Safety Alert – Improper Tubing for Flammable Gases

During recent laboratory inspections, EH&S identified misunderstandings regarding safe methods of conveying flammable gases to the point of use. Combustible, flexible tubing has been observed in several locations used to deliver natural gas and hydrogen to the point of use such as Bunsen Burners and process equipment. This practice has the potential to cause serious injury to ASU employees and/or major damage to ASU property.

The photos below illustrate examples of improper methods of conveying flammable gases. Tygon tubing is used to distribute natural gas. This type of tubing can melt, slip off the connection, and become brittle and leak. Hazards can be avoided by using the proper connections for supplying flammable gas from work benches or compressed gas cylinder to equipment such as Bunsen burners, gas chromatographs, or anaerobic chambers.

Improper Tubing

When making connections from a cylinder or “building” supply, the following characteristics should be considered when selecting appropriate tubing:

- Delivery pressure and temperature
- Chemical compatibility
- Environmental conditions (i.e., UV or temperature extremes)
- CGA approval

Natural Gas connections may be made with rubber connections rated for hazardous/flammable gas. Connections and tubing must meet the Compressed Gas Association (CGA) test standards. Hard plumbed piping, double contained tubing, wire braided tubing, and other forms of flame resistant tubing are ideal for flammable gases such as methane or hydrogen. Quick disconnect are not allowed for use with flammable or toxic gases.
Proper tubing and equipment can be purchased from commercial vendors such as Grainger (www.grainger.com), VWR (www.vwr.com), or Swagelok (https://www.swagelok.com/en/catalog/Hoses-and-Flexible-Tubing).

**Proper Tubing**

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<th>Hydrogen</th>
<th>Natural Gas</th>
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<td>Double contained tubing or double contained wire braided tubing.</td>
<td>Flame and pressure rated tubing. Natural gas connectors use flame rated, electro-galvanized, rust resistant steel with heavy rubber packing. This type of connection provides gas-tight performance under normal operating conditions and is CGA approved. The hose below can be purchased through ASU Purchasing Sunrise by the name Kantleke 36 L Hose ID 1/4, Tip ID 3/8.</td>
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**Fire Prevention**

When working with flammable liquids or gas, ensure work area is free from grease, oils and flammable materials. Watch for sparks, and have a fire extinguisher available in the immediate area. Always turn the gas supply off at the source when not in use (i.e., close the supply valve to the Bunsen burner in addition to closing the valve at the burner). If you smell natural gas or discover a flammable gas leak, call 9-1-1 immediately, activate the fire alarm and evacuate the building.

**Storage**

Hydrogen or other compressed gas storage should always be kept to a minimum. It is recommended you have only the gas supply that is in use. Cylinders not in use must have the safety cap secured on the cylinder at all times while in storage or transport.

**Questions**

Any exception to these requirements must be approved by the ASU Campus Fire Marshal. For more information, please contact the EH&S Department at (480)965-1823 or EHS@asu.edu. Visit our website http://cfo.asu.edu/ehs