Part 2

Forgotten* Laboratory Practices

*but still important

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Presentation Outline

- Summary of Last Time
- 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
Summary Part 1

- WOW!
- How do we not lose this knowledge
- Don’t assume
  - Trained elsewhere
  - What is common to you isn’t common to them (inside out vs. rightside out)
- Understand someone’s background
- Know the attitude of their supervisor/mentor towards safety

Summary Part 1

- Beware of “urban legends”
- Beware of new technology vs. old technology
  - New technology may not incorporate safety features in.
  - New technology may incorporate safety features in and people will assume older equipment has the same feature.
- Mercury thermometers vs. today’s technology
Why discuss forgotten practices

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

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 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 – part 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 – part 2

- GFCI in laboratories
- Peroxide formers
- Pyrophoric metals (handling)
- Bunsen Burners
- Cryogenics
- Methanol hazards
- Glacial Acetic Acid
- DMSO hazards
- Phenol hazards
- Storage of chemicals (alphabetical/incompatible)
- Acids with acids (mineral acids not compatible)
- Compressed gas safety
- pH discharge down the drain
- Biohazard waste vs. hazardous waste
- Working alone
- Chain of Infection
- Turning off chemical fume hoods
- Contact Lenses
- Glasses and face shields
- Elevator use
- Venting of flammable storage cabinets
- Loose clothing/Jewelry/Long hair
Forgotten Topics – more

- Common teratogens and UEL and LEL
- Light sensitive Radiation
- Use of airline
- Dry drains
- Glove removal
- Hand washing

- Oxygen deficient Use of an autoclave.
- Use of glasswasher
- HVAC requirements in lab for bench use
- Use of BSC
- Use of Fume hood
- Zoonosis

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.
Pyrophoric material

- Will spontaneously ignite with contact with air.
- Used for catalyzing reactions.
- Safe handling:
  - Keep combustibles away
  - Special PPE
  - Storage
  - Procedures (use of artificial atmosphere or under liquid)
- Emergency response

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
Cryogenic hazards

- Slow leakage
- Catastrophic release

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.
### 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>
<tbody>
<tr>
<td>Corrosive Acids</td>
<td>Mineral Acids – Chromic Acid Hydrogen Chloride Hydrochloric Acid Nitric Acid Perchloric Acid Phosphoric Acid Sulfuric Acid</td>
<td>Separate cabinet or storage area away from potential water sources, e.g., do not store under a sink</td>
<td>Flammable Liquids Flammable Solids Bases Oxidizers Poisons</td>
<td>Heat/Gas Generation Violent Reaction</td>
</tr>
<tr>
<td>Corrosive Bases/ Caustics</td>
<td>Ammonium Hydroxide Sodium Hydroxide Sodium Bicarbonate</td>
<td>Separate cabinet or storage area away from potential water sources, e.g., do not store under a sink</td>
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### Acids with acids (mineral acids not compatible)

- **Mineral Acids aka inorganic acids.**
  - H₂SO₄, HNO₃, HCl, HF, etc.
- **Oxidizers**
- **Do not assume all acids are compatible with other acids.**
Compressed Gas Safety

- Storage (compatibility, secured, and location)
- Movement
- Use of regulators
- Leak checks (snoop)

Table 1

<table>
<thead>
<tr>
<th>Common OSHA Violations Involving Compressed Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unsecured cylinders</td>
</tr>
<tr>
<td>2. Cylinders stored without protective caps</td>
</tr>
<tr>
<td>3. Noncompatible gases (such as hydrogen and oxygen) stored together</td>
</tr>
<tr>
<td>4. Cylinder valves open when cylinder is not in use (an attached regulator with a closed discharge valve is not sufficient)</td>
</tr>
<tr>
<td>5. Fire extinguishers not present during welding, burning, or brazing operations</td>
</tr>
<tr>
<td>6. No safety showers and eyewash fountains where corrosive gases are used</td>
</tr>
<tr>
<td>7. No gas masks and/or self-contained breathing apparatus conveniently located near areas where toxic gases are used or stored</td>
</tr>
</tbody>
</table>

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!

Working Alone

- Any policy?
- How to respond?
- PBX phone system
- What are health hazards vs. physical hazards vs. process hazards?
Chain of Infection

Four Conditions Necessary for Spreading Disease

- Presence of the pathogen
- Sufficient quantity of the pathogen
- Susceptible person
- Pathogen passes through correct entry site

Turning off chemical fume hoods

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

- When not permitted:
  - Full face respirators
  - Incompatible chemicals (usually acrylate or methyl methacrylate monomers)
- Removal before use of eye wash – not required

Safety Glasses & Faceshields

- For impact protection OSHA states “Face shields shall be used only as a secondary means of eye and face protection”.
  - Mark Z87 is a basic impact face shield. This means it should be capable of resisting impact from a 1 in. (25.4mm) diameter steel ball dropped from a height of 50 inches.
  - Mark Z87+ on the other hand is a high impact face shield that can resist impact from a .25 inch (6.35mm) diameter steel ball traveling at a velocity of 300 feet per second (91.4 m/s).
Elevator use

- Difference between freight and passenger
- Hazards of transporting chemicals and passengers together
  - Dry ice
  - Cryogens
  - Volatiles
  - Spillage
  - ......

Loose clothing/ jewelery/long hair

- Moving equipment
- Contamination
- Fire
Where do we go from here?

Thank you

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