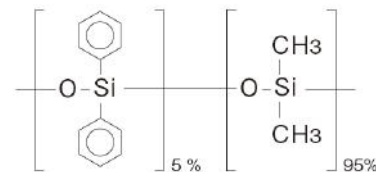


# Analytical and Retention Index for Pesticide Residues in Foods - Using InertCap5 MS/NP

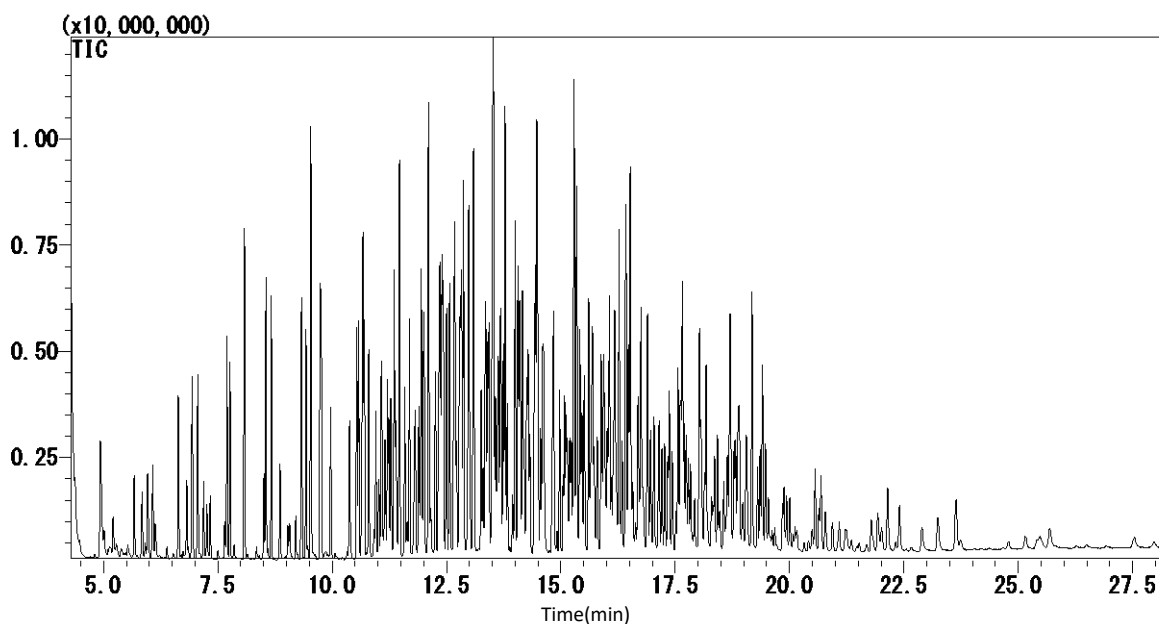
A GC-capillary column InertCap 5 MS and NP to determine the retention time and retention index of pesticide residues in foods.

InertCap 5 MS and NPs are micropolar columns chemically bonded to 5% phenyl-95% methyl polysiloxane. The reagents used were PL2005 agrochemicals GC/MS Mix I, II, III, IV, V, VI, and VII of Hayashi Pure Chemical Ind., Ltd., and the Model GCMS-QP2010 Plus of SHIMADZU CORPORATION was used for the measurement. The first and second pages show the TICC (Total Ion Current Chromatogram) of PL2005 pesticide GC/MS Mix I-VII blended components, and the third and ninth pages show the TICC, retention time, and retention index of each group of PL2005 pesticide GC/MS Mix I-VII.



Structural formula of InertCap 5 MS/NP liquid phase.

Equivalent: HP-5ms, Rtx-5MS, Rxi-5MS, Equity-5, SPB-5



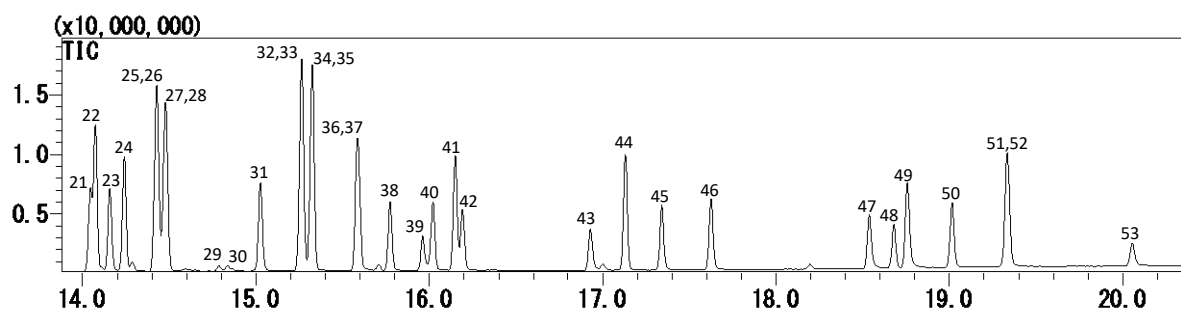
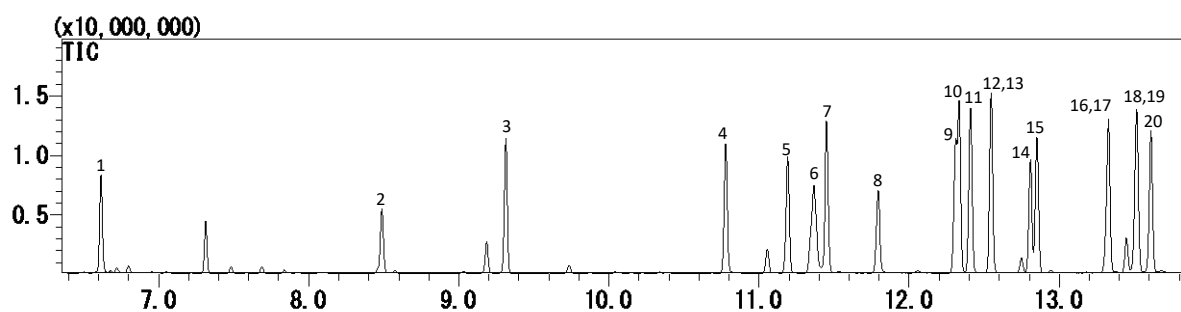
### Conditions

|                 |  |
|-----------------|--|
| System          | : GC - MS  |
| Column          | : InertCap 5MS/NP<br>0.25 mm I.D. x 30 m, df = 0.25 $\mu$ m<br>(Cat. No. 1010-18642) |
| Col. Temp.      | : 50 °C (1 min hold) - 25 °C/min - 125 °C - 10 °C/min - 280 °C                       |
| Carrier Gas     | : He 40 cm/sec (constant linear velocity)  |
| Injection       | : Splitless 1 min<br>250 °C  |
| Liner           | : Splitless liners<br>(Cat. No. 3001-16329,5 bottles)                                |
| Interface Temp. | : 280 °C   |
| Detection       | : MS Scan ( $m/z$ : 45 - 450)  |
| Ion source      | : 230 °C   |
| Inj. Vol.       | : 1 $\mu$ L  |
| Sample          | : PL2005 pesticide GC/MS Mix I - VII 2 ppm   |

\* Group names of the reagents containing each compound PL2005 the X part of the pesticide GC/ MS Mix X

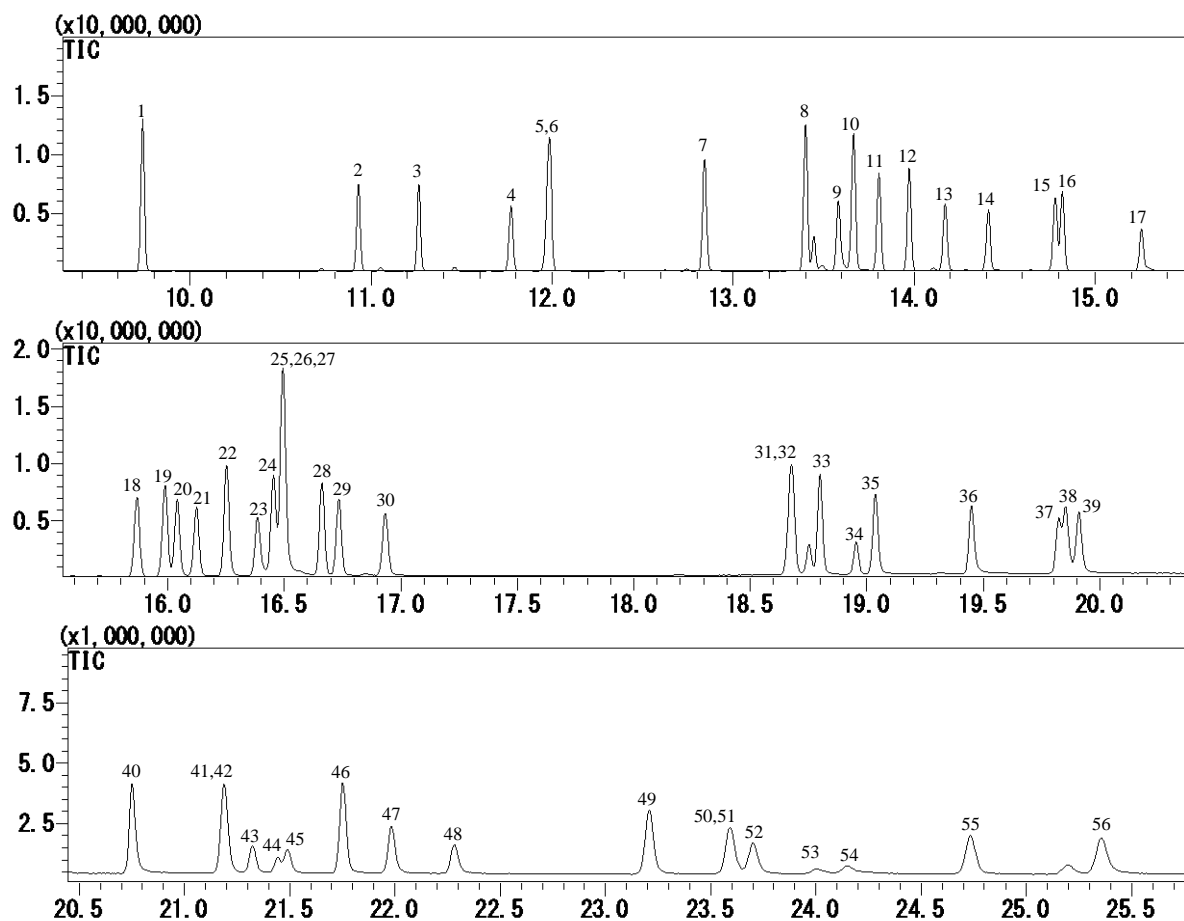
| Compound name                     | Retention index | *    | Compound name                               | Retention index | *   | Compound name                             | Retention index | *   | Compound name                           | Retention index | *     |
|-----------------------------------|-----------------|------|---|-----------------|-----|---|-----------------|-----|---|-----------------|-------|
| DCIP                              | 1057            | IV   | Diclofenthion                               | 1888            | I   | Disulfotone sulfone                       | 2146            | VII | Acetamidiprid                           | 2475            | VII   |
| Clofentidine digest               | 1181            | V    | Metribuzin                                  | 1890            | V   | Butachlor                                 | 2156            | IV  | Bromconazole-1                          | 2480            | V     |
| Tachigaren                        | 1193            | VI   | Oxospoconazole formyl decomposition product | 1892            | VI  | Endosulfan                                | 2157            | II  | Fenoxycarb                              | 2482            | IV    |
| Naphthalene-d8                    | 1198            | I.S. | Dimethenamide (Dimethenamide P)             | 1893            | IV  | Dithalimphos                              | 2161            | VI  | Phosmet                                 | 2484            | III   |
| Dichlorvos                        | 1251            | I    | Bromobutide                                 | 1896            | II  | Imazametabenzmethyl                       | 2163            | VII | Tetramethrin-2                          | 2489            | V     |
| Neristoxin                        | 1283            | VI   | Acetochlor                                  | 1903            | IV  | Flutriahole                               | 2164            | VII | Bromopropylate                          | 2490            | II    |
| Allyldoctor                       | 1295            | IV   | Terbucarb                                   | 1904            | VI  | TCMTB                                     | 2166            | VII | EPN                                     | 2491            | I     |
| Dichlobenil                       | 1357            | III  | Vinclozolin                                 | 1906            | III | Fenamiphos                                | 2167            | I   | Bifenthrin                              | 2491            | II    |
| EPTC                              | 1364            | VI   | Spiroxamine-1                               | 1906            | VII | Chlorfensone                              | 2170            | II  | Chrysene-d12                            | 2492            | I.S.  |
| Diphenyl                          | 1394            | V    | Parathion methyl                            | 1906            | I   | Butamifos                                 | 2173            | I   | Bifenazate                              | 2493            | V     |
| Mevinphos                         | 1433            | I    | Chlorpyrifos-methyl                         | 1907            | I   | Napropamide                               | 2176            | IV  | Picolinaphene                           | 2493            | VII   |
| Butyrate                          | 1438            | VI   | Simetryn                                    | 1911            | V   | Flutolanil                                | 2176            | II  | Piperophos                              | 2501            | I     |
| Chlormefos                        | 1449            | VI   | Cimeconazole                                | 1914            | II  | Hexaconazole                              | 2180            | V   | Methoxychlor                            | 2504            | VII   |
| Etridiazole                       | 1466            | III  | Tolclofomethyl                              | 1917            | I   | Isoprothiolane                            | 2185            | II  | Fenpropathrin                           | 2506            | II    |
| Acenaphthene-d10                  | 1499            | I.S. | Ametryn                                     | 1921            | V   | Prothiohost                               | 2188            | I   | Etoaxole                                | 2512            | IV    |
| Clothianidin                      | 1501            | VI   | Alachlor                                    | 1923            | II  | (E)-metminostrobin.                       | 2189            | IV  | Tebufenpyrad                            | 2515            | IV    |
| Thiocyclam                        | 1509            | V    | Prometryn                                   | 1928            | IV  | Fludioxonil                               | 2189            | V   | Phenamidon                              | 2518            | VII   |
| Methacryfos                       | 1510            | I    | Metalaxil (Mephenoxam)                      | 1932            | IV  | Profenofos                                | 2192            | I   | Bifenox                                 | 2527            | II    |
| Chloroneb                         | 1519            | VII  | Cinmethylin                                 | 1932            | VI  | Tricyclazole                              | 2195            | VII | Indanofan                               | 2528            | VI    |
| Crimidine                         | 1528            | VI   | Phenchlorfos                                | 1937            | II  | Pretilachlor                              | 2199            | IV  | Anilophos                               | 2534            | I     |
| Orthophenylphenol                 | 1528            | VI   | 2-(1-naphthyl)acetamide                     | 1949            | VII | Tribufos                                  | 2199            | II  | Bromconazole-2                          | 2537            | V     |
| Isoprocarb                        | 1547            | VII  | Dithiopyr                                   | 1954            | II  | Uniconazole (Uniconazole P)               | 2200            | III | Clomeprop                               | 2537            | II    |
| Molinate                          | 1548            | II   | Terbutryn                                   | 1955            | IV  | Oxadiazon                                 | 2207            | III | Phenothrin-1                            | 2541            | VI    |
| XMC                               | 1568            | VII  | Spiroxamine-2                               | 1961            | VII | Myclobutanil                              | 2215            | II  | Etoaxole metabolite                     | 2541            | IV    |
| OMETHATE                          | 1600            | III  | Fenitrothion                                | 1961            | I   | Carboxin                                  | 2216            | VII | Iprodione metabolite                    | 2550            | V     |
| Xylyl carb                        | 1606            | VI   | Bromacil                                    | 1963            | V   | Imibenconazole debenzyl                   | 2216            | VII | Tetradifon                              | 2553            | III   |
| Tecnazene                         | 1620            | III  | Pirimiphos-methyl                           | 1964            | I   | Oxyfluorfen                               | 2217            | III | Phenothrin-2                            | 2553            | VI    |
| Propoxur                          | 1620            | VII  | Etofosate                                   | 1966            | VII | Frampropmethyl                            | 2217            | VII | Furametpyr                              | 2553            | V     |
| Propanol                          | 1624            | IV   | Esprocarb                                   | 1971            | IV  | Flusilazole                               | 2222            | IV  | Pentoxazone                             | 2569            | V     |
| Demeton-S-methyl (methyldemeton)  | 1630            | III  | (E)-Dimethylvinphos                         | 1973            | I   | Buprofezin                                | 2223            | II  | Phosalone                               | 2575            | I     |
| Diphenylamine                     | 1633            | IV   | Quinoclamine                                | 1975            | II  | Bupirimate                                | 2226            | III | Azinphosmethyl                          | 2576            | I     |
| Chlorethoxyfos                    | 1635            | VII  | Dichlofluanid                               | 1980            | V   | Kresoxim                                  | 2227            | II  | Pyriproxyfen                            | 2582            | V     |
| Ethoprophos                       | 1644            | I    | Malathion                                   | 1981            | I   | Azaconazole                               | 2228            | II  | Leptophos                               | 2583            | VI    |
| Fenmedifam decomposition product  | 1645            | VI   | Thiobencarb                                 | 1984            | III | Diclobutrazole                            | 2228            | II  | Cyhalofop                               | 2591            | II    |
| Chlorpropham                      | 1658            | II   | Diethofencarb                               | 1988            | IV  | Thifluzamide                              | 2228            | III | Cyhalothrin-1                           | 2592            | III   |
| Diclofluanide metabolite          | 1665            | V    | Metolachlor (S-metolachlor)                 | 1998            | IV  | (Z)-metminostrobin                        | 2234            | VII | Mefenacet                               | 2600            | V     |
| Etafurarin                        | 1669            | III  | Cyanazine                                   | 1999            | II  | Isoxathione                               | 2241            | III | Amitraz                                 | 2606            | VI    |
| Naled                             | 1670            | III  | Fenthion                                    | 2000            | I   | Ciflufenamide                             | 2247            | II  | Furametopyr metabolite                  | 2610            | V     |
| Flucirazole metabolite            | 1671            | IV   | (Z)-dimethylvinphos                         | 2001            | I   | Nitrofen                                  | 2248            | V   | Cyhalothrin-2                           | 2617            | III   |
| Dicrotophos                       | 1677            | III  | Fenpropimorph                               | 2004            | VI  | Cyproconazole                             | 2251            | IV  | Acrinathrin                             | 2638            | II    |
| 2,6-Dichlorobenzamide             | 1678            | VI   | Carbetamide                                 | 2005            | VI  | 1,1-Dichloro-2,2-bis(4-ethylphenyl)ethane | 2255            | VII | Fenarimol                               | 2642            | II    |
| Dioxabenzophos (salithione)       | 1682            | I    | Chlorpyrifos                                | 2006            | I   | Chlorphenapil                             | 2255            | II  | Pyrazofos                               | 2649            | II    |
| Trifluralin                       | 1685            | III  | Parathion                                   | 2007            | I   | Fenoxanil                                 | 2260            | IV  | Azimphoethyl                            | 2658            | VI    |
| Monocrotophos                     | 1686            | III  | Triadimefon                                 | 2012            | III | Chlorthiophos-2                           | 2263            | VI  | Pyraclorophos                           | 2666            | I     |
| Venfluralin                       | 1689            | II   | Chlorthal-dimethyl                          | 2017            | III | Flufenpyrethylethyl                       | 2271            | VII | Dialyphos                               | 2672            | VI    |
| Sulfotepp                         | 1696            | VI   | Isophenphosoxone                            | 2017            | VII | Chlorbenzylate                            | 2271            | IV  | Phenoxaprop ethyl (phenoxaprop P ethyl) | 2677            | V     |
| Cassafos                          | 1699            | I    | Isocarbophos                                | 2018            | III | Chloropropylate                           | 2272            | V   | Oryzalin                                | 2698            | VII   |
| Diarate-1                         | 1706            | VII  | Nitrotar isopropyl                          | 2020            | III | Fensulfotlion                             | 2278            | I   | Bitertanol-1                            | 2707            | V     |
| Phorate                           | 1707            | I    | Tetraconazole                               | 2020            | IV  | Endosulfan                                | 2279            | II  | Permethrin-1                            | 2716            | III   |
| α-BHC                             | 1718            | V    | Fthalide                                    | 2039            | II  | Chlorthiophos-3                           | 2281            | VI  | Bitertanol-2                            | 2720            | V     |
| Desmedipham decomposition product | 1721            | IV   | Phosphatase-1                               | 2039            | I   | Diniconazole                              | 2287            | VI  | Spirodiclofen                           | 2723            | VI    |
| Diarate-2                         | 1723            | VII  | Thiamethoxam decomposition product          | 2040            | VI  | (Z)-pyriminobackmethyl                    | 2288            | III | Oxospoconazole                          | 2723            | VI    |
| Thiometon                         | 1727            | III  | Diphenamid                                  | 2042            | IV  | Oxadixyl                                  | 2299            | V   | Permethrin-2                            | 2732            | III   |
| Dicloran                          | 1738            | II   | Bromophos                                   | 2043            | II  | Ethion                                    | 2301            | I   | Pyridaben                               | 2736            | III   |
| Dimethoate                        | 1739            | I    | Phosphatase-2                               | 2044            | I   | Chlorthiophos-1                           | 2308            | VI  | Fluquinconazole                         | 2746            | II    |
| Simazine                          | 1748            | IV   | Cyprodinil                                  | 2057            | IV  | Mepronil                                  | 2316            | IV  | Dioxathion                              | 2760            | VI    |
| Carbofuran                        | 1751            | VII  | (E)-Chlorphenvinphos                        | 2064            | I   | Fluacriplim                               | 2323            | III | Butafenacil                             | 2764            | IV    |
| Furirazole                        | 1752            | VII  | Dimethamethrin                              | 2068            | IV  | Triazophos                                | 2326            | I   | Ethobenzanide                           | 2779            | IV    |
| Chlorbufam                        | 1753            | VII  | Ethychlozate                                | 2071            | VI  | Sulprofos                                 | 2328            | III | Caffenstrol                             | 2793            | II    |
| Swep                              | 1756            | V    | Pendimethalin                               | 2072            | III | Isxadiphenethyl                           | 2336            | VII | Cyfluthrin-1                            | 2795            | II    |
| Dimetipine                        | 1756            | II   | Penconazole                                 | 2074            | III | Azamehifos                                | 2337            | VI  | Fenbuconazole                           | 2798            | V     |
| Atrazine                          | 1758            | II   | Clozolate                                   | 2080            | VII | Chlornitrophenone                         | 2345            | V   | Cyfluthrin-2                            | 2807            | II    |
| Chromazone                        | 1767            | VII  | Zoxamide decomposition product              | 2080            | VII | Carbophenothion                           | 2350            | III | Cyfluthrin-3                            | 2818            | II    |
| Propazine                         | 1767            | VII  | (Z)-pyriphenox                              | 2080            | III | Carfentrasono ethyl                       | 2351            | IV  | Cyfluthrin-4                            | 2822            | II    |
| β-BHC                             | 1767            | V    | Thiabendazole                               | 2081            | VII | Benaraxyl                                 | 2356            | IV  | Cypermethrin-1                          | 2837            | III   |
| Trifluranide metabolite           | 1772            | V    | Allethrin-1                                 | 2081            | III | Cyanofenphos                              | 2358            | III | Halfenprox                              | 2847            | II    |
| Dioxathion decomposition product  | 1781            | VI   | Allethrin-2                                 | 2083            | III | Edifenphos                                | 2360            | I   | Cypermethrin-2                          | 2850            | III   |
| γ-BHC (lindane)                   | 1782            | V    | Tolyfluranide                               | 2084            | V   | Quinoxiphenone                            | 2362            | III | Xalofop Ethyl (Kizalofop P Ethyl)       | 2860            | VI    |
| Cyanophos                         | 1788            | II   | Allethrin-3 (vioallethrin)                  | 2088            | III | Norflurazon                               | 2362            | VII | Cypermethrin-3                          | 2862            | III   |
| Terbufos                          | 1791            | I    | (Z)-chlorfenvinphos                         | 2089            | I   | Propiconazole-1                           | 2364            | IV  | Cypermethrin-4                          | 2866            | III   |
| Quintozene                        | 1792            | III  | Fipronil                                    | 2089            | II  | Lenacil                                   | 2365            | VI  | Flucitrinate-1                          | 2868            | II    |
| Propyzamide                       | 1794            | III  | Allethrin-4 (vioallethrin)                  | 2090            | III | Trifloxystrobin                           | 2367            | III | Etofenprox                              | 2880            | IV    |
| Pyrochlorone                      | 1796            | V    | Isofenphos                                  | 2090            | I   | Endosulfan sulfate                        | 2373            | VII | Benzo(a)pyrene -d12                     | 2892            | I.S.  |
| Fonofos                           | 1798            | I    | Mecarbam                                    | 2090            | III | Chloridazon                               | 2373            | V   | Flucitrinate-2                          | 2896            | II    |
| Pyrimethanil                      | 1805            | VI   | Captan                                      | 2091            | V   | Pyraflufen ethyl                          | 2377            | VI  | Silafluofen                             | 2903            | V     |
| Anthracene-d10                    | 1809            | I.S. | Diclocimet-1                                | 2094            | V   | Propiconazole-2                           | 2379            | IV  | Fluridone                               | 2924            | VII   |
| Diazinon                          | 1811            | I    | Quinalphos                                  | 2096            | I   | (E)-pyriminobackmethyl                    | 2383            | III | Pyrimidiphene                           | 2941            | III   |
| Phosphamide-1                     | 1813            | I    | Fentoate                                    | 2097            | I   | Hexazinone                                | 2394            | VII | Flumioxazine                            | 2967            | IV    |
| Prohydrojasmon-1                  | 1821            | VI   | Triadimenol-1                               | 2097            | III | Tebuconazole                              | 2406            | IV  | Fenvalerate-1                           | 2968            | II    |
| Disulfoton                        | 1823            | III  | Dimepiperate                                | 2097            | IV  | Diclofop-methyl                           | 2408            | VII | Pilacrostrobin                          | 2973            | VI    |
| Terbacil                          | 1824            | IV   | Methoprene                                  | 2104            | V   | Tenyl chloride                            | 2408            | IV  | Fluvalinate-1                           | 2998            | II    |
| δ-BHC                             | 1825            | V    | Folpet                                      | 2105            | V   | Diflufenican                              | 2411            | III | Fenvalerate-2 (esfenvalerate)           | 2998            | II,VI |
| Tefluthrin                        | 1832            | III  | Ferrimzone                                  | 2107            | VI  | Propargitt 1                              | 2412            | V   | Fluvalinate-2                           | 3005            | II    |
| Thioethyl MCPA                    | 1835            | V    | Procyimidone                                | 2109            | III | Resmethrin-1                              | 2414            | VII | Diphenconazole-1                        | 3024            | II    |
| Chlorothalonil                    | 1837            | V    | Triadimenol-2                               | 2111            | III | Propargit 2                               | 2414            | V   | Diphenconazole-2                        | 3034            | II    |
| Isazophos                         | 1837            | I    | Chlorbenside                                | 2115            | VII | Piperonyl butoxide                        | 2421            | V   | Pyrazoxyphene                           | 3045            | V     |
| Tri-allate                        | 1840            | II   | Pronafos                                    | 2124            | I   | Cantafol                                  | 2424            | V   | Indoxacarb                              | 3063            | IV    |

## PL2005 pesticide GC/ MS Mix I



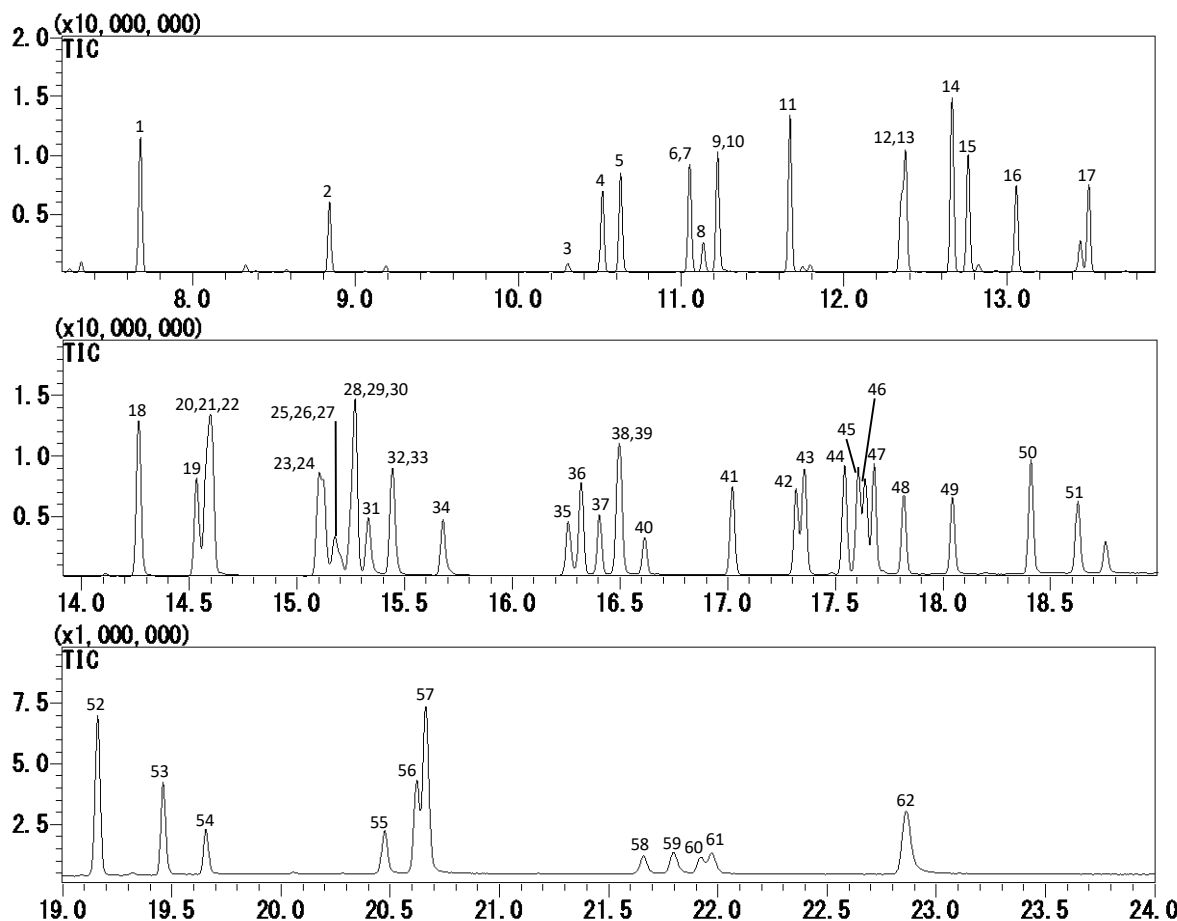
| Peak No. | Compound                    | Retention time (min) | Retention index | Peak No. | Compound             | Retention time (min) | Retention index |
|----------|-----------------------------|----------------------|-----------------|----------|----------------------|----------------------|-----------------|
| 1        | Dichlorvos                  | 6.634                | 1251            | 28       | Parathion            | 14.507               | 2007            |
| 2        | Mevinphos                   | 8.505                | 1433            | 29       | Phosphatase-1        | 14.806               | 2039            |
| 3        | Methacryfos                 | 9.331                | 1510            | 30       | Phosphatase-2        | 14.855               | 2044            |
| 4        | Ethoprophos                 | 10.796               | 1644            | 31       | (E)-Chlorphenvinphos | 15.043               | 2064            |
| 5        | Dioxabenzophos (salithione) | 11.209               | 1682            | 32       | (Z)-chlorfenvinphos  | 15.274               | 2089            |
| 6        | Cassafos                    | 11.386               | 1699            | 33       | Isofenphos           | 15.287               | 2090            |
| 7        | Phorate                     | 11.468               | 1707            | 34       | Quinalphos           | 15.341               | 2096            |
| 8        | Dimethoate                  | 11.812               | 1739            | 35       | Fentoate             | 15.347               | 2097            |
| 9        | Cyanophos                   | 12.328               | 1788            | 36       | Propafos             | 15.599               | 2124            |
| 10       | Terbufos                    | 12.352               | 1791            | 37       | Methidathion         | 15.612               | 2126            |
| 11       | Fonofos                     | 12.428               | 1798            | 38       | Tetrachlorvinphos    | 15.792               | 2146            |
| 12       | Diazinon                    | 12.563               | 1811            | 39       | Fenamiphos           | 15.980               | 2167            |
| 13       | Phosphamide-1               | 12.586               | 1813            | 40       | Butamifos            | 16.039               | 2173            |
| 14       | Isazophos                   | 12.825               | 1837            | 41       | Prothiohost          | 16.169               | 2188            |
| 15       | Etrimphos                   | 12.869               | 1841            | 42       | Profenofos           | 16.210               | 2192            |
| 16       | Phosphamide-2               | 13.328               | 1886            | 43       | Fensulfothion        | 16.951               | 2278            |
| 17       | Diclofenthion               | 13.347               | 1888            | 44       | Ethion               | 17.150               | 2301            |
| 18       | Parathion methyl            | 13.527               | 1906            | 45       | Triazophos           | 17.360               | 2326            |
| 19       | Chlorpyrifos-methyl         | 13.536               | 1907            | 46       | Edifenphos           | 17.645               | 2360            |
| 20       | Tolclofosmethyl             | 13.630               | 1917            | 47       | Pyridaphenthion      | 18.556               | 2473            |
| 21       | Fenitrothion                | 14.062               | 1961            | 48       | EPN                  | 18.701               | 2491            |
| 22       | Pirimiphos-methyl           | 14.092               | 1964            | 49       | Piperophos           | 18.779               | 2501            |
| 23       | (E)-Dimethylvinphos         | 14.176               | 1973            | 50       | Anilophos            | 19.035               | 2534            |
| 24       | Malathion                   | 14.259               | 1981            | 51       | Phosalone            | 19.350               | 2575            |
| 25       | Fenthion                    | 14.443               | 2000            | 52       | Azinphosmethyl       | 19.360               | 2576            |
| 26       | (Z)-dimethylvinphos         | 14.453               | 2001            | 53       | Pyraclphos           | 20.076               | 2666            |
| 27       | Chlorpyrifos                | 14.494               | 2006            |          |                      |                      |                 |

## PL2005 pesticide GC/MS Mix II



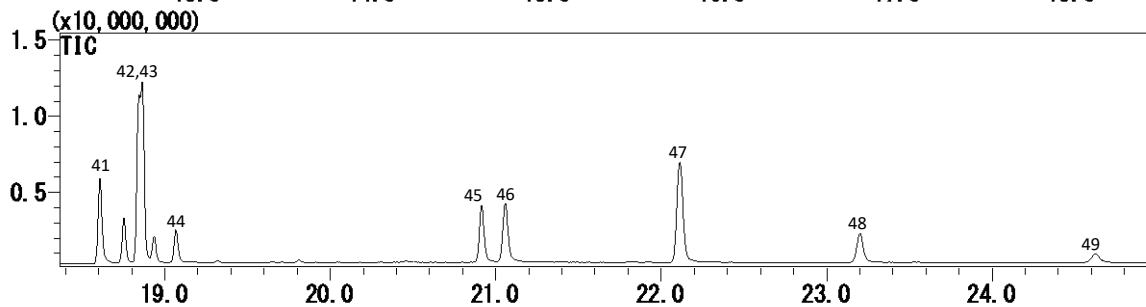
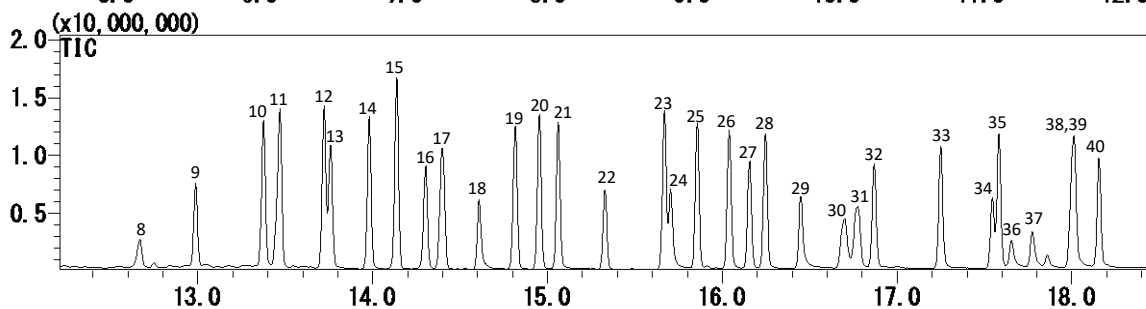
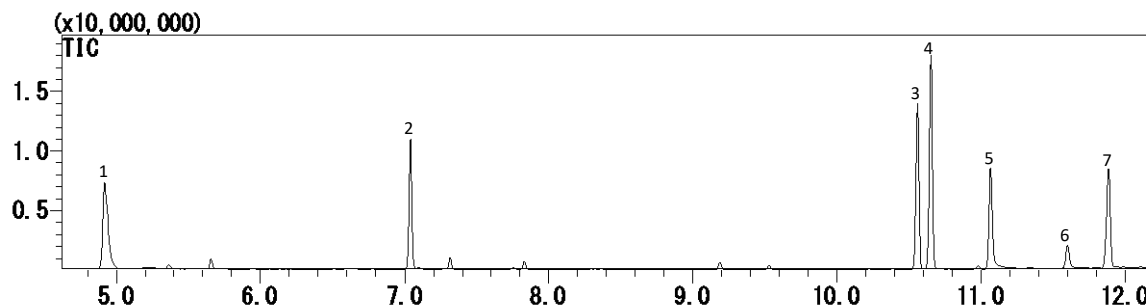
| Peak No. | Component      | Retention time (min) | Retention index | Peak No. | Component   | Retention time (min) | Retention index |
|----------|----------------|----------------------|-----------------|----------|---|----------------------|-----------------|
| 1        | Molinatate     | 9.756                | 1548            | 29       | Chlorphenapil                                       | 16.757               | 2255            |
| 2        | Chlorpropham   | 10.950               | 1658            | 30       | Endosulfan  | 16.959               | 2279            |
| 3        | Venfluralin    | 11.284               | 1689            | 31       | Bromopropylate                                      | 18.688               | 2490            |
| 4        | Dicloran       | 11.794               | 1738            | 32       | Bifenthrin  | 18.702               | 2491            |
| 5        | Dimetipine     | 11.993               | 1756            | 33       | Fenpropathrin                                       | 18.821               | 2506            |
| 6        | Atrazine       | 12.009               | 1758            | 34       | Bifenox   | 18.977               | 2527            |
| 7        | Tri-allate     | 12.862               | 1840            | 35       | Clomeprop   | 19.058               | 2537            |
| 8        | Bromobutide    | 13.423               | 1896            | 36       | Cyhalofop   | 19.469               | 2591            |
| 9        | Cimeconazole   | 13.603               | 1914            | 37       | Acrinathrin   | 19.846               | 2638            |
| 10       | Alachlor       | 13.689               | 1923            | 38       | Fenarimol   | 19.879               | 2642            |
| 11       | Phenclorfos    | 13.827               | 1937            | 39       | Pyrazofos   | 19.934               | 2649            |
| 12       | Dithiopyr      | 13.995               | 1954            | 40       | Fluquinconazole                                     | 20.778               | 2746            |
| 13       | Quinoclamine   | 14.194               | 1975            | 41       | Caffestrol  | 21.215               | 2793            |
| 14       | Cyanazine      | 14.434               | 1999            | 42       | Cyfluthrin-1  | 21.235               | 2795            |
| 15       | Fthalide       | 14.804               | 2039            | 43       | Cyfluthrin-2  | 21.351               | 2807            |
| 16       | Bromophos      | 14.842               | 2043            | 44       | Cyfluthrin-3  | 21.474               | 2818            |
| 17       | Fipronil       | 15.278               | 2089            | 45       | Cyfluthrin-4  | 21.520               | 2822            |
| 18       | Endosulfan     | 15.892               | 2157            | 46       | Halfenprox  | 21.785               | 2847            |
| 19       | Chlorfenson    | 16.012               | 2170            | 47       | Flucitriate-1                                       | 22.014               | 2868            |
| 20       | Flutolanil     | 16.063               | 2176            | 48       | Flucitriate-2                                       | 22.319               | 2896            |
| 21       | Isoprothiolane | 16.145               | 2185            | 49       | Fenvalerate-1                                       | 23.245               | 2968            |
| 22       | Tribufos       | 16.273               | 2199            | 50       | Fluvalinate-1                                       | 23.631               | 2998            |
| 23       | Myclobutanil   | 16.407               | 2215            | 51       | Fenvalerate-2 (esfenvalerate)                       | 23.636               | 2998            |
| 24       | Buprofezin     | 16.476               | 2223            | 52       | Fluvalinate-2                                       | 23.743               | 3005            |
| 25       | Kresoxim       | 16.514               | 2227            | 53       | Diphenconazole-1                                    | 24.046               | 3024            |
| 26       | Azaconazole    | 16.519               | 2228            | 54       | Diphenconazole-2                                    | 24.190               | 3034            |
| 27       | Diclobutrazole | 16.521               | 2228            | 55       | Deltamethrin (a tralomethrin decomposition product) | 24.780               | 3071            |
| 28       | Ciflufenamide  | 16.685               | 2247            | 56       | Azoxystrobin  | 25.403               | 3109            |

PL2005 pesticide GC/ MS Mix III



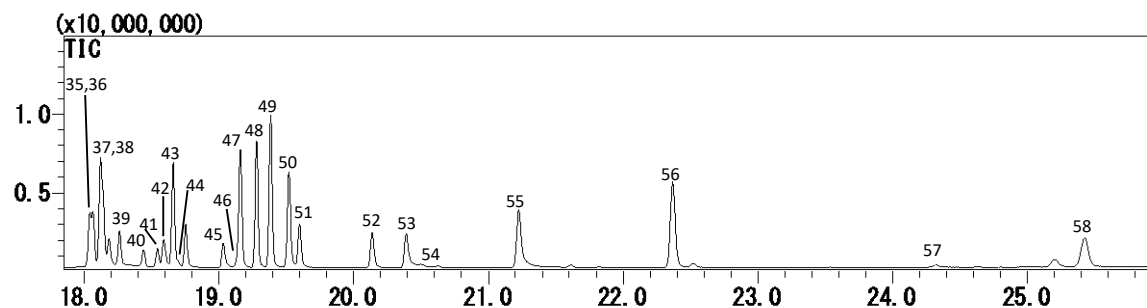
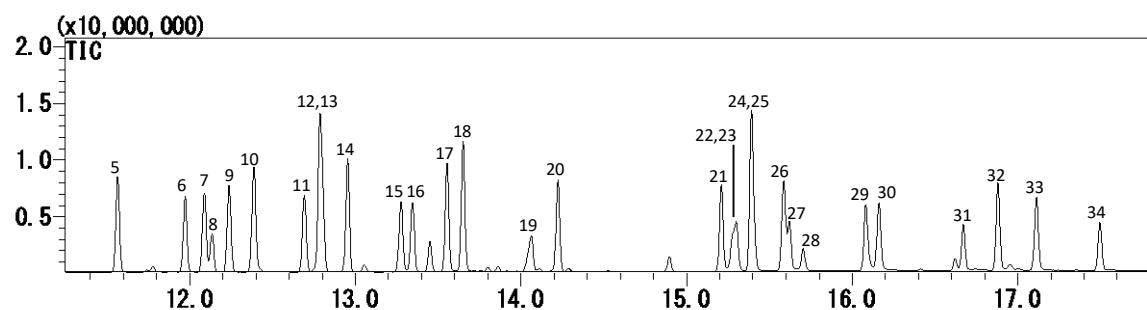
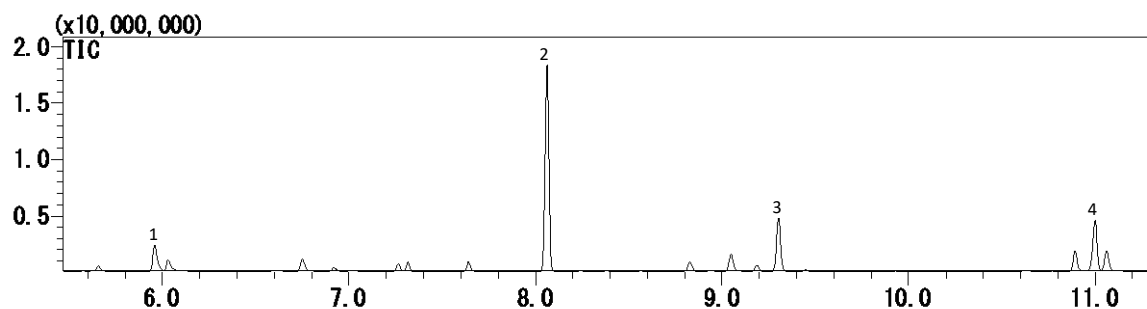
| Peak No. | Compound                         | Retention time (min) | Retention index | Peak No. | Compound                    | Retention time (min) | Retention index |
|----------|----------------------------------|----------------------|-----------------|----------|-----------------------------|----------------------|-----------------|
| 1        | Dichlobenil                      | 7.698                | 1357            | 32       | Procymidone                 | 15.461               | 2109            |
| 2        | Etridiazole                      | 8.860                | 1466            | 33       | Triadimenol-2               | 15.476               | 2111            |
| 3        | OMETHATE                         | 10.320               | 1600            | 34       | (E)-Pyriphenox              | 15.693               | 2135            |
| 4        | Tecnazene                        | 10.534               | 1620            | 35       | Uniconazole (Uniconazole P) | 16.277               | 2200            |
| 5        | Demeton-S-methyl (methyldemeton) | 10.645               | 1630            | 36       | Oxadiazon                   | 16.338               | 2207            |
| 6        | Etalfurarin                      | 11.068               | 1669            | 37       | Oxyfluorfen                 | 16.424               | 2217            |
| 7        | Naled                            | 11.077               | 1670            | 38       | Bupirimate                  | 16.507               | 2226            |
| 8        | Dicrotophos                      | 11.152               | 1677            | 39       | Thifluzamide                | 16.521               | 2228            |
| 9        | Trifluralin                      | 11.240               | 1685            | 40       | Isoxathione                 | 16.634               | 2241            |
| 10       | Monocrotophos                    | 11.250               | 1686            | 41       | (Z)-pyriminobackmethyl      | 17.041               | 2288            |
| 11       | Thiometon                        | 11.686               | 1727            | 42       | Fluacripilim                | 17.337               | 2323            |
| 12       | Quintozene                       | 12.368               | 1792            | 43       | Sulprofos                   | 17.373               | 2328            |
| 13       | Propyzamide                      | 12.394               | 1794            | 44       | Carbophenothion             | 17.561               | 2350            |
| 14       | Disulfoton                       | 12.680               | 1823            | 45       | Cyanofenphos                | 17.625               | 2358            |
| 15       | Tefluthrin                       | 12.778               | 1832            | 46       | Quinoxyphe                  | 17.660               | 2362            |
| 16       | Formothion                       | 13.074               | 1861            | 47       | Trifloxystrobin             | 17.699               | 2367            |
| 17       | Vinclozolin                      | 13.519               | 1906            | 48       | (E)-pyriminobackmethyl      | 17.836               | 2383            |
| 18       | Thiobencarb                      | 14.281               | 1984            | 49       | Diflufenican                | 18.061               | 2411            |
| 19       | Triadimefon                      | 14.552               | 2012            | 50       | Pyributicarb                | 18.427               | 2457            |
| 20       | Chlorthal-dimethyl               | 14.597               | 2017            | 51       | Phosmet                     | 18.646               | 2484            |
| 21       | Isocarbophos                     | 14.615               | 2018            | 52       | Tetradifon                  | 19.179               | 2553            |
| 22       | Nitrotar isopropyl               | 14.626               | 2020            | 53       | Cyhalothrin-1               | 19.478               | 2592            |
| 23       | Pendimethalin                    | 15.119               | 2072            | 54       | Cyhalothrin-2               | 19.675               | 2617            |
| 24       | Penconazole                      | 15.140               | 2074            | 55       | Permethrin-1                | 20.496               | 2716            |
| 25       | (Z)-pyriphenox                   | 15.191               | 2080            | 56       | Permethrin-2                | 20.645               | 2732            |
| 26       | Allethrin-1                      | 15.202               | 2081            | 57       | Pyridaben                   | 20.688               | 2736            |
| 27       | Allethrin-2                      | 15.218               | 2083            | 58       | Cypermethrin-1              | 21.684               | 2837            |
| 28       | Allethrin-3 (vioallethrin)       | 15.270               | 2088            | 59       | Cypermethrin-2              | 21.824               | 2850            |
| 29       | Allethrin-4 (vioallethrin)       | 15.286               | 2090            | 60       | Cypermethrin-3              | 21.951               | 2862            |
| 30       | Mecarbam                         | 15.289               | 2090            | 61       | Cypermethrin-4              | 21.997               | 2866            |
| 31       | Triadimenol-1                    | 15.349               | 2097            | 62       | Pyrimidiphe                 | 22.894               | 2941            |

PL2005 pesticide GC/ MS Mix IV



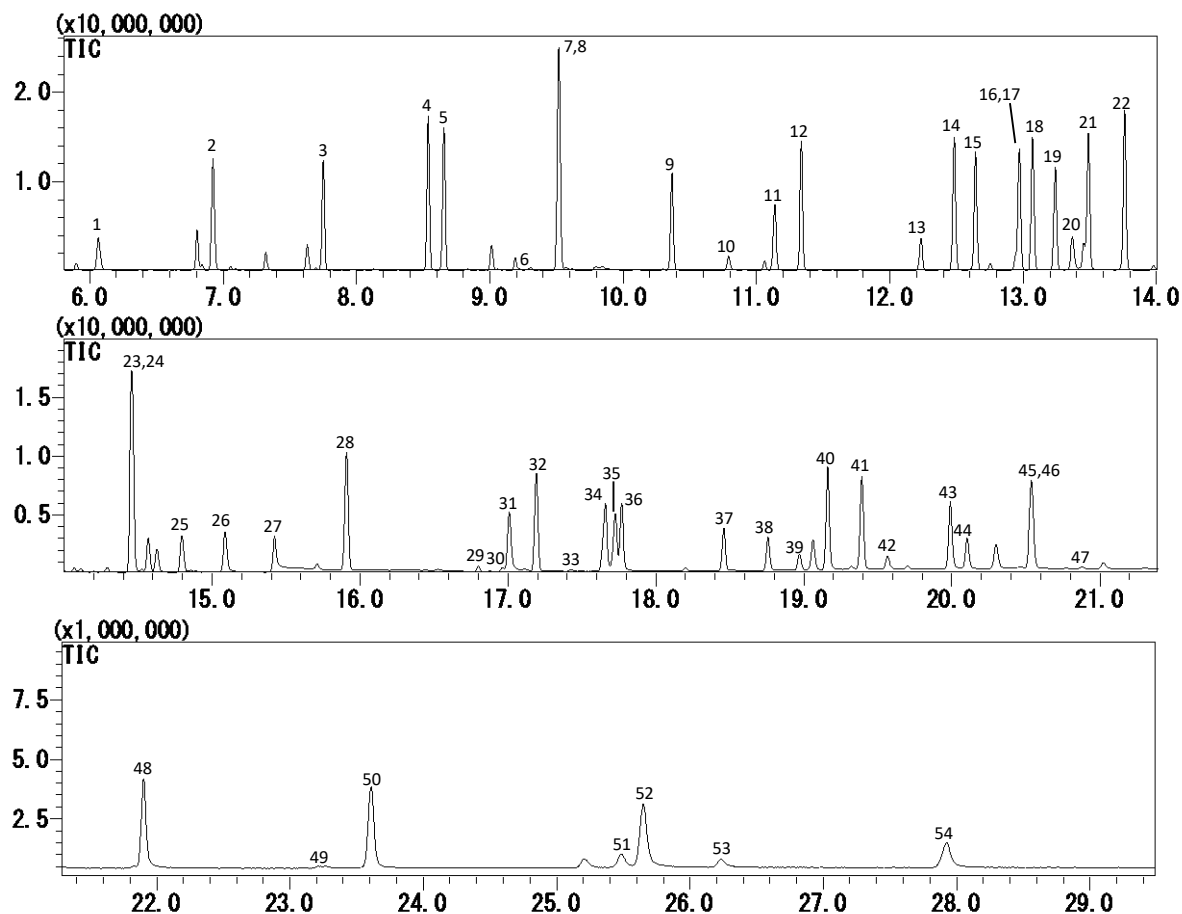
| Peak No. | Component                         | Retention time (min) | Retention index | Peak No. | Component                    | Retention time (min) | Retention index |
|----------|-----------------------------------|----------------------|-----------------|----------|------------------------------|----------------------|-----------------|
| 1        | DCIP                              | 4.935                | 1057            | 26       | Napropamide                  | 16.061               | 2176            |
| 2        | Allydoclor                        | 7.060                | 1295            | 27       | (E)-metminostrobin.          | 16.178               | 2189            |
| 3        | Propanol                          | 10.577               | 1624            | 28       | Pretilachlor                 | 16.268               | 2199            |
| 4        | Diphenylamine                     | 10.673               | 1633            | 29       | Flusilazole                  | 16.468               | 2222            |
| 5        | Flucirazole metabolite            | 11.086               | 1671            | 30       | Cyproconazole                | 16.720               | 2251            |
| 6        | Desmedipham decomposition product | 11.619               | 1721            | 31       | Fenoxanil                    | 16.793               | 2260            |
| 7        | Simazine                          | 11.904               | 1748            | 32       | Chlorbenzylate               | 16.892               | 2271            |
| 8        | Terbacil                          | 12.697               | 1824            | 33       | Mepronil                     | 17.272               | 2316            |
| 9        | Iprobenfos                        | 13.007               | 1855            | 34       | Carfentrasone ethyl          | 17.567               | 2351            |
| 10       | Dimethenamide (Dimethenamide P)   | 13.396               | 1893            | 35       | Benaraxyl                    | 17.607               | 2356            |
| 11       | Acetochlor                        | 13.490               | 1903            | 36       | Propiconazole-1              | 17.675               | 2364            |
| 12       | Prometryn                         | 13.742               | 1928            | 37       | Propiconazole-2              | 17.796               | 2379            |
| 13       | Metalaxil (Mephenoxam)            | 13.777               | 1932            | 38       | Tebuconazole                 | 18.018               | 2406            |
| 14       | Terbutryn                         | 14.002               | 1955            | 39       | Tenyl chloride               | 18.037               | 2408            |
| 15       | Esprocarb                         | 14.157               | 1971            | 40       | Resmethrin-2 (bioresmethrin) | 18.179               | 2426            |
| 16       | Diethofencarb                     | 14.323               | 1988            | 41       | Fenoxycarb                   | 18.631               | 2482            |
| 17       | Metolachlor (S-metolachlor)       | 14.419               | 1998            | 42       | Etoazole                     | 18.865               | 2512            |
| 18       | Tetraconazole                     | 14.627               | 2020            | 43       | Tebufenpyrad                 | 18.886               | 2515            |
| 19       | Diphenamid                        | 14.835               | 2042            | 44       | Etoazole metabolite          | 19.089               | 2541            |
| 20       | Cyprodinil                        | 14.974               | 2057            | 45       | Butafenacil                  | 20.944               | 2764            |
| 21       | Dimethamethrin                    | 15.081               | 2068            | 46       | Ethobenzanide                | 21.088               | 2779            |
| 22       | Dimepiperate                      | 15.350               | 2097            | 47       | Etofenprox                   | 22.149               | 2880            |
| 23       | Fenothiocarb                      | 15.692               | 2135            | 48       | Flumioxazine                 | 23.238               | 2967            |
| 24       | Paclobutrazol                     | 15.723               | 2138            | 49       | Indoxacarb                   | 24.662               | 3063            |
| 25       | Butachlor                         | 15.878               | 2156            |          |                              |                      |                 |

PL2005 pesticide GC/ MS Mix V



| Peak No. | Compound                 | Retention time (min) | Retention index | Peak No. | Compound                                | Retention time (min) | Retention index |
|----------|--------------------------|----------------------|-----------------|----------|---|----------------------|-----------------|
| 1        | Clofentedine digest      | 5.975                | 1181            | 30       | Fludioxonil                             | 16.182               | 2189            |
| 2        | Diphenyl                 | 8.081                | 1394            | 31       | Nitrofen                                | 16.692               | 2248            |
| 3        | Thiocyclam               | 9.323                | 1509            | 32       | Chloropropylate                         | 16.902               | 2272            |
| 4        | Diclofluanide metabolite | 11.017               | 1665            | 33       | Oxadixyl                                | 17.131               | 2299            |
| 5        | α-BHC                    | 11.586               | 1718            | 34       | Chlornitrophenene                       | 17.518               | 2345            |
| 6        | Sweep                    | 11.992               | 1756            | 35       | Propargitt 1                            | 18.065               | 2412            |
| 7        | β-BHC                    | 12.108               | 1767            | 36       | Propargitt 2                            | 18.086               | 2414            |
| 8        | Trifluranide metabolite  | 12.154               | 1772            | 37       | Piperonyl butoxide                      | 18.142               | 2421            |
| 9        | γ-BHC (lindane)          | 12.258               | 1782            | 38       | Captafol                                | 18.166               | 2424            |
| 10       | Pyrochlorone             | 12.407               | 1796            | 39       | Nitralin                                | 18.285               | 2439            |
| 11       | δ-BHC                    | 12.710               | 1825            | 40       | Iprodione                               | 18.463               | 2461            |
| 12       | Thioethyl MCPA           | 12.802               | 1835            | 41       | Tetramethrin-1                          | 18.567               | 2474            |
| 13       | Chlorothalonil           | 12.822               | 1837            | 42       | Bromconazole-1                          | 18.613               | 2480            |
| 14       | Oxabetrinyl              | 12.973               | 1851            | 43       | Tetramethrin-2                          | 18.682               | 2489            |
| 15       | Propanil                 | 13.295               | 1883            | 44       | Bifenazate                              | 18.716               | 2493            |
| 16       | Metribuzin               | 13.364               | 1890            | 45       | Bromconazole-2                          | 19.054               | 2537            |
| 17       | Simetryn                 | 13.574               | 1911            | 46       | Iprodione metabolite                    | 19.153               | 2550            |
| 18       | Ametryn                  | 13.670               | 1921            | 47       | Furametpyr                              | 19.181               | 2553            |
| 19       | Bromacil                 | 14.079               | 1963            | 48       | Pentoxazone                             | 19.302               | 2569            |
| 20       | Dichlofluanid            | 14.244               | 1980            | 49       | Pyriproxyfen                            | 19.405               | 2582            |
| 21       | Tolyfuranide             | 15.229               | 2084            | 50       | Mefenacet                               | 19.541               | 2600            |
| 22       | Captan                   | 15.299               | 2091            | 51       | Furametopyr metabolite                  | 19.624               | 2610            |
| 23       | Diclocimet-1             | 15.321               | 2094            | 52       | Phenoxaprop ethyl (phenoxaprop P ethyl) | 20.161               | 2677            |
| 24       | Methoprene               | 15.411               | 2104            | 53       | Bitertanol-1                            | 20.416               | 2707            |
| 25       | Folpet                   | 15.426               | 2105            | 54       | Bitertanol-2                            | 20.532               | 2720            |
| 26       | Quinomethionate          | 15.609               | 2126            | 55       | Fenbuconazole                           | 21.256               | 2798            |
| 27       | Diclocimet-2             | 15.640               | 2129            | 56       | Silafluofen                             | 22.404               | 2903            |
| 28       | Trichloride              | 15.724               | 2138            | 57       | Pyrazoxyphene                           | 24.369               | 3045            |
| 29       | Hexaconazole             | 16.102               | 2180            | 58       | Famoxadone                              | 25.472               | 3112            |

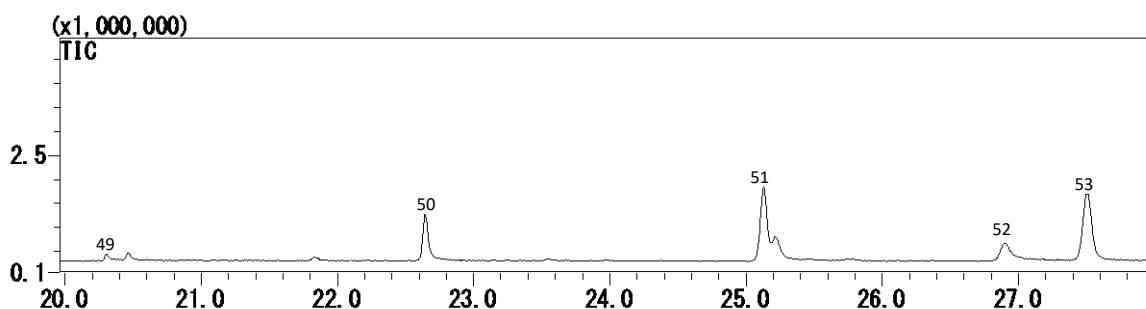
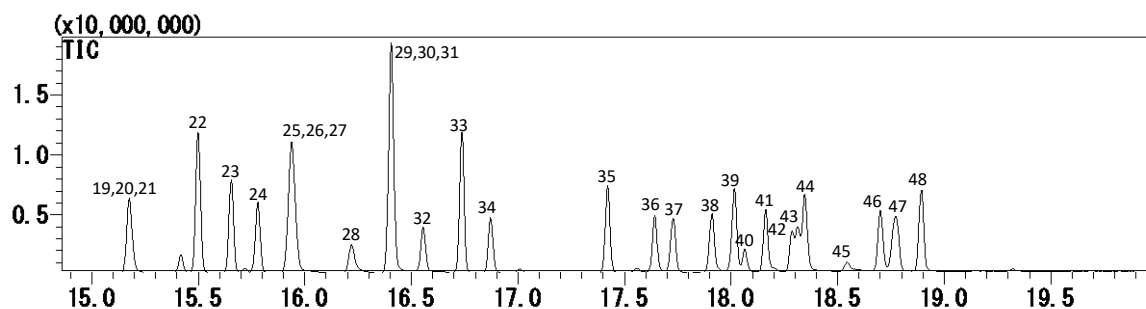
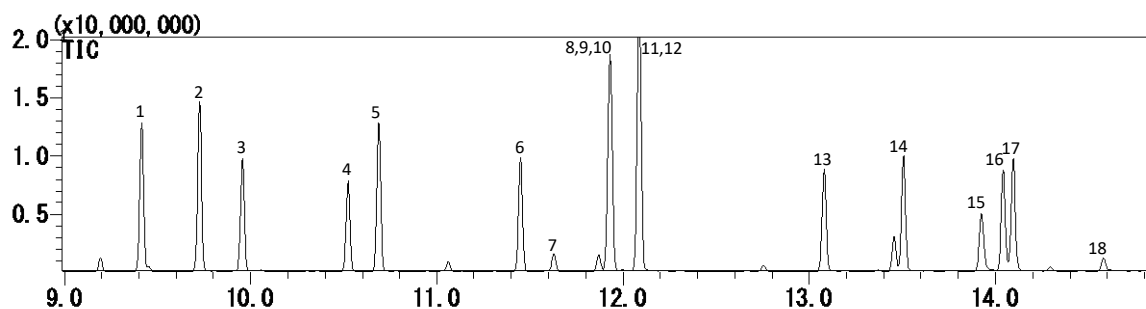
## PL2005 pesticide GC/ MS Mix VI



| Peak No. | Compound                                     | Retention time (min) | Retention index | Peak No. | Compound                          | Retention time (min) | Retention index |
|----------|--|----------------------|-----------------|----------|-----------------------------------|----------------------|-----------------|
| 1        | Tachigaren                                   | 6.084                | 1193            | 28       | Dithalimphos                      | 15.928               | 2161            |
| 2        | Neristoxin                                   | 6.938                | 1283            | 29       | Chlorthiophos-1                   | 16.820               | 2263            |
| 3        | EPTC   | 7.769                | 1364            | 30       | Chlorthiophos-2                   | 16.982               | 2281            |
| 4        | Butyrate                                     | 8.555                | 1438            | 31       | Diniconazole                      | 17.027               | 2287            |
| 5        | Chlormefos                                   | 8.672                | 1449            | 32       | Chlorthiophos-3                   | 17.212               | 2308            |
| 6        | Clothianidin                                 | 9.242                | 1501            | 33       | Azamethifos                       | 17.447               | 2337            |
| 7        | Crimidine                                    | 9.532                | 1528            | 34       | Lenacil                           | 17.679               | 2365            |
| 8        | Orthophenylphenol                            | 9.538                | 1528            | 35       | Chloridazon                       | 17.746               | 2373            |
| 9        | Xyllyl carb                                  | 10.385               | 1606            | 36       | Pyraflufen ethyl                  | 17.786               | 2377            |
| 10       | Fenmedifam decomposition product             | 10.808               | 1645            | 37       | Clomethoxyphene (Clomethoxynyl)   | 18.480               | 2464            |
| 11       | 2,6-Dichlorobenzamide                        | 11.157               | 1678            | 38       | Indanofan                         | 18.990               | 2528            |
| 12       | Sulfotepp                                    | 11.353               | 1696            | 39       | Phenothrin-1                      | 19.083               | 2541            |
| 13       | Dioxathion decomposition product             | 12.250               | 1781            | 40       | Phenothrin-2                      | 19.180               | 2553            |
| 14       | Pyrimethanil                                 | 12.502               | 1805            | 41       | Leptophos                         | 19.411               | 2583            |
| 15       | Prohydrojasmon-1                             | 12.660               | 1821            | 42       | Amitraz                           | 19.586               | 2606            |
| 16       | Prohydrojasmon-2                             | 12.961               | 1850            | 43       | Azimphoethyl                      | 20.012               | 2658            |
| 17       | Tebupirimphos                                | 12.988               | 1853            | 44       | Dialyphos                         | 20.126               | 2672            |
| 18       | Ethyl MCPB                                   | 13.090               | 1863            | 45       | Spirodiclofen                     | 20.560               | 2723            |
| 19       | Benflesete                                   | 13.260               | 1880            | 46       | Oxosporconazole                   | 20.562               | 2723            |
| 20       | Oxosporconazole formyl decomposition product | 13.387               | 1892            | 47       | Dioxathion                        | 20.903               | 2760            |
| 21       | Terbucarb                                    | 13.508               | 1904            | 48       | Xalofop Ethyl (Kizalofop P Ethyl) | 21.927               | 2860            |
| 22       | Cinmethylin                                  | 13.781               | 1932            | 49       | Pilacrostrobin                    | 23.305               | 2973            |
| 23       | Fenpropimorph                                | 14.477               | 2004            | 50       | Fenvalerate-2 (esfenvalerate)     | 23.641               | 2999            |
| 24       | Carbetamide                                  | 14.493               | 2005            | 51       | Dimethomorph-1                    | 25.521               | 3115            |
| 25       | Thiamethoxam decomposition product           | 14.817               | 2040            | 52       | Tolfenpyrad                       | 25.693               | 3124            |
| 26       | Ethychlozate                                 | 15.111               | 2071            | 53       | Dimethomorph-2                    | 26.279               | 3154            |
| 27       | Ferrimzone                                   | 15.442               | 2107            | 54       | Flutiacet methyl                  | 27.970               | 3234            |



PL2005 pesticide GC/ MS Mix VII



| Peak No. | Compound                       | Retention time (min) | Retention index | Peak No. | Compound                                  | Retention time (min) | Retention index |
|----------|--------------------------------|----------------------|-----------------|----------|---|----------------------|-----------------|
| 1        | Chloroneb                      | 9.430                | 1519            | 28       | Tricyclazole                              | 16.237               | 2195            |
| 2        | Isoprocarb                     | 9.741                | 1547            | 29       | Carboxin                                  | 16.418               | 2216            |
| 3        | XMC                            | 9.972                | 1568            | 30       | Imibenconazole debenzyl                   | 16.418               | 2216            |
| 4        | Propoxur                       | 10.539               | 1620            | 31       | Frampropmethyl                            | 16.425               | 2217            |
| 5        | Chlorethoxyfos                 | 10.702               | 1635            | 32       | (Z)-metminostrobin                        | 16.571               | 2234            |
| 6        | Diarate-1                      | 11.465               | 1706            | 33       | 1,1-Dichloro-2,2-bis(4-ethylphenyl)ethane | 16.755               | 2255            |
| 7        | Diarate-2                      | 11.643               | 1723            | 34       | Flufenpyrethylethyl                       | 16.888               | 2271            |
| 8        | Carbofuran                     | 11.940               | 1751            | 35       | Isoxadiphenethyl                          | 17.438               | 2336            |
| 9        | Furirazole                     | 11.944               | 1752            | 36       | Norflurazon                               | 17.661               | 2362            |
| 10       | Chlorbufam                     | 11.952               | 1753            | 37       | Endosulfan sulfate                        | 17.745               | 2373            |
| 11       | Chromazone                     | 12.103               | 1767            | 38       | Hexazinone                                | 17.927               | 2394            |
| 12       | Propazine                      | 12.103               | 1767            | 39       | Diclofop-methyl                           | 18.033               | 2408            |
| 13       | Benoxachol                     | 13.096               | 1864            | 40       | Resmethrin-1                              | 18.084               | 2414            |
| 14       | Spiroxamine-1                  | 13.521               | 1906            | 41       | Resmethrin-2 (bioresmethrin)              | 18.180               | 2426            |
| 15       | 2-(1-naphthyl)acetamide        | 13.943               | 1949            | 42       | Zoxamide                                  | 18.305               | 2442            |
| 16       | Spiroxamine-2                  | 14.058               | 1961            | 43       | Epoxiconazole                             | 18.332               | 2445            |
| 17       | Etofmesate                     | 14.112               | 1966            | 44       | Mefenpyrdiethyl                           | 18.367               | 2449            |
| 18       | Isophenphosoxone               | 14.597               | 2017            | 45       | Acetamiprid                               | 18.570               | 2475            |
| 19       | Clozolinatate                  | 15.190               | 2080            | 46       | Picolinaphene                             | 18.718               | 2493            |
| 20       | Zoxamide decomposition product | 15.190               | 2080            | 47       | Methoxychlor                              | 18.798               | 2504            |
| 21       | Thiabendazole                  | 15.200               | 2081            | 48       | Phenamidon                                | 18.911               | 2518            |
| 22       | Chlorbenside                   | 15.515               | 2115            | 49       | Oryzalin                                  | 20.330               | 2698            |
| 23       | Bromophosphoethyl              | 15.670               | 2132            | 50       | Fluridone                                 | 22.678               | 2924            |
| 24       | Disulfotone sulfone            | 15.797               | 2146            | 51       | Full microrack pentyl                     | 25.162               | 3095            |
| 25       | Imazametabenzmethyl            | 15.947               | 2163            | 52       | Imibenconazole                            | 26.936               | 3188            |
| 26       | Flutriahole                    | 15.956               | 2164            | 53       | Cinidone ethyl                            | 27.549               | 3216            |
| 27       | TCMTB                          | 15.970               | 2166            |          |   |                      |                 |

The retention index is a relatively representative index of the retention ratio of straight-chain alkanes in the target compounds based on the number of carbon, and is extremely useful information for qualitative analysis.

The retention index can be determined by isothermal and thermal rise analysis because the logarithm of the retention ratio and the retention ratio of straight-chain alkanes is linearly related to the number of carbons.

In the case of temperature programming...

Because the retention ratio of straight-chain alkanes is linearly related to the number of carbons in straight-chain alkanes, the retention index is given by the following equation.

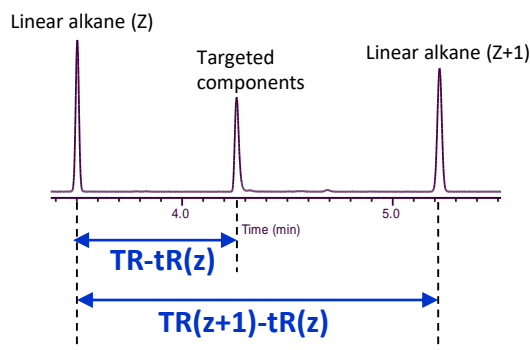
$$\text{Retention index } I = 100 \times \frac{\text{TR} - tR(Z)}{\text{TR}(Z+1) - tR(Z)} + 100 \times Z$$

TR = retention time of the target component

TR(Z) = retention time of straight-chain alkanes that precede the components of interest

TR(Z+1) = retention time of straight-chain alkanes emerging after the components of interest

Z = number of carbons in straight-chain alkanes with a retention time t R(Z)



#### Reference

Věra Pacáková and Ladislav Feltl, Chromatographic retention indices an aid to identification of organic compounds(1992)ELLIS HORWOOD LIMITED



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