AccuTOF™

# The AccuTOF™ Orthogonal API Ion Source: Stability when Phosphate Buffer is Used

JEOL recently introduced a new-generation LC/TOFMS system (the *"AccuTOF™")* with a wider dynamic range than conventional LC-TOF MS systems. The increased dynamic range of the AccuTOF provides qualitative and quantitative analysis with the increased accuracy and resolution of an LC/TOFMS system.

While the AccuTOF preserves the benefits of TOF MS, such as high sensitivity, high resolution and high mass accuracy, it also features a durable orthogonal API source with long-term stability and easy maintenance.

Here, we describe the features of the orthogonal API source. We also demonstrate the ability to operate the AccuTOF for an extended period in the presence of a nonvolatile phosphate buffer often used for LC Analysis.

Compared with the conventional API source, an orthogonal API source is highly resistant to contamination. The orthogonal geometry and off-axis design of the JEOL interface protect the analyzer from contamination and exposure to liquid droplets from the API sources.

## Benefits of the Orthogonal API Ion Source

Figure 1 shows the concept of the Orthogonal API source used in the AccuTOF. The downward spray directs most of the liquid stream into the waste drain, keeping orifice 1 clean. The design allows the use of a lower desolvation temperature, so the entire API source can be reduced in size. The off-axis skimmers and the bent RF ion guide minimize contamination in the analyzer region, so performance stability is greatly improved.

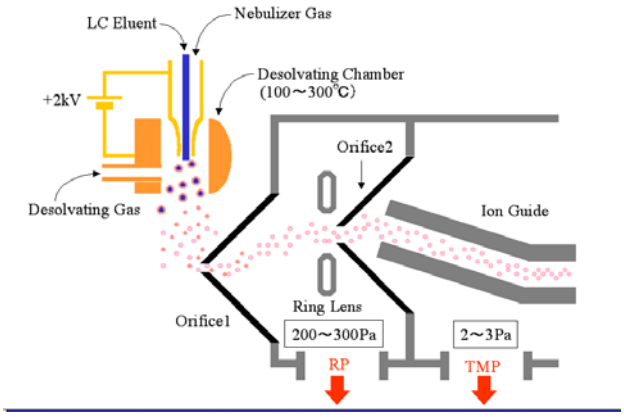


***Figure 1. Schematic Diagram of ESI Source and API Interface***

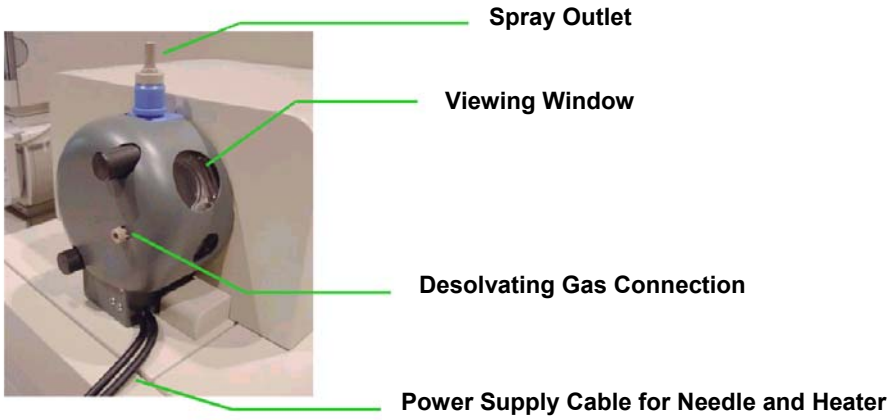


*Figure 2. Photograph of AccuTOF Orthogonal-spray ESI Source*

**Stability When Phosphate Buffer is Used**

Using this new orthogonal API source, we examined the stability of reserpine analyzed by electrospray ionization (ESI) over a 10-hour period in the presence of monosodium orthophosphate buffer*. Table 1 shows the measurement conditions.

Measurement was conducted using 5mM $NaH_2PO_4$ as the mobile phase solvent, and the separation was carried out with gradient elution without splitting, at a flow rate of 0.1ml/min. Fig. 3 shows the mass chromatogram of the sample (reserpine m/z 609: $[M+H]^+$) at the start time and after ten hours of continuous sample injections. Fig. 4 shows the change with time in the peak area for the mass chromatogram of m/z 609 from reserpine.

Even with the use of the nonvolatile buffer (5mM $NaH_2PO_4$), the orthogonal API ion source for the AccuTOF maintains adequate stability for a long time, demonstrating a high resistance against various contaminants introduced by the LC analysis.

*Table 1. LC/MS Measurement Conditions*

| MS Measurement Conditions | | | |
|---|---|---|---|
| Mass Spectrometer | JMS-T100LC AccuTOF | Liquid Chromatograph | Agilent1100 |
| Ionization | ESI (+) | Mobile Phase Solvent | A: 5mM $NaH_2PO_4$<br>B: $CH_3CN$<br>B%=70~90% (3min, linear gradient) |
| Flight Tube Voltage | - 7000V | Column | ZORBAX 5 mm Eclipse XDB-C18 |
| | | Flow Rate | 0.1ml/min |

**Note: Although the AccuTOF ion source is highly resistant to contamination, as shown in this application note, the use of involatile buffers for LC/MS is not recommended because of the possibility of analyte suppression.*

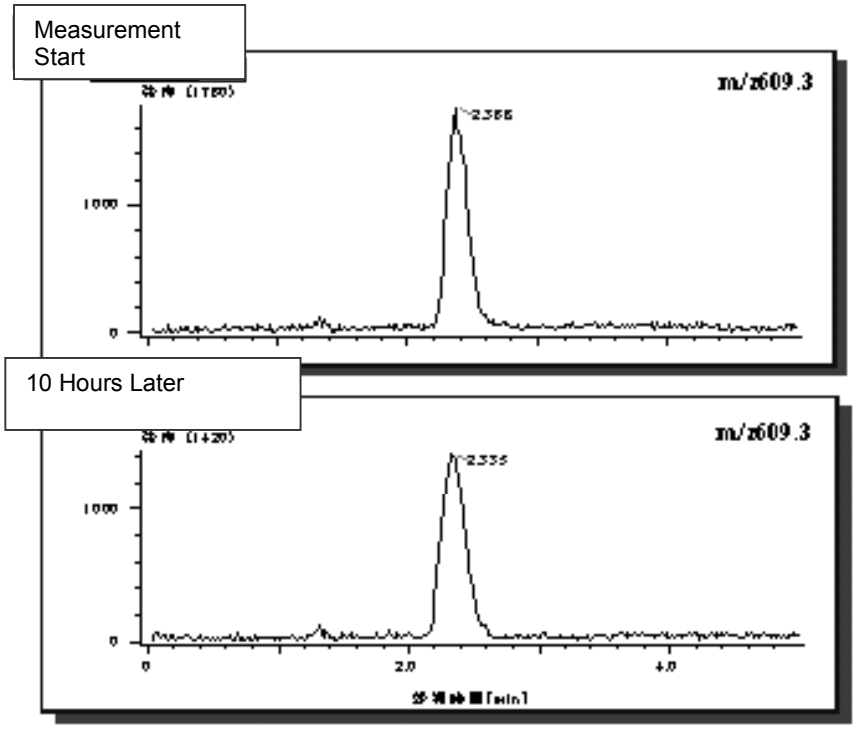


*Figure 3. Intensity Change of Reserpine when Phosphate Buffer is Used (Top: At start time; Bottom: Ten hours later)*

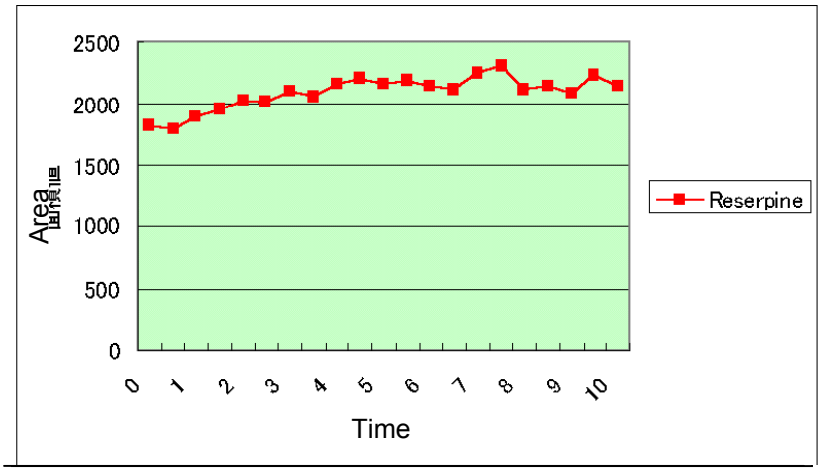


*Figure 4. Change of Reserpine Signal over Time when Phosphate Buffer is Used*

## Conclusion

The AccuTOF API source provides a stable analyte signal, even in the presence of contaminants such as involatile buffers. By combining the highly durable orthogonal API source and the newly developed detector with its wider dynamic range, the AccuTOF can provide powerful advantages over conventional HPLC/MS systems for a wide variety of analyses.