A New Secure, Reliable Connector for Use with Gas Chromatography Columns.

Michael A. Goss and Brad Rightnour

Restek Corporation, 110 Benner Circle,
Bellefonte, PA 16823

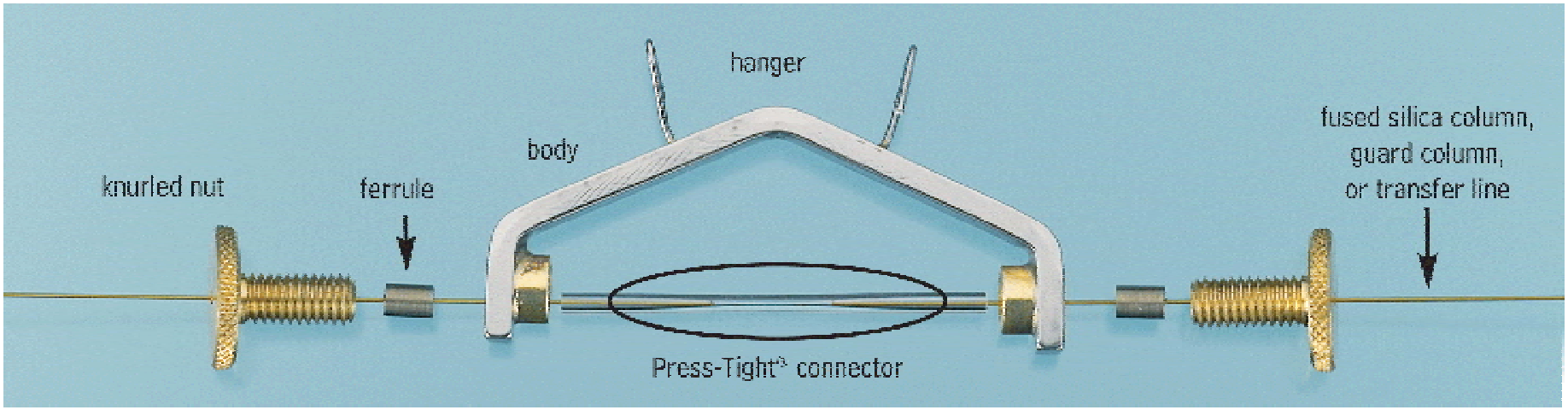
Abstract

A common problem when joining fused silica columns together is obtaining a secure and leak tight seal. There are many different connectors available to connect an analytical column, repair a broken column, or connect a transfer line to an analytical column. Press-Tight® glass connectors are often used, but these can disconnect when subjected to high temperatures or pressures. Metal-type connectors offer a secure connection, but it is difficult to obtain a proper connection inside the union.

Introduction

Joining fused silica columns together and maintaining a proper seal can be difficult. The new Vu2 union™ and SeCure™ “Y” connectors provide easy and reliable sealing between fused silica columns. The connectors utilize a Press-Tight® connection which joins the fused silica ends together; ferrules and nuts on each end of the connector hold the tubing in place. These ultra strong connections will not unexpectedly disconnect when subjected to temperature changes, vibrations, or other stresses encountered in GC analysis.

Vu2 Union™ Connector



Experiment

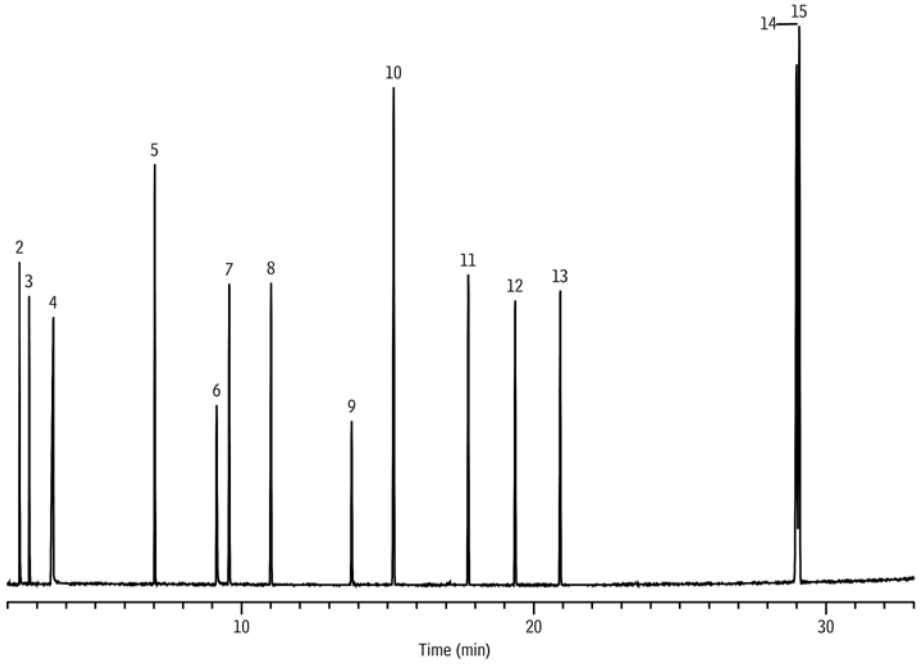
When using standard Press-Tights® in GC analysis, the turbulence in the oven and repeated heating and cooling cycles can cause a Press-Tight® to fail and leak. In this experiment, an XTI®-5 column was installed in the GC. The XTI® test mix was run and the following chromatogram was obtained (Figure 1).

A 5 meter guard column was connected to the analytical column using the Vu2 Union™. The columns and Vu2 Union™ were then subjected to several heating and cooling cycles. The XTI® mix was run again and the following chromatogram was obtained (Figure 2).

Figure 1:

Chromatogram of XTI® mix before Vu2 Union™ was installed.

Inj.:Split/Splitless in Split mode
GC: Agilent 5890
Inj. temp.: 250°C
Carrier gas: hydrogen, constant pressure
Linear Velocity: 40 cm/sec.
Oven temp.: 100°C to325°C @ 6°C/min (hold 15 min).
Det: FID @275°C



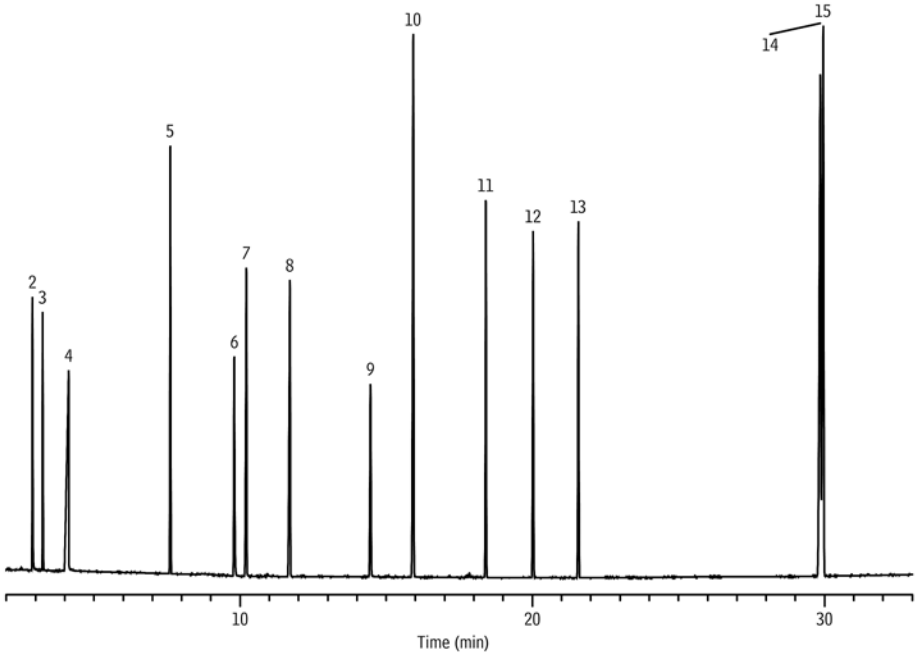
2. 1,2-hexanediol
3. Nitro-di-n-Propylamine
4. Benzoic Acid
5. C-14
6. 2,4-Dinitrophenol
7. Nitrophenol
8. Nitroanline
9. Pentachlorophenol
10. Carbazole
11. C-20
12. C-21
13. C-22
14. Benzo b Fluoranthene
15. Benzo K Fluoranthene

XTI-5 30m, 0.25mm ID, .25µm (cat# 12223)
acquired before installing Vu2 Union™.
Restek XTI® Test mixture

Figure 2:

Chromatogram of XTI® mix after Vu2 Union™ was installed.

Inj.:Split/Splitless in Split mode
GC: Agilent 5890
Inj. temp.: 250°C
Carrier gas: hydrogen, constant pressure
Linear Velocity: 40 cm/sec.
Oven temp.: 100°C to325°C @ 6°C/min (hold 15 min).
Det: FID @275°C



2. 1,2-hexanediol
3. Nitro-di-n-Propylamine
4. Benzoic Acid
5. C-14
6. 2,4-Dinitrophenol
7. Nitrophenol
8. Nitroanline
9. Pentachlorophenol
10. Carbazole
11. C-20
12. C-21
13. C-22
14. Benzo b Fluoranthene
15. Benzo K Fluoranthene

XTI-5 30m, 0.25mm ID, .25µm (cat# 12223)

Acquired after installing Vu2 Union™.

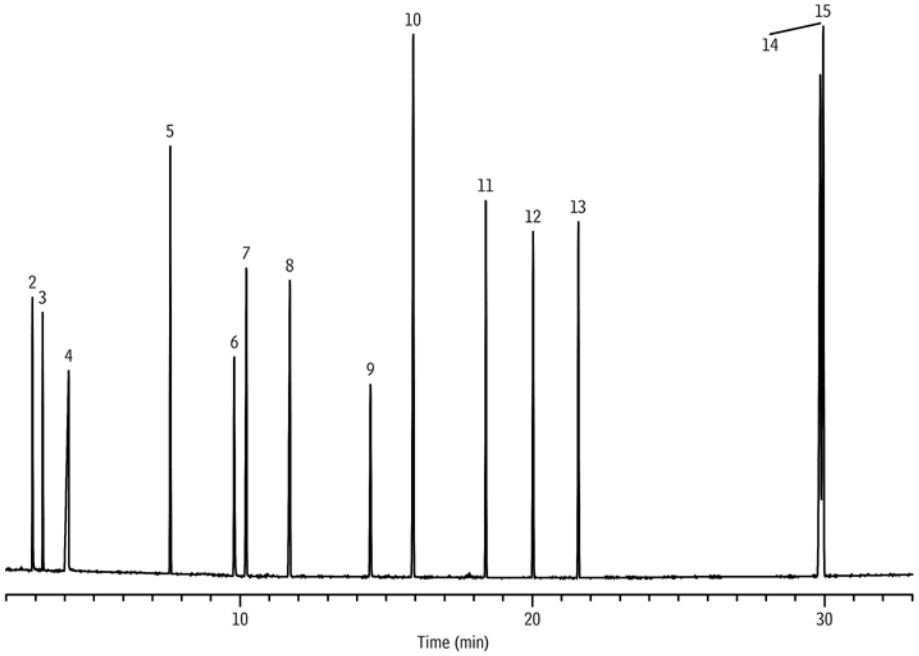
Restek XTI® Test mixture

Note: Retention time shift due to 5 meter guard column addition.

Figure 2:

Chromatogram of XTI® mix after Vu2 Union™ was installed.

Inj.:Split/Splitless in Split mode
GC: Agilent 5890
Inj. temp.: 250°C
Carrier gas: hydrogen, constant pressure
Linear Velocity: 40 cm/sec.
Oven temp.: 100°C to325°C @ 6°C/min (hold 15 min).
Det: FID @275°C



2. 1,2-hexanediol
3. Nitro-di-n-Propylamine
4. Benzoic Acid
5. C-14
6. 2,4-Dinitrophenol
7. Nitrophenol
8. Nitroanline
9. Pentachlorophenol
10. Carbazole
11. C-20
12. C-21
13. C-22
14. Benzo b Fluoranthene
15. Benzo K Fluoranthene

XTI-5 30m, 0.25mm ID, .25µm (cat# 12223)

Acquired after installing Vu2 Union™.

Restek XTI® Test mixture

Note: Retention time shift due to 5 meter guard column addition.

Figure 3:

Pentachlorophenol peak before Vu2 Union™ was installed.

Inj.:Split/Splitless in Split mode

GC: Agilent 5890

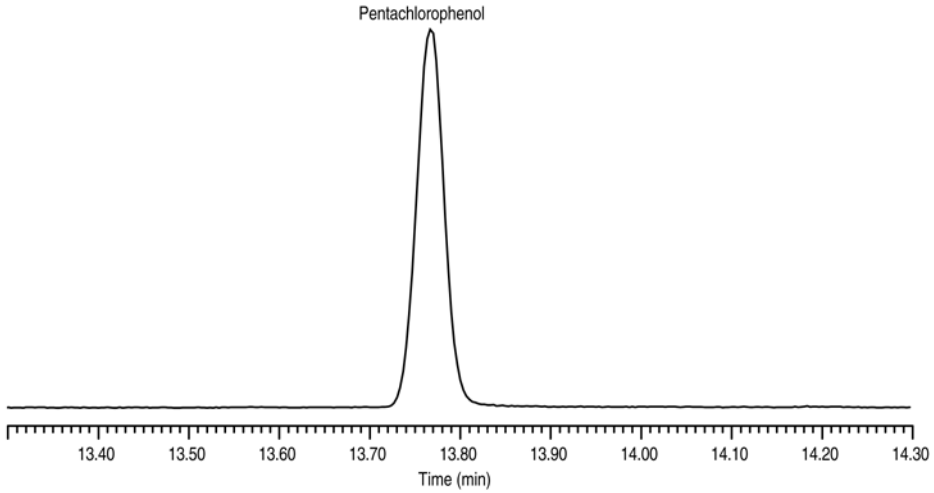
Inj. temp.: 250°C

Carrier gas: hydrogen, constant pressure

Linear Velocity: 40 cm/sec.

Oven temp.: 100°C to325°C @ 6°C/min (hold 15 min).

Det: FID @275°C



XTI-5 30m, 0.25mm ID, .25µm (cat# 12223)

acquired before installing Vu2 Union™.

Restek XTI® Test mixture

Figure 4:

Pentachlorophenol peak after Vu2 Union™ was installed.

Inj.:Split/Splitless in Split mode

GC: Agilent 5890

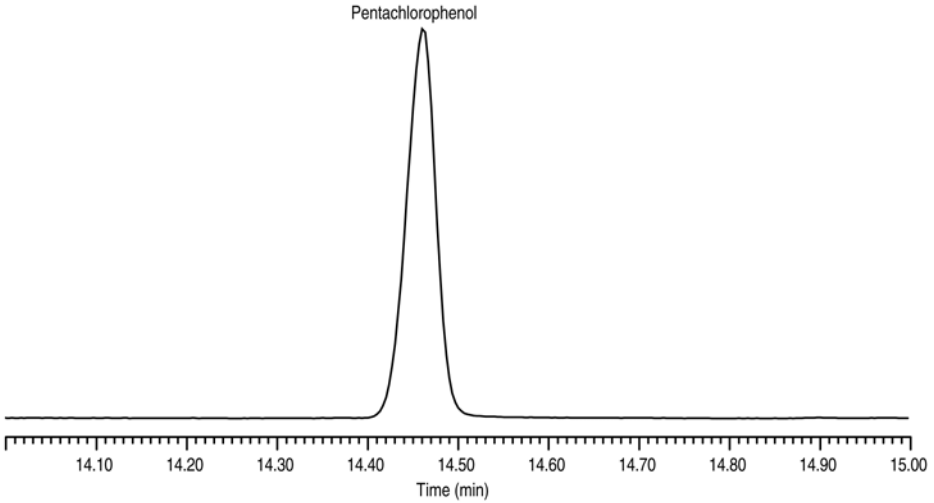
Inj. temp.: 250°C

Carrier gas: hydrogen, constant pressure

Linear Velocity: 40 cm/sec.

Oven temp.: 100°C to325°C @ 6°C/min (hold 15 min).

Det: FID @275°C



XTI-5 30m, 0.25mm ID, .25µm (cat# 12223)

acquired after installing Vu2 Union™.

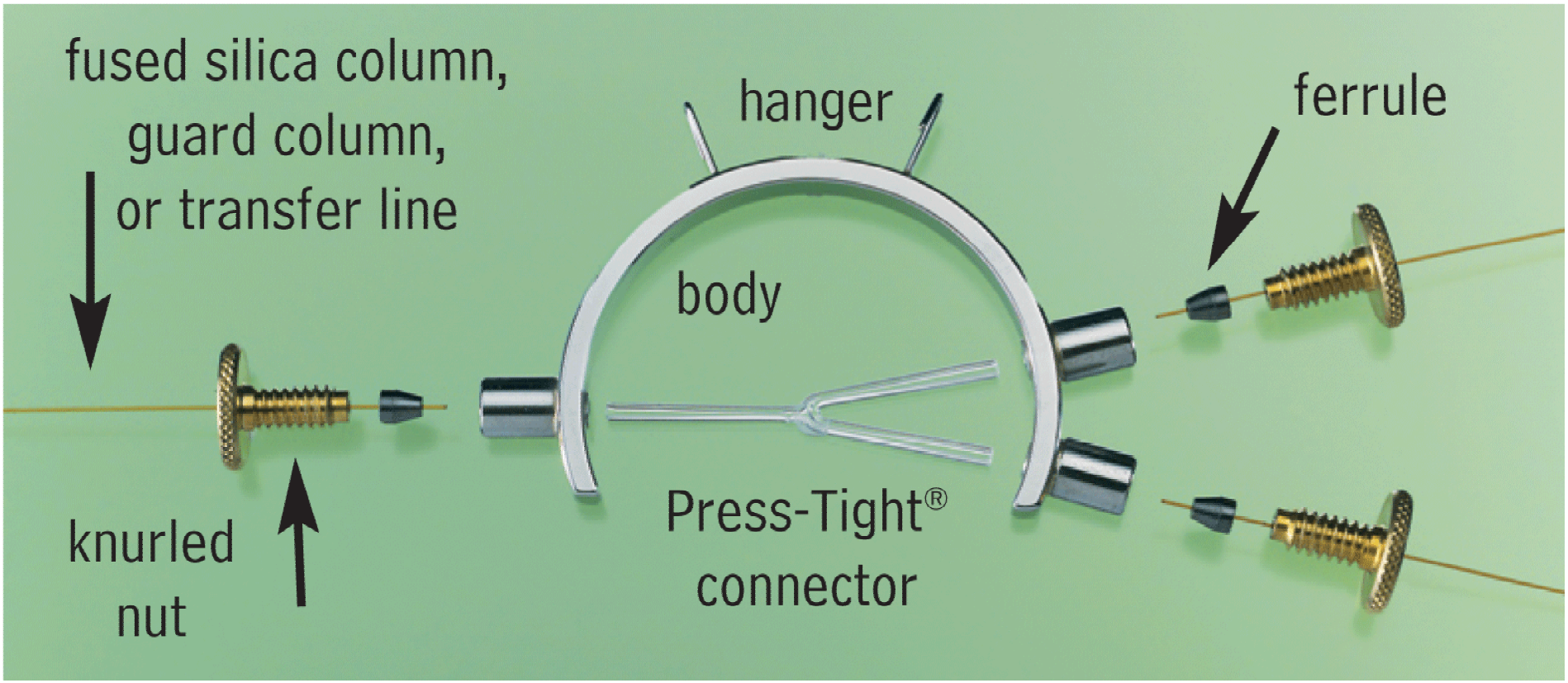
Restek XTI® Test mixture

Note: Retention time shift due to 5 meter guard column addition.

Dual column analysis

Dual column analysis involves connecting two capillary columns to one GC inlet and connecting each column to its own detection system. A guard column and Y Press-Tight® is the most common way to accomplish this. However, if the Press-Tight® fails at the guard column junction, then two analytical columns can be damaged when a leak is present. The simple solution is to use a SeCure™ “Y” connector. The SeCure™ “Y” connector uses a standard Y Press-Tight® and secures the fused silica columns with graphite ferrules and nuts to hold the columns in place.

SeCure™ “Y” Connector



Conclusion

The Vu2 Union™ and SeCure™ “Y” Connectors offer the simplicity of a Press-Tight® connector with the strength of a metal union. The open design allows visual confirmation of the seal for added confidence in the connection. Analysts using guard columns or transfer lines, performing dual column analysis with columns connected in series, or seeking to repair a broken column will find the new Vu2 Union™ and SeCure™ “Y” connectors a simple, reliable, easy-to-use solution.