



- i. No documented safety procedures.

Hazards related to the equipment used in the procedure (vacuum, temperature, etc.)

Hazards related to machine equipment (hand tools, saws, etc.) such as crushing, cutting, entanglement, severing, electrical contact, etc.

Required engineering controls, administrative controls, and [personal protective equipment](#).

[Waste disposal requirements](#).

Emergency requirements such as reporting injuries, cleaning up spills, etc.

- b. Step 2: You will also need to know what the exposure potential to these materials are, including:

Amount of material used

Dispersion Potential (Volatility, Aerosols, Dustiness)

Operating Temperature

Frequency of Use

Safety controls available

This information will not always be available for all the hazardous materials and processes in the procedure. It is possible to group these during a risk assessment based on prior knowledge. This is similar to [control banding](#) used in industry.

Assign categories of risk to some or all chemicals (carcinogens, reproductive toxics, acutely toxics, explosives, unstable processes, pyrophoric materials), apparatus and equipment.

Apparatus under high vacuum, heated oil baths, ultra-centrifuges, NMR equipment and high temperature ovens are classified as presenting a greater risk compared with other apparatus and equipment.

Industrial tools and powerful portable small benchtop tools are higher risk than

What-If q

- vi. Temperature: What is the maximum temperature that the process can be heated before reaching the flashpoint or autoignition temperature of any flammable material? What is the lowest temperature the equipment can withstand if cooling with liquid nitrogen or dry ice?
- vii. Volume: What is the equipment containment limits? This is important when scaling up a process. The equipment size must increase proportionally and allow for additional off-gassing.
- viii. Additional Parameters: There are many other factors that must be considered when designing a safe experiment. Some of these include:

Time - when scaling up, it is important to have more time to complete the process (loading, unloading, heating up, cooling down). Sometimes it goes into late night work without proper back up by second worker in the lab present.

Environment - room temperature too high that require additional

