

## **EXPECTORANTS**

### **Definition:**

Expectorants are the drugs that help in removing sputum from the respiratory tract either by increasing the fluidity (or reducing the viscosity) of the sputum or increasing the volume of fluids that have to be expelled from the respiratory tract by coughing. Both the action and mechanism of expectorants have been questioned and remain controversial. However, these may serve a placebo role and help the patient.

Examples of inorganic expectorants are ammonium chloride, potassium iodide, sodium iodide and related substances. If the patient is sensitive, dose of expectorant is high enough, this may induce vomiting (emetic action). Hence, it is advisable to give the doses of expectorants that could be tolerated (by the patient) along with other pharmaceutical aids (flavours, sweetners, etc.) and cough suppressants.

### **Classifications of expectorants**

It is possible to classify expectorants in according to their mechanism of action into two categories, viz., (i) sedative type and (ii) stimulant type.

### **Sedative expectorants:**

These are stomach irritant expectorants which are able to produce their effect through stimulation of gastric reflexes. Examples of sedative expectorants

include bitter drugs such as ipecac, senega, Indian squill, and compounds such as antimony

potassium tartrate, ammonium chloride, sodium citrate, potassium iodide, etc.

### **Stimulant expectorants:**

These are the expectorants which bring about a stimulation of the secretory cells of the respiratory tract directly or indirectly. Since these drugs stimulate

secretion, more fluid gets produced in respiratory tract and sputum is diluted.

Examples of

stimulant expectorants include drugs such as eucalyptus, lemon, anise, and active constituents of

oil like terpine hydrate, anethole.

Examples

Potassium iodide

Preparation Reaction:



### **Ammonium chloride**

Colourless crystals, or a white, fine or coarse, crystalline powder; hygroscopic.

Freely soluble in water, sparingly soluble in ethanol

ASSAY

MODIFIED VOLHARDS METHOD PRINCIPLE:

The assay of sodium chloride is based on precipitation titration. The sodium chloride reacts with excess of silver nitrate in presence of dilute nitric acid. The silver nitrate

reacts with sodium chloride to form a ppt of silver chloride. The excess of unreacted silver

nitrate is back titrated against standard ammonium thiocyanate using ferric ammonium sulphate

as indicator [Ferric alum].

In the Modified Volhard's method nitro benzene is added to prevent the interaction between

the precipitated silver chloride and the titrant ammonium thiocyanate. The nitro benzene forms

a protection covering over ppt of silver chloride. Nitric acid is used here to prevent the

precipitation of others halides by means of common ion effect.



Unreacted



Dry about 0.2 g of the sample over silica gel for 4 h, weigh accurately, and dissolve it in about

40 ml of water in a glass-stoppered flask. Add, while agitating, 3 ml of nitric acid, 5 ml of

nitrobenzene, 50.0 ml of 0.1 N silver nitrate, shake vigorously, then add 2 ml of ferric

ammonium sulfate TS, and titrate the excess silver nitrate with 0.1 N ammonium thiocyanate.

Each ml of 0.1 N silver nitrate is equivalent to 5.349 mg of  $\text{NH}_4\text{Cl}$ .

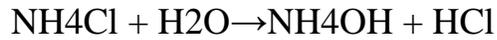
## FORMAL TITRATION METHOD

### PRINCIPLE:

Ammonium chloride is hydrochloride salt of the ammonia base and behaves as an acidic salt. When it is dissolved in water, it liberates hydrochloric acid and yields ammonium

hydroxide, The liberated hydrochloric acid titrated against standardized NaOH solution using

phenolphthalein as an indicator.

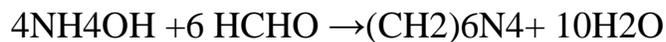
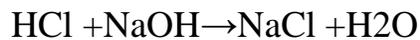


In the above titration few mL of neutralized formaldehyde is also added, which prevent

Ammonium hydroxide ( $\text{NH}_4\text{OH}$ ) interference with the end point, as formaldehyde reacts with

the  $\text{NH}_4\text{OH}$  and forms hexamine, thus  $\text{NH}_4$

$\text{OH}$  is removed and forwards the reaction.



Hexamine

Neutralized formaldehyde indicates that any acidic impurities if present in the formaldehyde was neutralized by addition of few drops of NaOH, which is marked by the

phenolphthalein indicator by persist pink color.