Forgotten* Laboratory Practices

*but still important

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Presentation Outline

› Acknowledgements
› Why discuss forgotten practices
› The “forgotten” 🤔
   ◦ How much do you remember?
   ◦ What did you never hear of?
› Where do we go from here?
› Open forum*

*time permitting
Acknowledgements
The people who contributed ideas

- Arlene Farrar
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Why discuss forgotten practices

- Speaker’s personal experience.
- “Good or bad?”
- Discussions with other “seasoned” EHS professionals.
  Most importantly
- Discussions with new lab workers.
Why discuss forgotten practices

- What may be routine or common for seasoned workers may not be for new workers.
- If we don’t remember the past we are doomed to repeat it and...

BOOM!

OR WORSE

How will this work?

- A topic will be chosen (we will rotate between DC location, MD location, and virtual).
- The audience (live and remote) will be asked to comment.
- Some thoughts by the presenter will be shown after the discussion.
- The presenter does not know everything 😊
Sample: Bleach and Ammonia

- React with each other.
- Create chloramine vapors.
- Chloramine can form hydrazine.
- Can also form hydrochloric acid.

Forgotten Topics – page 1

- GFCI in laboratories
- Peroxide formers
- Dry Ice in cold rooms
- Implosion hazards
- Bunsen Burners
- Aerosols
- Methanol hazards
- Glacial Acetic Acid
- DMSO hazards
- Phenol hazards
- Storage of chemicals (alphabetical/incompatible)
- Acids with acids (mineral acids not compatible)
- Blue Red Yellow
- pH discharge down the drain
- Biohazard waste vs. hazardous waste
- Mercury hazards
- Dry drain traps
- Turning off chemical fume hoods
- How to use an eye wash
- How to remove contaminated clothing
- How to remove gloves
- Venting of flammable storage cabinets
- Face velocity
- Use of UV lights
- Smelling of chemicals
Forgotten Topics – more

- Common teratogens and
- UEL and LEL
- Light sensitive
- Shock sensitive
- Pyrophoric metals (handling)
- Radiation
- Use of airline
- Compressed gas safety
- Cryogenics
- Working alone
- Dry drains
- Chain of Infection
- Glove removal
- Hand washing
- Loose clothing
- Jewelry
- Long hair
- Contact Lenses
- Glasses and face shields
- Oxygen deficient
- Use of an autoclave.
- Use of glasswasher
- HVAC requirements in lab for bench use
- Use of BSC
- Use of Fume hood
- Zoonosis
- Elevator use

GFCI in laboratories

- GFCI is a Ground Fault Circuit interrupter.
- A GFCI is not the same as a circuit breaker or surge protector.
- GFCI’s are required in wet environments.
- All that the test button on a GFCI tells is that the test button works.
- GFCI’s can be connected together or wired to the panel box.
- Need to assure functionality.
Peroxide formers

- Picric and Perchloric Acids are the most common in laboratories.
- Peroxides are shock sensitive and highly explosive.
- Peroxide crystals form readily after opening of a container but still form in unopened containers.
- Just opening a container can cause an explosion.

Dry Ice in cold rooms

- Dry ice is solid CO\textsubscript{2}.
- CO\textsubscript{2} is a simple asphyxiant.
- Most cold rooms have limited fresh air.
- Coolers with dry ice are not air tight.
- Dry ice in a cold room can displace oxygen.
Implosion hazards

- An implosion is caused by too great a vacuum.
- An implosion can be as damaging as an explosion.
- There is little warning before the implosion occurs and very difficult to stop once an indication is noticed.
- Prevention is the key.

Bunsen Burners

- Can be self contained or piped in gas.
- Are not as common.
- Should be lit with igniter and not an open flame.
- Training is required for proper use.
- Fuel can be released and ignite.
- Poor bench organization can
  - Tip over burner.
  - Cause burner to ignite other material
Aerosols

- Aerosols are liquid droplets suspended in air.
  - Oil based
  - Water based
- Aerosols can be created by:
  - Centrifuging, pouring, pipetting, sneezing, mixing, vortexing, and on and on and on………..
- Aerosol hazards are dependent upon the material and potential for exposure.
- Knowledge of how they are created is needed to prevent creation and exposure.

Methanol hazards

- Toxicity.
  - Blindness
  - CNS depressant
- Flammability
  - Highly flammable
  - Invisible flame.
- Density
  - Heavier than air
Glacial Acetic Acid

- Dual hazard.
  - Combustible
  - Corrosive
- Reacts with nitric acid

DMSO hazards

- DMSO – Dimethyl Sulfoxide.
- Solvent for both polar and nonpolar compounds.
- Used topically.
- Penetrates the skin rapidly.
- Transports other compounds with it.
Phenol hazards

- Corrosive and Analgesic.
- Low vapor pressure.
- Routes of entry – inhalation, ingestion, and absorption.

Storage of chemicals (alphabetical/incompatible)

Chemical Compatibility.

<table>
<thead>
<tr>
<th>Class of Chemical</th>
<th>Examples</th>
<th>Recommended Storage Method</th>
<th>Incompatible Materials</th>
<th>Possible Reaction If Mixed</th>
</tr>
</thead>
</table>
| Corrosive Acids   | Mineral Acids – Chromic Acid
Hydrogen Chloride
Hydrochloric Acid
Nitric Acid
Perchloric Acid
Phosphoric Acid
Sulfuric Acid | Separate cabinet or storage area away from potential water sources, e.g., do not store under a sink | Flammable Liquids Flammable Solids Bases Oxidizers Poisons | Heat/Gas Generation Violent Reaction |
| Corrosive Bases/ Caustics | Ammonium Hydroxide
Sodium Hydroxide
Sodium Bicarbonate | Separate cabinet or storage area away from potential water sources, e.g., do not store under a sink | Flammable Liquids Flammable Solids Acids Oxidizers Poisons | Heat/Gas Generation Violent Reaction |
Acids with acids (mineral acids not compatible)

- Mineral Acids aka inorganic acids.
  - $\text{H}_2\text{SO}_4$, $\text{HNO}_3$, $\text{HCl}$, $\text{HF}$, etc.
- Oxidizers
- Do not assume all acids are compatible with other acids.

Blue Red Yellow

- Diamond – NFPA.
  - Health, Flammability, Reactivity
- Square – HMIS (National Coatings Association)
  - Health, Flammability, Physical Hazard
pH discharge down the drain

- Needs to be determined by local authorities.
- Biological material needs to be inactivated.
- Do not put hazardous material down the drain.
- Flammable hazards cannot be diluted to reduce flash point.

biohazard waste vs. hazardous waste

- A Biohazard box does NOT mean.
  **BIOHAZARD**
- Make sure that chemical waste is not put into a biohazard box!
Mercury hazards

- Do not assume all thermometers are alcohol based.
- In many pieces of equipment.
- Inhalation hazard
- Ingestion hazard

Dry drain traps

- Drain traps are designed to be full of liquid to prevent sewer gases from backing up.
- May need to add water to floor drains on a regular basis.
Turning off chemical fume hoods

- Many laboratory HVAC systems are balanced assuming that the chemical fume hood is on.

How to use an eye wash

- Eyewashes are very difficult to use as an individual.
- Second person needs to hold open victim’s eyes.
- Second person will get wet.
- Second person needs to monitor time.
- Do not transport until 15 minute flush is completed.
- Does not work on HF
- Eye wash bottles are not eye washes
How to remove contaminated clothing

- Right side out or inside out?
- It depends!
- Button down shirt inside out.
- Pull over –
  - Cut off – inside out.
  - Pull away from face when removing.

How to remove gloves

- Make sure that people know proper methods.
- Need to assure that skin is not touched by the outside of the glove.
- Do not snap!
**Venting of flammable storage cabinets**

- Bungs in or out?
- Out if vented outside the *building*.
- In if not vented.

**Face velocity**

- Face velocity is not indicative of safe operation but is the typical practice.
- Velocity is typically measured at the front of the hood.
- The velocity should be between 80 and 120 fpm.
- A physical indicator is a good practice.
Use of UV lights

- Can cause burns to the eyes.
- Has different opinions on the effectiveness.
- Effectiveness may be limited on the hours of operations.

Smelling of chemicals

- Old school – waft the vapors towards you.
- New school – don’t do!
Where do we go from here?

- Realize that what is common to you may not be common to others?
- Be cognizant of reduced training time being allocated?
- Pay attention to who mentors are and their expertise.
- Be wary of “urban legends”.
- Other..........................