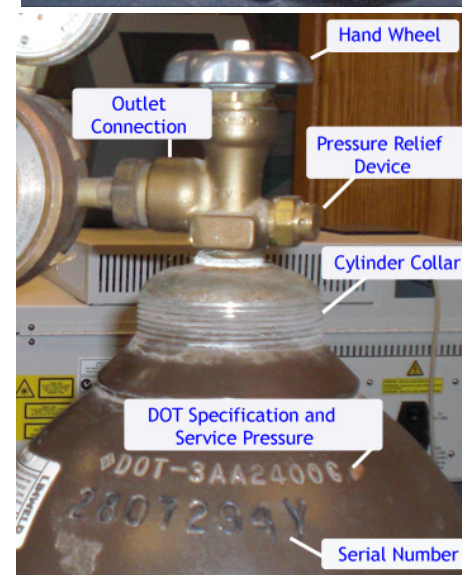


Training Needs Assessment and Documentation Training

**Zakarian Group Meeting
23 January 2014**

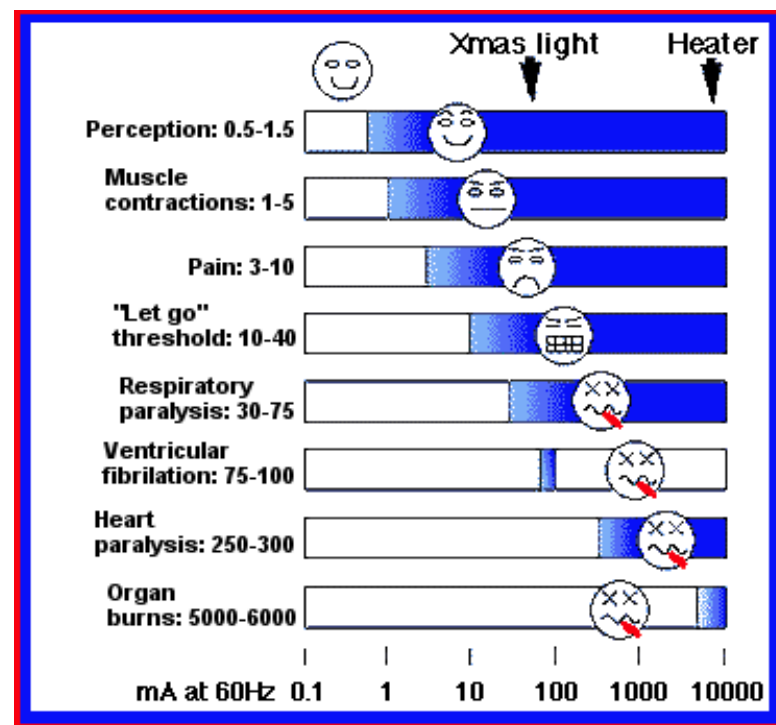
Gas Cylinder Use

- Cap fastened when cylinder is not used
- Chain at midpoints for seismic activity
- Store cylinders with similar hazard class
- Always transport with a hand-truck
- Never enter an elevator with a cylinder
- Never use teflon on regulators (meant for metal-metal seals)



High Volt./Basic Electrical Hazards

- 4th cause of workforce deaths in US
- 0.05 amps in 6-watt bulb
- Check integrity of wires and replace when needed
- Do not remove ground pin in sockets
- Do not overload electrical cords
- Unplug tools before working on them



Glassware Handling

- Use proper containers to dispose of broken glassware
- Throw away glass containers in designated trash bins
- When cardboard box is $\frac{3}{4}$ full then dispose of it
- If a glass container with a reagent breaks then contact EH&S if needed for chemical spill or neutralize chemical and dispose of the broken glass accordingly



Vacuum/Mechanical/Moving Parts Safety

- Place a cover over the vacuum belt
- Turn off the vacuum when maintenance is performed
- Protect yourself from hazardous chemicals in the vacuum
- Do not place incompatible chemicals on the vacuum line
- Keep good maintenance of vacuums
- No equipment should overbalance by more than 15 degrees



Cryogenic Safety

- cryogenic liquid is a liquid with a bp below -150 celcius
- Asphyxiation hazard once oxygen levels drops from 21% to 15%.
- Use cryogenic liquid cylinders
- Use proper PPE (prevent frostbite)
- Prevent pressure buildup
- Use in ventilated areas

Cryogenic Safety

Gas	Boiling Point Centigrade	Boiling Point Kelvin	Volume Expansion to Gas
Helium-3	-269.9	3.2	757 to 1
Helium-4	-268.9	4.2	757 to 1
Hydrogen	-252.7	20.4	851 to 1
Deuterium	-249.5	23.6	...
Tritium	-248.0	25.1	...
Neon	-245.9	27.2	1438 to 1
Nitrogen	-195.8	77.3	696 to 1
Carbon monoxide	-192.0	81.1	...
Fluorine	-187.0	86.0	888 to 1
Argon	-185.7	87.4	847 to 1
Oxygen	-183.0	90.1	860 to 1
Methane	-161.4	111.7	578 to 1
Krypton	-151.8	121.3	700 to 1
Tetrafluoromethane	-128	145	...

Cryogenic Safety

Ozone	-111.9	161.3	...
Xenon	-109.1	164.0	573 to 1
Ethylene	-103.8	169.3	...
Boron trifluoride	-100.3	172.7	...
Nitrous oxide	-89.5	183.6	666 to 1
Ethane	-88.3	184.8	...
Hydrogen chloride	-85.0	188.0	...
Acetylene	-84.0	189.1	...
Fluoroform	-84.0	189.1	...
1,1-Difluoroethylene	-83.0	190.0	...
Chlorotrifluoromethane	-81.4	191.6	...
Carbon dioxide	-78.5(b)	194.6	553 to 1

Ergonomics Safety

- Ergonomics – fitting the job to the worker
- Prevent musculoskeletal disorders, repetitive strain injury, carpal tunnel syndrome,
- Pipettors – pain in thumb and forearm
- Prevention – proper posture, keep motions close to the body, stretch and exercise.
- Identify symptoms to prevent chronic problems