Pressurized systems can cause serious injury and property damage if used improperly or if the equipment malfunctions. Main hazards can include impact from explosion, exposure to hazardous chemicals through uncontrolled release or malfunction and fire resulting from unintentional release of flammable chemicals and ignition.

Before an experiment begins, ensure the equipment is properly assembled and that all relevant information is compiled and evaluated.

**Gather information from the:**

**Manufacturer**
- Assembly of pressure system equipment
- Use of safety devices
- Chemical and physical compatibility of equipment with experiment

**SDS/References**
- Review literature, patents and published processes for reaction conditions (temperature, pressure, etc.)
- Know hazards (flammability, toxicity) and physical properties (flash point, auto-ignition temperature) associated with chemicals involved
- Be aware of possible decomposition products and their effects on pressure

**SOPs**
- Review, sign, and document any SOPs for equipment, processes, and chemicals as needed
- Handling of toxic, corrosive or unstable chemicals
- Develop emergency shut-down procedures
- Discuss scaling up of reactions with PI and ensure scale is within system’s capacity

**Check safety devices and controls for:**

**Heating**
- Thermocouples connected to the heating source for heat shut down in case of thermal runaway

**Pressure**
- Step down regulators to introduce gases from high pressure sources to the system
- Gauges and regulators with operating pressures that are at least 120% of the system’s maximum allowable working pressure
- Pressure relief valves to use as part of the pressure system
- Blast shields based on risk assessment of equipment being used (e.g., glass or materials that can shatter)

**Chemical**
- Flash-back arrestors used when flammable gases are employed
- Fume hoods/local exhaust ventilation for processes involving or producing toxic/flamable materials

**During experiment, monitor for:**
- Leakage (hissing, liquid release, smell)
- Pressure relief valve discharges
- Sudden changes in temperature/pressure

**After experiment:**
- Maintain seals and replace if needed
- Look for corrosion or wear
- Pressure test equipment with non-hazardous gases
- Keep records of use, maintenance and pressure tests

**Additional Information**
- Pressure Vessels Lessons Learned Video: http://youtu.be/sXGAI4NCzMs
- Pressure Safety Presentation: esh-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=1789
- Pressure Vessels on OSHA Website: www.osha.gov/SLTC/pressurevessels