

The following **LabStandard®** Kit contains the pesticides mentioned by Shimadzu Technologies to realize and publish the Application Note "Simultaneous Analysis of 477 Residual Pesticides in Agricultural Crops Using GC-MS/MS" for determination of pesticides residues using GCMSMS TQ8040.

Code	Concentration	Solvent	Packaging
KIT4EQ3L474	10,00 / 100,00 mg/l	Acetonitrile/ Methanol / Toluene / Isooctane	54 x 1,1 ml amber silanized ampoules in Acetonitrile 2 x 1,1 ml amber silanized ampoules in Methanol 4 x 1,1 ml amber silanized ampoules in Toluene 1 x 1,1 ml amber ampoule in Isooctane



**SHIMADZU**  
**Simultaneous Analysis of 477 Residual Pesticides in Agricultural Crops Using GC-MS/MS**  
Riki Kitano\*, Masato Takakura\*, Haruhiko Miyagawa\*, Isao Saito\*, Eiji Ueno\*, Shinji Chono\*, Robert H. Clifford\*  
\*Shimadzu Corporation, \*Kochi Science & Technology Foundation, \*Kochi Prefectural Institute of Public Health, \*Shimadzu Scientific Instruments

**1: Introduction**  
GC-MS/MS systems can measure more than 400 residual pesticides in foods. However, analyzing more than 477 pesticides simultaneously requires a short lead time (data handling time) during MS/MS measurement, which results in unreliable results. We have developed a method for the simultaneous analysis of 477 pesticides using GC-MS/MS. Compared to other methods, our method is simple and easy to use. The method is described in this application note. The method is described in this application note. The method is described in this application note.

**2: Experiment**  
**2-1: Sample Preparation**  
Many substances are prepared by processing by heat, orange, lemon, etc., and spray samples according to a predetermined procedure for residual pesticide analysis, and their profiling from using the GC/MS/MS system. The substances are prepared by processing by heat, orange, lemon, etc., and spray samples according to a predetermined procedure for residual pesticide analysis, and their profiling from using the GC/MS/MS system.

**2-1: Analysis Conditions**  
The GC/MS/MS system used in this study is the GC-MS/MS system. The GC/MS/MS system used in this study is the GC-MS/MS system. The GC/MS/MS system used in this study is the GC-MS/MS system.

**2-1: Analysis Conditions, continued**  
GC/MS/MS System: Shimadzu GC-MS/MS System (GC-MS/MS System)  
Column 1: DB-5MS (30m x 0.25mm ID, 0.25µm film thickness)  
Column 2: DB-5MS (30m x 0.25mm ID, 0.25µm film thickness)  
Carrier Gas: Helium (Flow Rate: 1.0 mL/min)  
Injection Volume: 1 µL

**3: Results**  
**3-1: Consideration of Analysis Method**  
The average lead time for all components was 123 msec with over 8.5 msec provided time for retention time bands when a full number of pesticides were analyzed by Smart MRM.

**3-2: Analytical Accuracy**  
This shows that MS/MS is 100% in 10 sec 10% or less for 88% of samples. 100% of the MS/MS method is 100% in 10 sec 10% or less for 88% of samples. 100% of the MS/MS method is 100% in 10 sec 10% or less for 88% of samples.

Shimadzu TQ8040 and Shimadzu are trademarks of Shimadzu Corporation

Analytes	CAS	Analytes	CAS	Analytes	CAS	Analytes	CAS
1,4-Dichlorobenzene	106-46-7	Anilazine	101-05-3	Bifenox	42576-02-3	Cadusafos	95465-99-9
2,4,5-T-2-ethylhexyl	1928-47-8	Anilofos	64249-01-0	Bifenthrin	82657-04-3	Cafenstrole	125306-83-4
2,4,5-T-methyl	1928-37-6	Anthraquinone	84-65-1	Bioresmethrin	28434-01-7	Captafol	2425-06-1
2,4-D-butyl	94-80-4	Atraton	1610-17-9	Biphenyl	92-52-4	Captan	133-06-2
Acephate	30560-19-1	Atrazine	1912-24-9	Bitertanol	55179-31-2	Carbaryl	63-25-2
Acetamidrid	135410-20-7	Atrazine, Desethyl-	6190-65-4	Boscalid	188425-85-6	Carbetamide	16118-49-3
Acetochlor	34256-82-1	Azaconazole	60207-31-0	Bromacil	314-40-9	Carbofuran	1563-66-2
Acibenzolar-S-Methyl	135158-54-2	Azamethiphos	35575-96-3	Bromobutide	74712-19-9	Carbophenothion	786-19-6
Aclonifen	74070-46-5	Azinphos-ethyl	2642-71-9	Bromocyclen	1715-40-8	Carbosulfan	55285-14-8
Acrinathrin	101007-06-1	Azinphos-Methyl	86-50-0	Bromophos-Ethyl	4824-78-6	Carboxin	5234-68-4
Alachlor	15972-60-8	Azoxystrobin	131860-33-8	Bromophos-Methyl	2104-96-3	Carfentrazone-Ethyl	128638-02-1
Alanycarb	83130-01-2	Beflubutamid	113614-08-7	Bromopropylate	18181-80-1	Chinomethionat	2439-01-2
Aldicarb	116-06-3	Benalaxyl	71626-11-4	Bromuconazole	116255-48-2	Chlormethoxyfen	32861-85-1
Aldicarb-Sulfone	1646-88-4	Bendiocarb	22781-23-3	Bupirimate	41483-43-6	Chlorantraniliprole	500008-45-7
Aldrin	309-00-2	Benfuralin	1861-40-1	Buprofezin	69327-76-0	Chlorbenside	103-17-3
Allethrin	584-79-2	Benfuracarb	82560-54-1	Butachlor	23184-66-9	Chlorbufam	1967-16-4
Allidochlor	93-71-0	Benfuresate	68505-69-1	Butafenacil	134605-64-4	Chlordane, trans-	5103-74-2
Ametryn	834-12-8	Benoxacor	98730-04-2	Butamifos	36335-67-8	Chlorethoxyfos	54593-83-8
Aminocarb	2032-59-9	Benzoylprop-Ethyl	22212-55-1	Butralin	33629-47-9	Chlorfenapyr	122453-73-0
Amitraz	33089-61-1	Bifenazate	149877-41-8	Butylate	2008-41-5	Chlorfenson	80-33-1

**Lab.Instruments s.r.l.**

70013 Castellana Grotte(BA) Italy - S.S. 172 (Putignano-Alberobello) Km 28+200  
Tel +39 080 4969746-9 - Fax +39 080 2121749  
Email: info@labinstruments.it - Website: www.labinstruments.org  
Part.IVA: 03176570723 - C.C.I.A.A. n. 247858 Trib. Bari n. 12439

**Accreditations and Certifications**

ISO 17034:2016  
UNI EN ISO 14001:2015  
ISO/IEC 17025:2017  
UNI EN ISO 9001:2015

Analytes	CAS	Analytes	CAS	Analytes	CAS	Analytes	CAS
Chlorfenvinphos	470-90-6	DDE, p,p-	72-55-9	Endosulfansulfate	1031-07-8	Fluazinam	79622-59-6
Chloridazon	1698-60-8	DDT, o,p-	789-02-6	Endrin	72-20-8	Flubenzimine	37893-02-0
Chlormephos	24934-91-6	DDT, p,p-	50-29-3	EPN	2104-64-5	Flucythrinate	70124-77-5
Chlornitrofen	1836-77-7	Deltamethrin	52918-63-5	Epoxiconazole	133855-98-8	Fludioxonil	131341-86-1
Chlorobenzilate	510-15-6	Demeton-S-Methyl	919-86-8	EPTC	759-94-4	Flufenacet	142459-58-3
Chloroneb	2675-77-6	Demeton-S-Methylsulfone	17040-19-6	Esfenvalerate	66230-04-4	Flufenpyr-ethyl	188489-07-8
Chloropropylate	5836-10-2	Desmedipham	13684-56-5	Esprocarb	85785-20-2	Flumiclorac-pentyl	87546-18-7
Chlorothalonil	1897-45-6	Dialifos	10311-84-9	Etaconazole	60207-93-4	Flumioxazin	103361-09-7
Chlorpropham	101-21-3	Di-Allate	2303-16-4	Ethalfuralin	55283-68-6	Fluopicolide	239110-15-7
Chlorpyrifos-Ethyl	2921-88-2	Diazinon	333-41-5	Ethiofencarb	29973-13-5	Fluotrimazole	31251-03-3
Chlorpyrifos-Methyl	5598-13-0	Dichlobenil	1194-65-6	Ethion	563-12-2	Fluquinconazole	136426-54-5
Chlorthal-Dimethyl	1861-32-1	Dichlofenthion	97-17-6	Ethofumesate	26225-79-6	Fluridone	59756-60-4
Chlorthiamid	1918-13-4	Dichlofuanid	1085-98-9	Ethoprophos	13194-48-4	Flusilazole	85509-19-9
Chlorthion	500-28-7	Dichlorvos	62-73-7	Ethychlozate	27512-72-7	Fluthiacet-methyl	117337-19-6
Chlorthiophos	60238-56-4	Diclobutrazol	75736-33-3	Etobenzanid	79540-50-4	Flutolanil	66332-96-5
Chlozolate	84332-86-5	Diclocymet	139920-32-4	Etofenprox	80844-07-1	Flutriafol	76674-21-0
Cinidon-Ethyl	142891-20-1	Diclofop-Methyl	51338-27-3	Etoxazole	153233-91-1	Fluvalinate	69409-94-5
Cinmethylin	87818-31-3	Dicloran	99-30-9	Etridiazole	2593-15-9	Fluvalinate, tau-	102851-06-9
cis-Chlordene	56534-02-2	Dicofol	115-32-2	Etrimfos	38260-54-7	Folpet	133-07-3
Clodinafop-Propargyl	105512-06-9	Dicrotophos	141-66-2	Famoxadone	131807-57-3	Fonofos	944-22-9
Clofentezine	74115-24-5	Dieldrin	60-57-1	Famphur	52-85-7	Formothion	2540-82-1
Clomazone	81777-89-1	Diethofencarb	87130-20-9	Fenamidone	161326-34-7	Fosthiazate	98886-44-3
Clomeprop	84496-56-0	Difenoconazole	119446-68-3	Fenamiphos	22224-92-6	Furalaxyl	57646-30-7
Clothianidin	210880-92-5	Diflufenican	83164-33-4	Fenarimol	60168-88-9	Furametpyr	123572-88-3
Coumaphos	56-72-4	Dimepiperate	61432-55-1	Fenzaquin	120928-09-8	Furametpyr-hydroxy	
Crimidine	535-89-7	Dimethachlor	50563-36-5	Fenbuconazole	114369-43-6	Furathiocarb	65907-30-4
Cyanazine	21725-46-2	Dimethametryn	22936-75-0	Fenclorphos	299-84-3	Furilazole	121776-33-8
Cyanofenphos	13067-93-1	Dimethenamid	87674-68-8	Fenitrothion	122-14-5	Halfenprox	111872-58-3
Cyanophos	2636-26-2	Dimethipin	55290-64-7	Fenothiocarb	62850-32-2	HCH, alpha-	319-84-6
Cyantraniliprole	736994-63-1	Dimethoate	60-51-5	Fenoxanil	115852-48-7	HCH, beta-	319-85-7
Cycloate	1134-23-2	Dimethomorph	110488-70-5	Fenoxaprop-ethyl	66441-23-4	HCH, delta-	319-86-8
Cyflufenamid	180409-60-3	Dimethylvinphos	2274-67-1	Fenoxycarb	72490-01-8	HCH, gamma-	58-89-9
Cyfluthrin, beta-	68359-37-5	Diniconazole	83657-24-3	Fenpropathrin	39515-41-8	Heptachlor	76-44-8
Cyhalofop-Butyl	122008-85-9	Diofenolan	63837-33-2	Fenpropidin	67306-00-7	Heptachlorepoxid, cis-	1024-57-3
Cyhalothrin	68085-85-8	Dioxabenzofos	3811-49-2	Fenpropimorph	67564-91-4	Heptachlorepoxid, trans-	28044-83-9
Cyhalothrin, lambda-	91465-08-6	Dioxathion	78-34-2	Fenson	80-38-6	Heptenophos	23560-59-0
Cymiazole	61676-87-7	Diphenamid	957-51-7	Fensulfothion	115-90-2	Hexachlorobenzene	118-74-1
Cypermethrin	52315-07-8	Diphenylamine	122-39-4	Fenthion	55-38-9	Hexaconazole	79983-71-4
Cyproconazole	94361-06-5	Disulfoton	298-04-4	Fenvalerate	51630-58-1	Hexazinone	51235-04-2
Cyprodinil	121552-61-2	Disulfoton-Sulfone	2497-06-5	Ferimzone	89269-64-7	Hymexazol	10004-44-1
Cyprofuram	69581-33-5	Ditalimfos	5131-24-8	Fipronil	120068-37-3	Imazalil	35554-44-0
DCIP	620-45-1	Dithiopyr	97886-45-8	Fipronil-Sulfone	120068-36-2	Imazamethabenz-Methyl	81405-85-8
DDD, o,p-	53-19-0	Edifenphos	17109-49-8	Flamprop-Methyl	52756-25-9	Imibenconazole	86598-92-7
DDD, p,p-	72-54-8	Endosulfan, alpha-	959-98-8	Fluacrypyrim	229977-93-9	Imibenconazole-debenzyl	154221-27-9
DDE, o,p-	3424-82-6	Endosulfan, beta-	33213-65-9	Fluazifop-P-Butyl	79241-46-6	Indanofan	133220-30-1

#### Lab.Instruments s.r.l.

70013 Castellana Grotte(BA) Italy - S.S. 172 (Putignano-Alberobello) Km 28+200

Tel +39 080 4969746-9 - Fax +39 080 2121749

Email: info@labinstruments.it - Website: www.labinstruments.org

Part.IVA: 03176570723 - C.C.I.A.A. n. 247858 Trib. Bari n. 12439

#### Accreditations and Certifications

ISO 17034:2016

UNI EN ISO 14001:2015

ISO/IEC 17025:2017

UNI EN ISO 9001:2015

Analytes	CAS	Analytes	CAS	Analytes	CAS	Analytes	CAS
Indoxacarb	144171-61-9	Mevinphos	7786-34-7	Phosfolan	947-02-4	Pyridalyl	179101-81-6
Iodofenphos	18181-70-9	Mirex	2385-85-5	Phosmet	732-11-6	Pyridaphenthion	119-12-0
Iprobenfos	26087-47-8	Molinate	2212-67-1	Phosphamidon	13171-21-6	Pyrifenox	88283-41-4
Iprodione	36734-19-7	Monocrotophos	6923-22-4	Phoxim	14816-18-3	Pyrimethanil	53112-28-0
Iprodione, Impurity RP30228	63637-89-8	Myclobutanil	88671-89-0	Phthalide	87-41-2	Pyrimidifen	105779-78-0
Iprovalicarb	140923-17-7	Naled	300-76-5	Picolinafen	137641-05-5	Pyriminobac-methyl-E	136191-64-5
Isazofos	42509-80-8	Naphthylacetamide, 1-	86-86-2	Picoxystrobin	117428-22-5	Pyriminobac-methyl-Z	147411-70-9
Isocarboxphos	24353-61-5	Naproanilide	52570-16-8	Piperonyl butoxide	51-03-6	Pyriproxyfen	95737-68-1
Isodrin	465-73-6	Napropamide	15299-99-7	Piperophos	24151-93-7	Pyroquilon	57369-32-1
Isofenphos	25311-71-1	Nicotine	54-11-5	Pirimicarb	23103-98-2	Quinalphos	13593-03-8
Isofenphos-Methyl	99675-03-3	Nitralin	4726-14-1	Pirimiphos-Ethyl	23505-41-1	Quinoclamine	2797-51-5
Isofenphos-oxon	31120-85-1	Nitrapyrin	1929-82-4	Pirimiphos-Methyl	29232-93-7	Quinoxifen	124495-18-7
Isoprocarb	2631-40-5	Nitrofen	1836-75-5	Pretilachlor	51218-49-6	Quintozene	82-68-8
Isopropalin	33820-53-0	Nitrothal-Isopropyl	10552-74-6	Probenazole	27605-76-1	Quizalofop-Ethyl	76578-14-8
Isoprothiolane	50512-35-1	Norflurazon	27314-13-2	Prochloraz	67747-09-5	Resmethrin	10453-86-8
Isoxathion	18854-01-8	Nuarimol	63284-71-9	Procymidone	32809-16-8	Silafluofen	105024-66-6
Kresoxim-Methyl	143390-89-0	Omethoate	1113-02-6	Profenofos	41198-08-7	Simazine	122-34-9
Lenacil	2164-08-1	Orthophenylphenol	90-43-7	Prohydrojasmon	158474-72-7	Simeconazole	149508-90-7
Leptophos	21609-90-5	Oryastrobin	248593-16-0	Promecarb	2631-37-0	Simetryn	1014-70-6
Linuron	330-55-2	Oxabetrinil	74782-23-3	Prometon	1610-18-0	Spirodiclofen	148477-71-8
Malaaxon	1634-78-2	Oxadiazon	19666-30-9	Prometryn	7287-19-6	Spiromesifen	283594-90-1
Malathion	121-75-5	Oxadixyl	77732-09-3	Propachlor	1918-16-7	Spiroxamine	118134-30-8
MCPA-thioethyl	25319-90-8	Oxpoconazole fumarate	174212-12-5	Propamocarb	24579-73-5	Sulfallate	95-06-7
MCPB	94-81-5	oxy-Chlordane	27304-13-8	Propanil	709-98-8	Sulfotep	3689-24-5
MCPB-ethyl	10443-70-6	Oxyfluorfen	42874-03-3	Propaphos	7292-16-2	Sulprofos	35400-43-2
Mecarbam	2595-54-2	Paclobutrazol	76738-62-0	Propaquizafop	111479-05-1	Swep	1918-18-9
Mefenacet	73250-68-7	Paraoxon-Methyl	950-35-6	Propargite	2312-35-8	TCMTB	21564-17-0
Mefenpyr-Diethyl	135590-91-9	Parathion-ethyl	56-38-2	Propazine	139-40-2	Tebuconazole	107534-96-3
Mepanipyrin	110235-47-7	Parathion-Methyl	298-00-0	Propetamphos	31218-83-4	Tebufenpyrad	119168-77-3
Mepronil	55814-41-0	Pebulate	1114-71-2	Propham	122-42-9	Tebupirimfos	96182-53-5
Metalaxil-m	70630-17-0	Penconazole	66246-88-6	Propiconazole	60207-90-1	Tebuthiuron	34014-18-1
Metalaxyl	57837-19-1	Pencycuron	66063-05-6	Propisochlor	86763-47-5	Tecnazene	117-18-0
Metazachlor	67129-08-2	Pendimethalin	40487-42-1	Propoxur	114-26-1	Tefluthrin	79538-32-2
Methacrifos	62610-77-9	Pentachloroaniline	527-20-8	Propyzamide	23950-58-5	Temephos	3383-96-8
Methamidophos	10265-92-6	Pentachlorophenol	87-86-5	Proquinazid	189278-12-4	Terbacil	5902-51-2
Methidathion	950-37-8	Pentoxazone	110956-75-7	Prosulfocarb	52888-80-9	Terbucarb	1918-11-2
Methiocarb	2032-65-7	Permethrin, cis-	61949-76-6	Prothiofos	34643-46-4	Terbufos	13071-79-9
Methomyl-oxime	13749-94-5	Permethrin, trans-	61949-77-7	Pyraclifos	89784-60-1	Terbumeton	33693-04-8
Methoprene	40596-69-8	Perthane	72-56-0	Pyraclostrobin	175013-18-0	Terbutylazine	5915-41-3
Methoxychlor	72-43-5	Phenmedipham	13684-63-4	Pyraflufen-Ethyl	129630-19-9	Terbutryn	886-50-0
Metolachlor	51218-45-2	Phenothrin	26002-80-2	Pyrazophos	13457-18-6	Tetrachlorvinphos	22248-79-9
Metolachlor-s	87392-12-9	Phenthoate	2597-03-7	Pyrazoxyfen	71561-11-0	Tetraconazole	112281-77-3
Metolcarb	1129-41-5	Phorate	298-02-2	Pyrethrins	8003-34-7	Tetradifon	116-29-0
Metominostrobin	133408-50-1	Phorate-Sulfone	2588-04-7	Pyributicarb	88678-67-5	Tetrahydrophthalimide	1469-48-3
Metribuzin	21087-64-9	Phosalone	2310-17-0	Pyridaben	96489-71-3	Tetramethrin	7696-12-0

#### Lab.Instruments s.r.l.

70013 Castellana Grotte(BA) Italy - S.S. 172 (Putignano-Alberobello) Km 28+200

Tel +39 080 4969746-9 - Fax +39 080 2121749

Email: info@labinstruments.it - Website: www.labinstruments.org

Part.IVA: 03176570723 - C.C.I.A.A. n. 247858 Trib. Bari n. 12439

#### Accreditations and Certifications

ISO 17034:2016

UNI EN ISO 14001:2015

ISO/IEC 17025:2017

UNI EN ISO 9001:2015

Analytes	CAS	Analytes	CAS	Analytes	CAS	Analytes	CAS
Thenylchlor	96491-05-3	Tolclofos-Methyl	57018-04-9	Trichlamide	70193-21-4	Triticonazole	131983-72-7
Thiabendazole	148-79-8	Tolfenpyrad	129558-76-5	Trichlorfon	52-68-6	Uniconazole-P	83657-17-4
Thiacloprid	111988-49-9	Tolyfluanid	731-27-1	Tricyclazole	41814-78-2	Vamidothion	2275-23-2
Thiamethoxam	153719-23-4	Tralomethrin	66841-25-6	Tridemorph	24602-86-6	Vamidothion sulfone	70898-34-9
Thifluzamide	130000-40-7	Triadimefon	43121-43-3	Trifloxystrobin	141517-21-7	Vinclozolin	50471-44-8
Thiobencarb	28249-77-6	Triadimenol	55219-65-3	Triflumizole	68694-11-1	XMC	2655-14-3
Thiocyclam-Oxalate	31895-22-4	Tri-Allate	2303-17-5	Triflumizole, FM-6-1	131549-75-2	Xylycarb	2425-10-7
Thiometon	640-15-3	Triazophos	24017-47-8	Trifluralin	1582-09-8	Zoxamide	156052-68-5
Thionazin	297-97-2	Tribufos	78-48-8				

### Optional Internal Standards

Analytes	CAS	Analytes	CAS	Analytes	CAS	Analytes	CAS
Acephate D6	2109699-73-0	Diethofencarb D7		Fosthiazate D5		Linuron D6	1219804-76-8
Carbaryl D7	362049-56-7	EPN D5		Imazalil D5	1398065-91-2	Metolachlor D6	1219803-97-0
Chlorpyrifos D10	285138-81-0	Esfenvalerate D7		Iprobenfos D7		Pendimethalin D5	1219803-39-0
Diazinon D10	100155-47-3	Etofenprox D5		Isoprothiolane D4	1715020-82-8	Thiabendazole 13C6	
Dichlorvos D6	203645-53-8	Fenitrothion D6	203645-59-4	Isoxathion-D10			

#### Lab.Instruments s.r.l.

70013 Castellana Grotte(BA) Italy - S.S. 172 (Putignano-Alberobello) Km 28+200

Tel +39 080 4969746-9 - Fax +39 080 2121749

Email: [info@labinstruments.it](mailto:info@labinstruments.it) - Website: [www.labinstruments.org](http://www.labinstruments.org)

Part.IVA: 03176570723 - C.C.I.A.A. n. 247858 Trib. Bari n. 12439

#### Accreditations and Certifications

ISO 17034:2016

UNI EN ISO 14001:2015

ISO/IEC 17025:2017

UNI EN ISO 9001:2015