

Proton OnSite Application Note Series

The Benefits of Switching from Helium to Hydrogen as a Carrier Gas

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Abstract

Helium, a common carrier gas for gas chromatography, is becoming increasingly expensive. Today, chromatographers choose to switch to hydrogen, an inexpensive and reliable gas source.

Introduction

Helium has always been a prized resource, sealed in caverns filled with the gas to create the Helium National Reserves. But in 1996, legislation ⁽¹⁾ allowed the sale of 0.6 billion ft³ of gas between 2005 and 2015. The law also set the price of crude helium to approximately \$43/1000 scf. In 2010 the Federal Bureau of Land Management reset prices to \$64.75/1000 scf, based on the Consumer Price Index ⁽²⁾. This increased to \$75.75/1000 scf for FY 2012. Critics argue this price is still too low when assessing remaining reserves of helium. ⁽³⁾

In addition to the economic issues around using helium in GC, there is a question of efficiency. Both helium and hydrogen are very efficient gases to use for GC. But the differences in the properties of the gases will lead to a difference in the efficiency of the separation. Using the van Deemter equation, which predicts an optimum velocity at which there will be the minimum variance per unit column length and, thence, a maximum efficiency, ⁽⁴⁾ one can deduce that linear flow rate of hydrogen can be greater than that of helium and offer equal efficiency in the gas' ability to separate peaks.

