

# Column Technology

## Technical Bulletin

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### Description

Molecular Sieve Material (MSM) has long been used in gas chromatography as the column material of choice for separating light gases, such as helium, hydrogen, oxygen, argon, nitrogen methane, and carbon monoxide.

The historical problem with MSM is gradual component retention time drift. For the user, this means higher maintenance costs due to column replacement or column rejuvenation. Additional costs result from equipment downtime as well as unplanned labor to address shifting retention times and retain measurement uptime.

MSM is particularly susceptible to contamination by water, carbon dioxide or any hydrocarbons that are heavier than methane at the conditions the column is typically used in a gas chromatograph.

### Now chemists have an alternative

Siemens can provide the Column 1902 MSR (Mole Sieve Replacement) material as an industry alternative to MSM in

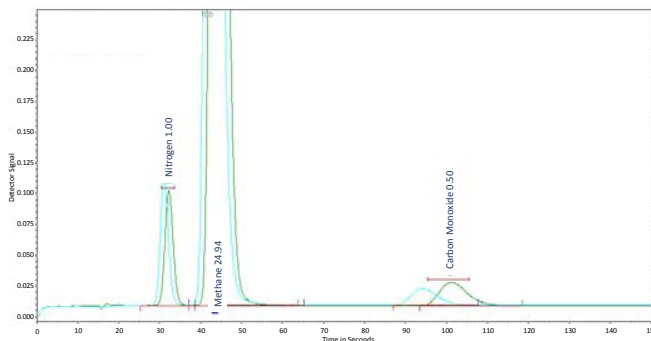
columns designed for light gas applications. It also is an alternative column material for most Molecular Sieve 5A (MS 5A) and 13X (MS 13X).

### No component retention time drift

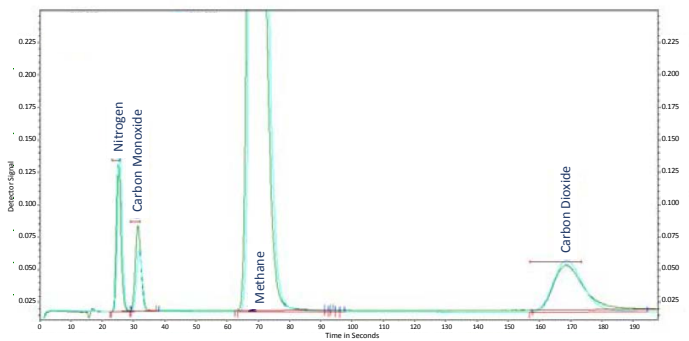
Column 1902 MSR demonstrates no component retention time drift, and do not have many of the inherent contamination problems associated with MSM.

### How to obtain this new application solution?

Column 1902 MSR is available from Siemens as an alternative option to MSM when ordering a MAXUM edition II analyzer. Also, the columns and engineering can be ordered to upgrade your existing chromatographs. As an added service, our technicians will come to your site to replace your present MSM columns, install new MSR columns and make other equipment adjustments to get the chromatograph back on line.



MS5A Column Showing Retention Time Shift



MSR Column Showing No Retention Time Shift

## Test Show Contamination of Sample Does Not Degrade Column 1902 MSR

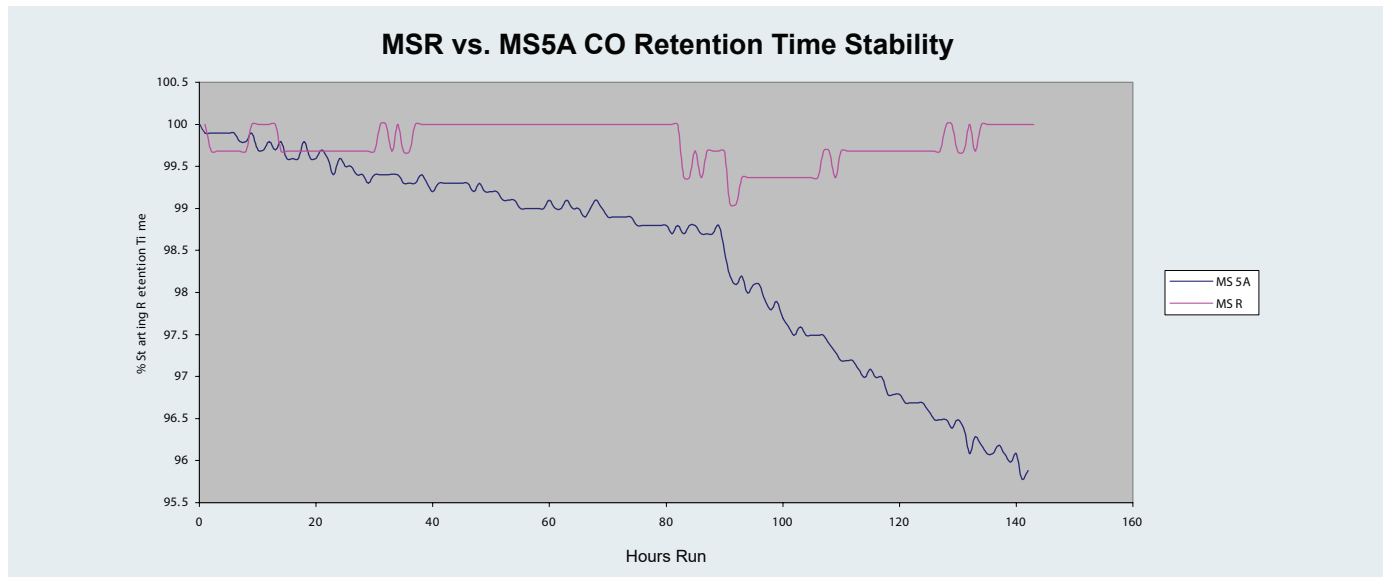
Our tests show, that under similar conditions, Column 1902 MSR as compared to molecular sieve MS 5A is not affected with respect to component retention time from any water or CO<sub>2</sub>.

The test spanned 7 days on a test mixture of 1.0% Mole N<sub>2</sub>, 0.5% CO, 25% methane and 2.0% CO<sub>2</sub> in a balance of H<sub>2</sub>. Columns used were 1 meter MSR and 1 meter MS 5A, both with 0.5m Hayesep N as a pre-column. Temperature was 60° C, injection volume was 41ul, and carrier gas was H<sub>2</sub> at 10 cc/min. of flow. In each case, backflush timing was adjusted to allow elution of CO<sub>2</sub> on both 1 meter columns. The amount of CO<sub>2</sub> allowed on both columns was the equivalent of a 16-ppm contamination of CO<sub>2</sub> in the carrier gas.

After approximately 80 hours of testing, fresh sample of the same composition was supplied to the analyzer. This time the

sample was bubbled through water at room temperature before entering the analyzer. Bubbling through water should yield a water concentration of approximately 3%, which is equivalent to a carrier gas contamination of 24 ppm of water. Backflush timing was adjusted to allow water to elute to 1 meter.

See graph below. As indicated by the movement of the CO retention time in the first 80 hours, the MS 5A column shows a steady deterioration from exposure to CO<sub>2</sub> of roughly 0.4% per day of the original retention time. The combined effect of CO<sub>2</sub> and water on the MS 5A column increased the daily rate to about 1.2% or about triple that of the effect of CO<sub>2</sub> contamination alone. The MS 5A column demonstrated over a 4% total reduction in original retention time over the test period. This can be compared to the MSR column, which showed no trending to shorter retention times and was stable within 1% of the starting value through the entire test.



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