

➤ The use of **ionizing radiation** poses an external exposure risk, since ionizing radiation produces ions, which – in turn – could affect human tissues. Ionizing radiation includes the following radiation types: alpha (α), beta (β), gamma (γ), x and neutrons. Gamma and x radiations emit short-wavelength high-energized photons. Although ionizing radiation is invisible, its affects are cumulative.

- Be familiar with the properties of the radioisotope you work with. For example, there are special precautions for working with ^{35}S -methionine because of its volatility.
- Rehearse unfamiliar radioisotope procedures before radioactive material is actually used.
- Cover the work surface with protective and absorbent bench paper to trap droplets of contamination.



- The radioisotope working area should have a set of equipment that is only used for radioactive work. Depending on your protocol, this may include pipettors, a microcentrifuge, timers, mixers, a water bath, etc.
- Distance yourself as much as possible from the ionizing radiation source.
- Shorten the time interval you are working with ionizing radiation sources.
- Use proper PPE, especially when working with radioactive aerosols. For any work with an open radioactive source, wear:
 - ** Disposable gloves (latex or nitrile). Change your gloves frequently. Your radioactive solutions, especially when aliquoting from the stock vial, are likely to be highly concentrated. It is very easy to contaminate your gloves and spread contamination.
 - ** a full-length lab coat (worn closed with sleeves rolled down).
 - ** close-toed shoes. Never wear sandals or other open-toed shoes while working with radioactivity.
 - ** Goggles are required for any radioisotope procedure, specifically upon potential for the build-up of pressure that could release a spray of material.
 - ** Lab coat cuffs may hang down and drag across contaminated surfaces. To protect the skin of your wrists, consider wrapping tape around your lab coat sleeve or put a rubber band around the sleeve to keep the cuff from dragging or wear long gloves and tuck your lab coat into the gloves. Survey the skin of your wrists frequently as you work.
 - ** Keep an extra set of clothing and shoes in the lab in case your clothing becomes contaminated.
 - ** Avoid using petroleum-based hand creams when wearing gloves because petroleum-based hand creams may increase glove permeability.
- Survey your working area carefully before commencing radioactive work in case someone else left the work area contaminated or in case you missed contamination the last time you worked. In addition,

survey frequently and extensively as you work. Don't assume that contamination will only be found on the bench top. Monitor your clothing, shoes and floor as well.

- Wear dosimetry radiation monitor badges when appropriate:
 - ** Wear ring badges under gloves to prevent the ring from getting contaminated. Make sure you don't discard the ring when you remove your gloves.
 - ** never leave chest badges exposed to an open radioactive source when not working with source. The badge should only count the exposure the employee was exposed to during radioactive work.
- Work in a fume hood during procedures using volatile materials such as I-125 or S-35 methionine/cysteine. Do not use biological safety cabinets (or laminar flow hoods) for work with volatile radioactive materials, since the air from the cabinet may be exhausted back to the room.
- During hybridization reactions, be sure to check the condition of the tubes to be sure the o-rings aren't dried out.
- Contaminated microcentrifuges must be cleaned following use to prevent contamination from spreading to other tubes and gloves. The following steps may help reduce the incidence of contamination:
 - ** Wipe down the exterior of the tubes before placing them in the microfuge.
 - ** Don't fill tubes more than 2/3 full.
 - ** Use tubes with locking caps or with screwcaps.



- Do not eat or drink in any room labeled with a *Radioactive* sign on the door.
 - Do not store food or beverages in refrigerators, freezers or cold rooms where radioactive sources are used or stored.
 - Do not leave radioactive sources unsecured in an unattended lab, even for a short time, unless the lab is locked.
 - If you discover that a radioactive source is missing and cannot be accounted for, notify the Safety & Radiation Unit ASAP, no later than the next business day.
 - If there are no signs on a room in which radioactive sources are used or stored, contact the Safety & Radiation Unit to request labeling for the room.
 - Label any container of radioactive source or piece of equipment in which a radioactive source is stored and any contaminated area or item with a designated tape.
 - Label all contaminated items and containers.
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