

How to use sampling bag with GasMix™?

Compliant with ISO 6145-7 “Gas analysis — Preparation of calibration gas mixtures using dynamic volumetric methods — Part 7: Thermal mass-flow controllers (MFC)” dynamic diluters allow a large quantity of a gas mixture to be prepared on a continuous basis and multicomponent mixtures can be prepared as readily as binary mixtures with little added uncertainty. This practical solution is easy to put in place in an analytical laboratory, significantly reducing the stock of cylinders of calibration gases. Dynamic gas mixers/diluters GasMix™ deliver the desired concentration directly in the output line, which is typically connected to an analyzer like GC, spectrometer, or a reactor. Where it is not possible or not convenient, the gas can be collected in a sampling bag (e.g. Tedlar® bag) and future injected into an analyzer for an analysis or a calibration purpose.



With feedback from our users, we compiled some useful tips on how to make this procedure properly.

Make the right choice of sampling bag:

Many types of sampling bags are available on the market, their specifications should match the application needs. The correct bag material should be carefully chosen when collecting gas containing trace of sulfur or other reactive compounds. Material permeability is important, as these bags are not intended to store a gas. Bags with a septum should be chosen if the intent is to future transfer the gas to a GC using a gas tight syringe. The Tedlar® bag is the industry standard for air sampling, but it is not suitable for all applications. As an example, the following guide is available: <https://www.sigmaaldrich.com/analytical-chromatography/air-monitoring/gas-sampling-bags.html>

To simplify, we will take a Tedlar® bag as an example to describe a filling procedure below.

The user must take into consideration the following aspects:

- Choice of bag materials.
- Choice of bag valve (type, material).
- Choice of tubing (material).
- Bag volume (2L – 100L or others).
- Way to transfer gas to the analyzer (gas syringe, tubing, pump, ...).

AlyTech Recommendations:

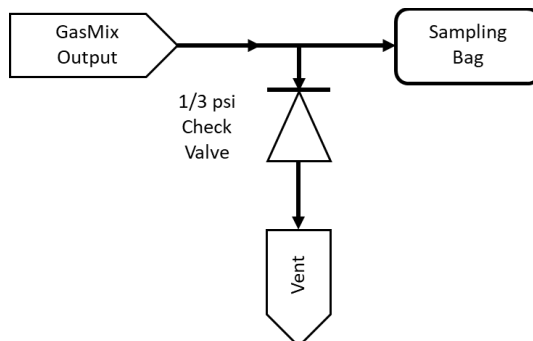
- Maximum pressure rating for a typical Tedlar® bag is around 2 psi (0.14 bar). When selecting a bag volume, the total flow on the GasMix output. For high flow bigger volume bags are recommended to have sufficient time to inflate the bag to 80%.
- AlyTech accessory: **FL-KIT03-18** with check valve set at 1/3 psi is recommended. This tool prevents the risk of exploding the bag.
- Choice of bag valve: the valves named Screw Cap Valve (SCV), polypropylene or stainless-steel valves equipped with a septum allow sampling or doping with a syringe.
- Choice of tubing: inert PTFE-type tubes are generally good, with possibility of using nylon cable ties or clamps to ensure tightness for flexible tubes.

Preparation of the sampling bag:

First, before any sampling, the bag must be purged. It is recommended to fill the Tedlar® bag at 80% of its full capacity with dry nitrogen or a similar inert gas. In some cases, it is possible to use the gas mixture you want to analyze instead of the inert gas. Then empty it by using a pump or by applying a pressure on the bag. This purge must be carried out at least twice.

Bag filling by GasMix™ :

- Connection diagram:
- With accessory **FL-KIT03-08**



- GasMix™ sequence: For simplicity, a single line can be configured on the sequence with desired concentration. (Refer to GasMix™ manual for details). If necessary, the total flow rate of the mixture considering the capacity of the bag. For example, with flow rate of 1000mln/min, 1L bag will be filled in approx. 1 minute. In the sequence sufficient flow duration time is set.
- If using the FL-KIT03-18 Kit is not used (as shown above), the bag filling must be monitored to avoid any risk of bursting: either by programming the GasMix™ so that the gas mixture volume does not reach more than 80% of the bag volume or by stopping diluter manually when the volume in the bag reached the desired level.



- Once the bag was purged and connected to a diluter output, the bag valve is opened, and then sequence is started.
- Once at 80%, the bag valve is closed. The gas can now be transferred to the analyzer in the most convenient way:
 - Connect the bag directly to the analyzer and exert a pressure to push the gas.
 - If the analyzer has a sampling pump, the pump should be used.
 - Or sample the gas through the septum using a gas tight syringe then inject.

Good practice:

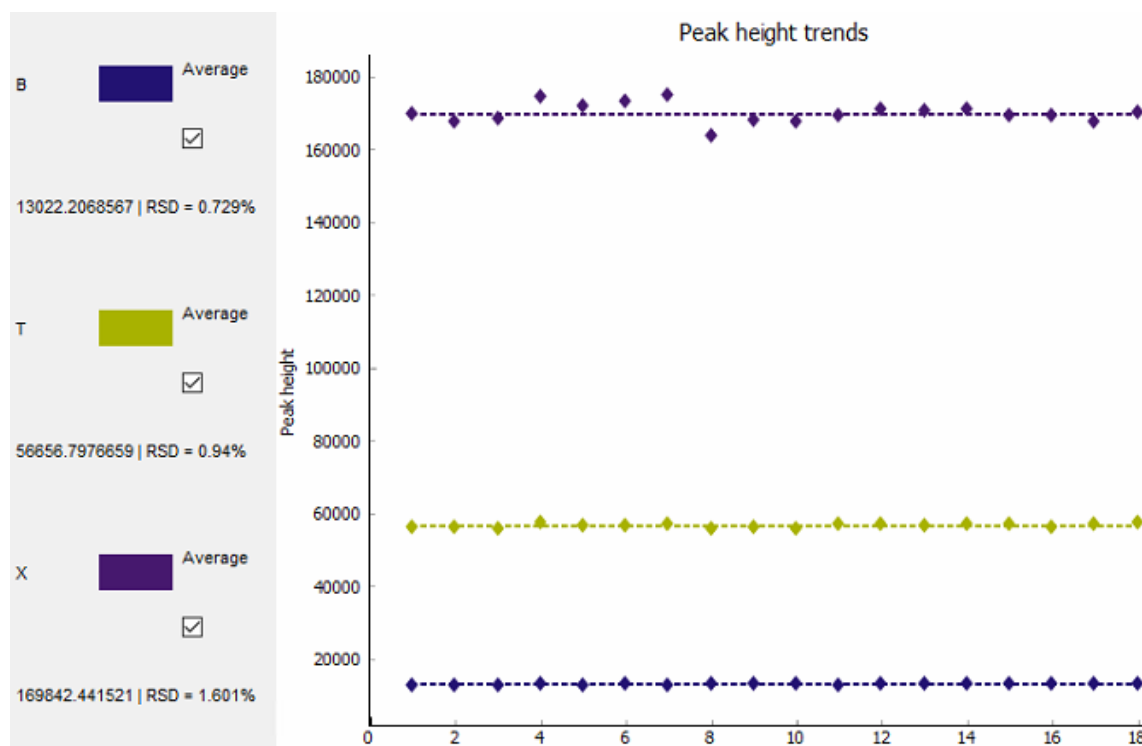
- Handle under a fume hood to avoid any risk linked to a gas leak.
- Do not fill the bag more than 90% of his capacity to avoid leaks and deformations.
- Make sure that PTFE tubing and fittings used are clean and not contaminated.
- Between each mixture of different concentrations, purge the lines, the fittings, and the bag (or use new).
- The shelf life of gas mixture collected in the bag depends on its material, the composition of the gas, Refers to the sampling bag datasheet to know how long the concentration* in the bag will be stable.
- Some bag materials can exhibit a ghost pic on sensitive GC detectors. Make a blank to be sure.

***Warning:** As the GasMix™ is a dynamic diluter, AlyTech guarantees the composition of the mixture at the outlet of the diluter when it flows but cannot guarantee the concentration contained in the bag after storage.

Results example obtained with a sampling bag:

Injectons on a μ GC system of a mixture of 3 VOC standard compounds – BTX – at 1ppm. The gas was prepared by diluting 10 ppm BTX in air standard following the above methodology. Filled bag was directly connected to the μ GC which takes the necessary amount of gas with a built-in sampling pump.

- 18 Injections are performed: the repeatability of the analysis is very good with an RSD < 1.6%:


Useful links :

<https://www.restek.com/globalassets/pdfs/literature/EVSS1335B-UNV.pdf>
<https://www.sigmaaldrich.com/analytical-chromatography/air-monitoring/gas-sampling-bags.html>
<https://www.techinstro.com/how-to-use-tedlar-bag-gas-sampling-bag>

Video

<https://www.youtube.com/watch?v=zTvPcdtlk-s>
<https://www.youtube.com/watch?v=TEdUEZUF64g>