Compressed Gas Safety
OSHA Regulations

29 CFR 1910.101 - Compressed Gases
Hazards of Compressed Gas Cylinders

- Chemical Hazards
- Physical Hazards
Compressed Gases

Chemical Hazards

- Inerts
- Oxidizers
- Flammable
- Toxic
Chemical Hazards of Compressed Gas Cylinders
Oxidizers

OXYGEN & GAS MIXTURES

- OXYGEN CONCENTRATION >23.5%
Oxidizers

- SUPPORTS COMBUSTION.

- NEVER ALLOW PETROLEUM-BASED PRODUCTS TO COME INTO CONTACT WITH OXIDIZERS.

- SEPARATE FROM COMBUSTIBLES & FLAMMABLES IN STORAGE.
  - 20’ DISTANCE, OR
  - 5’ HIGH, 1/2 HOUR FIRE WALL
Oxygen

- Odorless, colorless gas
- Non-flammable but is necessary for other material to burn
- Hyperoxia
Oxygen Cylinder
Inerts

NITROGEN, ARGON, HELIUM, CO2

- Simple Asphyxiants which can displace oxygen
- Will not support life
**Inerts**

- **USE IN WELL VENTILATED AREAS**
- **DO NOT DISPOSE OR VENT OFF UNUSED QUANTITIES.**
- **MONITOR FOR OXYGEN > 19.5% WHEN USED IN CONFINED SPACE**
Inerts
Argon

- Odorless, colorless gas
- Can be stored with flammables or combustibles.
ACTYLENE, PROPANE, PROPLYENE

- Gas flammables in concentration of 13% or less in air by volume

- Gas in flammable range greater than 12% by volume
Flammables

- STORE IN A WELL VENTILATED LOCATION
- KEEP AWAY FROM HEAT SOURCES
- STORE AWAY FROM OXIDIZERS AND COMBUSTIBLES
Flammables
Acetylene

- Slight garlic-like odor

- Burns easily in air
  - 2.5% LEL - 99% UEL

- May be explosive under high pressure
  - Used at 15 psi or less
ARSINE, NITROGEN DIOXIDE, BORON TRICHLORIDE

- Material capable of causing death or serious debilitation

- In absence of data on human toxicity tested on laboratory animals has a LC50 value
Every Gas Cylinder or Vessel Must Be Clearly Labeled

- Product Name
- DOT ID Number
- DOT Hazard Class
- Manufacture Name & Location
- Precautionary Statement
Cylinder Identification

- Never rely on color of cylinder for identification.
- Color of cylinder may vary by manufacturer or owner.
- Always use product label to properly identify contents.
Cylinder Identification

Never modify, cover or remove a label.

If cylinder label becomes illegible or detached

- Write product name with black marker.
- Mark as “contents unknown” if unknown.
- Contact manufacturer or distributor.
Physical Hazards of Compressed Gas Cylinders

- Pressure
- Weight
- Stability
- Mechanical Failure
- Movement
Recognize the Hazards

Pressure

● Causes
  - Typical High Pressure Cylinders have 1800 – 3000 PSI
  - Not regulating pressure

● Consequences
  - Uncontrolled release
  - Activation of relief device
  - Container failure
Recognize the Hazards

Weight

- This stuff is heavy
- Nitrogen 160
  - 251 lbs
- Argon 450
  - 1059 lbs
Recognize the Hazard

Weight

- Consequences
  - Smashed finger
  - Back strain
  - Broken foot
  - Internal injuries
  - Amputation
Recognize the Hazard

Stability

- **Causes**
  - Naturally unstable
  - Transitions
  - Uneven surfaces
  - Debris on floors

- **Consequences**
  - Falling cylinder
  - Falling piles
  - Liquid container tipping over
Recognize the Hazards

- Mechanical Failure
  - Cylinder
  - Valves
  - Regulator
Recognize the Hazards

Mechanical Failure

Causes
- Over pressurization
- Backflow
- Flashback
- Damaged in transportation
- Worn threads
- Valve packing and seats

Consequences
- Flying debris
- Property damage
- Injury/Death
Recognize the Hazard

Movement

- Causes
  - Lose of control while rolling
  - Trying to catch falling cylinders
  - Miss alignment of cart hooks
  - Failure to secure to cart
Recognize the Hazards

Movement

Consequences
- Smashed hand
- Back strain
- Shoulder strain
- Broken foot
- Internal injuries
- Finger amputation
Cylinder Storage

- Store in dry, ventilated location.
- Secure from falling or rolling.
- Protect from falling objects.
- Do not use as a door stop.
- Keep valve closed when not in use.
Cylinder Storage

- Store with valve closed and cap on.
- Hand tighten caps.
- Do not store in extreme temperatures near flames or direct heat.
- If ice and snow accumulate on cylinders, thaw at room temperature.
- Do not store near gasoline.
Cylinder Storage

Fuel gas
- Always in upright position.
- 20 feet from oxygen & combustible material.
- Never place anything on top of cylinder.

Oxygen
- 20 feet from flammable or combustible material.

Separation can be 1 hour fire wall.
Cylinders in use or connected can be stored together.
Cylinder Handling

Personal Protective Equipment
Cylinder Handling

- Protect valve, couplings, regulators, hose and apparatus from oil & grease.
- Never drop or strike a cylinder.
- Do not lift cylinder by cap.
- Do not weld on lift attachments.
**Cylinder Handling**

- If cylinder does not have a fixed valve handle, a non-adjustable wrench must be with the cylinder while in use.
- Valve must be closed before moving a cylinder.
  - Unless secured to a cart, regulator must be removed and cap in place.
Cylinder Handling

- Check container for bulges, dents, pits.
- Check container and valve for corrosion.
- Do not direct a gas stream directly at any person.
- Cylinders must be kept away from actual hot work area to protect from sparks, slag, etc.
- Cylinders need a check valve to prevent backflow.
Cylinders & Regulators

- Never attempt to repair or modify a regulator.

Before attaching to cylinder
- Stand to one side of cylinder outlet
- Open valve slightly, then close
- Never use Teflon tape on a CGA fitting

Before removing from cylinder
- Close cylinder valve
- Release gas from regulator
Cylinders & Valve Leaks

- NEVER USE A LEAKING CYLINDER.
- Attempt to stop leak by closing valve.
- Move outdoors & away from ignition sources, allow to slowly empty.
- Tag or mark cylinder to warn others that it is leaking.
Cylinders & Fire

- Move cylinders away from fire if possible.
- Use water to keep cylinders cool.
- Inform emergency personnel of type & amount of gas on-site.
Additional Information Sources

- Product Label
- Safety Data Sheet
- www.Mathesongas.com
- Emergency Response Guidebook
Questions