All You Need to Know to be Safe in the Laboratory are Found in the Following Three Hazard Control Areas.
Hazard Control Measures

• **Engineering Controls**: The work environment is designed to eliminate hazards or reduce exposure to hazards.

• **Work Practices and Administrative Controls**: Policies or procedures used to reduce employee exposure

• **Personal Protective Equipment**: Worn by the worker to protect against exposure to chemicals.
How HVAC Works In a Typical Lab

Welcome to the Lab!
Personal Protective Equipment
Hazards -vs- Risks

- **Hazard**: physical and chemical properties of materials.

- **Risk**: probability that a substance will produce harm.
Routes of Exposure

- Inhalation
- Skin Contact
- Ingestion
- Injection
Local Effect

Occurs at the point of contact with the skin, eyes, nose, throat and airway.
Acute Corrosive Exposures
Acute Eye Injuries
Chromatography is a method of separation based on principle of phase distribution.

There are two phases in all Chromatography techniques:

- A Mobile phase
- A Stationary phase

Different Chromatography Techniques:

Thin Layer Chromatography (TLC) ***
Gas Chromatography (GC) ***
Paper Chromatography
Column Chromatography
Liquid Chromatography (LC)
High Performance Liquid Chromatography (HPLC)
Chromatography

All chromatographic techniques flow the mixture that is to be separated through a material that retains some components more than others.

This causes different components to flow through the material at different speeds, so they separate.
Thin Layer Chromatography

Use PENCIL (NOT PEN) to mark the spots on the TLC plate!!!!
Delevoping Chamber for TLC

Figure 2.2. A 250 mL beaker is used as a developing chamber.
Use **PENCIL** (NOT PEN) to mark the spots on the TLC plate!!!!

Use micropipettes, as the TA will demonstrate, to spot compounds on the TLC plate.
Different Solvents Have Different Polarities...

- Petroleum ether
- Hexane
- Cyclohexane
- Carbon tetrachloride
- Toluene
- Dichloromethane
- Chloroform
- Diethyl ether
- Ethyl acetate
- Acetone
- Iso-Propanol
- Ethanol
- Methanol
- Water

Increasing polarity:

- Hexanes
- CH₂Cl₂
- CH₃OH
- H₂O
How to Separate a Mixture Using TLC

Known Standards

1 – Benzophenone
2 – Biphenyl
3 – Triphenylmethanol

4 – Salicylic acid
5 – Methyl benzoate

Benzophenone
Biphenyl
Triphenylmethanol

Salicylic acid
Methyl benzoate
How to Separate a Mixture Using TLC and Identify your Unknowns

Use PENCIL (NOT PEN) to mark the spots on the TLC plate!!!!

- First find the appropriate solvent system to separate your compounds (you will probably have to try a few)

- After you have the correct solvent system you need to spot ON THE SAME PLATE your unknown with TWO different standards every time and compare the spots on the developed TLC.

- After a few trials you will be able to identify the unknowns of your mixture.
Calculating $R_f$

$R_f = \text{Retention Factor}$

$R_f = \frac{\text{distance moved by solute}}{\text{distance moved by solvent}}$

$= \frac{x}{y}$ \text{ in cm}

i.e $R_f = \frac{11}{15} = 0.73$

(Rf always <1)