Qualification Test Specifications for 6890/7890 Agilent GCs

Test	Set Points/ Range	Acceptance Criteria
Oven Temperature Accuracy	Temperature 1 = 40°C Temperature 2 = 100°C Temperature 3 = 230°C	± 2°C
Oven Temperature Stability	Temperature 1 = 100°C	± 2°C
Headspace Oven Temperature Accuracy	Temperature 1 = 100°C	±4°C
ALS Inlet Leak Test	Pressure 1 = 25 psi	≤ 2.0 psi over 5 minutes
Headspace Sampler Inlet Leak Test	Pressure 1 = 25 psi	≤ 2.0 psi over 5 minutes
ALS Pressure Accuracy	Pressure 1 = 25psi	±1.2 psi
FID Flow Rate Accuracy	Air Flow Rate = 400ml/min Hydrogen Flow Rate = 30ml/min Make-up Flow Rate = 25 ml/min	Air: ± 40.0 ml/min Hydrogen: ±3.0 ml/min Make-up: ± 2.5 ml/min
TCD Flow Rate Accuracy	Air Flow Rate = 20 ml/min Make-up Flow Rate = 2 ml/min	Air: ± 3.0 ml/min Make-up: ± 0.5 ml/min
Split/Splitless Injection Precision (ALS)	Injection Volume1 = 1µl	%RSD < 3.0%
Purged Packed Injection Precision (ALS)	Injection Volume1 = 1µl	%RSD < 3.0%
Headspace Injection Precision	Injection Volume1 = 1ml	%RSD < 5.0%
Carryover (HS only)	Injection Volume1 = 0µl	< 1.00%
Linearity (ALS only)	Five (5) appropriate injection volumes based on detector response. Ex: 0.5, 1.0, 1.5, 2.0, 2.5 µl	$R^2 \leq 0.9990$
Noise/Drift	Detector Signal	Drift ≤ 0.20pA Noise ≤ 25pA

Overview for Above Mentioned Tests

1. Oven Temperature Accuracy

DESCRIPTION:

A calibrated digital thermometer is used to measure the oven temperature at three set points.

ACCURACY CALCULATION:

Abs (Temperature $_{\text{Set Point}}$ – Temperature $_{\text{Measured}}$)

UNDERLYING PRINCIPLE:

Temperature accuracy is important for transferring methods between instruments.

2. Oven Temperature Stability

DESCRIPTION:

After a 30 minute equilibration period at 100°C, a calibrated digital thermometer is used to measure the oven temperature. Temperature Readings are taken at 2 minute intervals for ten minutes.

STABILITY CALCULATION:

%RSD of the temperature readings is calculated by dividing the standard deviation of the temperature readings by the average of the temperature readings then multiplied by 100.

UNDERLYING PRINCIPLE:

Temperature stability is critical for repeatability and for transferring methods between instruments.

3. Headspace Oven Temperature Accuracy

DESCRIPTION:

A calibrated thermocouple is used to measure the headspace oven temperature at 100°C.

ACCURACY CALCULATION:

Abs (Temperature $_{\text{Set Point}}$ – Temperature $_{\text{Measured}}$)

UNDERLYING PRINCIPLE:

Temperature accuracy is important for transferring methods between instruments.

4. ALS Inlet Leak Test

DESCRIPTION:

Inlet is capped. Pressure is set to 25 psi. Pressure is turned off and pressure recorded after equilibration. After 5 min pressure is recorded again.

LEAK TEST CALCULATION:

Pressure Drop = $\text{Pressure}_{\text{Initial}} - \text{Pressure}_{\text{Final}}$

UNDERLYING PRINCIPLE:

The Leak Test is critical for transferring methods between systems and accuracy of peak area and peak response time.

5. Headspace Sampler Inlet Leak Test (if applicable)

DESCRIPTION:

Inlet is capped and pressure set at 25 psi. After equilibration the initial pressure is recorded and again after five minutes.

LEAK TEST CALCULATION:

Pressure Drop = $\text{Pressure}_{\text{Initial}} - \text{Pressure}_{\text{Final}}$

UNDERLYING PRINCIPLE:

The Leak Test is critical for transferring methods between systems and accuracy of peak area and peak response time.

6. FID/TCD Flow Rate Accuracy

DESCRIPTION:

Gas flow rates for Make-up, Hydrogen (only for FID) and Air are set and measured using a calibrated gas flow meter at the detector exit vent for each gas.

ACCURACY CALCULATION:

Abs ($\text{Flow Rate}_{\text{Set Point}} – \text{Flow Rate}_{\text{Measured}}$)

UNDERLYING PRINCIPLE:

Flow rate accuracy is important for transferring methods between systems.

7. Injection Precision

DESCRIPTION:

Sample is injected 6 consecutive times using the appropriate method based on inlet/detector configuration. Peaks are integrated and the average and %RSD for all peak areas is calculated.

PRECISION CALCULATION:

%RSD for retention time and %RSD for peak area are calculated by dividing the standard deviation of the peak area or the standard deviation of the retention time by the average of the peak area or the average of retention time multiplied by 100.

UNDERLYING PRINCIPLE:

Injector precision is critical for quantitative analysis accuracy.

8. Carryover

DESCRIPTION:

A blank injection is made after the six precision injections.

CARRYOVER CALCULATION:

$$\% \text{ Carryover} = \frac{\text{Area Peak of Blank Injection}}{\text{Area Peak of Previous Injection}} \times 100$$

UNDERLYING PRINCIPLE:

To have low or no carryover is critical for quantitative and qualitative analysis accuracy and reliability.

9. Injector/Detector Linearity

DESCRIPTION:

Five injections of different injection volumes of a traceable Standard are made onto a column.

ACCURACY CALCULATION:

RSQ is calculated

UNDERLYING PRINCIPLE:

Linearity is important for transferring methods between systems and for quantitative and qualitative analysis accuracy and reliability.

10. Noise and Drift

DESCRIPTION:

If the software controlling the instrument has the ability to measure noise and drift, a blank injection is made and a signal is take over a 20min span.

ACCURACY CALCULATION:

Noise and drift are calculated.

UNDERLYING PRINCIPLE:

Noise and drift are important for quantitative and qualitative analysis accuracy and reliability. It shows the stability and sensitivity of the detector.

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