

EKSTRAKSI MINYAK ATSIRI

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Pendahuluan

Beberapa tanaman memiliki komponen yang cukup penting bagi dunia farmasi dan pangan, khususnya yang mengandung senyawa aromatic dan bioaktif (meski kandungan sedikit)).



Essential oils are interested in aromatherapy for healing, cleansing, preservative, and mood-elevating attributes.



Minyak atsiri (Essential oils) merupakan cairan terekstrak yang memiliki sifat volatil dan menghasilkan aroma tertentu yang berasal dari bunga, biji, daun, batang, akar, phon, dsb.

Biasanya , minyak atsiri ini mengandung dua komponen besar yaitu Terpene (mono- and sesquiterpenes) dan senyawa aromatic.

Essential oils found in 108 families and > 2000 species.



Gramineae



Labiatae



Lauraceae



Myrtaceae



Oleaceae



Pinaceae



Rosaceae



Rutaceae



Santalaceae



Umbelliferae

Umbelliferae



Eryngium foetidum
(ผักชีฝรั่ง)



Centella asiatica
(บัวบก)



Angelica acutiloba
(ตั๋งกุ่ม)



Carum carvi
(หอมป้อม)



Apium graveolens
(คื่นช่าย)



Cuminum cyminum
(ยี่หระ)



Foeniculum vulgare
(ผักชีล้อม)



Coriandrum sativum
(ผักชี)



Coriander

Kingdom: Plantae

Family: Umbelliferae

Genus:

Coriandrum

Species: *C. sativum*

Binomial name:

➤ All parts of the plant are edible **used in cooking.**

➤ **seeds** are used **a carminative and a digestive aid** the relief of **anxiety and insomnia** in Iran

➤ It helps to detoxify the body and to stimulate the spleen.



Coriander oil has a sweet, spicy, warm smell, is nearly colorless to pale yellow and has a watery viscosity.

The therapeutic properties of coriander oil are analgesic, aphrodisiac, antispasmodic, carminative, depurative, deodorant, digestive, carminative, fungicidal, lipolytic, stimulant and stomachic.

Commercial Used



Pharmaceutical



Aromatherapy



Lotions & Cream



Beverages



Candy



Meat sauce



Alcoholic

Chemical composition of essential oil from Coriander .

53 compounds are detected

Essential oils Compound	Composition (%)
γ-Terpinene	(14.42%)
β -Pinene	1.82
β -Myrcene	0.55
m-Cymene	1.27
Linalool	(37.65%)
Citronellal	1.96
Borneol	0.32
Terpinyl acetate	0.31
Citronellol	1.31
Citral	1.36
Geraniol	1.87

Essential oils compound	Composition (%)
Eugenol	0.9
Undecanal	0.58
Myrtenyl acetate	0.43
Geranyl acetate	(17.57%)
Caryophyllene	0.33
α-Cedrene	(3.87%)
α -Farnesene	1.22
β -Bisabolene	0.8
β -Sesquiphellandrene	1.56
Others	7.16

Chemistry of essential oils

The complicated volatile compounds in essential oil could be divided into 4 groups



Aliphatic compound

Benzene derivatives



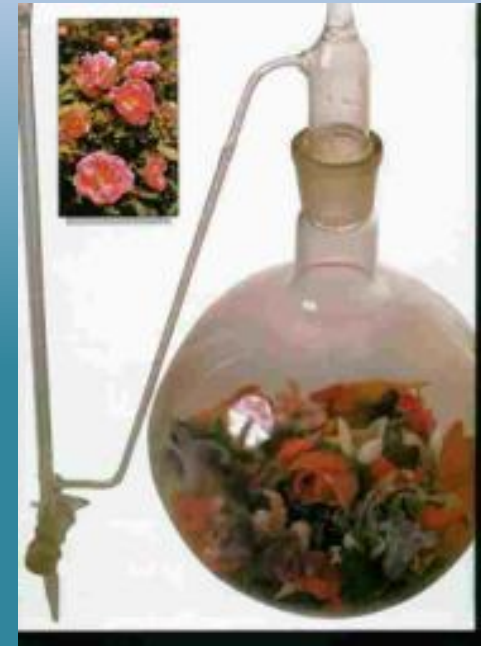
Terpene derivatives



Others compound



The volatile oil composition may change from the natural odor depending on the extraction method (Anitescu *et al*, 1997).



Compositions	Hydrodistillation	Ethanol	supercritical carbon dioxide
Linalool	✓	✓	✓
Terpinene	✓	✓	
Camphor	✓		✓
Limonene	✓		✓
α -pinene	✓		✓
γ -terpinene	✓		✓
C-terpinene			✓
Coumarins			✓
Geraniol	✓		✓
Geranyl acetate	✓		✓
Phenylpropanoids	✓		
P-cymene	✓		✓
Myrcene	✓		✓
Terpenolene	✓		✓
Camphene	✓		✓
Terpinolene	✓		✓
α -terpineol	✓		✓
Trans-sabinene hydrate			✓
Citronello			✓
n - Octanol			✓

The volatile oil composition may change from the natural odor depending on the extraction method

Plant extracts Production

Methods	Final products	notes
Enfleurage	Enfleurage absolutes	Suitable for extracts flavor of flowers
Expression	Essential oils	Need a high energy, suitable for extracts citrus peel, low yield
Solvent extraction	Concrete (crude extracts) a waxy, semisolid, dark-colored material free from the original solvent	Easy, simple, low energy
	Absolutes Free from wax and resinoids	
Steam/hydro distillation	Essential oils concentrate hydrophobic liquid containing volatile aroma compounds and rich of bioactive compounds (aliphatic, terpene, benzene, others)	High yield compared with expression

Metode Ekstraksi

➤ Pengepresan (Expression)

➤ Distilasi

- Distilasi dengan air (Hydrodistillation)
- Distilasi dengan uap panas (Steam distillation)
- Ekstraksi distilasi kontinyu
- Distilasi Vakum

➤ Ekstraksi Pelarut

- Enflurasi
- ekstraksi cairan-cairan
- Ekstraksi padatan-cairan
- **Supercritical fluid extraction**

1. Pengepresan



Kelebihan

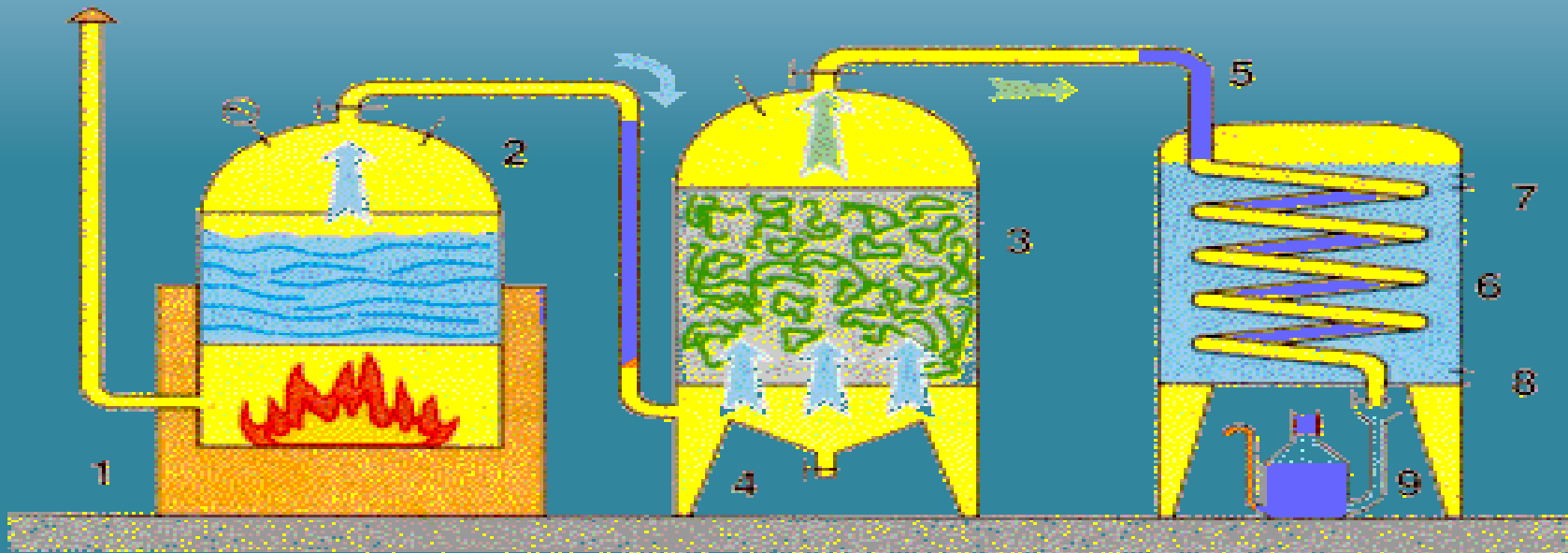
- biaya murah
- mudah

Kelemahan

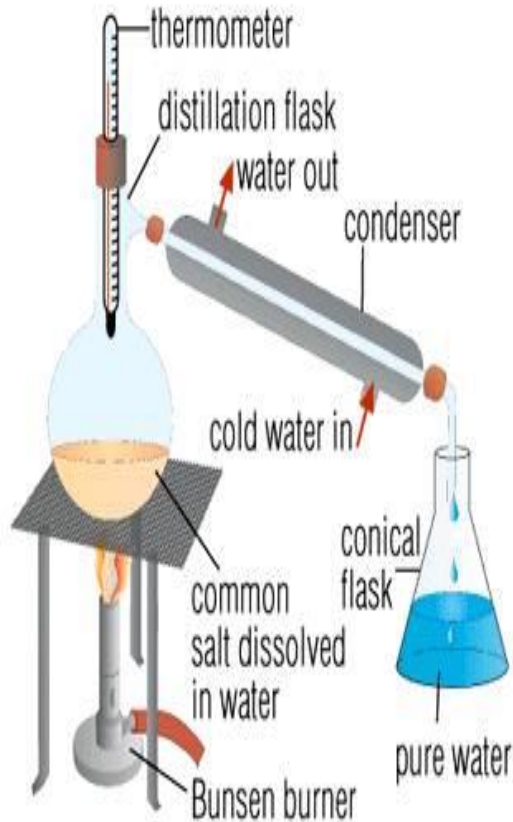
- membutuhkan usaha yg besar
- perlu waktu lama

2. Distilasi

Distilasi adalah suatu metode memisahkan campuran berdasarkan titik uap (volatilitas) ketika larutan dipanaskan. Distilasi merupakan suatu unit operasi atau proses pemisahan, bukan reaksi kimia.



Hydrodistillation



• Traditional method of extraction

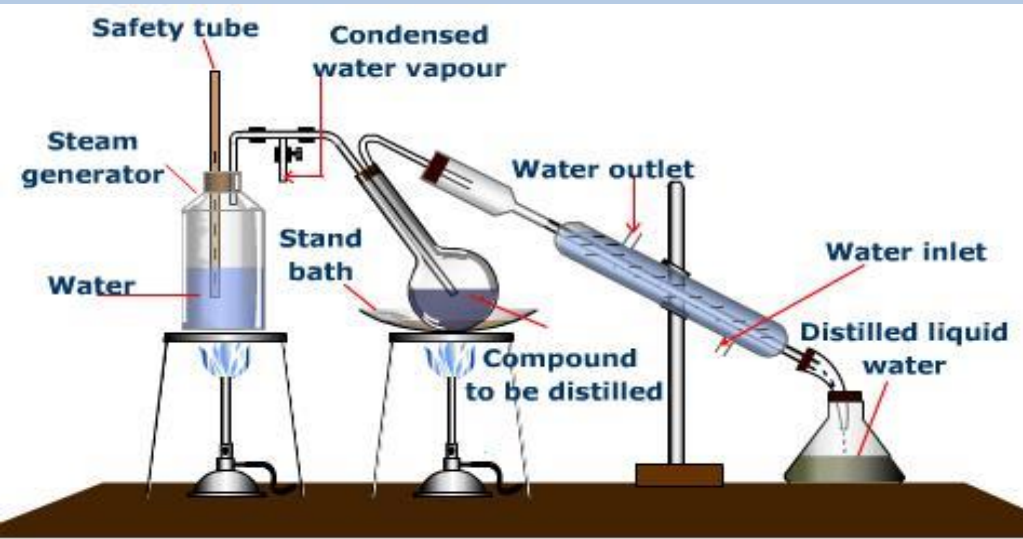
Kelebihan

- mudah dipisahkan

Kelemahan

- sampel terbakar
- kerusakan komponen volatil

➤ Steam distillation



- distilling compounds which are heat-sensitive

Advantage

- Easy separation
- Easy operation

Disadvantage

- Degradation of some analytes
- Sample impurities
- Expensive equipment



➤ Simultaneous distillation extraction (SDE)



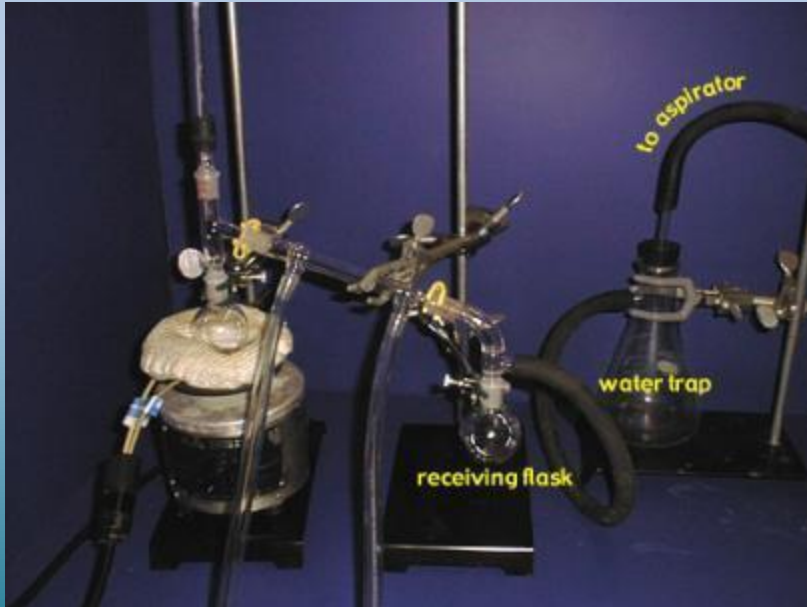
Kelebihan

- dapat diaplikasikan ke komponen tahan panas
- rendemen tinggi
- dapat dilakukan dgn cepat

Kelemahan

- merusakkan komponen volatil
- merusakkan akibat panas berlebih

Vacuum distillation



- menggunakan suhu rendah
- Prinsip : tekanan yang ada di atas larutan dikurangi sehingga lebih rendah dari tekanan uap pelarut.

Kelebihan

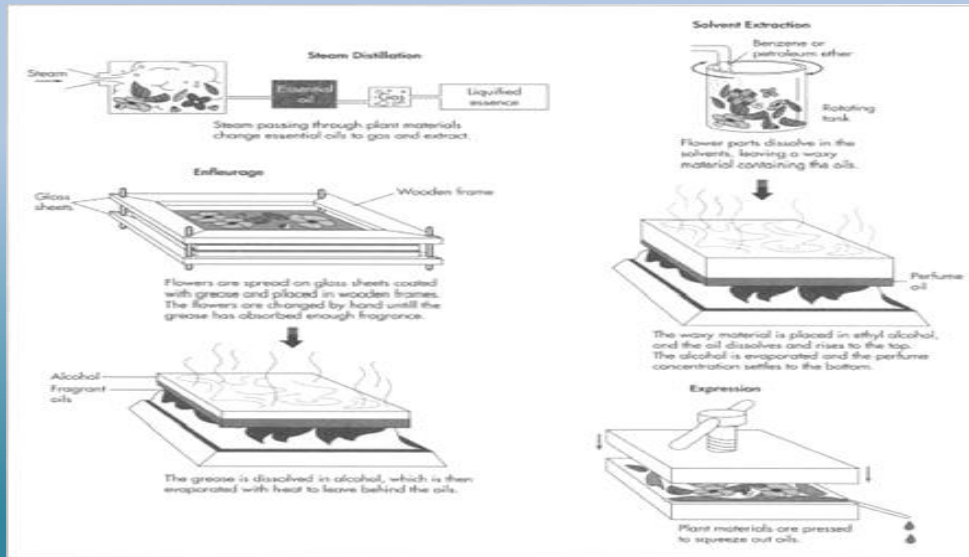
- Mencegah kerusakan

Kelemahan

- Membutuhkan peralatan yang kuat
- mahal

3. Ekstraksi dgn Pelarut

➤ Enfleurasi



Enfleurasi menggunakan lemak yg tidak berbau dan padat pada suhu ruang

uses odorless fats that are solid at room temperature

Keunggulan

- mudah
- cocok utk ekstraksi minyak bunga

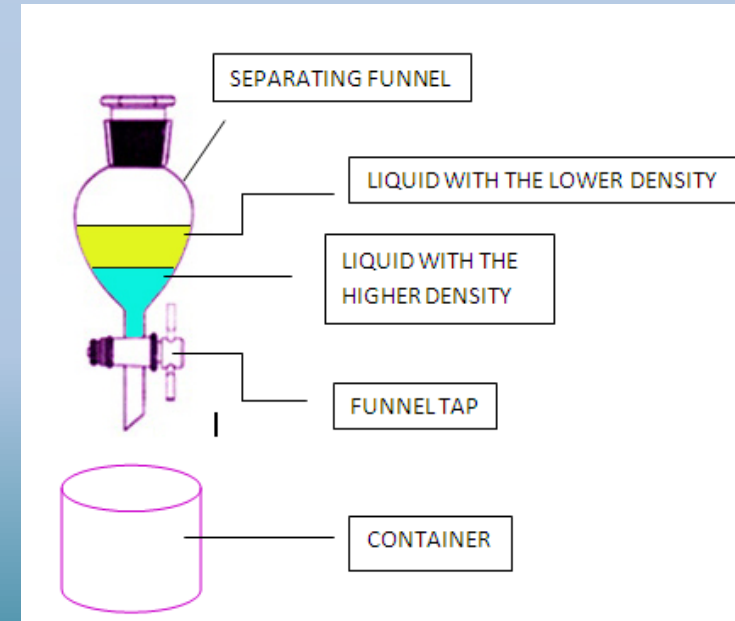
Kelemahan

- * Membutuhkan waktu yang lama

➤ Liquid-liquid extraction (LLE)

❖ Partition

- ❖ Berdasarkan perbedaan densitas bahan pelarut



Keunggulan

- Mudah dipisahkan
- ekstraksi dapat dilakukan di suhu ruang

Kelemahan

- membutuhkan pelarut organik yang cukup banyak

➤ Soild-liquid extraction

• Base on like dissolve like

• mengekstrak komponen dari sampel padat dengan menggunakan pelarut

keunggulan

- analisis dilakukan dalam sekali tahapan

Disadvantage

- akan kehilangan komponen tertentu
- membutuhkan waktu yang agak lama (± 3 jam)



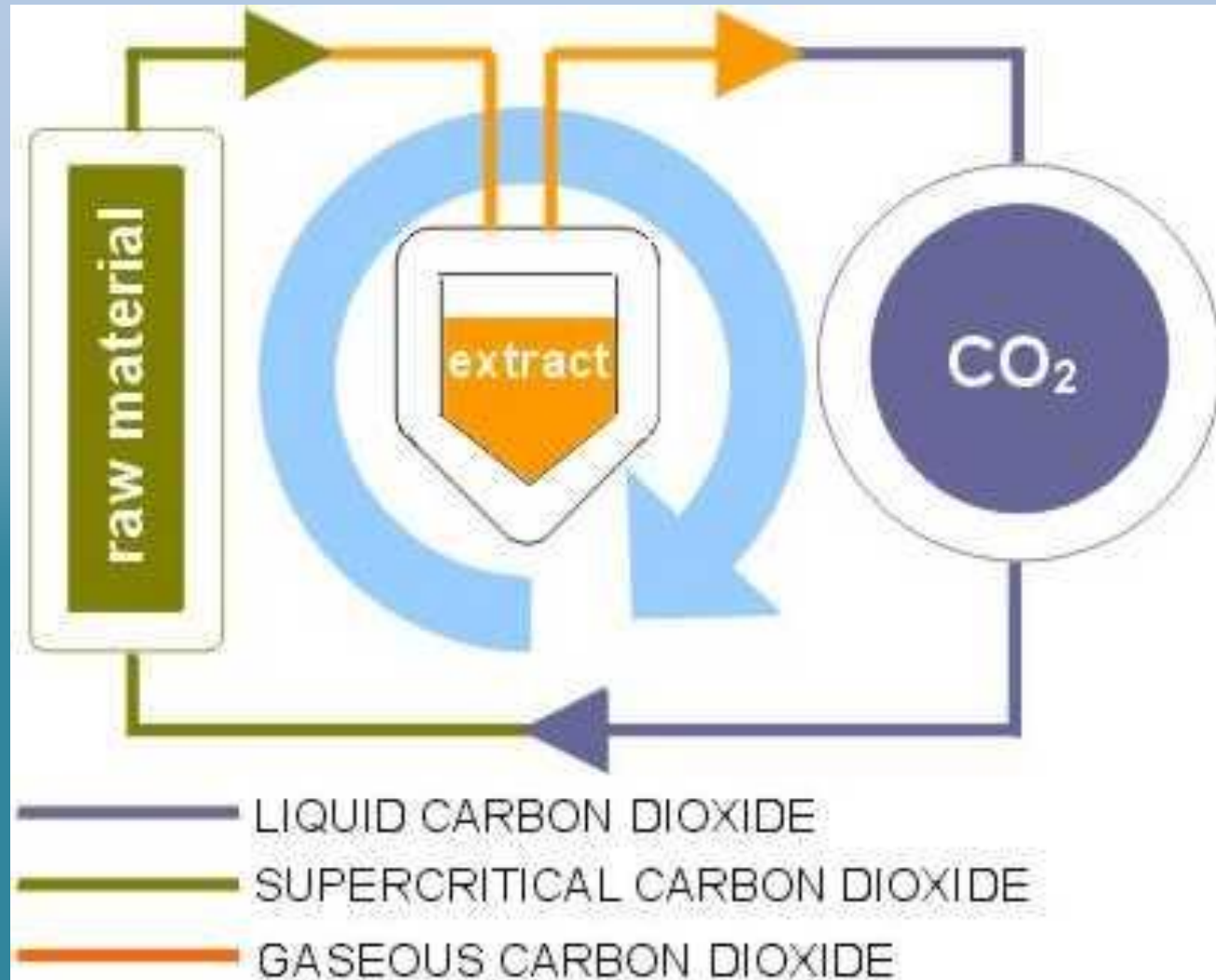
Soxhlet extractor

➤ Supercritical fluid extraction (SFE)

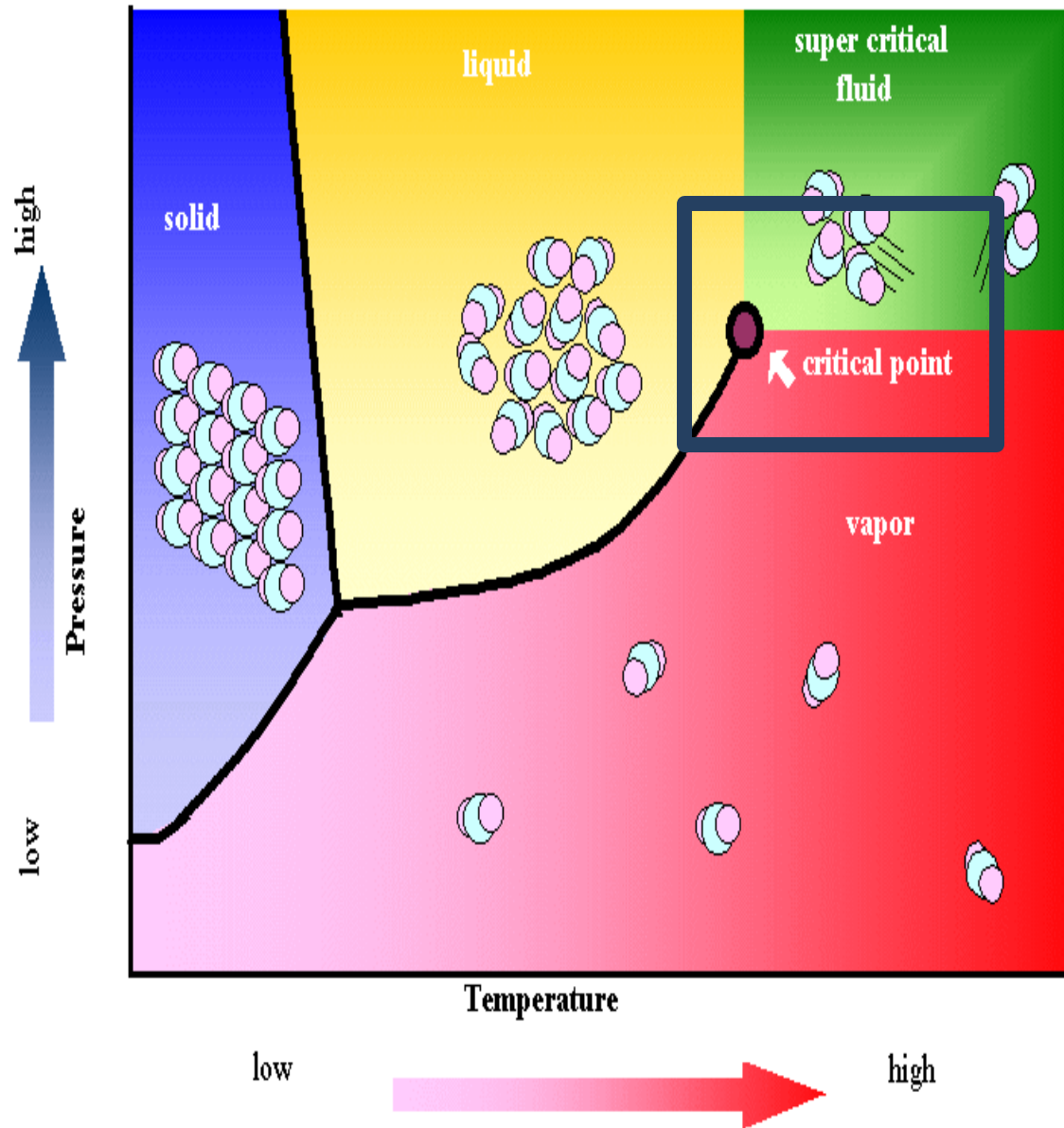
Ekstraksi Supercritical fluida akan meningkatkan tingkat solubilitas komponen volatil. Dengan demikian, proses ekstraksi akan lebih mudah dilakukan dengan modifikasi suhu dan tekanan.



➤ Supercritical fluid extraction (SFE)



Supercritical fluid extraction (SFE)



- Dense gases

- Critical temperature & pressure

- Resemble both liquids & gases

Critical properties of various solvents

Solvent	Molecular weight	Critical temperature	Critical pressure	Critical density
	g/mol	°C	Bar	g/cm ³
Carbon dioxide (CO₂)	44.01	30.95	73.77	0.469
Water (H ₂ O)	18.015	373.946	220.65	0.322
Methane (CH ₄)	16.04	-82.75	46	0.162
Ethane (C ₂ H ₆)	30.07	32.15	48.7	0.203
Propane (C ₃ H ₈)	44.09	96.65	42.5	0.217
Ethylene (C ₂ H ₄)	28.05	9.25	50.4	0.215
Propylene (C ₃ H ₆)	42.08	91.75	46.0	0.232
Methanol (CH ₃ OH)	32.04	239.45	80.9	0.272
Ethanol (C ₂ H ₅ OH)	46.07	240.75	61.4	0.276
Acetone (C ₃ H ₆ O)	58.08	234.95	47.0	0.278

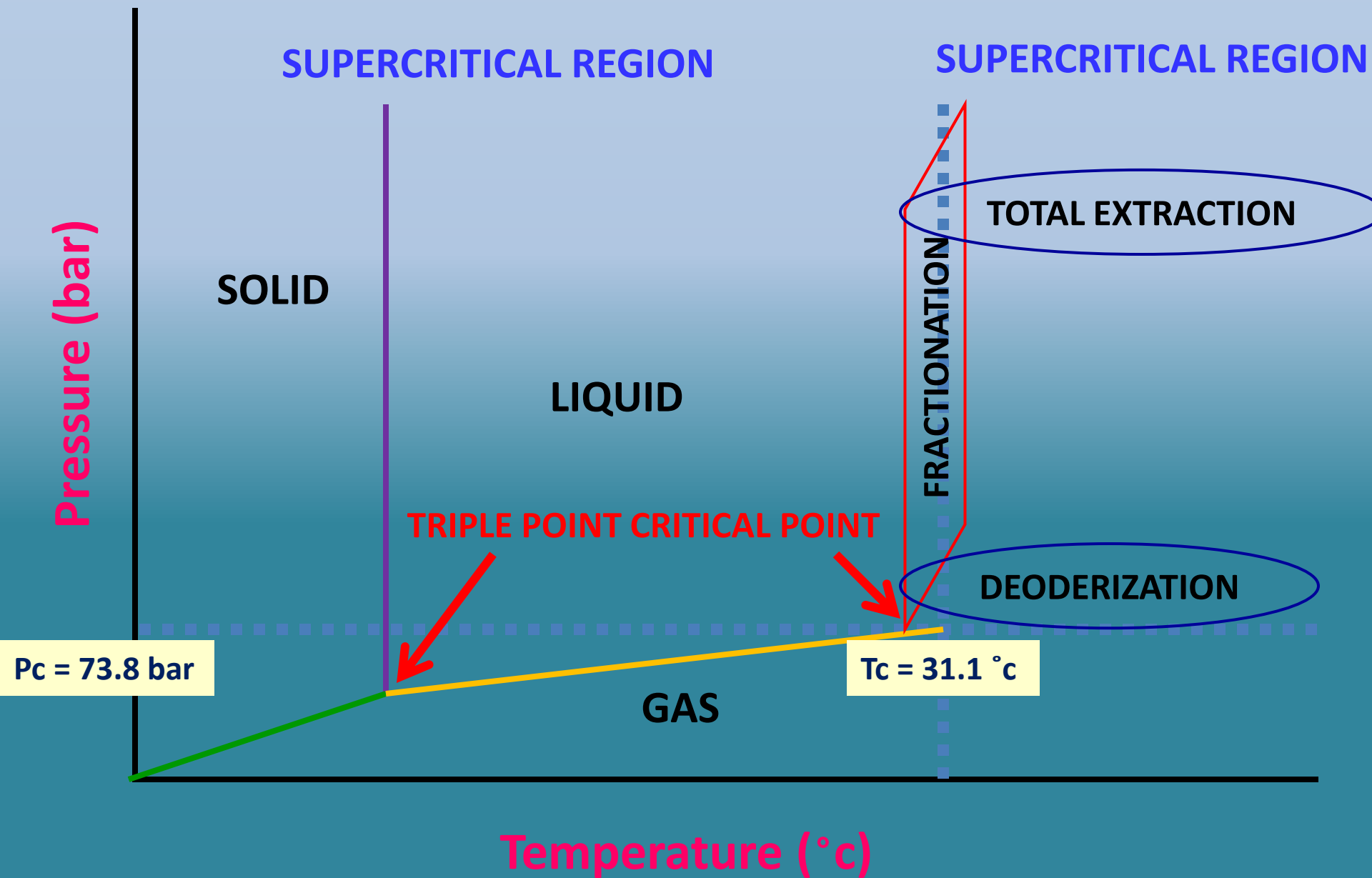
Super Critical CO₂ Extraction

Kekurangan

Titik didih, kehilangan komponen volatil tertentu

Keunggulan

Tidak berasa, tidak berbahaya, tidak berbau,
tidak mudah terbakar, kondisi moderat= 31⁰C
74 bar , tidak terjadi kerusakan---->labile
flavor compounds selectivity, aroma & flavor--
>mirip dengan komponen alami nya.



Factor affecting on quality of extract by SFE

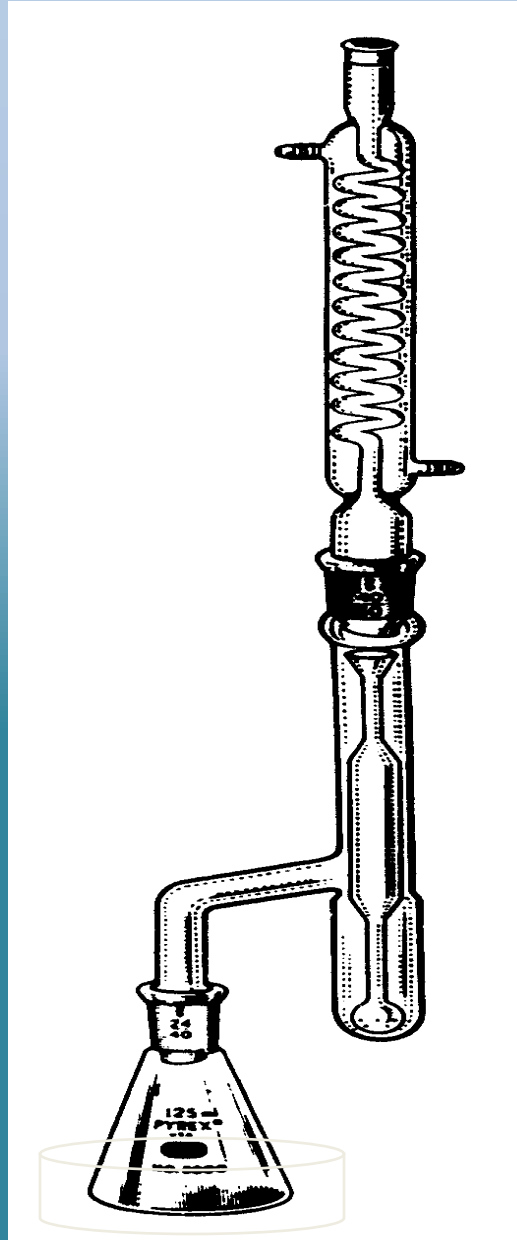
➤ Temperature

➤ Pressure

➤ Particle size

➤ Time

2. Continuous Solvent Extraction



Condenser

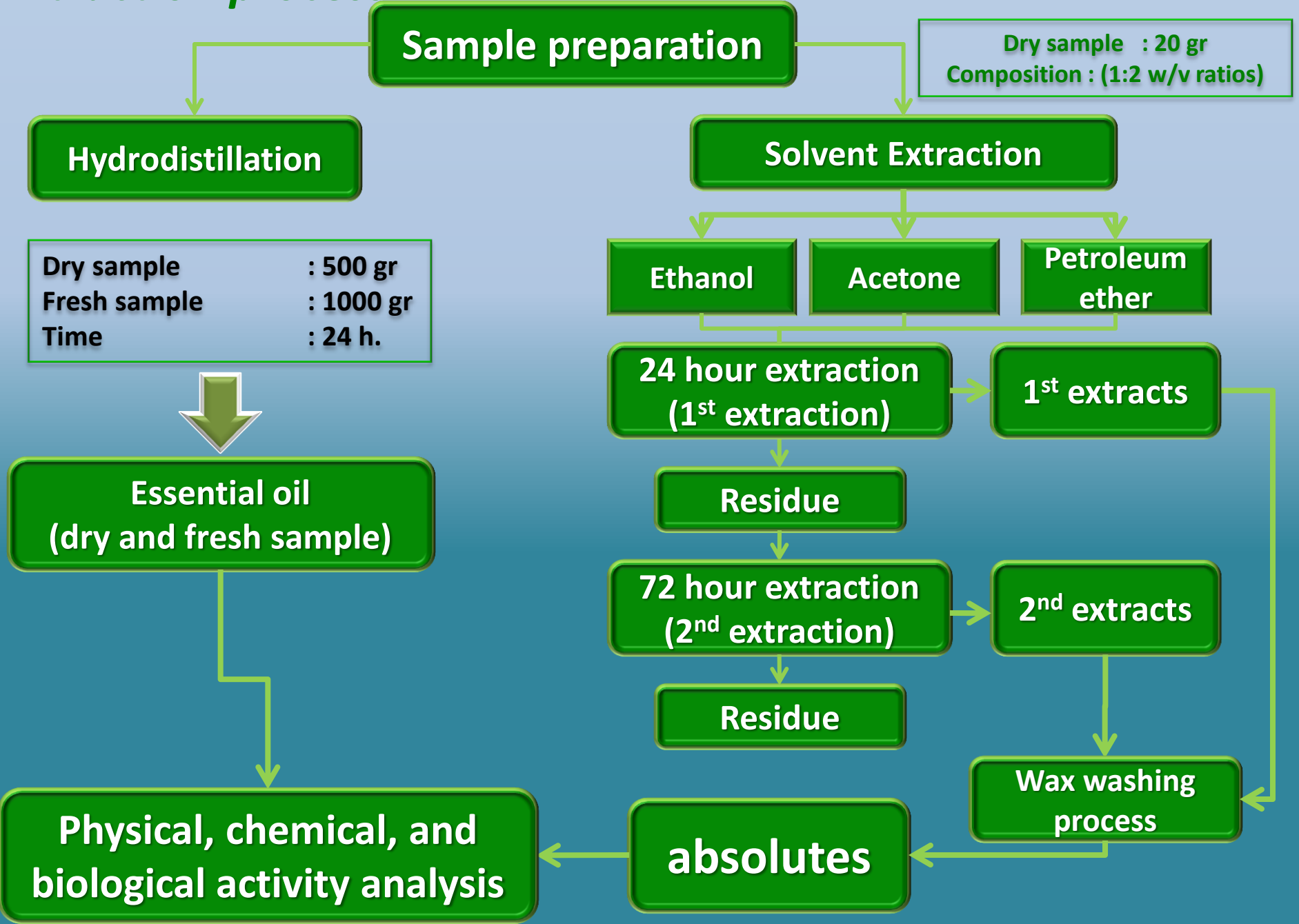
Beverage sample

Solvent (Ether)

Water Bath

Holes at the bottom
of the tube

Extraction process



Physical, chemical, and biological activity analysis

Analysis

Physical properties :

- Percent of yield extraction
- Optical rotation
- Color
- Refractive index.

Chemical properties :

- Volatile compounds analysis
- Total phenolics compounds

Biological activities :

- Antibacterial activity
- Minimum Inhibitor Concentration (MIC) values
- Antioxidant activity (DPPH and ABTS methods)



**The best plant
extracts**



**Application into the raw chicken
meat**