

## Exp.6: Alkaloid Extraction

### Objectives:

- Extraction of alkaloid from green tea.

### 1- Introduction:

**Alkaloids:** are alkalis and contain at least one N<sub>2</sub>-atom. They also normally have a significant physiological action on humans and animals

**Alkaloid:** Difficult to define No definitive difference between an alkaloid and naturally occurring complex amines.

### **Alkaloid Description**

- In plants, they may exist in the free state, as salts or as N- oxides.
- Alkaloids are basic - they form water-soluble salts.
- They give a precipitate with heavy metal iodides. Except Caffeine.

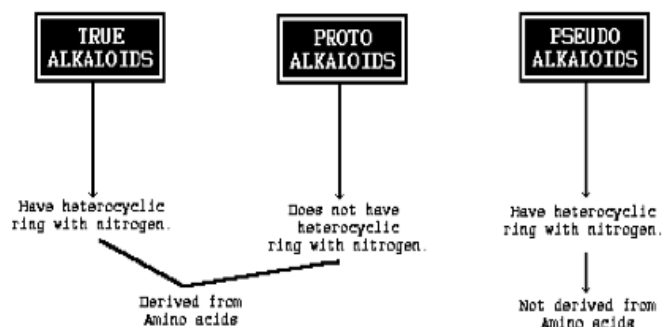
### Alkaloid classification

#### **A-General classification:**

**1- True alkaloids:** which contain nitrogen in the heterocycle and originate from amino acids.

**2- Protoalkaloids:** which contain nitrogen and also originate from amino acids.

**3- Pseudalkaloids:** which contain nitrogen in the heterocycle and do not originate from amino acids



**B- Chemical classification:**

1	Pyridine and Piperidine.	7	Indol
2	Pyrolidine and pyrole.	8	Pyrimidine and Imidazol
3	Tropane	9	Pyrrolizidine
4	Quinolone	10	Terenoids
5	Isoquinoline	11	Tropolone
6	Phenyl ethyl amine		

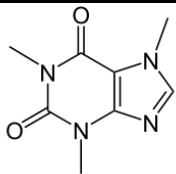
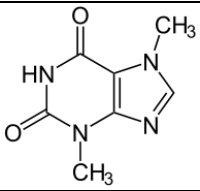
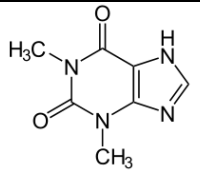
**Tests for Alkaloids**

Most alkaloids are precipitated from neutral or slightly acidic solution by

- 1- Mayer's reagent: Cream colored precipitate.
- 2- Wagner's reagent: red-brown precipitate.
- 3- Hagers reagent: yellow precipitate.
- 4- Dragendorff's reagent (solution of potassium bismuth iodide): orange coloured precipitate.

**Tea:**

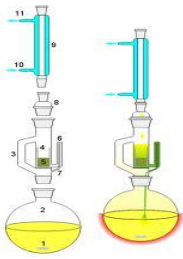

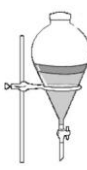
Beverages such as tea and coffee owe their stimulant action to the purine alkaloids

Purine alkaloids	Chemical structure	Effectiveness
Caffeine		In humans, caffeine acts as a central nervous system stimulant, temporarily warding off drowsiness and restoring alertness.
Theobromine		Opposite action
Theophylline		Relaxes involuntary muscles more effectively than caffeine or theobromine

**Side effects for Caffeine:**

tachycardia, Epigastric pain, Nausea, Vomiting, Headaches, Nervousness Insomnia, tremors

**2- Experiment Procedure:**

Step	Procedure	
1	- 10 g of green tea in soxhlet extractor	
	- Add alcohol (Ethanol)	
	- Heat for 1 h	
2	- Concentrated (all solvent evaporated = 2-3 ml)	
3	Dissolved the residue containing alkaloids (bases) in 20 ml of 10% HCl (salt formation)	
4	Extract with 10 ml Chloroform (three times and collect the aqueous layer containing the salt).	
5	Add NH <sub>4</sub> OH (10%) to the aqueous layer (convert the salt to free alkaloid). (Check by litmus paper)	
6	Extract three times with Chloroform (collect the Organic layer containing the Free alkaloid).	
7	Passing over anhydrous sodium sulphate.	
8	Transfer the organic layer into clean dry (measured) Beaker.	
9	Concentrated the organic layer (=2 ml)	
10	Calculate total alkaloids % in tea $\% \text{ Total alkaloids} = \frac{\text{wt. of the residue}}{\text{wt. of tea}} \times 100$	
11	TLC: chloroform-methanol (95:5) using Dragendorff's reagent (orange color).	
12	Put some drops in filter paper and detect the alkaloids using Dragendorff's reagent (orange color).	