

Purifying Compressed Air and Acetylene for Atomic Absorption Spectroscopy

Market Application Publication



Background:

Atomic Absorption spectroscopy (AAS) is very commonly employed to quantitatively determine the concentration of a broad range of elements in a sample. Over 70 elements can be determined in liquid and solid samples. The technique involves atomizing the sample, typically with an acetylene flame, then irradiating the atoms with a source that provides a wavelength to excite the element of interest. The amount of energy that is absorbed by the sample is related to the concentration of the element of interest via Beer's law. The system measures the light intensity in comparison to that of a sample that is identical to it, except for the element of interest.

A critical step in the process is the atomization of the sample, which is usually performed with an air-acetylene flame, which has a temperature of approximately 2000°C. The sample (in solution) is aspirated via a pneumatic nebulizer to create an aerosol which is introduced into a spray chamber where it is mixed with the flame gases and introduced into the flame. Since an AAS is capable of measuring trace levels of the various elements (e.g. 1-5 ppb for Ca, Cd, Cr, Cu) high purity air and acetylene are required.



Features and Benefits:

- Provides high purity compressed air and acetylene to optimize AA sensitivity
- Ensures a clean contaminant-free flame
- Protects gas controls and burner system from contamination and corrosion
- Includes a flashback arrestor to prevent back travel of AA flame
- Provides a cost effective alternative to using high-pressure compressed air cylinders
- Allows the user to use a greater percentage of the acetylene gas cylinder without the concern of damaging liquid acetone getting into the instrument.
- Requires minimum maintenance, filters can be replaced in 15 minutes
- Meets OSHA safety requirements
- Extremely low cost of operation, no hidden costs (demurrage, maintaining inventory)
- Operates on a 24/h/day, 7 day/week basis

Providing High Purity Air and Acetylene for Atomic Absorption

The requirement for highly purified compressed air and acetylene for AAS is a critical concern for the analyst. If either gas contains impurities such as oil, water and particulate matter, it is very likely that erroneous results will be obtained. In addition, the presence of these impurities in the gas could cause corrosion and contamination of the gas controls and the nebulizer over time.

The Parker Balston Model 73-100 Atomic Absorption Gas Purifier, which is designed specifically for AA systems, includes two independent filtration systems for the two gases:

The compressed air purifier is capable of removing all water, oil and particulate matter down to 0.01 micron from the air.

The acetylene purifier removes liquid acetone and solid particulates from the acetylene. In addition, it contains an integral flashback arrestor that meets OSHA requirements to provide safe operation of the AA spectrophotometer.

The compressed air purifier involves passing the air through a series of high efficiency coalescing filters to remove oil and water droplets as well as particulate matter. A coalescing filter consists of a matrix of borosilicate glass fibers in a fluorocarbon resin binder that is resistant to water, hydrocarbon lubricants and synthetic lubricants. The liquids trapped by the coalescing filter drip into the bottom of the housing and are automatically emptied by an autodrain assembly

so that the filter can continue to remove liquids for an indefinite time without loss of efficiency or flow capacity.

The first filter (Grade DX) removes particulate matter with an efficiency of 93% at the 0.01 micron level. The compressed air leaving this filter is then passing the air through a second coalescing filter (Grade BX) which provides a retention efficiency of 99.99%.

The acetylene purifier includes a specially designed Grade BQ filter which purifies acetylene gas by effectively removing acetone and particulate matter to less than 1.0 ppm. Acetone aerosols are blocked and allowed to vaporize and pass harmlessly through the AA instrument.

Conclusion

The Atomic Absorption Gas Purifier supplies a continuous supply of pure air and acetylene to the instrument. The system removes all oil, water and particulate matter down to

0.01 micron from compressed air. In addition, it removes acetone and particulate matter from acetylene. The use of the purifier allows the analyst to optimize the sensitivity of the AA system and

protects the gas controls and burner system from contamination and corrosion. The purifier is safe (meets OSHA requirements), easy to use, and requires a minimum of maintenance.

Principal Specifications

Gas Purifier	Specifications
Compressed Air Inlet/Outlet	¼" NPT (female)
Recommended Inlet Air Temperature	<78° F (26° C)
Min/Max Inlet Pressure (Compressed Air)	15 psig/125 psig
Acetylene Input/Output	9/16-18 LH (B size)
Compressed Air Input/Output	¼" NPTF
Max Inlet Pressure (Acetylene)	15 psig working pressure
Ambient Operating Pressure	40° F-100° F (4°C-38°C)
Dimensions	11" W X 8" D X 10" H (28 cm x 20 cm x 25 cm)
Weight	10 lbs (4.5 kg)
Shipping Weight	58 lbs (26 kg)

Ordering Information

Description	Part Number
Atomic Absorption Gas Purifier	73-100
Replacement seal set for compressed air filter housing	22091
Replacement seal set for Acetylene filter housing	22914
Acetylene hose (6 ft.)	19257
Flame arrestor	73051
Filter maintenance kit	73065

