Assure LC/MS/MS System Performance for Drug Analyses

Using a System Suitability Test Mix

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- Increase sample throughput and data quality with easy, reliable verification of LC/MS/MS performance.
- Extensively documented standard preparation assures accurate, consistent solutions.
- Method included in Cliquid® Drug Screen & Quant Software—automatically generates test reports.

Sample throughput is a critical issue in drug toxicology, and it can be adversely affected by inferior system performance. Poor system performance can produce unreliable data, increase downtime, and necessitate sample reanalysis, which ultimately decreases sample throughput. To ensure that your LC/MS/MS system is running properly, a system suitability mix should be analyzed on a regular basis before case samples are analyzed.

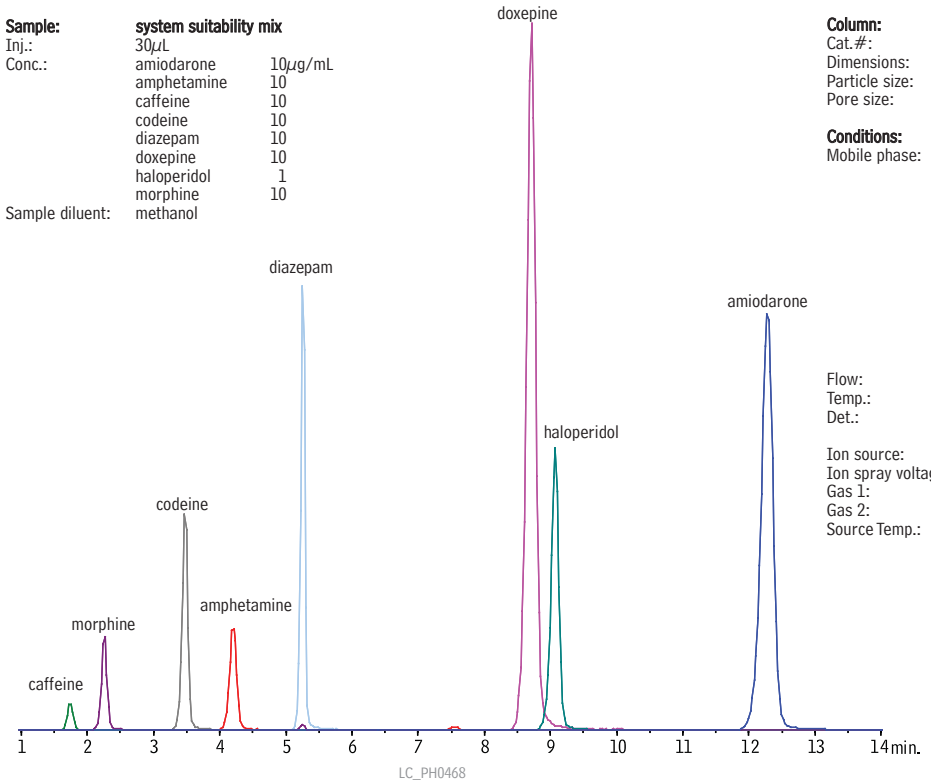
Restek and Applied Biosystems have developed a system suitability mix specifically for drug testing that contains compounds covering a wide range of molecular weights, polarities, and retention times (Table I). This standards mix is designed to verify system performance and identify system problems. Figure 1 shows a representative chromatogram (+MRM transitions) of this suitability mix analyzed on an Applied Biosystems API 3200™ LC/MS/MS system. This simple test evaluates the entire analytical system, including the autosampler, column, HPLC pumps, and mass spectrometer. The data is automatically compared to expected results by Applied Biosystem's Cliquid® Drug Screen & Quant Software to identify system problems.

Table I Mix components vary in chemical properties, providing a rigorous system performance test.

Mass Spectrometer Conditions:

Analyte	MW	RT (min)	Q1	Q3
Amiodarone	645	12.30	646.0	58.0
Amphetamine	135	4.21	136.1	91.1
Caffeine	194	1.72	195.1	122.9
Codeine	299	3.47	300.2	165.2
Diazepam	284	5.25	285.1	193.2
Doxepin	279	8.72	280.2	107.1
Haloperidol	375	9.08	376.1	123.0
Morphine	285	2.24	286.1	165.1

Figure 1 Increase sample throughput by verifying system readiness with a drug standard system suitability mix. (MRM transitions)



The Cliquid® Drug Screen & Quant Software automates this test and generates a verification report which highlights failures. Peak area, peak shape, retention time reproducibility, fragmentation, and library search function all are evaluated through the software by comparing the test mix data to expected results. For example, full scan linear ion trap MS/MS data for diazepam and caffeine are compared to the library to assess fragmentation. A mass spectral match of 80% or more must be achieved to pass this portion of the system suitability test. Otherwise, the failure will be highlighted on the automated report.

Use this system suitability mix for drug analyses to assure system performance and simplify troubleshooting.

Analyzing this system suitability mix for drug analysis on a regular basis assures system performance, improves data quality, increases sample throughput, and simplifies troubleshooting. Moreover, the Cliquid® Drug Screen & Quant Software for Routine Forensic Toxicology enables nonexpert LC/MS/MS users to employ this system suitability test with little effort.

Acknowledgement
Method and data supplied by Applied Biosystems.

References

H. El Arbi, T. Sasaki, A. Schreiber, K. Sellers, K. Herwehe. Development of an LC/MS/MS System Suitability Test for Forensic Toxicology Applications. Applied Biosystems/MDS Sciex, 2007.

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ABI/SCIEX Cliquid® Drug Screen Mix

Forensic Drug Screen Test Mixture

amiodarone	10µg/mL	diazepam	10
amphetamine	10	doxepine	10
caffeine	10	haloperidol	1
codeine	10	morphine	10

In P&T methanol, 1mL/ampul
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Forensic Drug Screen Internal Standard

D5-diazepam D5-doxepine

10µg/mL each in P&T methanol, 10mL/ampul
cat. # 36341

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