

Analysis Using Dual Ion Source DUIS-2010 (Part 2)

Previously, Shimadzu Application News No. C50 introduced the Dual Ion Source DUIS-2010, an LC-MS interface equipped for both Electrospray Ionization (ESI) and Atmospheric Pressure Chemical Ionization (APCI). This interface, which was developed to handle the analysis of a greater range of compounds, can be

used as a tool for improving efficiency. Presented here is a comparison of DUIS and ESI, and DUIS and APCI mass spectra generated from the analysis of pesticides as high-polarity compounds, and alkylphenones as low-polarity compounds.

Analysis of High-Polarity Compounds

ESI is suitable for analysis of relatively high-polarity compounds such as carbamate pesticides. Fig.1 shows the mass chromatograms of 8 carbamates (20 ng each). All of the compounds were detected with good sensitivity using ESI; however, using APCI,

sensitivity was poor overall, with aldicarb and thiram not detected at all. Also, when performing a comparison of the mass spectra of DUIS and ESI, as shown in Fig.2, it can be seen that there are no major differences in these patterns.

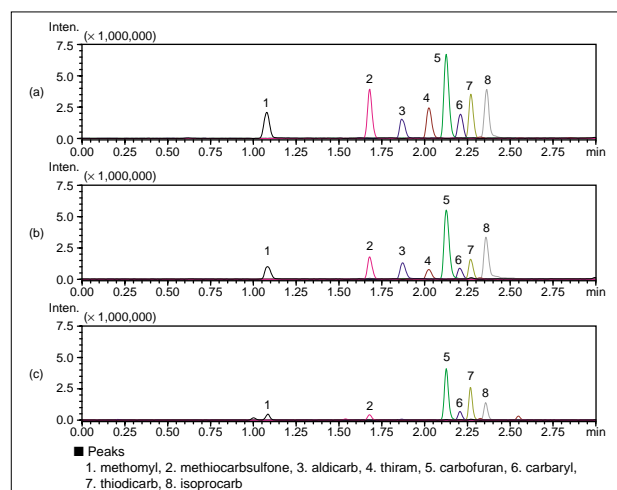


Fig.1 Mass Chromatograms of Pesticides (a) ESI, (b) DUIS, (c) APCI

Table 1 Analytical Conditions for LC-MS

Column	: Shim-pack XR-ODS (30 mmL. × 2.0 mmI.D., 2.2 μm)
Mobile phase	: A - water : B - methanol
Time program	: B Conc. 10 % (0 min)→95 % (2.5 min) →10 % (2.51 min)→STOP (4 min)
Flow rate	: 0.5 mL/min
Column temperature	: 40 °C
Injection volume	: 1 μL
Probe voltage	: +4.5 kV
Nebulizing gas flow	: 1.5 L/min (ESI), 1.5 L/min (DUIS), 2.5 L/min (APCI)
Drying gas pressure	: 0.15 MPa (ESI), 0.15 MPa (DUIS)
Probe temperature	: 400 °C (APCI)
CDL temperature	: 250 °C (ESI), 300 °C (DUIS), 250 °C (APCI)
Block heater temperature	: 200 °C (ESI), 480 °C (DUIS), 200 °C (APCI)
CDL, Q-array voltages	: using default values
Scan range	: m/z 100-400 (0.2 sec)

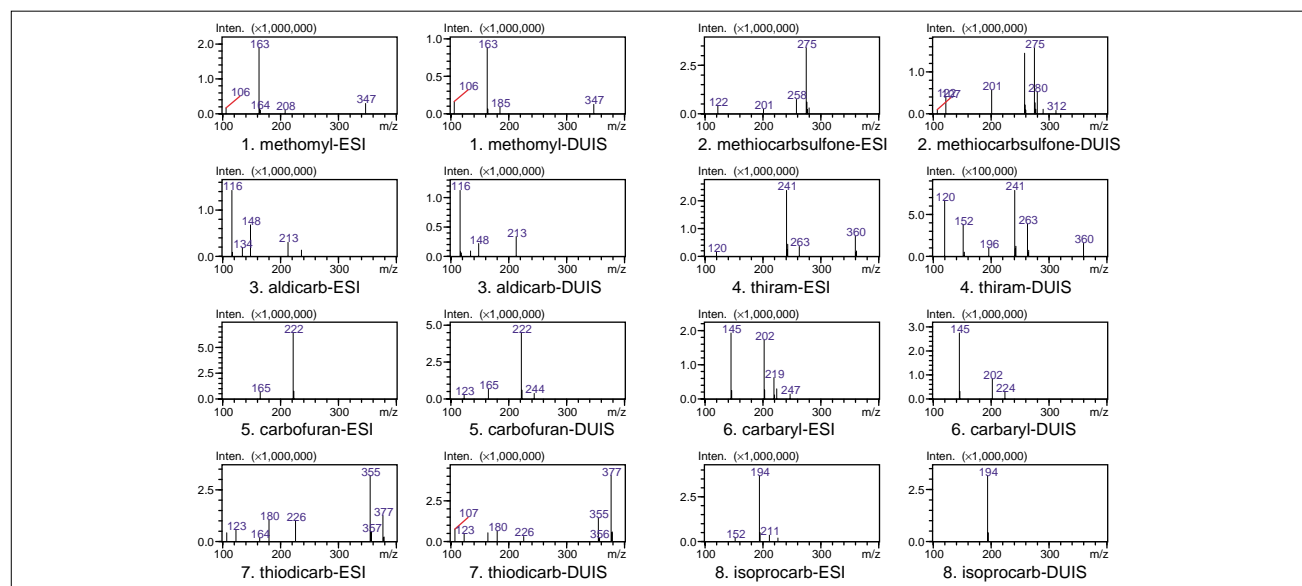


Fig.2 Comparison of Mass Spectra (ESI, DUIS)

■ Analysis of Low-Polarity Compounds

Measurement of a sample containing 7 alkylphenone compounds (500 ng each) was conducted using APCI, DUIS and ESI. As shown in Fig.3, conversely to the data associated with pesticides, the APCI method is more suitable than ESI. Using DUIS, the intensity was about 70 % to 80 % of that using APCI. When comparing the DUIS and APCI mass spectra, about the same result was obtained, as shown in Fig.4.

Table 2 Analytical Conditions for LC-MS

Column	: Shim-pack VP-ODS (150 mmL. × 2.0 mmI.D., 5 μm)
Mobile phase	: A - water : B - methanol
Time program	: B Conc. 30 % (0 min)→65 % (1 min)→95 % (8 min) →95 % (9 min)→30 % (9.01 min)→STOP (18 min)
Flow rate	: 0.2 mL/min
Column temperature	: 40 °C
Injection volume	: 1 μL
Probe voltage	: +4.5 kV
Nebulizing gas flow	: 2.5 L/min (APCI), 0.5 L/min (DUIS), 1.5 L/min (ESI)
Drying gas pressure	: 0.05 MPa (APCI), 0.1 MPa (DUIS), 0.1 MPa (ESI)
Probe temperature	: 400 °C (APCI)
CDL temperature	: 250 °C (APCI), 300 °C (DUIS), 250 °C (ESI)
Block heater temperature	: 200 °C (APCI), 450 °C (DUIS), 200 °C (ESI)
CDL, Q-array voltages	: using default values
Scan range	: m/z 110-250 (0.5 sec)

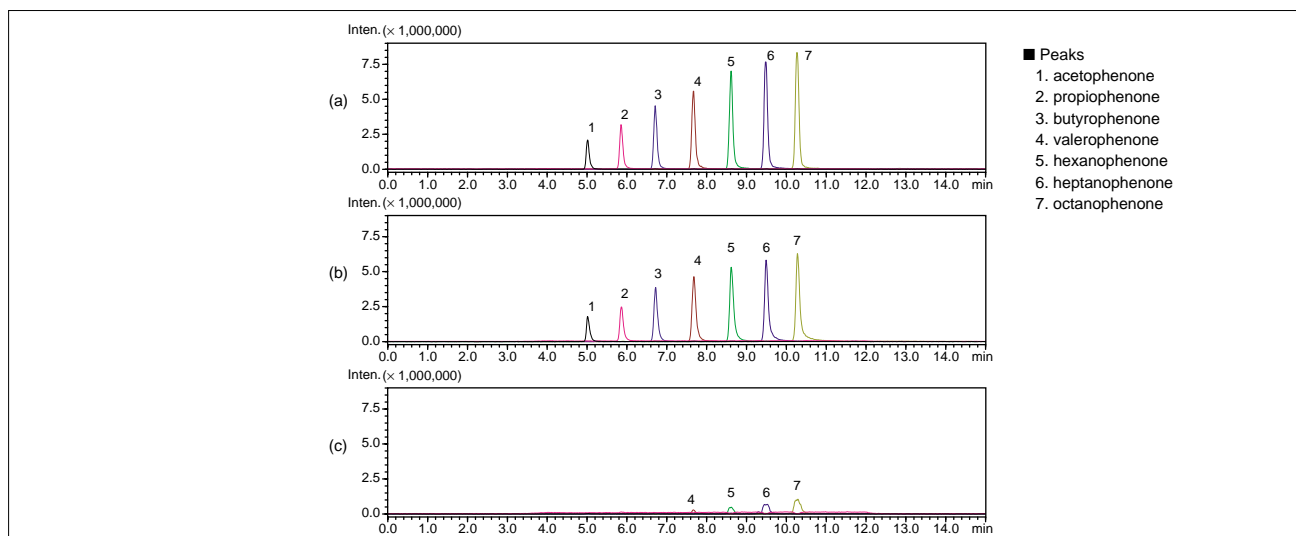


Fig.3 Mass Chromatograms of Alkylphenones (a) APCI, (b) DUIS, (c) ESI

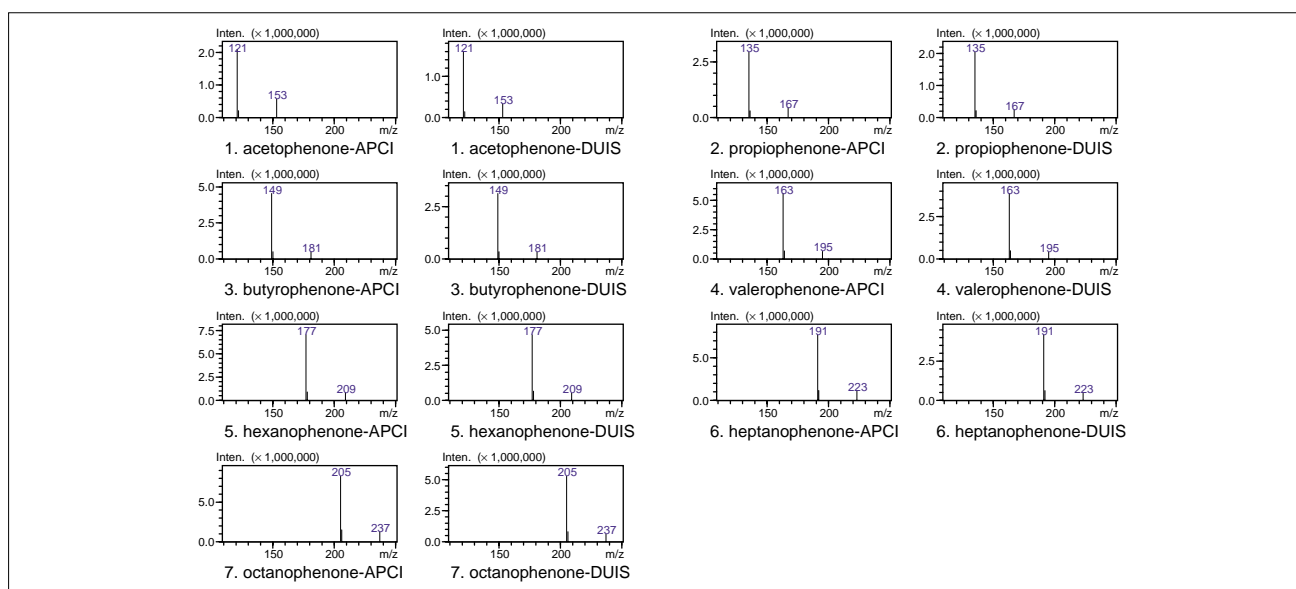


Fig.4 Comparison of Mass Spectra (APCI, DUIS)

NOTES:

*This Application News has been produced and edited using information that was available when the data was acquired for each article. This Application News is subject to revision without prior notice.



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