

### 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<sup>+</sup> 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

|                           |                                                                                               |                                  |
|---------------------------|-----------------------------------------------------------------------------------------------|----------------------------------|
| <b>6.Characterisation</b> | 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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Published 18th April, 2025.  
Last updated 18th April, 2025.  
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