

Unattended Reactions Standard Operating Procedure

1. Purpose

This Standard Operating Procedure (SOP) defines the general requirements for conducting unattended reactions. It includes specifications for the setup, hazard communication and monitoring of unattended reactions in the laboratory. If you have questions concerning the requirements within this SOP, contact the Approval Holder (AH)/Approval Safety Coordinator (ASC), or the Research Laboratory & Safety Services (RLSS).

2. Scope

An unattended reaction is any reaction (i.e. chemical, biological, biochemical) that is initiated by a researcher and then left unattended for a period of time. A reaction may be left unattended for one or multiple hours, overnight or for multiple days. Examples of unattended reactions include organic and inorganic syntheses, DNA extractions, as well as automated processes.

3. Hazard Description

Multiple hazards can be presented by an unattended reaction, depending on the starting materials used, reaction conditions and the reactivity of any potential products. Without the person who initiated the reaction present, other laboratory workers cannot know the hazards of the reaction. If an unattended reaction is not monitored, certain methods and reaction conditions (e.g. heating, grinding, stirring, cooling, etc.) may pose a greater risk to surrounding laboratory workers, as well as laboratory equipment.

4. Unattended Reaction Setup

Any unattended reactions involving hazardous chemicals must be set up within a certified chemical fume hood or other approved ventilated enclosure (e.g. Biosafety Cabinet Type II B2, glove box, etc.). The sash of the chemical fume hood must be adjusted to its lowest possible position and the reaction apparatus must be moved as far back in the chemical fume hood (or other ventilated enclosure) as is reasonable when the reaction is unattended. The area immediately surrounding the unattended reaction should be free of clutter.

Refrain from heating a reaction while it is left unattended whenever possible. If heating is necessary, the temperature must be monitored and controlled by a thermometer or other thermal sensing device. The built-in thermometer of a hot plate is not appropriate for this purpose. Oil baths that must be left unattended should be fitted with a thermal sensing device that turns off the electric power if the bath overheats and exceeds a set limit. Remove combustible or flammable substances from the area when the reaction is heated.

If your reaction may cause an increase in pressure within the reaction vessel, the reaction must be properly ventilated to avoid an explosion and projection hazard. In some instances, shielding may be necessary to prevent these projection hazards. This may be accomplished using the fume hood sash or a portable blast shield that is placed between the reaction and the laboratory work area.

5. Hazard Communication

Obtain permission from your AH/ASC before beginning a reaction that must be left unattended. The reaction vessel must be labeled, either with the components of the reaction, or with a page number of a laboratory notebook that fully describes the reaction. If the latter is chosen, the laboratory notebook must be available near the reaction while it is left unattended.

Laboratory workers must complete the Unattended Reaction Form (available on the RLSS website) for every unattended reaction. The completed form must be placed in a visible location in front of the reaction apparatus (e.g. on the chemical fume hood sash) before the reaction is left unattended. It is vital that the person initiating the reaction leaves an accessible phone number on this form so first responders and agencies may have a point of contact in case of an emergency involving the unattended reaction. If a laboratory worker plans on performing many different unattended reactions throughout the year, he/she may want to consider laminating the Unattended Reaction Form and using a dry erase marker to fill out the form for each reaction.

6. Unattended Reaction Monitoring

Experimental protocols for unattended reactions must include periodic monitoring of the reaction throughout the reaction process. This is to ensure the reaction is proceeding as planned and further hazards are not being created (e.g. flammable solvents boiling over when heated or catching on fire, corrosive liquids corroding the septum, etc.). If a reaction is being performed over multiple days, it must be monitored at least once a day.

7. Emergency Procedures

Before you begin a reaction that will be left unattended, you must consider what emergency situations could be caused by the reaction and what signs of such emergencies may exist (e.g. smoke issuing from reaction, creation of sparks, fire, etc.). Explain these warning signs and the steps that must be taken in the case of an emergency in the “Emergency Warning Signs” section of the Unattended Reaction Form.

Properly completing these sections of the Unattended Reaction Form will help laboratory workers or other personnel recognize and respond to an emergency situation caused by an unattended reaction. The proper response in such situations could mean the difference between a small accident and an incident causing harm to fellow workers or damage to equipment.