

## Analysis of Pesticide Residues in Foods Using GC/MS

In Japan, various pesticides are produced and used, and they are strictly regulated by law. For example, the Drinking Water Test Method regulates 19 substances (4 substances were recently added). Pesticides residues in food products are regulated by the Food Sanitation Law. In the official gazette issued on August 14, 1995, 108 pesticides were regulated. Subsequently, 30 pesticides were added on September 2, 1996, 23 pesticides on September 1, 1997, 18 substances on October 12, 1998, and 20 pesticides on November 22, 1999. In 1999, 199

pesticides were regulated.

Below, regulated pesticides which can be analyzed by GC/MS or GC were analyzed using GC/MS. Table 1 shows the analytical conditions and Table 2 shows the list of 47 target pesticides. Fig. 1 shows the TIC for the 47 pesticides and Fig. 2 through 5 show the SIM chromatograms. Concentrations were 1 ppm for all pesticides.

Table 1 Analytical conditions

|                  |                                                          |
|------------------|----------------------------------------------------------|
| -GC-             |                                                          |
| Column           | : DB-1 30m × 0.25mm I.D. df=0.25µm                       |
| Column Temp.     | : 50°C(1min)- 20°C/min - 120°C - 5°C/min - 300°C(1.5min) |
| Injector. Temp.  | : 300°C                                                  |
| Interface. Temp. | : 300°C                                                  |
| Carrier Gas      | : He 250kPa(1min)-100kPa(2min)- 3kPa/min - 220kPa        |
|                  | : Splitless (2min)                                       |
| -MS-             |                                                          |
| Scan Range       | : m/z 35 → 550                                           |
| SIM              | : 0.2sec                                                 |

Table 2 List of pesticides

| Peak NO. | Compound           | SIM    |        |        | Peak NO. | Compound        | SIM    |        |
|----------|--------------------|--------|--------|--------|----------|-----------------|--------|--------|
| 1        | DCIP               | 121.05 | 77.05  | 123.05 | 28       | Lenacil         | 153.15 | 234.20 |
| 2        | EPTC               | 128.20 | 189.10 |        | 29       | Thenylchlor     | 288.25 | 127.15 |
| 3        | Butylate           | 156.20 | 217.10 |        | 30       | Acetamiprid     | 152.15 | 221.00 |
| 4        | Cadusafos          | 159.00 | 270.25 |        | 31       | Tebuconazole    | 250.15 | 125.10 |
| 5        | Trifluralin        | 306.10 | 264.05 |        | 32       | Pyributicarb    | 181.15 | 165.15 |
| 6        | Thiometon          | 125.05 | 88.10  | 246.20 | 33       | Bifenthrin      | 181.20 | 166.20 |
| 7        | Nitenpyram         | 236.05 | 169.05 |        | 34       | Tebufenpyrad    | 333.30 | 318.25 |
| 8        | Tefluthrin         | 197.10 | 177.10 |        | 35       | Furametpyr      | 298.30 | 157.10 |
| 9        | Dimethenamid       | 230.10 | 154.15 |        | 36       | Pyriproxyfen    | 136.20 | 226.20 |
| 10       | Tolclofos-methyl   | 265.05 | 267.05 |        | 37       | Cyhalofop-butyl | 357.30 | 256.20 |
| 11       | Alachlor           | 188.15 | 160.20 |        | 38       | Fenarimol       | 330.10 | 139.10 |
| 12       | Dimethylvinphos(E) | 295.05 | 297.05 |        | 39       | Pyraclofos      | 360.05 | 194.10 |
| 13       | Pirimiphos-methyl  | 305.20 | 290.20 |        | 40       | Acrinathrin     | 181.15 | 289.10 |
| 14       | Dimethylvinphos(Z) | 295.05 | 297.05 |        | 41       | Pyridaben       | 147.20 | 364.10 |
| 15       | Metolachlor        | 238.15 | 162.20 |        | 42       | Cafenstrole     | 100.15 | 188.20 |
| 16       | Fosthiazate        | 195.15 | 283.00 |        | 43       | Cyfluthrin      | 163.15 | 226.00 |
| 17       | Fosthiazate        | 195.15 | 283.00 |        | 44       | Cyfluthrin      | 163.15 | 226.00 |
| 18       | Isofenphos         | 213.15 | 255.10 |        | 45       | Cyfluthrin      | 163.15 | 266.00 |
| 19       | Paclobutrazol      | 236.15 | 125.10 |        | 46       | Cyfluthrin      | 163.15 | 266.00 |
| 20       | Tricyclazole       | 189.10 | 162.10 |        | 47       | Halfenprox      | 265.10 | 183.10 |
| 21       | Fludioxonil        | 248.15 | 182.05 |        | 48       | Pyrimidifen     | 184.15 | 377.00 |
| 22       | Butamifos          | 286.20 | 200.15 |        | 49       | Fenvalerate     | 125.10 | 418.95 |
| 23       | Myclobutanil       | 179.10 | 288.15 |        | 50       | Fenvalerate     | 125.10 | 418.95 |
| 24       | Difenoquat         | 234.20 | 189.10 |        | 51       | Difenoconazole  | 323.15 | 265.10 |
| 25       | Flusilazole        | 233.15 | 315.15 |        | 52       | Difenoconazole  | 323.15 | 265.10 |
| 26       | Cyproconazole      | 222.10 | 139.10 |        | 53       | Imibenconazole  | 375.20 | 125.05 |
| 27       | Chlorfenapyr       | 59.10  | 247.00 |        |          |                 |        |        |

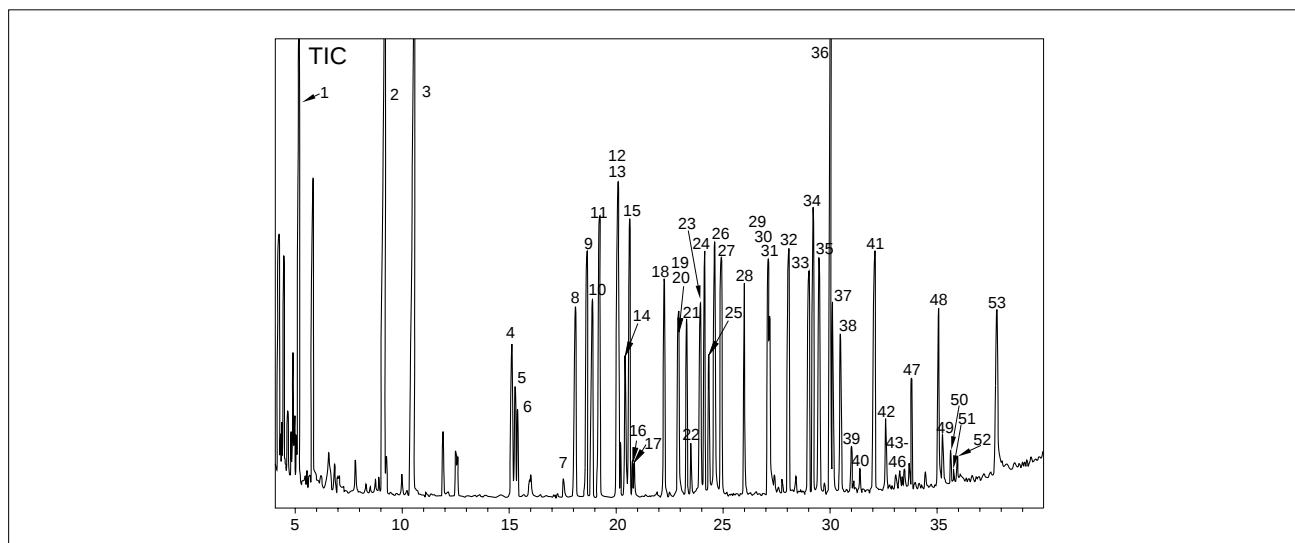


Fig. 1 TIC of pesticides

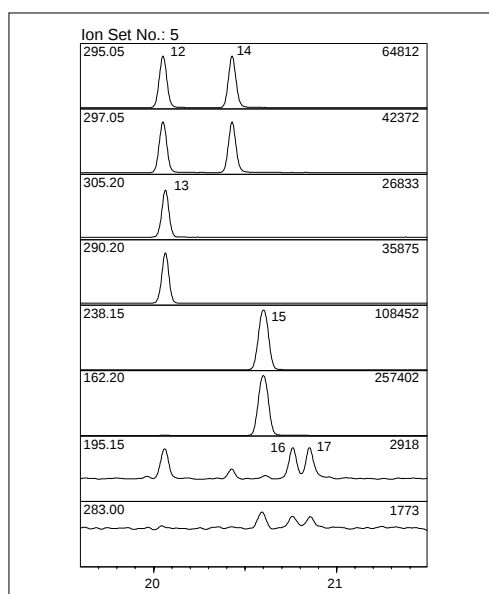


Fig. 2 SIM Chromatograms of Pesticides (Ion Set: 5)

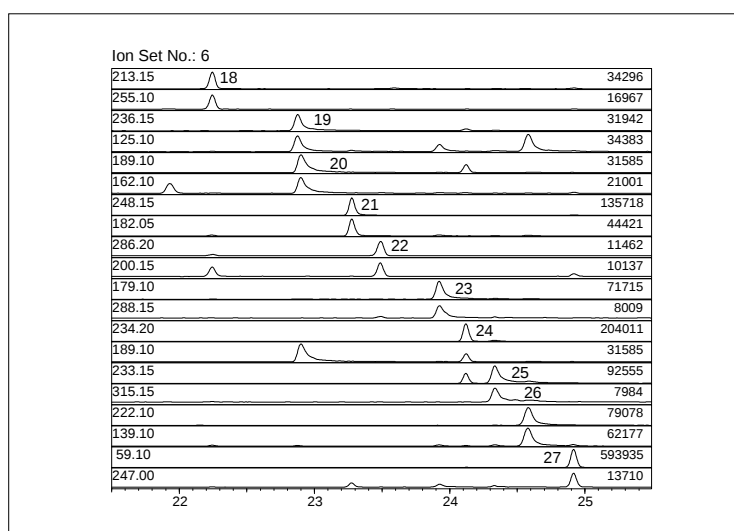


Fig. 3 SIM Chromatograms of Pesticides (Ion Set: 6)

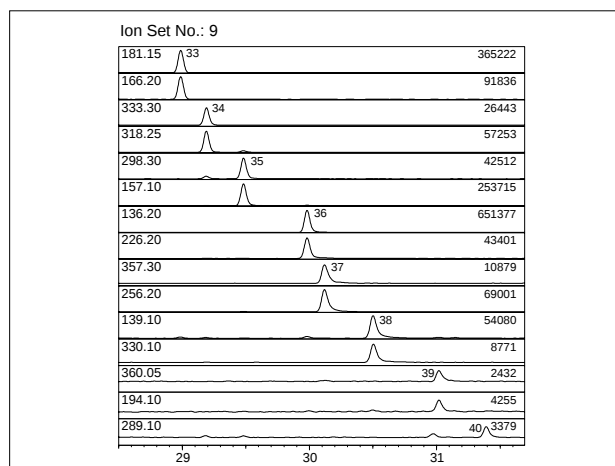


Fig. 4 SIM Chromatograms of Pesticides (Ion Set: 9)

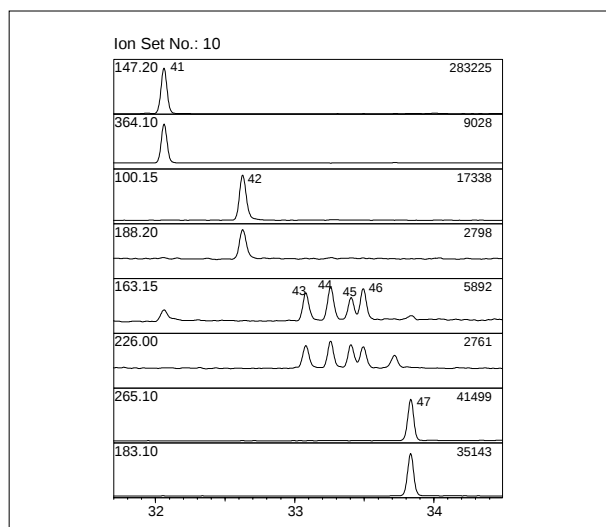


Fig. 5 SIM Chromatograms of Pesticides (Ion Set: 10)



SHIMADZU CORPORATION. International Marketing Division

3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5641 Fax: 81(3)3219-5710

Cable Add.: SHIMADZU TOKYO

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