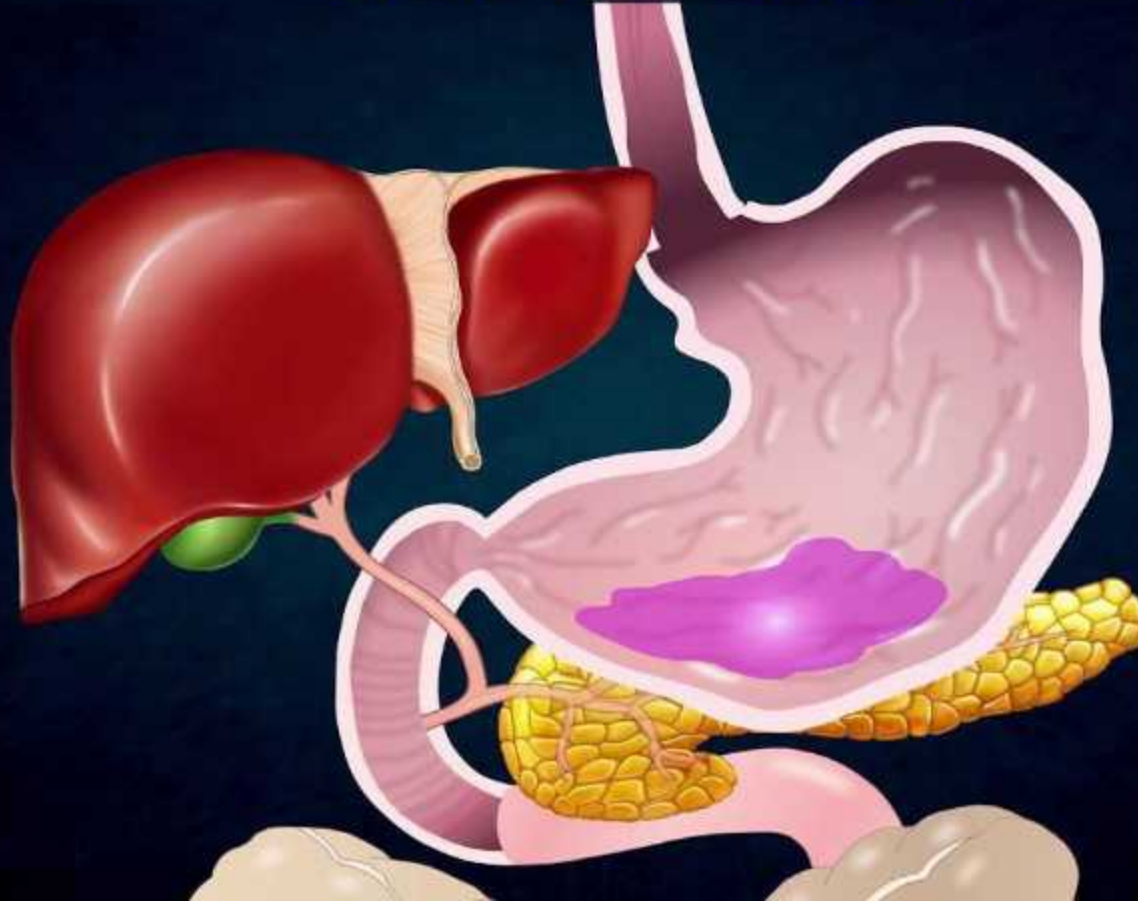


# GASTROINTESTINAL AGENTS

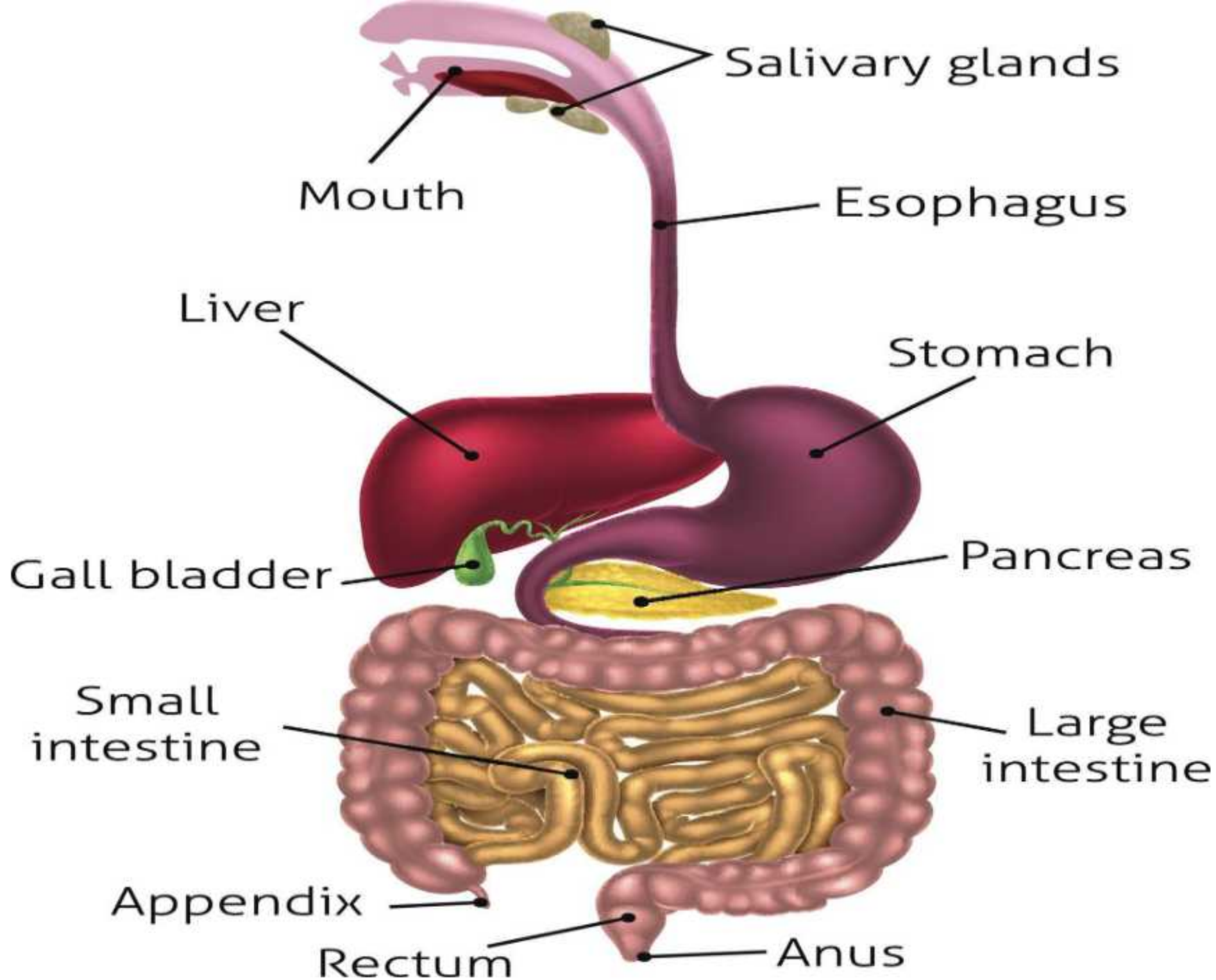
## ORGANS OF DIGESTION





# Introduction

- The gastrointestinal (G.I.) tract comprises the oral cavity, esophagus, stomach, small intestine (duodenum, jejunum, ileum) and large intestine (colon and rectum).
- Accessory organs such as the pancreas, liver and gallbladder play an important role in the digestive process.
- The process of digestion begins in the mouth with the mechanical grinding of food by the teeth.



- Digestive system
  - performs the mechanical & chemical processes of digestion, absorption of nutrients, & elimination of wastes
  - consists of the mouth, esophagus, stomach, intestine, & accessory organs
- medical specialty that deals with the structure, function, diagnosis, & treatment of diseases of the stomach & intestines is called **gastroenterology**
- medical specialty that deals with the diagnosis & treatment of disorders of the rectum & anus is called **proctology**





**Low Stomach Acid**

**Poor Digestion**

**Protein & Mineral  
Deficiency**

**Acidic Blood**

**Insufficient Nutrients to  
Produce Stomach Acid**

**Poor Digestion**

ORGAN	FUNCTION(S)
<b>Pharynx</b>	Receives a bolus from the oral cavity & passes it into the esophagus.
<b>Esophagus</b>	Receives a bolus from the pharynx & moves it into the stomach; this requires relaxation of the upper esophageal sphincter & secretion of mucus.
<b>Stomach</b>	Mixing waves combine saliva, food, & gastric juice, which activates pepsin, initiates protein digestion, kills microbes in food, helps absorb vitamin B <sub>12</sub> , contracts the lower esophageal sphincter, increases stomach motility, relaxes the pyloric sphincter, & moves chyme into the small intestine.
<b>Small intestine</b>	Segmentation mixes chyme with digestive juices; peristalsis propels chyme toward the ileocecal sphincter; digestive secretions from the small intestine, pancreas, & liver complete the digestion of carbohydrates, proteins, lipids, & nucleic acids; circular folds, villi, & microvilli help absorb about 90 percent of digested nutrients.
<b>Large intestine</b>	Haustral churning, peristalsis, and mass peristalsis drive the colonic contents into the rectum; bacteria produce some B vitamins and vitamin K; absorption of some water, ions, and vitamins occurs; defecation.

# Gastrointestinal Agents

- ⊗ Acidifying agents
- ⊗ Antacids
- ⊗ Protectives
- ⊗ Adsorbents
- ⊗ Cathartics or Laxatives



# Acidifying agents

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**Substances** that are used in liquid preparation to provide acidic media for product stability.

e.g. Citric acid

Acetic acid

Fumaric acid

Hydrochloric acid

Nitric acid



## **Acidifying reagents/acidifiers:**

These are drugs or agents which are able to increase acidity in GIT. Some of the drugs are used to increase metabolic acidosis whereas some of these are used to increase the gastric hydrochloric acid. They are also known as acidifying reagents or acidifiers.

- ❖ **Gastric acidifiers:** These are drugs which are used to restore temporarily the acidity of 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 type of urinary tract disorders.
- ❖ **Systemic acidifiers:** These are the drugs which are able to neutralize the alkaline body fluids, particularly blood, in patients who are suffering from systemic alkalosis.
- ❖ **Acids:** Acids are used as pharmaceutical aids in the preparation, laboratory quality control etc.

## ACHLORHYDRIA:

- Achlorhydria is the absence of hydrochloric acid in the gastric secretions. Patient with this condition fall into two groups.
- 01. Free of gastric hydrochloric acid after stimulating with histamine phosphate.
- 02. lack of gastric hydrochloric but respond to stimulation by histamine.

## SYMPTOM:

- ⦿ The symptoms of achlorhydria can vary with the associated disease. These includes
- ⦿ 01. Mild diarrhea
- ⦿ 02. Epigastric pain
- ⦿ 03. Sensitivity to spicy food
- ⦿ 04. pernicious anaemia

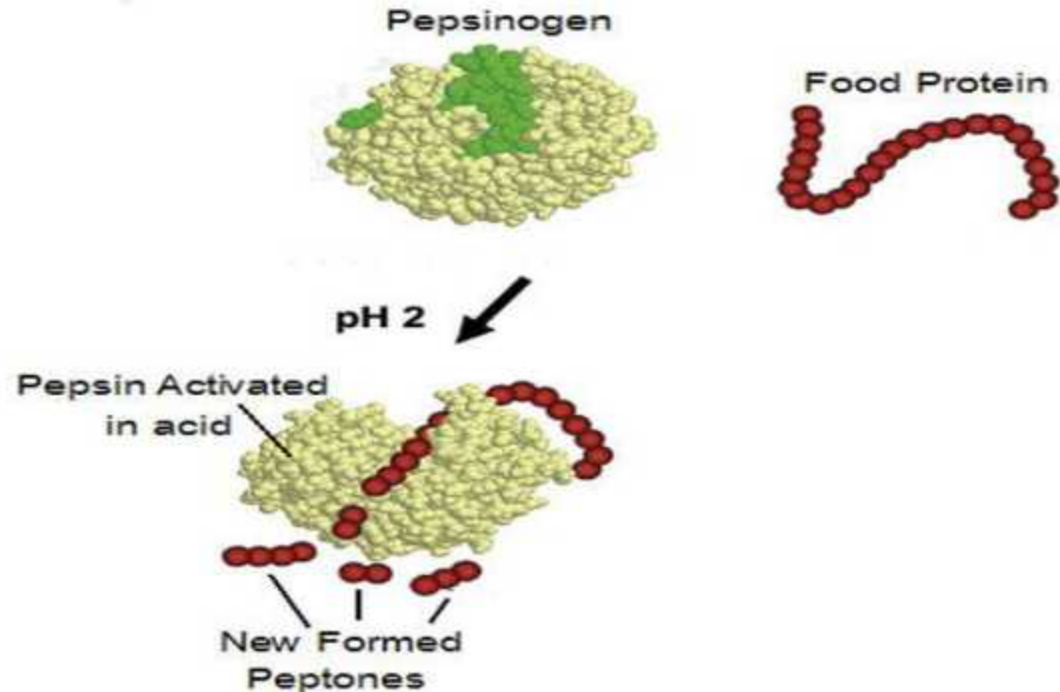


Pepsinogen is converted into pepsin when the gastric pH is below 6. Pepsin shows best action Below 3.5. Thus the absence of gastric acid can cause lack of pepsin activity which leads to the impairment of protein digestion

Pepsinogen (inactive form): gets converted to pepsin (active form) once it reaches the acid.

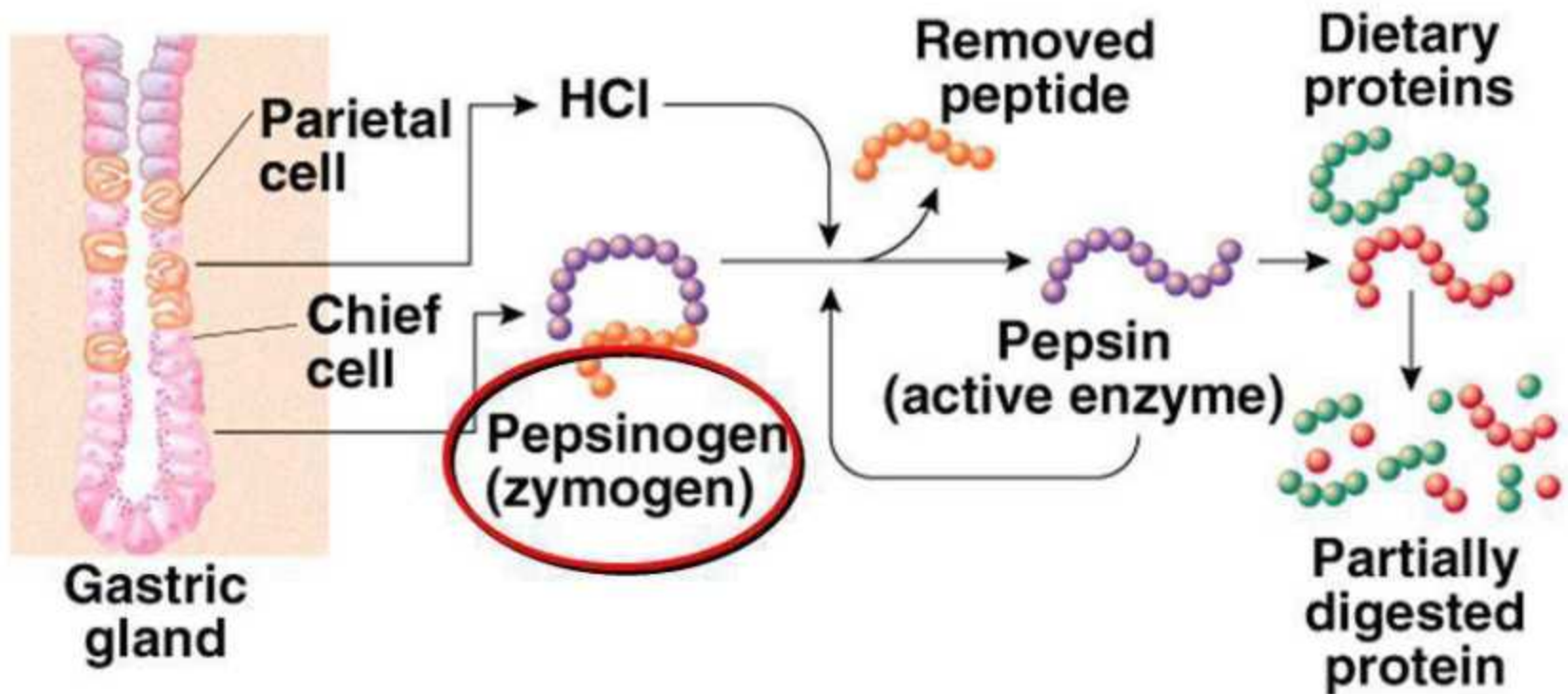
Pepsin (active): breaks Protein chains into smaller chains called Peptones

## Pepsin

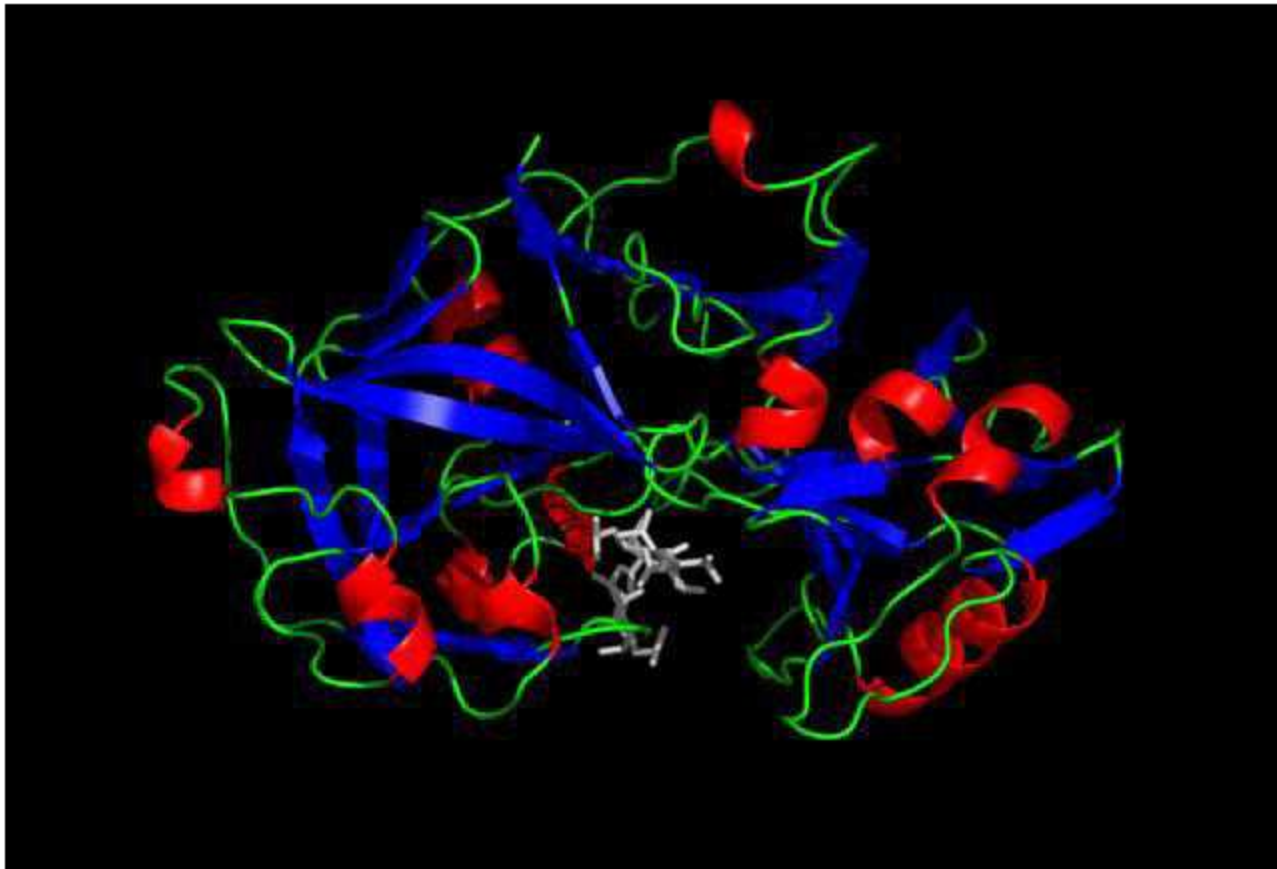




# Production & Action of Pepsin



# PEPSIN



# Ammonium chloride

## Chemical compound



### Description

Ammonium chloride is an inorganic compound with the formula  $\text{NH}_4\text{Cl}$  and a white crystalline salt that is highly soluble in water. Solutions of ammonium chloride are mildly acidic. Sal ammoniac is a name of the natural, mineralogical form of ammonium chloride.



**IUPAC ID: Ammonium chloride**

**Molar mass: 53.491 g/mol**

**Melting point: 338 °C**

**Boiling point: 520 °C**

**Soluble in: Ammonia, Water, Methanol, Alcohol, Glycerol, Hydrazine**

# Ammonium chloride

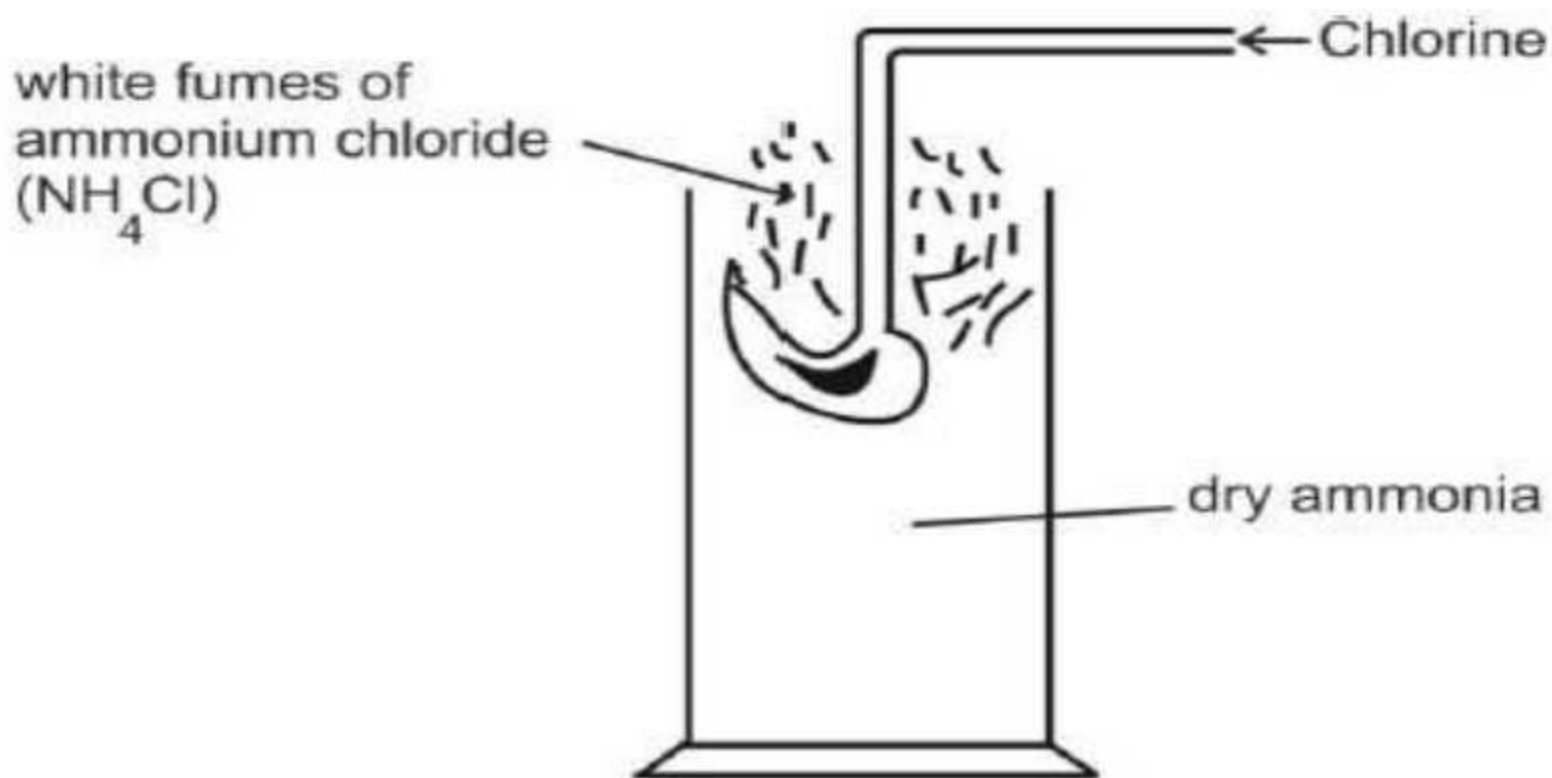
- Properties:

- White coloured fine or coarse crystalline powder
- Cooling saline taste
- Slightly hygroscopic
- Partially soluble in mixture of water & alcohol
- Freely soluble in glycerine
- 0.8% w/v of  $\text{NH}_4\text{Cl}$  is isotonic with serum.
- Freshly prepared aqueous solutions are neutral to litmus but become quickly acidic on standing because of hydrolysis.



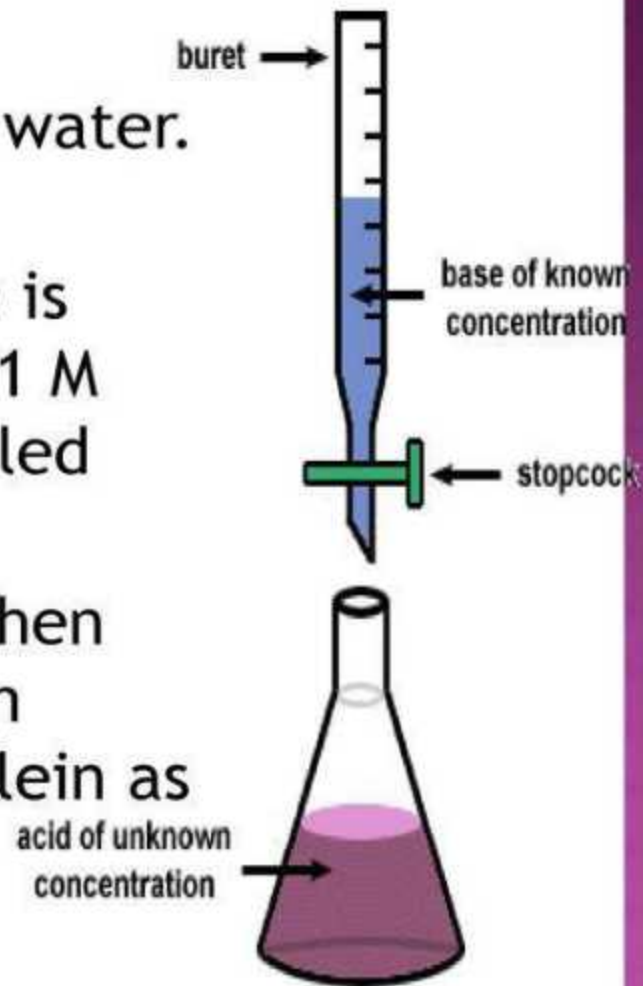
## CHEMICAL PROPERTIES

In vapours form it dissociates in ammonia and hydrochloric acid



## ASSAY TEST:

- Dissolve 1.0 g of ammonium chloride in 20 ml of distilled water.
- Add a mixture of 5 ml formaldehyde solution which is previously neutralized with 0.1 M NaOH (why?) and 20 ml distilled water.
- Leave it for 2 minutes, and then titrate slowly with 1M sodium hydroxide using Phenolphthalein as indicator.



## Uses:

- As nitrogen source, added to fertilizers and animal nutrients.
- Pharmacological uses:**
- As expectorant in cough preparations.
- As acidifying agent to correct metabolic alkalosis.



DOSE- 3-6 g daily in divided dose

Hydrochloric acid

Chemical compound

## **Description**

Hydrochloric acid or muriatic acid is a colorless inorganic chemical system with the formula  $H_2O:HCl$ . Hydrochloric acid has a distinctive pungent smell. It is classified as strongly acidic and can attack the skin over a wide composition range, since the hydrogen chloride completely dissociates in aqueous solution

**Formula:** HCl

**Molar mass:** 36.46094 g/mol



## METHOD OF PREPARATION

Hydrogen Chloride in the laboratory by treating sodium chloride with concentrated sulphuric acid. then, heat this mixture up to 420K.



Sodium bisulphate get as a by-product which is insoluble. Therefore, we further mix it with more sodium chloride. This mixture has to be further warmed to a higher temperature of around 823K. It gives dissolvable sodium sulfate and HCl gas.



dry this HCl by treating it with concentrated sulphuric acid. HCl is not dried over phosphorus pentoxide or brisk lime. This is because it reacts with both of these compounds.

## Properties of Hydrogen Chloride

☐ Hydrogen Chloride is a vapour gas. It has a very sharp and pungent odour.

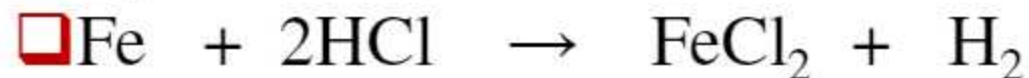
☐ It can melt to a colourless fluid at 189K. HCl forms a white solid at 159K upon freezing.

☐ It is very soluble in water. An aqueous solution of Hydrogen Chloride is what we know as the hydrochloric acid.

☐ Hydrochloric acid has a higher dissociation constant and is, therefore, a strong acid.

☐ It reacts with metals and salts to give various chlorides. For example, it reacts with zinc to form zinc chloride.

☐ Hydrochloric acid reacts with iron to form ferrous chloride.



# ACKNOWLEDGEMENT

This power point presentation is part of following sites

- ❑ [https://unacademy.com/lesson/introduction-to-human-digestive system/YA3URJHK](https://unacademy.com/lesson/introduction-to-human-digestive-system/YA3URJHK)
- ❑ <https://drjockers.com/10-ways-improve-stomach-acid-levels/>  
[www.jbc.org](http://www.jbc.org)
- ❑ [https://en.wikipedia.org/wiki/Ammonium chloride](https://en.wikipedia.org/wiki/Ammonium_chloride)
- ❑ [https://reference.medscape.com/drug/ammonium-chlorid 342855](https://reference.medscape.com/drug/ammonium-chlorid-342855)
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