

Method Summary:

Static Headspace Analysis (outgassing) is performed by subjecting the Gel sample in a sealed container to a controlled temperature for a fixed period of time. This procedure drives volatile compounds from the sample matrix into the atmosphere above the sample, called the headspace. This procedure is commonly referred to as outgassing. The volatile components are then injected onto the Gas Chromatograph (GC), where they are separated until subsequent analysis by Mass Spectrometry (MS).

Test Standard:

IDEMA Microcontamination Standard M8-98
Determination of Volatile Organic Compounds (VOC) by Static Headspace GC/MS

Test Method and Results:

The Gel-Pak Vacuum Release Tray with X4 Gel film was tested in a sealed glass headspace vial at 28°C for 24 hours. The volatile and semi-volatile components were then analyzed by Gas Chromatography/Mass Spectrometry. The results are summarized as follows:

Component Detected	Detection Time	VOC	VOC
		Total VR tray	DGL Film Component
Butene or Cyclobutane	0.65 minutes	0.04 µg/g	0.0 µg/g
Isopropyl Alcohol	0.91 minutes	0.01 µg/g	1.92 µg/g
Trimethylsilanol	1.31 minutes	0.07 µg/g	0.0 µg/g
Xylene	9.15 minutes	0.02 µg/g	0.0 µg/g

The outgassed components detected were Isopropyl Alcohol (IPA), Trimethylsilanol, Butane or Cyclobutane, and Xylene, all of which had detection times of less than 10 minutes. Components that are detected within the first 12 minutes are considered volatile. Those detected after 12 minutes are considered semi-volatile, and may not completely volatilize.

Results Summary:

Static Headspace Analysis revealed that only Isopropyl Alcohol was outgassed from the DGL “Process B” Gel film material that is in contact with customer parts. Trimethylsilanol and small fractions of Isopropyl Alcohol, Butane or Cyclobutane, and Xylene were outgassed from the Gel-Pak vacuum release tray.

Analysis performed by Charles Evans & Associates, independent laboratory.