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# Evaluating GC/MS Performance

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## Evaluating GC/MS Performance

1) Evaluating the chemical background in the GC/MS system (system background) and solvent purity.

- This procedure will allow the analyst to verify that the GC/MS is free of chemical interferences or contamination and verify the solvent being utilized is free of interferences
  - Conduct a GC/MS analysis without injecting a solvent (system background)
  - Conduct a GC/MS analysis inject 1 $\mu$ L of CH<sub>2</sub>Cl<sub>2</sub> solvent (Solvent background)

GC conditions:

Injector Temperature (°C): Injector Temperature is typically set at 250°

Transferline Temperature (°C): The Transferline Temperature is typically set at 280°C

Constant flow (Sec./cm<sup>2</sup>): This value, in seconds per cubic cm. Typically, set at 32.

Splitless mode (Sec.): This value, in seconds, is the time before the purge valve opens. Typically, set at 45 seconds.

Starting Temperature (°C): The Starting Temperature value can be set at 40°C.

Hold Time 1 (Min.): Hold Time 1 is the amount of time, in minutes at the Starting Temperature that Ramp 1 Temperature is held. Typically set at 3 minutes.

Ramp 1 Rate (°C/Min.): Ramp 1 Rate is the temperature rise per unit time and has a typically value of 8°C per minute to 300°C.

Hold Time 2 (Min.): Hold Time 2 is the amount of time, in minutes at the final Temperature that Ramp 1 Temperature is held. Temperature is held at 300°C for 3 minutes.

MS conditions:

Electronic : 40 to 500 amu

Scan Range: 30 – 600 m/z

Scan time: 0.7 sec.

Mass Resolution: 07u

Electron energy 1: 70 eV

The total ion chromatograms (TIC) from a bakeout and solvent should be void of any large chromatographic peaks (see figure 1).

2) Autotune using the PFTBA calibrant

- First selecting the autotune option and click on standard autotune. The software program will generate final tune report similar to figure 2. If there are any MS tuning problems (e.g., dirty source, air leak, etc..) the tuning process will fail.

- Be sure to save the tune file before proceeding to the next step.

### 3) Run an “Air and Water Check”

- By selecting View - Diagnostics/Vacuum Control – Vacuum - Air and Water Check. A Yes/No dialogue box will appear; select No (use current values). It is very important to select No! Otherwise the tune values are drastically altered.
- The software program will generate a water/air report similar to figure 3.

### 4) Evaluating the GC/MS system with a performance standard.

- This procedure should allow the analyst to verify that the chromatographic column and associated components are working adequately to separate the various classes of chemical compounds (e.g., hydrocarbons, alcohols, fatty acids, aromatics, etc..).
- Use the same GC/MS conditions used to collect the system background and solvent check (part 1 of this document)
- Figure 5 is an example of a commercial GC/MS column test mixture used to evaluate GC/MS prior to analysis.

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strument  
mple Name  
sc Info : 12m, 0.33 film, 0.2ID DB-5MS  
vial Number: 1

TDSAM

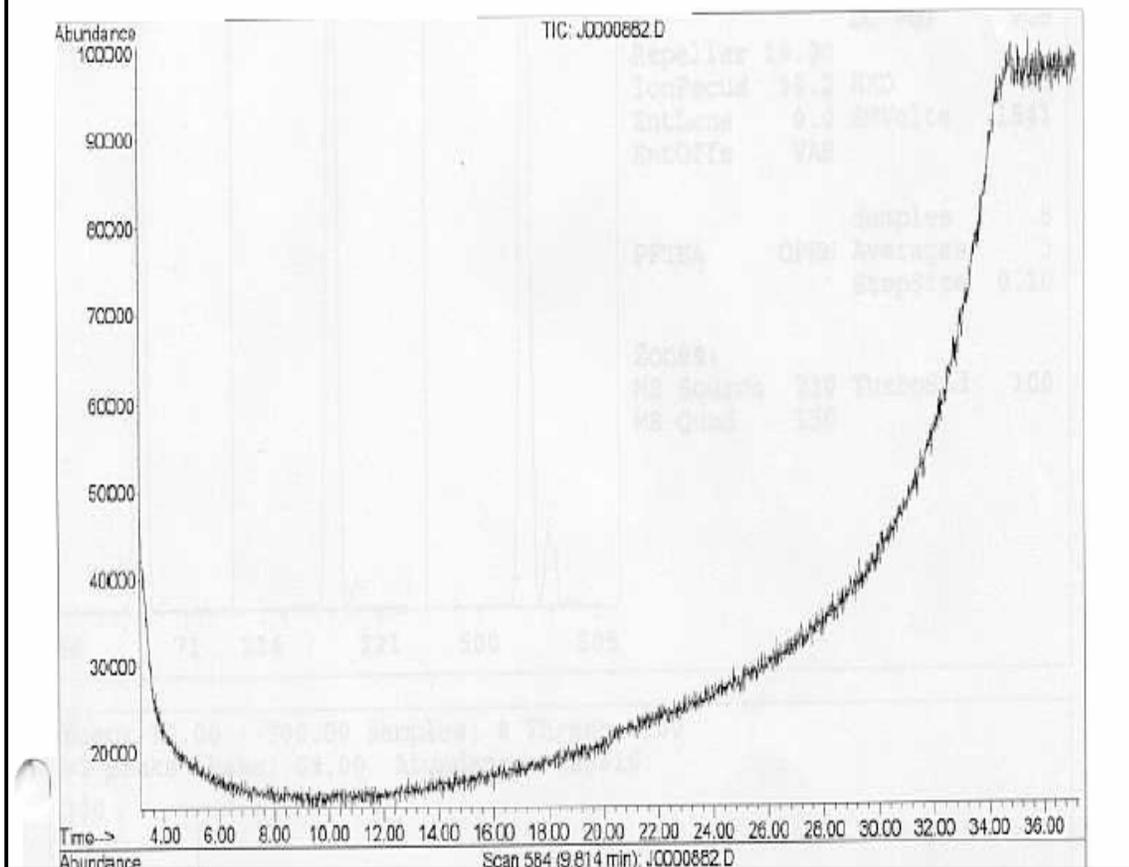


Figure 1. GC/MS total ion chromatogram (TIC) of a system blank

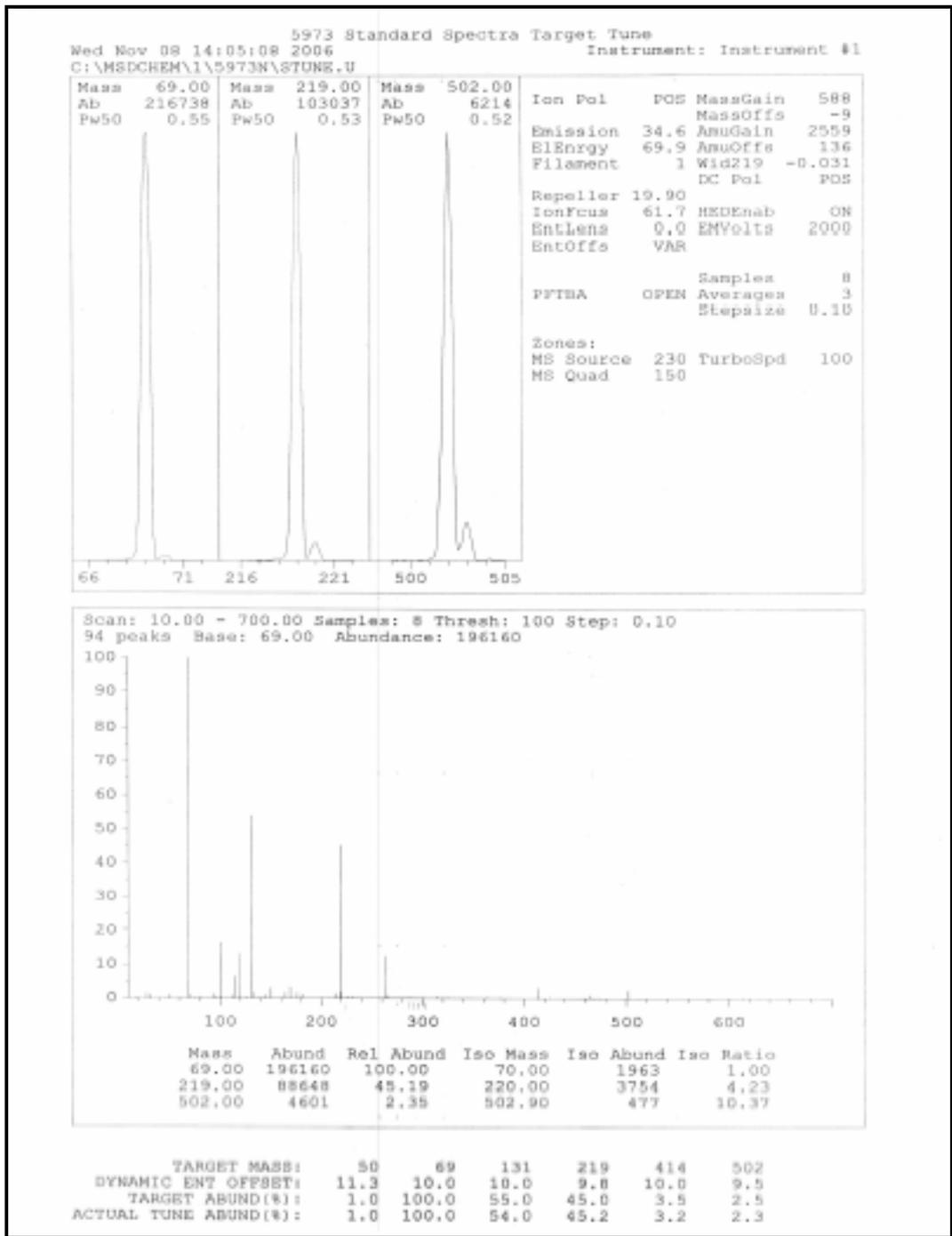


Figure 2. Example of an acceptable tune report

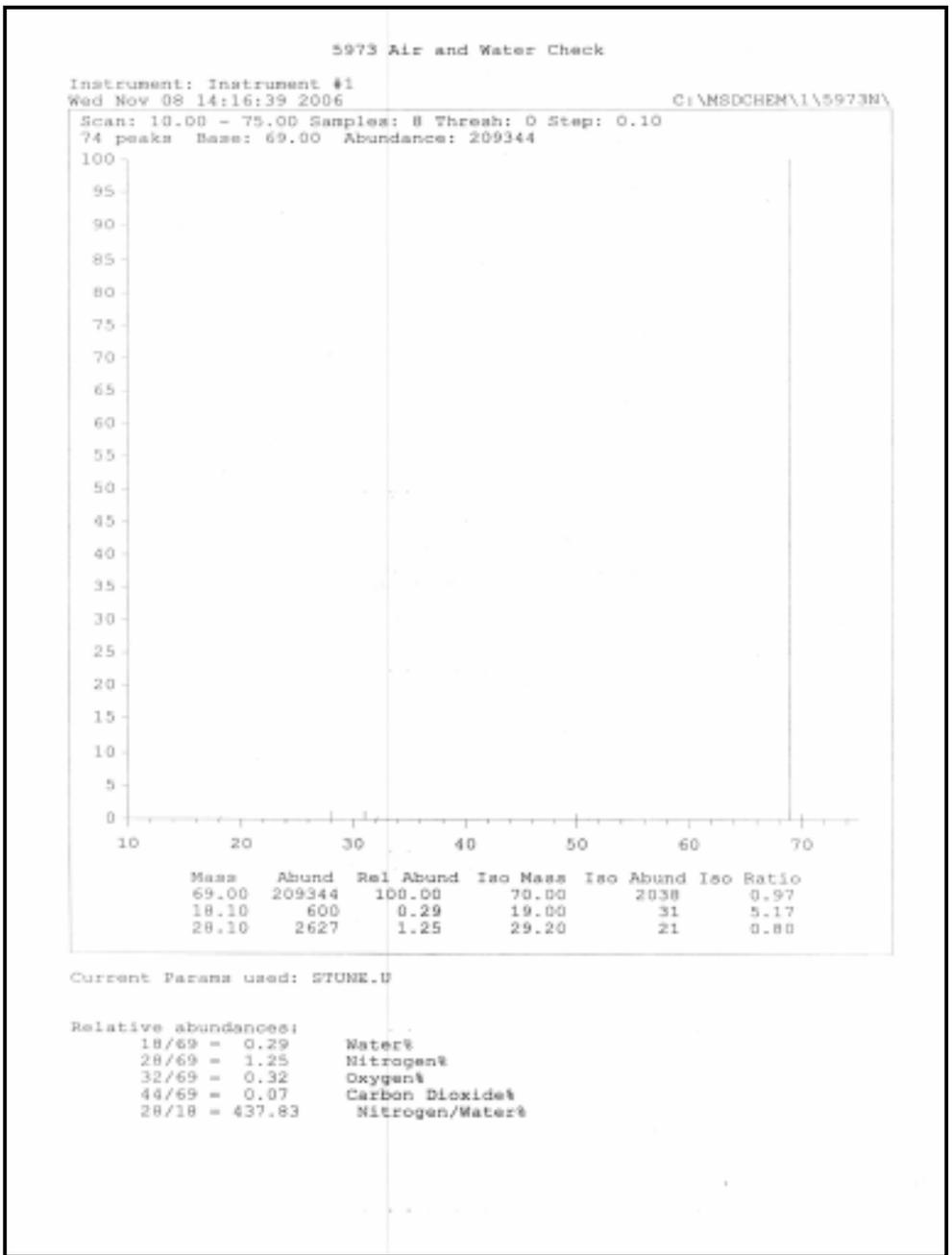


Figure 3. Example of an acceptable air and water check report

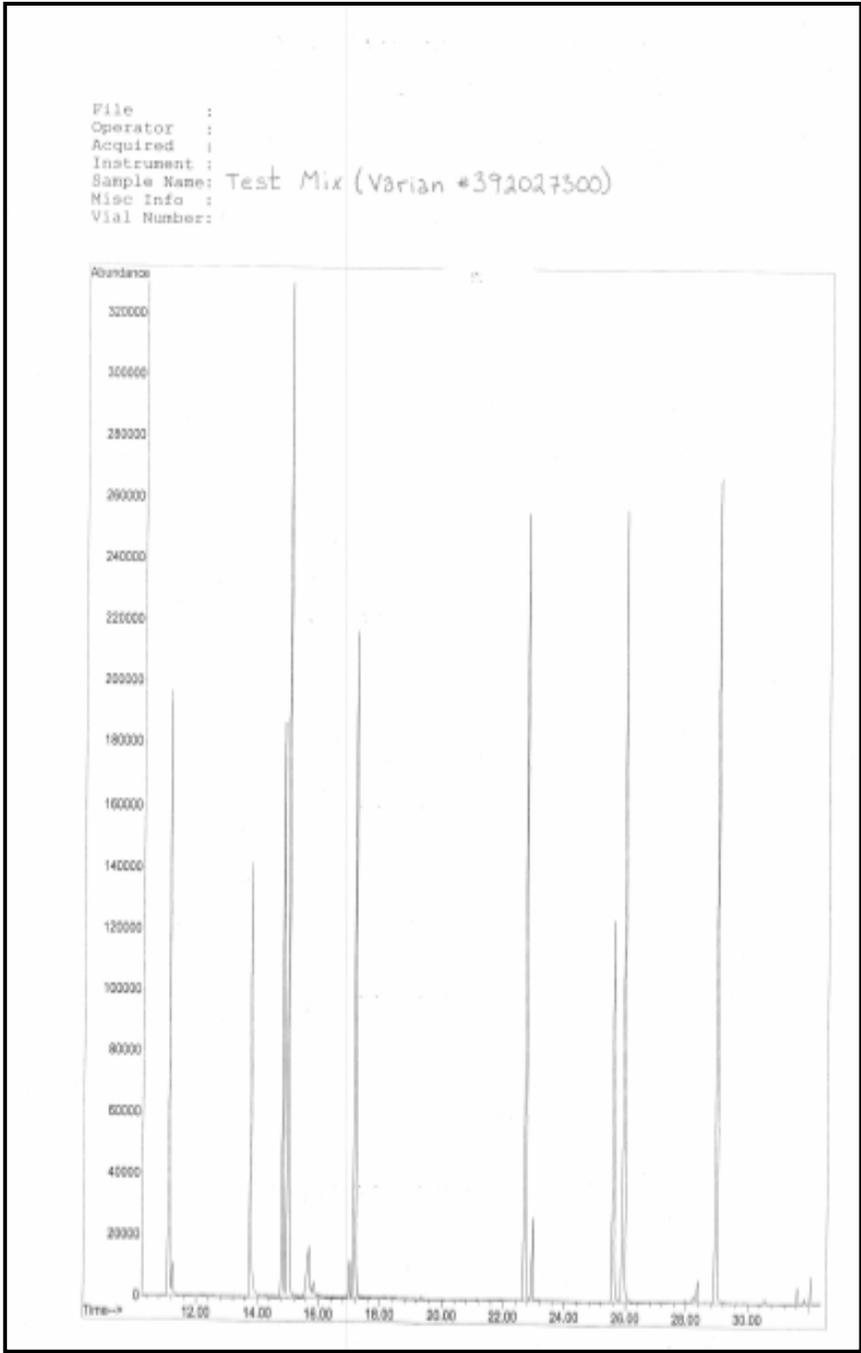


Figure 4. Example of an total ion chromatogram (TIC) of a performance standard

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**GC/MS COLUMN TEST MIX, 6 X 1 ML, HAZARDOUS**

**Part Number** 392027300  
**Package Quantity** 1

<b>Instrumentation</b>	Gas Chromatography & GC/MS	<b>Manufacture</b>
<b>Category</b>	Standards, Test Samples, Reference Materials & Reagents	<b>Brand or Mo</b>
<b>Product Group</b>	GC/MS Performance Testing	<b>Each</b>

Decane ✓  
 1-octanol  
 Undecane  
 Nonanol  
 2,6 dimethylphenol ✓  
 2,3 Butanediol  
 2,6 Dimethylaniline  
 Dicyclobexylamine  
 Methyl undecanoate  
 Methyl decanoate  
 Methyl dodecanoate

All of the above in the concentration of about 4ug per microliter in N-hexane solvent.

Also, there may be a trace of hexachlorobenzene (HCB) for sensitivity testing. (100 pg / μL)

Figure 5. Example of a commercial GC/MS column test mixture.