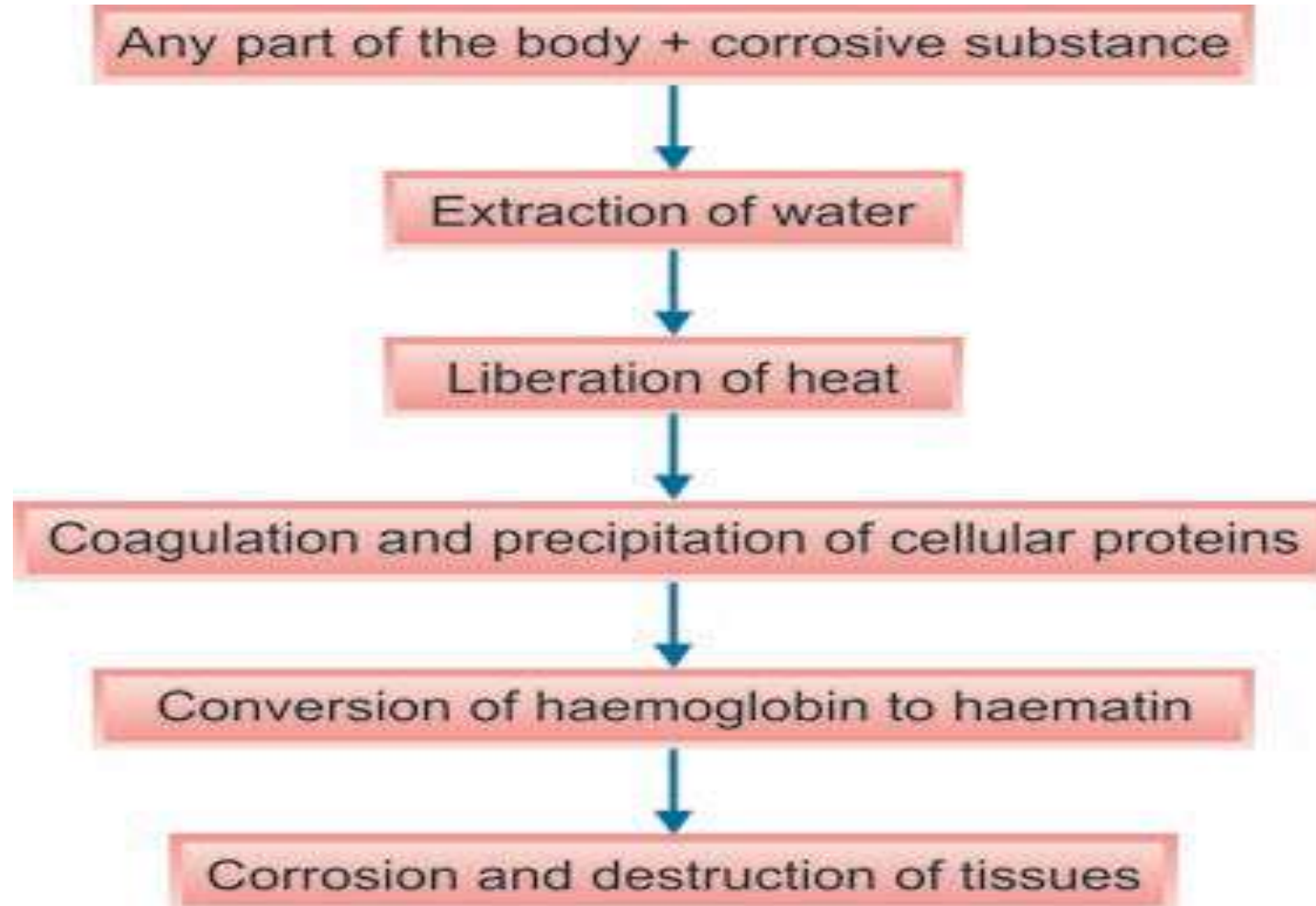


# Corrosives I

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Professor & HOD

# Mechanism of action of acid

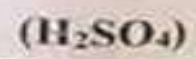


# Sulfuric Acid (Oil of vitriol)

- *Physical Appearance*-Sulfuric acid is a heavy, oily, colourless, odourless, non-fuming liquid
- It is *hygroscopic*, i.e. it has great affinity for water with which it reacts violently, giving off intense heat.
- *Uses/Sources*- Sulfuric acid is also used in the leather, fur, food processing, wool, and uranium industries, and as a laboratory reagent.
- Storage batteries utilise sulfuric acid as an electrolyte.



Sulfuric Acid

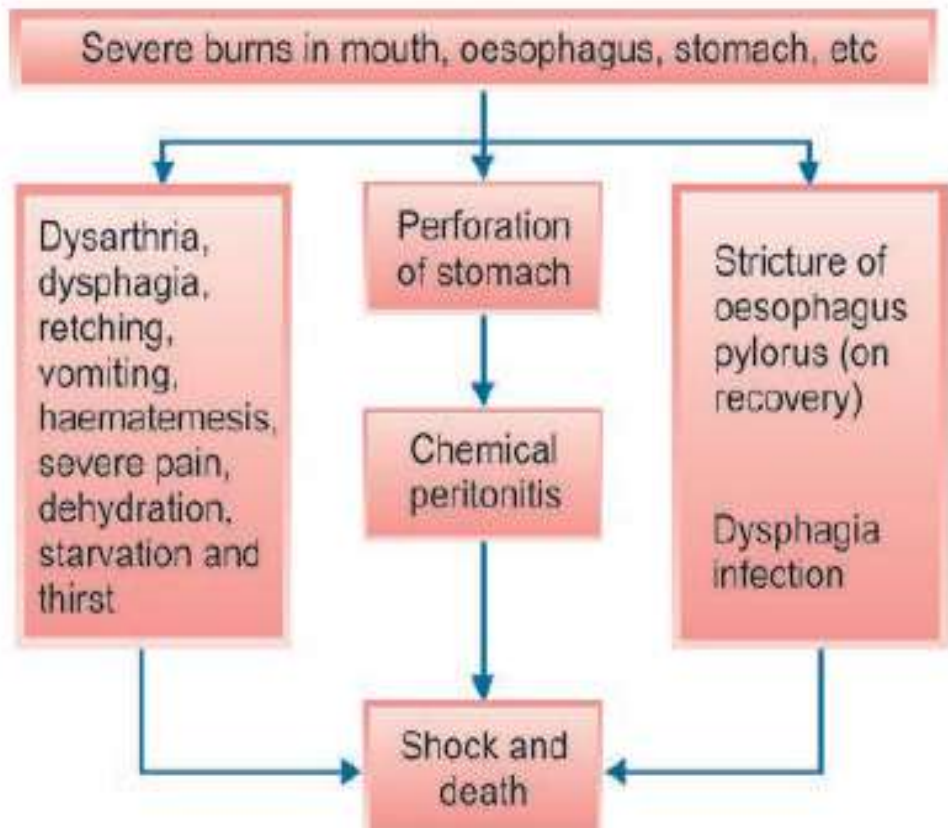


- *Fatal Dose*- About 20 to 30 ml of concentrate sulfuric acid
- *Mode of Action*- Produces coagulation necrosis of tissues on contact
- *Clinical Features*-Burning pain from the mouth to the stomach
  - Abdominal pain
  - Intense thirst
  - vomitus is brownish or blackish in colour (*coffee grounds vomit*)
  - dysphonia, dysphagia, and dyspnoea

- Tongue is usually swollen, and blackish
- Teeth become chalky white
- Drooling of saliva
- corrosion of the skin of the face (mouth), neck, and chest. Burnt skin appears dark brown or black.



- Features of generalised shock
- Renal failure and decreased urine output
- Contact with the eyes can cause severe injury including conjunctivitis, periorbital oedema, corneal oedema and ulceration, necrotising keratitis, and iridocyclitis
- Perforation of stomach
- Stricture formation





# Diagnosis

- *Litmus test:* The pH of the saliva- litmus paper (turns red in acid, and blue in alkaline solution)
- Fresh stains in clothing - adding a few drops of sodium carbonate. Production of effervescence (bubbles) is indicative of an acid stain.
- Vomitus or stomach contents add 10% barium chloride. A heavy white precipitate forms which is insoluble on adding 1 ml nitric acid.

# *Treatment*

- 100% oxygen
- Remove all contaminated clothes and irrigate exposed skin copiously with saline.
- Eye injury should be dealt with by retraction of eyelids and prolonged irrigation for at least 15 to 30 minutes with normal saline or lactated Ringer's solution, or tap water if nothing else is available
- The following measures are **contraindicated**: oral feeds, induction of vomiting, stomach wash, and use of activated charcoal
- Antibiotics

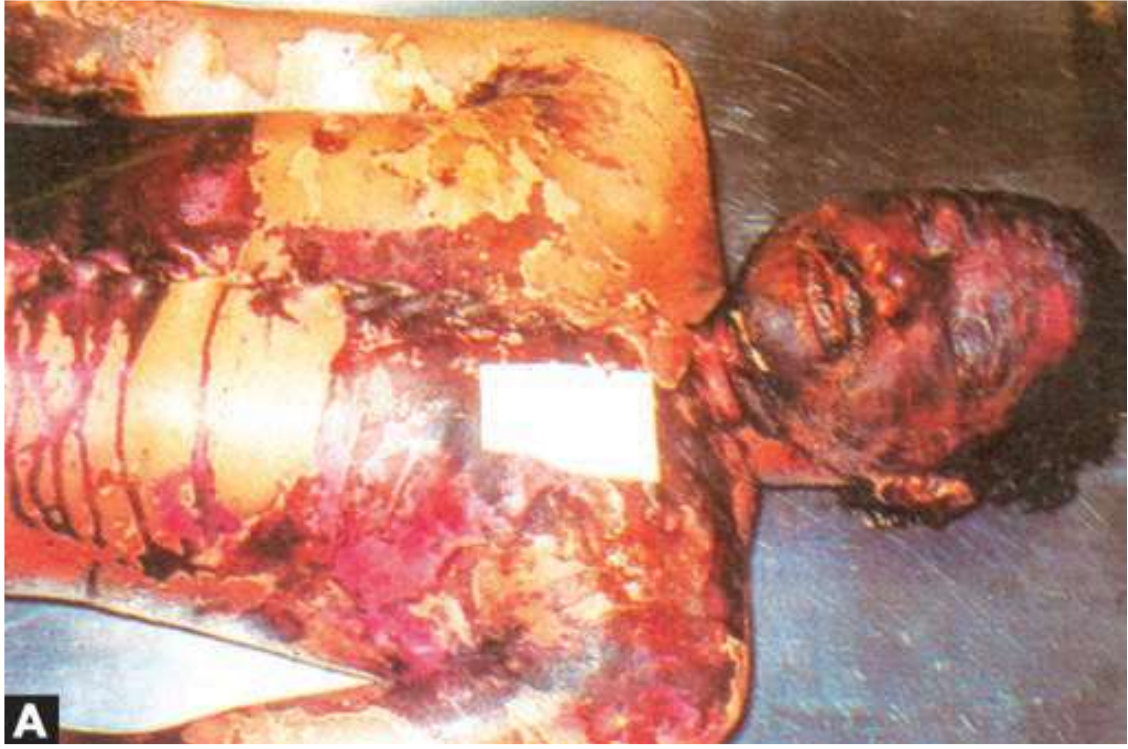
- NBM
- Acid should be immediately diluted by giving a glass of milk or water to drink and 4 tablespoonfuls of aluminum hydroxide gel.
- Demulcents
- Prednisolone 60 mg/day may be given in divided doses.

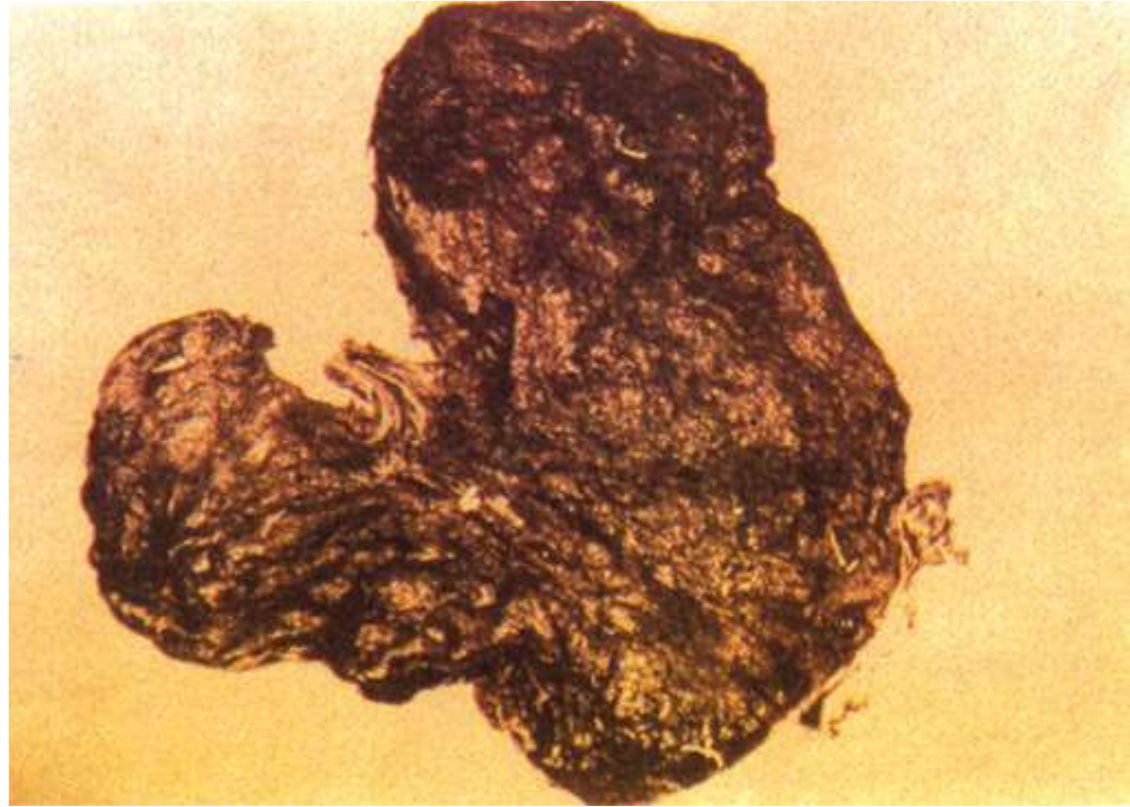
- circulatory shock

- Morphine

# *Autopsy Features*

- Corroded areas of skin and mucous membranes appear brownish or blackish. Teeth appear chalky white
- Stomach mucosa shows the consistency of wet blotting paper
- Inflammation, necrosis, or perforation of the GI tract





# Cause of death

- Shock
- Perforation of stomach
- Peritonitis
- Laryngeal spasm
- Malnutrition



# MLI

- Accidental poisoning (glycerine and castor oil)
- Abortifacient
- Homicidal
- Suicidal

## Vitriolage-

- throwing of an acid on to the face or body of a person in order to disfigure or blind him
- The motive is usually revenge or jealousy
- *Grievous hurt*





- **Other substances used:** Nitric acid, carbolic acid, caustic soda, caustic potash, iodine, marking nut juice or calotropis

## **Characteristics of Burns**

- Discoloration and staining of the skin and clothings (brown or black in sulphuric acid and yellow in nitric acid)
- Trickle marks
- Presence of chemical substance in the stains
- Repair is slow and scar tissue causes contractures.

## Treatment

- Wash the parts with plenty of water and soap.
- Apply thick paste of MgO or carbonate.
- Cover raw surface with antibiotic ointment.
- For *eye burns*, the conjunctiva and corneal surfaces are anesthetized with topical anesthetic drops (e.g. proparacaine) and irrigated with water for 15 min holding the eyelids open.

# Nitric Acid (Aqua fortis)

- *Physical Appearance*- Nitric acid is a colourless or yellowish fuming liquid with an acrid, penetrating odour.

- *Uses/Sources*-

Workers : glassblowing, underground blasting operations, farming (fertilisers), welding, fire fighting, and industrial chemistry.

*Fatal Dose*- 20 to 30 ml





## *Mode of Action*

- Nitric acid is a powerful oxidising agent and reacts with organic matter to produce trinitrophenol, liberating nitrogen monoxide (*xanthoproteic reaction*).

# Xanthoproteic reaction



## *Clinical Features*

- Corroded areas appear yellowish due to xanthoproteic reaction. Stains on clothing and teeth also appear yellowish.
- Perforation of GI tract is less common
- Inhalation of fumes can produce coughing, rhinorrhoea, lacrimation, dyspnoea, and pulmonary oedema

- Teeth
- Dysphagia, dysphonia and dyspnea
- Burning pain in throat, epigastrium

# *Diagnosis*

- *Litmus test*
- Drop a small piece of copper into the stomach contents and heat it. Pungent, dark brown heavy fumes will come

## *Treatment*

- Same as for sulfuric acid. Respiratory distress is present more often and requires special attention

## *Autopsy features*

- Corroded areas of skin, teeth, and mucous membranes appear yellowish. Stains on clothing also show yellowish discolouration

# MLI

- Same as for sulfuric acid

# MCQ

**Maximum damage to esophagus is with:**

- A. H<sub>2</sub>SO<sub>4</sub>**
- B. Sodium hydroxide**
- C. Acetic acid**
- D. Nitric acid**



Brown discolouration of mucosa of stomach is seen in poisoning due to

a)  $\text{HNO}_3$

b)  $\text{H}_2\text{SO}_4$

c) Oxalic acid

d) Carbolic acid

Perforation of stomach is more common due to ingestion of

- $\text{HNO}_3$
- $\text{H}_2\text{SO}_4$
- $\text{HCl}$
- Carbolic acid