University Health and Safety

Fact Sheet

Unattended Operations

Equipment or experiments left unattended, whether over a lunch break or overnight, may have the potential to cause significant problems. Though leaving operations unattended is discouraged, sometimes procedures may require 12 hours or more to complete, making it difficult to be present the entire time. To leave a procedure unattended, you must follow best practices and do your best to ensure your experiment will fail-safe.

Determining if You Can Leave Your Procedure Unattended

A procedure left unattended is not automatically more hazardous. It is, however, a higher risk because no one will be there to monitor it, or adjust it if anything goes wrong. In order to decide if you can leave a reaction unattended, you must evaluate the risks of doing so. Any procedure left alone, whether it is overnight, during the day, or over the weekend, must be assessed for hazards and appropriate precautions must be taken to ensure safety while the experiment is unattended.

Consider the chemicals involved, temperatures, the type of reaction, as well as products and byproducts of the reaction. Think about what will happen if the lab loses power, compressed air, gas, or water, or if there is a leak in your system. What would the consequences of these issues be? Would the system over-pressurize, over-heat, or lose cooling? Identify possible negative consequences and revise your set-up to eliminate or control them. If significant negative consequences cannot be controlled, your procedure should not be left unattended.

Some procedures that should never be left unattended include:

- Column chromatography
- Any time-sensitive reactions
- Reactions using unstable compounds, in amounts larger than de minimis quantities, if the controls necessary to keep reaction contained while unattended are not provided with back-ups or an excess amount of suppression
- Procedures you haven't run before
- Procedures that cannot "fail-safe" or have significant consequences that can only be controlled by human intervention

Before You Leave

Before you can leave safely, there are some steps you should take to ensure your reaction will proceed safely and to make sure others (including potential emergency responders) will be able to find enough information on what your reaction involves.

Step 1 – Make sure your system has fail-safes

• This means that if something goes wrong, the reaction should end and be in a stable state. Think about every way your procedure could go wrong, and then think about the ways that failure could be controlled to prevent it from proceeding to a chemical release, fire, or explosion. For each possible way the reaction could fail, controls should be implemented.

• As an example, if a procedure could over-heat, there should be temperature sensors that would shut down the heating element. If a vessel might over-fill, there should be flow monitors that would shut down flow.

Step 2 – Create and post signage

• Signage is covered in more detail below. You will need to document the date, intended duration, intended temperature set-point, process you are running, any hazards, contact information (including a phone number you will be available at), intended conditions, and emergency shut-down procedures.

• Signage should be posted near the process, such as on the counter near the equipment, or on the hood sash. Consider posting a sign on the door if no one will be in the room.

Step 3 – Verify stability, double-check your connections and settings, and remove extra equipment from the nearby area or fume hood.

• Extra equipment should be removed in case there is an incident to decrease the risk of fire or damage. Connections should be checked to make sure hoses will not pop off or break while unattended, and settings should be confirmed and documented.

• If leaving overnight, make sure that your reaction has been at a constant temperature for at least 1 hour, and that it is less than 25% completed.

• For reactions dependent on materials such as coolant, reagents or inert gases, make sure there is enough material for several hours longer than you plan to be away. 1.5 times the amount needed for the time you plan to be away is a good rule of thumb.

• If a critical condition or reagent were to fail, resulting in a potential fire, blast, or release of toxic material, the problem should be contained and not capable of spreading. There should be ventilation, blast containment, and no extraneous combustible materials in the area which could spread a fire. Again, plan for more than you expect. Do NOT leave until you can verify the procedure is stable.

Step 4 – Notify others working in the area

• Tell your lab-mates how long you will be gone, even if for a short time. Others in your lab should know that your reaction is running, that it will be unattended, and the basics of the process. They also should briefly look over your signage.

• If reasonable, ask the person who will arrive first in the morning to check on your reaction.

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Signage communicates for you when you're not there. To make sure that others in the lab and potential emergency responders know what your reaction includes, signage is important. This helps others to understand the potential hazards and take the appropriate action if your reaction starts to go wrong.

If you intend to re-use your signage, or if it is posted in a splash zone, it may be useful to laminate them. There are several templates available. Researchers should customize these to fit their needs. These can be found here, under Safe Operating Cards (SOCs): http://www.jst.umn.edu/labeling.html See the example below.

Sample Unattended Reaction Signage