

## **PRESENTER'S GUIDE**

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

**Part of the Laboratory Safety Series**

# **OUTLINE OF MAJOR PROGRAM POINTS**

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The following outline summarizes the major points of information presented in the program. The outline can be used to review the program before conducting a classroom session, as well as in preparing to lead a class discussion about the program.

- **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 alkalis.
  - 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!**