

**Topic: Expectorants & Emetics**

**Subject: General Chemistry**

**Class: F.Y. B. Pharm. (Sem.- I)**

**Academic Year: 2018-19**

**Programme: 2018-2022**



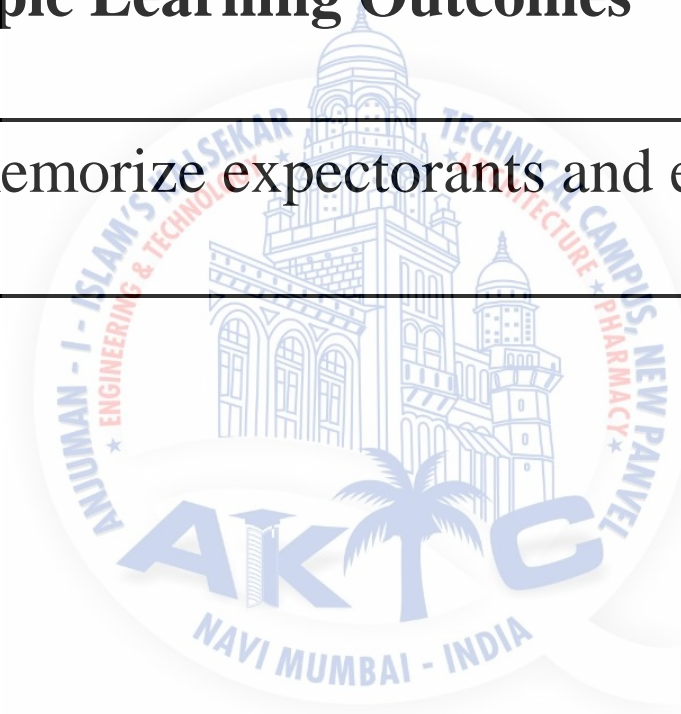
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# Mapping of TLO with Course outcomes (Cos)

Sr. No.	Topic Learning Outcomes	COs	BL
1	Describe and memorize expectorants and emetics.	CO4	L2



# Expectorants

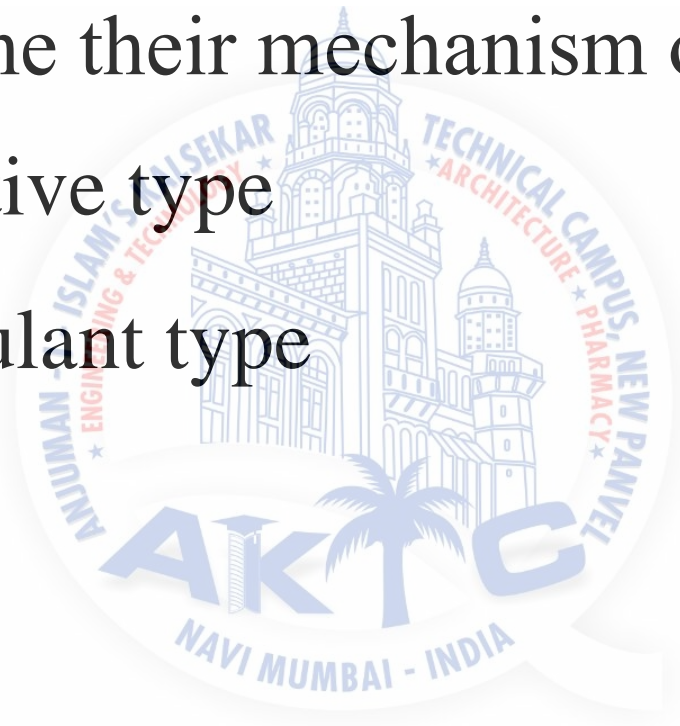
“Drugs that help in removing sputum from the respiratory tract

-by increasing the fluidity (or reducing the viscosity) of sputum and

-inducing the cough to expelled sputum from the respiratory tract”.

# Classification of Expectorants

- According to their mechanism of action...
  - (1) Sedative type
  - (2) Stimulant type



# Sedative expectorants

- These are agents which act by irritating gastric mucosa and produce their effect through stimulation of gastric reflexes. This lead to expel of sputum.
- e.g.  
Bitter drugs – Ipecac, Indian Squill  
Compounds –Ammonium chloride,  
Potassium iodide

# Stimulant type

- These are the expectorants which bring about a stimulation of the secretory cells of the respiratory tract.
- Since these drugs stimulate secretion, more fluid in respiratory tract and sputum is diluted.
- e.g. - Eucalyptus, terpine hydrate, anethole

# Ammonium chloride, I.P.

- Molecular formula:  $\text{NH}_4\text{Cl}$
- Preparation:
  - (i) Heating ammonium sulphate with  $\text{NaCl}$



- (ii) Neutralisation of  $\text{NH}_3$  with  $\text{HCl}$



# Ammonium chloride

- Properties:
  - White coloured fine or coarse crystalline powder
  - Cooling saline taste
  - Slightly hygroscopic
  - 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.



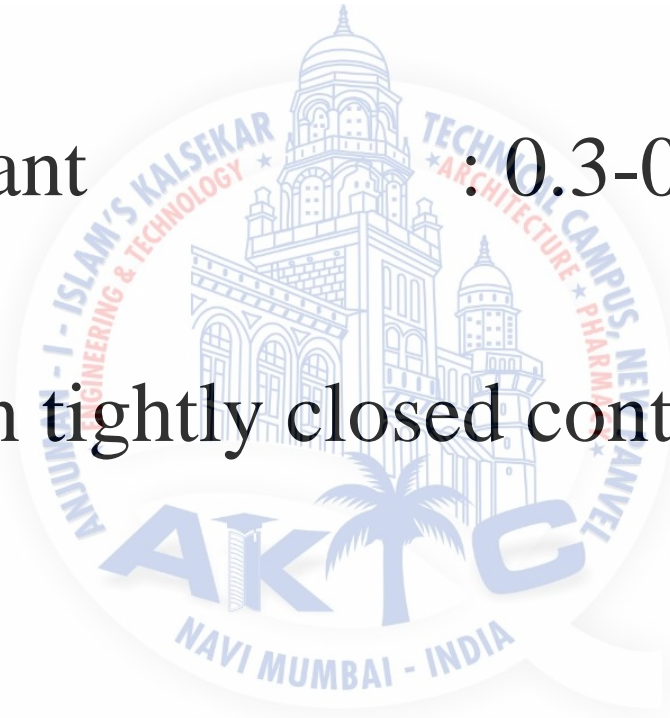
# Ammonium chloride

## Uses:

- ❑ It acts as mild expectorant when administered in small doses.
- ❑ It acts by stimulating the gastric reflexes and also by increasing the respiratory secretion.
- ❑ It may produce nausea and vomiting if used in a large doses.
- ❑ It can also be used as diaphoretic (sweating)

# Ammonium chloride

- Dose:  
As expectorant : 0.3-0.5 g
- Storage:  
It is stored in tightly closed container.



# Potassium Iodide I.P.

**Chemical formula:** KI

**Molecular weight:** 166.0

## Properties:

- Colourless & odourless.
- Opaque crystals or white granular powder.
- Saline & slight bitter taste.
- Soluble in water, alcohol and glycerine.
- Aqueous solution is neutral or slightly alkaline to litmus.

# Potassium Iodide I.P.

## Uses:

- ❑ It is used expectorant.
- ❑ It acts by stimulating the gastric reflexes. It also by increases the respiratory secretion and help to liquefy the thick sputum.
- ❑ Potassium iodide can prevent thyroid cancer in people who have been exposed to radioactive iodine.



**Dose:** 300 mg as expectorant

# Emetics

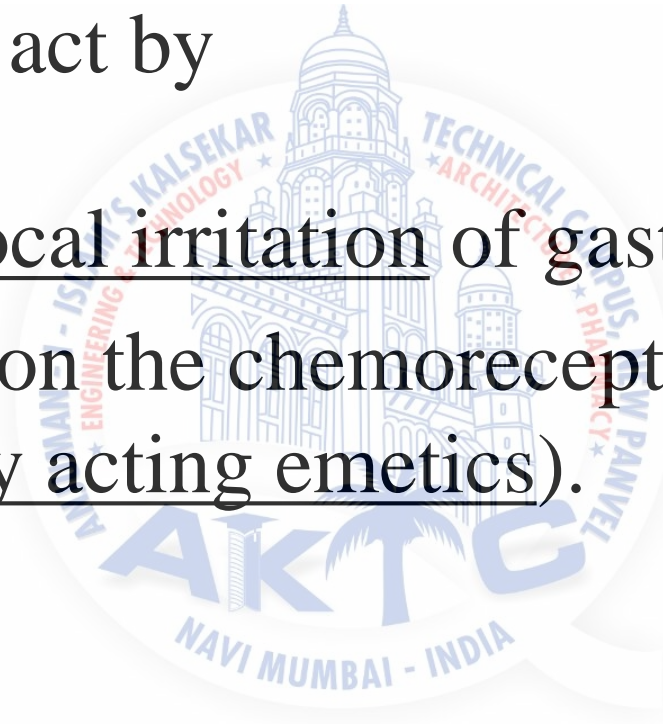
- These are the drugs which induce emesis or vomiting i.e. contents of the stomach get expelled through the oral cavity.
- Emetics in low doses are added to cough preparation. A mild emetic response would stimulate the flow of respiratory tract secretion.
- They are very important in cases of poisoning.

# Clinical facts...

- There are certain types of poisoning in which the toxic substances themselves may be able to induce emesis by reflex action.
- There are some types of poisoning in which poisons may remain in stomach for sometime before entering intestine where they may get absorbed.
- Before this occurs, emetics are given to patients for physically expelling the toxic substances and reduce the harmful effects and may be able to save patient's life.
- When a patient is in **unconscious state**, emetics may not be very useful and gastric lavage may be required.

# Mechanism of action

- The emetics act by
  - either by local irritation of gastric mucosa.
  - or directly on the chemoreceptor trigger zone (i.e. centrally acting emetics).



# Antimony potassium tartrate, I.P.

- **Synonym:** Tarter emetic
- **Molecular formula:**  $C_4H_4KO_7Sb$
- **Structural formula:**  $KOOC-CHOH-CHOH-COO(SbO)$
- **Properties:**
  - Colourless crystals
  - Odourless
  - Sweetish taste
  - Solubility : 1 in 12 (Water at 25°C)



# Antimony potassium tartrate

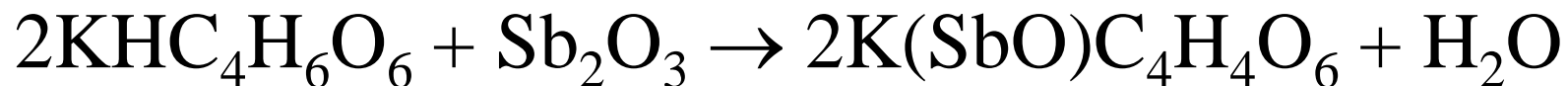
- Preparation:

It is obtained by mixing and making fine paste of 5 parts of antimony trioxide ( $\text{Sb}_2\text{O}_3$ ) with 6 parts of potassium acid tartrate

↓  
Keep this paste aside for a day

↓  
Boil it with water for 15 minutes with constant stirring

↓  
The liquid is then filtered and left for crystallization



# Antimony potassium tartrate

- Uses:
  - As an **emetic** as low dose in expectorant preparation.
  - The emetic action is because of irritant action on the gastric mucosa. The emetic action has slow onset.
  - It can also be used to treat **schistosomiasis** (drug of choice in infections produced by *Schistosoma japonicum*).

Dose: 40 mg to 140 mg

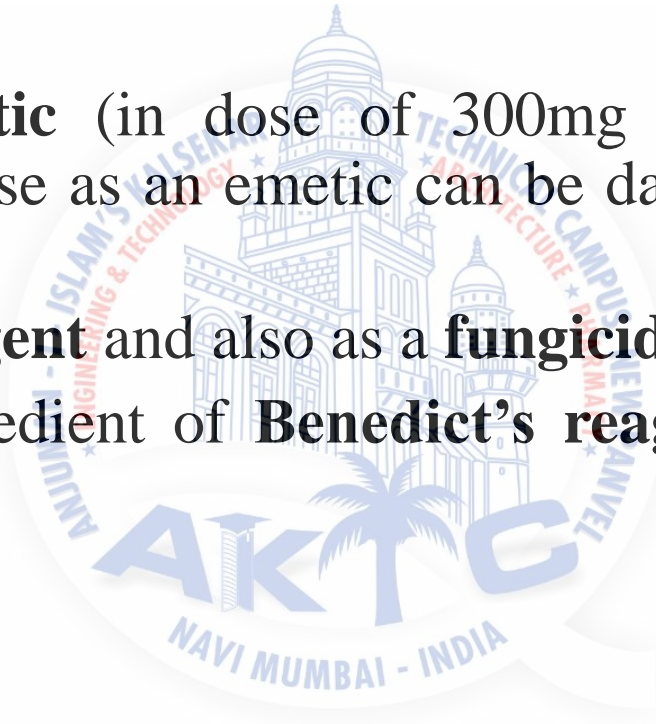
# Copper sulphate, I.P.

- **Synonym:** Cupric sulphate, Blue vitriol
- **Molecular formula:**  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- **Molecular weight:** 249.7
- **Preparation:**



# Copper sulphate

- Uses:
  - As an **emetic** (in dose of 300mg in 30ml of H<sub>2</sub>O). However, its use as an emetic can be dangerous because of large doses.
  - As an **astringent** and also as a **fungicide** (1.5% solution).
  - It is an ingredient of **Benedict's reagent** and **Fehling's reagent**.

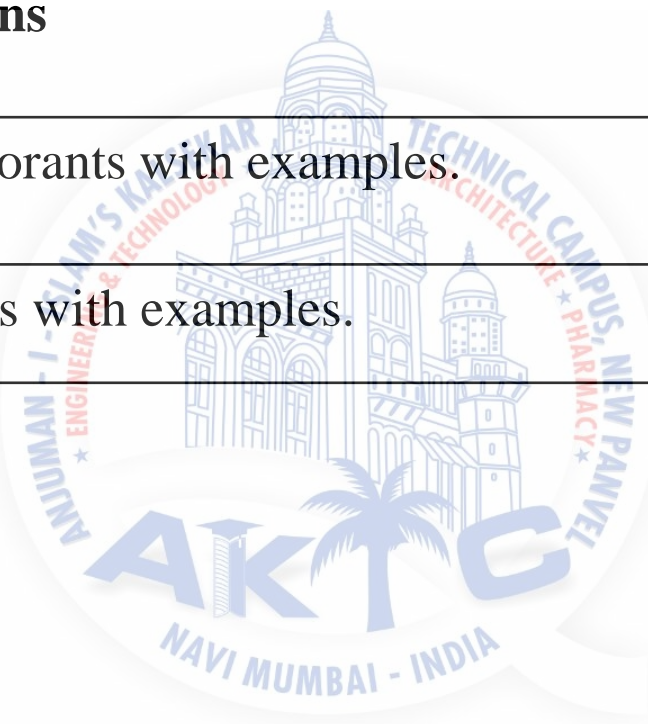


## References

- Inorganic medicinal and pharmaceutical chemistry, J.H. Block, E.B. Roche, T.O. Soine and C.O. Wilson. Lea & Febiger, Philadelphia, PA, 1986, Page no.: 429-430.
- A Hand Book of Inorganic Pharmaceutical Chemistry, Dr. K.G. Bothara, Nirali Prakashan, 2007, Page no.: 13.1-13.8.
- Inorganic Pharmaceutical Chemistry, H.P. Tipnis & A.S. Dhake, Career Publications, 2016, Page no.181-182.

# Review questions to ensure attainment of TLOs/ COs

Sr. No.	Review questions	COs with Bloom's Level
1	Describe expectorants with examples.	CO4 (L2)
2	Describe emetics with examples.	CO4 (L2)





**Thank You**