KIMIA ORGANIK BAHAN ALAM (2 SKS)

Kimia Organik Bahan Alam ?

Makhluk Hidup/ Organisme

(Hewan; Tumbuhan, Mikrorganisme yang hidup di darat, laut, dan udara)

Proses metabolisme

Metabolit Primer

(Karbohidrat; lemak, protein, asam nukleat), merupakan molekul dengan BM tinggi, struktur sama utk setiap organisme, dan digunakan sbg penghasil energi/ kelangsungan hidup organisme

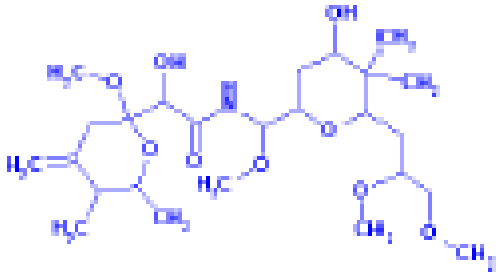
Banyak dipelajari di bidang Biokimia

Metabolit Sekunder

(golongan senyawa dengan struktur bervariasi dan khas untuk setiap organisme, BM relatif kecil, ditemukan dalam jumlah minor, berfungsi untuk pertahanan diri organisme, melawan penyakit, pertumbuhan, atau hormon

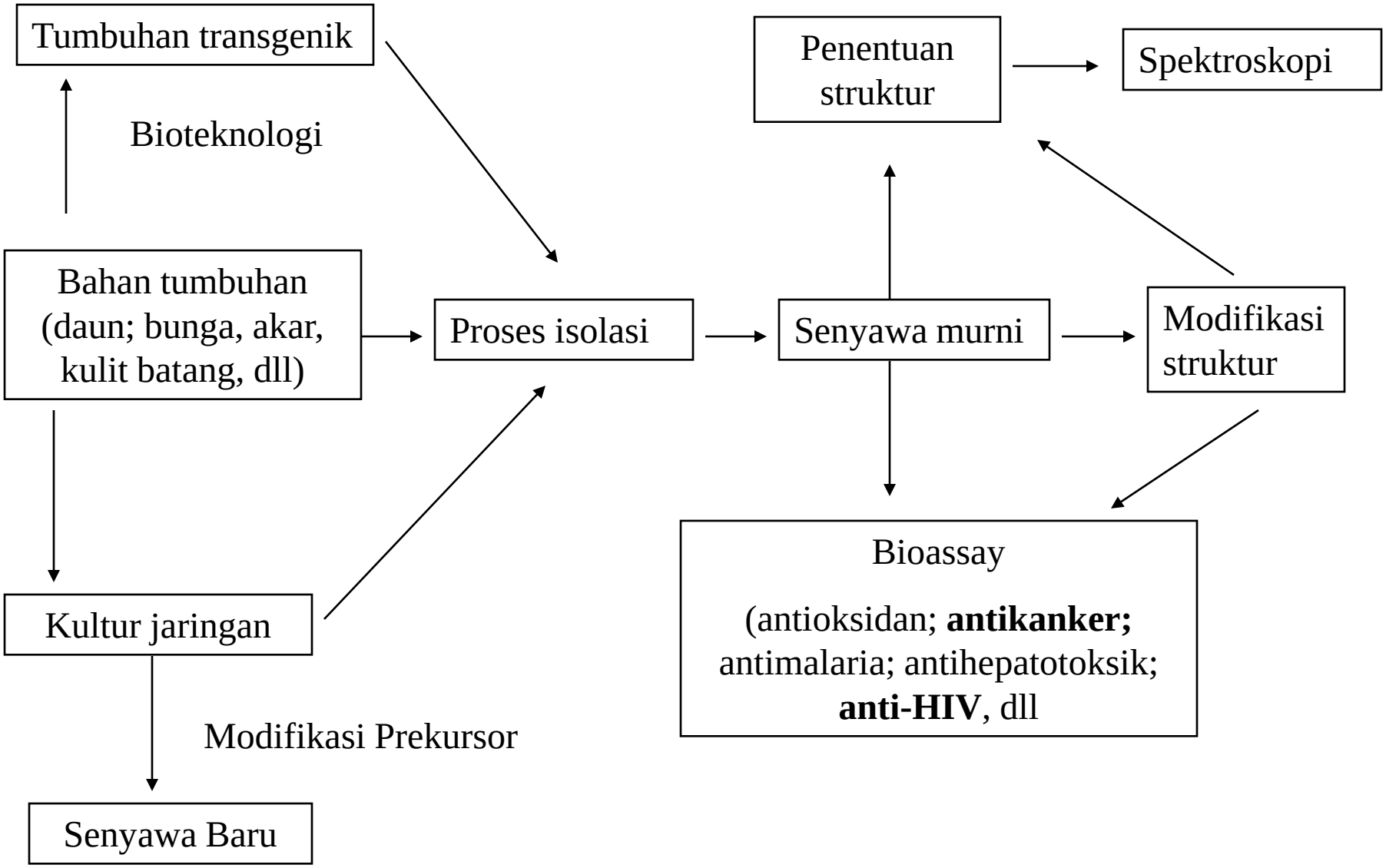
Bidang Kimia organik bahan alam

Peran Ekologis bahan alam:

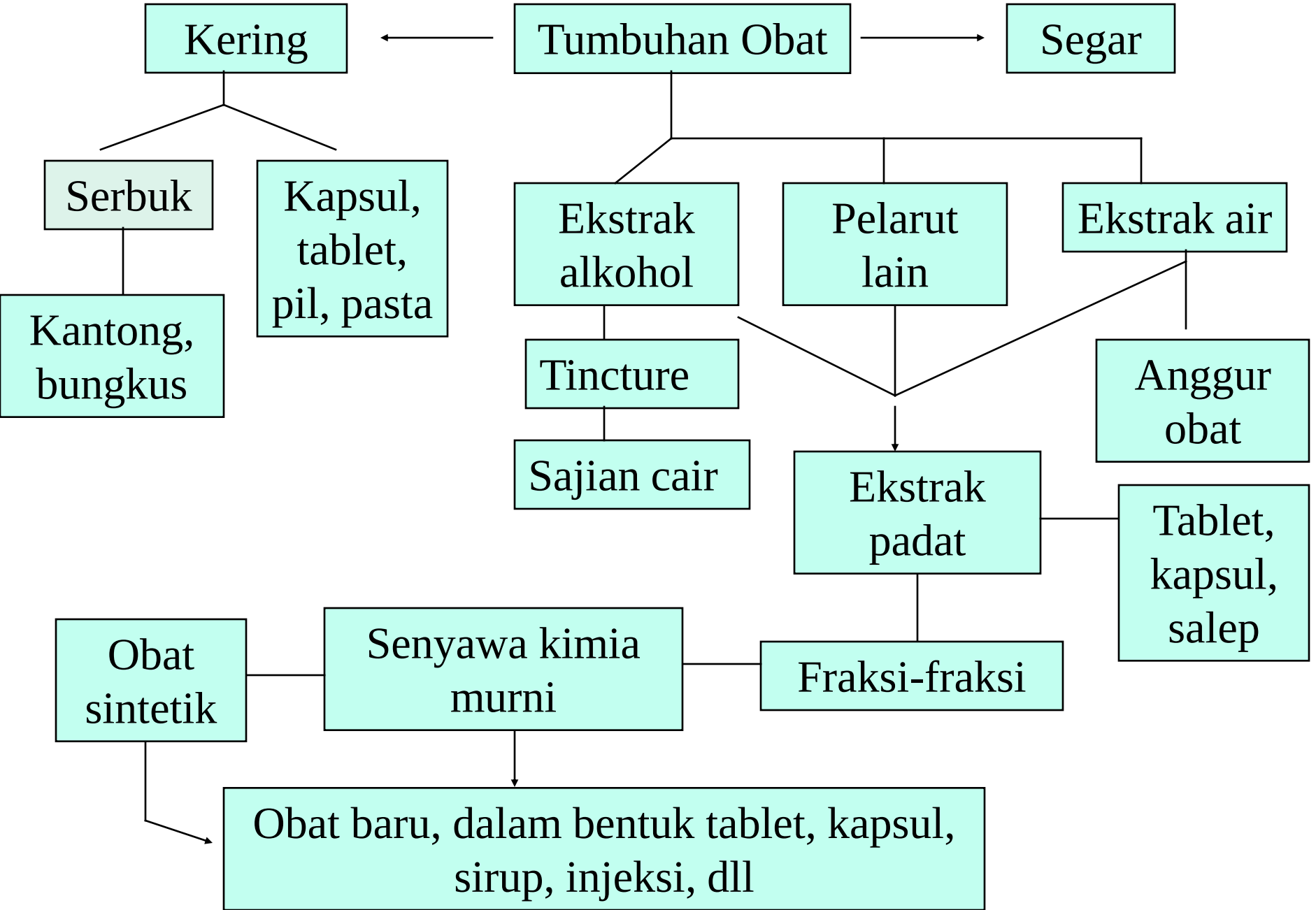


- Melindungi tumbuhan dari serangan herbivora dan infeksi mikroba
- Penarik serangga atau hewan penyerbuk dan penebar biji
- Agen alelopati yg berperan dlm kompetisi antar spesies tumbuhan.

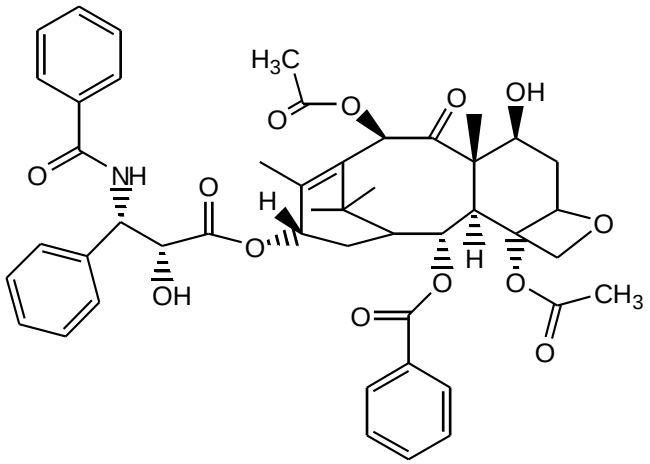
PELUANG PENELITIAN KIMIA ORGANIK BAHAN ALAM



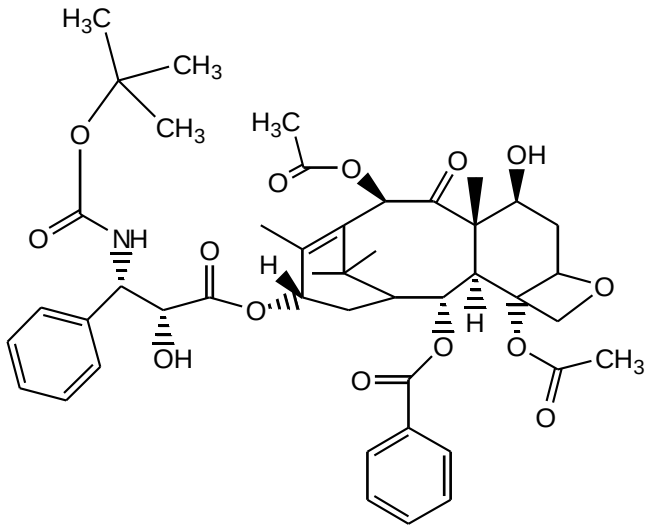
Tahapan proses pemanfaatan tumbuhan obat



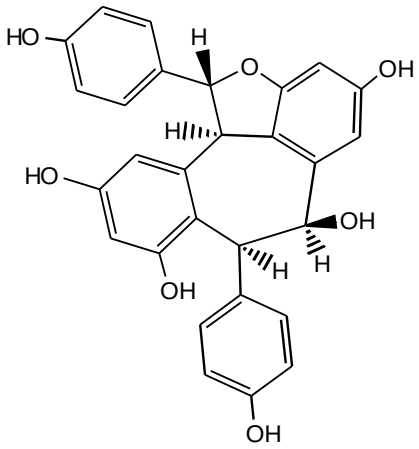
Beberapa penemuan obat dari senyawa alam



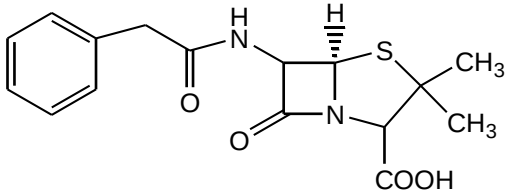
Taxol (*Taxus brevifolia*) Obat kanker



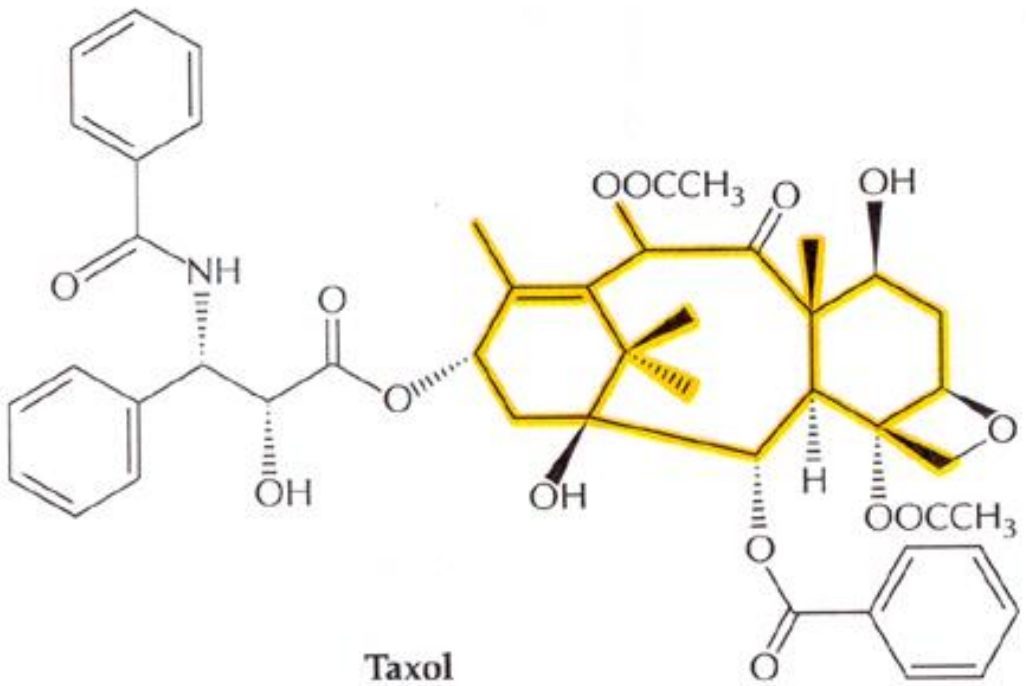
Taxotere (derivat taxol) obat kanker



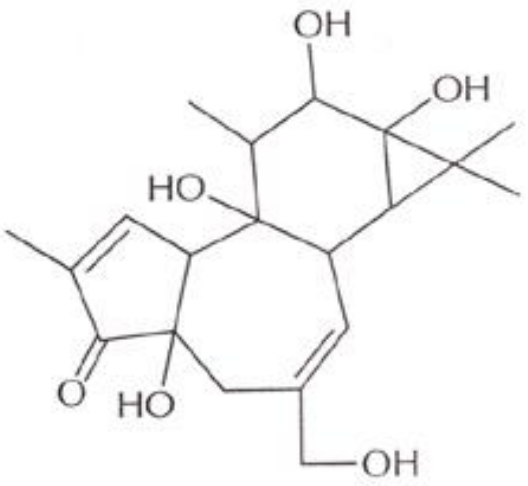
Balanokarpol (*Hopea*) anti-HIV



Penicillin G (*Penicillium notatum*) sbg antibiotik ditemukan th 1928 oleh Alexander fleming



Taxol
(anticancer drug)



Phorbol
(irritant and cocarcinogen)

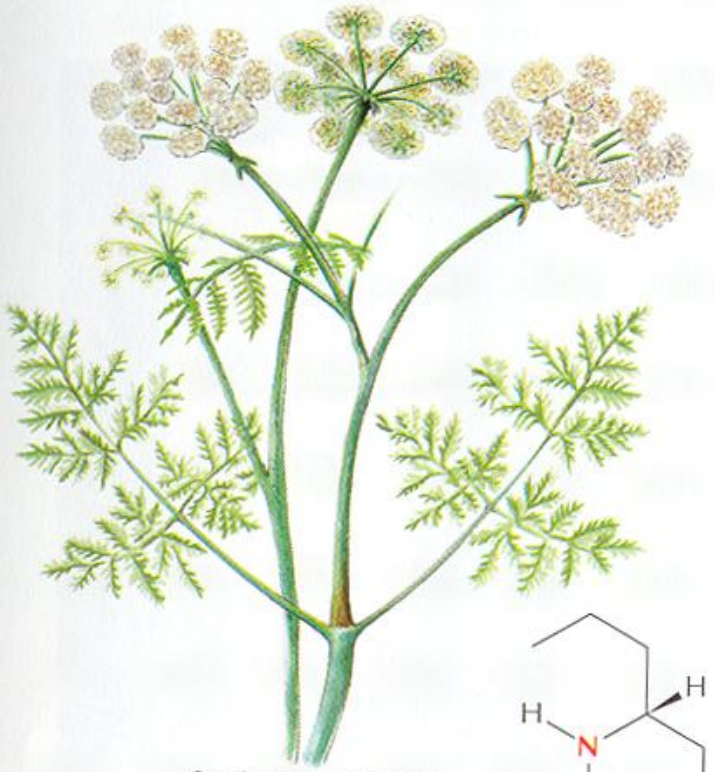
Taxol is an extensively decorated terpenoid, while Phorbol is less so (hydroxylations).

(Core terpenoid of Taxol is in yellow/bold).

Alkaloids

- Contain a Nitrogen, usually derived from an amino acid (e.g., Tyrosin)
- Long history of usage by people – at least 3000 years

Socrates death in 400 BC from the alkaloid of hemlock – Coniine.



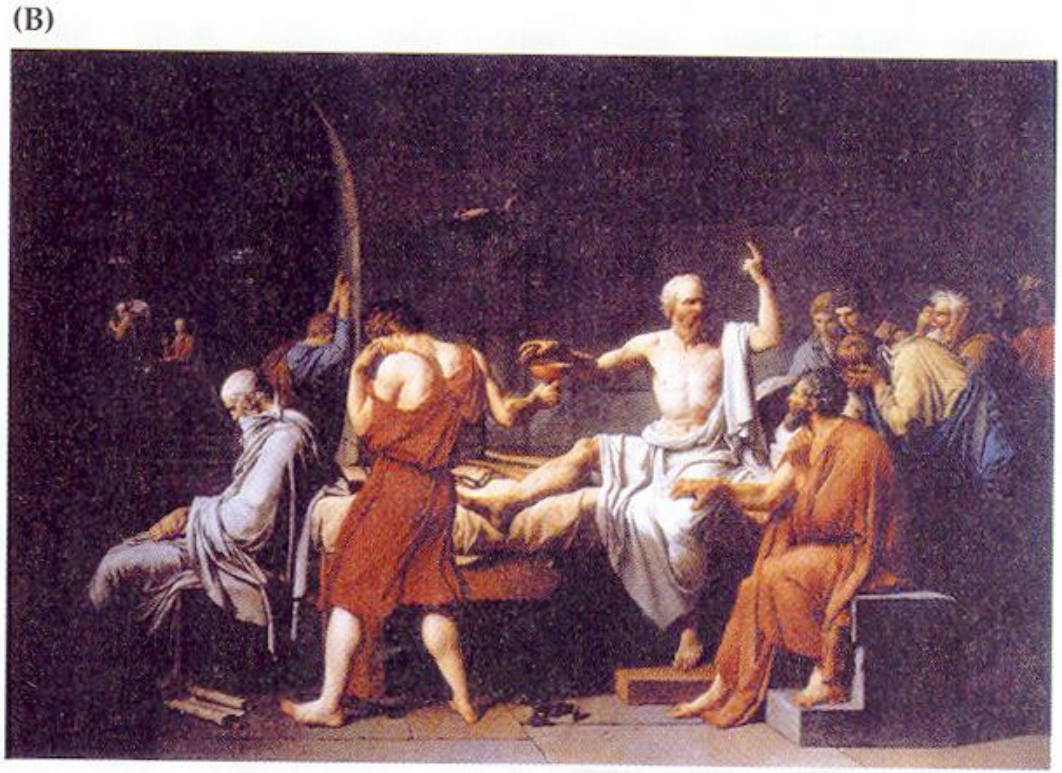
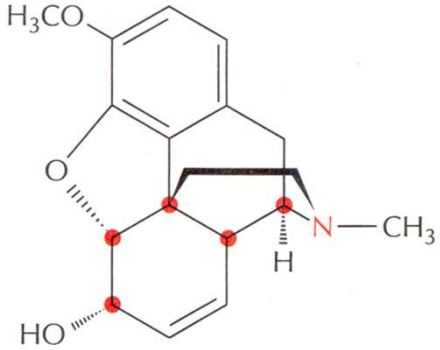


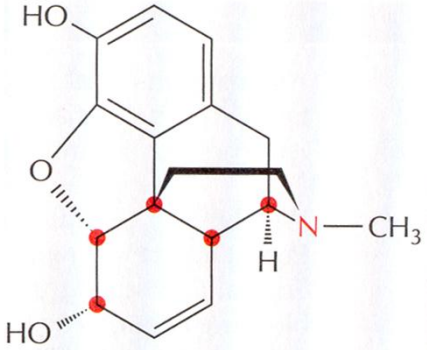
Figure 24.19
(A). The piperidine alkaloid coniine, the first alkaloid to be synthe-
sized, is extremely toxic, causing paralysis of motor nerve endings

ing an extract of coniine-containing poisonous hemlock. This depic-

Papaver somniferum



Codeine



Morphine

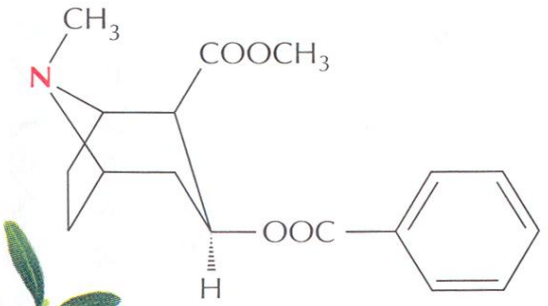
Figure 24.21
(A) Structures of the alkaloids codeine and morphine from the opium poppy *Papaver somniferum.* Asymmetric (chiral) carbons are highlighted with red dots. (B) The frog *Bufo marinus* accumulates a considerable amount of morphine in its skin.

illicit production of heroin, a semisynthetic compound derived by acetylation of morphine (Fig. 24.23), and cocaine, a naturally occurring alkaloid of the coca plant (Fig. 24.24). Because of their various pharmacological activities, alkaloids have influenced

The most used and abused alkaloids, morphine/heroin and cocaine.

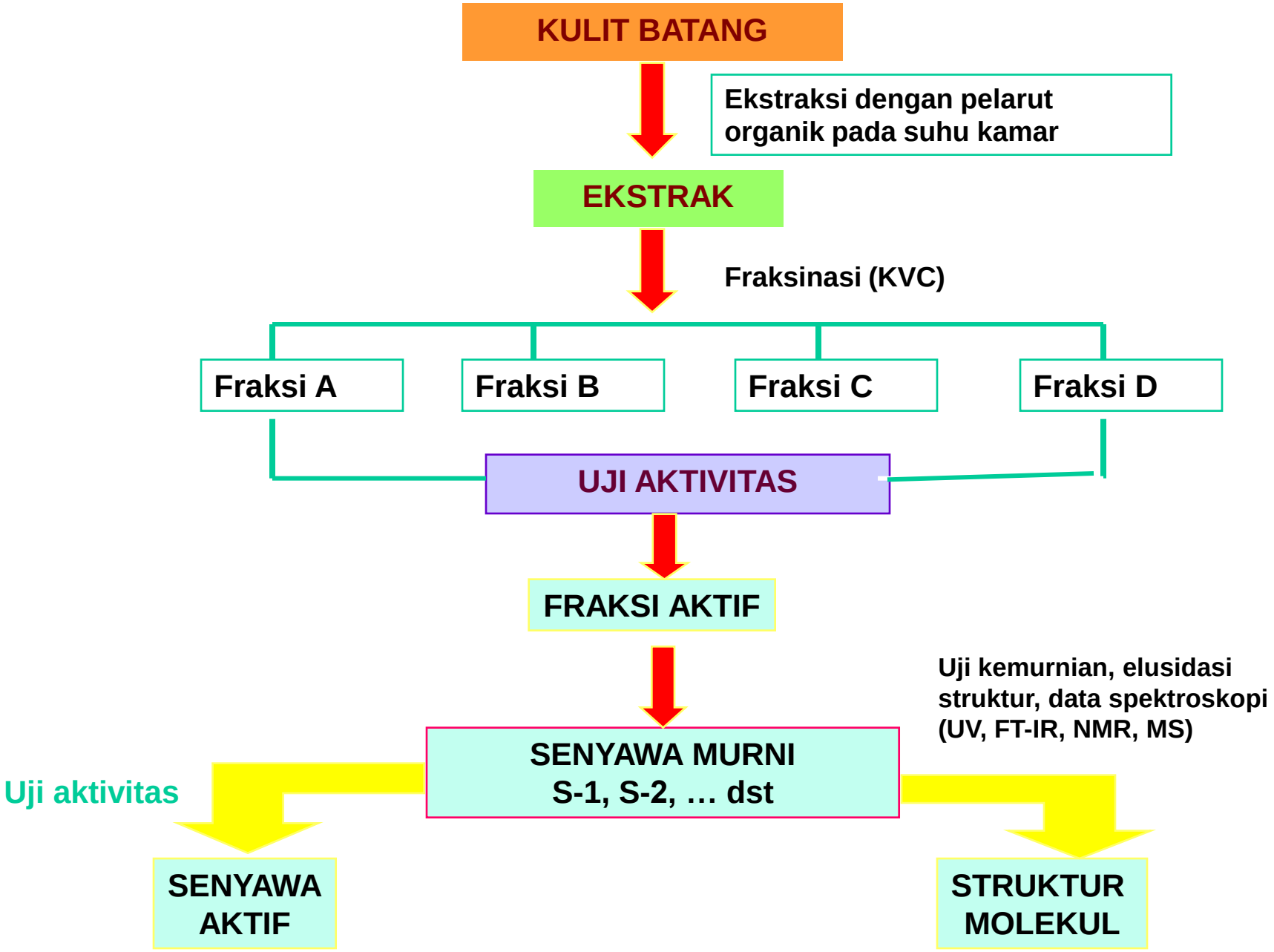
Morphine – is converted to heroin by acetylation of the hydroxyls.

Erythroxylon coca



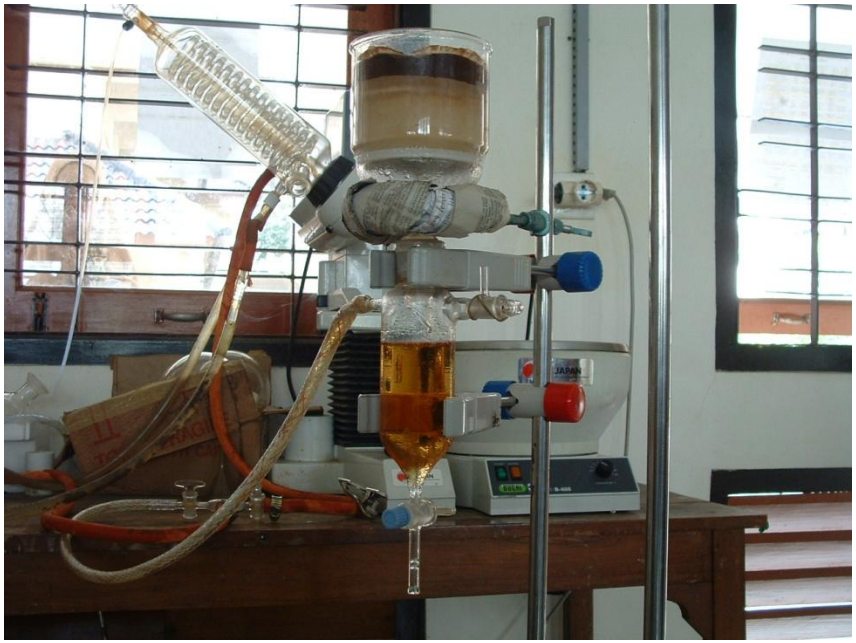
Cocaine

Figure 24.24
Structure of the tropane alkaloid cocaine, a central nervous system stimulant derived from *Erythroxylon coca.*


KULIT BATANG
Ekstraksi dengan pelarut organik pada suhu kamar
EKSTRAK
Fraksinasi (KVC)
Fraksi A
Fraksi B
Fraksi C
Fraksi D
UJI AKTIVITAS
FRAKSI AKTIF
Uji kemurnian, elusidasi struktur, data spektroskopi (UV, FT-IR, NMR, MS)
SENYAWA MURNI
S-1, S-2, … dst
Uji aktivitas
SENYAWA AKTIF
STRUKTUR MOLEKUL

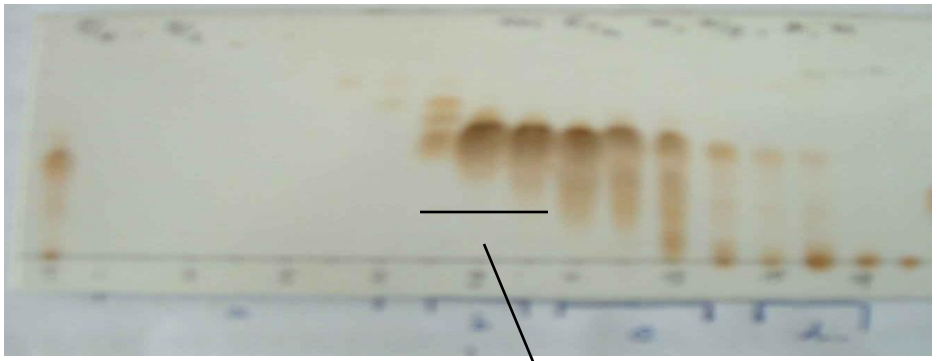
CARA ISOLASI SENYAWA BAHAN ALAM I

CARA ISOLASI SENYAWA BAHAN ALAM 2



Kromatogram Hasil Pemisahan Senyawa Alam Secara Kromatografi

1



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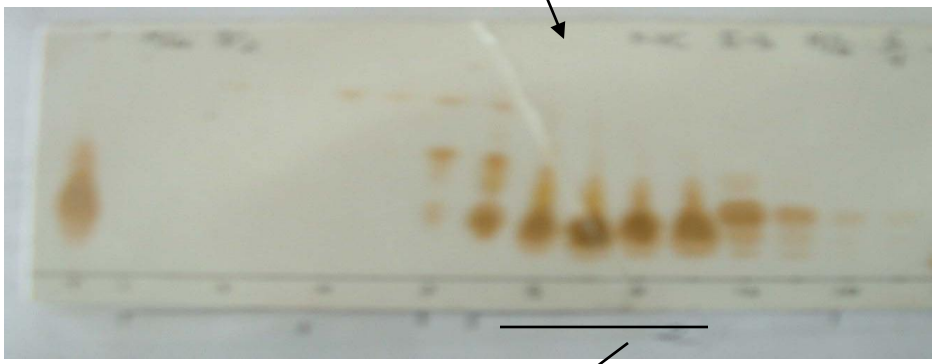

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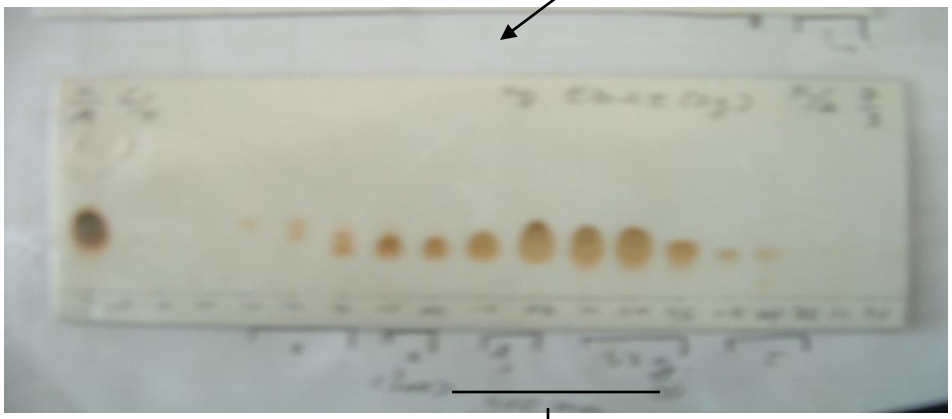
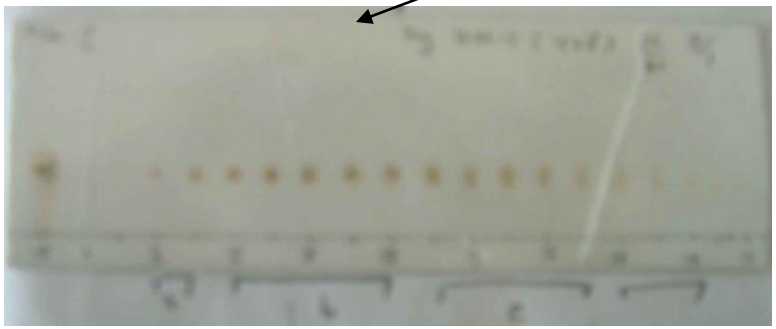
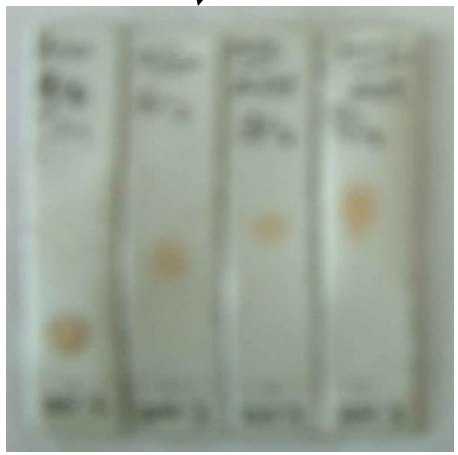


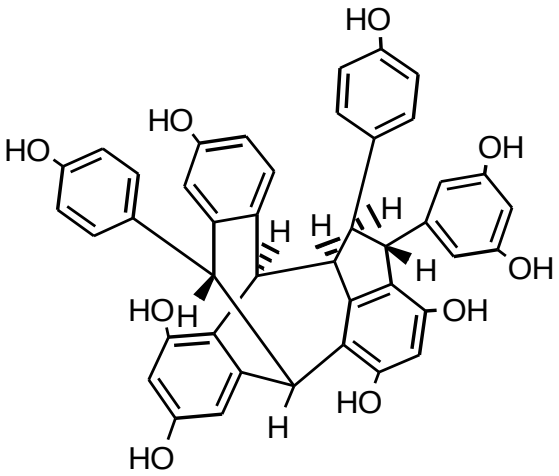
4

5



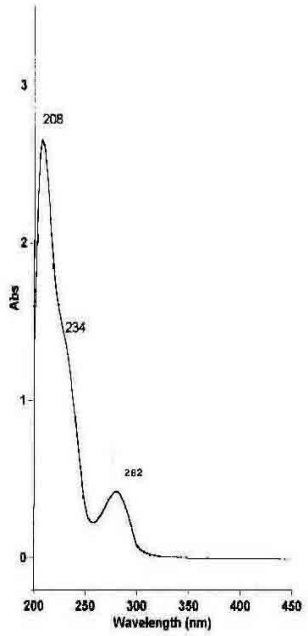


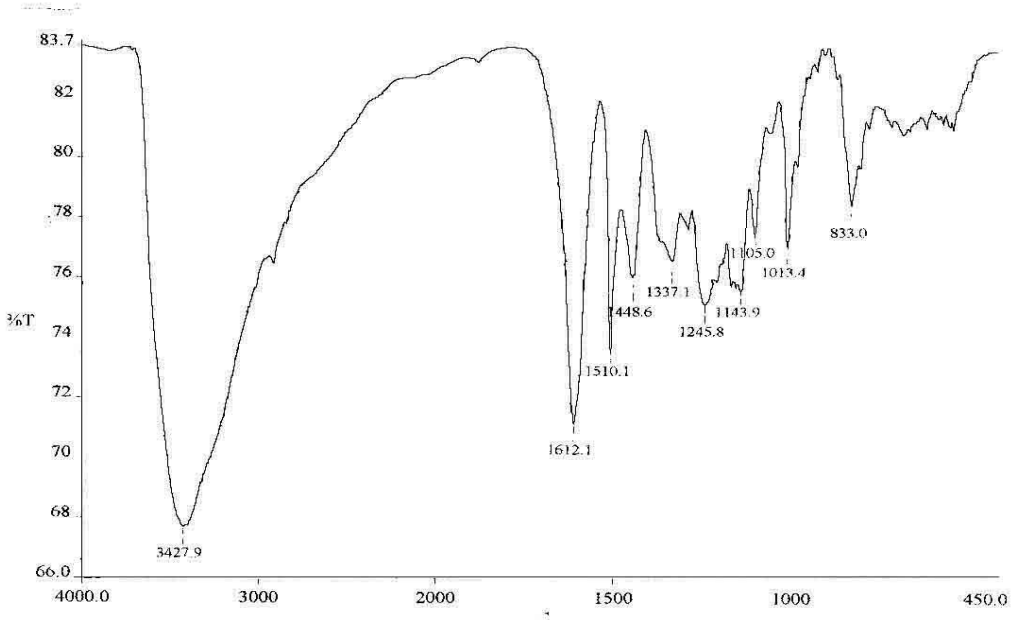
IDENTIFIKASI STRUKTUR SECARA SPEKTROSKOPI



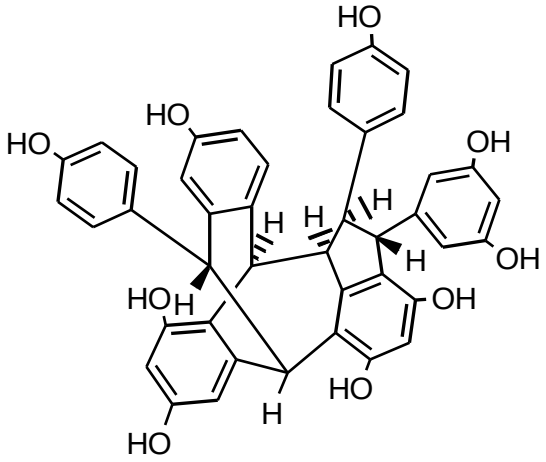
FAB-MS [M^+] 680 ($C_{42}H_{32}O_9$)

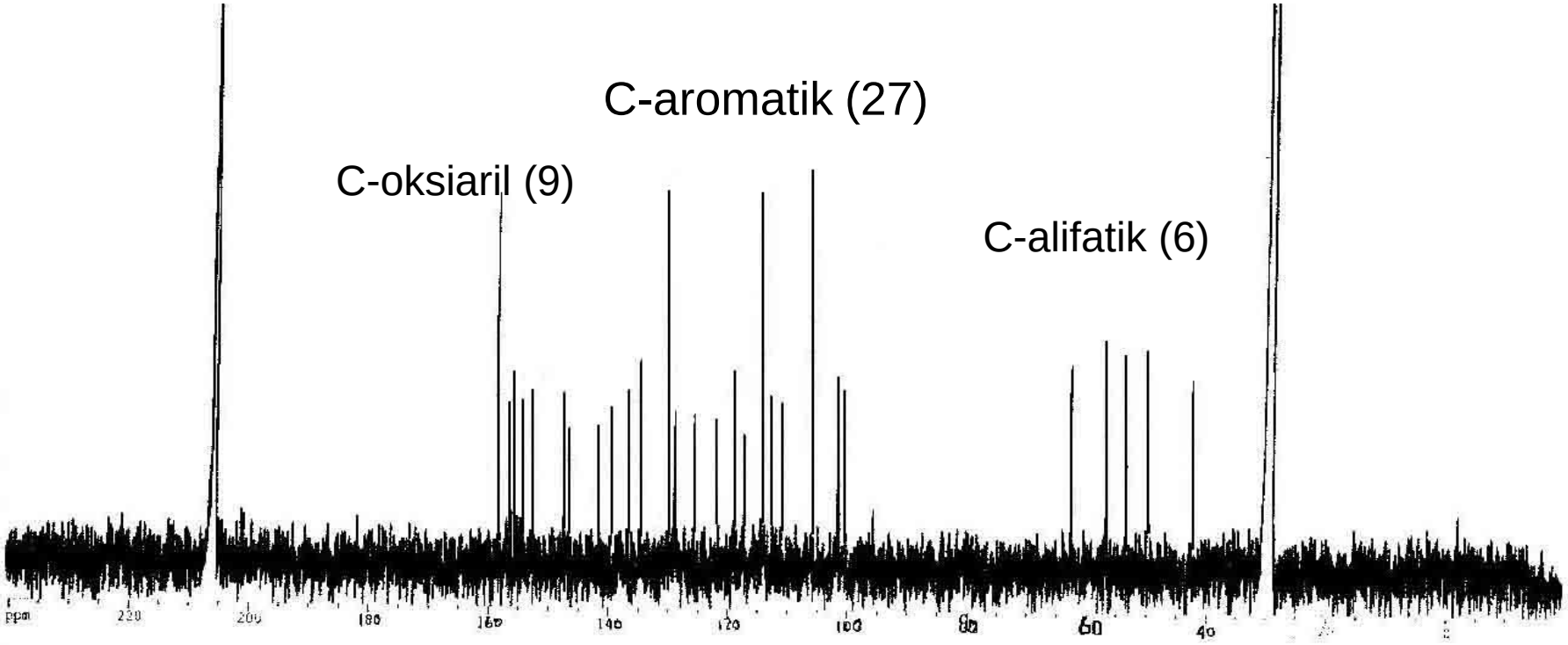
Spektrum
UV dan IR



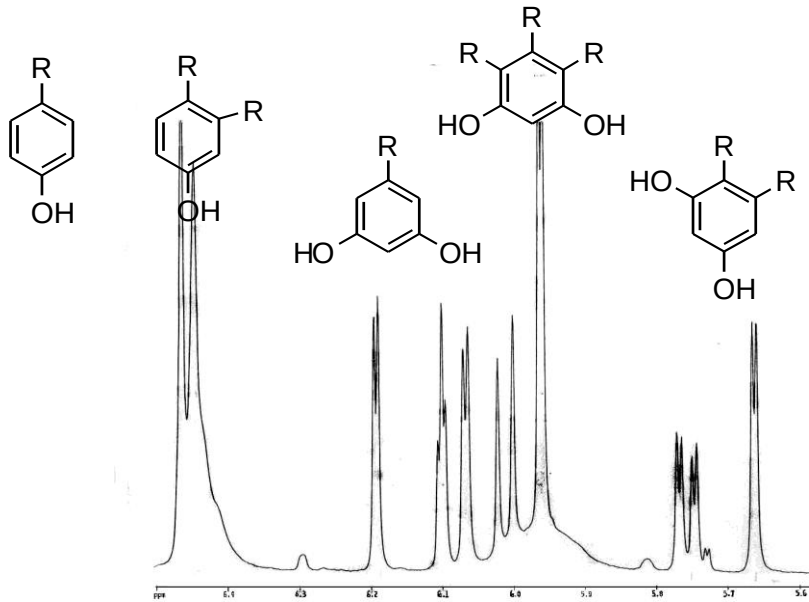


Spektrum ^{13}C

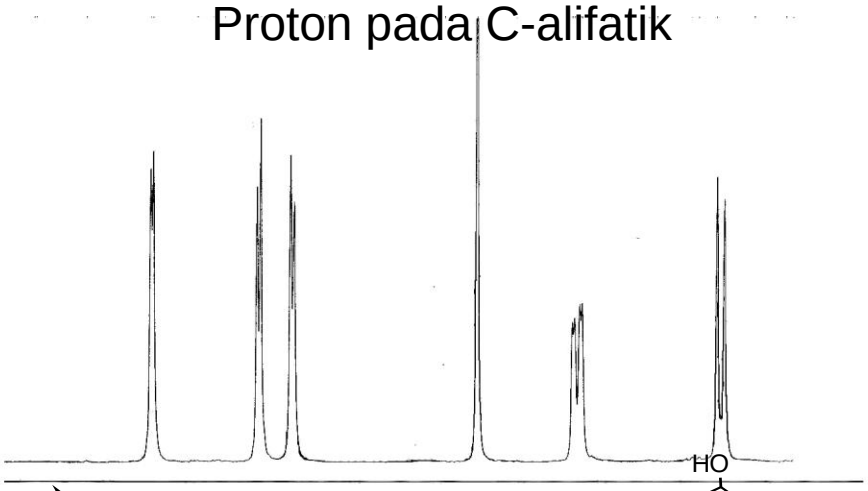


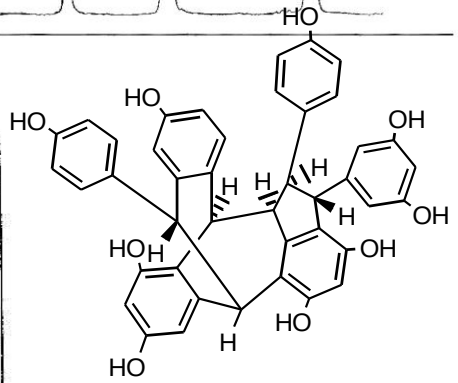


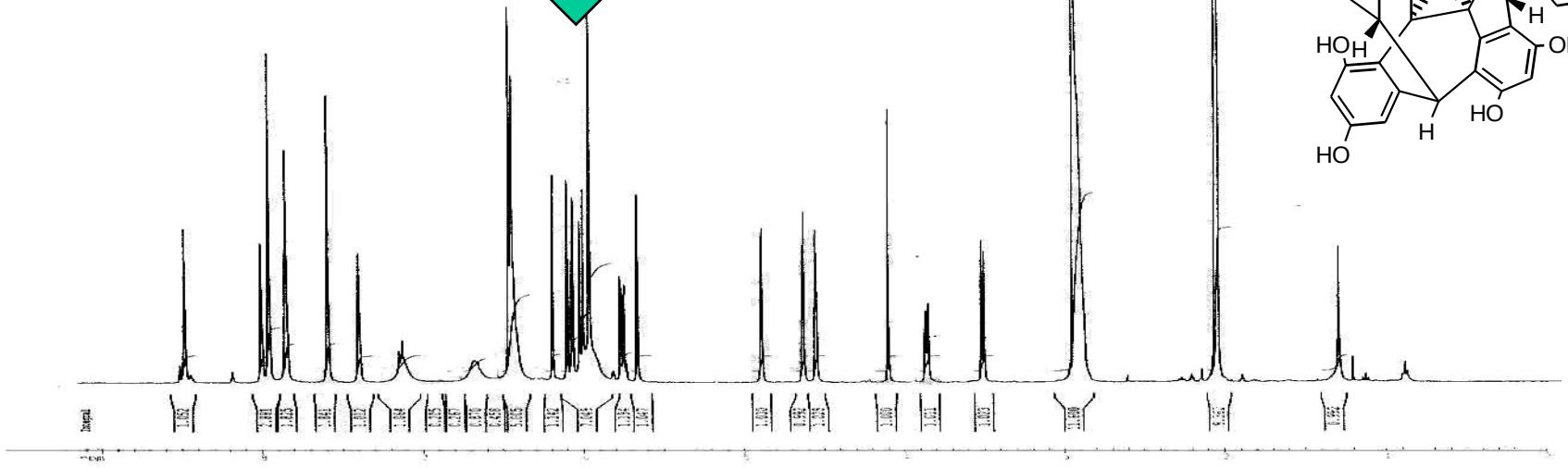
Spektrum ^{1}H NMR



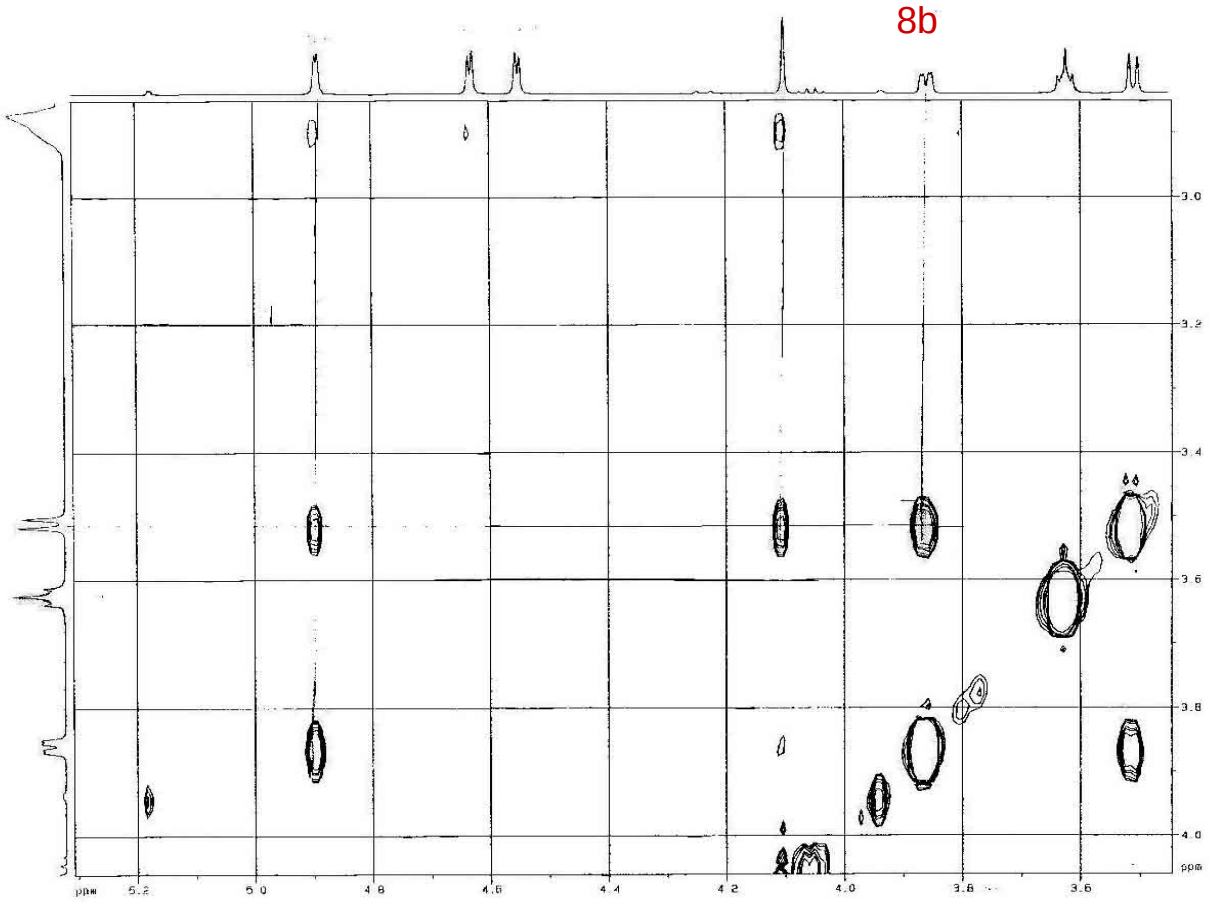
Proton pada C-alifatik

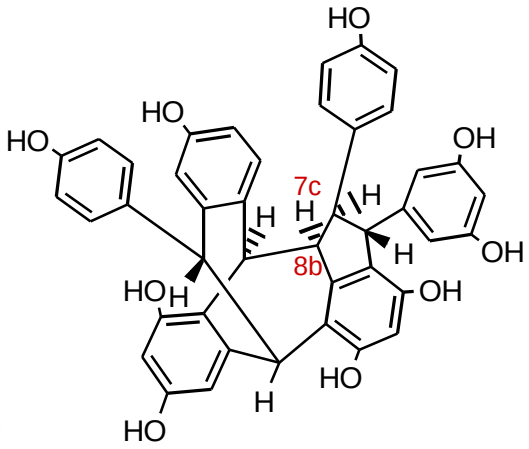




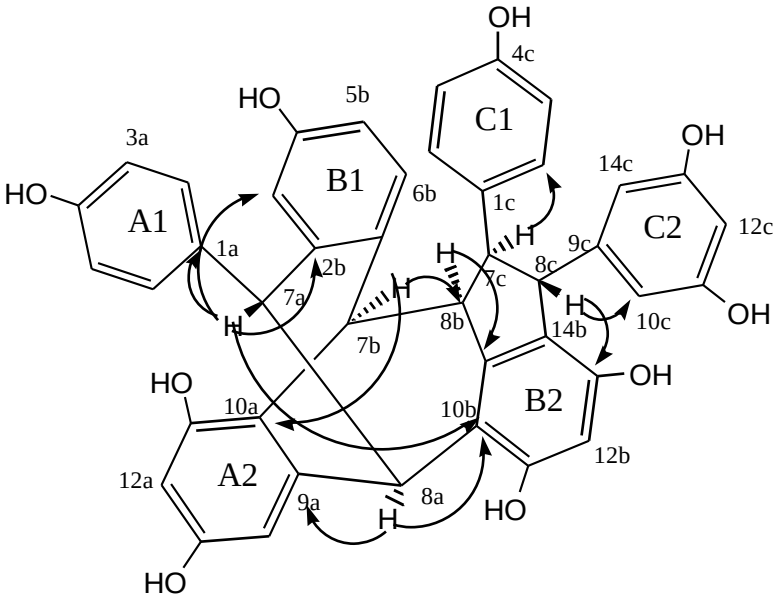


Spektrum (^{1}H-^{1}H) COSY NMR

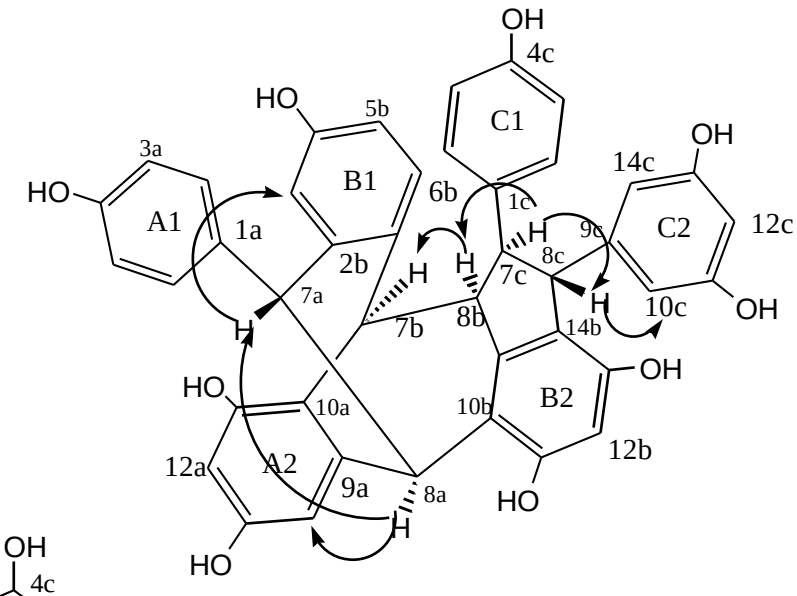




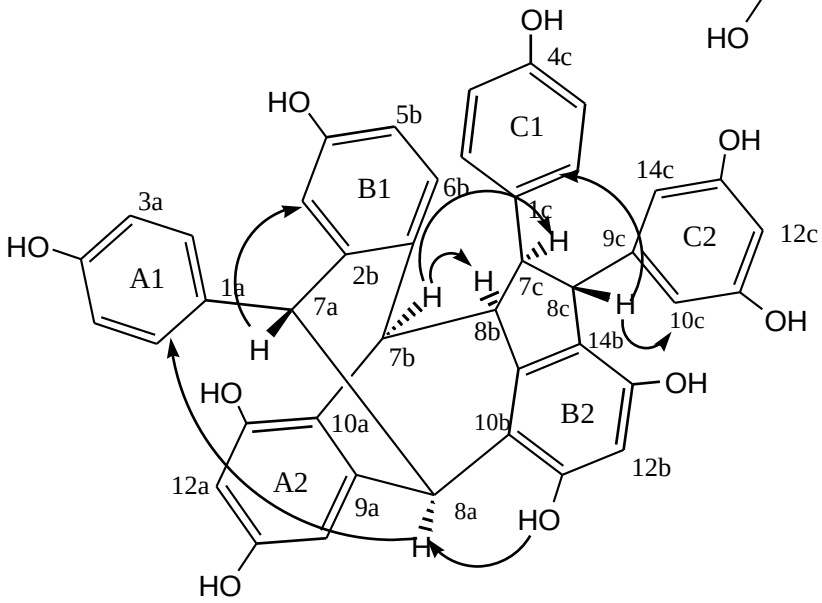
Beberapa hasil korelasi dari spektrum NMR dua dimensi



HMBC



COSY



NOESY