

# PHYTOCHEMICAL METABOLITE LIBRARY OF STANDARDS

Cat No. PHYTOMLS



**CONVENIENT 96-WELL FORMAT** Easy storage, no glass bottles  
Plated to allow row multiplexing for efficient processing

**HIGH PURITY and STABLE**

Supplied as 5 µg dried weight; plenty of material for multiple injections

**MLSDiscovery™ SOFTWARE**

Data processing, data collection and data reduction tool creates libraries in hours

**PHYTOMLS™** (Phytochemical Metabolite Library of Standards) is a collection of high-quality phytochemicals produced by many edible plants. These are high purity (>95%) compounds supplied in an economical, ready-to-use format. These plant standards are most commonly used to provide retention times and spectra for these key metabolic compounds, help optimize mass spectrometry analytical protocols, and qualify and quantify mass spectrometry sensitivity and limit of detection.

Diets containing fruits, vegetables, whole grains, legumes, nuts and plant-based beverages include many bioactive phytochemicals such as carotenoids, phenolic acids, flavonoids, stilbenes, hydroxycinnamic acids, phytosterols and lignans. Through various physiological mechanisms these compounds have protective or disease preventative properties and many studies have been undertaken to reveal the health benefits of phytochemicals. Afterall, you are what you eat!

## Features and Benefits

### *Compounds*

**PHYTOMLS** contains 364 unique primary and secondary plant metabolites covering key metabolic pathways, including the following classes of compounds:

- Terpenes
- Phytosterols
- Flavonoids
- Phenolic acids
- Tannins
- Stilbenes
- Lignans
- Carotenoids

### *Convenient*

- High purity metabolites, pre-weighed, supplied dried, 5µg each compound
- Ideal for mass spectrometry metabolomics applications

## Formatted

- Arrayed in (4) four 96-well plates
  - Greiner MASTERBLOCK® #780215, polypropylene deep-well (total volume per well = 1.2 mL) in combination with seal, Greiner VIEWseal #676070
- Suitable for manual and automated work flow

## Software

**MLSDiscovery** software package is distributed with and is tailored to work with IROA Mass Spec Standards to help build a physical mass spectral library using the analytical conditions that are normally employed in the user laboratory. MLSDiscovery collects spectra, retention time, mass and relative intensity information for compounds, fragments and adducts.

The software supports most MS data files. The requirements of the program are that:

- 1) The computer should have at least 8 GB of RAM; Windows 7 or higher;
- 2) Data files must be able to be converted to mzXML format.

To facilitate the use of the program a MLSDiscovery User Manual is provided to help you run through the standard workflow.

## Plate Map

The library compounds are arranged in (4) four 96-well polypropylene plates with alphanumeric assigned positions. Please refer to plate map excel sheet that comes with the library for compound locations and identifiers.

**Occasionally the map plate will change due to the availability of compounds. Although we try to make sure that the compounds of each row have distinct molecular weights and can be multiplexed, users should refer to the plate map before proceeding.**

**The plate map contains descriptors and represents information gathered from multiple databases and therefore may contain errors. We suggest that the information provided is carefully reviewed. To help build a better database, please report any discrepancies.**

The excel spreadsheet plate map includes columns **A-Q** as follows:

- A. Plate number** - total number of plates is four (4).

- B. Plate row letter** - rows are marked A-H.
- C. Plate column number** - columns are numbered 1-12.
- D. Primary compound name** – from KEGG or PubChem where available.
- E. SMILES** – from [https://pubchem.ncbi.nlm.nih.gov/search/help\\_search.html#Smiles](https://pubchem.ncbi.nlm.nih.gov/search/help_search.html#Smiles)  
SMILES -- **S**implified **M**olecular **I**nput **L**ine **E**ntry **S**ystem, a chemical structure *line notation* (a typographical method using printable characters) for entering and representing molecules. SMILES strings can be imported or exported from many molecular editors.
- F. Molecular formula** – formula of neutral form without salts or water (except in cases where compound has an innate positive charge).
- G. KEGG ID or ChemSpider ID (CSID)** – KEGG number where available, otherwise CSID provided.
- H. CAS ID**– a unique numerical identifier assigned by Chemical Abstracts Service, a division of the American Chemical Society, to every chemical substance described in the open scientific literature.
- I. HMDB/YMDB ID** – Human Metabolome Data Base or Yeast Metabolome Data Base ID number. Either the chemical name or the CAS number was used to search for the HMDB/YMDB ID entry.
- J. Neutral monoisotopic mass**
- K. METLIN ID** – Scripps Center for Metabolomics and Mass Spectrometry; HMDB, KEGG or CAS number used for METLIN lookup.
- L. PC CID** – PubChem Compound Database ID; HMDB, KEGG or CAS number used for PC CID lookup.
- M. PC SID** – PubChem Substance Database ID; PC CID, KEGG or CAS number used for PC SID lookup.
- N. CHEBI** – Chemical Entities of Biological Interest (ChEBI); HMDB, KEGG or CAS number used for ChEBI lookup.
- O. Supplier compound name**
- P. Supplier URL**
- Q. Supplier Cat. No.**

## Preparation Instructions

PHYTOMLS compounds are conveniently provided at 5 µg per well, enough for multiple injections. The compounds can either be used as standards and injected individually or mixed in such a way that the entire library may be examined with reasonable efficiency. Across all plates

the compounds in each row *may* all have unique masses; mixing compounds by row *may* allow multiple compounds to be analyzed per injection.

The following are suggestions and dependent on user chromatography and instrumentation.

- 1) Individual injections. As standards, each well represents a single compound; the entire library may be examined in great detail in 364 injections for each of the unique compounds. (Volumes of approximately 250  $\mu$ L may be considered).
- 2) Simple multiplex injections. If each row of each plate is pooled, then the entire collection may be analyzed in 31 injections of simple mixtures. Keep the well volume to 100  $\mu$ l or less to prevent loss due to dilution and take 5-10  $\mu$ l of each well for the pooled sample, then inject 2, 4, or 6  $\mu$ l of the pooled material as needed.

**Note:** Be sure to check the individual masses across plate rows to ensure these compounds can be separated with the chromatographic system employed.

### *Solubilization and compound preparation procedure*

The following are suggestions and dependent on user chromatography and instrumentation.

- 1) Use high-quality solvents. Compounds in Plate 1 & 2 can be solubilized using Ethanol; compounds in Plate 3 (all compounds) and Plate 4 Rows A-D are Water soluble and Plate 4 Rows E-H are Methanol soluble. Pipet liquid up and down in the well 2-3 times to facilitate solubilization.
- 2) Pool compounds as desired for multiplexing. Again, be sure to check the compound masses you wish to multiplex on the plate map to ensure you can adequately separate the compounds using your chromatographic system prior to pooling.

### Precautions and Disclaimer

The PHYTOMLS product is for laboratory research use only. Wear safety glasses and handle with gloves. Avoid contact with skin and eyes. Please consult the Safety Data Sheet for safe handling practices and hazards information.

### Storage/Stability

Store plates at -20° C. Once diluted the plates should be resealed and kept at -20° C or -80° C for long-term storage and protected from moisture and light. Avoid repeated freeze/thaw cycles.

## Metabolite Libraries Available from IROA

**MS Metabolite Library of Standards (MSMLS)** - Over 600 unique compounds arrayed in seven (7) 96-well plates that span a broad range of primary metabolism; 5 µg per well.

**Large Scale Metabolite Library of Standards (LSMLS)** - Over 500 unique compounds arrayed in seven (7) 96-well plates that span a broad range of primary metabolism; 1 mg per well.

**Bile Acid Carnitine Sterol Metabolite Library of Standards (BACSMLS)** - 96 bile acid, carnitine and sterol metabolites covering key metabolic pathways; 5 µg per well.

**Fatty Acid Metabolite Library of Standards (FAMLS)** - 96 unique small molecule fatty acid metabolites covering key metabolic pathways; 5 µg per well.

**Organic Acid Metabolite Library of Standards (OAMLS)** - 96 unique small molecule organic acid metabolites covering key metabolic pathways; 5 µg per well.

**Amino Acid/Peptide Metabolite Library of Standards (AAPMLS)** – 96 unique metabolites including acetylated, methylated and hydroxy amino acids and dipeptides which are building blocks of proteins in many prokaryotic and eukaryotic organisms; 5 µg per well.

**Microbiome Metabolite Library of Standards (GUTMLS)** – 185 unique small biochemicals that the gut microbiome produces and interacts with including bacterial, dietary and host xenobiotic metabolites; 5 µg per well.

**Phytochemical Metabolite Library of Standards (PHYTOMLS)** - 364 unique primary and secondary plant metabolites obtained from consuming diets containing fruits, vegetables, whole grains, legumes, nuts and plant-based beverages; 5 µg per well.

## Legal Information

BACSMLS, AAPMLS, OAMLS, FAMLS, GUTMLS, PHYTOMLS, MSMLS, LSMLS and MLSDiscovery are trademarks of IROA Technologies LLC.

MasterBlock is a registered trademark and VIEWseal is a trademark of Greiner Bio-One GmbH.

## Acknowledgements

We gratefully acknowledge usage of the following websites and databases for their publicly accessible information.

Database	Website
The Human Metabolome Database (HMDB), v 2.5 [1-3]	<a href="http://www.hmdb.ca/">http://www.hmdb.ca/</a>
The Yeast Metabolome Database [4]	<a href="http://www.ymdb.ca/">http://www.ymdb.ca/</a>

Chemical Entities of Biological Interest (ChEBI) [5]	<a href="https://www.ebi.ac.uk/chebi/">https://www.ebi.ac.uk/chebi/</a>
Chemical Abstracts Service (CAS) REGISTRY Database [6]	<a href="https://www.cas.org/">https://www.cas.org/</a>
Kyoto Encyclopedia of Genes and Genomes (KEGG) [7]	<a href="http://www.genome.jp/kegg/">http://www.genome.jp/kegg/</a>
The METLIN Metabolomics Database [8-9]	<a href="http://metlin.scripps.edu/index.php">http://metlin.scripps.edu/index.php</a>
The PubChem Compound and Substance Database [10]	<a href="https://pubchem.ncbi.nlm.nih.gov/">https://pubchem.ncbi.nlm.nih.gov/</a>

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