

SHREE H. N. SHUKLA INSTITUTE OF PHARMACEUTICAL EDUCATION AND RESEARCH



B.PHARM

(SEMESTER -I)

SUBJECT NAME: PHARMACEUTICAL INORGANIC

CHEMISTRY

SUBJECT CODE: BP103TP

CHAPTER 3(A): Acidifiers

Content

GASTROINTESTINAL AGENTS: Acidifiers, Antacid, Cathartics, Antimicrobials

Acidifiers

Acidifiers are inorganic chemicals that either produce or become acid.

- These chemicals increase the level of gastric acid in the stomach when ingested, thus decreasing the stomach pH.

- These are many types of acidifiers but the main four types are:

- i. **Gastric acidifiers**, used in controlling pH in stomach.
- ii. **Urinary acidifiers**, used in controlling pH in urine.
- iii. **Systemic acidifiers**, used in controlling pH in all the parts of body.

- **ACHLORHYDRIA:** In patients suffering from achlorhydria, there is deficient secretion of HCl in stomach. In such cases acidifiers are useful in providing the necessary acidity for the proper digestion of food. Systemic acidifiers are those which, when given usually by injection, act by reducing the alkali reserve in the body and are also useful in reducing metabolic alkaloids.

Acidifying agents:

1.) Ammonium chloride:

Molecular formula

NH₄Cl

Molar mass

53.49 g/mol

Synonym

Sal ammoniac

Note: Solutions of ammonium chloride are mildly acidic.

Physical properties:

Appearance: White solid, hygroscopic

Odour: Odourless

Taste: Cooling saline

Density: 1.5274 g/cm³

Melting point: 338^oC (decomposes, sublimes)

Solubility: free soluble in water and glycerol, Sparingly soluble in alcohol

Method of Preparation

- Ammonium chloride prepared through the **Solvay process**:



- Ammonium chloride is prepared commercially by combining ammonia (NH₃) with either hydrogen chloride (gas) or hydrochloric acid (water solution): **NH₃ + HCl → NH₄Cl**

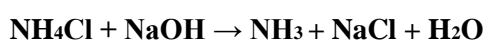
Assay:

- Dissolve 1.000 g of Ammonium chloride in 20 ml of water and add a mixture of 5 ml of formaldehyde solution, with few drops of phenolphthalein solution. After 1 min to 2 min, titrate slowly with 1M sodium hydroxide.

Chemical properties:

- Ammonium chloride appears to sublime upon heating but actually decomposes into ammonia and hydrogen chloride gas: $\text{NH}_4\text{Cl} \rightarrow \text{NH}_3 + \text{HCl}$

- Ammonium chloride reacts with a strong base, like sodium hydroxide, to release ammonia gas:



- Similarly, ammonium chloride also reacts with alkali metal carbonates at elevated temperatures, giving ammonia and alkali metal chloride: $2 \text{NH}_4\text{Cl} + \text{Na}_2\text{CO}_3 \rightarrow 2 \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O} + 2 \text{NH}_3$

Storage

Stored in well closed container.

Uses:

- Ammonium chloride is used as an expectorant in cough medicine. Its expectorant action is caused by irritative action on the bronchial mucosa, which causes the production of excess respiratory tract fluid, which presumably is easier to cough up.
- Ammonium salts are an irritant to the gastric mucosa and may induce nausea and vomiting.
- Ammonium chloride is used as a systemic acidifying agent in treatment of severe metabolic alkalosis.
- The main application of ammonium chloride is as a nitrogen source in fertilizers.
- Ammonium chloride is used as a flux in preparing metals to be tin coated, galvanized or soldered.

2.) Dilute. Hydrochloric Acid

Molecular formula

HCl

Molar mass

36.5

Synonyms

Spirit of salt, Muriatic acid.

Physical properties

Appearance: Colourless liquid,

Odour: Characteristics

Taste: Tasteless

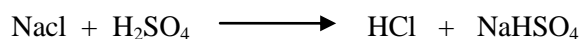
Density: 1.189 g/ml

Melting point:

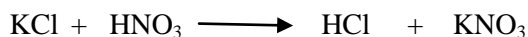
Solubility:

Method of Preparation:

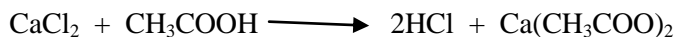
- It is manufactured by the action of Sulphuric acid on Sodium chloride.



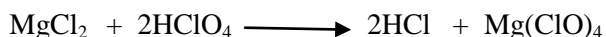
- It is manufactured by the action of Nitric acid on Potassium chloride.



- It is manufactured by the action of Acetic acid on Calcium chloride.

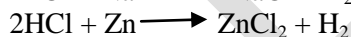


- It is manufactured by the action of Perchloric acid on Magnesium chloride.



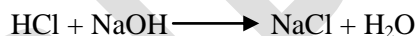
Chemical properties:

- 1.) HCl attacks on metal and form their chlorides with evolution of H₂ gas.



- 2.) Neutralization reaction

The reaction in which acid reacts with base and produce salt and water, this is known as Neutralization reaction.



Storage:

It is stored in well closed container of glass and other material and temperature is not more than 30°C.

Uses:

- It is used as a pharmaceutical aid.
- It is used as a solvent.
- It is act as catalyst in basic pharmaceuticals.
- Act as acidifying agent (Gastric Acidifier).

HNSIPER