WELCOME

TO



This is an Education Platform

We provide Free PDF Notes and Videos Classes for Pharmacy Students

Web Site http://www.fdspharmacy.in/

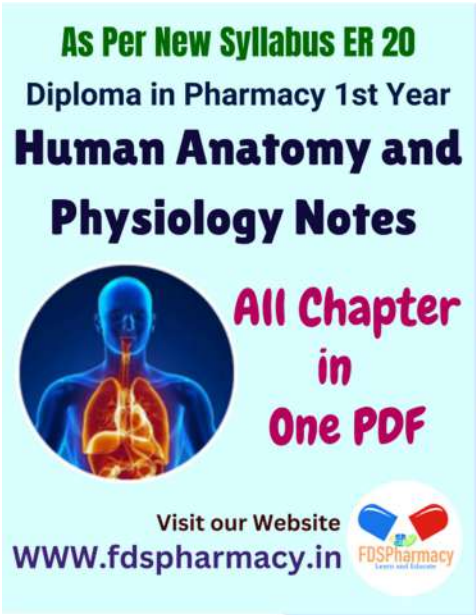
You tube https://www.youtube.com/channel/UC77iEsiuZolU4pB8WAJIR5Q

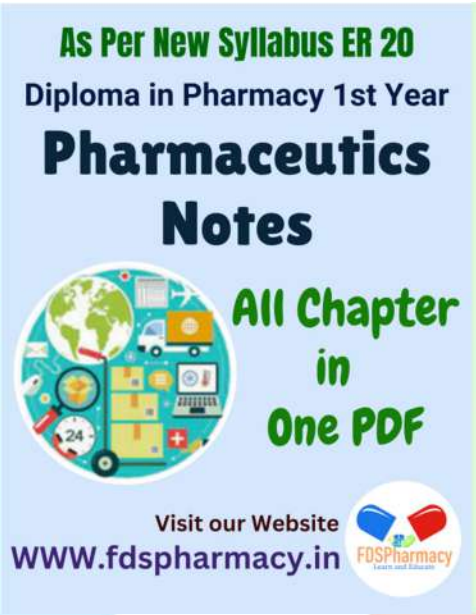
What app https://chat.whatsapp.com/IzSgXtFEvhS4LN5xhUgq5z

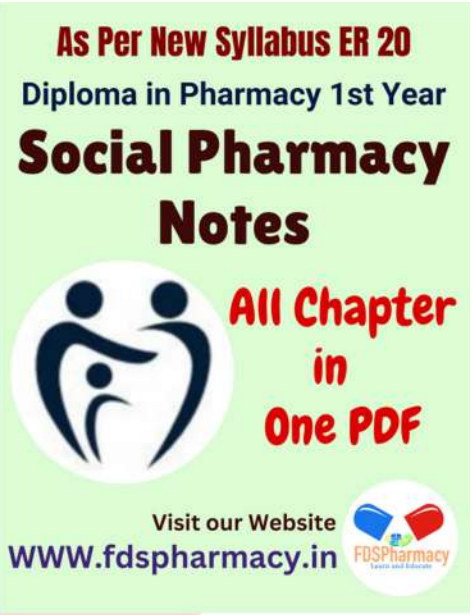
Telegram https://t.me/+cvxm17xSloA4MjVl

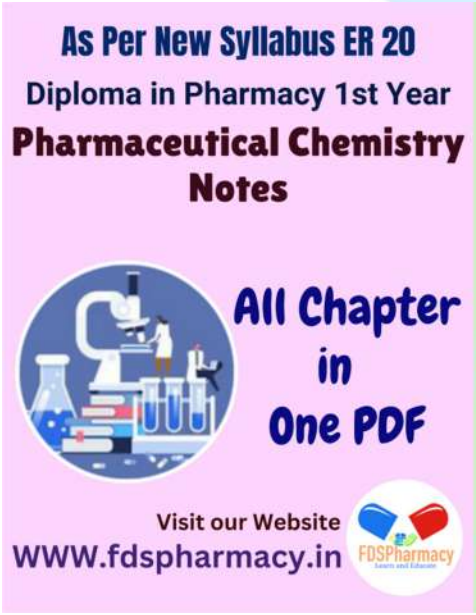
Face book https://www.facebook.com/Fdspharmacy-105764311994440/

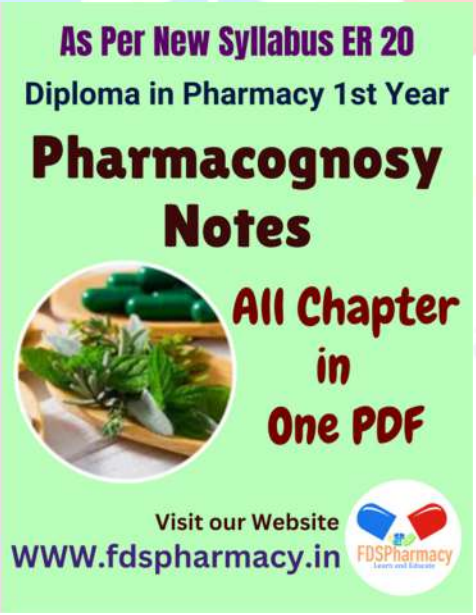
E-mail fdspharmacyinfo@gmail.com











Link in Description

Diploma in Pharmacy 1st Year
Pharmaceutical Chemistry
Chapter 3 : Inorganic Pharmaceuticals

Topics	Page No
Haematinics : 1. **Ferrous sulphate,** 2. **Ferrous fumarate,** 3. **Ferric ammonium citrate,** 4. **Ferrous ascorbate,** 5. **Carbonyl ion,**	3
Antacids : • **Aluminium hydroxide gel,** • **Magnesium hydroxide mixture,** • **Magaldrate,** • **Sodium bicarbonate,** • **Calcium carbonate**	7
Anti-Microbial Agents : ❖ **Silver nitrate,** ❖ **Ionic silver,** ❖ **Chlorhexidine gluconate,** ❖ **Hydrogen peroxide,** ❖ **Boric acid,** ❖ **Bleaching powder,** ❖ **Potassium permanganate,**	11
Dental Products : **Cleaning agents,** **Dentifrices,** **Anticaries agents/fluorides,** **Desensitising agent,** **Cements and fillers,** **Oral antiseptics and astringents,** **Polishing/abrasive agents**	17
MEDICINAL GASES → **Oxygen** → **Carbon Dioxide** → **Nitrous Oxide**	20

Chapter 3

Inorganic Pharmaceuticals

Haematinics

→ Haematinics are the drugs used to increase the the Concentration of haemoglobin (iron) in blood or used to cure anaemia mainly due to iron deficiency.

Examples

→ These agents are required for the formation of blood.

→ Some common examples of haematinics used in treatment of iron-deficiency anaemia are

1. Ferrous sulphate,
2. Ferrous fumarate,
3. Ferric ammonium citrate,
4. Ferrous ascorbate,
5. Carbonyl ion, etc.

1.Ferrous Sulphate (FeSO4.7H20)

→ Ferrous sulphate, also known as green vitriol, contains not less than 98% of ferrous ion (Fe^{2+}) and not more than 103.3% of $FeSO_4.7H_2O$.

Preparation

- It can be prepared by when iron pyrites are exposed to air and moisture

$$2FeS + 7O_2 + 2H_2O \longrightarrow Fe SOg + 2H_2SO_4$$

Physical properties

- **Appearance :** Pale, bluish green crystals or granules.
- **Odour :** Odourless.
- **Taste :** Saline and styptic (astringent or bitter).
- **Solubility :** Soluble in water (43.5gm in 100gm of water at 150°C).
- **Acidic Nature :** Its solution is acidic to litmus paper at pH about 3.7.
- **Crystal Properties :** Crystals undergo oxidation when comes in contact with air, forming brown patches of sulphate due to efflorescent nature.

Chemical Properties

- It undergoes complete dehydration when heated at 300°C and in the absence of air it shows white colour. On further heating, the anhydrous solid produces sulphur dioxide, sulphur trioxide, and ferric oxide salts by undergoing decomposition.
- It undergoes rapid oxidation and forms ferrie sulphate, thus, it is an effective reducing agent. It also reduces potassium permanganate, potassium dichromate, etc.
- Being a reducing agent, it decolourises potassium permanganate and converts potassium dichromate into green.

Pharmaceutical Formulations

- Ferrous Sulphate Oral Solution,
- Ferrous Sulphate Tablets

Market Preparations

- Fer-In-Sol ,
- FerrouSul ,
- FeroSul ,
- Iron Supplement,
- Slow Fe, etc.

Storage Conditions

- It should be store out of the children's reach and in child-resistant containers.

Uses

- It is a haematinic preparation most widely used for treating iron-deficiency anaemia.
- Ferrous sulphate coated with brownish yellow basic ferric sulpnae should not be used.
- It is also used in agriculture as an insecticide

2.Ferrous Fumarate

→ Ferrous fumarate is the fumarate salt form of the minera iron

Preparation

- Anhydrous ferrous fumarate should be prepared by mixing a water-soluble ferrous salt and a water soluble salt of fumaric acid in aqueous medium at a temperature over about 70°C.

Physical Properties

- **Appearance** : Reddish-brown powder.
- **Odour** : Odorless powder.
- **Solubility** : Hardly soluble in water and very slightly soluble in alcohol.
- **Nature** : Basic in nature.

Chemical Properties

- ferrous fumarate is quite stable to oxidation and hydration.
- This salt remains stable in even hot, humid atmosphere in comparison to ferrous sulphate and ferrous gluconate.

Pharmaceutical Formulations

- Ferrous Fumarate and Folic Acid (Combination) Tablets,
- Ferrous Fumarate Syrup

Market preparations

- Feosol,
- Ferra-TD,
- Fer-in-Sol,

Storage Conditions

- It should be stored in clean, dry warehouse in the original unopened containers.
- It should be kept in cool condition.

Uses

- It is used to treat pernicious anaemia.
- It is used to treat iron deficiency anaemia.

3.Ferric Ammonium Citrate

→ It is a complex salt which contain 20.5 – 22.5 % of iron . It is the Scale Preparations of iron

Preparation

→ Ferric ammonium citrate (iron (III) ammonium citrate) is prepared by the **reaction of ferric hydroxide with citric acid, followed by treatment with ammonium hydroxide, evaporating, and drying**. The resulting product occurs in two forms depending on the stoichiometry of the initial reactants.

Physical Properties

- **Appearance** : Bright and brownish-red scales
- **Solubility** : Highly soluble in water, but insoluble in alcohol
- **Taste** : Slightly astringent in taste

Chemical properties

- Due to presence of different complexes ferric ammonium citrate is present in the form of bright scales which are brownish-red in colour.

Pharmaceutical Formulations

- Ferric Ammonium Citrate Tablets ,
- Ferric ammonium citrate solution

Market Preparations

- Deriton ,
- Geritol Liquid ,
- Iron, Vitamin and Min Supplement

Storage Conditions

- It should be stored in original package to protect it from light.
- It should not be stored above 30 °C.

Uses

- It acts as a haematinic agent.
- It is used as a source of iron for treating iron-deficiency anaemia.

4.Ferrous ascorbate

→ Ferrous ascorbate is an iron supplement which is used in the treatment of low iron levels in the blood. Ascorbic acid increases the absorption of iron from the stomach.

Preparation

- The present invention provides an improved and industrially feasible earth metal salts or its hydroxides are reacted with ferrous sulfate to get corresponding ferrous salts, which are reacted with ascorbic acid in an aqueous medium at slightly acidic or neutral condition followed by filtration to get ferrous ascorbate

Pharmaceutical Formulations

- Ferrous Ascorbate Capsules
- Ferrous Ascorbate Syrups

Market Preparation

- Ascofer Cap 275mg
- Solufer syrup 150ml
- Iron Ascorbate Caps

Storage Conditions

- It should be kept away from direct contact with heat, air and light because it may damage the medicines.
- The medicine must be kept in a safe place and out of children's reach.
- The drug should be kept at room temperature between 68°F and 77°F (20°C and 25°C).

Uses

- Iron deficiency aneamia.
- Anemia due to chronic kidney disease.

5.Carbonyl Iron

→ Carbonyl iron is an iron replacement product. Iron is obtained from the foods we eat. Red blood cells are produced with the help of iron that carries oxygen via the blood to tissues and then to organs.

Pharmaceutical Formulations

- Tablet
- Oral Suspension

Market Preparations

- Feosol (Carbonyl Fe)
- Icar Pediatric
- Icar C
- Irco

Storage Condition

- It should be stored in an airtight container at room temperature. Keep away from children

Uses

- As a dietary iron supplement.
- To treat iron deficiency anaemia.

ANTACIDS

- Antacids are such substances which are used to neutralise the excess amount of acid in our stomach.
- It may cause many severe problems like pain, ulceration, and also inactivate the pepsin (proteolytic enzyme).
- The stomach pH can range from pH 1, when empty to pH 7, when food is present.
- The low pH is due to the presence of endogenous hydrochloric acid, which is always present under physiological conditions.
- When hyperacidity develops, the results can range from gastritis (a general inflammation of the gastric mucosa) to peptic ulcer (specific circumscribed erosion)
- Patients with this condition will frequently suffer from "heartburn", which occurs due to the gastric acid entering the Oesophagus either during a belch or upon lying in bed.

Ideal Properties

- It should be non-absorbable
- It should not cause constipation.
- It should act rapidly for a prolonged time period.
- Its pH should lie within the range of 4-6.
- It should not evolve a large amount of gas on reacting with gastric hydrochloric acid.
- It should inhibit pepsin.
- It should not interfere with food absorption.

Classification

1) Systemic antacids (absorbable) : e-g., sodium bicarbonate which is soluble, readily absorbable and capable of producing systemic electrolytic alterations and alkalosis.

2)Non-systemic antacids (non-absorbable): Aluminium salts, magnesium salts, calcium carbonate, and sodium carboxyethylcellulose, which are not absorbed to a significant extent and thus do not exert a systemic effect.

some common examples of antacids:

1. Aluminium hydroxide gel,
2. Magnesium hydroxide mixture,
3. Magaldrate,
4. Sodium bicarbonate,
5. Calcium carbonate, etc.

1. Aluminium Hydroxide Gel

→ Preparations of aluminium hydroxide gel should not have less than 3.5% and not more than 4.4% w/w of aluminium oxide (Al_2O_3).

Preparation

- It can be formed by treating an aluminium salt (e.g, aluminium chloride or sulphate) with ammonium hydroxide.
- $AlCl_3 + 3NH_4OH \longrightarrow Al(OH)_3 + 3NH_4Cl$

Physical Properties

- **Appearance** : white amorphouse solid
- **Odour** : Odourless.
- **Solubility** : It is insoluble in water and ethanol, but soluble in acids and alkalis solutions.

Chemical Properties

- It gets converted to aluminium oxide on heating.
  $2Al(OH)_3 \longrightarrow Al_2O_3 + 3H_2O$
- It acts as an acid in the presence of an alkali.
  $Al(OH)_3 \longrightarrow 3H^+ + AlO_3^{3-}$

Pharmaceutical Formulation

- Oral Suspension

Market Preparations

- AlternaGEL
- Nephrox
- Amphojel

Storage Conditions

- It should be stored in well-closed containers and freezing should be avoided. It can be dispensed in blue or amber coloured bottles.

Uses

- To treat peptic ulcer, gastritis, peptic oesophagitis, gastric hyperactivity, and hiatal hernia,
- To protect the skin

2. Magnesium Hydroxide

→ Magnesium hydroxide (molecular weight 58.3197) or milk of magnesia contains not less than 95% and not more than 100.5% of $Mg(OH)_2$.

Preparation

- Treating the solution of different soluble magnesium salts with alkaline water induces the precipitation of the solid hydroxide $Mg(OH)_2$: $Mg^{2+} + 2OH^- \rightarrow Mg(OH)$

Physical Properties

- **Appearance :** White powder
- **Solubility :** Soluable in water

Chemical properties

- At pH 10, magnesium hydroxide is alkaline to litmus solution and absorbs carbon dioxide from air.

Pharmaceutical Formulations

- Chewable Tablet
- Suspension

Market Preparations

- Milk of Magnesia

Storage Conditions

- It should be kept in original containers. Humidity
- It should be avoided in indoor storage areas and at least one metre away from heating devices.

Uses

- Magnesium hydroxide is a non-systemic gastric antacid and mild cathartic. But on continuous or prolonged use, kidney stones may develop.

3. Magaldrate

→ Magaldrate acts as an antacid which is used in the treatment of various conditions in GI tract, such as esophagitis, duodenal and gastric ulcers, and gastroesophageal reflux.

Properties

- It is white or almost white crystalline powder.
- It is practically insoluble in water and ethanol (96 per cent). It is soluble in dilute mineral acids.

Pharmaceutical Formulation

- Oral Suspension
- Market Preparation
- Riopan

Storage Condition

- The tablets and capsules should be stored at room Temperature
- Refrigerator is used to store the liquid form of this medication to improve taste.

Uses

- It is used to treat gastric and duodenal ulcer, GERD.
- It neutralies gastric acid and increases gastric pH.

4. Sodium Bicarbonate

→ Sodium Bicarbonate is not having less than 99% and not more than 101% of $NaHCO_3$.

Preparation

→ A similar method is used for the production of sodium bicarbonate on commercial scale. The soda ash (mined in the form of ore trona) is dissolved in water and treated with carbon dioxide. From this method, sodium bicarbonate is obtained as a solid precipitate.

$$Na_2CO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$$

Physical Properties

- **Appperance** : white crystalline powder
- **Odour** : odourless
- **Stability** : It is stable only in dry air.
- **Solubility** : soluble in water and insoluble in other solvent like alcohol.

Chemical Properties

- It can be used as a wash for removing any acidic impurities from a crude liquid and resulting to a pure sample.
- It reacts with acetic acid (CH_3COOH) to give sodium acetate.

Pharmaceutical Formulations

- Injectable Solution
- Tablet

Market Preparations

- Sellymin
- Brioschi
- Sodium Bicarbonate
- Neut

Storage Condition

- It should be stored in well-closed containers.

Uses

- Aqueous solution of sodium bicarbonate is used as an antacid which is given orally to treat acid indigestion and heartburn.
- It is used in urinary alkalinisation for treating uric acid renal stones.

5. Calcium Carbonate

→ Calcium carbonate is a chemical compound with chemical formula the $CaCO_3$.

→ It is having not less than 98.0% and not more than 100.5% of $CaCO_3$ which is calculated with reference to the sample dried at 105°C.

Preparation

$CaCO_3$ is obtained by using carbon dioxide and slaked lime as raw materials. When carbon dioxide is passed through slaked lime, calcite is obtained. Another method to obtain calcite is by adding sodium carbonate to calcium chloride.

Physical Properties

- Apperance : White Powder
- Solubility : Soluble in dilute acids

Chemical Properties

- Action of Heat: When heated, calcium carbonate gives a reversible reaction.
- $CaCO_3 \longrightarrow Cao + CO_2 \uparrow$

Pharmaceutical Formulations

- Tablet
- Chewables

Market Preparations

- Tums
- Tums Chewy Delights
- Tums Extra, Tums Freshers , Tums Kids, Tums Regular
- Tums Ultra
- Tums Smoothies
- Children's Pepto

Storage Conditions

- Should be stored in well closed container.

Uses

- It is a rapidly acting non – systemic antacid .

Anti-Microbial Agents

- Chemicals or agents that are used to kill or to inhibit the growth of microorganism (bacteria, fungi, or protozoans) are known as antimicrobial.
- They are either Microbicidal (kill microbes) or microbiostatic (prevent the growth of microbes) in nature.
- Antimicrobial substance like disinfectants are generally used to clean non – living objects

Classification

- **Antiseptics :** These substance are used to inhibit the microbial growth and are specifically applied to living tissue. Antiseptic agents are used for treating sepsis, putrefaction,etc
- **Disinfectants :** These substance kill the pathogenic microorganisms to prevent infection. Disinfectants are usually applied to non-living objects.
- **Germicides :** These are used to kill microorganisms. More precise terms like bactericide (against bacteria), fungicide (against fungi), virucide (against virus), etc
- **Bacteriostatic Agents:** These are used to inhibit bacterial growth. They do not kill but hamper bacterial growth.
- **Sanitizers:** These are used to maintain general public health standards and to clean or wash away the organic matter (e.g., saliva, mucous, etc.).

Example

- Silver nitrate,
- Ionic silver,
- Chlorhexidine gluconate,
- Hydrogen peroxide,
- Boric acid,
- Bleaching powder,
- Potassium permanganate, etc

1. Silver Nitrate

→ Silver nitrate (or lunar caustic) is a soluble chemical compounds, having not less than 99.5 % and not more than the equivalent of 100.5% of AgNo3

Preparation

- It is prepared bu dissolving metallic silver in cold and dilute nitric acid
- $Ag + 2HNO_3 \longrightarrow AgNO_3 + NO_2 + H_2O$

Physical Properties

- **Apperance** : Colourless or White crystals.
- **Odour** : Odoueless
- **Taste** : Bitter in taste
- **Solubility** : Solubile in boiling alcohol, Water , Slightly soluble in alcohol

Chemical properties

➲ Raction with Potassium Chromate: It reacts with potassium chromate to give a reddish brown colour.

$2AgNO_3$ + K_2CrO_4 ⟶ Ag_2CrO_4 + $2KNO$

(Silver nitrate) (Potassium Chromate) (Reddish brown) (Potassium nitrate)

Pharmaceutical Formulations

- Topical Solution
- Applicator Sticks

Market Preparations

- Avoca Flexible Caustic Applicator
- Silver Nitrate

Storage Conditions

- It should be stored in amber coloured bottles in a cool and dark place.

Uses

- It is used as a disinfectant, astringent, and an irritant.
- In cosmetics, it is used to dye eyebrows, eye lashes, and hair.

2. Ionic Silver

- A Silver ion is an atom of silver that has one missing electron.
- Silver ion is obtained by removing one electron from a silver atom.

Pharmaceutical Formulations

- Solution ,
- Powder ,
- Gel

Market Preparations

- Antibacterial Hand Wash
- Ave Silvergen
- Argentyn 23 Professional Silver First Aid Gel

Storage Condition

- Many advertised products as ionic silver are actually ionic silver solutions that should be stored in glass.

Uses

- ♠ Ionic silver has been used for numerous years as "ultimate" antibiotic, antifungal and antiviral altermative.

3. Chlorhexidine Gluconate

→ Since 1950, Chlorhexidine gluconate is known to be broad spectrum antiseptic. It is first generation antiplaque, anti-gingivitis agent and chemical plaque control agent.

Preparation

- ➢ It can be prepared from 1,6 hexamethylenebis(dicyandiamide) and 4-chloroaniline hydrochloride.

Properties

- ➢ It is solid or crystal from methanol.
- ➢ It is soluble in water at 20 °C.
- ➢ It is stable under ambient warehouse conditions to moisture and simulated sunlight.

Pharmaceutical Formulations

- ♦ Mucous inserts
- ♦ Mucous membrane liquid

Market Preparations

- ▪ Paroex
- ▪ PerioChip
- ▪ Peridex
- ▪ Periogard

Storage Conditions

- ♦ It should be stored at 66°F- 90°F (19°C- 32°C).

Uses

- It is used in dairy cattle, the operation of dairy facilities or production of dairy products.
- By these different types of pesticide which are used to destroy or inhibit the growth of disease-causing mechanisms can be impregnated into clothing.,

4. Hydrogen Peroxide

Preparation

→ A thick paste of barium peroxide is added to ice-cold water. This mixture is added to a calculated volume of Ice-cold dilute sulphuric acid. The solution is filtered and the insoluble sulphate is separated.

$BaO_2 + H_2SO_4 \longrightarrow BaSO_4 \downarrow + H_2O_2$

Physical Properties

- Apperance : Colourless
- Odour : Odourless
- Solubility : It is soluble in ether and insoluble in water.

Chemical Properties

- As an Oxidising Agent: It oxidises ferrous to ferric in the presence of dilute sulphuric acid; and the solution turns yellow from green.

Pharmaceutical Formulation

- Solution

Market Preparations

- Eskata
- Orajel Antiseptic Mouth Sore Rinse
- Proxacol
- Peroxyl

Storage Conditions

- It should be stored in light-resistant containers.
- It is kept in a dark and cool place.

Uses

- It is used as a disinfectant, anti-infective, and deodorant.
- It is used to clean septic sockets and root canals in dentistry.
- It is available as ear drops used for removing wax.
- It is also used as a bleaching and oxidising agent.

5. Boric Acid

Preparation

→ By Decomposition of Borax: Hot aqueous solution of borax is mixed with a mixture of concentrated sulphuric acid, followed by addition of water. The hot solution is fltered and cooled resulting in the crystallisation of boric acid which is separated by filtration.

$$Na_2B_4O_7 + H_2SO_4 + 5H_2O \longrightarrow Na_2SO_4 + 4H_3BO_3$$

Physical Properties

- It is a colourless and odourless powder.
- It is stable in air.
- It is soluble in water and alcohol; and freely soluble in glycerine, boiling water, and boiling alcohol.

Chemical Properties

- It is a weak acid which turns litmus paper slightly red.
- On treating with boric acid, colour of turmeric paper changes to brown which when dipped in sodiumn hydroxide solution turns blackish.

Pharmaceutical Formulations

- Boric acid ophthalmic
- Boric acid otic
- Boric acid topical

Market Preparations

- Borofax
- Dri-Ear
- Hylafem
- Collyrium Fresh

Storage Conditions

➲ It is stored in tightly closed containers.

Uses

- It is used in eyewash and mouthwash in the form of solutions at a concentration of 2.5-4.5%.
- It is also used as a dusting powder.
- It is used as a buffer and as an antimicrobial in eye drops.

6. Bleaching Powder or Chlorinated Lime [CaOCl (Cl) H2O]

→ Chlorinated lime is also known as calcium hypochlorite and bleaching powder. It should not have less than 30.0% w/w of available chlorine

Preparation

★ Bleaching powder is prepared by **passing dry chlorine gas over dry slaked lime**. The reaction being essentially:

$2Ca(OH)2+2Cl2 \rightarrow Ca(OCl)2+CaCl2+2H2O$.

Properties

- It is a dull white powder with a characteristic odour.
- After being exposed to air it absorbs moisture and decomposes slowly.

Pharmaceutical Formulations

♦ Powder
♦ Liquid

Market Preparations

- Haktiman
- Vikram
- Lion

Storage Conditions

➲ It should be stored in a well-closed containers and kept in a cool place away from moisture and heat.

Uses

- It is used as a bleaching agent.
- It is used as an antiseptic.
- It is used as a cleaning solution for patients.

7. Potassium Permanganate

→ Potassium permanganate, formerly known as permanganate of potash or Condy's crystals is the inorganic, water-soluble chemical compound which consists equal moles of potassium (K^+) and permanganate (MnO_4^-) officially called manganate (VII) ions.

Preparation

- Industrial Preparation (Large Scale Preparation): It is prepared by mixing KOH solution, powdered manganese oxide, and potassium chlorate. The resultant mixture is boiled and evaporated. The residue obtained is heated in iron pans till it forms a paste of desired consistency.

$$KOH + 3MnO_2 + KClO_3 \longrightarrow K_2MnO_4 + KCl + 3H_2O$$

Physical Properties

- It is found in the form of dark purple coloured monoclinic prism.
- It is odourless
- It is soluble in water and boiling water

Chemical Properties

➲ On heating at 240°C, it disintegrates and deteriorates.

$$2KMnO_4 \longrightarrow K_2MnO_4 + Mno_2 + o_2 \uparrow$$

Pharmaceutical Formulations

- Oral Tablet
- Topical Solution

Market Preparations

- Permasol
- Kalii permanganas RFF
- Koi Med Tricho-Ex

Storage Conditions

- ❖ It should be stored in closed containers.
- ❖ It must be handled carefully.

Uses

- ➢ It is used as an antiseptic in mouthwashes.
- ➢ It is used in the treatment of urethritis.
- ➢ Its solution destroys the effect of a poison and prevents its absorption.

DENTAL PRODUCTS

- At the present time dental products of different category are available which are used to maintain dental health and hygiene.
- Dental decay and other dental problems mainly caused by poor oral hygiene.
- Inorganic compounds which are used as dental products or in dentistry can be categorised under the following heads
    - Cleaning agents,
    - Dentifrices,
    - Anticaries agents/fluorides,
    - Desensitising agent,
    - Cements and fillers,
    - Oral antiseptics and astringents, and
    - Polishing/abrasive agents.

1. Cleaning Agents

- An efficient cleaning agent must comprise of fine particles having suitable abrasive property. It must provide suitable abrasiveness in order to remove stains from teeth.
- The phosphates are generally used as anticaries and cleaning agents.

Dentifrices

- A dentifrice is a substance used for cleaning the reachable surfaces of the teeth with a toothbrush.
- The main objective of a dentifrice is to help the toothbrush clean the teeth.
- A dentifrice is used to maintain good oral hygiene.
- Toothpaste is the most common dentifrice that dentists recommend to use with a toothbrush for removing dental plaque and food debris.

Types

Dentifrices are of three types depending on whether they are solid, semi-solid or liquid:

I. **Toothpaste:** It is used with a toothbrush for maintaining oral hygiene. Toothpaste is mainly used for removing debris and plaque. It also has some additional functions, like whitening teeth and freshening breath.

II. **Tooth powder:** It is a substitute of toothpaste and is available in both fluoride and non-fluoride forms.

III. **Mouthwash:** It is available in a variety of compositions, claiming to kill bacteria forming plaque or bad breath, and freshen up breath on regular use

Examples

- Calcium carbonate,

Calcium Carbonate

→ Calcium carbonate is a chemical compound with the chemical formula $CaCO_3$.

Preparation

- $CaCO_3$ is obtained by using carbon dioxide and slaked lime as raw materials.

Properties

- It is a fine white powder, and is soluable in dilute acids .

Pharmaceutical Formulation

- Tablet
- Chewables

Market preparations

- Tums,
- Tums freshers,
- Tums kids, etc

Storage condition

- It stored in well closed containers.

2. Denture Cleaners

→ A dentures cleaner 9 also termed denture cleanser) is used to clean dentures when they are out of the mouth.

Properties

- Non-toxic
- Easy to remove
- Harmless to patient if accidentally spilled/splashed
- Harmless to denture base materials, denture teeth and soft liners
- Long shelf life and cheap

Pharmaceutical Formulations

- Liquid Solutions
- Powders
- Pastes
- Tablets

Market Preparations

- Polient ,
- Corega,
- Secure

Storage Conditions

- It should be stored in hygienic place

Uses

- They help the denture to intact in place.
- They fight bad breath with its antibacterial ingredients.
- The adhesive locks out any food particles from getting between the gum and the denture.

3. Mouth Washes

→ Mouthwashes are concentrated, clear aqueous solution having a pleasant taste that is used to clean and deodorise the mouth or buckle cavity.

Preparation

➢ Dissolve the benzoic acid in the chloroform, add the glycerin and mix. Dissolve the cinnamon, peppermint and phenol in alcohol and mix two solutions together.Mix for two hours, chill and filter.

Properties

- It should be quick in action and potent enough to show its intended action at specific dilution.
- Flavour must be strong enough to mask foul smell of mouth.
- It should have an acceptable taste, in most cases, sweet taste is considered.
- Low cost of production.
- No irritation should be caused to oral cavity or mucous membrane.
- It must be non-toxic.

Pharmaceutical Formulations

- Oral solution

Market Preparations

- Colgate
- Listerine
- Closeup
- Freshclor

Storage Condition

➲ Mouthwashes should be supplied in a well closed air tight plastic container having screw cap

Uses

- It is used as an antiseptic/antibacterial.
- It is used as cooling and refreshing action.

MEDICINAL GASES

- Gases like oxyger and water and food are therapeutically significant and essential for the maintenance of living organisms.
- Among oxygen, food and water (the three basic needs of life), oxygen deficiency leads to death most rapidly.
- In case of many diseases and intoxication, intereferin with normal oxygenation of blood or tissues, oxygen therapy is required.

Oxygen (O2)

- Mol. wt-32.0
- Oxygen is a living gas, constituting one-fifth by weight of air in its free form. It contains not less than 99.0% of v/v of O_2

Preparation

→ Laboratory Method: Electrolysis of aqueous solutions of alkalis or acids liberates oxygen. Here, H^+ drifts to the cathode, accepts an electron and converts into a neutral atom forming hydrogen molecules whereas, OH^- discharges at anode forming water and oxygen.

Physical Properties

- It is a colourless, odourless, and tasteless gas which supports combustion.

Chemical Properties

- Many non-metals, when heated with oxygen, burns rapidly, producing a non-metal oxide, e.g., CO_2, P_2O_5, and SO_2.

$$C + O_2 \longrightarrow CO_2$$
$$S + O_2 \longrightarrow SO_2$$
$$P_4 + 5O_2 \longrightarrow P_4O_{10}$$

Pharmaceutical Formulation

- Medical gas

Market Preparation

- EZ-Ox

Storage Conditions

- It is stored and supplied in metallic cylinders under pressure with a pressure gauge.

Uses

- It is used for treating hypoxia.
- It is used in anaesthesia.
- It is used for treating carbon monoxide poisoning.

Carbon Dioxide

→ Carbon dioxide with not less than 99.0% W/w of CO_2 is stored and compressed in metal cylinders.

Preparation

➢ It is obtained when carbon containing compounds likecoal, coke, oil, etc., are burned with an excess of oxygen.

$C + O_2 \longrightarrow CO_2$

Physical Properties

♦ It is a heavy, colourless, odourless gas with a faintly acidic taste. It can be liquefied under water, is soluble in water.

Chemical Properties

Carbon dioxide forms carbonic acid when passed in water. This carbonic acid produces sodium bicarbonate when added to sodium hydroxide.

Pharmaceutical Formulation

- Medical gas

Market Preparation

♦ Carbon dioxide

Storage Conditions

➲ It is stored and supplied in metal cylinders in compressed form.

Uses

➢ It is inhaled to be used as a respiratory stimulant which stimulates the respiratory and cardio accelerator centres.

➢ Mixture of carbon dioxide and oxygen are used for treating carbon monoxide poisoning.

Nitrous Oxide

→ Nitrous oxide contains not less than 99.0% v/v of N_2O. It is also known as laughing gas because if inhaled an exhilarating/ exciting effect is produced.

Preparation

★ When sulfamic acid is heated with 73% nitric acid solution, pure nitrous oxide is liberated.

Physical Properties

- It is a colourless, non-flammable gas, with a pleasant and slightly sweet odour and taste.

Chemical Properties

♦ At low temperature (about 600°C), it dissociates into nitrogen and oxygen.

♦ Sulphur and phosphorus burn in its atmosphere.

♦ It reduces to nitrogen when passed over red hot copper.

Pharmaceutical Formulation

- Medical gas

Market Preparation

- Nitrous Oxide

Storage condition

- It is stored and supplied in metal cylinders.

Uses

- It is used as an anaesthetic.
- Mixture of oxygen and nitrous oxide in 65:35 ratio is used in myocardial infarction.
- It is used as a good analgesic. In low concentration, it reduces the sensitivity of pain.
- In high concentration, it has a stimulating effect on the nervous system as it is a laughing gas.

FDSPharmacy
Learn and Educate