



Testing of Pesticide Residues in Foods – Results Calculation and Reporting

24 October 2013



Pesticide Residues in Food Regulation



Public Health and Municipal Services Ordinance (Cap. 132)
Pesticide Residues in Food Regulation (Cap.132CM)

- Enacted on 1 August 2012 with 2 years grace period.
- Grace period
To allow sufficient time for the trade to comply with the Regulation, there would be a grace period of two years prior to the commencement of the Regulation. The Regulation will commence on 1 August 2014.





Pesticide Residues in Food Regulation

- Number of pesticides in Regulation:
 - 360 pesticides
- Number of Maximum Residue Limit (MRL) /Extraneous Maximum Residue Limit (EMRL)
 - Approximate 7000 limits
- Food types:
 - Include different foods from plant and animal origins
 - Include foods of high fiber, high protein, high fat, high carbohydrate, high water content, etc.





Websites

Pesticide Residues in Food Regulation

<http://www.gld.gov.hk/egazette/pdf/20121618/es22012161873-1.pdf>

<http://www.gld.gov.hk/egazette/english/gazette/pdf.php?extra=0&year=2012&month=05&day=04&vol=16&no=18&gn=&type=2&id=73>

食物內除害劑殘餘規例

<http://www.gld.gov.hk/egazette/pdf/20121618/cs22012161873-1.pdf>

http://www.gld.gov.hk/egazette/tc_chi/gazette/pdf.php?extra=0&year=2012&month=05&day=04&vol=16&no=18&gn=&type=2&id=73



354 pesticides

Schedule 1

[ss. 2, 4, 5 & 6]

Part 1

Maximum Residue Limit (MRL)

Column 1	Column 2	Column 3	Column 4	Column 5
Item	Pesticide	Residue definition	Description of food	Maximum residue limit (MRL) (mg/kg)
1.1	1-Naphthaleneacetic acid	Sum of 1-naphthaleneacetic acid and its conjugates, expressed as 1-naphthaleneacetic acid	Orange, Sweet	0.1
1.2	1-Naphthaleneacetic acid	Sum of 1-naphthaleneacetic acid and its conjugates, expressed as 1-naphthaleneacetic acid	Tangerine	0.1

Schedule 1—Part 1

Pesticide Residues in Food Regulation

L.N. 73 of 2012
B2911

6 pesticides

Part 2

Extraneous Maximum Residue Limit (EMRL)

Column 1	Column 2	Column 3	Column 4	Column 5
Item	Pesticide	Residue definition	Description of food	Extraneous maximum residue limit (EMRL) (mg/kg)
1.1	Aldrin and Dieldrin	Sum of HHDN and HEOD	Berries and other small fruits	0.05
1.2	Aldrin and Dieldrin	Sum of HHDN and HEOD	Citrus fruits	0.05
1.3	Aldrin and Dieldrin	Sum of HHDN and HEOD	“Assorted tropical and sub-tropical fruits—inedible peel”, except banana, mango and pineapple	0.05
1.4	Aldrin and Dieldrin	Sum of HHDN and HEOD	Banana	0.02
1.5	Aldrin and Dieldrin	Sum of HHDN and HEOD	Mango	0.03



Testing Objectives

- Instead of report and analyse individual pesticide residues, Testing Method(s) shall be able to analyse the pesticide residues according to the stated residue definition.
- The Reporting Limit of an appropriate testing method shall be at least equal to or lower than the regulatory limit.





Testing Objectives

- MRLs/EMRLs of the same pesticide may be different for different foods
 - Reporting limits of the pesticide concerned may also be different for different foods

Item	Pesticide	Residue definition	Description of food	MRL (mg/kg)
8.6	Acephate	Acephate	Pome fruits	0.5
8.7	Acephate	Acephate	Stone fruits	0.5
8.8	Acephate	Acephate	Assorted tropical and sub-tropical fruits - edible peel	0.5
8.9	Acephate	Acephate	Maize	0.2
8.10	Acephate	Acephate	Wheat	0.2





Testing Objectives

- According to the regulation, some foods may require lower reporting limits (<0.1mg/kg)

Pesticide	Food	MRL (mg/kg)
Diazinon	Maize	0.02
Chlorpyrifos	Mango	0.05
Azinphos Methyl	Apple	0.05





Results Calculation and Reporting

Example 1: Determination of Chlorpyrifos in Orange

MRL of Chlorpyrifos in Citrus Fruits = 2 mg/kg

Reporting Limit (RL) = 2 mg/kg

Residue definition : Chlorpyrifos

Sample A : conc. of chlorpyrifos = 1.5 mg/kg

Reporting as = < RL or <2 mg/kg or ND

Notes :

ND : "Not detected" means that the concentration of the target analyte, if present, was found to be lower than the reporting limit of the respective matrix.

Sample B : conc. of chlorpyrifos = 4 mg/kg

Reporting as = 4 mg/kg





Results Calculation and Reporting

Example 2: Determination of DDT in Orange

MRL of DDT in Citrus Fruits = 0.05 mg/kg

Reporting Limit (RL) = 0.05 mg/kg

Residue definition : Sum of p,p'-DDT, o,p'-DDT, p,p'-DDE and p,p'-TDE (DDD)

Sample A : conc. of p,p'-DDT = 0.03 mg/kg

conc. of o,p'-DDT = 0.01 mg/kg

conc. of p,p'-DDE = 0.02 mg/kg

conc. of p,p'-TDE = 0.01 mg/kg

Conc. of Total DDT = $0.03 + 0.01 + 0.02 + 0.01 = 0.07$ mg/kg

Reporting as = 0.07 mg/kg





Results Calculation and Reporting

Example 3: Determination of Aldicarb in Orange

MRL of Aldicarb in Citrus Fruits = 0.2 mg/kg

Reporting Limit (RL) = 0.2 mg/kg

Residue definition : Sum of aldicarb and its sulphoxide and sulphone, expressed as aldicarb

Sample A : conc. of Aldicarb = 0.30 mg/kg

conc. of Aldicarb Sulphoxide = 0.10 mg/kg

conc. of Aldicarb Sulphone = 0.20 mg/kg

Conc. of Total Aldicarb = ?





Results Calculation and Reporting

Example 3: Determination of Aldicarb in Orange

Another way is to prepare Calibration Standards according to the concentration of marker residue prior to analysis.

Then the concentration determined in sample is directly expressed as the marker residue. Thus, the concentration of analytes can be added directly.

Sample A :

Conc. of Aldicarb = 0.30 mg/kg

Conc. of Aldicarb Sulfoxide expressed as Aldicarb = 0.092 mg/kg

Conc. of Aldicarb Sulphone expressed as Aldicarb = 0.171 mg/kg

Conc. of Total Aldicarb = $0.30 + 0.0922 + 0.171 = 0.56$ mg/kg
Reporting as = 0.56 mg/kg





Results Calculation and Reporting

Example 4: Determination of Methomyl in Orange

MRL of Methomyl in Citrus Fruits = 1 mg/kg

Reporting Limit (RL) = 1 mg/kg

Residue definition : Sum of methomyl and thiodicarb, expressed as methomyl

Sample A : conc. of Methomyl = 2 mg/kg

 conc. of Thiodicarb = 1 mg/kg

Conc of Total Methomyl = ?

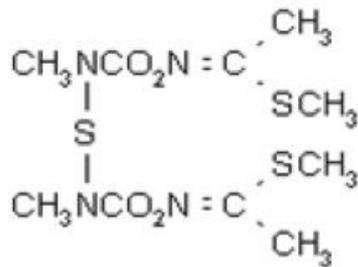




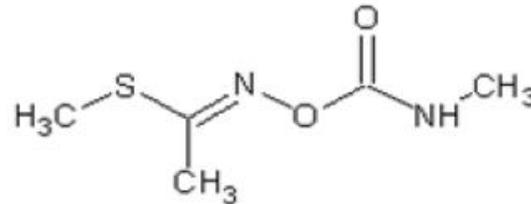
Results Calculation and Reporting

Example 4: Determination of Methomyl in Orange

Thiodicarb



Methomyl



Sample A :

conc. of Methomyl = 2 mg/kg

conc. of Thiodicarb = 1 mg/kg

conc. of Thiodicarb expressed as Methomyl

= 1 mg/kg x (2 x MW of Methomyl / MW of Thiodicarb)

= 1 mg/kg x (2 x 162.2 / 354.5) = 0.92 mg/kg

Total Methomyl = 2 mg/kg + 0.92 mg/kg = 2.9 mg/kg



Sampling - Portion of Commodity for Analysis



Codex Alimentarius Commission (Codex) Standard

- Portion of Commodities to which is analysed
CAC/GL 41-1993 (Amendment 2010)



Sampling - Portion of Commodity for Analysis

Codex Alimentarius Commission (Codex) Standard

- Codex Classification of Foods and Animal Feeds

Codex Alimentarius Volume 2, Pesticides Residues in Food, Second Edition.



Sampling - Portion of Commodity for Analysis

Peach (Stone fruits)

– Whole commodity after removal of stems and stone, calculated on the whole commodity without stem



Calculations:

For example, Peach

- Weight of the whole commodity **without stem (with stone)** = 100 g
- Weight of the whole commodity after **removal of stems and stone** = 70 g

If the **concentration** of pesticide for the portion of commodity for analysis (the whole commodity after removal of stems and stone) = **1.0 mg/kg**

then the concentration of the pesticide **calculated on the whole commodity without stem**

$$= 1.0 \text{ mg/kg} * 70\text{g} / 100\text{g} = 0.7 \text{ mg/kg}$$





Thank you!

