

# Liquid Nitrogen – Best Practices Meeting Kit



## WHAT'S AT STAKE

Liquid nitrogen is essential in many industries – from manufacturing and labs to food processing and cryogenic storage. But just because it's commonly used doesn't mean it's low risk. At  $-196^{\circ}\text{C}$  ( $-321^{\circ}\text{F}$ ), a splash can cause instant frostbite or blindness. Improper use can also lead to pressure explosions or even deadly oxygen displacement. Whether you're filling a dewar, transferring between containers, or using it during production, following best practices is critical. One careless move can result in life-altering injury or put your whole team in danger. Taking shortcuts isn't worth the risk – safe handling starts with smart habits.

## WHAT'S THE DANGER

Liquid nitrogen may look like just a foggy, cold liquid – but its hazards are serious and sometimes invisible. If best practices aren't followed, even routine tasks can lead to dangerous incidents. Let's break down the key risks:

**Frostbite and Burns – Instant Cold Injury** – At  $-196^{\circ}\text{C}$  ( $-321^{\circ}\text{F}$ ), liquid nitrogen causes tissue damage in seconds. It doesn't just feel cold – it freezes flesh on contact. Exposed wrists, faces, or ankles are especially at risk if PPE isn't worn properly. Even a small splash can cause blisters, nerve damage, or permanent scarring. If it enters the eyes, it can cause blindness.

**Pressure Explosions – Sealed Equals Dangerous** – Liquid nitrogen expands 700 times in volume as it turns into gas. If stored in a sealed or non-vented container, the pressure builds up and can cause violent explosions.

- Using capped bottles, jars, or thermoses can result in container rupture
- Even small amounts of nitrogen can burst improperly vented equipment
- Flying shrapnel from failed containers can cause blunt force or eye injuries

**Asphyxiation – Silent Oxygen Displacement** – Nitrogen gas is invisible, odorless, and heavier than air. In enclosed or poorly ventilated areas, it can displace oxygen without warning. Workers may feel dizzy, confused, or faint – and collapse without realizing what's happening. Without immediate access to fresh air or oxygen, this can quickly become fatal.

**Material Hazards – Shattering and Equipment Failure** – Some materials like rubber,

plastic, or untreated metal become brittle at cryogenic temperatures, which can cause hoses or containers to crack and shatter unexpectedly.

- Brittle hoses can split without warning, releasing hazardous spray
- Plastics may fracture, causing chemical splashes or broken parts to fly
- Old or damaged cryogenic equipment is especially vulnerable

**Unsafe Pouring – Boil-Over and Splash Hazards** – Pouring too quickly or into warm or wet containers can cause violent boil-over and splash-back. If you're not pouring slowly and using properly cooled equipment, you're creating a serious injury risk for yourself and anyone nearby.

## HOW TO PROTECT YOURSELF

Best practices with liquid nitrogen are not just about being careful – they're about following proven steps that prevent life-changing injuries. Here's how to protect yourself every time:

### Always Wear the Right PPE

Use cryogenic gloves that are insulated and loose-fitting, so you can pull them off quickly in case of a spill. Wear a face shield or safety goggles, long-sleeved lab coats or aprons, long pants, and closed-toe, non-absorbent shoes. Make sure there are no gaps between your gloves and sleeves.

**Example:** If you're about to fill a container and your wrists are exposed between glove and cuff, pause and adjust your gear. That small gap could cost you a trip to the emergency room.

### Check Before You Use

Inspect all equipment – containers, hoses, transfer lines, valves – for cracks, leaks, frost buildup, or brittle parts. If anything looks damaged or out of spec, don't use it until it's repaired or replaced.

### Work in Well-Ventilated Areas

Only use liquid nitrogen in spaces with strong airflow or exhaust systems. If you're working in a tight or enclosed space – like a walk-in freezer or storage room – ensure there's an oxygen monitor and that others know you're working there.

- Avoid storing nitrogen in small, sealed rooms
- Post warning signs where nitrogen is used regularly
- Respond immediately to any signs of dizziness, confusion, or fatigue

### Transfer Slowly to Prevent Splash and Boil-Over

Always pour liquid nitrogen slowly and carefully into pre-cooled containers. If the container is too warm or wet, the liquid can boil violently and splash back, causing burns.

### Dispose of It Safely

Allow leftover liquid nitrogen to evaporate in a well-ventilated space. Never pour it down a drain, into a sink, or into confined areas like closets or sealed containers. Doing so can cause serious damage or buildup of hazardous gas.

### Know Emergency Actions

- **Frostbite or contact injury:** Remove affected gloves or clothing. Rinse with lukewarm water (not hot) and seek medical care.
- **Eye contact:** Rinse eyes for at least 15 minutes and go directly to emergency care.
- **Asphyxiation symptoms:** Move the person to fresh air immediately. Call emergency services and provide oxygen if available.

## FINAL WORD

Liquid nitrogen is useful, powerful – and dangerous when handled without care. Following best practices isn't just about checking boxes; it's about preventing real injuries.

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