



iMethod™ Applications for  
Food and Beverage Analysis

## A Rapid iMethod™ Application for Screening Pesticides V.2.4 for Cliquid® Software

*Details on the EU MRL pesticide list iMethod™ Application modules*



# A Rapid iMethod™ Application for Screening Pesticides V.2.4 for Cliquid® Software

*Tools for routine testing labs for easy implementation of pesticide screening in food, water, and other consumer products compatible to the EU MRL list*

## Overview

With more than 800 pesticides currently in use there is growing concern by government agencies about the effect of pesticide exposure on human health. As a result, the residue level of pesticides in food, water and other consumer products are highly regulated. While analytical techniques like GC or GC/MS have traditionally been used for pesticide analysis, LC/MS/MS has quickly become the technique of choice due to the ability to analyze a more diverse set of pesticides faster and with better sensitivity and less sample preparation.

The following description outlines an overview of the AB SCIEX iMethod™ Application for Pesticide Screening and Quantitation using a 3200 Q TRAP® system, 4000 Q TRAP® system, or the QTRAP® 5500 LC/MS/MS system. This iMethod™ application consists of a pre-configured method to screen for 384 pesticides, consisting of a positive polarity method and a negative polarity method to screen for analytes identified in the EU MRL list of regulated pesticides. See Table 1 for the comprehensive list of compounds included in these iMethod™ Application modules.

The iMethod™ application contains multiple sample preparation approaches, including EN 15662, AOAC Method 2007.01, and several others, instrument parameter information, and expected retention times for 3 different HPLC systems – the Shimadzu Prominence, the Agilent 1200, and the Eksigent ekspert™ ultraLC 100 and 100XL. The iMethod™ application also includes the required analytical columns for the analysis. Solvents, standards and any supplies required for sample preparation are not included.

Please note that the use of QTRAP® system technology is recommended for use with the screening method provided and that the associated library is not included and may be purchased separately. The compound library includes 603 pesticide compounds, and the catalogue can be used to create customized test methods according to any desired list of compounds.

## Experimental details

The pesticide screening method included in this iMethod™ application is for the routine screening of 384 pesticides from food samples using the QuEChERS extraction and cleanup technique, although several other sample preparation approaches, including one for the analysis of pesticides in water by direct injection, are provided within the method SOP. The method uses external calibration standards and matrix spike recoveries to correct for sample and instrument variability and is based upon the use of a 3200 Q TRAP® system, 4000 Q TRAP® system, or the QTRAP® 5500 LC/MS/MS system.

## Quantitation Methods

The complete iMethod™ application for pesticide analysis also contains 5 quantitative analysis modules for targeted quantitation of classes of pesticides ranging from carbamates and organophosphorous compounds to acidic pesticides, triazines, and phenyl ureas. The methodology for this iMethod™ Application was developed to quantify each pesticide at < 10 ppb in order to meet regulatory requirements.

Example sample preparation procedures are provided for fruits and vegetables, based upon a simple sample homogenization, centrifugation, extraction and dilution. These procedures may require additional optimization based upon the actual composition and consistency of the fruit or vegetable under investigation. Deuterated and/or C13-labeled internal standards of known concentrations are added during sample preparation to monitor sample recovery. Additionally, iDQuant™ Standards kits, which contain 204 common pesticides in 10 easy-to-use and certified mixes, may also be used with this iMethod™ application to simplify standards preparation or for internal or external calibration.

For more details on the quantitative analysis modules, please email us at [support@absciex.com](mailto:support@absciex.com).

**Table 1a. Pesticides analyzed using positive polarity**

Pesticide Name			
3,4,5-Trimethacarb	Difenoconazole	Indoxacarb	Pirimiphos-methyl
3-Hydroxycarbofuran	Diffubenzuron	Iodosulfuron-methyl	Prochloraz
Acephate	Diffufenican	Ipconazole	Procymidone
Acequinocyl	Dimethachlor	Iprodione	Profenofos
Acetamiprid	Dimethenamide	Iprovalicarb	Prohexadione
Acetochlor	Dimethoate	Isoproturon	Propachlor
Acibenzolar-S-methyl	Dimethomorph	Isopyrazam	Propamocarb
Aclonifen	Dimoxystrobin	Isoxaben	Propanil
Acrinathrin	Diniconazole	Isoxaflutole	Propaquizafop
Alachlor	Dioxathion	Kresoxim-methyl	Propargite
Ametoctradin	Diphenylamine	Lactofen	Propham
Amidosulfuron	Disulfoton	lambda-Cyhalothrin	Propiconazole
Aminopyralid	Disulfotone-sulfone	Lenacil	Propoxur
Amitraz	Disulfotone-sulfoxid	Linuron	Propoxycarbazone
Amitrole	Diuron	Lufenuron	Propyzamide
Anilazine	Dodine	Malaoxon	Proquinazid
Aramite	Emamectin B1a	Malathion	Prosulfocarb
Atrazine	Epoconazole	Mandipropamid	Prosulfuron
Avermectin B1a	Esfenvalerate	MCPA-2-Ethylhexylester	Prothioconazole
Avermectin B1b	Ethalfuralin	MCPA-butotyl	Prothioconazole desthio
Azadirachtin	Ethirimol	Mecarbam	Pymetrozine
Azimsulfuron	Ethofumesate	Mepanipyrim	Pyraclostrobin
Azinphos-ethyl	Ethoprophos	Mepronil	Pyraflufen-ethyl
Azinphos-methyl	Ethoxyquin	Mesosulfuron-methyl	Pyrazophos
Azoxystrobin	Ethoxysulfuron	Mesotrione	Pyrethrin I
Barban	Etofenprox	Metaflumizone	Pyrethrin II
Beflubutamid	Etoxazole	Metaxyl	Pyridaben
Benalaxyl	Famoxadone	Metamitron	Pyridalyl
Benfluralin	Fenamidone	Metazachlor	Pyridate
Benfuracarb	Fenarimol	Metconazole	Pyrimethanil
Bentazone	Fenazaquin	Methacrifos	Pyriproxyfen
Benthiavalicarb-isopropyl	Fenbuconazole	Methamidophos	Pyroxsulam
Bifenazate	Fenchlorphos	Methiocarb	Quinalphos
Bifenox	Fenhexamid	Methiocarb-sulfone	Quinmerac
Bifenthrin	Fenitrothion	Methiocarb-sulfoxide	Quinoxifen
Binapacryl	Fenoxaprop	Methomyl	Quizalofop-ethyl
Bitertanol	Fenoxycarb	Methoxyfenozide	Quizalofop-P (free acid)
Boscalid	Fenpropathrin	Metolachlor	Resmethrin
Bromophos-ethyl	Fenpropidin	Metosulam	Rimsulfuron
Bromuconazole	Fenpropimorph	Metrafenone	Rotenone
Bupirimate	Fenpyroximate	Metribuzin	Sethoxydim
Buprofezin	Fenvalerate	Metsulfuron-methyl	Silthiofam
Captafol	Fipronil	Mevinphos	Spinetoram A
Carbaryl	Flazasulfuron	Milbemectin A3	Spinosyn A
Carbendazim	Flonicamid	Milbemectin A4	Spinosyn D
Carbetamide	Florasulam	Molinate	Spirodiclofen
Carbofuran	Fluazifop (free acid)	Monolinuron	Spiromesifen
Carbosulfan	Fluazifop-butyl	Monuron	Spirotetramat
Carboxin	Flubendiamide	Myclobutanil	Spiroxamine
Chlorantranilprole	Flucycloxuron	Napropamide	Sulcotrione
Chlorbufam	Flucythrinate	Nicosulfuron	Sulfosulfuron
Chloridazon	Fludioxonil	Novaluron	tau-Fluvalinate
Chlorothalonil	Flufenacet	Omethoate	Tebuconazole

<i>Chlorotoluron</i>	<i>Flufenoxuron</i>	<i>Oxadiargyl</i>	<i>Tebufenozide</i>
<i>Chloroxuron</i>	<i>Flumioxazin</i>	<i>Oxadiazon</i>	<i>Tebufenpyrad</i>
<i>Chlorpropham</i>	<i>Fluometuron</i>	<i>Oxadixyl</i>	<i>Teflubenzuron</i>
<i>Chlorpyrifos</i>	<i>Fluopicolide</i>	<i>Oxamyl</i>	<i>Tefluthrin</i>
<i>Chlorpyrifos-methyl</i>	<i>Fluoroglycofene-ethyl</i>	<i>Oxasulfuron</i>	<i>TEPP</i>
<i>Chlorsulfuron</i>	<i>Fluoxastrobin</i>	<i>Oxycarboxin</i>	<i>Tepraloxymid</i>
<i>Chlorthiamid</i>	<i>Flupyr-sulfuron-methyl</i>	<i>Oxydemeton-methyl</i>	<i>Terbufos</i>
<i>Chromafenozide</i>	<i>Fluquinconazole</i>	<i>Oxyfluorfen</i>	<i>Terbutylazine</i>
<i>Cinidon-ethyl</i>	<i>Flurochloridone</i>	<i>Paclobutrazol</i>	<i>Tetraconazole</i>
<i>Clethodim</i>	<i>Fluroxypyr</i>	<i>Paraoxon</i>	<i>Thiabendazole</i>
<i>Clodinafop-propargyl</i>	<i>Fluroxypyr-meptyl</i>	<i>Paraoxon-methyl</i>	<i>Thiacloprid</i>
<i>Clofentezine</i>	<i>Flurprimidole</i>	<i>Parathion</i>	<i>Thiamethoxam</i>
<i>Clomazone</i>	<i>Flurtamone</i>	<i>Parathion-methyl</i>	<i>Thifensulfuron-methyl</i>
<i>Clopyralid</i>	<i>Flusilazole</i>	<i>Penconazole</i>	<i>Thiobencarb</i>
<i>Clothianidin</i>	<i>Flutolanil</i>	<i>Pencycuroton</i>	<i>Thiodicarb</i>
<i>Cyazofamid</i>	<i>Flutriafol</i>	<i>Pendimethalin</i>	<i>Tolclofos-methyl</i>
<i>Cycloxydim</i>	<i>Folpet</i>	<i>Penoxsulam</i>	<i>Tolyfluanid</i>
<i>Cyflufenamid</i>	<i>Foramsulfuron</i>	<i>Permethrin</i>	<i>Toprimezone</i>
<i>Cyfluthrin</i>	<i>Forchlorfenuron</i>	<i>Pethoxamid</i>	<i>Tralkoxydim</i>
<i>Cyhalofop-butyl</i>	<i>Formetanate</i>	<i>Phenmedipham</i>	<i>Triadimefon</i>
<i>Cymoxanil</i>	<i>Fosthiazate</i>	<i>Phorate</i>	<i>Triadimenol</i>
<i>Cypermethrin</i>	<i>Fuberidazole</i>	<i>Phorate oxon</i>	<i>Tri-allate</i>
<i>Cyproconazole</i>	<i>Furathiocarb</i>	<i>Phorate oxon sulfoxide</i>	<i>Triazophos</i>
<i>Cyprodinil</i>	<i>Gibberellic acid</i>	<i>Phorate sulfone</i>	<i>Tribenuron-methyl</i>
<i>Daminozide</i>	<i>Halosulfuron-methyl</i>	<i>Phorate sulfoxide</i>	<i>Trichlorfon</i>
<i>Dazomet</i>	<i>Haloxypop-etotyl</i>	<i>Phorate-sulfone</i>	<i>Tricyclazole</i>
<i>Deltamethrin</i>	<i>Haloxypop-methyl</i>	<i>Phorate-sulfoxide</i>	<i>Tridemorph</i>
<i>Demeton-S-methyl-sulfone</i>	<i>Haloxypop-P</i>	<i>Phosalone</i>	<i>Trifloxystrobin</i>
<i>Desmedipham</i>	<i>Hexaconazole</i>	<i>Phosmet</i>	<i>Triflumizole</i>
<i>Desmethyl-pirimecarb</i>	<i>Hexythiazox</i>	<i>Phosmet-oxon</i>	<i>Triflumuron</i>
<i>Di-allate</i>	<i>Imazalil</i>	<i>Phosphamidon</i>	<i>Trifluralin</i>
<i>Diazinon</i>	<i>Imazamox</i>	<i>Phoxim</i>	<i>Triflurosulfuron-methyl</i>
<i>Dichlorvos</i>	<i>Imazaquin</i>	<i>Picolinafen</i>	<i>Tritosulfuron</i>
<i>Diclofop-methyl</i>	<i>Imazosulfuron</i>	<i>Picoxystrobin</i>	<i>Valifenalate</i>
<i>Diethofencarb</i>	<i>Imidacloprid</i>	<i>Pirimicarb</i>	<i>Zoxamide</i>

**Table 2b. Pesticides analyzed using negative polarity**

Pesticide Name			
<i>1-Naphthylacetic acid</i>	<i>Chloridazon</i>	<i>Fipronil</i>	<i>Lufenuron</i>
<i>2,4,5-T</i>	<i>Clopyralid</i>	<i>Fluazinam</i>	<i>MCPA</i>
<i>2,4,6-Trichlorophenol</i>	<i>Cyclanilide</i>	<i>Fludioxonil</i>	<i>MCPB</i>
<i>2,4-D</i>	<i>Dicamba</i>	<i>Flufenoxuron</i>	<i>MCPP</i>
<i>2,4-DB</i>	<i>Dichlorprop</i>	<i>Fuberidazole</i>	<i>Metamitron</i>
<i>Asulam</i>	<i>Dinoseb</i>	<i>Gibberellic acid</i>	<i>Metsulfuron-methyl</i>
<i>Bentazone</i>	<i>Dinoterb</i>	<i>Ioxynil</i>	<i>Prothioconazole</i>
<i>Bromoxynil</i>	<i>Dithianon</i>	<i>Iprodione</i>	<i>Triclopyr</i>

Get additional details on customizing a pesticide screen for your specific laboratory application by contacting AB SCIEX at support@absciex.com.

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