

## Safe Working Procedure for *tertiary*-butyl lithium (*t*-BuLi)

*tert*-Butyl lithium (*t*-BuLi) is the most reactive of the commercially available organolithium reagents. It is supplied as a standard solution in hydrocarbon solvents, usually in a bottle sealed with a septum.

Before opting to use *t*-butyl lithium, safer, alternative reagents such as *t*-butylmagnesium bromide, *n*-butyl lithium, *n*-butyl lithium-TMEDA and others should be considered.

### Hazard

*t*-Butyl lithium is a pyrophoric chemical, i.e., it will spontaneously catch fire when exposed to air.

### Precautions

Read the Material Safety Data Sheet (MSDS) before using *t*-BuLi.

Complete and have approved a separate risk assessment for use of this chemical.

This chemical may only be handled under an inert atmosphere (N<sub>2</sub> or Ar) in a well ventilated fume cupboard.

Using syringe or cannula techniques. Only good quality ("gas-tight") syringes should be used. Syringe methods should not be used for quantities greater than 20 mL.

All equipment for *t*-butyl lithium transfer should be inspected before use.

The following personal protective equipment (PPE) is to be used:

- *Safety Glasses*
- *Labcoat*
- *Gloves*
- Long trousers and Covered shoes
- *tert*-Butyl lithium may only be handled in a well ventilated fume cupboard.

If large quantities (in excess of 100 mL) are used, then the following additional PPE is required: *Faceshield* (8-inch minimum) and *chemical apron or portable shield*

### Procedure

- ALWAYS clamp the reagent bottle to prevent it from moving.
- ALWAYS clamp the receiving vessel.
- Connect the bottle to an inert gas source with a bubbler and keep the needle tip above the liquid level (this is to equalise the pressure in the bottle). Ensure that the bottle is not over-pressurized.

When using a syringe:

- Flush the syringe at least 4 times with inert gas to avoid contact with air/moisture.
- Use a syringe with a tight seal to prevent leakages through between the plunger and the syringe body. Ensure that the needle is firmly attached to the syringe.
- Gently pull the plunger to draw liquid into the syringe (if done too quickly air leakage will occur through the syringe plunger).

- Once the desired amount is drawn into the syringe, some inert gas should be collected to empty any liquid from the needle (this will avoid the needle dripping when transferring the liquid to the recipient vessel).
- When transferring the liquid into the recipient vessel always hold the needle syringe connection and do it gently as excess pressure on the plunger will force the needle to 'fly off' and pyrophoric material would be splashed everywhere.

When using a cannula (required for large amounts)

- Flush the cannula by inserting it into the bottle connected to an inert gas source. The cannula should be above the level of the liquid. Flush the cannula for a little while.
- Connect the cannula to the recipient vessel (equipped with a rubber septum and connected to an inert gas source)
- Submerge the cannula below the liquid level to commence the transfer until the required volume is transferred.
- Withdraw the cannula above the liquid level of the bottle and wait until the liquid transfer stops at the other end of the cannula and the cannula is fully flushed with inert gas.
- Remove the cannula first from the apparatus and then from the reagent bottle.

NOTE: make sure the cannula is above the liquid level in the reagent bottle before you disconnect the cannula from the apparatus and/ or the reagent bottle. Failure to do so will result in release of *t*-BuLi and fire.

- Clean all the needle, syringes and cannulas with hexane first and iso propanol second.
- All these procedures should be done in a glove box or a fumehood, and must **never** be done in an open bench.

**Fire extinguishers to be used in case of a *t*-butyl lithium fire.**

Suitable: Dry chemical powder.

Unsuitable: Do not use water.


**Note 1:** A very comprehensive video on how to handle pyrophoric materials:

<http://www.youtube.com/watch?v=RaMXwNBAbxc>

**Note 2:** A brief article about the risks and handling of organolithium reagents:

<http://www.sciencedirect.com.ezlibproxy1.ntu.edu.sg/science/article/pii/S1074909802002952>

Prepared by,



Approved by,

