

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



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Acknowledgements

The people who contributed ideas

- ▶ Arlene Farrar
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- ▶ David Prevar



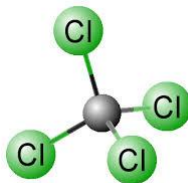
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Why discuss forgotten practices

- ▶ Speaker's personal experience.
- ▶ "Good or bad?"
- ▶ Discussions with other "seasoned" EHS professionals.

Most importantly

- ▶ Discussions with lab workers.



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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...



OR WORSE



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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 😊



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Sample: Bleach and Ammonia

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



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Forgotten Topics – page 1

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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



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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.



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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.



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Dry Ice in cold rooms

- ▶ Dry ice is solid CO_2 .
- ▶ CO_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.



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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.



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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



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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.



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Methanol hazards

- ▶ Toxicity.
 - Blindness
 - CNS depressant
- ▶ Flammability
 - Highly flammable
 - Invisible flame.
- ▶ Density
 - Heavier than air



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Glacial Acetic Acid

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



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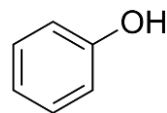
DMSO hazards

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

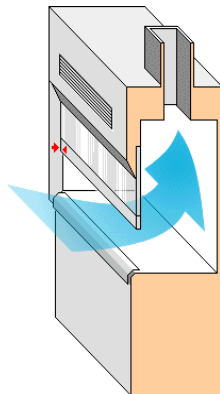


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Phenol hazards



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



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Storage of chemicals (alphabetical/incompatible)

- ▶ Chemical Compatibility.



Class	Flammable	Corrosive	Oxidizing	Toxic	Reactive
Flammable	✓	✓	✓	✓	✓
Corrosive	✓	✓	✓	✓	✓
Oxidizing	✓	✓	✓	✓	✓
Toxic	✓	✓	✓	✓	✓
Reactive	✓	✓	✓	✓	✓

Class of Chemical	Examples	Recommended Storage Method	Incompatible Materials	Possible Reaction If Mixed
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



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Acids with acids (mineral acids not compatible)

- ▶ Mineral Acids aka inorganic acids.
 - H_2SO_4 , HNO_3 , HCl , HF , etc.
- ▶ Oxidizers
- ▶ Do not assume all acids are compatible with other acids.

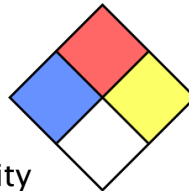


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Blue Red Yellow

- ▶ Diamond – NFPA.
 - Health, Flammability, Reactivity
- ▶ Square – HMIS (National Coatings Association)
 - Health, Flammability, Physical Hazard



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pH discharge down the drain

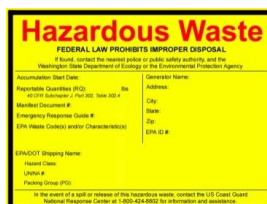
- ▶ Needs to be determined by local authorities.
- ▶ Biological material needs to be inactivated.
- ▶ Do not put hazardous material down the drain.
- ▶ Flammable hazards cannot be diluted to reduce flash point.



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biohazard waste vs. hazardous waste

- ▶ A Biohazard box does NOT mean.
~~BIO~~HAZARD
- ▶ Make sure that chemical waste is not put into a biohazard box!



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Mercury hazards



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



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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.



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Turning off chemical fume hoods

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



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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



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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.

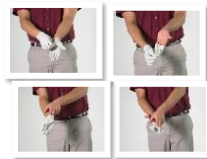


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How to remove gloves

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



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Venting of flammable storage cabinets

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



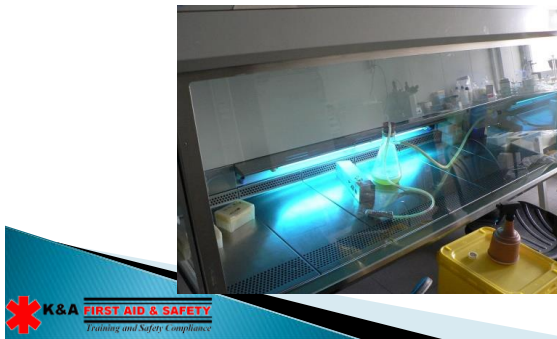
Face velocity

- ▶ 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



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Smelling of chemicals

- ▶ Old school – waft the vapors towards you.
- ▶ New school – don't do!



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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.....



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Thank you

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