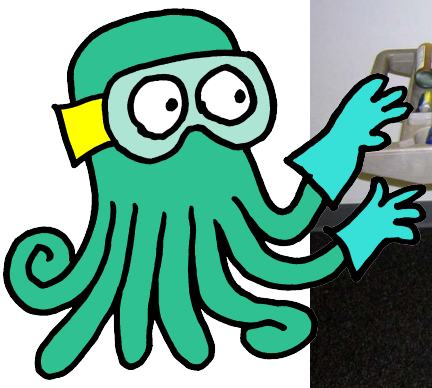


EYE WASH

- Test weekly (2-3 min run time).
- Make sure access to eye wash is not blocked!

SPILL PREVENTION

Use a containment cart to transfer hazardous chemicals.



Bottle carriers are expensive... But it's worth it to avoid a spill!

SPILL MATERIALS & PROCEDURES

- **Clean up** when the spill happens.
- Use proper **PPE & Spill Kit materials** – No paper towels for hazardous chemicals.
- **Collect waste debris** until you can evaluate hazards.
- **If shelving or large debris is contaminated**, it must be evaluated before disposal to determine if it's hazardous.

Recommended SPILL KIT Supplies

Personal Protective Equipment (PPE):

- Nitrile gloves
- Goggles
- Sturdy shoes
- Lab coat/apron
- Push Broom (stiff bristles)
- Sturdy dustpan
- Collection containers w/ lids

FOR ACIDS:

✔ Clumping cat litter

✔ sodium carbonate

✔ pH paper test

✔ Absorbent universal spill pads

FOR BASES:

✔ Clumping cat litter

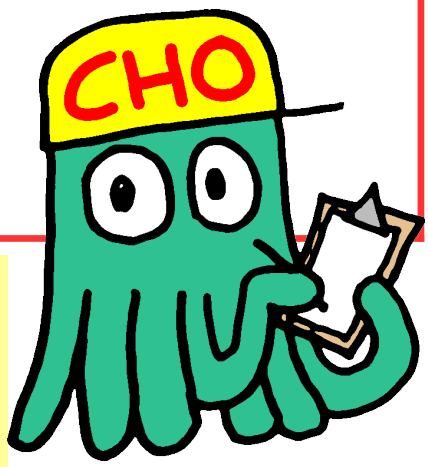
✔ citric acid

✔ pH paper test

FOR SOLVENTS:

✔ Clumping cat litter

✔ Absorbent pads



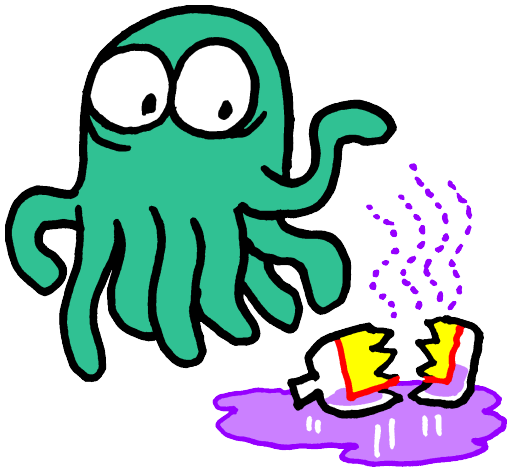
MOST IMPORTANT:

HAVE A SPILL RESPONSE PLAN!

Emergency Spill & Response Plan

Key sections of your Emergency & Spill Response Plan (as required by OSHA):

- Safe work practices
- Methods to keep exposures below permissible limits
- Training, medical consultation, hazard ID, PPE requirements & record keeping.
- Task- & chemical-specific training:
  - Storage strategy
  - Spill training & management
  - Disposal requirements
- Student contracts & expectations



Hazardous Waste Disposal

Waste disposal is complicated, and can be very expensive! Here are a few notes & tips – Ask your facility expert for more help.

5 Categories of Waste:

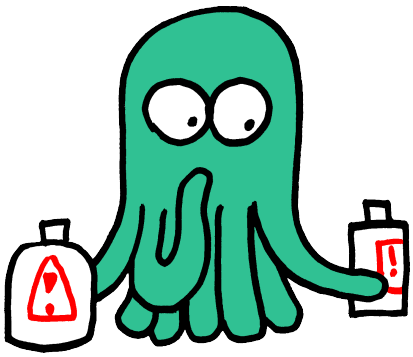
"Don't want it" Dangerous legacy chemicals	*(EXAMPLE: Peroxidized ether)*
"Can't use it" Risk exceeds utility.	*(Mercury thermometers)*
"Unknown" Unidentified chemical supplies?	*(Solutions from retired teachers)*
"Orphaned or Abandoned" Esp. outdated technology.	*(Old CRT monitors)*
"Spilled" Accidents & unplanned releases.	*(Dropped 4L bottle of Acetone)*

- Regulations require hazardous waste to be managed by FACILITY address; Disposal must be **coordinated for the whole building**!
- Regulations are based on how much is generated in a **calendar month**.
- MOST **empty containers** can be disposed in trash – But ask your local waste expert first.

OTHER SIMPLE SAFETY TIPS:

✔ DON'T STORE what you won't use.

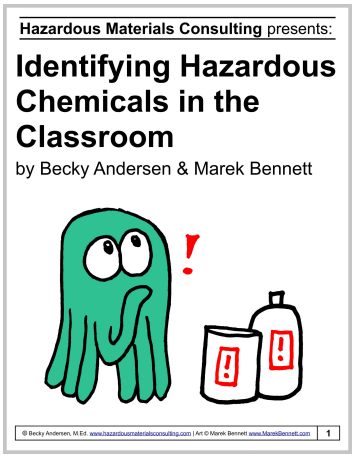
✔ CLEAN UP – Housekeeping is important!

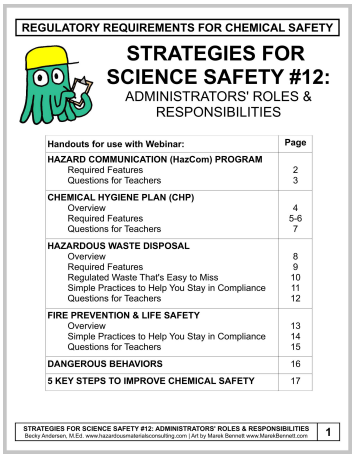


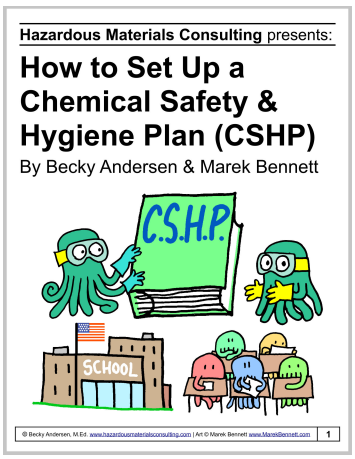
✔ KEEP APART all incompatible chemicals.

This book is dedicated to the memory of Dave Waddell, a devoted teacher, school chemical safety expert, & friend.

More in this series:

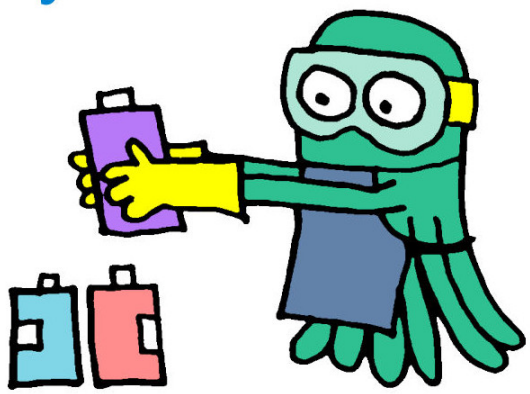


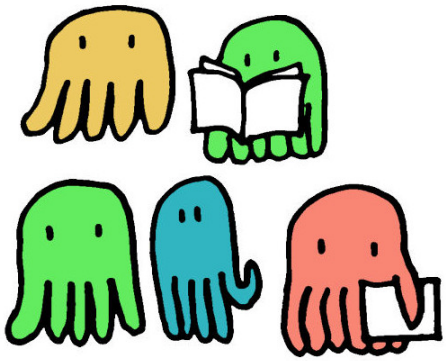




CHEMICAL SAFETY IN THE ART ROOM

✔ Your health = your choices





✔ Your choices = students' health

We all have the same goals:

- Keep students safe.
- Keep employees safe.
- Provide exceptional teaching.

CHEMICAL SAFETY IN THE ART ROOM:
Minimizing Health Risks from Supplies & Other Hazards

PROJECT HOST: Upper Valley Lake Sunapee Regional Planning Commission
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