

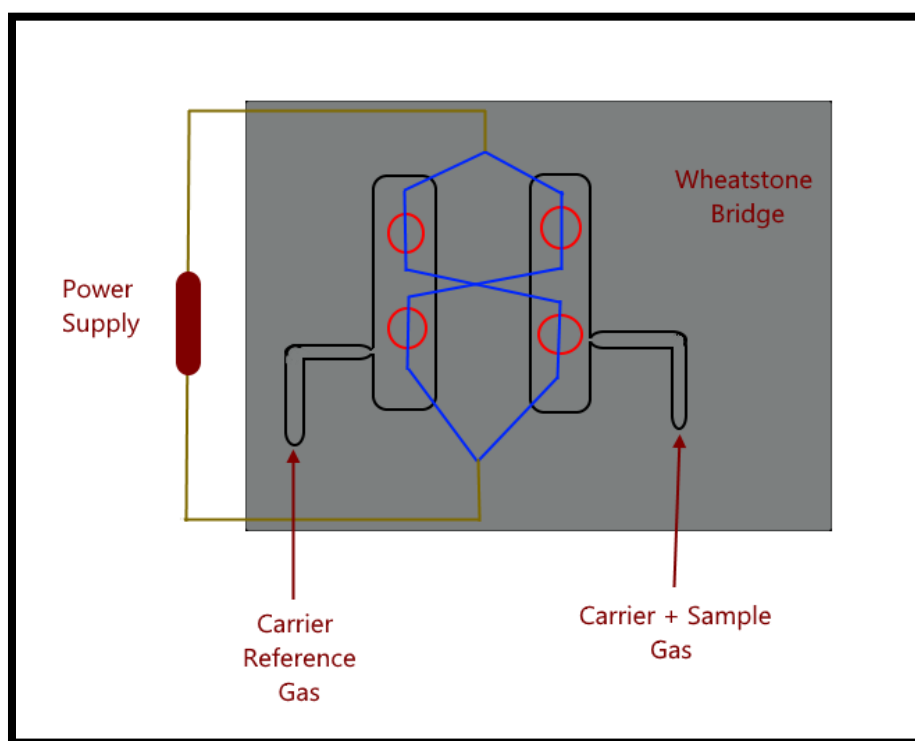
Thermal Conductivity Detector (TCD)

TCD Specifics:

The Thermal Conductivity Detector (TCD) is truly a universal detector and can detect air, hydrogen, carbon monoxide, nitrogen, sulfur oxide, inorganic gases, and many other compounds. The TCD is a non-specific and non-destructive detector. For most organic molecules, the sensitivity of the TCD is lower when compared to the Flame Ionization Detector (FID.)

TCD Mechanics:

The TCD is based on the principle of thermal conductivity which depends upon the composition of the gas. The sample components in the carrier gas pass into the measuring channel. A second channel serves as a reference channel where only pure carrier gas flow. Electrically heated resistance wires are located in both channels (Wheatstone bridge). The difference in thermal conductivity between the column effluent flow (sample components in carrier gas) and the reference flow of carrier gas alone, produces a voltage signal proportional to this difference. The signal is proportional to the concentration of the sample components.



TCD Notes:

Chemically active compounds like acids and halogenated compounds should be avoided when using TCD since they can attack the filament (wires) and thereby change the resistance and permanently reduce the detector sensitivity. Oxidizing substances, such as oxygen, can also damage the filament, and a leak free environment should be maintained.

For an optimal and proper response of the TCD, there are a couple of critical factors:

- Temperature of the detector block
- Flow rate of the carrier gas and the reference gas
- Resistance of the filaments

All these factors must be optimal to obtain a representative TCD response.

TCD Carrier and Reference Gas:

In the GC-TCD the carrier gas is both used to transfer the sample through the column and into the TCD detector, and as a reference gas. With the GC-TCD the reference gas and the detector gas must be the same as the carrier gas. As for any GCs the carrier gas must be inert and may not be adsorbed by the column material. Helium is typically used as the carrier gas for the TCD because of its high thermal conductivity.

Contact the TRACES Manager for full details.