Extraction of Nicotine from Cigarettes

Introduction:

- Nicotine is an alkaloid found in the nightshade family of plants (*Solanaceae*), predominantly in tobacco, and in lower quantities in tomato, eggplant, and in green pepper.
- Nicotine alkaloids are also found in the leaves of the coca plant.
- Nicotine was first isolated from the tobacco plant in 1828 by German chemists, Posselt & Reimann.

- Nicotine constituents 0.3 to 5% of the tobacco plant by dry weight, with biosynthesis taking place in the roots, and accumulate in the leaves.
- It is a potent neurotoxin and is included in many insecticides.
- In lower concentrations, the substance acts as a stimulant and is one of the main factors responsible for the dependence-forming properties of tobacco smoking.

Chemistry:

- Nicotine is hygroscopic, oily liquid that is miscible with water in its base form.

- As a nitrogenous base, nicotine forms salts with acids that are usually solid and water soluble.

- Nicotine easily penetrates the skin.

Toxicology:

- The LD_{50} of nicotine is 50mg/kg for rats and 3mg/kg for mice. 40-60mg/kg can be lethal dosage for adult human beings. This makes it an extremely deadly poison.

- It is more toxic than many other alkaloids such as cocaine which has a lethal dose of 1000 mg.

Aim of the experiment:

-In this experiment you will extract nicotine from cigarettes and muassil with ether and precipitate it as nicotine di-picrate salt.

Principle:

- The extraction depends on isolation of base by dissolving the cigarettes in NaOH. Then extract nicotine from the filtrate by ether. After evaporation of ether you will get nicotine oil.

- The factories of cigarettes remove large quantities of nicotine from cigarette leaves because of high toxicity. This is why the produced oil is very little. To get nicotine crystals, saturated solution of picric acid is added to form nicotine di picrate yellow crystals.

Materials:

1- Cigarettes, cigar, and muassil.

2- Ether.

3- NaOH solution (5%)

4- Saturated picric acid solution in methanol.

5- Beaker 250ml

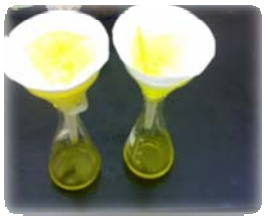
6- Separating funnel.

7- Conical flasks.

8- Buchner glass wool.

Procedure:

1- Weigh 10 g of cigarettes leaves in beaker.
2- Add 100ml NaOH solution and stir very well for 15 min.
3- Filter in Buchner using glass wool and press the cigarettes very well by using other beaker.
4- Transfer the cigarettes again to beaker.
5- Add 30ml DW and stir and filter again.
6- Collect the filtrate together. (If there is any impurities re-filter).
7- Transfer the filtrate to the SF and extract by 25ml ether.
8- Repeat the extraction 3times.
9- Gather the 4 filtrates in conical flask.
10- Dry by using 1teaspoon anhydrous potassium carbonate.
11- Filter.
12- Evaporate ether on water bath. (Avoid extra heat because nicotine is hydrolyzed by extreme heating).
13- After evaporation of ether add 4ml methanol to dissolve the resulted oil.
14- Add 10ml saturated picric acid solution.
15- Cool in an ice bath to precipitate the nicotine di picrate crystals.
16- Filter; allow drying and weighing the product.



Microscopic examination:

- Nicotine + mercuric chloride $HgCl_2$ ----------→ examine under microscope------→ flowery-shape

References:

- Pavia, D. L., Lampman, G. M. and Kriz, G. S. Jr., Introduction to organic laboratory technique, W. B. Saunders Co., Philadelphia, 1976, p. 50-54.

Results Sheet