

Gastrointestinal agents

- ❖ The digestive system is the gastrointestinal tract which is the group of organs.
- ❖ The main portions of GIT include stomach, small intestine, large intestine and rectum with the exit anus.
- ❖ **Stomach-** Digestion of protein in acidic medium take place in pepsin enzyme
- ❖ **Small intestine-** Digestion of protein, carbohydrates and lipids in alkaline medium in presence of enzymes and bile salts

The above functions go wrong there occur diseases or undesirable conditions.

- ❖ Inadequate secretion of acid take place in the stomach causes **Achlorhydria**
- ❖ Excess secretion of acid take place in the stomach causes **hyperchlorhydria (hyperacidity), ulcers**
- ❖ Inadequate absorption of fluids and minerals from large intestine causing **diarrhea**
- ❖ Insufficient peristaltic movement of large intestine causing **constipation**
- ❖ Inadequate secretion of saliva, making the food to swallow with difficulty.

It is possible to correct the above conditions by administration of suitable drugs.

Classification of gastrointestinal agents

- ❖ **-Acidifiers** - Increase the level of gastric acid in the stomach
- ❖ **Antacids-** Neutralize excess stomach acid
- ❖ **Cathartics/Purgatives/Laxatives-** To bring about defecation/
mild action of cathartics/ mild action purgatives
- ❖ **Adsorbents** – Ability to adsorb gases, toxins and bacteria

Acidifiers

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

- ❖ These are drugs which enhance the gastric secretion and improve digestion in stomach. These agents are administered for

Hypochlorhydria

Achlorhydria

Mainly there are four types of acidifiers

Gastric acidifiers- These are the drugs which are used to restore temporarily the acidity of the stomach in patients suffering from Achlorhydria or Hypochlorhydria.

Urinary acidifiers - These are the drugs which are used to render acidic urine to enable treatment of some types of urinary tract disorder.

Systemic acidifier -These are the drugs which are able to neutralize the alkaline body fluids, particularly blood, in patients who are suffering from systemic alkalosis.

Acids - These are used as pharmaceutical aids in the preparation, laboratory quality control etc., **Eg. HCl and NH₄Cl**

Dilute Hydrochloric acid (dil. HCl)

Preparation:

It is prepared from conc. HCl by diluting 274g of the acid with 726g of purified water.

Uses:

- Acidifier
- To treat achlorhydria
- Uses as a reagent in the laboratory

Dose - 0.6 to 8ml

2. Ammonium Chloride (NH₄Cl)

Preparation:

It is prepared commercially by combining ammonia (NH₃) with either hydrogen chloride gas or hydrochloric acid



2. It is prepared by boiling ammonium sulphate solution with calculated amount of sodium chloride.



At boiling point the less soluble sodium sulphate is crystallised and removed. The mother liquor is evaporated to get ammonium chloride.

Uses:

It exhibit the following pharmacological actions. These actions are dose dependent

- Expectorant
- Diuretic
- Systemic acidifier
- Maintaining acid base equilibrium of body fluids

Storage condition:

Since it is **hygroscopic**, it is stored in a well closed container

Assay :

Estimated by two methods

1. Formal Method

2. Modified Volhards method

Formal Method

Principle :

It is assayed by **acid base titration** (alkalimetry). In this assay ammonium chloride reacts with formaldehyde solution liberating equal amount of hydrochloric acid after the formation of hexamine. The liberated hydrochloric acid is titrated against standard sodium hydroxide solution using phenolphthalein as an indicator.



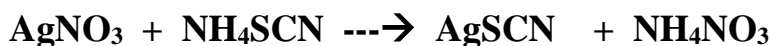
HCHO must be previously neutralized, otherwise the acidic impurity (formic acid) present in it will consume some amount of NaOH leading to over titration.

Procedure

- ❖ Weigh accurately about 0.1g of ammonium chloride and transfer into a conical flask.
- ❖ Dissolve in 20ml of water; add a mixture of 5ml of formaldehyde previously neutralized to phenolphthalein.
- ❖ Allow to stand for 10 minutes and then titrate with 0.1N. NaOH using phenolphthalein as indicator until a pale pink colour appears.
- ❖ Each ml of 0.1N sodium hydroxide is equivalent to 0.00534g of ammonium chloride.

2. Modified Volhards method

- ❖ A solution of the substance acidified with nitric acid is shaken with a measured volume of silver nitrate solution
- ❖ Nitrobenzene is added to coagulate the precipitate of silver chloride.
- ❖ So that it will not interfere with the titration later of excess of silver nitrate which is determined by titration with ammonium thiocyanate using ferric ammonium sulphate as indicator.



Procedure:

- ❖ 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 3 ml of nitric acid, 5 ml of nitrobenzene, 50ml of 0.1N silver nitrate, shake vigorously, then add 2 ml of ferric ammonium sulfate.
- ❖ 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 NH_4Cl .