



EXPECTORANTS

Expectorants are the drugs used to help in the removal of sputum or secretions or exudates from the trachea, bronchi or lungs and hence they are used in the treatment of cough.

They act upon the respiratory tract in 2 ways.

- i. By decreasing the viscosity of the bronchial secretions and enhancing their elimination.
- ii. By increasing the amount of respiratory tract fluid, a demulcent action is exerted on the dry mucosal linings, thus relieving the unproductive cough.

For example, inorganic saline expectorants are ammonium salts (ammonium chloride), iodides (potassium iodide/sodium iodide), citrates and antimony potassium tartarate.

AMMONIUM CHLORIDE

Molecular formula: NH₄Cl

Molecular weight: 53.5 g/mol

Synonym: sal ammoniac

IP Limit: Ammonium Chloride contains not less than 99.0 per cent and not more than 100.5 per cent of NH₄Cl, calculated on the dried Basis

Preparation:

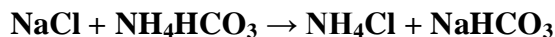
1. Ammonium chloride is prepared by reacting ammonia (NH₃) with hydrochloric acid (HCl) to form white crystalline ammonium chloride.



2. Ammonium chloride prepared through the Solvay process.



3. It can also be produced by reaction of sodium chloride with ammonium bicarbonate.





Physical Properties:

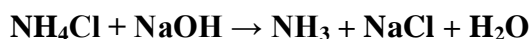
1. It occurs as white, fine or coarse crystalline powder.
2. It is odourless.
3. It is having cooling saline taste.
4. It is very soluble in water and glycerol.
5. It is sparingly soluble in alcohol.
6. Its aqueous solution is weakly acidic having pH of 4.6
7. Density: 1.5274 g/cm³ and Melting point: 338⁰ C
8. It is hygroscopic in nature.

Chemical Properties:

1. Ammonium chloride appears to sublime upon heating but actually decomposes into ammonia and hydrogen chloride gas.



2. Ammonium chloride reacts with a strong base like sodium hydroxide to release ammonia gas.



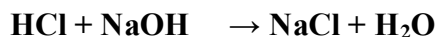
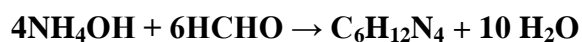
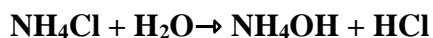
3. Similarly, ammonium chloride also reacts with alkali metal carbonates at elevated temperatures, giving ammonia and alkali metal chloride.



Assay:

Principle:

This is assayed by acid base titration. Ammonium chloride hydrolyses into ammonium hydroxide and hydrochloric acid. This hydrolysis is catalyzed by formaldehyde and forming hexamine. Finally the acid is titrated using an alkali.



Procedure:

Accurately weighed 0.1 gm of ammonium chloride is taken and 50ml of water is added to dissolve. 50 ml of neutralized formaldehyde solution is added to the above solution. The



hydrochloric acid liberated is titrated with standard sodium hydroxide solution using phenolphthalein as an indicator. End point is the appearance of permanent pale pink colour.

Uses:

1. Ammonium chloride serves as an expectorant, helping to relieve congestion and coughing.
2. It can also be used to acidify urine in specific medical conditions and as a diuretic in some cases.
3. In addition, it's employed as an antidote for certain poisonings.
4. Ammonium salts are an irritant to the gastric mucosa and may induce nausea and vomiting.
5. Ammonium chloride is used as a systemic acidifying agent in treatment of severe metabolic alkalosis.
6. The main application of ammonium chloride is as a nitrogen source in fertilizers.
7. Ammonium chloride is used as a flux in preparing metals to be tin coated, galvanized or soldered.

POTASSIUM IODIDE

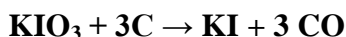
Molecular formula: KI

Molecular weight: 166.0 g/mol

IP Limit: Potassium iodide contains not less than 99.0 per cent and not more than 100.5 per cent of KI, calculated on the dried basis.

Preparation:

It is prepared by treating a hot solution of potassium hydroxide with iodine in slight excess to form a mixture of potassium iodide and potassium iodate. The solution is concentrated and then treated with excess of charcoal powder followed by evaporating the mixture to dryness followed by ignition. The charcoal reduces the iodate to iodine, utilising thus the total iodine to get the potassium iodide.



Physical Properties:

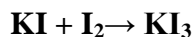
- It occurs as cubic or hexahedral crystals, white or as a white granular powder.
- It is slightly hygroscopic.



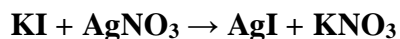
- Its solution is neutral or slightly alkaline to litmus.
- It is very soluble in water and even more soluble in boiling water.
- It is freely soluble in glycerin and soluble in alcohol.
- On long exposure to air it becomes yellow due to liberation of iodine and small quantity of iodate may be formed.
- Light and moisture accelerate the decomposition.

Chemical Properties:

- Iodine readily dissolves in an aqueous solution of potassium iodide, forming a dark brown solution containing potassium triiodide.



- With silver nitrate it gives yellow precipitate of silver iodide.



Uses

- It is used as an expectorant.
- It may be used for the prophylaxis and treatment of simple goiter.
- It is used as antifungal agent in veterinary practice.
- It acts as a source of iodine and potassium.
- It is used as saline diuretics.