Merck Complete Solution for

palm oil

Upstream & Downstream Processes

Merck Life Science Indonesia 2023

Discover More

Palm Oil Industry Workflow

Upstream Industry
(Industri Hulu)

Seed Production
(Pembenihan)

Cultivation
(Budidaya TBS)

Oil Palm Factory
(PKS - CPO)

Palm Core Processing Company PPIS (CPKO)

- **TBS :** Tandan Buah segar (Fresh Fruit Bunches / FFB)
- **PKS :** Pabrik kelapa sawit (Palm Oil Factory)
- **PPIS :** Pabrik Pengolahan Inti Sawit (Palm Core Processing Company)
- ★ = Process supported by Merck

Downstream Industry
(Industri Hilir)

Basic Oleochemical Industry
(Industri Oleochemical Dasar)

Oleofood Industry
(Industri Oleofood)

Derivative Oleochemical Industry
(Industri Oleochemical Turunan)

Oleochemical End Product
(Produk Akhir Oleochemical)

upstream workflow

upstream industry workflow

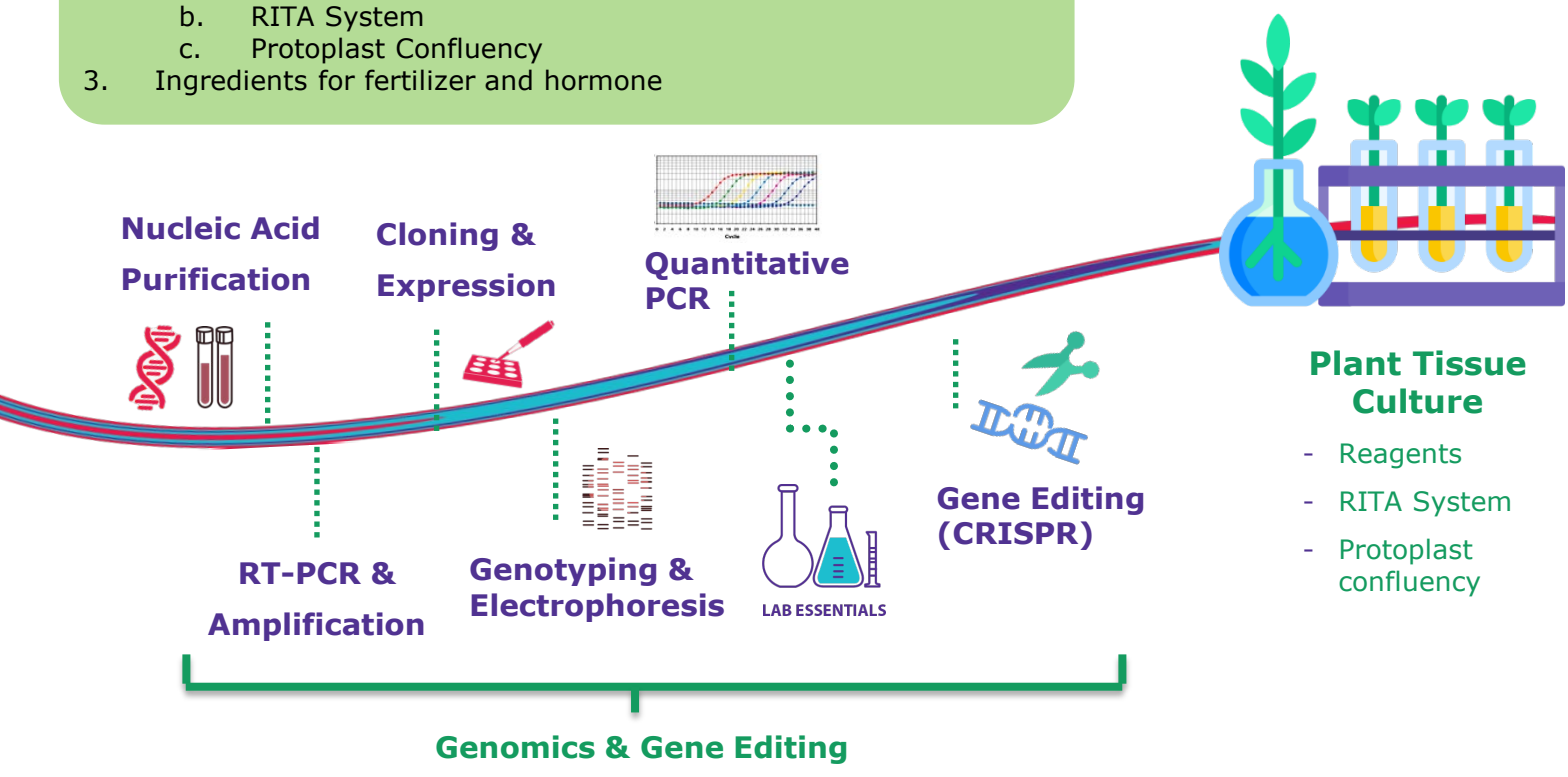
Seed Production

The seedling process is the first step in the upstream palm oil industry. Research & Development (R&D) is carried out with the aim of producing better quality and quantity of palm oil through research by optimizing various varieties of palm oil. Some desirable characteristics of palm oil are abundant fruit yields, ability to adapt to various agroecosystem conditions, low level of dura contamination, resistance to pest ***Ganoderma bonisense*** which causes stem rot disease, and others.

Merck supports the upstream R&D process of the palm oil industry through various molecular biology technologies from **DNA purification and amplification processes for biomarker research** to advanced **genetic engineering technologies, such as CRISPR,** to produce palm oil with the desired characteristics. Merck also provides complete solution for Plant Tissue Culture research and scale up: from **plant tissue culture grade reagents** to **Temporary Immersion System** for scaling up your seedlings.

Merck offers solution for Seed Production and Cultivation:

1. Genomics & Gene Editing (CRISPR)
2. Plant Tissue Culture
   a. Plant Tissue Culture Reagents
   b. RITA System
   c. Protoplast Confluency
3. Ingredients for fertilizer and hormone



Cultivation

Merck support cultivation process through varieties of nutrients for fertilizers and ingredients for hormones.

Cat. No.	Description	
I5148-10G	INDOLE-3-ACETIC ACID SODIUM SALT, BIOR&	Fertilizer Ingredients
N0640-100G	1-NAPHTHALENEACETIC ACID, BIOREAGENT, &	
G1025-10G	GIBBERELLIC ACID POTASSIUM SALT BIOREAG&	
B3408-25G	6-BENZYLAMINOPURINE PLANT CELL CULTURE &	
W241105-5KG-K	4-ALLYLANISOLE, 98+%, FCC	Pheromone ingredient

upstream industry workflow

After harvested, Palm Fruit are processed into two main products in Palm Oil Factory: Crude Palm Oil (CPO), which is extracted from the mesocarp or flesh of the fruit, and Crude Palm Kernel Oil (PKO), from the hard seed in the center.

CPO and CPKO obtained from the milling process, is further refined into palm oil products such as Refined Bleached Deodorized Palm Oil (RBDPO), Refined Bleached Deodorized Palm Stearin (RBD palm stearin) and Refined Bleached Deodorized Palm Olein (RBD palm olein) which is used as Cooking Oil, Margarine,

CPO, PKO and other palm oil product quality are determined various parameters/specifications, this includes **Free fatty ccid (FFA) content**, **moisture and impurities** (MandI), **iodine value (IV), peroxide value (PV), anisidine value (AV), deterioration of bleachability index (DOBI) and color**

Merck Offer a Complete Solution for Palm Oil Product Quality Analysis to ensure your quality-monitoring result is realiable and accurate :

- Salts / Acids / Caustics / Bases for analysis EMSURE®

- Volumetric solutions Titripur®/ Titrisol®/ Titripac®

- Karl Fischer Reagent Aquastar® for Moisture Analysis

- Spectrophotometer Spectroquant equipment and tests®

Molecular Biology and Plant Tissue Culture Application

DNA & RNA Purification Reagents

Technologies designed to provide solutions to counter abundant phenols and carbohydrates in plant tissues for effective extraction of highly purified nucleic acids.

We have a range of comprehensive, off-the-shelf solutions to enable your research. An optimized DNA extraction requires high purity reagents and chemicals for maximum performance. Some of the purification products available include:

- DNA
- Genomic DNA
- mRNA
- Total RNA
- Plasmid
- High-Throughput
- Reagents

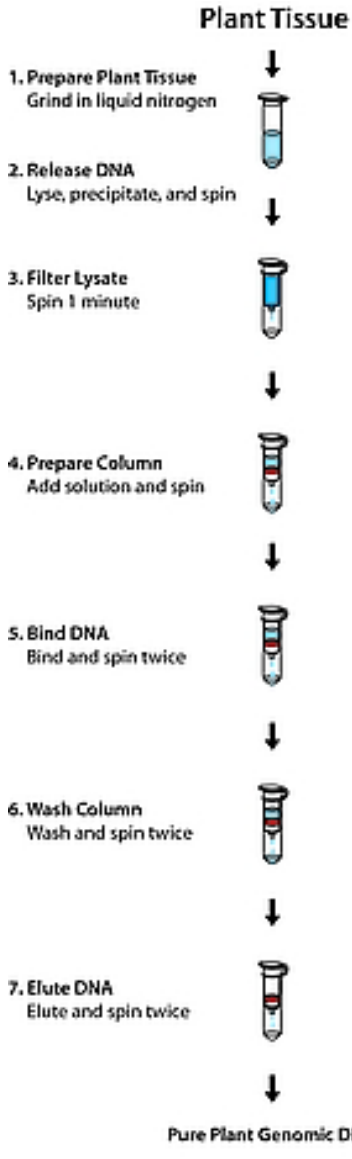
Product Highlight for Purification:

- GenElute™-E Single Spin Purification Kits
- KAPA Express Extract
- Extract-N-Amp™

GenElute™-E Single Spin Plant DNA Kit

(EC500)

KAPA Express Extract Kit (KK7100)



DNA Purification workflow for Plants

For a more complete list of products for **DNA & RNA Purification**

Amplification Reagents

Our chemistry expertise can help customers develop and optimize their entire genotyping workflow to reduce cost per data point while increasing throughput rates.

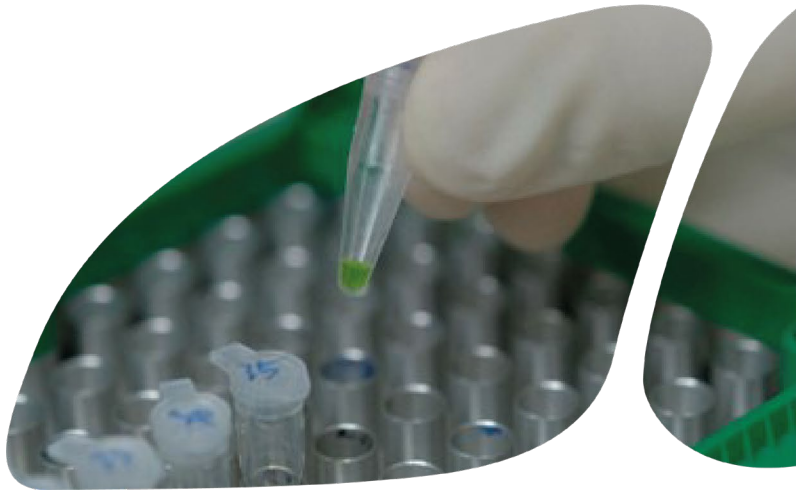
MasterMix
- PCR and qPCR MasterMix
- High Throughput MasterMix

Taq Polymerase
- Standard Taq
- REDTaq®
- JumpStart™ Taq

PCR Components
- Magnesium Chloride
- dNTP
- Betaine and DMSO
- Buffers
- Carbohydrates
- Molecular Biology Reagents
- Amino Acids and Derivatives
- Electrophoresis
- Agarose

Extract-N-Amp™
- Extract-N-Amp Plants
- Extract-N-Amp Seed

Oligos
- Oligos and Modified Oligos
- qPCR Probes
- NGS Adapters



Scan here to learn more about **our PCR Reagents & Kits** options:
SigmaAldrich.com/pcr

KOD One™ PCR Master Mix

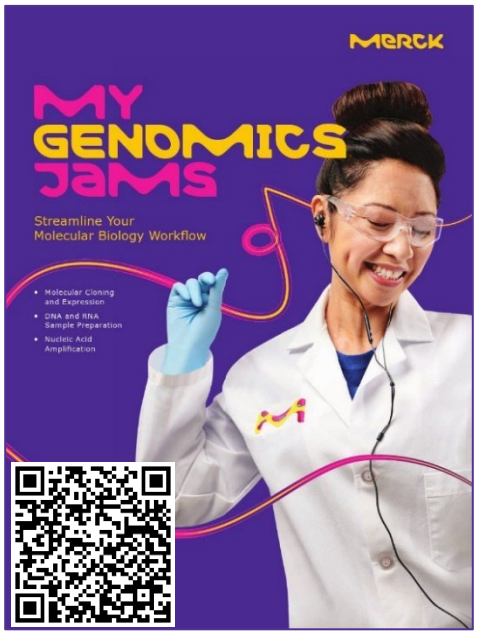
(KMM-101NV)

Product Highlights for Amplification:

KOD One™ PCR Master Mix for Ultra-Fast PCR

KAPA PROBE FAST One-Step

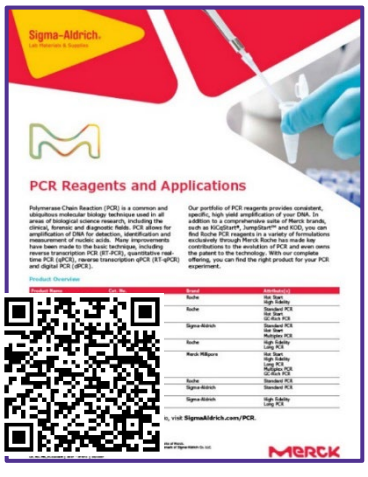
Download our brochures on Genomics by scanning the QR Code



Genomics Workflow Brochure

Successful Solutions for qPCR and RT-qPCR Mix Brochure

GenElute-E Single Spin DNA/RNA Purification Kits



PCR Reagents and Applications Flyer

KOD One PCR Master Mix flyer

KAPA 2GFast Multiplex

Nucleic Acid Purification Product Guide

ADVANCED GENE EDITING

Targeted genome editing has rapidly become a vital tool across the entire research continuum from early discovery to therapeutic application. By enabling scientists to **selectively disrupt, recover, repress**, or **activate gene expression**, modern gene editing methods allow for unprecedented exploration of genetic mechanisms governing biological processes.

Application of genome engineering ranges from **curing developmental disorders** to **developing disease-resistant crops.**

CRISPR – ACCURATE, EFFICIENT GENE EDITING

Sigma-Aldrich® Advanced Genomics offers an industry leading selection of CRISPR-Cas9 proteins to meet your individual research needs. Choose from multiple Cas9 variants (wild-type, enhanced specificity, nickase, GFP-fused, catalytically inactive) and several formats (plasmid, lentivirus, lyophilized protein).

Merck Gene Editing 101

Scan here to explore our full list of Cas9 Products

Wondering if CRISPR is right for your project? **Connect with a Sigma-Aldrich® Advanced Genomics Expert.**

CRISPRi AND CRISPRa – POWERFUL GENE INHIBITION AND ACTIVATION

CRISPRi (CRISPR interference) and **CRISPRa (CRISPR activation)** deliver highly efficient silencing and activation of genes, respectively, without altering the underlying DNA sequence. When employed in large scale LOF (loss-of-function) and GOF (gain-of-function) screens, researchers are able to identify unique, yet functionally related, gene pathways that are often missed with other methods.

Sigma-Aldrich® Advanced Genomics offers a complete suite of optimized **CRISPRi** and **CRISPRa** libraries for gene knockdown and overexpression experiments. Pooled CRISPRi and SAM CRISPRa lentiviral libraries are available off-the-shelf or customized to your specific needs.

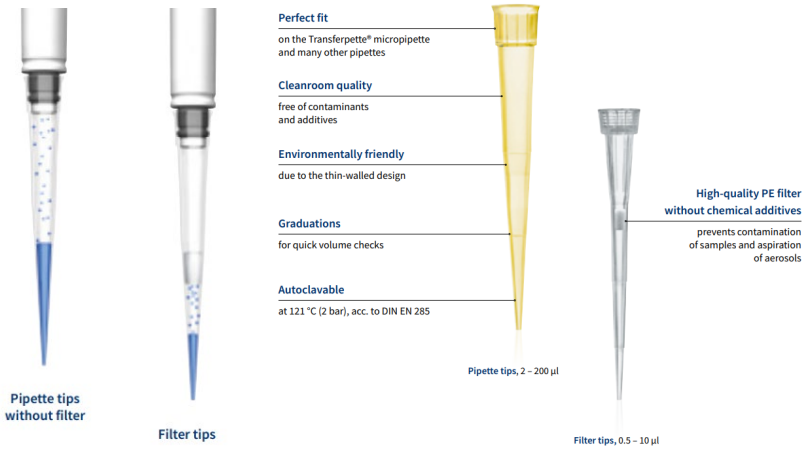
CRISPRi Whole Genome and Non-Coding Libraries

CRISPRa Whole Genome SAM Libraries

BRAND® Transferpette® S Pipette Package

volume × volume × volume (0.1-2.5 µL) (0.5-10 µL) (2-20 µL) (20-200 µL) (100-1000 µL), single-channel, adjustable volume, mechanical, benchtop rack for 6 pipettes

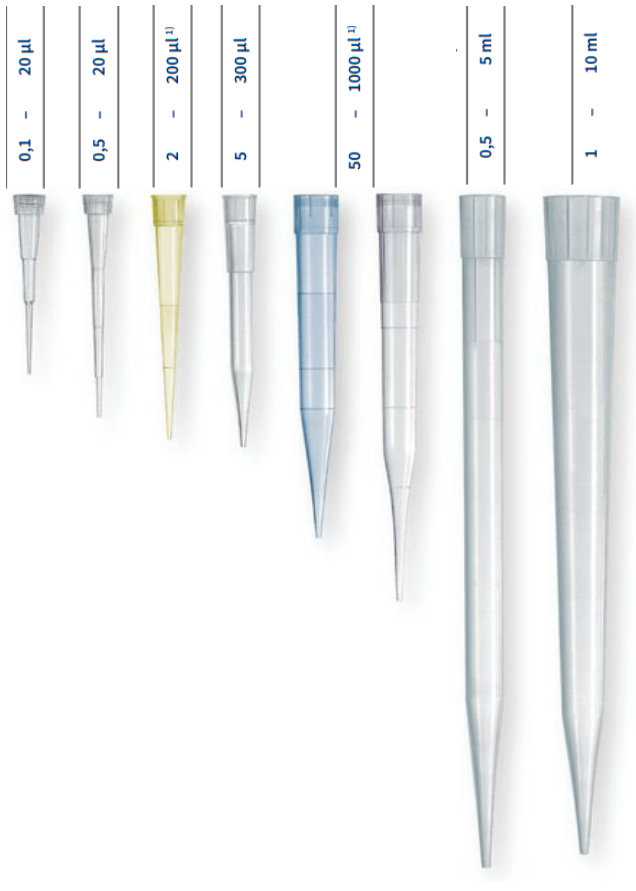
Cat. No. BR705896-1EA



Pipette and filter tips from BRAND are tested for BRAND pipettes and for most pipette models **from GILSON®,Thermo Fisher Scientific FINNPIPETTE®, Eppendorf®, and Sartorius®.**

BRAND® QUALITY LEVELS

	CERTIFIED BIO-CERT® QUALITY	LIQUID HANDLING BIO-CERT® STERILE
Cleanroom class 8 according to ISO 14644-1	✔	✔
Free of DNA*	✔	✔
Free of RNase	✔	✔
Free of DNase	✔	✔
Free of pyrogens, according to LAL test**	✔	✔
Sterile according to ISO 11137		✔
Free of ATP	✔	✔

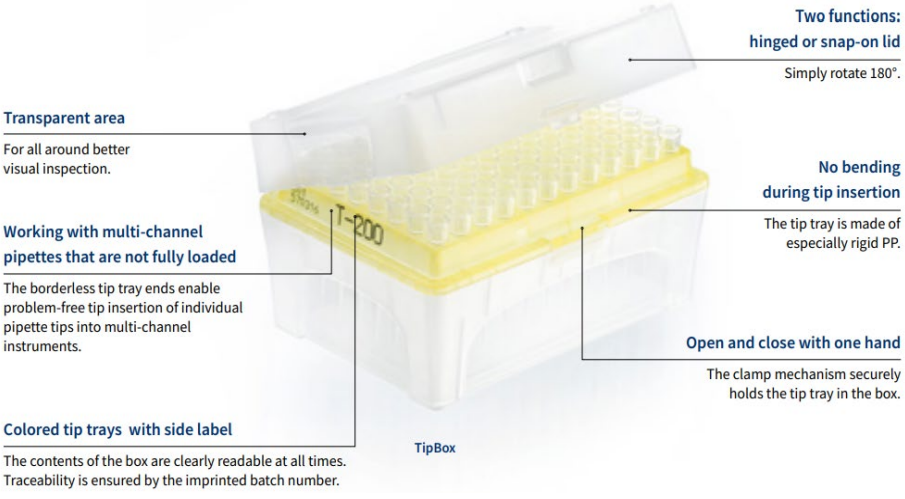


Packaging Formats are efficient and sustainable

Bag (bulk tips)

TipRack refilling system
(palletized tips)

TipBox (10 ml)

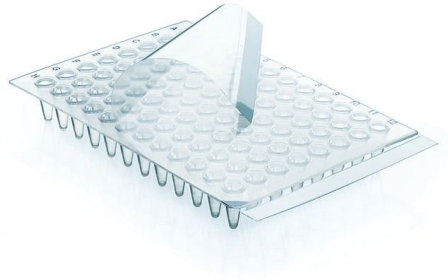


Single tubes PCR,
BIO-CERT® PCR QUALITY

with flat cap

with domed cap

PCR sets 96-well plates and films



PCR strips, **BIO-CERT® PCR QUALITY**

Microtubes, PP, 2 mL and 1,5 ml,
BIO-CERT® PCR QUALITY

BRAND PCR-Box/Rack

BRAND PCR Mini cooler, keeps samples at 4 ºC for approximately 3 hours

BRAND®

MultiTherm™ shaker with heating and cooling AC/DC input 230 V AC, European 2-pin plug, CE compliant
Cat. No. Z755737-1EA

\+ Block for MultiTherm™ shaker

Cat. No:	
Z755796-1EA	96x 0.2 mL or 1 x PCR plate
Z755826-1EA	15 x 0.5 mL and 20 x 1.5 mL
Z755842-1EA	Holds 35 x 2.0 mL tubes

MyBlock II digital dry bath with 2 Quick-Flip blocks for tube strips and plates, AC/DC input 230 V AC, Schuko plug

Cat. No. BMSBSH50022BE-1EA

PlateFuge™ Microplate Microcentrifuge with rotor and plate carrier, AC/DC input 230 V AC, EuroPlug
Cat.No.
Z742568-1EA

BenchMixer™ V2 Vortexer with reversible AC/DC input 230 V AC, Schuko plug
Cat.No.
Z742701-1EA

MC-12™ High Speed Microcentrifuge with rotor for 12 x 1.5/2.0 mL tubes, AC/DC input 230 V AC, EuroPlug
Cat. No.
Z742565-1EA

MyFuge™ 12 mini centrifuge with COMBI-Rotor™ for microtubes or PCR strips/tubes, AC/DC input 100 – 240 V AC, Schuko plug
Cat. No.
Z681733-1EA

PLAS ■ LABS, INC.™

Plas-Labs PCR UV chamber AC/DC input 220 V AC, EuroPlug
Cat. No. Z742286-1EA

PLAS ■ LABS, INC.™

Plas-Labs PCR UV chamber, with HEPA filter, AC/DC input 220 V AC, EuroPlug
Cat. No. Z566233-1EA

Benchmark Scientific

TC-9639 Thermal Cycler with multiformat block, AC/DC input 230 V AC, EuroPlug (96 well)
Cat. No. Z742463-1EA

TC-32 Mini Thermal Cycler with multiformat block, AC/DC input 230 V AC, EuroPlug (32 well)
Cat. No. Z742471-1EA

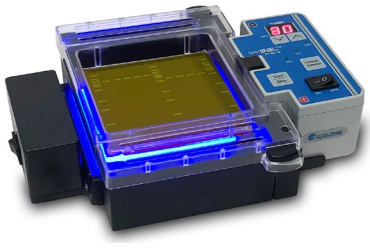
CORNING

Labnet
Labnet International, Inc.

Labnet MultiGene™ OptiMax thermal cycler, AC/DC input 240 V AC (UK 3-pin and European 2-pin plug)
Cat. No. Z759163-1EA

ACCURIS INSTRUMENTS

Benchmark Scientific

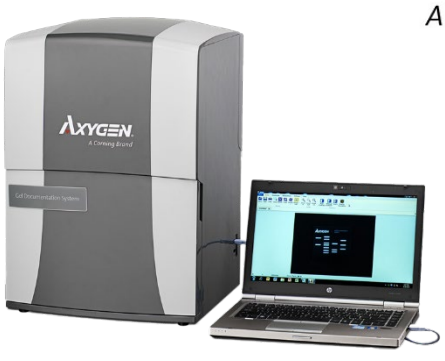


Benchmark myGel InstaView Complete Electrophoresis System with Blue LED Illuminator
Cat. No. BMSE1201E-1EA

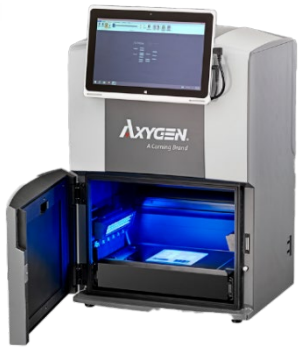
Benchmark myGel™ Mini Electrophoresis System
Cat. No. Z742286-1EA

Accuris™ SmartDoc™ 2.0 Imaging System with blue light illumination base, AC/DC input 230 V AC, EuroPlug
Cat. No. Z742592-1EA

AXYGEN®
A Corning Brand



Cat. No. AXYGD1000



Cat. No. AXYGDBL1000

Corning® Axygen® Gel Documentation System

Plant Tissue Culture Reagents

Our global distribution network provides regional availability, making us the perfect partner to ensure you receive consistent and reliable products.

Gelling Agents

- **Agar** (Natural Agar)
- **Agargel** ™ (Natural Agar + Synthesis Agar)
- **Phytagel** ™ (Synthesis Agar)
- **Gelzan** ™ (Synthesis Agar)

Gelzan™ CM
G1910
Gelrite®

Phytagel™
P8169
BioReagent, suitable for plant cell culture, powder

Plant Growth Regulators

- Colchicine
- Gibberellic Acid

Culture Media, Salts and Vitamins

- Murashige and Skoog Media (M5519)

Macro Nutrients

- NH_4NO_3 (Ammonium Nitrate)
- KNO_3 (Potassium Nitrate)
- KH_2PO_4 (Potassium dihydrogen phosphate)
- $MgSO_4.7H_2O$ (Magnesium sulfate hepta hydrate)
- $CaCl_2.2H_2O$ (Calcium chloride)

Micronutrients

- H_3BO_3 (Boric Acid)
- $MnSO_4.H_2O$ (Magnesium sulfate)
- $ZnSO_4.7H_2O$(Zinc Sulphate hepta hydrate)
- KI (Potassium Iodide)
- $Na_2MoO_4.7H_2O$ (Sodium Molibdate)
- $CuSO_4.5H_2O$ (Copper (II) Sulfate)
- $CoCl_2.6H_2O$ (Cobalt (II) Chloride Hexahydrate

Variegated Reagents

- EMS
- Cholchicine
- 2.4 D
- Streptomycine
- DMSO

Antibiotics

- Canamycine
- Vancomycine
- Streptomycine

Sugars

- Glucose, Mannose and Sucrose

Plasticware

- Phytatray™

Vitamin

- Thyamine-HCL (Vit. B1)
- Glycine (amino acid)
- Nicotinic acid (Vit. B3)
- Pyridoxine (Vit. B6)
- Myo Inositol (Vit. B8)

FeEDTA

- $FeSO_4.7H_2O$ (Iron (II) Sulfate)
- Na_2EDTA (Ethylendiaminetetraacetic acid)

Charcoal

- Activated Charcoal (0,5-1 %)

PVP

- Phenolic/browning Absorbtion

Scan here for a more complete list of products for **Plant Culture Reagents**

Plant Tissue Culture Research for Palm Oil:

Temporary Immersion System (TIS)

The Principle of TIS technology is **immersing the plant material into liquid growth media for short periods of time.** These immersion are sufficient for the plant's nutrient uptake.

Main Benefits

1. **Higher plant multiplication**
2. Time, space, manpower, and cost reduction (liquid medium)
3. Decontamination with filter (0.2 µm)
4. Culture conditions are much uniform
5. Media can be changed easly
6. Complete renewal of the culture atmophere on each immersion
7. Very marked reduction tissue vitrification compared with permanent immersion

Purposes

1. Enhancing culture efficiency for mass propagation.
2. Enhancing accuracy of culture effectiveness at each culture stages
3. Reduction of potential abnormality
4. Culture automatization and scale up

TIS Applications in Plants

- Callus Induction
- Proliferation
- Germination
- Maturation

Temporary Immersion System	
Useful volume for plants	250 ml
Minimum air flow (required for immersion)	2 to 5 l/mnt
Plantlets optimal capacity RITA	600 – 1000
Autoclaving	Extremely resistant
Material	POLYCARBONATE (PC) transparent
Dimensions (diameter x height)	Ø290 mm x 180 mm
Empty weight	0.5 kg

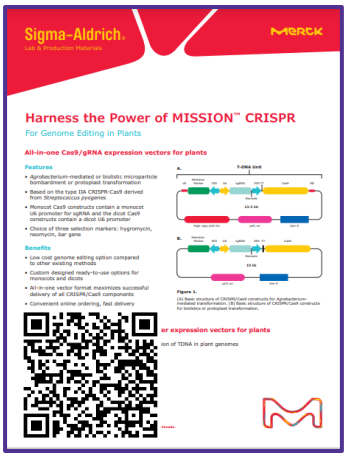
TIS are applicable for different types of plants:

1. Horticultural plants (kopyor cocont, potato, tomato, banana, etc.)
2. Spices (garlic, chilli, red ginger, vanilla etc.)
3. Medicinal plants
4. Plantations (palm oil, sugarcane, cocoa, tea, etc.)
5. Ornamental plants (monstera, orchid, philodendron, aglaonema, etc.)
6. Aquatic plants (anubias, hair grass, etc.)

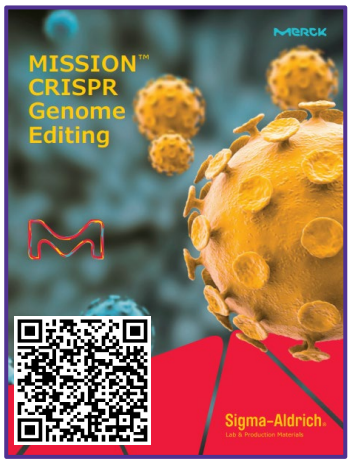
Murashige and Skoog Basal Medium (M5119)
powder, suitable for plant cell culture

Scan to watch How To **Boost your plant tissue culture yields with RITA® Temporary Immersion System (TIS).**

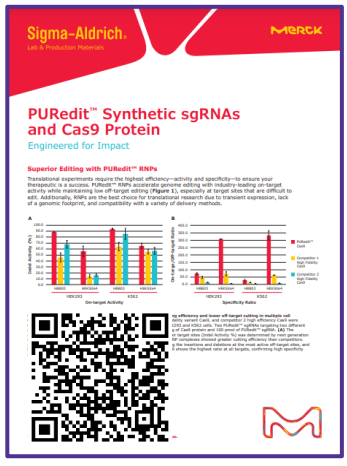
Download brochures on Gene Editing/CRISPR & Agriculture Solutions for Palm Oil by scanning the QR Code



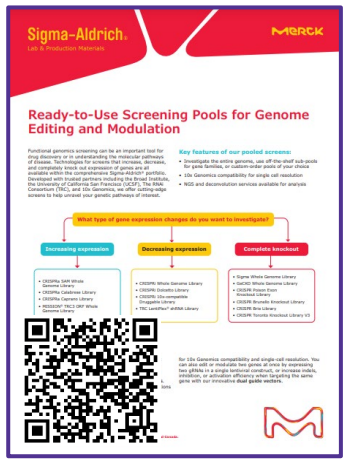
CRISPR Gene Editing for Plants



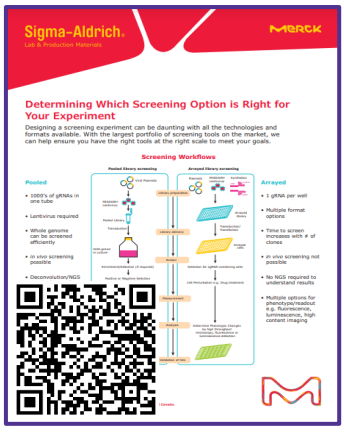
CRISPR Gene Editing Complete Brochure



PURedit Synthetic sgRNAs and Cas9 Protein



Ready-to-use Screening Pools for Genome Editing & Modulation



CRISPR Screening Option for Gene Editing Experiment

Product Guide - CRISPRa-CRISPRi

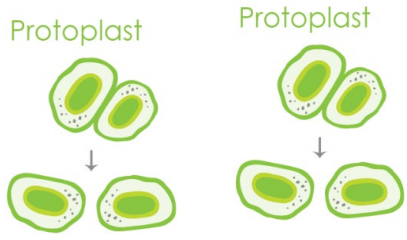
Agriculture Solutions Brochure

Agriculture: from Tissue culture to crop protection

Plant tissue culture reagent

Molecular Biology and Tissue Culture Application for

protoplasts counting



In Palm Oil, **Protoplast** are utilized in plant genetic transformation research to introduce desirable traits such as resistance to specific pests or improved nutritional properties. Protoplast mediated transformation (PMT) are reported for transient expression, providing an efficient way to study many genes in a short time.

In research involving protoplasts, counting the cells is an important but usually a laborious task. Merck offers Millicell® Digital Cell Imager (DCI) to simplify protoplast automatic counting through the ***haemacytometer*** mode.

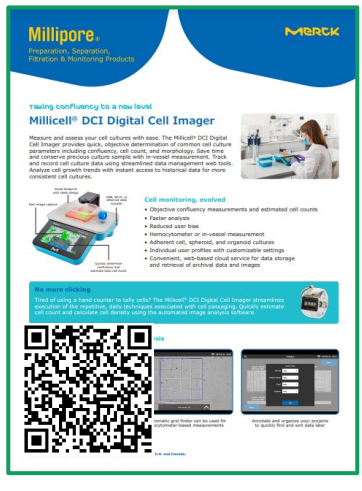
INCREASE YOUR PRODUCTIVITY

The Millicell® DCI provides a range of benefits to increase your lab's efficiency:

- Easy culture monitoring
- Faster analysis
- More accurate results with reduced user bias
- Assess a broad range of parameters including confluency, morphology, and cell growth trends
- Evaluate a wide variety of cell cultures including adherent cells and cell lines, spheroids, and organoids
- Hemocytometer or in-vessel measurement
- Enhanced accessibility using the web-based cloud service for data analysis, storage, and archiving.

Scan to watch our video

Contact us to request for a demo session in your lab!



Learn more about Millicell DCI, scan QR code to download brochure

MERCK

chemicals and instruments for palm oil analysis

Titration

Sophisticated and precise analyses require precisely adjusted and produced volumetric solutions. Whether you're titrating reducing or oxidizing substances, acids, bases or complexing reagents in either aqueous or non-aqueous solutions : we offer the right solutions for every application.

SigmaAldrich.com/titration

Titripur® - precision and quality

Titripur® volumetric solutions are subject to stringent manufacturing and testing requirements. From the selection of the raw materials and packaging on up to quality control, the highest demands are placed on purity and quality. All Titripur® volumetric solutions are measured in our DIN EN ISO / IEC 17025 accredited laboratory.

Titrisol® - concentrates for greater flexibility

For users who regularly perform different types of analyses, we also offer most volumetric solutions as Titrisol® concentrates. Every ampoule contains a precisely defined quantity of substance that is normally filled to a final volume of 1 liter. However, any other concentrations can be produced by diluting correspondingly

Titripac® - reliable solution from the first to the last drop

Titripac® from Merck is an innovative and safe packaging option for high-quality, ready-to-use volumetric solutions. Its economical and ecological advantages enable you to optimize your working processes. The consistent quality of a volumetric solution is ensured from the first to the last drop. A hermetically sealed package system makes this possible. Contamination caused by air, carbon dioxide or microorganisms is excluded.

Advantages

- Consistent high level of quality
- Innovative and safe packaging options
- Produced under stringent production processes
- Measured in our DIN EN ISO/IEC 17025 accredited laboratory

Karl Fischer Titration

Karl Fischer titration is a widespread method used in quality and in-process control, production, research, and development to determine the amount of water in solid, liquid, or gas samples. Water can adversely affect quality, stability, and other physical and chemical properties of raw materials, intermediates, and finished goods. This rapid and accurate method can quantify water content in a variety of substances in concentrations from 10 ppm to 100%.

SigmaAldrich.com/Aquastar

Two methods for water determination

Two methods are available for the determination of water using the Karl Fischer method: a volumetric and a coulometric method.

- **Volumetry:** In the case of higher levels of water (0.1 – 100%), the volumetric method should be used. For volumetric titration, we supply both one component and two component reagents.
- **Coulometry:** For very low levels of water (<1%) or for water determination of very expensive substances with small sample amount, the coulometric method should be used. In this case, Aquastar® reagents are available for cells both with and without a diaphragm.

Aquastar® Standards

The Aquastar® range is rounded off with water standards for monitoring and qualification of Karl Fischer instruments, for checking measuring results and titer determination.

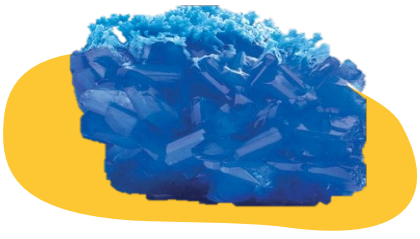
Advantages

- High accuracy and excellent precision
- Rapid and reproducible titration results
- Large water capacity
- No crystallization
- Innovative formulations for special applications
- Reagents for all types of applications
- Wide range of water standards

Salts/acids/caustics/bases for EMSURE analysis®

Tested for up to 70 parameters, EMSURE® products offer the best and most extensive specifications worldwide! This, combined with unsweet impurity levels, gives you greater control over your analysis and helps you avoid incorrect analytical results, especially when developing new applications.

Premium packaging not only protects chemicals, but also the lab staff who use them. EMSURE products meet international standards specifications that are quality reference in chemicals such as ACS, ISO and Ph Eur. That's why we've developed several innovative packaging concepts that precisely adapt to the contents.

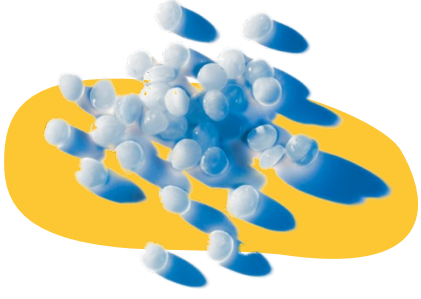


Salts

EMSURE salts® for analytical use are manufactured under strictly controlled conditions at Merck's facilities in Darmstadt, Germany. The key feature of these salts is their extraordinary analytical purity. The product range contains a wide assortment of inorganic salts for use in qualitative and quantitative analyses.

Acids

Merck's EMSURE® for analysis loacids offer the highest possible quality, the highest safety and the most optimized packaging. Our products undergo strict quality controls using the most sensitive analytical instruments and methods. That's why you can rely on Merck acids for analysis for a multitude of applications'



Caustics and bases

Our EMSURE alkalis and caustic bases® premium products are produced using specially selected raw materials. The product range includes sodium and potassium hydroxide granules and corresponding solutions, as well as ammonia solutions at various concentrations and quality grades. Please find the right caustic and base for your specific use.

Highlights:

- Lightweight and unbreakable HDPE bottles for reagents
- Robust EP-coated Safebreak bottles for acids
- Packaging suitable for increased demand, e.g. 25 l

instrumental solvent

Merck offers a complete range of high-quality solvents for your instrumental analysis applications – from HPLC to gas chromatography and spectroscopy to NMR applications.

LiChrosolv®

High-Performance Solvents for Analytical HPLC, Fast Chromatography, and LC-MS

For perfect high-performance liquid chromatography (HPLC) results, high-performance solvents are a must. LiChrosolv® solvents from Merck are designed to optimally support analytical HPLC, fast chromatography, and LC-MS applications.

Uvasol®

Best Optical and Chemical Purity for Reliable Spectroscopy Results

Uvasol® solvents from Merck are specially designed for spectroscopy and other applications that demand solvents of the highest spectral purity.

Uvasol® solvents offer you the best optical purity for UV/VIS and infrared spectroscopy as well as outstanding chemical purity (minimal fluorescence, water, evaporation residue, acidity, alkalinity) – consistently from batch to batch.

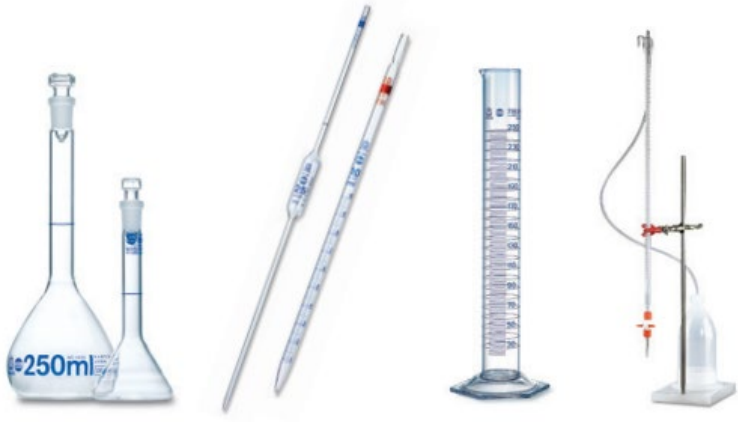
SupraSolv®/UniSolv®

Dedicated Solvents for Your Gas Chromatography Applications

SupraSolv®/UniSolv® solvents from Merck are developed specially for sample preparation in gas chromatography.

Ideally suited for all GC applications including sensitive detection tasks in residue and environmental analysis, SupraSolv®/UniSolv® solvents offer you the security and reliability needed for today's gas chromatography applications.

Laboratory equipment, glassware, and plasticware are essential for the success of any laboratory. Through our partnerships with brands, you know and trust, we offer a wide selection of laboratory equipment and supplies to support more than 100 areas of interest.



Volumetric flasks | Bulb and graduated pipette | Graduated cylinder | Burette

Dispensette® Brand's S Trace Analysis® for safe and accurate dispensing of high purity acids

Bottle-coupled dispensers Dispensette® S Trace Analysis

The new generation!

For high purity chemicals.

Innovative ideas, proven technique – Dispensette® S Trace Analysis, the new bottle-coupled dispenser. To dose exact volumes of high purity media in trace analysis.

- New dosing cannula with and without purge valve
- New valve system requires no gasket rings
- Volume fixation by snated strip located inside
- Dosage of high purity media such as acids and alkalis in the analysis of traces in volume range from 1 to 10 ml.
- Detachment of metal traces is, as a rule, in the lower range of ppb, and even in the range of ppt, for certain applications
- Hydrofluoric acid dosage with platinum-iridium valve spring without problems.

Brand® Liquid Handling

spectrophotometer for palm oil quality analysis

Spectroquant® Photometers

Merck´s range of Spectroquant® photometers, colorimeters, and accessories offers you the appropriate measurement instrument for every area of application – from simple pocket instruments all the way to powerful lab-bench photometers.

Spectroquant® Prove 100

For routine applications

- primarily to use the broad range of Spectroquant® test kits
- Performs Vis measurements
- great value for money for daily analyses

Spectroquant® Prove 300

For sensitive measurements

- long-lasting xenon lamp
- ideal for more intense use
- capable of UV and Vis measurements
- higher flexibility for more intricate analyses.

Spectroquant® Prove 600

For superior analyses

- with high-end UV/Vis optics
- holds cuvettes of up to 100 mm
- excellent resolution and sensitivity
- for use with test kits, complex kinetics or spectral measurements

Spectroquant® Move 100. The mobile colorimeter

The Spectroquant mobile colorimeter® Move 100

Need to make quick decisions during on-site analysis or process control? Do you have to act quickly to prevent deterioration or contamination of your sample, for example during chlorine measurements? Merck offers the optimal solution: Bring your lab to the sample with the Move 100 Spectroquant colorimeter® and enjoy fast and reliable results on the spot.

Spectroquant test kits® for palm oil quality control

Merck offers a set of applications for palm oil quality control that not only simplify analysis but also ensure accurate results in compliance with ISO 17932:2011. Developed for use with the Spectroquant® spectrophotometers, the applications guide you through the entire measurement

spectrophotometer for palm oil quality analysis

The quality of palm oil is determined by several factors. One important parameter is its deterioration of bleachability index (DOBI), which is dependent on the quality of the fruit, as well as its ripeness and storage conditions.

The DOBI value indicates how easy it is to refine crude palm oil. A value of less than 1.8 implies poor quality, while values greater than 3 signify high quality.

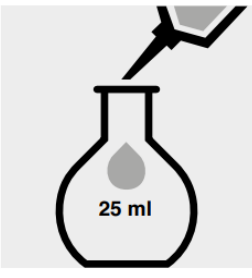
DOBI (Deterioration of the bleachability index) of raw palm oil

corresponds to **DIN EN ISO 17932:2011**

Application

Measuring range:	0 – 4.00 DOBI	10-mm quartz cell
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment	
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.	

Melt the sample at 60 - 70 °C and homogenize.



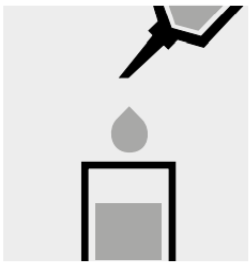
Weigh **between 100 mg to 500 mg of sample** into a 25-ml volumetric flask.

Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 104718).

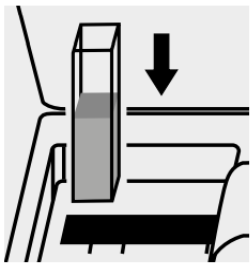
Dissolve the sample at room temperature.

Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 104718) and mix.

Select method no. **2524**. Perform the zero adjustment and confirm by pressing the <OK> button.



Transfer the solution into the quartz cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. The DOBI value is shown in the display.

Materials

Product Description	Catalog No.
Isooctane for spectroscopy Uvasol®	104718
Prove 300 suitable for UV/Vis spectroscopy, Spectroquant®	173017
Prove 600 suitable for UV/Vis spectroscopy, Spectroquant®	173018
Rectangular cells quartz 10mm Spectroquant®	100784

spectrophotometer for palm oil quality analysis

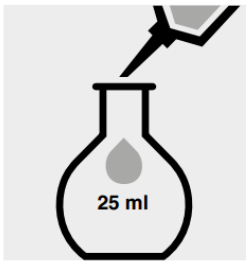
Carotene content is another key quality quality of palm oil parameter, with greater values representing better quality.

Carotene
in raw palm oil
corresponds to **DIN EN ISO 17923:2011**

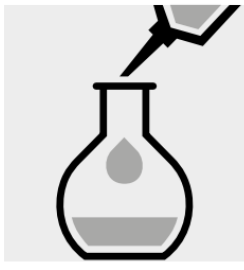
Application

Measuring range:	10 – 7500 mg/kg β-Car	10-mm cell
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment	
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.	

Melt the sample and homogenize.



Weigh **between 100 mg to 500 mg of sample** into a 25-ml volumetric flask.



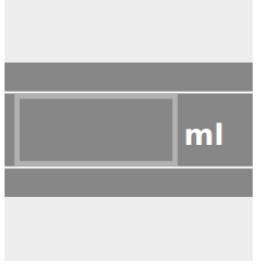
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 104718).

Dissolve the sample at room temperature.

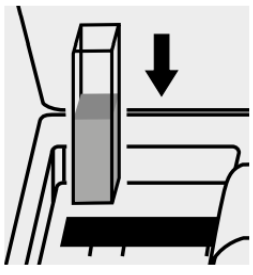
Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 104718) and mix.

Select method no. **2523**. Perform the zero adjustment and confirm by pressing the <OK> button.

Enter the sample weight in milligrams.



Enter the volume of the sample solution in milliliters.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. The β-carotene content is shown in the display in mg/kg.

Materials

Product Description	Catalog No.
Isooctane for spectroscopy Uvasol®	104718
Prove 100 Spectroquant®	173016
Prove 300 suitable for UV/Vis spectroscopy, Spectroquant®	173017
Prove 600 suitable for UV/Vis spectroscopy, Spectroquant®	173018
Rectangular cells 10mm Spectroquant®	114946
Rectangular cells quartz 10mm Spectroquant®	100784

sample preparation for chromatography

Sample preparation prior to chromatography is often the most time-consuming yet critical step of the analysis. Merck offers a range of high-quality products to speed up the process and ensure optimal sample preparation for reliable chromatographic results.

Liquid-Liquid Extraction: **Extrelut®**

Emulsion-free extraction with high sample throughput to save time and costs.

Features and Benefits

- No formation of emulsions
- Saving of solvent, sample and time
- Simple adaption of classical extraction procedures
- Higher recoveries and cleaner extracts
- Samples are stable when absorbed onto the columns

Solid-Phase Extraction**: LiChrolut®/Visiprep™**

Rapid extraction with high recoveries for a great variety of samples in environmental, pharmaceutical and food & beverage applications.

Features and Benefits

- Rapid sample preparation within minutes
- Higher recoveries without emulsion formation
- Highly precise analytical results using disposable cartridges
- Saving of solvent, hence lower material and disposal costs
- Possible to automate the entire process
- Optimized, validated and certified manufacturing
- Visiprep vacuum manifolds allow you to process up to 12 (12-port version) or 24 (24-port version) SPE samples simultaneously

Syringe Filters
There's Only One **Millex® Syringe Filter.**

Improve signal-to-noise ratios, maintain clean baselines and maximize instrument uptime with trusted Millex® syringe filters. With low extractables and low analyte-binding membranes, Millex® syringe filters are the most convenient, highest-quality syringe filters for sensitive instrumental analyses, including gas, liquid, and ion chromatography.

Wide chemical compatibility enables their use with virtually any sample composition.

HPLC Column

Supelco® HPLC and UHPLC columns meet today's demands of fast U/HPLC, LC-MS, and biopolymer separation. Supelco® HPLC products are available with Fused-Core® particle technology, monolithic silica, and fully porous particles, including ultra-pure silica. In addition, polymeric particles, alumina oxide, and zirconia particles are available for high pH stability.

Featured Products

- Ascentis® Express Superficially Porous Silica Particles (SPP) Columns
- Chromolith® Monolithic Silica Columns
- BIOshell™ Superficially Porous Silica Particles (SPP) Columns
- Discovery® Fully Porous Silica Particles (FPP)
- LiChrospher® Fully Porous Silica Particles (FPP)
- TSKgel® Fully Porous Particles (FPP)

GC Columns, Accessories & Adsorbents

GC COLUMNS

PACKED GC COLUMNS

Packed GC columns consist of stainless steel, PTFE, or glass tubing filled with packing material (stationary phase). Packed columns can handle larger sample volumes and are not susceptible to contamination. Glass columns are used for applications requiring high inertness, metal columns are utilized for less demanding applications, and PTFE columns are preferred for low temperature applications.

CAPILLARY GC COLUMNS

Capillary GC columns are best suited for highly sensitive assays. Capillary columns consist of a thin, fused silica glass tube in which the stationary phase is chemically bonded or coated to the inner column surface.

GC ACCESSORIES

GC accessories suitable for common GC instruments include GC septa, inlet liners, inlet seals, ferrules, nuts, guard columns, connectors, flowmeters, hand tools, syringes, vials, and photoionization detector (PID) lamps.

CARBON GC ADSORBENTS

We offer highly engineered carbon absorbents (Carbosieve®, Graphsphere™, Carbotrap®, and Carbopack™) and several commonly used molecular sieve and porous polymer adsorbents for GC analysis.

Reference Material

Standards for the determination of free fatty acids should be purchased from a chemical manufacturer with knowledge in the preparation, handling, storage, and shipment of volatile analytes. Supelco®, with over 40 years in chemical standard manufacturing, offers several suitable standards.

Palm Oil Reference Standard

Product Description	Catalog No.
F.A.M.E. Mix C18:0 - C20:0, certified reference material, pkg of 100 mg (Neat)	18916-1AMP
F.A.M.E. Mix, C20:1-C20:5 Unsaturates, certified reference material, ampule of 50 mg (Neat)	18913-1AMP
F.A.M.E. Mix GLC-80, certified reference material, ampule of 100 mg (Neat)	1898-1AMP
F.A.M.E. Mix GLC-40, certified reference material, ampule of 100 mg (Neat)	1895-1AMP
F.A.M.E. Mix GLC-30, certified reference material, ampule of 100 mg (Neat)	1893-1AMP
Methyl heptadecanoate, standard for gas chromatography	51633-5G
Methyl nonadecanoate, standard for gas chromatography	74208-5G
Palm oil analytical standard	70905-500G

Buffers

Product Description	Catalog No.
pH buffer solution 7.00 (20 GRAD C) Certipur®	1.09477.0500
Buffer solution pH 10.00 (20 GRAD C) Certipur®	1.09400.0500
Buffer solution pH 10.00 (20 GRAD C) Certipur®	1.09400.0500
pH buffer solution 7.00 (20 GRAD C) Certipur®	1.09477.0500
pH buffer solution 4.00 (20 GRAD C) Certipur®	1.09475.0500
pH buffer solution 7.00 (20 GRAD C) Certipur®	1.09439.1000
pH buffer solution 4.00 (20 GRAD C) Certipur®	1.09475.4000
Concentrated buffer for 500 mL buffer solution, pH 12.00 +/- 0.05 (20 GRAD C) Titrisol®	1.09892.0001
pH buffer solution 4.00 (20 GRAD C) Certipur®	1.09435.1000
pH buffer solution 10.00 (20 GRAD C) Certipur®	1.09438.1000

Scan to start check price and quick order

Total Acid Number

Product Description	Catalog No.
Potassium hydroxide pellet for analysis EMSURE®	1050331000
Phenolphthalein Indicator	1072330025
2-Propanol for Analysis EMSURE®	1096342500
Potassium hydroxide solution c(KOH) = 0.1 mol/l (0.1 N), Titripur®, reag. Ph. Eur.	1091121000
Phenolphthalein solution 1% in ethanol indicator pH 8.2 - 9.8	1072270250

Iodine Value

Product Description	Catalog No.
Acetic acid (glacial) 100% anhydrous for analysis EMSURE® ACS,ISO,Reag. Ph Eur	1000632500
Acetic acid (glacial) 100% anhydrous for analysis EMSURE® ACS,ISO,Reag. Ph Eur (Safebreak Bottle)	1000632510
Acetic acid (glacial) 100% anhydrous for analysis EMSURE® ACS,ISO,Reag. Ph Eur (Plastic Bottle)	1000632511
Potassium Iodide for analysis EMSURE®	1050431000
Starch soluble GR for analysis	1012520250
Sodium thiosulfate pentahydrate for analysis EMSURE®	1065161000
Sodium thiosulfate solution for 1000 ml, c($Na_2S_2O_3$) = 0.1 mol/l (0.1 N) Titrisol®	1099500001
Sodium thiosulfate solution c(Na2S2O3) = 1 mol/l (1 N) Titripur®	1603121003
Potassium dichromate for analysis EMSURE® ACS,ISO,Reag. Ph Eur	1048641000
Potassium dichromate solution for 1000 ml, c($K_2Cr_2O_7$) = 1/60 mol/l (0.1 N) Titrisol®	1099280001
Potassium dichromate solution c(K2Cr2O7) = 1/60 mol/l (0.1 N) (20°C) Titripur®	1603331000
Wijs solution for determination of the iodine number c(ICl) = 0.1 mol/l Titripur®	1091631000
Cyclohexane for analysis EMSURE®	1096662500

Peroxide Value

Product Description	Catalog No.
Acetic acid (glacial) 100% anhydrous for analysis EMSURE® ACS,ISO,Reag. Ph Eur (Plastic Bottle)	1000632511
Chloroform for analysis EMSURE®	1024452500
Potassium Iodide for analysis EMSURE®	1050431000
Sodium thiosulfate solution c(Na2S2O3) = 1 mol/l (1 N) Titripur®	1603121003
Starch soluble GR for analysis	1012520250

Anisidine Value

Product Description	Catalog No.
Isooctane for spectroscopy Uvasol®	1047182500
p-Anisidine for synthesis	8004580100

Scan to start check price and quick order

Saponification Value

Product Description	Catalog No.
Potassium hydroxide solution in ethanol c(KOH) = 0.5 mol/l (0.5 N) (20°C), Titripur®	1603411000
Hydrochloric acid c(HCl) = 0.5 mol/l (0.5 N) Titripur®	1090581000
Phenolphthalein Indicator	1072330025
Phenolphthalein solution 1% in ethanol indicator pH 8.2 - 9.8	1072270250
Boiling chips granules ~ 2-8 mm	1079130100

Gas Liquid Chromatography-GLC

Product Description	Catalog No.
Acetone for gas chromatography ECD and FID SupraSolv®	1000122500
Ethyl acetate for gas chromatography ECD and FID SupraSolv®	1109722500
n-Hexane for gas chromatography ECD and FID SupraSolv®	1043712500

Determination of Ester Content & FAME Composition by GLC

Product Description	Catalog No.
n-Heptane for gas chromatography ECD and FID SupraSolv®	1043601000
Methyl Margarete reference substance for gas chromatography	1.09754.0005
Methyl heptadecanoate, standard for gas chromatography	51633-5G
Methyl tridecanoate ≥97%	T0627-5G
Boron trifluoride-methanol complex (20% solution in methanol) for synthesis	8016630100
Sodium hydroxide 0.5N in methanol	1091381000

Determination of Free Glycerol, Mono-, Di-, Triglycerides and Total Glycerol

Product Description	Catalog No.
N-Methyl-N-(trimethylsilyl)trifluoroacetamide, for GC derivatization, LiChropur™,≥98.5%	69479-10X1ML
Pyridine or analysis EMSURE®	1097282500
n-Heptane for gas chromatography ECD and FID SupraSolv®	1043601000
Glycerol ACS reagent, ≥99.5%	G7893-2L

Determination of Total Sterols in Vegetable Oils by GLC

Product Description	Catalog No.
Methanol gradient grade for liquid chromatography LiChrosolv®	1060074000
Hydrochloric acid fuming 37% for analysis EMSURE®	1003172500
Potassium hydroxide pellet for analysis EMSURE®	1050331000
Dichloromethane hypergrade for organic trace analysis SupraSolv®	1064541000
Sodium sulfate anhydrous for analysis EMSURE®	1066491000
BSTFA with 1% TMCS	15238-10X1ML
Pyridine or analysis EMSURE®	1097282500
Stigmasterol ~95%	S2424-25G

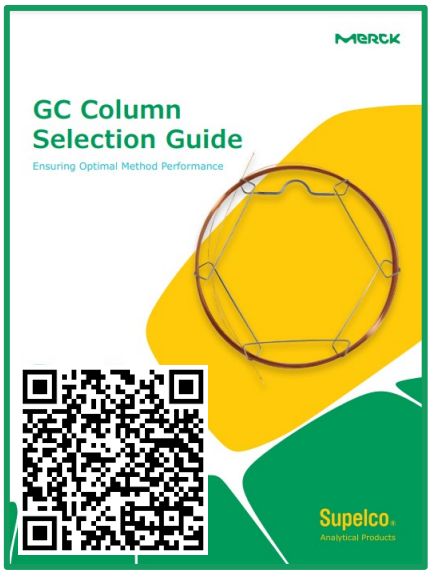
Scan to start check
price and quick order

Download our brochures on Chemistry by scanning the QR Code

Spectroquant Prove brochure

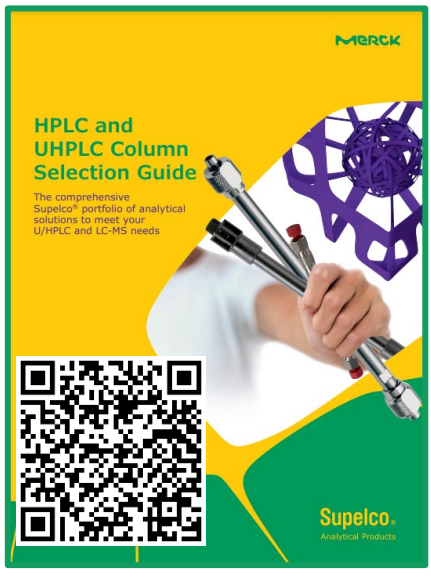
BRAND Dispensette S Brochure

Volumetric Measurement in the Laboratory



GC Column Selection Guide

Analytical Filtration For HPLC



HPLC Column Selection guide

Download our brochures on Chemistry by scanning the QR Code

Volumetric Solutions and Standards for Titration

EMPOWER your lab

Suprasolv Unisolv brochure

GC accessories brochure

Purospher™ STAR HPLC and UHPLC columns

Solid Phase Extraction Products

Certipur Ready-to-Use Buffer Solutions Brochure

downstream workflow

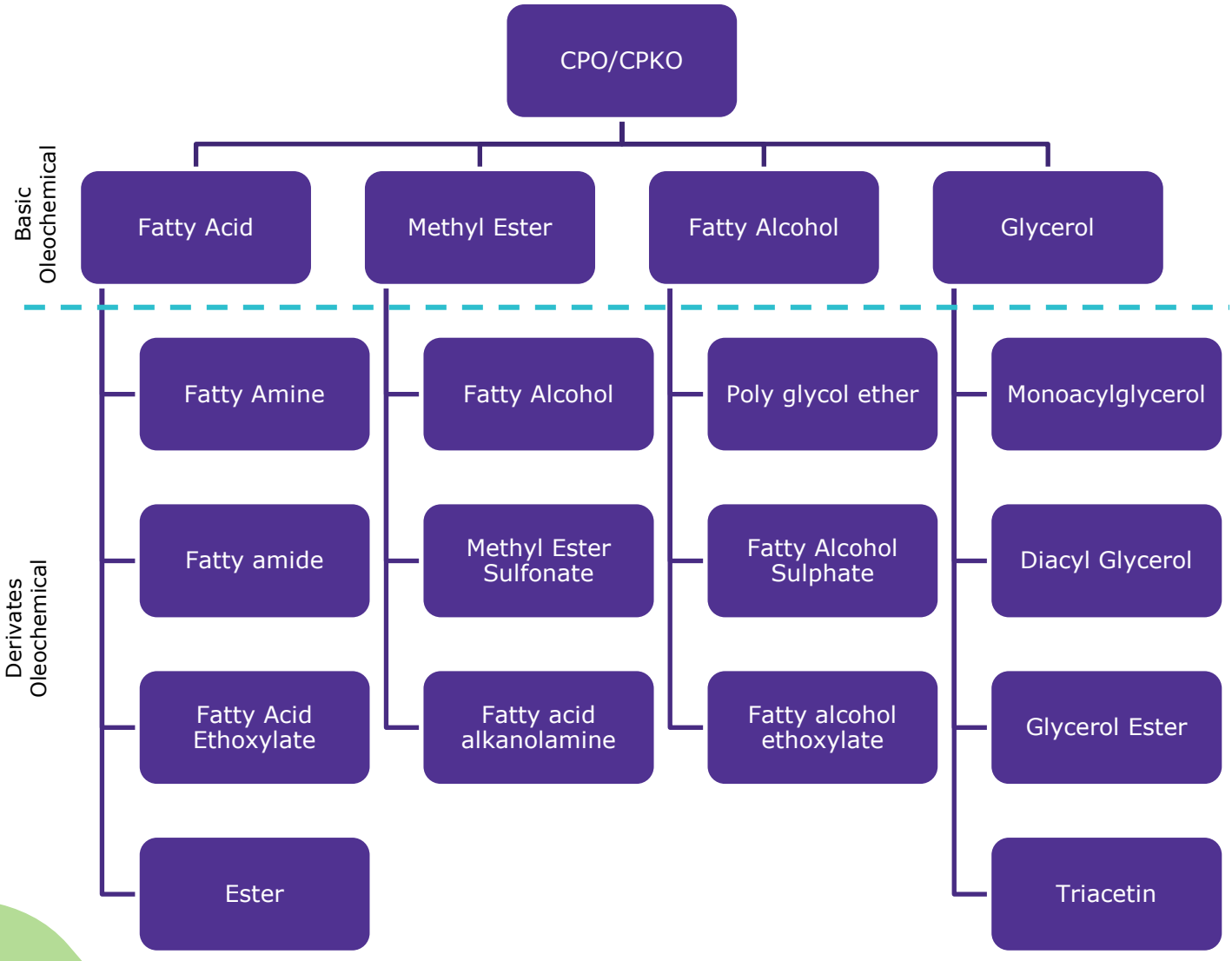
downstream industry workflow

In the palm oil downstream industry, palm oil conversion product (CPO, RBDPO, CPO, RBDPO, Olein, Stearin, PFAD) are processed into basic oleochemicals products which includes **fatty acids, fatty alcohols, glycerin, and fatty methyl esters.**

Basic oleochemical products, further can be proceeds into derivates oleochemical products and end products. Derivates Oleochemicals includes soap, detergent, surfactant, soap noodle, and other products.

Those products which is used in production of lots of products, from cosmetic, lubricant, biodiesel and even concrete additives. The quality control-monitoring and testing are important in ensuring the quality of palm oil products and to judge the products quality.

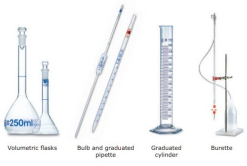
Merck support the quality control-monitoring of palm oil products by provide a high quality and high technology products to ensure your quality-monitoring result is reliable and accurate.



Workflow for palm oil and Oleochemicals products Quality-monitoring

1 → 2

Sample Preparation



- Labware

- Syringe Filter

- Dispensette

- Sample Prep. for Chromatography

- Salts/Acids/Caustics/ Bases for analysis EMSURE®

Instrumental Analysis

- Volumetric solutions Titripur®/ Titrisol®/ Titripac®

- Spectrophotometer Spectroquant equipment and tests®

- Karl Fischer Reagent Aquastar® for Moisture Analysis

- GC Column and Acc.

- HPLC Column

- Instrumental Solvent Lichrosolv® for HPLC, Uvasol® for UV and Suprasolv® for GC

3 →

Quality Control Check

Reference materials

Spectroscopic buffers and matrix modifiers

Safety Products

Absorbent Chemizorb®

Extran Cleaning Reagent®

Withdrawal Systems for Barrels and Drums

Drying agent

Food contaminant analysis

The issue of food safety is a major concern in the oil palm industry. 3-MCPD (3-monochloropropane-1,2-diol) and GE (glycidyl esters) are contaminants formed during the refining of palm oil, mainly in the deodorization step.

The other contaminant in palm oil are heavy metals and polycyclic aromatic hydrocarbon (PAH).

Palm oil was reported to contain one of the highest levels of these contaminants amongst all vegetable oils. Both 3-MCPD and GE are characterized as a possible risk to human health.

Merck offer solution for food contaminant analysis, from reference materials, GC-MS solvent, and GC accessories.

Food Contaminant Analysis Reference Standard

Product	No. Catalog
(±)-3-Chloro-1,2-propanediol, analytical standard	32406-100MG
2-Chloro-1,3-propanediol, analytical standard	16761-25MG
EPA 525 PAH Mix A, certified reference material, 500 µg/mL each component in dichloromethane	48953-U
EPA 525 PAH Mix B, certified reference material, 500 µg/mL each component in acetone	48249
ICP multi-element standard solution IV(23 elements in diluted nitric acid) 1000 mg/l: Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Sr, Tl, Zn Certipur®	1.11355.0100
Arsenic ICP Standard traceable to SRM from NIST H_3AsO_4 in HNO_3 2-3% 1000 mg/l As Certipur®	1.70303.0100
Cadmium ICP Standard traceable to SRM from NIST $Cd(NO_3)_2$ in HNO_3 2-3% 1000 mg/l Cd Certipur®	1.70309.0100
Mercury ICP Std traceable to SRM from NIST $Hg(NO_3)_2$ in HNO_3 10% 1000 mg/l Hg Certipur®	1.70333.0100
Lead ICP Standard traceable to SRM from NIST $Pb(NO_3)_2$ in HNO_3 2-3% 1000 mg/l Pb Certipur®	1.70328.0100

Scan to start check price and quick order

NOW Live!

SigmaAldrich.ID

Experience a New Way to Shop at Merck

Search **Choose** **Order** **Track**

Scan to start
Check Price &
Quick Order

https://bit.ly/Quick-Order-Merck

Contact Us

PT Merck Chemicals and Life Sciences
Arkadia Green Park - G building, 9th floor
Jl. TB Simatupang No.Kav. 88, Pasar Minggu
Jakarta, 12520 - Indonesia

Toll Free: 0800 140 1253

CS.Merck@merckgroup.com

Let's Stay Connected

@mercklifescience.id

Merck Life Science Indonesia

www.sigmaaldrich.com

Merck Life Science Indonesia