Traps / Gas Purifiers

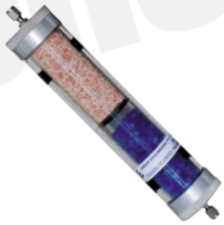
Choosing the right Gas Purifier

There are variety of gas purifiers available. Some remove specific contaminents while others remove multiple contaminents from your gas stream. There are several factors you need to consider when selecting purifiers for your application. These include —

1. Contaminents potentially present in your gas stream
2. Flow required
3. Gas purity level required after the gas passes through the purifier
4. Pressure limitations
5. Desired convenience when replacing the traps
6. Space availability

Moisture, Hydrocarbon and Oxygen are the most commonly used purifiers for analytical applications. Some of the applications do require CO_2 traps and some special applications may even require HCl traps.

Moisture Traps



Moisture trap removes moisture, CO_2, oil & dust from wet carrier gas before it flows into your column. Moisture traps are typically packed with modelcular sieves. Cleaner gas improves baseline stability for more accurate analyses and it can also be used for purification of hydrogen in FID detector. The gas dry filter trap consist of 120 CC total volume indicating silica gel and Molecular sieves 13X in a clear acrylic tube. Acrylic is used as the tubing material for its low permeability, which is superior to that of competitive polycarbonate tube. The Silica gel changes from blue to pink at 5% relative humidity to warn of leaks in the gas stream. The packing can easily be changed periodically. End cap is supplied with ⅛" OD or ¼" OD compression fittings.

Hydrocarbon Traps

Hydrocarbon traps are packed with an activated charcoal that adsorbs any organic compound larger than methane. Size and molecular weight of the organic contaminents will greatly affect the capacity of traps and to a smaller degree of trap efficiency. Activated charcoal has a higher capacity for larger (>C_4) hydrocarbons than for smaller hydrocarbons. The hydrocarbon filter trap are also made in clear acrylic tube. The packing can easily be changed periodically. End cap is supplied with ⅛" OD or ¼" OD compression fittings.

Oxygen (Oxy) Traps

Oxygen is the most detrimental contaminent to analytical columns. It produces irreversible oxidation damage particularly to polar stationary phases. Stainless Steel high capacity oxygen trap employs a time proven oxygen scavenging materials technology. A high surface area reduced metal is used to irreversibly bind any free oxygen present in the gas. It reduces Oxygen and moisture level below 1 ppm from standard 4.0 grade or higher lab gases. Oxygen traps are packed with metal catalyst. End cap is supplied with ⅛" OD or ¼" OD compression fittings.

Instrument Gas Purification

Clean gas is the key to longer column lifetime and less detector noise and accurate results. Oxygen and moisture can enter downstream of the carrier gas cylinder through fitting leaks or connectors that utilize rubber o-rings. Also, contamination of the tubing with solvents or lubricating oils can increase background noise and cause ghost peaks / wrong results with Instrument systems. Therefore, traps should always be used (even with ultra high purity gases) to prevent impurities from entering the Instrument system. Individual traps are designed to remove moisture, oxygen, hydrocarbons and other contaminants from the gas supply. Traps are available with either ¼" or ⅛" compression fittings. Several common carrier, make-up, and detector gas purifiers are discussed in the following section.

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gas solutions

TRAPS

Traps / Gas Purifiers

The most common contaminants in instrument gases are oxygen, water, and hydrocarbons. Both oxygen and moisture degrade the stationary phase and shorten column lifetime. Hydrocarbons cause ghost peaks or increase detector noise. Oxygen contamination in carrier gas can produce excessive column bleed at high temperatures. Although some stationary phases are more resistant to oxidation (methyl and phenyl/methyl polysiloxanes), all stationary phases will eventually degrade when exposed to oxygen in the carrier gas at high temperatures.

Oxygen can be removed using adsorbents, or materials that adsorb or chemically react with oxygen. Adsorbents are extremely reactive when broken, therefore care must be taken not to break the trap or expose the trap material. Adsorbents can also remove trace moisture but this diminishes their capacity to remove oxygen. Removing moisture with molecular sieve traps is more effective and will extend the lifetime for most adsorbents. Molecular sieve traps exhibit excellent capacity for removing trace levels of moisture from carrier gas. Indicating molecular sieve traps are available. They are packed, activated at oven temperatures of 300°C, sealed, and are ready to use. Because of their small size, they can be reconditioned in a Instrument oven when contaminated.
Hydrocarbon impurities in the carrier gas lines will result in detector instability, ghost peaks, and in extreme cases will result in column contamination. Hydrocarbon and solvent contamination is frequently removed using activated coconut charcoal. Since indicating hydrocarbon traps are not available for carrier gas lines, the analyst must note the date of installation and change the trap after approximately six months of use.

What are the differences between indicating and non-indicating traps?

Some traps can indicate oxygen, moisture, or hydrocarbon removal by changing color. Indicating traps are made with transparent housings to allow visual inspection of the color change. Although transparent housings are sometimes fragile, they prevent oxygen from diffusing into the carrier gas and allow visual indication of the purifier activity level. Non-indicating traps are generally contained in a metal housing for strength and ruggedness. Indicating traps have an advantage over non-indicating traps since you can visually determine when to install a new trap. With non-indicating traps, it is impossible to accurately determine when the trap needs to be replaced.

In what order should the traps be installed?

The order in which the traps are placed in the carrier gas flow path and their proximity to the Instrument is very important. The molecular sieve trap should be placed first in line from the carrier gas tank. This trap will remove moisture, and prevent condensation in the carrier gas line. The hydrocarbon trap should be placed next, to prevent hydrocarbons from contaminating the oxygen trap. The oxygen trap should be placed last. In general, traps should be installed in the laboratory. Traps installed near the gas cylinder will not remove oxygen that may enter the carrier gas from leaky fittings downstream. Traps should be installed vertically to avoid channeling. Channeling results from the packing material settling which, when a trap is positioned horizontally, may allow carrier gas to pass through without sufficient interaction with the packing.

Should purifiers be used for other gases?

In addition to carrier gas, traps can also be used for other gases such as make-up and detector gases. Make-up gas for Flame Ionization Detectors (FID) does not require purification unless the FID is operated at high sensitivities. However, oxygen and moisture traps are highly recommended for make-up gas when operating sensitive detectors such as Electron Capture Detectors (ECD). The hydrogen reaction gas used for sensitive Electrolytic Conductivity Detectors (ELCD) also requires a hydrocarbon trap to remove trace impurities. These impurities can cause baseline instability and decrease the lifetime of the nickel reaction tube.

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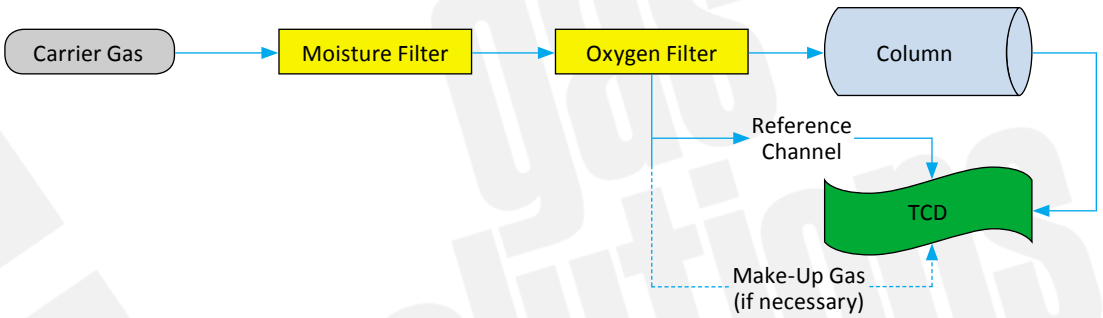
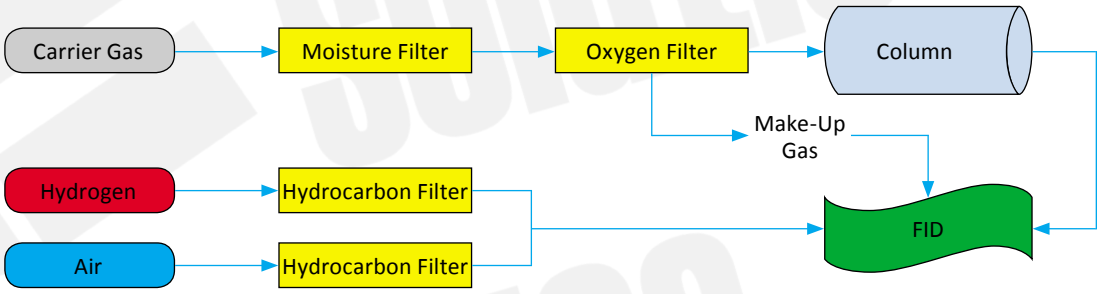
Traps / Gas Purifiers

Recommended Purifiers

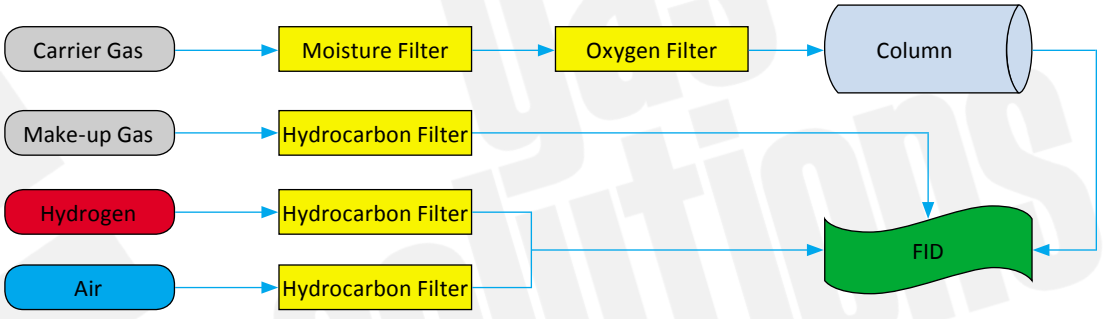
Detector	
TCD	
Makeup Gas:	He, N_2 Ar
	H_2
Moisture filter:	MT/IMT
Oxygen filter :	OT/IOT



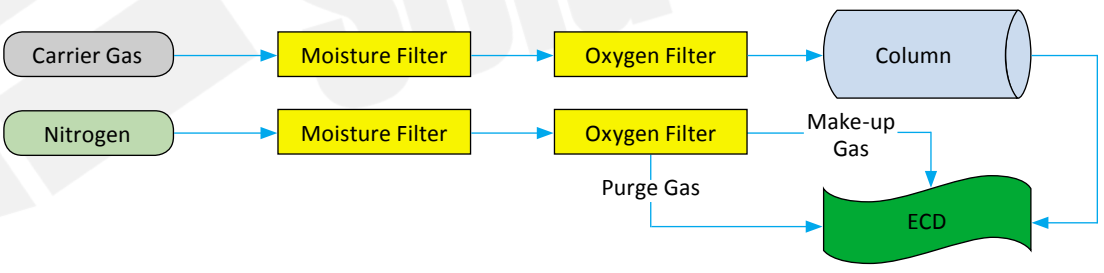
Detector	
FID	
Detector Gas:	H_2
	Air
Makeup Gas:	He, N_2
Moisture filter:	MT/IMT
Oxygen filter :	OT/IOT
Charcoal filter:	HT/IHT



Detector	
FID	
Detector Gas:	H_2
	Air
Makeup Gas:	He, N_2
Moisture filter:	MT/IMT
Oxygen filter:	OT/IOT
Charcoal filter:	HT/IHT



Detector	
ECD	
Detector Gas:	N_2 , Ar/CH_4
Moisture filter:	MT/IMT
Oxygen filter:	OT/IOT



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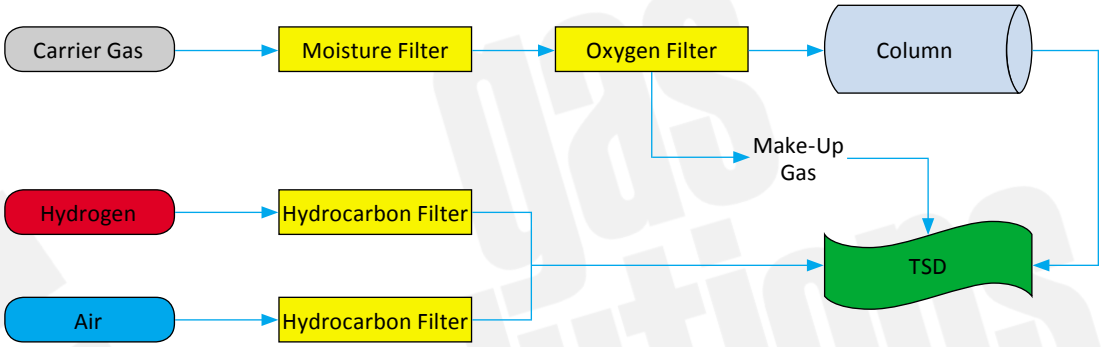
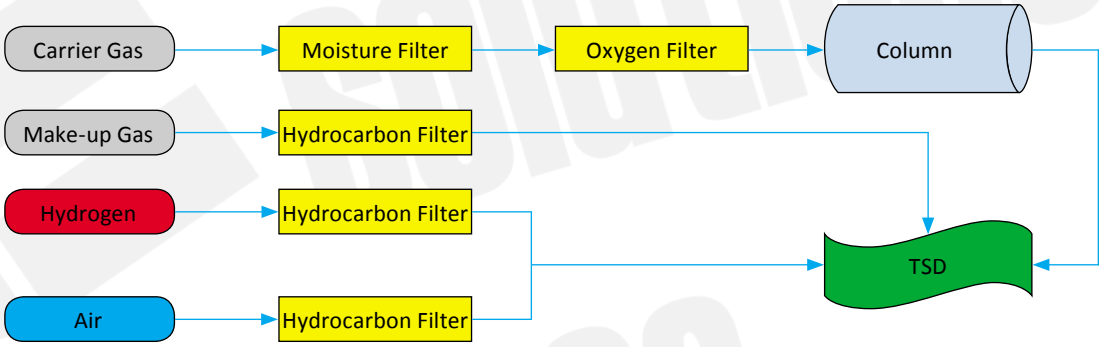
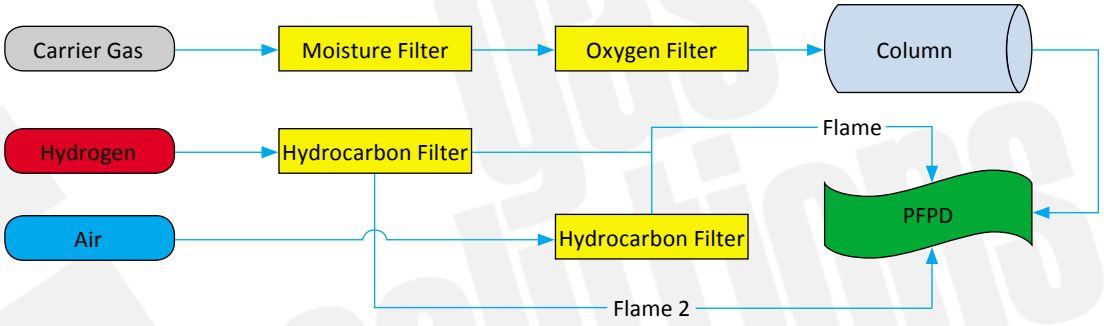
Detector	
TSD	
Detector Gas:	H_2
	Air
Makeup Gas:	He, N_2
Moisture filter:	MT/IMT
Oxygen filter :	OT/IOT
Charcoal filter:	HT/IHT



Detector	
TSD	
Detector Gas:	H_2
	Air
Makeup Gas:	He, N_2
Moisture filter:	MT/IMT
Oxygen filter :	OT/IOT
Charcoal filter:	HT/IHT



Detector	
PFPD	
Detector Gas:	H_2
	Air
Makeup Gas:	N/A
Moisture filter:	MT/IMT
Oxygen filter :	OT/IOT
Charcoal filter:	HT/IHT



Ordering Information

Cylinder Capacity	Inscribe
Moisture Trap (Low Capacity)	MT
Hydrocarbon Trap (Low Capacity)	HT
Oxy Trap (Low Capacity)	OT
Moisture Trap (High Capacity)	IMT
Hydrocarbon Trap (High Capacity)	IHT
Oxy Trap (High Capacity)	IOT

Connection - Inlet Side	Inscribe
⅛" OD Compression Fitting	8
¼" OD Compression Fitting	4

Connection - Outlet Side	Inscribe
⅛" OD Compression Fitting	8
¼" OD Compression Fitting	4

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