CHAPTER-3

HAEMATINICS

HAEMATINICS

→ Haematinics are the agents that help in the formation of Haemoglobin and stimulate the production of blood cells.

→ They include iron compounds, folic acid and Vitamin B_{12}

→ Deficiency of Iron in the body leads to anaemia.

→ Various iron compounds are used to supplement the iron content of the body in Iron deficiency anemia.

→ They can be given by oral route or parenteral route depending upon the extent of iron deficiency

→ Some of the iron compounds are- ferrous Sulphate, ferrous fumarate, Carbonyl iron etc

→ Iron deficiency is the most common nutritional deficiency worldwide.

→ It is associated with symptoms of Pallor, Cardiovascular Respiratory and cognitive complication and decreased quality of life

→ Anaemia is a reduction in RBC Red blood cell mas

→ It is often described as a decrease in the numb of RBCs per microliter (μL) or decrease in the Hemoglobin concentration in blood to a level belo the normal physiologic requirement for adequate tissue oxygenation

* Dietry Requirement of IRON:-

To make good average daily loss, iron requirement are

Adult male - 0.5-1 mg (13 μg/kg)
Adult female - 1-2 mg (21 μg/kg)
Infants 60 μg/kg
Children - 25 μg/kg
Pregnancy - 3-5 μg/kg

* Dietary source of IRON :-

(1) Rich source - Liver, egg yolk, oyster, dry beans, dry fruit, wheat germ, yeast

(2) Medium Source: Meat, chicken, fish, spinach, banana, apple

(3) Poor Source - Milk and its products, root vegetables

Formula for calculation total dose of Iron in Grams:

(1) Dose of IRON in gm - 0.25 X (normal Hb - Patient Hb)

(2) Iron Requirement(mg) - 4.4 X body wt in kg X Hb (g/dl). Hb = -Hb

FERROUS SULPHATE

Synonym:- Iron sulphate, Green vitriol, Iron vitriol, Copperas

Formula :- $FeSO_4 \cdot H_2O$

Molecular weight — 278.01

Standard:- Ferrous sulphate is the most commonly used of Iron. It is the cheapest and effective preparation.

Physical properties:-

(1) Ferrous sulphate occurs as pale, bluish green, transparent crystal or granules.
(2) It is odourless
(3) It has a saline astringent taste
(4) It dissolve freely in water but insoluble in alcohol
(5) It oxidise readily in moist air to form brownish yellow basic ferric sulphate

Chemical Properties :-

(1) When heated strongly, it decompose sulphuric acid and sulphur di oxide.

$$2FeSO_4 \cdot 7H_2O \xrightarrow{\Delta} Fe_2O_3 + SO_2 + H_2SO_4 + 13H_2O$$

(2) Ferrous sulphate is treated with Potassium Permangnate ($KMnO_4$) and sulphuric acid (H_2SO_4) then it gets oxidised into Potassium Sulphate (K_2SO_4) and Ferric sulphate ($Fe_2[SO_4]_3$).

$$2FeSO_4 + 2KMnO_4 + 4H_2SO_4 \longrightarrow K_2SO_4 + 2MnS$$
$$+ Fe_2(SO_4)_3 + 4H$$

Pharmaceutical Preparation :-

(1) Ferrous sulphate is obtained from the treatm of large quantitie of Iron with sulphuric acid (H_2SO_4).

$$Fe + H_2SO_4 \longrightarrow FeSO_4 + H_2\uparrow$$

(2) Ferrous sulphate is also prepared commercially by oxidation of Pyrite.

$$2FeS_2 + 7O_2 + 2H_2O \longrightarrow 2FeSO_4 + 2H_2SO_4$$

Storage It should be stored in tightly closed contai because it gets oxidised on exposure to moist air, and get coated with brown basic ferr sulphate

Dose- 60 mg to 600 mg

Incompatabilities :- It is incompatible with alkalies, soluble carbonates, phosphates, tannates, Benzoates,

↳ It gets oxidised in air readily in the presence of permanganates, arsinates, and mercuric salts

Uses:

(1) It is used as a Haematinic agents
(2) It is used to treat and prevent Iron deficiency
(3) It is used to dye Fabrics.
(4) It is used as disinfectant in veterinary practice
(5) It is used as Astringent and
(6) It is used for tanning leather
(7) It is used in the manufacture of ink and photography
(8) It is used as an insecticide in aquaculture

Formulation:- It is available in the form of Tablet, capsule and Oral liquids.

Brand name:- Fefol, Fesovit, Globac Z
Ferich - SR
Ferrochelate - Z
Fenz
Feton - Z - TR
Fezee
Hb-Rich 300

Synonym - Iron fumarate.

Formula - $C_4H_2FeO_4$

Molecular weight - 169.91

Pharmaceutical Preparation:

(1) Iron and fumarate is prepared by mixing a water soluble ferrous salt and salt of fumaric ac at a temp over about 70°C

$$Fe + C_4H_4O_4 \longrightarrow \underset{\text{ferrous fumarate}}{C_4H_2FeO_4} + H_2\uparrow$$

Physical properties:

(1) It occurs as reddish orange to reddish brown fine powder.

(2) It may contain soft lumps that produce a yell streak when crushed.

(3) It has a slight odour

(4) It has astringent taste

(5) It is slightly soluble in water and very slight in alcohol.

* Chemical Properties:

(1) When ferrous fumarate is reacted with sulph acid then it is converted into ferrous sulphat

$$C_4H_2FeO_4 + H_2SO_4 \longrightarrow FeSO_4 + 2H_2O + 2CO_2 + 2$$

Storage :- It should be stored in well closed containers.

Uses:

(1) It is used in the treatment of Iron-deficiency anemia.

(2) It has advantage, that is less irritating, secondly it does not get oxidised so readily and is more stable.

(3) It is used as Disinfectant.

(4) It is used in the manufacture of ink and photography.

(5) It is used as Insectisidi.

Formulation :- It is available in the form of tablets

Brand name - Autrim, HBPlus
Feostat.
Hemoyte
AF 12, Ecariotin
Anvital, Cheri CAPS

Dose - 200 mg

FERRIC AMMONIUM CITRATE

Synonym- Iron ammonium citrate

Formula- $Fe(C_6H_5O_7)$ x. ~~Fe $(NH_4)_5$~~

Molecular wt- 488

Standard :- It is a complex salt containing not less than 20.5% and not more than 22.5% of iron

Pharmaceutical Preparation

(1) It is prepared by the reaction of Ferric Hydroxide $Fe(OH)$ with citric acid $C_6H_8O_7$.

$$Fe(OH)_2 + C_6H_8O_7 \xrightarrow{NH_4OH} [Fe(C_6H_5O_7)](NH_4)_5$$

Physical properties:

(1) It occurs as thin, transparent, dark red scale or granules or brownish red powder.

(2) It is odourless powder

(3) It is deliquescent in moist air.

(4) It is affected by light.

(5) It is very soluble in water but practically insoluble in alcohol.

Chemical properties:

(1) When Ferric ammonium citrate o heating, it evaporate into citric acid

$$[Fe(C_6H_5O_7)](NH_4)_5 \longrightarrow Fe(OH)_2 + C_6H_8O_7$$

Incompatibilities: It is incompatible with mineral acids, alkali, alkali carbonates and tannates.

Storage: It is stored in tightly closed containers protected from light and moisture.

Uses:

(1) It is used in iron-deficiency anemia like other iron compounds.

(2) It is relatively free from astringent properties of ferrous sulphate.

(3) It is less irritating than other iron preparation.

Dose- 1 to 3mg

Formulation - It is available in the form of tablets, capsule and oral liquid dosage forms.

Brand name- Haem up
Dexorange syrup
Amvufer syrup, Cheri SYR,
Corufer Drops,
Exifol syrup.

FERROUS ASCORBATE

Synonym- Ferrous Cevitamate, Iron-L ascorbate

Formula - ~~406.08~~ $C_{12}H_{14}FeO_{12}$

Molecular wt. ~~Ferrous~~ - 406.08

Standard- Ferrous ascorbate is a combination of iron and Vitamin C. Vitamin C helps in the absorption of iron.

Preparation

(1) ferrous ~~hydroxide~~ ascorbate are reacted with ferrous sulphate reacted with ascorbic acid.

$$Fe(SO_4) + 2C_6H_8O_6 \longrightarrow C_{12}H_{14}FeO_{12} + H_2SO_4$$

Physical properties

(1) It is usually found in the form of white or slightly yellowish crystalline powder.

(2) It can be easily oxidized or destroyed in light, temperature.

(3) It is soluble in water and very slightly soluble in alcohol.

(4) It is insoluble in chloroform and ether.

chemical properties:

(1)

Uses:-

(1) It is used as an iron supplement in the Iron treatment of iron-deficiency anemia.

(2) It is also used to supplement ~~in the treatment~~ iron level in conditions such as pregnancy.

(3) Presence of ascorbic acid increase the absorption of iron from stomach.

Formulation → It is available in the form of Tablet

Dose- Usual adult dose is 100 mg

Brand name — Livogen-CZ, Ferikind

Dose- Usually adult dose is 50 mg orally three times a day.

Brand name - Feosol caplet
Icar.
Elemental iron.

Uses:

(1) Carbonyl iron is used to treat Iron defiveny anemia.

(2) It is also used as an Iron defiveny supplement

Antacid

An antacid is a substance which neutralize stomach acidity and.
It is used to treat Heart burn, Indigestion and reduce spasm

→ Antacid are weak bases and raise the PH above 4 by excess gastric HCl. The HCl acid may be causing pain and ulceration.

→ Antacid are free from side effect but a few drug cause alkalosis (excessive blood alkalinity)

→ They contain ingredient such as. Aluminium Hydroxide gel, sodium bicarbonate, Alu. phosphate

→ Antacid can be classified into two type

(1) Absorbale or Systemic antacid.

(2) Non- absorbable or Non- systemic antacid.

Systemic antacid :- They are readily absorbable, soluble and produce systemic electrolytic -alteration and alkalosis. e.g- Sodium Bicarbonate

Non- Systemic :- These antacid are not absorbed and donot produce systemic electrolytic alteration
e.g- Aluminium Hydroxid Gel

(4) Aluminium Hydroxide Gel

Chemical formula :- $Al(OH)_3$

M.W - 77.99.

Standard :- It contain not less than 3.5% and not more than 4.4% w/w of Al_2O_3

Physical Properties :-

(1) It is a white odourless powder or viscous Suspension.

(2) It is also known as Aluminium Hydrate Powder

(3) It is soluble in diluted ~~खनिज~~ mineral acid and bases Hydroxide.

(4) It is insoluble in water and alcohol.

(5) It is a good buffer system.

Chemical Properties :-

(1) Aluminium Hydroxide Gel are reacts with a acid to form salt.

$$Al(OH)_3 + 3HCl \longrightarrow \underset{\text{Aluminium chloride}}{AlCl_3} + 2H_2O$$

(2) When $Al(OH)_3$

ge:- It should be stored in air tight container at cool place but freezing must be avoid.

(3) (5)

Incompatibility:-

Uses:- (1) It is a slow acting Antacid with mild astringent activity.

(2) It is used in the treatment of peptic ulcer and Hyper-chlorhydria.

(3) It is used in treatment of kidney.

(4) It is used in the deordent and toothpaste.

Dose- 5 to 3ml for 2 times a day.

Synonym- Aluminic acid
Aluminic Hydroxide
Hydrated alumina

Dosage form- Oral suspension
category- Peptic ulcer disease, Hyperphosphatemia
Brand name- Vercain-gel, Milad, Celus

Magnesium Oxide (3)

Synonym - Magnesia.

Chemical formula - MgO

M.w - 40.30

Standard → It contain not less than 98% of MgO.

Physical Properties:

(1) It is an odourless, white amorphous powder

(2) It is very slightly soluble in water and insoluble in alcohol and soluble in dilute acids.

(3) MgO are nanoparticles appear and non-toxic.

(4) It is a nanoparticle appear in a white powder form.

(5) MgO have high purity and high M.P.

Category - Saline laxative, Brandname - Gelojem, Wcidaz-M Gelusil

Chemical properties:

(1) It react with atmospheric moisture and forms magnesium Hydroxide.

$$MgO + H_2O \longrightarrow Mg(OH)_2$$

(2) With air — It reacts with atmospheric CO_2 and form magnesium carbonate.

$$MgO + CO_2 \longrightarrow MgCO_3$$

Mag. trisilicate

Storage - Stored in tightly closed container.

Uses — ~~Antacid~~, Systemic acidosis, ~~electrolyte~~, ~~Ear drop, eye lotion,~~

Sodium Bicarbonate

Chemical formula:- $NaHCO_3$

Molecular weight – 84

It contain not less than 99% and more than 101.0% of $NaHCO_3$.

Physical Properties

(1) It is a white, crystalline solid powder.
(2) It is a small opage, monoclinic crystals.
(3) It is freely soluble in water.
(4) It is insoluble in 95% ethanol

Synonym- Baking soda, Sodium Bicarb, Sodium Hydrogen carbonate

Chemical Properties

(1) It react with HCl it form NaCl and carbon di-oxide.

$$NaHCO_3 + HCl \longrightarrow NaCl + CO_2\uparrow + H_2O$$

(2) On heating it gets converted into sodium carbonate.

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

(3) On Reaction with acids it form salt.

$$2NaHCO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + 2CO_2 + 2H_2O$$

Age- It is hygroscopic compound and Stored in air-tight container.

Uses:- (1) It is used as Antacid.
(2) It is used as wax-softer in ear drop., in eye lotion
(3) It is used as intravenous infusion as electrolyte replenisher.
(4) In the treatment of systemic acidosis.

Dose- 300 mg to 2 gm four times a day.

Category – Duodenal and gastric ulcer, Heartburn

Brand name – Sodadec, Carbowell, Carbocure.

Calcium Carbonate

Synonym- Precipitated chalk
" calcium carbonate

chemical formula- $CaCO_3$

M.W- 100.

Standard- It contain not less than 98% and not more than 100.5% $CaCO_3$.

Physical Properties:-

(1) It is a white odourless powder.
(2) It is very slightly soluble in water but solubility is increased by the presence of carbon dioxide.
(3) Ammonical salt soluble in dilute acids
(4) It is stable in air

chemical properties:-

(1) When it react with HCl gives calcium chloride and water.

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$$

(2) It react with $NaCl_3$ give calcium chloride and sodium carbonate

$$2NaCl + CaCO_3 \longrightarrow Na_2CO_3 + CaCl_2$$

(3) When $CaCO_3$ react with ~~Water~~ Lime water ~~they~~ passed CO_2 ~~CO_2 and $Ca(OH)_2$~~ in the soln of $CaCO_3$

$$CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_2$$

calcium Bicarbonate

Storage:- It is stored in well closed container

Uses:- (1) It is used as Antacid.
(2) It is used in the G.I.T agent
(3) In the electrolyte replinisher.

(1) When On Heating they gives CaO and CO_2

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2\uparrow$$

(2) $$CaCO_3 + CO_2 + H_2O \longrightarrow Ca(HCO_3)_2$$

Calcium Bicarbonate

it react with CO_2 then it gives ↗

Category - ~~Duodenal and gastric ulcers, Heart burn~~

Brand name ~~Sodadec~~, Carbowell, Carbocure

Category- Antacid

Brand name - Encalvit, Ostifit, Ruhocal

Megaldrate

Megaldrate, Algeldrate

Synonym – Aluminium Magnesium Hydroxide Sulphate

M.F – $Al_5Mg_{10}(OH)_{31}(SO_4)_2 \cdot x H_2O$

M.W – 1097.38

Physical properties:-

(1) It is a white or almost white crystalline powder.
(2) It is soluble in dilute mineral acids.
(3) It is insoluble in water and ethanol.
(4) The aqueous solution of PH – 8 – 10.5%

chemical properties:-

(1)

$$Al_5Mg_{10}(OH)_{31}(SO_4)_2 \longrightarrow 5Mg(OH)_2 \downarrow + Al(OH)_3$$

GIT- Drugs used for their effects on the GIT system. as to control gastric acidity, regulate git motility and water flow and improve digestion.

Acidifying agents:- The drugs or agents which are used to increased metabolic Acidosis and gastric hydrochloric acid

They are also known as acidifying agent or Acidifiers.

eg. dilute HCl.

a). Gastric acidifiers:- They are drug which are used to restore temporarily the acidifying of stomach in suffering from achlorhydria or hypochlorhydria. Achlorhydria

b). Urinary acidifiers:- They are drug which use to render Alkaline to enable treatment of some type treat this order.

- Dilute Hydrochloric Acid :-

Chemical formula:- HCl

Molecular weight:- 36.

It contain not less than 9.95% and not more than 10.5% of HCl.

Physical properties:-

i). It is colourless liquid and strongly acidic.

(ii). It is soluble in water and alcohal.
(iii). It is strong acid and attack metal formic done HCl with H_2O.
(iv). Even in High dilude from if is vairly strong Acidic to litimus.

Chemical properties:-

(i). it dissuciate into hydrogen & Chlorin 1500°C

$$2HCl \xrightarrow{1500^\circ C} H_2 + Cl_2$$

Hydrogen Chlorin gas.

(ii). it form white amonium claride cloud with amonia.

$$NH_3 + HCl \longrightarrow NH_4Cl$$

(iii). it form aquaregia with nitric acid

$$3HCl + HNO_3 \longrightarrow 2H_2O + NOCl + 2Cl.$$

Storage:- it is stored in stoped containrble 30°C

Uses:- (i). it is mainly pharmaceutical aid.
(ii). it is used as an acidefying agent
(iii). it is used as gastric acidifure.
(iv). lable of HCl in gastric juice are glow.

Protective and Adsorbents :-

is substance protect the mucous lining of GIT is called as adsorbent & protective.

It is used for the treatment of mild diarrhoea. It is a serious condition with loss of fluid and electrolyte which can lead to dehydration and electrolyte Balance.

→ There are two types of ~~Bacteria~~ Diarrhoea.

(a) Acute Diarrhoea is caused by bacterial-toxins, chemical poison, drug allergy causing damaged GIT.

(b) Chronic diarrhoea may be caused by GI surgery, chronic, inflammatory conditio

Bismuth Sub carbonate

→ Chemical formula - $[(BiO_2)_2(O_3)]_2 \cdot H_2O$

Synonym — Basic Bismuth carbonate

Molecular weight - 529.

Standard — _

Standard - It contain not less than 80% and not more than 82.5% of Bi

Physical Properties :-

(1) It is a white, amorphous powder without odour and taste.

(2) It is insoluble in water and alcohol.

(3) It is soluble with effervescence in water.

(4) It is stable in air but is slowly affected by light.

(1) When ignited, it decompose into yellow Bismuth trioxide and CO_2

$$(BiO)_2CO_3 \xrightarrow{\Delta} Bi_2O_3 + CO_2\uparrow$$

(2) It react with acids give effervescance. The salt formed is Hydrolyzed to the basic salt

$$(BiO)_2CO_3 + 6HCl \longrightarrow 2BiCl_3 + CO_2\uparrow + 3H_2O$$

$$BiCl_3 + 4H_2O \longrightarrow Bi(OH)_2Cl + 2H_3O + 2Cl$$

Storage:- It is affected by light, it should be protected from light during storage.

→ It is store in an amber colowred bottle in dark place.

Incompatibility :- Bismuth subcarbonate react with acids giving effervescance. It goes into solution forming the acid salt,

Uses:-

(1) It is used as a Protective.
(2) It is used as Astringent
(3) It is used as dusting Powder and astringent.
(4) It is used gastric disorder, diarrhoea, dysentry, ulcers, colitis. (5) It is used as an Antacid.

Saline Cathartics

Cathartic may be defined as the drugs which bring about defecation. They are beneficial in constipation and for expulsion of intestinal parasites.

→ They may be given for clearing bowels before surgery.

→ Saline cathartics substance that loses stool and increase bowel movement.

Sodium potassium Tartrate

Chemical formula:- $KNaC_4H_4O_6 \cdot 4H_2O$

Molecular weight - 288.17

Standard:- It contain 99 to 104% sodium potassium tartrate.

Synonym:- Rochelle salt

Physical properties:-

(1) It occurs as odourless, colourless, crystals or white crystalline powder.

(2) It has a saline taste.

(3) Its Melting point 70 - 80 °C

(4) It is soluble in water

(5) Its aq. solution is slightly alkaline to litmus.

(6) The efflorescence slightly in warm water.

Sodium- Potassium tartrate

→ Chemical properties :-

(1) Sodium pot tartrate is treated with CO_2 then it give sodium carbonate and potassium tartrate

$$KNaC_4H_4O_6 \cdot 4H_2O + CO_2 \longrightarrow 2KHC_4H_4O_6 + Na_2CO_3$$

Pot tartrate — Sodium carbonate

(2) On ignition it give the odour of Burning sugar & form an alkaline residue consist of sodium and pot carbonate.

Incompatibility :- Acid, calcium or lead salts, Mag. sulphate, silver nitrate

Storage : It is stored in well closed container at cool place.

Uses :-

(1) It is used as a laxative
(2) It is used as a food additive in the form of stabili: in cheese and meat product
(3) It is used as Antacid
(4) It as used in fehling solution.
(5) It is used as GIT agent

Antimicrobial and Astringent

→ Antimicrobial is an agent that kills micro-organism and stop their growth such as- Bacteria, fungi and algae.

→ Antiseptic :- is an agent that inhibit the growth of micro-organism on living surface.
ex- Dettol, Savlon.

→ Disinfectant :- is an agent that kill the micro-organism with spores on non-living.
e.g- Phenol.

Sterilization :- is a process agent that kill micro-organism, such as- Bacteria, Algae, ~~Mold~~ fungi, viruses by radiation and gaseous moist Heat, dry Heat method. etc.

Astringent :- It is applied to the skin to reduce bleeding from minor abrasion/wound or cosmetic to make the less only :-

Hydrogen Peroxide

Chemical formula — H_2O_2.

Mol. wt — 34.06

Standard :- It is an aqueous solution contain 29 to 31% of w/w of H_2O_2

Physical properties:

(1) H_2O_2 is a clear, colourless liquid.
(2) It is odourless or may have an odour.
(3) It is bitter in taste.
(4) It is soluble with water and insoluble in Petroleum ether.

Chemical Reaction

(1) Decomposition: Decompose into water and oxygen. Rapidly in alkaline solution. Heated at 100°C

$$2H_2O_2 \longrightarrow 2H_2O + O_2$$

(2) Oxidation: It oxidation lead sodium sulphite to sodium sulphate, ~~an~~ pot. nitrite to pot. nitrate

$$Na_2SO_3 + H_2O_2 \longrightarrow Na_2SO_4 + H_2O$$

Sodium sulphite — Sodium sulphate

$$KNO_2 + H_2O_2 \longrightarrow KNO_3 + H_2O$$

Pot nitrite — Pot. nitrate

(3) Reducing Reaction: it reduce silver oxide to silver and chlorine to Hydrochloric acid

$$AgO_2 + H_2O_2 \longrightarrow 2Ag + H_2O_2 + O_2$$

$$Cl_2 + H_2O_2 \longrightarrow 2HCl + O_2$$

Incompatibility:- Reducing agent, Oxidizing agent, alkalies, Heavy metal ion, Iodide and calcium

Uses:-

(1) It is used as a disinfectant, deordant.

(2) It is used as mild antiseptic to clean wounds and ulcer.

(3) It is used as a mouth wash in treatment of acute stomatitis.

(4) It is used for the removal of ear wax.

(5) It is also used as bleaching agent

Brand name - Borexa

Category - Antifungal, Antimicrobial

Potassium permanganate

KMnO4
Pot. mu

Chemical formula :- $KMnO_4$

Mol. weight – 158.03.

Standard: It contain not less than 99% of $KMnO_4$.

Physical properties:

(1) It occurs as odourless. ~~dark purple~~

(2) It is a dark purple or almost black prismatic crystals or granular powder.

(3) It is almost opaque by transmitted light.

(4) It decomposes with organic substance.

(5) It is sweet with astringent after taste.

(6) It is soluble in water and boiling water.

Chemical Reaction :-

(1) Potassium permanganate react with potassium iodide it gives potassium hydroxide.

$$KMnO_4 + H_2O + KI \longrightarrow 2MnO_2 + KIO_3 + KOH$$

(2) Acidic solution, iodides are oxidized to molecular iodine.

$$2KMnO_4 + 10KI + 8H_2SO_4 \longrightarrow 6K_2SO_4 + 2MnSO_4 + 5I_2 + 8H_2O$$

Incompatibilities – Iodides
Bromides
alcohol, arsenite HCl,
Charcoal, organic substance

$KNO_2 + H_2O_2 \longrightarrow KNO_3 + H_2O$

Pot. nitrite — Pot. nitrate

(3) Reducing Reaction :- It reduce silver oxide to silver

$Ag_2O + H_2O_2 \longrightarrow 2Ag + H_2O + O_2$

It reduce chlorine to Hydrochloric acid.

$Cl_2 + H_2O_2 \longrightarrow 2HCl + O_2$

Incompatibilities :- Reducing agent, oxidizing agent alkalies, or Heavy metal ions, iodides, calcium etc

Uses :-

(1). It is used as a disinfectant, deodorant.
(2) It is used as mild oxidizing antiseptics to clean wounds and ulcer.
(3) It is used as a mouth wash in the treatment of acute stomatitis.
(4) H_2O_2 is used for the treatment of ear-wax removal.
(5) It is also used as bleaching agent.

Category - Antifungal, Antibacterial

Brand name - Wako

CHLORINATED LIME

Chemical formula - $CaOCl_2 \cdot (Cl) \cdot H_2O$

Molecular weight - 136.98

Synonym — Bleaching powder, chloride of lime

Standard :- It contain not less than 30% w/w of available chlorine.

Physical properties :-

(1) It is a dull white powder.
(2) It is slightly soluble in water and alcohol.
(3) It has strong odour of chlorine.
(4) On exposure to air it becomes moist and rapidly decompose to release Hypochlorous acid.

Chemical properties :-

(1) Treatment of chlorinated lime with dilute acids liberates Hypochlorous acid which act as a bleaching agent.

$$2CaO(Cl)_2 + H_2SO_4 \longrightarrow CaCl_2 + CaSO_4 + 2HCl$$

(2) Chlorinated lime treated with CO_2 then it liberates calcium chloride and calcium carbonate

$$2CaOCl_2 \cdot Cl + CO_2 + H_2O \longrightarrow CaCO_3 + CaCl_2 + 2HOCl$$

(3) Oxidation of Bleaching powder gives calcium chlorate

$$6CaOCl_2 \longrightarrow Ca(ClO_3)_2 + 5CaCl_2$$

orage:- It is stored in well-closed containe

Uses:-

(1) It is used as Anti-microbial.
(2) It is used for the chlorination treatment of wate in swimming pool.
(3) A mixture of chlorinated lime and Boric acid use as a disinfectant lotion and wound dressing.
(4) It kills most of Bacteria, fungi, yeast, algae and vir

Brand name- Bleaching powder

Category-

Silver nitrate

Chemical formula - $AgNO_3$

Mol. weight - 169.9

Standard - It contain not less than 99.5% of $AgNO_3$.

Physical properties:-

(1) It occurs as colourless or white transparent crystals or crew

(2) It is crystalline odourless powder.

(3) The taste is bitter.

(4) The melting point is 212.

(5) It is soluble in water and alcohol.

(6) The solubility is increased in boiling water.

(7) It is decomposed at 440°C.

Chemical properties:-

(1) Silver nitrate decomposed at 440°C then it gives nitrous oxide.

$$2AgNO_3 \xrightarrow[A]{440^\circ C} 2Ag + 2NO_2 + O_2$$

(2) Silver nitrate react with NO_2 then it gives conc- nitric acid.

$$AgNO_3 + NO_2 + H_2O \longrightarrow Ag + 2HNO_3$$

Storage :- It is stored in airtight non-metallic containers and protected from light

Incompatibility:- Alkalies, chlorides, iodides, ferrous salts, Morphine salts, oils, phosphate tannic acid. tartrates.

Uses:- It is used as disinfectant and astringent

(2) It is used for prophylaxis of opthalmia.
(3) In cosmetic preparation to dye eyebrows, eye lashes.
(4) It is used in homoepathic medicine.
(5) It is used as hair dye.

IONIC SILVER

Synonym- Dissolved silver.

→ The silver ions are produced by electrolysis. 90% of silver content is in the form of ionic silver and the remaining 10% in the form of silver particles.

Physical properties

(1) Silver solutions are colourless or pale yellow
(2) clear solutions.
(2) They form white, cloudy solution with sodium chloride

Storage:- It should be stored in amber- coloured glass containers.

Uses:-

(1) It has strong anti-microbial action, It can kill bacteria, fungi and viruses.
(2) It is applied topically in the treatment of burns and chronic wounds.

Formulation:- It is available in the form of solution, gel, spray.

Brand name:- Argentum, Cyanatom CH

Category- Anti-fungal, Antibiotic, Anti-viral

Brand name- Silver stream

Chlorohexidine Gluconate

formula- $C_{34}H_{54}Cl_2N_{10}O_{14}$

M.W- 897.8

Synonym - Chlorohexidine digluconate

→ Chlorhexidine Gluconate is the gluconate salt of chlorhexidine which is a biguanide. It is an organochlorine compound and a D-Gluconate adduct.

Physical properties

(1) It is soluble in water, alcohol, and glycerol.
(2) It is stable under normal storage condition
(3) It is alkaline in nature.
(4) When heated strongly, it decomposes. and emits toxic fumes, Aqueous solution decompose when heated above 70°c.

Uses:-

(1) CHG is a broad-spectrum anti-microbial agent
(2) It readily kills micro-organism.
(3) It finds use in agriculture as a pesticide.
(4) Its solution is used to treat gingivitis
(5) It is used in mouth wash and oral rinse.
(6) It is a topical disinfectant
(7) It is also used in cosmetics
(8) It is widely used to clean and dis

Storage:- Chlorhexidine gluconate should be stored at room temp - protected from heat and moisture.

Formulation:- Mouth wash, Creams, Gel, Solution

Brand name - Perudex, Periogard
Hexwin, Kenfresh,
Medihex

Boric Acid

Synonym - Boracic acid, Ortho Boric acid

Chemical formula - (H_3BO_3)

Molecular weigh - 61.83.

Standard : It contain not less than 99.5% and not more than 100.5% of Boric acid

Physical properties :-

(1) It is a white crystalline colourless shiny plate.

(2) It is odourless powder.

(3) It is soluble in water and ethanol

(4) It has light acidic in nature

(5) It evaporates in air.

Chemical properties :-

(1) On Heating, it losses water and converted into metaboric acid.

$$H_3BO_3 \xrightarrow{100^\circ C} HBO_2 + H_2O$$

(2) When it is heated at 160°C, it forms pyroboric acid and finally borone trioxide, which has glassy appearance.

$H_3BO_3 \xrightarrow[100^\circ C]{\Delta} 4HBO_2 + H_2O$

$4HBO_2 \xrightarrow{106^\circ C} H_2B_4O_7 + H_2O$

Pyro boric acid.

$H_2B_4O_7 \xrightarrow{160^\circ C} 2B_2O_3 + H_2$

Boron tri oxide

(3) Boric acid is treated with sodium Hydroxied then it gives sodium meta borate

$NaOH + H_3BO_3 \longrightarrow NaBO_2 + 2H_2O$

(4) When calcium flowride and conc- sulphuric acid, it forms boron trifluoride.

$2CaF_2 + 3H_2SO_4 + 2H_3BO_4 \longrightarrow 3CaSO_4 + 2BF_3 + 6H_2O$

Storage:- It is stored in well- closed container.

Uses:-

(1) It is used as mouth washes, gargles, eye lotion, skin lotion, douches.

2) It is used as dusting powder.

(3) In the preparation of suppositories.

(4) It is used in the Astringent.

(5) It is used as fungicides

DENTAL PRODUCTS

The substances used to produce effect on teeth and in dental cavity is called as dental products

→ Dental Hygiene is the most important for human body. There are many products are present in the market for the dental Hygiene of teeth and are considered as dental products

→ Dental caries is a disease of teeth cause by acids produced by the action of micro-organism on carbohydrate so to prevent dental caries, anti-caries are used.

SODIUM FLUORIDE

Chemical formula - NaF

Molecular weight - 42.0

Standard - It contain 98.5 to 100.5% of NaF.

Physical properties:-

(i) It occurs as a white or colourless powder.

(ii) It is a odourless powder.

(iii) Its melting point 99.3.

(iv) It is soluble in water and insoluble in alcohol.

Chemical properties:-

(i) Treatment of sodium fluoride with concentrated Sulphuric acid liberate Hydrogen fluoride.

$$2NaF + H_2SO_4 \longrightarrow 2HF + \underset{\text{Sodium sulphate}}{Na_2SO_4}$$

(3) When $CaCO_3$ react with ~~water~~ Lime water ~~they for~~ passed CO_2 ~~CO_2 and $Ca(OH)_2$~~ in the soln of $CaCO_3$

$$CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_2$$

calcium Bicarbona

Storage:- It is stored in well closed contains

Uses:- (1) It is used as Antacid.
(2) It is used in the G.I.T agent
(3) In the electrolyte Replinisher.

(1) When On Heating they gives CaO and CO_2

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2\uparrow$$

(2) $$CaCO_3 + CO_2 + H_2O \longrightarrow Ca(HCO_3)_2$$

Calcium Bicarbonate

it react with CO_2 then it gives ↗

Category - Antacid and Abrasive ~~Abrasive~~ Abrasive agent
Brand name - Caldimet, Bonvet D3

DENTURE :-

→ Denture is also known as false teeth.

→ Denture are prosthetic device constructed to replace missing teeth.

→ Denture are supported by the surrounding soft and hard tissue of the oral cavity.

→ There are two main categories of denture, the distinction being whether they are used to replace missing teeth on the Mandibular arch or on the maxillary arch.

DENTURE CLEANER

⇒ Denture cleaner also termed as denture Cleanser.

⇒ It is used to clean denture when they are out of the mouth.

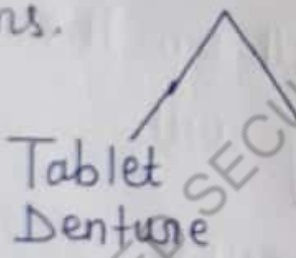
⇒ The main use to control the growth the growth of micro-organism on the denture, especially candida albicans which leads to the denature related stomatitis.

⇒ When denture are worn in the mouth, a biofilm develops which may lead dental plaque.

⇒ It may become Hardened and mineralized as dental product · calculus.

⇒ Denture cleansers are also used to remove stains and other debris that may be caused by diet, tobacco use, drinking tea & coffee etc.

⇒ Mostly dentable cleaners are found in two forms.



→ Some denture cleaner can come in cream and liquid format.

→ Others come in powder, paste, or tablet format.

Ingredient :-

The main constituent of DC

① Sodium Hypochlorite (Mild Bleach)
② Sodium Bicarbonate (alkalize the water)
③ Citric acid (remove stains)
④ Sodium perborate

(5) Sodium polyphosphate

(6) Potassium monopersulfate- (cleansing & Bleaching agent)

Pharmaceutical formulation ⇒

(1) Dentural (Sodium Hypochlorite solution)

(2) Milton (Sodium " ")

(3) Mildent (" " ")

(4) Steradent (alkaline peroxides)

(5) Polident

(6) Efferdent

(7) Novadent

DENTURE ADHESIVE

→ Denture adhesive are pastes, powders or adhesive Pads that may be placed in/on denture to help them stay in place.

→ Sometimes denture adhesive contain Zinc to enhance adhesion.

→ In most cases, properly fitted & maintained dentures should not require the use of denture adhesive.

→ Over time, shrinkage in the bone structure in the mouth causes denture to gradually become loose.

→ Denture adhesive fill gaps caused by shrinking bone and give temporary relief from loosening denture.

Pharmaceutical Formulation :-

(1) Fixodent Extra Hold Denture Adhesive Powder
(2) Fixodent complete Original denture Cream
(3) Zinc free Denture Adhesive

The main ingredients of denture adhesive are classified into 3 groups

Group 1 Adhesive agent

Group 2 Antimicrobial agent

Group 3 (Other agents)

Adhesive agent:- Tragacanth, Gelatin, Methyl-cellulose, Acacia, HMC, Sodium CMC, Pectin, and synthetic polymers like Acrylamides, acetic, polyvinyl and polyethylene oxide.

Antimicrobial agents:- Sodium tetraborate, ethanol, Hexa chlorophene, and sodium Borate.

Others agents:- Plasticizing agents, Flavouring agents like oil of Peppermint, oil of wintergreen, and wetting agents etc

MOUTWASHES :-

→ Mouthwashes are concentrated, clear aqueous solution with a pleasant taste, Intended to clean and deodorise the mouth or Buccal cavity.

→ Mouthwash contain antibacterial agents, alcohol, glycerin, sweetening agent, flavouring agent and colouring agent

→ They are also used in oral mucous disease to treat mouth Infection and to maintain oral Hygiene.

→ Mouthwashes are used after diluting with warm water

Storage :- Mouthwashes are supplied in well closed container (air-tight) plastic having screw cap.

Uses :-

(1) It is used as Antiseptic and Antibacterial.
(2) It is used as Astringent.
(3) It has a cooling effect, refreshing action

4

Pharmaceutical formalation :-

Antiseptic Mouthwash

(1) TRICLOSAN
(2) -LISTRINE
(3) POVIDINE - iodine
(4) Chlorohexidine Gluconate
(5) Hexidine

Analgesic Mouthwash

(1) Benzydamine mouthwash
(2) Lidocaine mouthwash

Anticavity Mouthwash

(1) Fluoride Mouthwash

Haemostatic Mouthwash

(1) Tranexamic acid mouthwash

Antibiotic mouthwash

(1) Tetracycline mouthwash

Steroidal mouthwashes :-

(1) Treatment of oral Lichen Planus

Respiratory Stimulant

It is also known as Analeptics.

It stimulate respiration and can have resuscitati value in coma or fainting.

→ The stimulate respiration in sub convulsive doses but margin of safety is narrow.

* Respiratory stimulate measure are employed under following situations.

1) As an expedient measure in Hypnotic drug Poisoning untill mechanical ventilation is instituted

(2) Suffocation on drowning.

(3) Apnoea in premature infant.

(4) failure to ventilate spontaneously after General anaes

Carbon di Oxide

Molecular wt – 44

Chemical formula – CO_2.

Standard :- It contain not less than 99% v/v of CO_2

→ Carbon di oxide is present in air in about 0.03% v/v. It is evolved from volcanoes decaying of dead bodies, during process of respiration, combustion and fermentation.

Physical properties :-

(1) Carbon di oxide occurs as a colourless, odourless gas.
(2) Its has faint acid taste.
(3) It is soluble in water at normal temp and pressure.
(4) It is about 1.5 times as heavy as air.

Physico Properties :-

(1) It dissolve in water to form an unstable carbonic ac

$$CO_2 + H_2O \longrightarrow H_2CO_3$$

(2) It react with sodium hydroxide then it give sodiu carbonate.

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

(3) Carbon di oxide is react with Mg (magnesium) then it gives magnesium oxide

$$CO_2 + 2Mg \longrightarrow 2MgO + C$$

Storage :- It is stored in cylinder painted grey or gre in a cool place from material of an inflammabl nature.

The name of the gas or the chemical symbol CO_2.

is used as a respiratory stimulant
carbon dioxide and O_2 (95:5) is used in the treatment
of carbon mono oxide poisoning.
Inhalation of CO_2 has been tried for the relief of
intractable hiccups.
(4) CO_2 is used for detoxifying heroin addicts without
the painful withdrawal syndrome

NITROUS OXIDE

(1) Chemical formula - N_2O
Mol. wt - 44
Standard: It contain not less than 95 % N_2O in the
gaseous phase.

Physical properties:
(1) It is colourless, gas.
(2) It is odourless and tasteless gas.
(3) It is heavier than air.
(4) It is freely soluble in alcohol.

Chemical properties:
On heating the
(1) Nitrous oxide is give oxygen and Nitrogen.

$$2N_2O \longrightarrow 2N_2O + O_2$$

(2) Nitrous oxide is react with sulphur then it gives
Sulphur di oxide and N_2

$$S + 2N_2O \longrightarrow SO_2 + 2N_2$$

(3) When passed over red Hot copper, it reduced to Nitro

$$Cu + N_2O \longrightarrow CuO + N_2$$

Nitrous oxide has weak analgesic properties.
(2) It is used for the relief of pain in childbirth and pain from myocardial infraction.
(3) It is used as muscle relaxation
(4) It is used in the treatment of Hypoxia.

Oxygen

chemical formula - O_2
Molecular weight - 32
Standard - It contain not less than 99% v/v of oxygen.

Physical properties:-

(1) It is colourless gas
(2) It is odourless and tasteless glass
(3) It is soluble in water and alcohol.
(4) It is insoluble in chloroform and Benzene.
(5) One volume of gas is dissolved in 32 volume of water.

Chemical properties:-

(1) Oxygen is react with Fe (iron) then it is converted into ferric oxide.

$$4Fe + 3O_2 \longrightarrow 2Fe_2CO_3$$

2) Oxygen is react with Sulphur then it is converted into SO_2.

$$2O_2 + 2S \longrightarrow 2SO_2$$

oxygen is reacted with ammonia and it libe
nitrogen oxide and water.

$$4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$$

Storage:- It is stored in metallic cylinder with painte blue and neck is painted with white and write the name and formula is O_2.

Uses (1) It is essential for normal respiratory function.
(2) It is used in the treatment of Hypoxia.
(3) It is used in the treatment of Artificial respiration

INHALANTS

→ Inhalants are a type of formulation which either gas or mist directly reaches to the affected area when administered through nasal or buccal cavity.

→ Any living cell requries Oxygen. It is necessary for normal oxidative metabolic process in cell for the production of energy. Energy is used by cells in the form of ATP, FAD and NADH.

→ Venous blood carries about 52 cc% of CO_2 where as, arterial blood caries about 48 cc% of CO_2.