
Longevity Testing of QuinTron Multi-Use Collection Bags

Abstract

Patient breath samples collected in QuinTron multi-use collection bags (QT00841-P & QT00844-P) can be held for six hours with minimal losses in H₂, CH₄ and CO₂ concentration. If samples cannot be analyzed within the six hour time period, they can be transferred to a sample holding bag (QT00842-P).

Introduction

When bacteria digest (or ferment) food substances, they produce acids, water and gases. The major gases produced by bacteria include, primarily, hydrogen (H₂), methane (CH₄), carbon dioxide (CO₂) and small concentrations of aromatic gases.¹ These gases are absorbed into the blood circulating near the site of digestion and are carried to lungs, where they are equilibrated with the air in the alveoli. When a patient exhales, gases contained in alveolar air can be captured and measured.

QuinTron manufactures instruments and accessories which are designed to capture and analyze the contents of a patient's breath sample. Specifically, our instrumentation measures concentrations of breath hydrogen (H₂) and methane (CH₄) in parts per million (ppm) and the percentage of exhaled carbon dioxide (CO₂). Using the GaSampler breath collection system, patients exhale into a collection bag which holds the alveolar air sample until it is ready to be analyzed.

QuinTron multi-use collection bags (QT00841-P & QT00844-P) are made of a proprietary aluminum foil-laminate. Hydrogen, being the smallest element, can easily diffuse through many materials; one exception being metal foils due to their low permeability rating. Unlike the sample holding bag (QT00842-P), the collection bags have two port openings: one small opening for a sample to be extracted from the bag by a syringe and another large port opening for the tee-connector to connect to, which allows the patient to breathe into the bag. The large port opening has a one-way valve, permitting air to flow into the bag but preventing air from escaping. A blue cap covers the port once the patient has finished breathing into the bag to further prevent the breath sample from escaping the bag. Multi-use bags are intended to be used to collect multiple samples from one patient but can be cleaned and used on another patient.

The purpose of this study was to determine how long the multi-use collection bags could adequately hold a sample without significant losses in H₂, CH₄ and CO₂ concentration.

Materials/Method

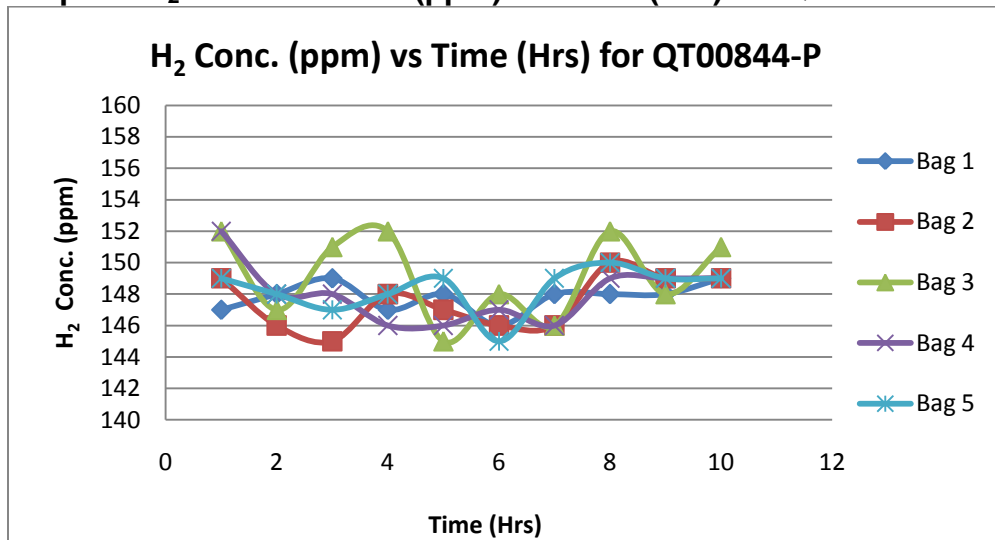
Five QT00844-P (250mL) bags and five QT00841-P (750mL) bags were filled with calibration gas. The calibration gas tank values were H₂=150ppm, CH₄=75ppm, CO₂=6.2%, with an uncertainty of ±2ppm for H₂ and CH₄ and ±0.2% for CO₂. The H₂,

CH₄ and CO₂ concentrations in each bag were measured every hour for 10 hours on a calibrated BreathTracker SC.

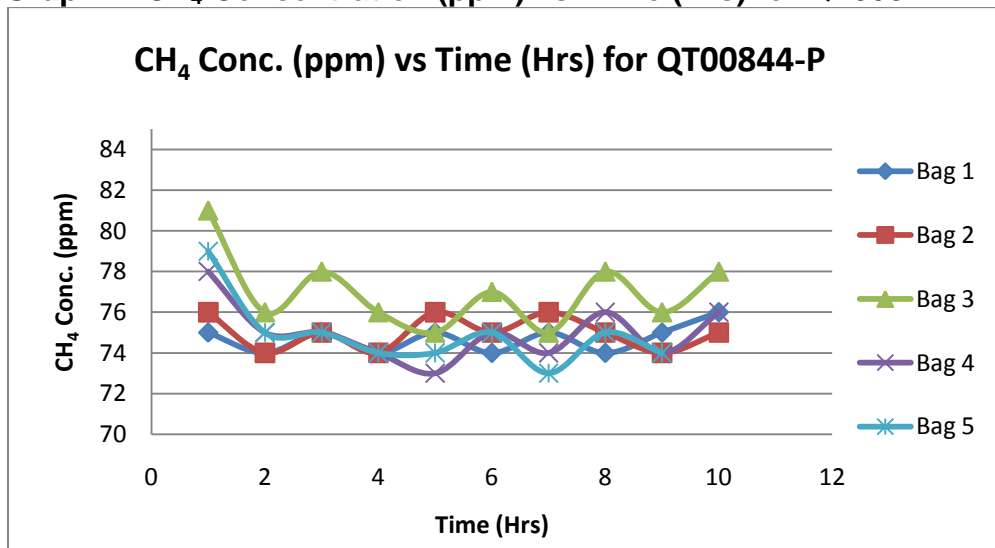
Results

Graphs 1-2 and 4-5 show the concentrations of H₂ (Graphs 1 & 4) and CH₄ (Graphs 2 & 5) corrected for dilutions using the CO₂ concentration (see www.QuinTron-usa.com for an explanation of the CO₂ Correction Factor). Graphs 3 & 6 show the CO₂ concentrations in each bag over time.

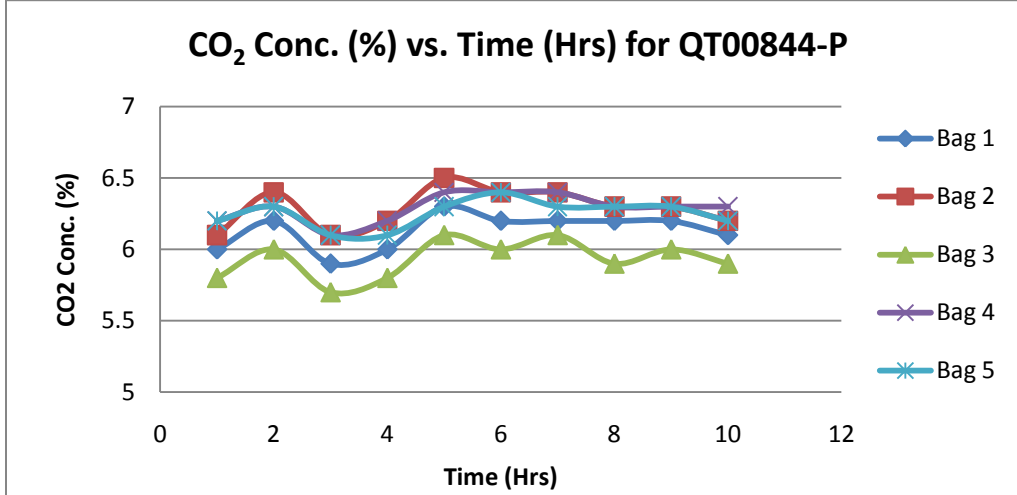
Graph 1: H₂ Concentration (ppm) vs. Time (Hrs) for QT00844-P



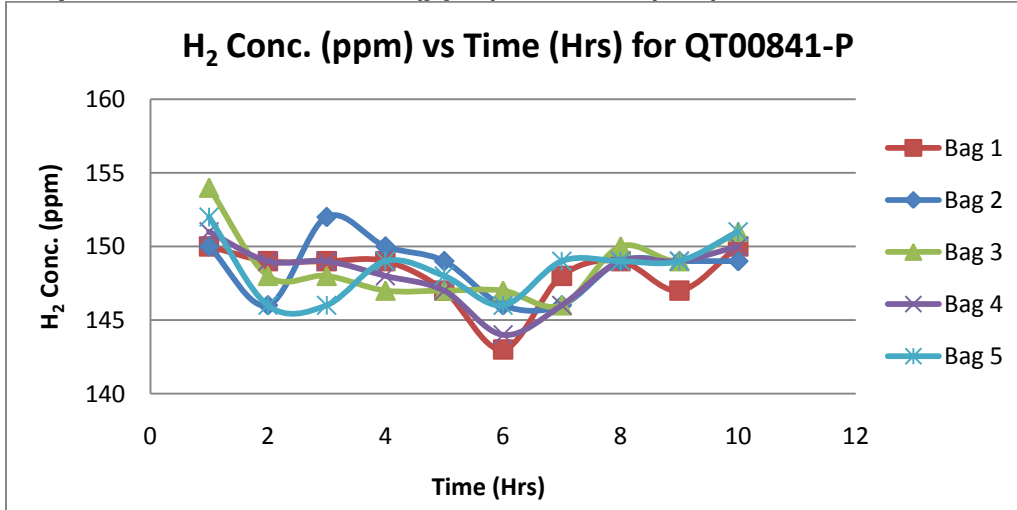
Graph 2: CH₄ Concentration (ppm) vs. Time (Hrs) for QT00844-P



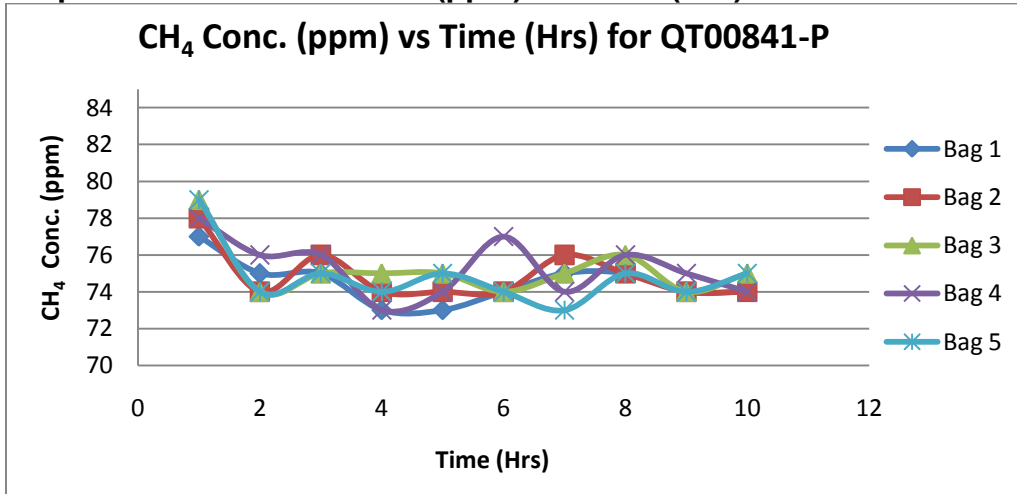
Graph 3: CO₂ Concentration (ppm) vs. Time (Hrs) for QT00844-P



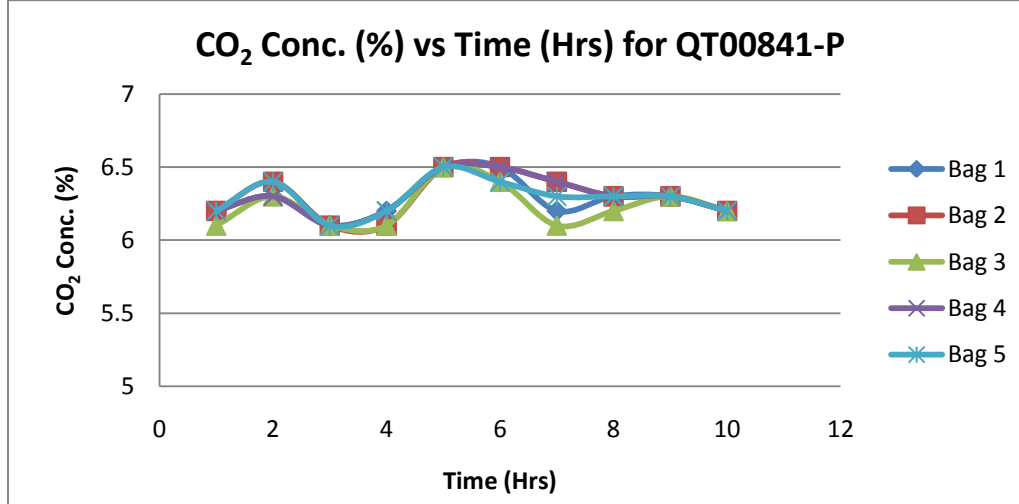
Graph 4: H₂ Concentration (ppm) vs. Time (Hrs) for QT00841-P



Graph 5: CH₄ Concentration (ppm) vs. Time (Hrs) for QT00841-P



Graph 6: CO₂ Concentration (ppm) vs. Time (Hrs) for QT00841-P



Graphs 1-6 show that the bags can hold calibration gas for up to 10 hours. In Graph 3, the CO₂ concentration began to slowly decline after six hours. While the H₂ and CH₄ concentrations can still be corrected back to acceptable values at 10 hours, QuinTron recommends six hours as the maximum holding time for samples in multi-use collection bags.

Conclusion

The data shows that QuinTron's multi-use collection bags can adequately store calibration gas for up to 10 hours without significant losses in H₂, CH₄ and CO₂ concentrations. In order to maintain the sample integrity, QuinTron recommends a maximum holding time of six hours in the multi-use collection bags. If the sample cannot be analyzed within this time frame, it can be transferred to a QuinTron holding bag (QT00842-P) and held for up to two weeks. QuinTron Application Notes #1 & 2 detail testing of the holding bags.

For further information on the history and science of breath-testing, sample protocols and collection techniques please reference [Breath-Tests & Gastroenterology, 1998 edition](#), written by Lyle Hamilton Ph.D. or request information from QuinTron directly.

References

1. Bond, J.H., Levitt, M.D. Quantitative measurement of lactose absorption. *Gastroenterol.* 1976; 70(6):1058-62