



APPLICATION NOTE

Cepure Zero™ Injection Port Septum Life Study Analysis Using Gas Chromatography

Introduction

The new **Cepure Zero™** injection port septum was analyzed to determine total expected cycle life. Conditions were set at the extremes in order to determine life even under the most difficult of circumstances.

Experimental

One **Cepure Zero™** septum was placed in the septum holder of an Agilent 6890 GC. The GC was setup to perform 1000 injections (initial 250/750) of ethanol samples from sample vials that had no septa. The inlet flow pressure was monitored with each run. A longer high temperature analysis was performed near the start of the sample sequence and after every 100-125 injections. A new GC syringe needle (Agilent Gold Standard, Part# 5183-4730, 10ul, 23/42/HP6) was used.

Mode	Short Run
Column	Agilent DB-1 30.0 m x 320 um (19091Z-213)
Detection	FID
Inlet Temperature	400 °C
Injection Size	0.2 uL (Split 3:2:1)
Oven	40 °C hold for 3 minutes
Flow	30 mL/min (Constant)

Mode	Full Analysis
Column	Agilent DB-1 30.0 m x 320 um (19091Z-213)
Detection	FID
Inlet Temperature	400 °C
Injection Size	0.2 uL (Split 3:2:1)
Oven	40 °C hold for 3 minutes, 40-260°C @ 40°C/min
Flow	30 mL/min (Constant)

Results

Short Time Testing:

The retention time and peak area for ethanol were measured for each injection. The septum was tested until failure, which was defined by several factors:

1. Retention Time increase (hole in the septum leading to increased retention time).

- 2. Inlet Flow Pressure decrease (hole in the septum leading to reduced inlet flow pressure).
- 3. Peak Area decrease (increased coring leads to loss of sample therefore lower peak area).

The results were as follows:

Table #1 – Summary Data After 1000th Injection

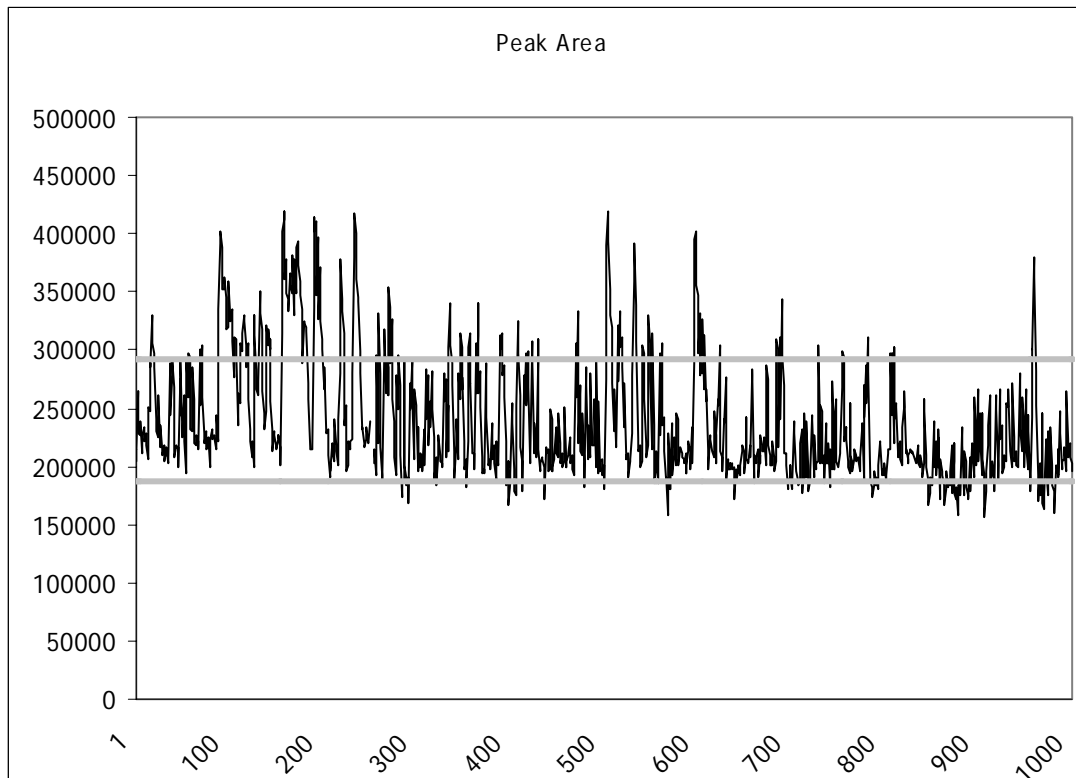
Septum	Injection#	RT	Inlet Flow Pressure	Peak Area
Cepure Zero	1000	Pass	Pass	Pass

Extended Testing:

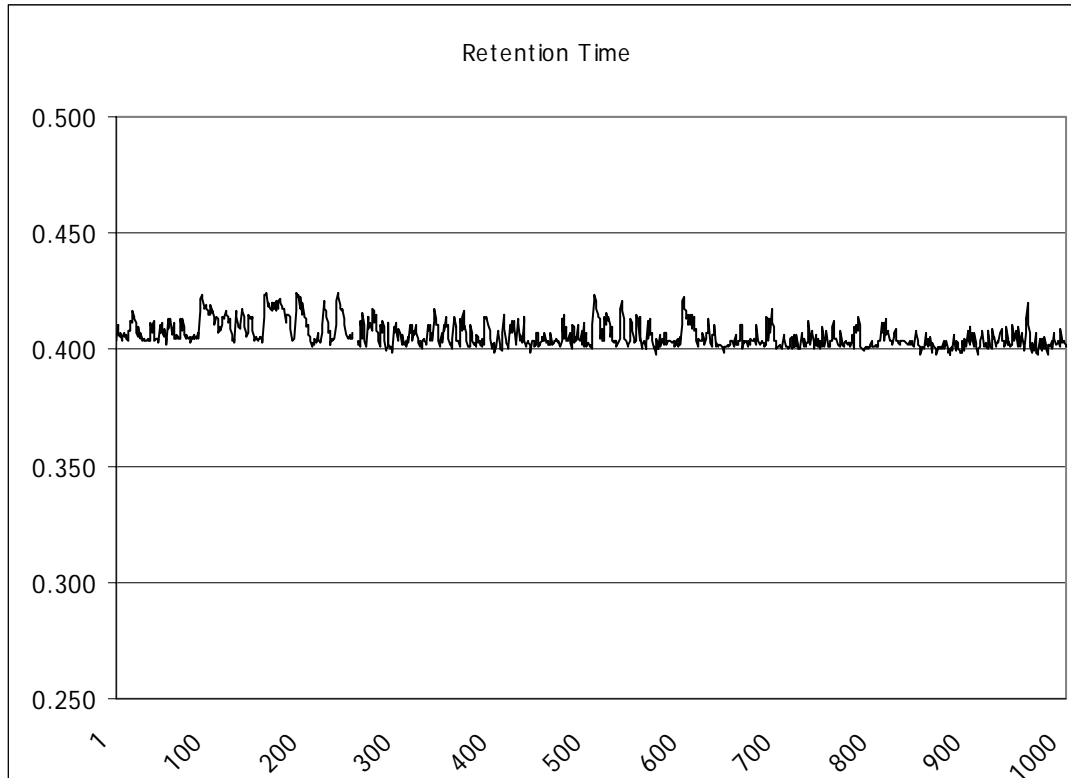
Table#2 – Summary Data Showing Mean Peak Area and Retention Time with Standard Deviation

	Peak Area	RT (min)
Mean	239143	0.406
Std Dev	52142	0.005

Chart#1 – Total Peak Area by Injection



Chart#2 – Retention Time by Injection



Summary

Total peak area values throughout the test showed normal variation and did not illustrate a significant loss which would indicate septum failure. Total retention time did not increase substantially, which would indicate the presence of a hole in the septum. Overall pressure (while not summarized) was consistent throughout each test.

Overall, testing showed that the **Cepure Zero™** injection port septum continued to perform well to 1000 injections at a 400°C inlet temperature. This data suggests that the unique O-ring design of the septum which allows for displacement of material rather than a puncture leads to longer life and minimizes coring. Further subjective analysis of the septum showed minimal wear, which suggests that it may last even longer.

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