

## **MAJOR PROGRAM POINTS**

# **"SAFE HANDLING OF LABORATORY GLASSWARE"**

**Part of the "LABORATORY SAFETY SERIES"**

**Quality Safety and Health Products, for Today...and Tomorrow**

# Outline of Major Points Covered in the "Safe Handling of Laboratory Glassware" Course

The following outline summarizes the major points of information presented in the course on "Safe Handling of Laboratory Glassware". The outline can be used to survey the course before taking it on a computer, as well as to review the course when a computer is not available.

- **Glassware is a marvelous accomplishment. It is:**
  - Designed efficiently.
  - Shaped "by science, for science".
- **But glassware is fragile and can break or shatter under a number of conditions:**
  - If it is bumped.
  - If it is dropped.
  - If too much pressure is applied.
  - If temperatures change too drastically.
- **Any of these problems can cause accidents.**
  - Some accidents are minor.
  - Others can result in serious injuries.
  - Contamination can also be a problem.
- **How do we protect ourselves from glassware accidents?**
  - Learn about our equipment.
  - Inspect it before use.
  - Follow proper procedures.
- **Glassware is everywhere.**
  - Beakers.
  - Flasks.
  - Bottles and jars.
  - Tubing.
  - And more.
- **Each type of glassware is made for a specific purpose.**
  - They should be used only for that purpose.
  - "Makeshift" apparatus is unstable and can lead to accidents.

- **You should always determine the compatibility of glassware with the chemicals you are using.**
  - Especially acids and alkalies.
  - Many chemicals react with glass.
- **Only certain grades of glassware can stand up to lab environments.**
- **Labware can often be heated to extreme temperatures.**
  - Inferior/flawed material can shatter or crack.
- **Certain operations require specifically designed glassware:**
  - Vacuum operations.
  - Gas-producing reactions.
- **Before working with glassware, always inspect it for flaws.**
  - Glass should be pulled from service if defects are present.
  - Discard or send defective glassware to a glass blower for repair.
- **Proper handling of glassware is also important.**
  - Never carry a flask by its neck.
  - Never carry a beaker by its side.
  - Always use two hands carrying any glassware (position one hand under the glass for support).
- **Gloves should be worn whenever glassware is handled.**
  - Cut-resistant gloves are best.
  - Wear lab gloves underneath to keep out liquids.
  - Use insulated gloves with extreme temperatures.
  - Compromises must sometimes be made when a fine sense of touch is required.
- **Never heat or cool glassware unless it is designed for those processes.**
  - Round-bottom flasks are best for boiling liquids.
  - Never set hot glass on a cold bench top.

- **Scratches in glass can grow to cracks later on.**
  - So don't use glass/metal stirring rods.
- **Avoid any physical stresses to glassware.**
  - Where necessary, stabilize it.
  - Use clamps and platforms to relieve pressure.
- **Ground-glass joints are crafted for a perfect fit.**
  - Because of this they sometimes stick.
  - Never force a joint free (the glass can shatter).
  - Lubricate surfaces or use a teflon sleeve.
  - A heat gun can gently loosen the joints.
- **Cutting and bending tubing can also cause problems.**
  - Make sure you are wearing gloves and safety glasses.
- **Several specific steps should be followed to cut tubing:**
  - Position a triangular file where the cut is to be.
  - Score the tube with your a single, light stroke.
  - Grip the tube with your fingers on either side of the score mark (with the score facing away from your body).
  - Gently pull the ends of the tube toward you.
  - The glass should snap at the score mark.
- **Remember to fire-polish the tube's ends.**
  - Removes sharp edges.
  - Keeps cracks from appearing.
- **Bending tubing has its own procedures:**
  - Heat it in a flame until the glass turns red.
  - Pull the ends toward you to form desired angle.

- **Setting up apparatus can involve pushing glass tubes through a cork or stopper.**
  - This should be approached with caution.
  - Determine that holes are the correct size for the tubing.
  - Lubricate the hole and tube (with water or glycerin).
  - Hold the tubing with a towel.
  - Position the tube close to the insertion point.
  - Gently twist the tube into the stopper.
  
- **Using proper techniques when stirring materials is also important.**
  - Make sure that electrodes, tubing, etc. are placed high enough to avoid the stir bar.
  - Avoid contact with any portion of the apparatus.
  
- **Some glassware can present unusual safety risks.**
  - Make sure you have had the necessary training before working with specialized equipment.
  
- **Vacuum operations can severely test glassware.**
  - Container walls must be able to withstand pressure differences.
  - Containers can implode if they are not strong enough.
  - Round-bottomed or thick-walled flasks should always be used.
  
- **Glassware that is showing repairs should be avoided.**
  - It is more apt to break through thermal shock.
  - Checking for flaws before use is very important.
  
- **Often, protective measures should also be taken.**
  - Place all vacuum apparatus behind a blast shield.
  - Always wear appropriate protective equipment (goggles, gloves and even a face shield).
  - Cover flasks, dewers and desiccators with tape or mesh, or use PVC coated containers.

- **Using containers made of other materials can also prevent accidents. Alternatives include:**
  - Metal.
  - Plastic.
  - Teflon.
- **Make sure the containers you select are appropriate for the task.**
- **More glassware accidents occur during clean-up than any other activity.**
  - Keep glassware clear of the sides of sinks.
  - Never use worn out cleaning brushes (they can scratch the glass).
  - Avoid cleaning with "aqua-regia", "chromic acid" or other caustics.
- **Be careful when drying glassware.**
  - Place small articles on towels or in lined baskets.
  - Large containers should be hung on pegs.
- **It is also important to know how to store glassware properly.**
  - Keep it well away from shelf edges.
  - Don't let instruments roll around in drawers (use drawer pads).
  - Place glassware well back in hoods or on benches.
- **Know proper procedures in case of a mishap.**
  - If something is falling, let it drop.
- **Use common sense when doing cleanup.**
  - Wear leather or other cut-resistant gloves.
  - Never pick up fragments with your fingers... use a dustpan and broom instead.
  - Dispose of glass pieces in "glass-only" receptacles.
- **Also be aware of any spilled substances. Look for:**
  - The substance itself.
  - Contaminated broken glassware
- **Spilled materials may have to be disposed of as a hazardous/biological waste.**
  - The situation could conceivably require evacuation.

- **Know the location of eye washes and safety showers.**
  - Make sure you can use them effectively.

**\* \* \* SUMMARY \* \* \***

- **Remember the major principles for avoiding glassware accidents**
- **Learn about your equipment.**
- **Inspect all glassware before use.**
- **Follow proper procedures.**
- **Use common sense!**