

1. Collection & preparation of plant material

1. Collection & preparation of plant material: **Selecting** the appropriate plant species known for containing the target compound.

Harvesting the **correct parts** of the plant (leaves, roots, stems, etc) based on the phytochemicals of interest.

Drying & grinding the plant material to increase surface area for extraction.

Isolating potential drugs from plants involves several systematic steps, dependent on the specific compound/class of compounds

4. Concentration

4. Concentration: **Evaporating the solvent** (using rotary evaporators) to concentrate the extract, yielding a crude extract that contains a mixture of compounds.

7. Activity testing

7. Activity testing: Assessing the bioactivity of the isolated compounds through pharmacological tests to determine their potential medicinal properties

Poisonous Plants - Aconitine

Diterpene alkaloid obtained from Aconitum species (250 species) aka monkshood & wolfsbane – considered Britain's most toxic plant (an ornamental) Used at one time to treat trigeminal neuralgia (sudden/severe facial pain).

Alkaloid content varies with growth stage
Roots previously used for pain relief
Roots have been mistaken for horseradish
fatalities 5 mg considered enough to kill.

Poisonous Plants - Aconitine (cont)

Aconitine & related structures are complex terpene esters & neurotoxins acting on Na⁺ channels. No antidote available! Symptoms of poisoning include burning of the mouth & throat, abdominal pain, intense thirst, headache, slow pulse, paralysis, convulsions, delirium & coma. Treatment would be symptomatic.

2. Extraction

2. Extraction: Using **solvents** (e.g., water, ethanol, methanol or hexane) to dissolve the desired compounds. Solvent depends on nature of the compounds (polar vs. non-polar).

Common extraction method:

Maceration: Soaking plant material in solvent at room temperature for long period

Percolation: allowing solvent to pass through the plant material in column-like setup

Soxhlet extraction: Repeatedly washing the plant material with boiling solvent

2. Extraction (cont)

Repeatedly washing the plant material with boiling solvent

5. Purification

5. Purification: **Separating** specific compounds from the crude extract using techniques such as:

Chromatography: column chromatography, thin-layer chromatography (TLC), high-performance liquid chromatography (HPLC) to separate, identify & purify compounds

Crystallisation: recrystallising desired compound from solution to increase purity

Filtration/distillation: depending on chemical nature of compounds

3. Filtration

3. Filtration: Removing solid plant material from the liquid extract using gravity/vacuum filtration

6.Characterisation

6.Characterisation	Analysing the isolated compounds to confirm their identity & purity using various techniques:	mass spectrometry (MS)
		nuclear magnetic resonance (NMR)
		spectroscopy
		infrared (IR)
		spectroscopy

Poisonous Plants

Poisonous plants & fungi may be divided into 3 groups:

Plants that are **undoubtedly toxic** but have medical application in defined doses e.g., Deadly nightshade (*Atropa belladonna*)

Plants that are **toxic & have no medicinal potential** or not yet realised e.g., Hemlock water-dropwort (aka deadman's fingers) (*Oenanthe crocata*) – contains oenanthotoxin – a polyene compound; Death cap (*Amanita phalloides*) – contains amatoxins (peptides that inhibit RNA polymerase II that converts DNA to mRNA)

Plants & fungi that are **toxic & are abused for their hallucinogenic properties** e.g., nutmeg & liberty cap (*Psilocybe* species)



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