GIT AGENTS:

i. ACIDIFYING AGENTS ii. ANTACIDS (ALKALIS)

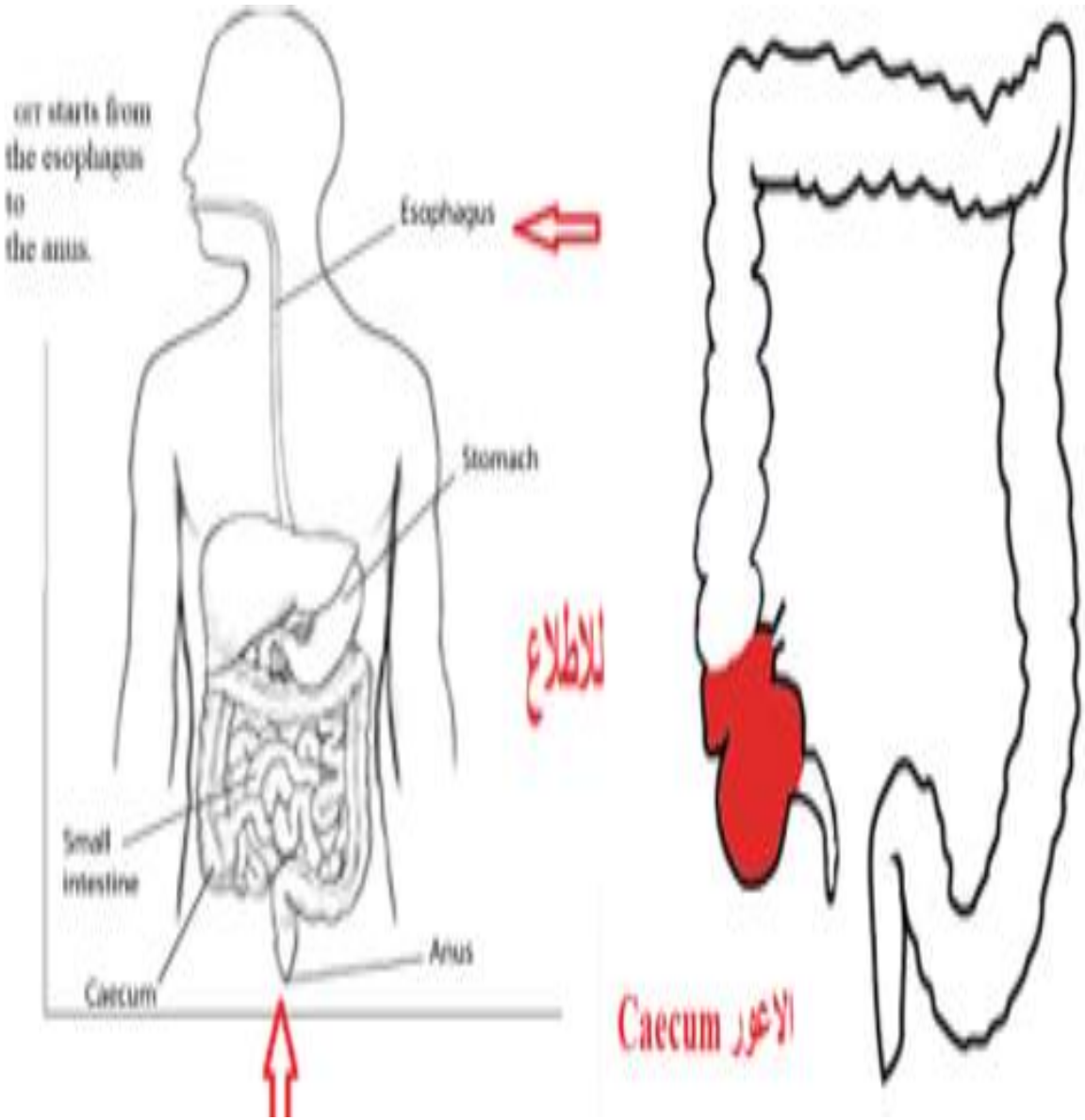
*Acidifiers are:

i.Inorganic chemicals that, put into a human body, either produce or become acid.

ii.Acidifiers increase the level of gastric acid in the stomach when ingested, thus decreasing the stomach pH.

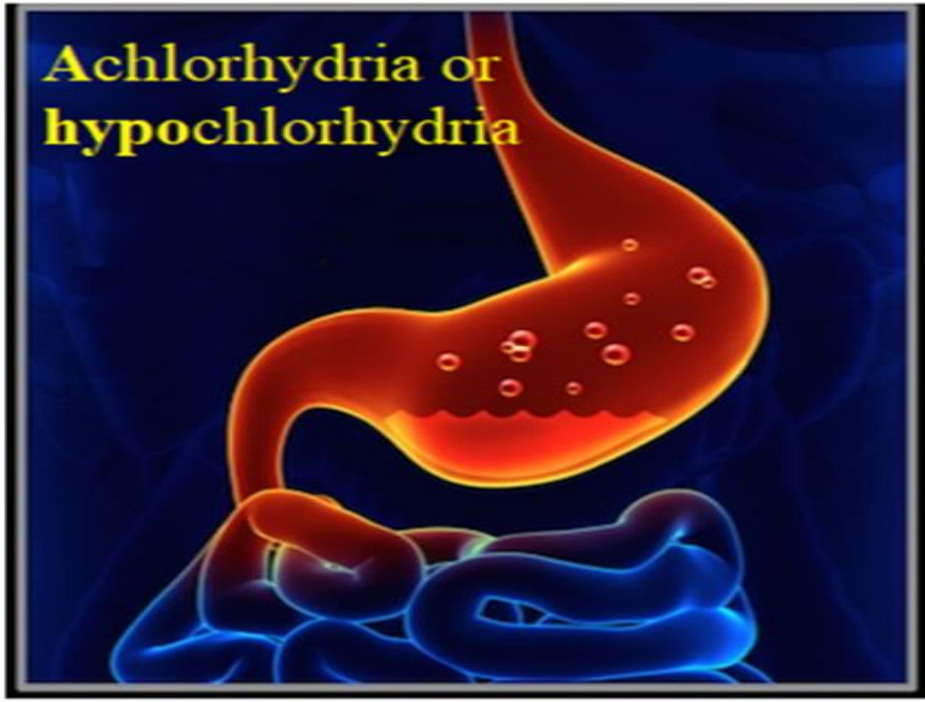
The main portion of GIT includes the stomach, small intestine, large intestine and the rectum with the exit anus. Whenever the functions of GIT go wrong, disease occurs. Hyper and hypo-chlorhydria are two of these wrong functions.

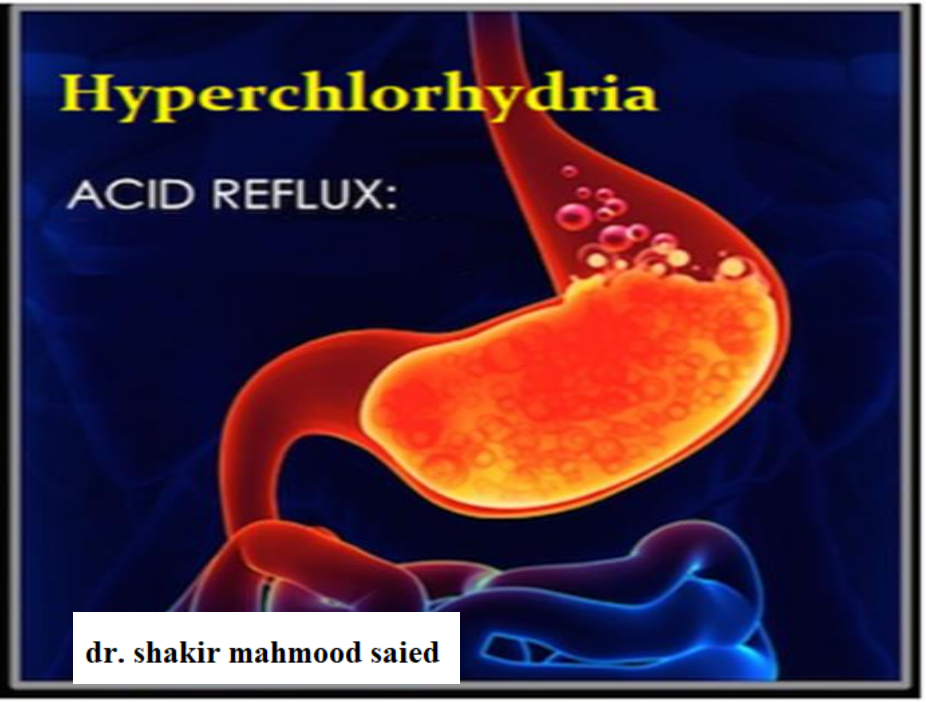
The digestive system is the GIT. It starts from the esophagus to the anus.



*The rule of the acid in the stomach is :

The hydrochloric acid present in the stomach dissolves bits of food and creates an acidic medium . In this acidic medium , enzyme pepsinogen is converted to pepsin. Which is a protein digesting enzyme.





Achlorhydria:

*Achlorhydria or **hypo**chlorhydria refer to states where the production of hydrochloric acid in gastric secretions of the stomach and other digestive organs is absent or low.

It is associated with various other medical problems.

Whenever insufficient secretion of acid takes place in the stomach, this causes achlorhydria or hypochlorhydria.

Acidifying agents/ acidifiers are used in treatment of Hypochlorhydria (Achlorhydria).

**Causes of Low Stomach Acid:

1.Overuse of antibiotics.

2.Helicobacter Pylori* infections.

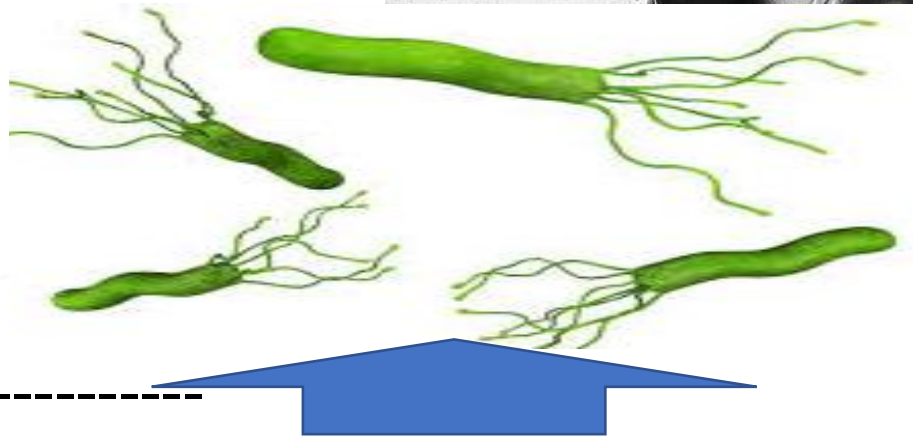
(which neutralize gastric acid by ammonia)

3.Chronic stress. 4.Poor diet. 5.Eating to quickly or on the Go بلا شبع

dr. shakir mahmood saied

6.Overuse of NSAIDs

7.Using proton pump inhibitors, e.g.



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*Helicobacter pylori, is a gram-negative, microaerophilic, spiral (helical) bacterium usually found in the stomach

8.Small intestinal bacterial overgrowth

9.Aging and 10.Food sensitivities

5.Eating to quickly or <u>on the Go</u>

The symptoms of achlorhydria:

1.Mild diarrhea (frequent bowel movement)حركة الأمعاء المتكررة

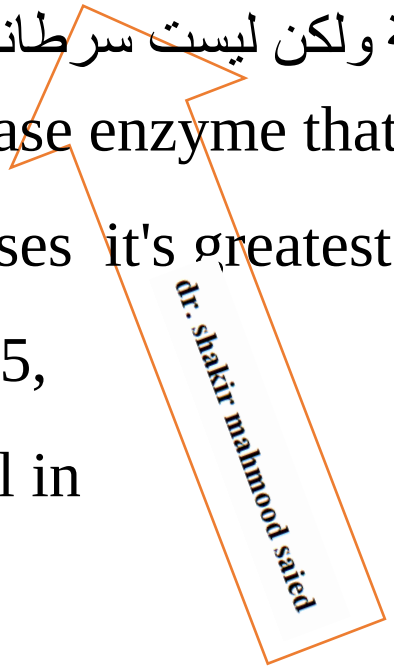
2.Epigastreic pain (upper abdominal pain)الم اعلى البطن.

3.Sensitive to food (spicy).

4.Pernicious anemia(خبيثة ولكن ليست سرطانية).

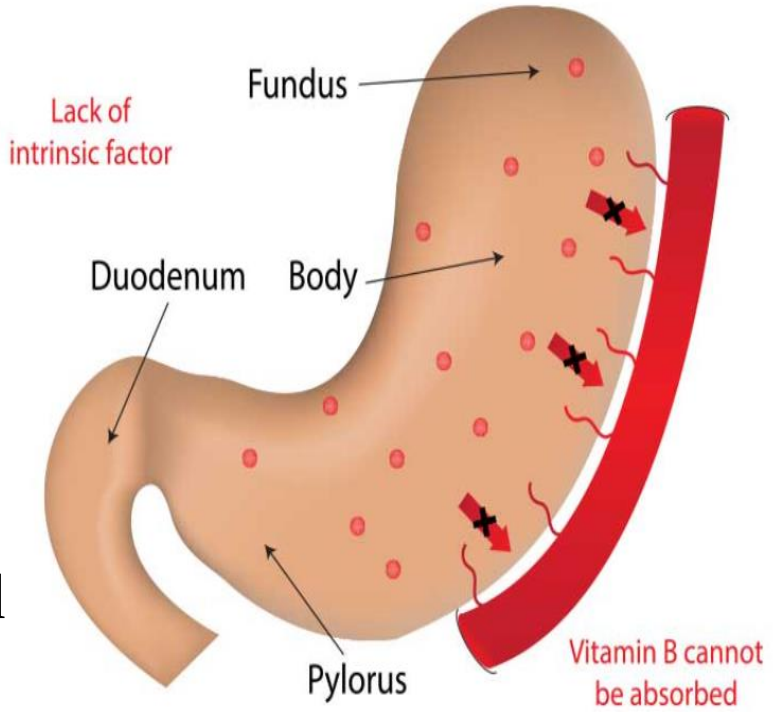
Pepsin, (An endopeptidase enzyme that breaks down proteins into smaller peptides)possesses it's greatest proteolytic activity (breakdown of proteins)below pH 3.5,

so in the absence of HCl in stomach pepsin is inactivated and as result the (1-3) symptoms arrived.



4.Pernicious anemia (per. Nesh. Yu's), It is common for patients with achlorhydria to have pernicious anemia due to lake of the protein necessary to carry vitamin B12 across the intestinal wall.

Acidifying agents are the drugs or agents which are used to increased metabolic acidosis and gastric hydrochloric acid, they are inorganic chemicals that give to patient to increase the level of gastric acid in the stomach when ingested, thus decreasing the stomach pH.



Out of many types of acidifiers, the main three are:

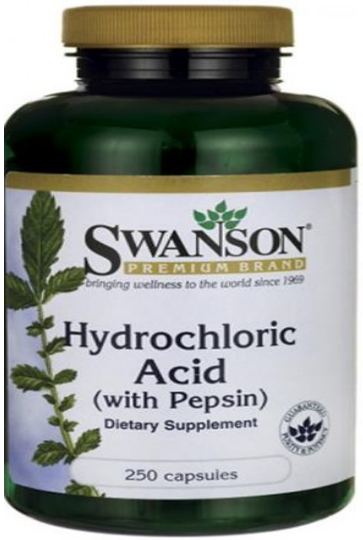
1.Gastric acidifiers, used to control pH in the stomach.

2.Urinary acidifiers, used to control pH in urine.

3.Systemic acidifiers, used to control pH in the overall body.

1. Gastric acidifiers:

e.g. Swanson (Hydrochloric acid (HCl):

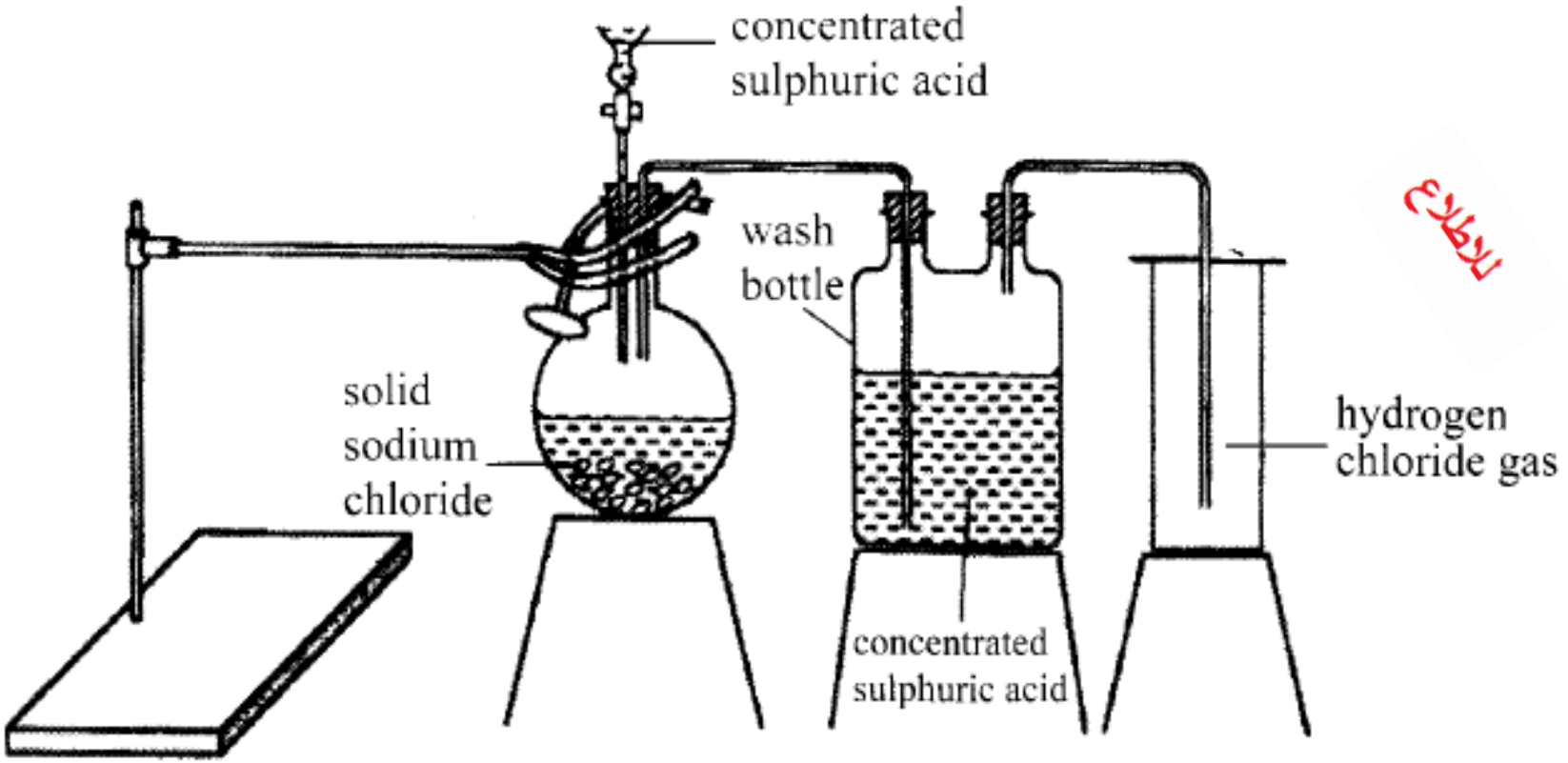


The formula is HCl, used with concentration of 10 % w/w acid to purified water. Because HCl is prepared from salt sulfuric acid, it is commonly known as Spirit of salt It is aqueous sol. of 35-38% of HCl

The preparation equations:

$$NaCl + H_2SO_4 \longrightarrow NaHSO_4 + HCl$$

$$NaHSO_4 + NaCl \longrightarrow Na_2SO_4 + HCl$$



Properties:

i .Colorless liq., strongly acidic iii. Attacks metals.

ii. Miscible with water, alcohol having specific gravity of 1.18

Identification:

When it is added to $KMnO_4$ sol., chlorine gas is liberated

Assay*:

HCl(4gm) is transferred into a stoppered flask which is having (40ml.) of water. Now the sol. is titrated with (1N) NaOH , using methyl orange as an indicator.

Assay is an investigative (analytic) procedure in laboratory medicine, pharmacology, environmental biology and molecular biology for qualitatively assessing or quantitatively measuring the presence, amount, or functional activity of a target entity (the analyte).

Uses:

1.As a pharmaceutical aid or as an acidifying agent.

2.As gastric acidifier when levels of HCl in gastric juice are low. dr. shakir mahmood saied

*Low stomach acid (Hypochlorhydria) treatments combinations:

1. **2.** **3.** **4.**

2.Urinary acidifiers:

i. Ammonium Chloride NH_4Cl "Noshader"

It is a systemic and urinary acidifying salt.

Ammonium chloride helps maintain pH and exerts a mild diuretic effect. This acid forming salt also exerts an expectorant effect by irritating the mucous membranes and is used for relief of cough.

ii. Ureze:

It is also ammonium chloride compound which are used to treat :

a. Low chloride levels in the blood.

b. A health problem called metabolic alkalosis

Dose:

1 to 2 gm (As systemic acidifier)

0.3 to 0.5 gm (As Expectorant)

Preparation:

It prepared by neutralization of hydrochloric acid by ammonia and evaporated the product to dryness.

iii. Also **ascorbic acid (Vitamin C)**

A daily intake of 10 mg of ascorbic acid cures clinical signs of scurvy but does not maintain body stores.

iv. Potassium phosphate and

v. Sodium phosphate can be use to increase the acid in stomach

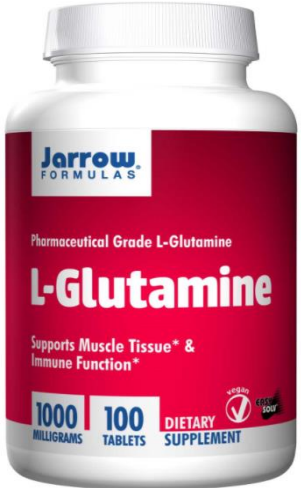
Another remedies علاجات

(ra. Ma. dess)

are: 1.Chew thoroughly

2.Vit. B complex 3.L. Glutamine

4.Ginger tea



- The simple act of **chewing food** in your mouth gives two advantages:

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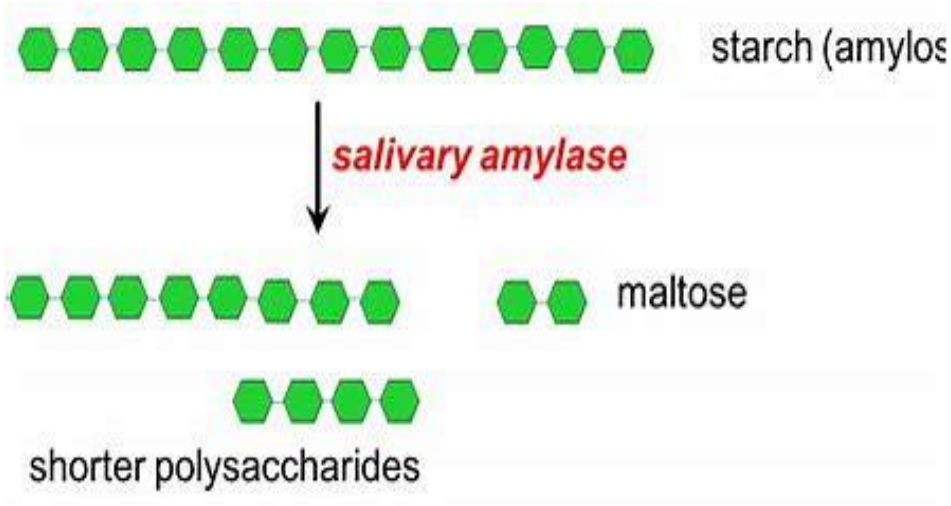
i. Helps to break down larger particles of **food** into smaller particles. This helps to reduce stress on the esophagus and thereby helps the stomach to metabolize your **food**.

ii. When **food** is **chewed thoroughly**, you also release a lot of saliva, which contains digestive enzymes.



Topical Agents :

Agents which are applied locally on skin or mucous membrane or in the body cavities and give their local protective(or systemic effect).

Sites of applications:

1)Skin 2) Eye 3)Nose 4)Vagina 5)Urethra & 6)Rectum

أ.م.د. شاكر محمود سعيد

Forms:

i. Powder ii. Ointments iii.Creams iv. Spray v.Past

vi. Gel vii. Transdermal patches لواصق تفرز موادها عبر الجلد

Classification according to their type of activity :

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i. Protectives

ii. Astringents

(ast. ren. gent) constricting

iii. Antimicrobial agents

(Anti- invectives)

iv. Miscellaneous agents

Transdermal Contraceptive patches

v. Topical administrations الموضعي:

also include transdermal applications, where the substances are administered onto the skin but are absorbed into the body to attain systemic distribution.

Topical administrations

Medications are generally hydrophobic chemicals, such as steroid hormones (Testosterone)and transdermal contraceptive patches.

*An example of antibiotics that applied topically like chloramphenicol.

Examples of Protectives topical agents:

i. Talc (talcum in French =chalk)

*Chemical formula =

$3MgO, 4SiO_2, 2H_2O$

---

*Talc is a clay mineral, composed of hydrated magnesium silicate

Mode of action:

As a powder, it absorbs moisture well and helps cut down on friction تنهي امر الاحتكاك, making it useful for keeping skin dry and helping to prevent rashes.

Talc in powdered often combined with corn starch and used as:

a. Baby powder. B.A thickening agents and l

c. It is a main ingredient in many cosmetics

d. Food additive .

Side effects:

Describe briefly the side effect of Talc powder:

It poses a risk of respiratory problems if the baby inhales it, because the small size of the particles makes it difficult to keep them out of the air while applying the powder.

*Zinc oxide-based ointments are a much safer alternative.

ii. Zinc oxide:

Zinc oxide is an inorganic compound with the chemical formula ZnO

Uses of Zinic oxide:

1. As an additive in many materials and products including:

i. Cosmetics ii. Food supplements and iii. Lubricants….etc.

.

3.Rectal suppositories(suppo. Seto. Ery) are used to treat:

i. Itching ii. Burning iii. Irritation تهيج, and

iv. Other rectal discomfort caused by hemorrhoids البواسيرor painful bowel movements.

2.Topical for the skin to treat:

i. Diaper حفاضاتrash

ii. Minor burns

iii. Severely chapped skin or iv. Other minor skin irritations

Preparation:

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Zinc oxide prepared on a large scale by burning zinc metal in current air.

$$2Zn + O_2 \longrightarrow 2ZnO$$

Zinc oxide paste (one kilogram); consists of 250 gm of zinc oxide and 250 starch with 500 gm white soft paraffin.

Astringent:

Is a chemical that shrinks يجعله منكمش or constrictsتقبض body tissues. The word derives from the Latin adstringere, which means "to bind fast".

Example:

Calamine lotion:

This soothing pink lotion can help relieve the following skin conditions:

a. Reactions to poisonous plants, such as poison sumac.

b. Insect bites لدغات . C. Chickenpox.جدري الماء

d.Shingles الحزام الناري . e.Swimmer’s itch

f.Scabies(es.kep.es)جرب . g)Chigger العثbites and

h.Minor burns

تحوي اوراق بعض اشجار السماق في امريكا على مواد راتنجية سامة

أ.م.د. شاكر محمود سعيد

Antimicrobial topical agents:

1.Iodine preparations 2.Boric acid

3.Borax 4.Potassium permanganate.

Boric acid:

1.Use of 3% boric acid has a potential to treat local Pseudomonal wound infections التهابات الجروح الحادة effectively without any toxic side effects (secrete a blue-green coloured fluid and have a fruity smell).

2. Use for eye: It is used as eye wash for inflammations with the following potential side effects:

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i. Eye redness ii. Eye pain iii. Eyelid inflammation iv. Itchy eyes
v. Persistent weepy eye تدميع مستمر

3.Dilute boric acid can be used as a vaginal douche to treat bacterial vaginosis due to excessive alkalinity, as well as candidiasis , also suppository (boricVag) is used.

4. As an antibacterial compound, boric acid can also be used as an acne treatment.

5.To prevent of athlete's foot, by inserting powder in the socks

6.Various preparations can be used to treat some kinds of otitis (ear infection).

Borax:

Borax, also known as sodium borate, sodium tetraborate, or disodium tetraborate, It is a compound with chemical formula

$Na_2H_4B_4O_9\,nH_2O$.

Borax is a component of many detergents, cosmetics, and enamel glazesمزجج للمينا.

It is used to make buffer solutions in biochemistry and as an anti-fungal compound.

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In addition to the best-known use for borax as a cleaner, it can use as ingredient in many other household products, including:

i.Toothpastes and mouthwashes

ii.In cosmetics such as lotions, skin creams, moisturizers, sunscreen, and acne care products

iii.Herbicides

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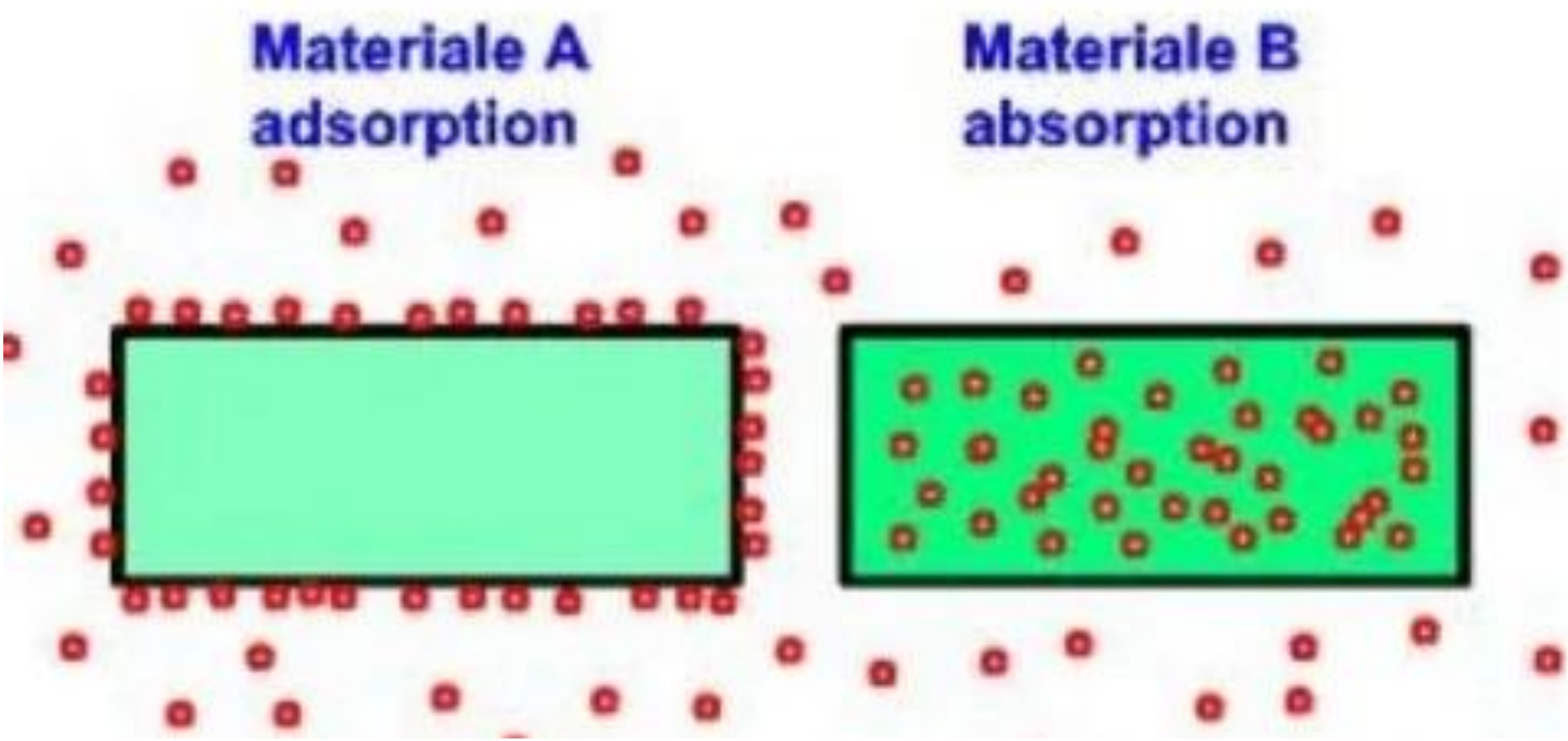
Lecture 8 (1st hr.), PROTECTIVE ADSORBENTS



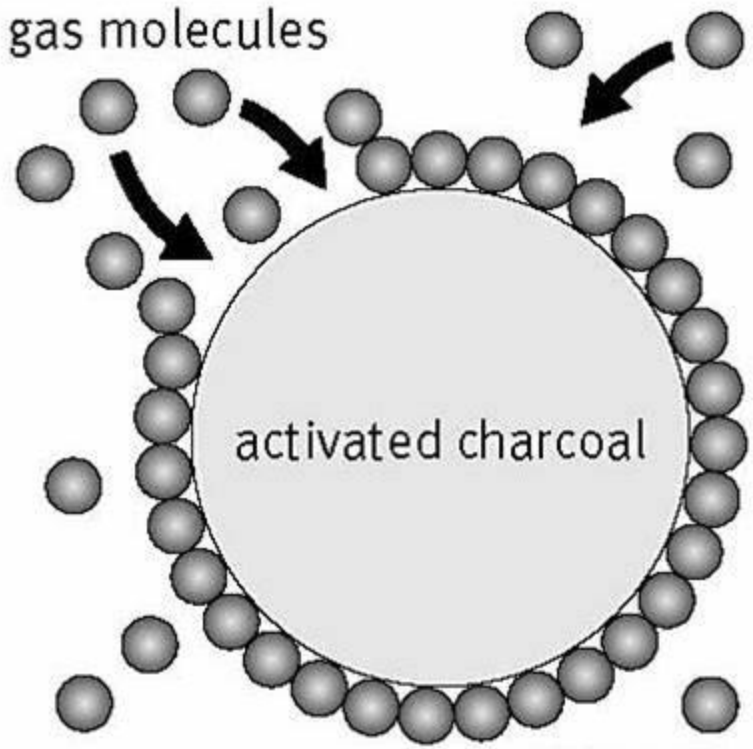
Absorption:

Is a physical or chemical phenomenon or a process in which atoms, molecules or ions enter some bulk phase – liquid or solid material.

Adsorption:

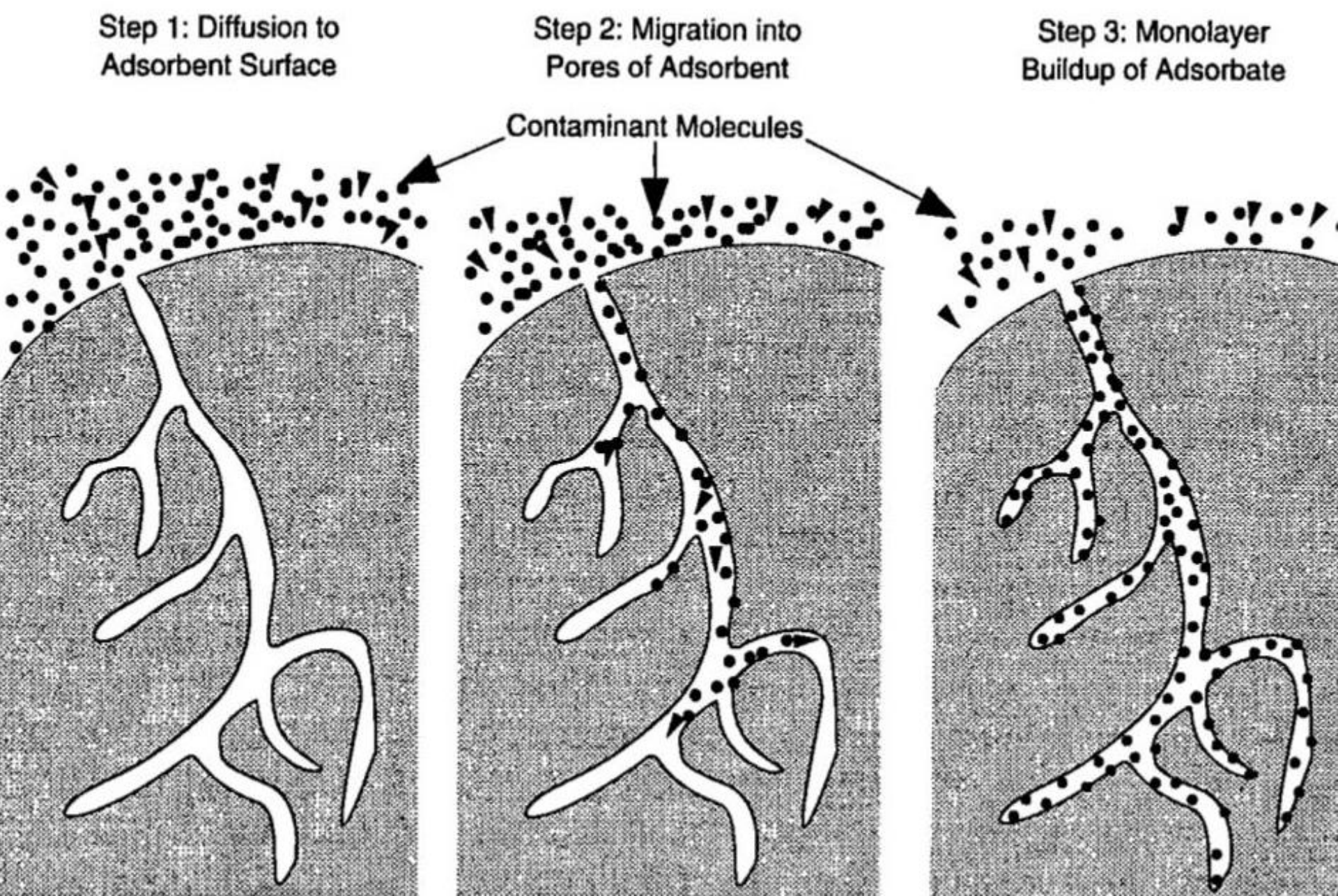
The adhesion التصاقof atoms, ions or molecules from a gas, liquid or dissolved solid to a surface.

This process creates a film of the adsorbate on the surface of the adsorbent.



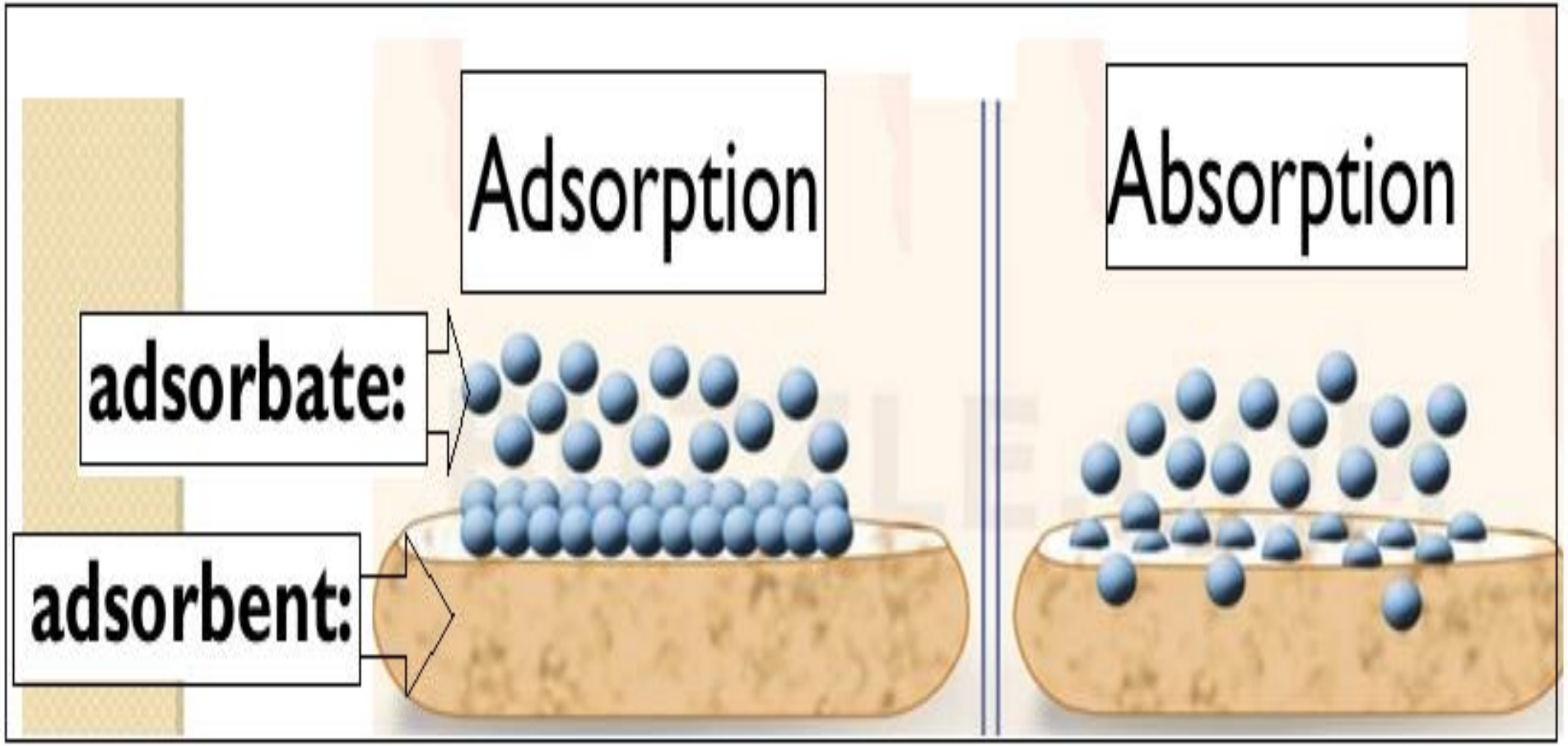
Charcol adsorped and remove odors from Refrigerator

Adsorption Mechanism

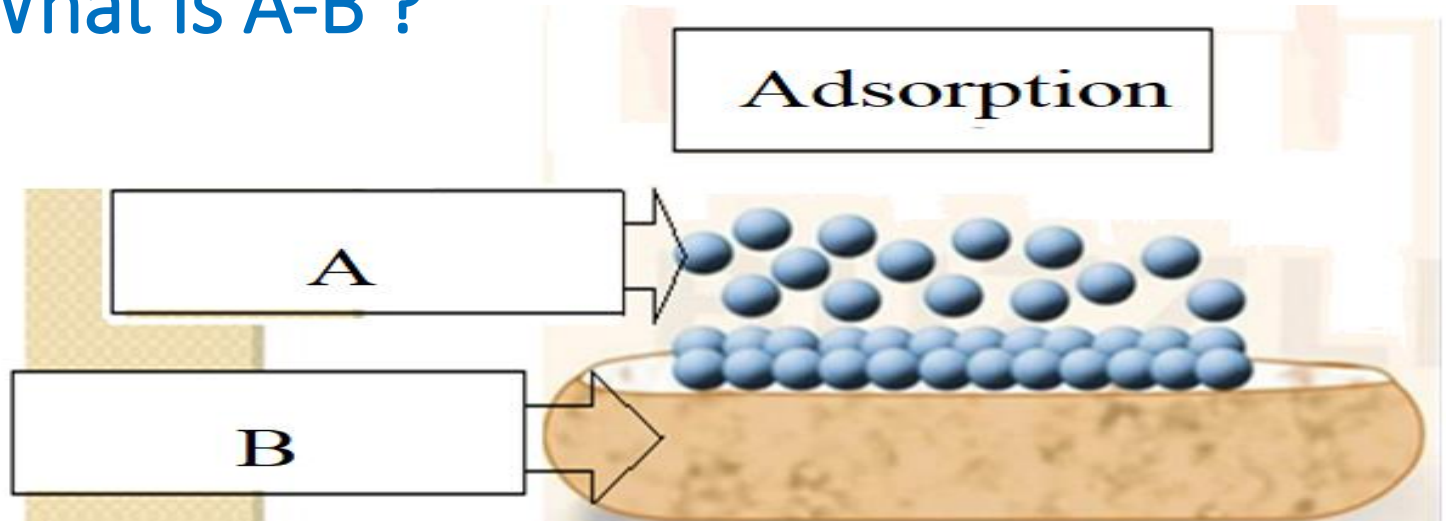


Adsorbate: Material being adsorbed

Adsorbent: Material doing the adsorbing (examples are activated carbon or ion exchange resin), it is a substance that attracts other materials or particles to its surface.



What is A-B ?



GIT adsorbents :

A powder, taken to adsorb gases, toxins, and bacteria in the stomach & Intestines , e.g. Activated charcoal & kaolin.

Five differences between Adsorption and Absorption

Adsorption	Absorption
1.It is a surface phenomenon	1.It is a bulk phenomenon.
2.It is rapid in the beginning and slows down	2.It occurs at an uniform rate near the equilibrium.
3.Temperture dependent	3.Temperture independent (generally).
4.Exothermic	4.Endothermic
5.e.g. Adsorption of ammonia by charcoal	5.Absorption of ammonia by water.

GIT adsorbents drugs are used in the treatment of :

i. Mild dysentery ii. Diarrhea iii. GIT disturbances by adsorb gases, toxins, and bacteria.

iv. Used as mild astringent v. Used as antiseptic agent.

Examples:

1.Bismuth subsalicylate: (sub of substitute)

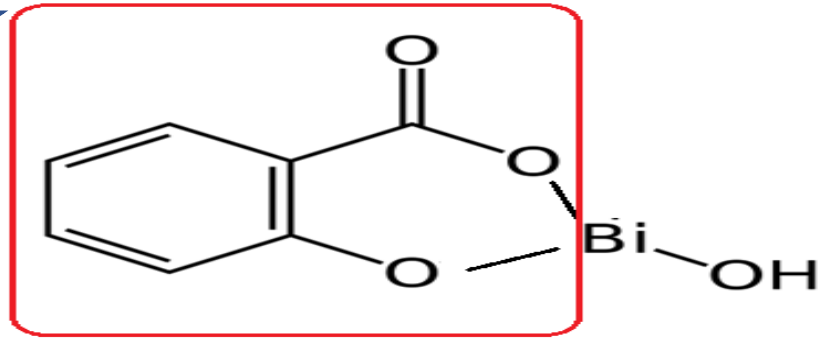
It produce protective agent with **combination therapy.**

It has antimicrobial activity

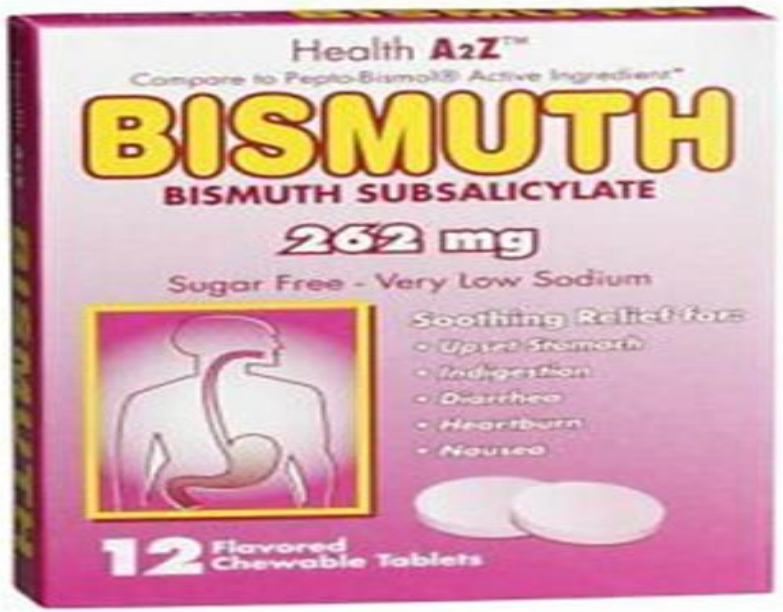
Mode od Action:

It inhibits activity of pepsin and increase secretions of mucous membrane thus coating and help in healing the wounds of the membrane in ulcers

Diarrhea and dysentery differences



salicylate moiety



2.Bismuth subcarbonate :

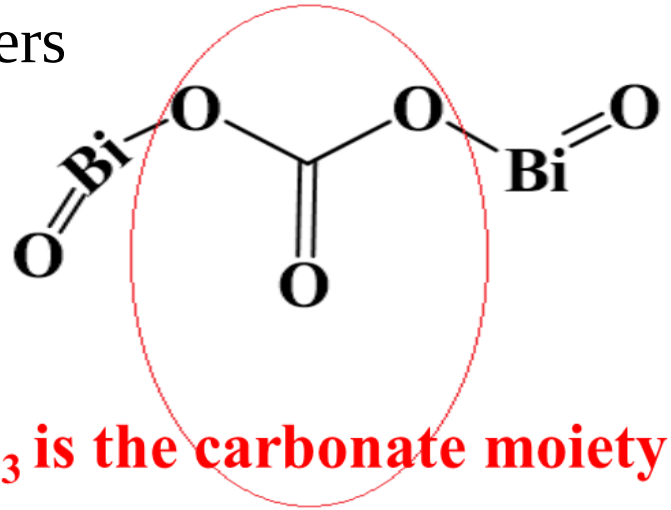
Uses:

a. It is still used for GIT disorders and diseases.

b. Also it is used as filler in radiopaque catheters

القسطرات باستخدام المظهرات المشعة

c. In treatment of Peptic ulcers



CO_3 is the carbonate moiety

Preparation of Bismuth subcarbonate:

By dissolving metallic bismuth in 50% nitric acid, then the solution is concentrated and added to sodium carbonate solution with stirring.

Complete the following equations (give chemical structures or formulas with all names or notes if any)in your text book.

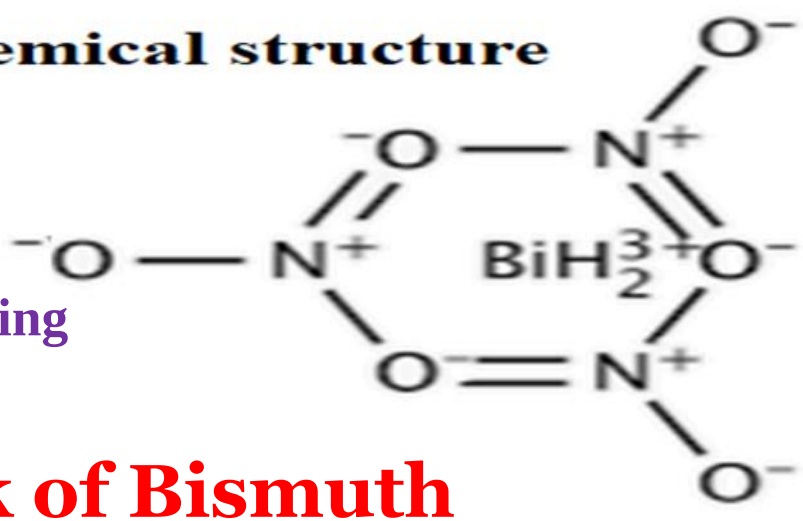
$$2Bi + 8HNO_3 \longrightarrow 2Bi(NO_3)_2 + 2NO + 4H_2O$$

$$2Bi(NO_3)_2 \xrightarrow{H_2O,\ Na_2CO_3} (BiO)_2CO_3$$

3.Bismuth Subnitrate"(or Oxynitrate):

Bismuth subnitrate is used as a component of milk of Bismuth, where it probably functions as a mild astringent protective, it can inhibit pepsin enzyme .

Chemical structure



Q. Draw the chemical structures of the following

4.Milk of Bismuth

It contains bismuth hydroxide and bismuth subcarbonate suspension in water.

It is made by converting bismuth subnitrate to bismuth nitrate by nitric acid. Then milk of bismuth is prepared by treatment of bismuth nitrate with ammonium carbonate and ammonia solution.

Q. Draw the complete equation of Milk of Bismuth preparation.

$Bi(ONO_2)_3$
Bismuthsubnitrate
↓ HNO_3
$Bi(NO_2)_3.5H_2O$
Bismuthnitrate
↓ NH_3CO_3 / NH_4OH
$Bi(OH)_3 + (BiO)_2CO_3$
Bismuth hydroxide and Bismuth subcarbonate

Milk of Bismuth
Suspension in water.

Mode of action of Bismuth compounds:

Hydrogen sulfide (H_2S), is the final product of sulfate-reducing bacteria metabolism. Its high concentration in the gut القناة الهضميةcan affect adversely bowel environment and intestinal microbiota by toxicity and pH lowering. The bismuth salts react with H_2S to form bismuth sulfide and removed it as black stool.

Q1. Choose the correct word from the following antonyms

Mode of action of Bismuth compounds:

Hydrogen sulfide (H_2S, HS_2) , is the (starting, final) product of sulfate- (oxidizing, reducing) bacteria metabolism. Its (low, high) concentration in the gut القناة الهضميةcan affect adversely bowel environment and intestinal microbiota by toxicity and pH (increasing , lowering. The bismuth salts react with (H_2S, HS_2) to form bismuth sulfide and removed it as (brown, black) stool.

Explain the black stools from oral administration of Bismuth:

It acts upon the bismuth salts to form bismuth sulfide; hence, the black stools resulting from the oral administration of bismuth-containing preparations by the following equation:

$$2Bi^{3+} + 3H_2S \longrightarrow \underset{\text{black}}{Bi_2S_3} + 6H^+$$

5.Hydrated aluminum silicate, (Kaoline) $Al_2Si_2O_5(OH)_4$

من جبل كاو لينج

Clay mineral, It is a layered silicate mineral.

Uses:

i. GIT agents. ii. Protective & Adsorbent agents iii. Treatment of diarrhea

iv. Treatment of food poisoning. V. Used in dusting powder

vi. Used in cosmetics.


KAOLIN CLAY
Powder
GMP
Ingredients :
KAOLIN CLAY Powder


Kaoline
STORE


MESMARA
Nett
100 gm
Kaolin
White Cosmetic Clay
Ingredients :
Kaolin Clay
Caution :
For external use only
People with allergies
and sensitive skin
should test before use.
Siva Sri Retail
www.mesmara.com

Storage:

It should be stored in well closed container at a cool place.

6)Activated Charcoal U.S.P

It has been used as an adsorbent in the treatment of diarrhea

It is now a recommended antidote in certain types of poisoning.

Uses:

The best uses of activated charcoal that you must know :

Enumerate Only Five Best Uses of Activated Charcoal:

General Mode of Action of Adsorbents :

Adsorbents Coat the walls of the GI tract and the intestinal mucosa and bind to or adsorb the causative bacteria or toxin, which is then eliminated through the stool.

Adsorbents Side Effects:

i. Increased bleeding time ii. Constipation, dark stools

iii. Confusion تشوش, twitching ينشمر

iv. Hearing loss, tinnitus طنين, metallic taste.

INORGANIC DENTAL AGENTS

1. Dental Cements

Three types of inorganic compounds used in dentistry:

a. Restorative dental materials (e.g. Dental cements)(مواد التعويض السنية)

Dental Cements: which have a wide range of dental and orthodontic (تقويم) applications.

Common uses include: Temporary restoration (تعويض مؤقت) of teeth and/or cavity linings to provide pulpal (جذر) protection, sedation or insulation (عزل) and cementing fixed prosthodontic (pros. to. don. tek) appliances.(حشوات تثبيت التراكيب الاصطناعية للأسنان)

*A cement reaction is an acid-base **reaction in general**,

*All cements consist of proton **acceptor and proton donor,**

All cements are with the following types:

a. Those use Zinc oxide proton acceptors which are of three types:

i. Zinc oxide-eugenol,

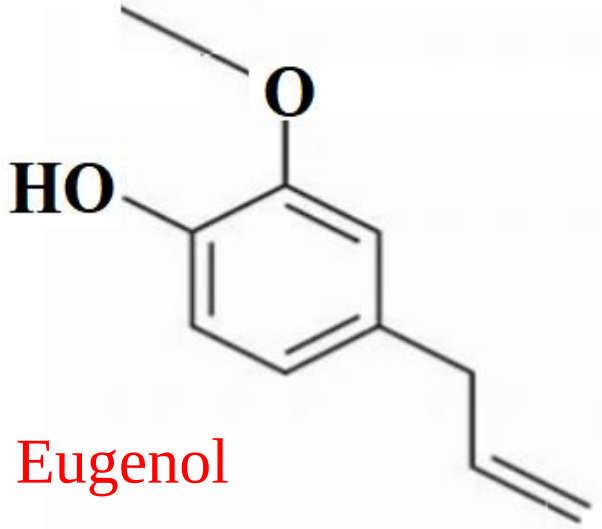
which used eugenol proton donor of the chemical structure.

ii. Zinc phosphate,

which used aqueous sol. of phosphoric acid.

iii. Zinc poly acrylate,

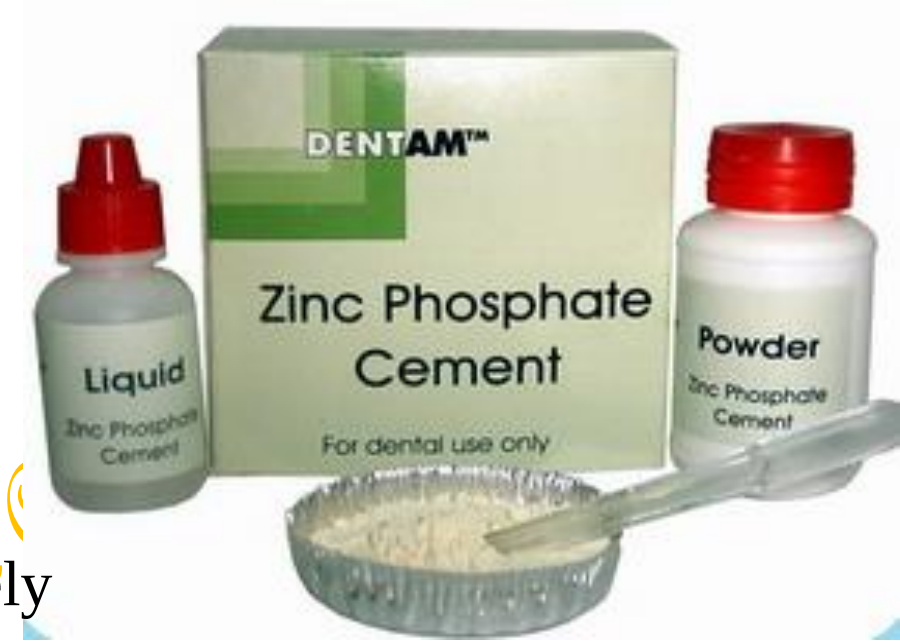
which used liquid sol. of poly acrylic acid.



Eugenol

Zinc phosphate cement setting:

*Chemical formula $Zn_3(PO_4)_2$



On mixing the powder and liquid together a vigorous reaction occurs, resulting in the formation of a relatively insoluble zinc phosphate :

*The chemical equation of Zinc phosphate cement setting reaction:

$$3ZnO + 2H_3PO_4 + H_2O \rightarrow Zn_3(PO_4)_2 + 4H_2O$$

ZINC PHOSPATE MIXING

b. Those use Fluoride containing aluminosilcate:

Si = Silicon is a chemical element with the symbol Si and atomic number 14

Aluminosilcate chemical formula : Al_2SiO_5

Two types of Silicate cements used aqueous sol. of Phosphoric acid

i. Silicate cement .

ii.. Class ionomer (ion-polymer) .

Class ionomer

c. Copper cements :

These are similar to phosphate cement except that the powder contains a copper compound in addition to zinc oxide.

The electronic configuration of Copper Cu is: **$[_{18}Ar]\ 3d^{10}\ 4S^{1}$**.

Cuprous Cation:

The electronic configuration of Cu^{+1} is: $[_{18}Ar]\ 3d^{10}\ 4s^{0}$.

It is monovalent cation.

Cupric Cation:

The electronic configuration of Cu^{+2} is:

$[_{18}Ar]\ 3d^9\ 4s^0$. It is divalent cation.

*Notes;

If copper (I) oxide (Cuprous oxide) is used, the cement is red, while copper(II)oxide(Cupric oxide) gives **black** materials.

d. Silver cements :

Same phosphate type cements contain silver salt in an attempt to render لجعلها their bactericidal.

e. Dental amalgam:

An alloy سبيكة(alligare "bind to")which is a mixture of metals or a mixture of a metal and another element. Alloys are defined by a metallic bonding character.

Alloy may be a solid solution of metal elements (a single phase) or a mixture of metallic phases (two or more solutions).

Amalgam :

Is a mixture of two or more metals one of which is mercury combined with a powdered silver-tin alloy.(Tin=Sn =قصدير)

Mercury is a liquid at r.t. and is able to form a workable mass when mixed with the alloy.

This behavior renders the material suitable for use in dentistry.

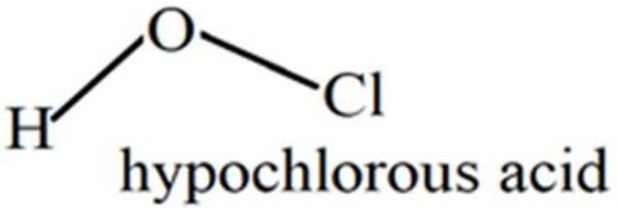
2. Sodium hypochlorite:

i. Commonly known as bleach .

ii. Chemical formula NaOCl

iii. Comprising a sodium cation (Na^+) and a hypochlorite anion (OCl^-).

iv. It is the sodium salt of hypochlorous acid.



hypochlorous acid

*Sodium hypochlorite is widely used as a disinfectant or a bleaching agent.

In solution, the compound is unstable and easily decomposes, liberating chlorine which is the active principle of such products.

Using In Endodontic علاجات وحشوات الجذر:

*Sodium hypochlorite is the medicament **of choice** due to its efficacy against pathogenic organisms and endodontic therapy.

Hypox concentration for use varies from 0.5% to 5.25%.

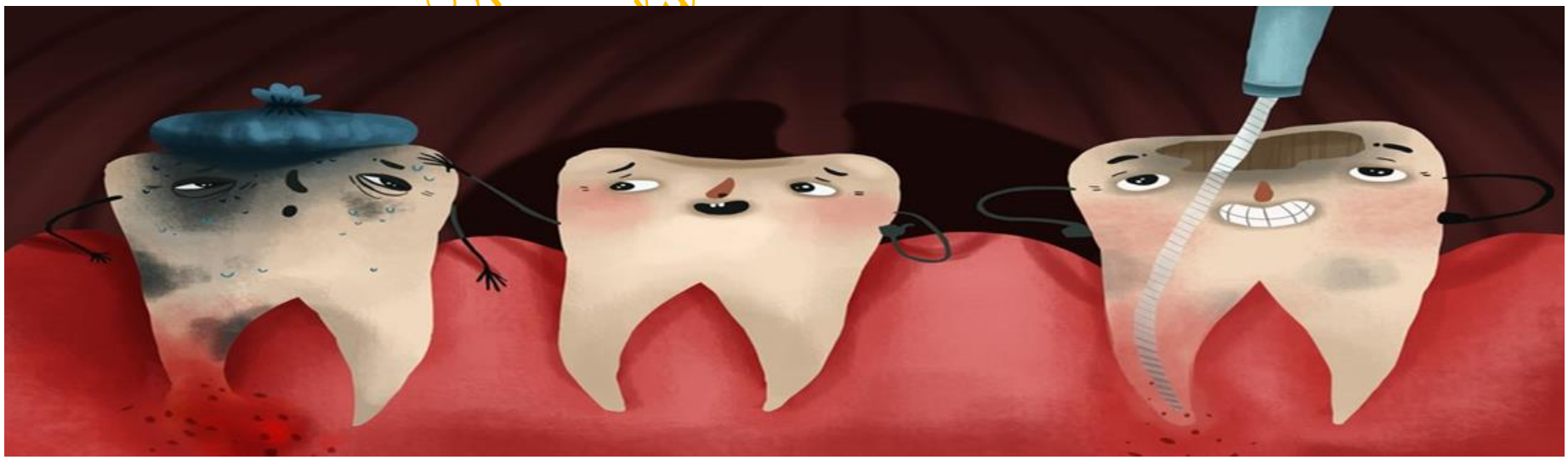
Mode of action:(slide 12,13 & 14) مهم جدا حفظ

a. At low concentrations it dissolves mainly necrotic tissue (death of most or all of the cells)

b. At higher concentrations it also dissolves vital tissue الانسجة الحيويةand additional bacterial species.

c. They liberate hypochlorous acid (HClO), which is decomposed to give the chlorate ion (ClO)-, which composed of active chlorine in oxidation state +1 and active oxygen.

Active chlorine and oxygen react with amino acid Cysteine by the **chlorination** of amide nitrogen atoms and **oxidation** of sulfa hydryl group in proteins



forming N-chloro derivatives and denature the germs protein as shown by the following equation .

Q. What is A-J of the Sodium hypochlorite mode of action in Dentistry?

A = NaOCl , sodium hypochlorite

B = active chlorine in oxidation state +1 (Cl^{+1})

C = active Oxygen O^{-2}

D = Cysteine amino acid , E= Chlorination F = Oxidation

G = Denature

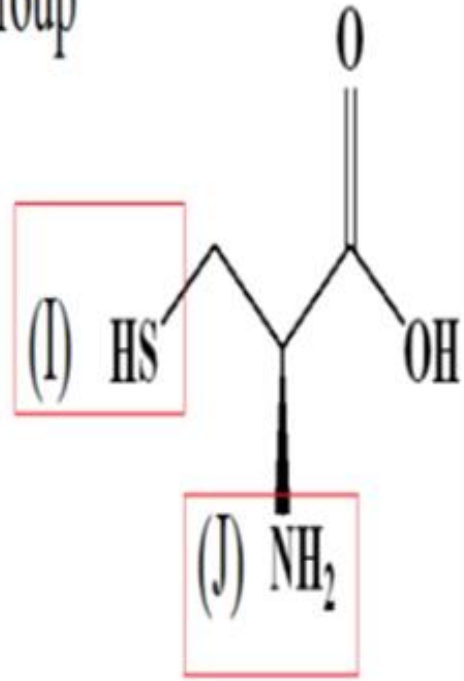
H= Germs I = Sulfhydryl group and J = Amino group

$Na(OCl) + H_2O \rightarrow$ (A) $\rightarrow$ (B) + (C)

These active products (B&C) react with amino acid (D) _____

by the (E) _____ of amino group and (F) _____ of sulfahydryl group

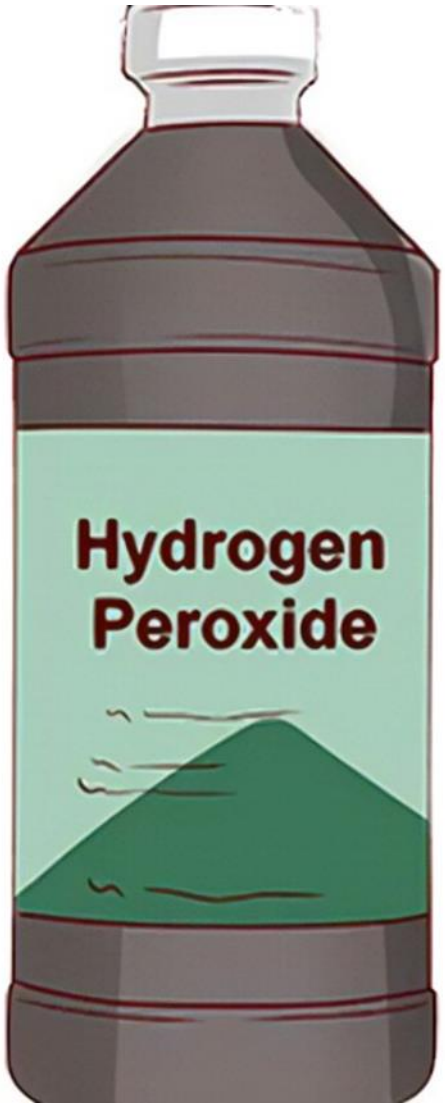
forming (G) _____ and denature the (H) _____ proteins.

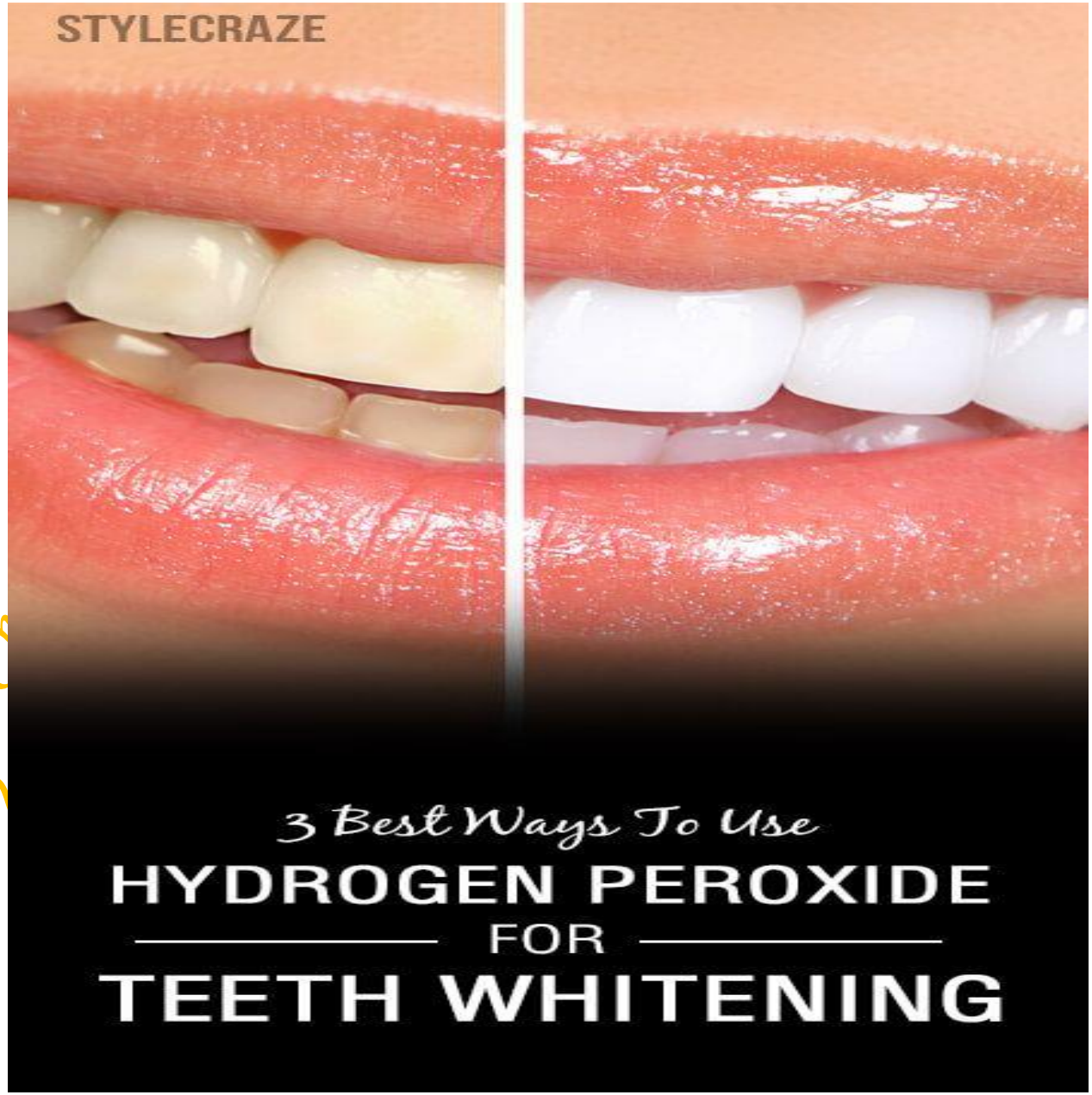


Cysteine amino acid with (I) _____ group and (J) _____

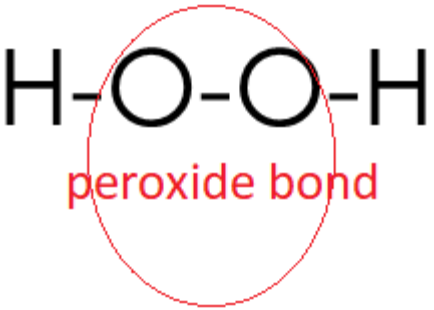
3.HYDROGEN PEROXIDE

35% Hydrogen Peroxide Dental Teeth Whitening


Hydrogen
Peroxide


STYLECRAZE
3 Best Ways To Use
HYDROGEN PEROXIDE
FOR
TEETH WHITENING

Hydrogen peroxide:



i. Chemical formula H_2O_2.

ii. It is the simplest peroxide.

iii. *It is used as an oxidizer, bleaching agent, and antiseptic.

iv. It is a reactive oxygen species.

The increased use of agents containing (or generating) H_2O_2 in dentifrices (dent. Frez.ces) as : مستحضرات العناية بالاسنان

i. Bleaching (whitening) agents: قصر او تبييض

By oxidizing colored pigments onto the enamel .

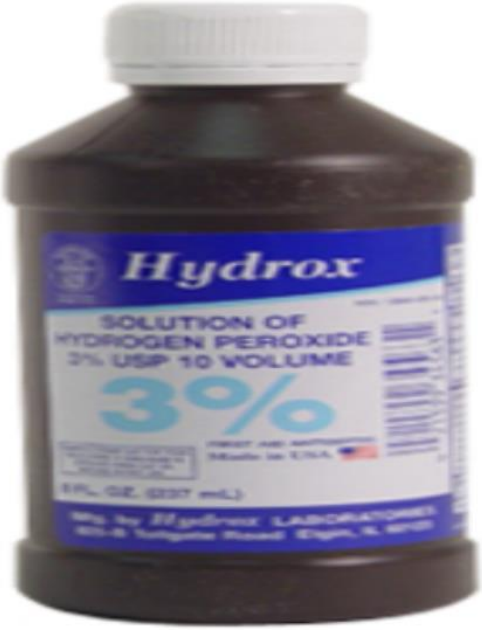
e.g. Tooth whitening strips:

The strips شرائطremove both extrinsic and intrinsic tooth stains, each strip contains around 14 percent hydrogen peroxide

ii. Disinfectants:

***Two of the most common peroxides in dentistry are:**

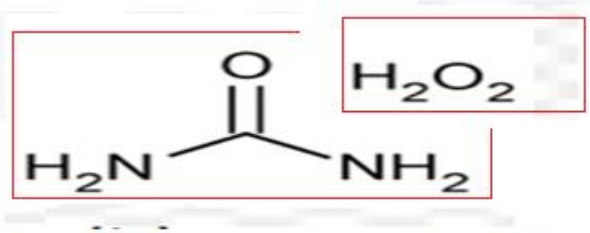
i. Hydrogen peroxide (H_2O_2) ii. Carbamide peroxide ($CH_6N_2O_3$), also known as (urea hydrogen peroxide)



Carbamide peroxide,

Also known as Urea-hydrogen peroxide, it is :

i. Water-soluble, ii. White crystalline solid compound. Consisting of hydrogen peroxide and urea.

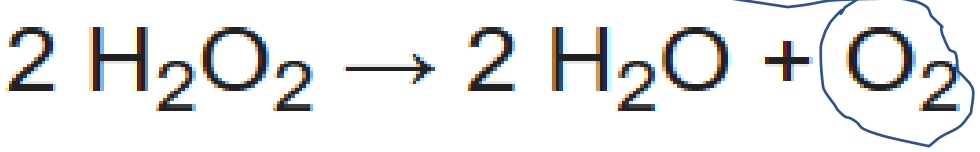


The Carbamide peroxide dental whitening gel, of 35 % and chemical structure.

Adverse effects: مهم

1. Dentin العاجsensitivity

2. Gingival irritation led by unstable and active oxygen and low pH from prolonged use.



$$2\,H_2O_2 \rightarrow 2\,H_2O + O_2$$

3.Alter enamel ميناء السنsurface morphology via enamel mineral loss and surface roughening.

The FDA considers Carbamide peroxide to be safe in oral mucosal injury drug products as an oral wound healing agent.

4. EDTA:

Chelating EDTA agent is used in an endodontic حشو الجذر as an aid for the preparation of narrow and calcified root canals by المساعدة في حشوة الجذر عندما تكون القناة ضيقة ومتكلسة:

i. Its chemically softens the root canal dentine and dissolve the smear layer الطبقة المشوهةby irrigation سقي of the root canal with 15-17% EDTA solutions.

ii. Its increases dentine permeability.تزيد نفاذية عاج السن

Complete:

Mode of action of EDTA use in Dentistry:

EDTA, the hexadentate ligand has **6** lone pairs of electrons, all of which can form **coordinate** bonds with the bacteria metal ions from the cell envelope مغلف الخلية and also forms a stable complex with cell **calcium**.

When all available ions have been coordinated the bacterial surface proteins are **denatured** and this leading to bacterial **death** .

Lecture 4
ESSENTIAL TRACE IONS

i. Iron (Fe) ii. Copper (Cu) & iii. Sulfur (S)

Trace elements:

Naturally occurring inorganic substances (elements or ions) are necessary for physiology and require by humans in amount (< 100mg/day), ingestion of, or exposure to, excessive quantities of them can be toxic.

Classification:

1-Essential trace elements.

2- Non-essential trace elements.

Essential trace elements.

Why essential?

Because, they have biochemical functions in the body, or in the tissues and their deficiency produce syndromes, these ions are important for :

i)Electrolytes

ii)Electrical activity needed to support muscle contractions and neuron activation

iii)They contribute to the osmotic pressure of body fluids.

iv)Performing تؤدي a number of other important functions.

Examples:

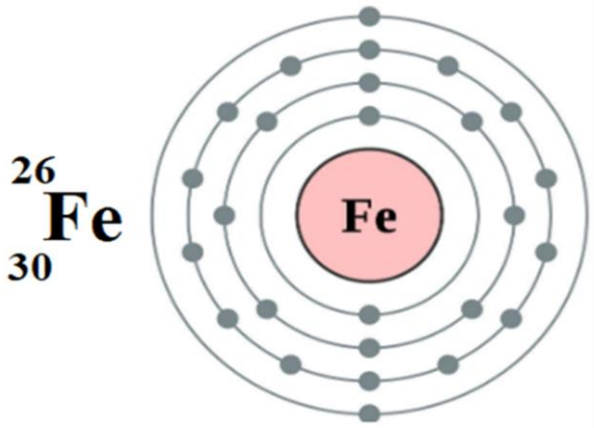
i)Ferrum = Iron =

(Ferrous or Ferric ions) Fe^{+2} or Fe^{+3}

It is a metal that belongs to the 1st transition series and group **8** of the periodic table with atomic number Z = **26**.

Q . Draw Iron electronic configuration and Bohr model of atom:

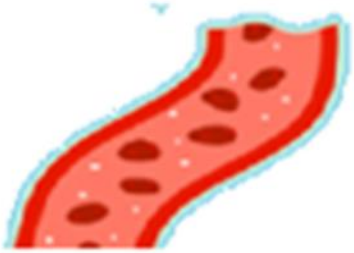
or [Ar](18), $4s^2 3d^6$



★ i)Fe is the most essential trace Element

ii)Body content = 4 – 6 g, Hb = 68 %, Ferritin =13 %, Myoglobin = 3%, Iron enzyme = 0.2%

(Cyclochrome oxidase, Xanthine oxidase, Peroxidase) ★



يعزز

Treats anemia **Boosts hemoglobin** **Reduces fatigue**

Boosts immunity **Improves concentration** **Restores sleep**

الحفاظ على

Q. Enumerate **The six health benefits of Iron**

Daily requirement = 0.5 – 2 mg/day; (pregnancy) = 3-5 mg/day

Daily excretion= 0.9 mg/ day

Ferritin:

Is a protein that stores iron, releasing it when your body needs it. Ferritin usually lives in the body's cells, with very little actually circulating in your blood.

The greatest concentrations of ferritin are typically in :

i) The cells of the liver and ii) The immune (im.you.n) system .

Ferritin is stored in the body's cells until it's time to make more red blood cells. The body will signal the cells to release ferritin. The ferritin then binds to another substance called transferrin

Transferrin(TF):

TF is a protein having 24 subunits binds to 4000 iron molecules use to:

i)Transport protein

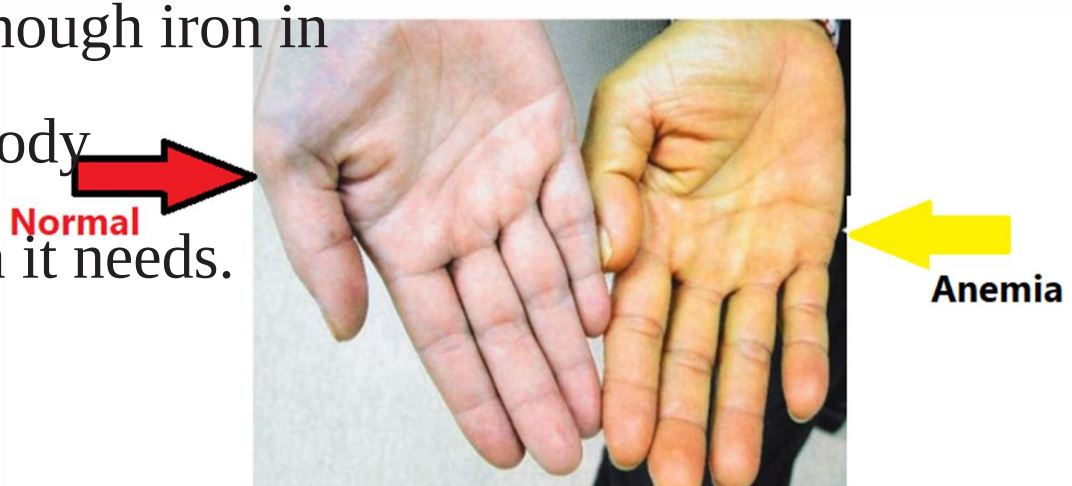
ii)Transport iron to various organs & tissues

Note that :

Increase ferritin levels may be seen in hepatitis التهاب الكبد, cirrhosis تليف الكبد, hepatic carcinoma as in leukemia, stress and covid19.

Iron deficiency :

Is the most common type of anemia, and it occurs when the body doesn't have enough of the mineral iron. Body needs iron to make hemoglobin. When there isn't enough iron in blood stream , the rest of your body can't get the amount of oxygen it needs.



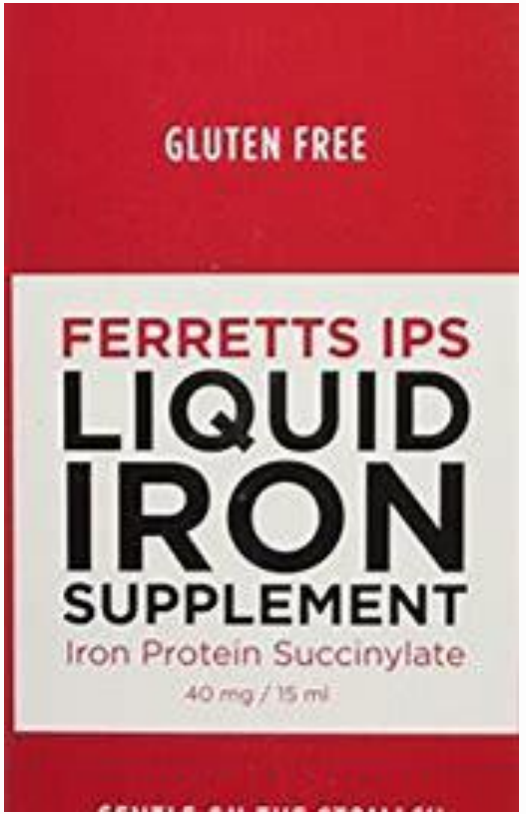
The treatment of iron deficiency:

i)Taking iron supplements مكملات غذائية(as tablets, liquid or injections)

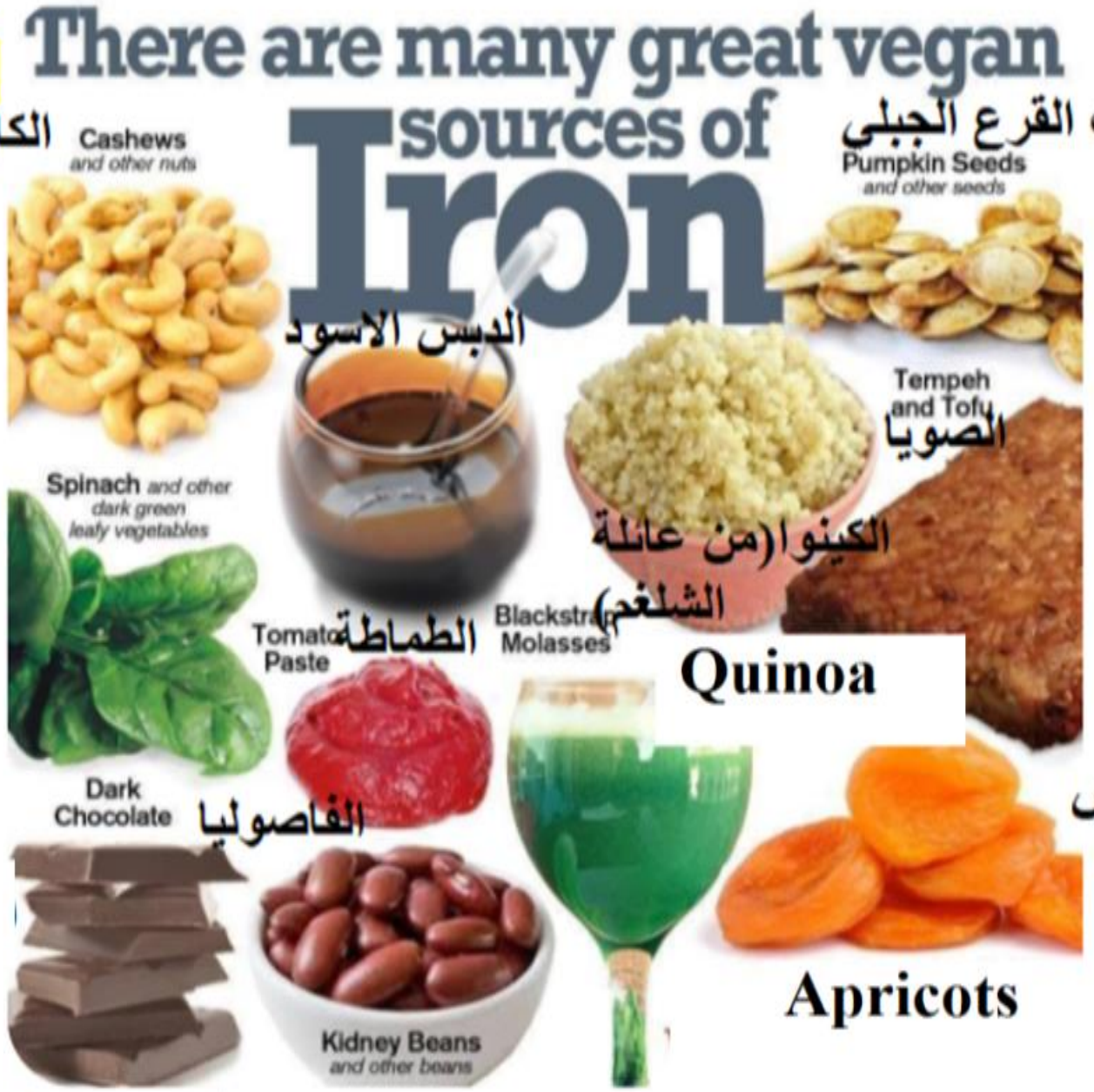
Iron supplements may need to be taken for

3 to 6 months to replenish تجديدbody's iron stores.

ii)Eating an iron-rich diet.



Q. Enumerate Only six



Official iron products رسمي

Oral preparations:

1)Ferrous sulphate

($FeSO_4.7H_2O$):

It is the most widely

used oral iron preparation

and is considered as the drug of choice* for treating uncomplicated iron deficiency anemia.

***Drug of choice:** Drug which is known to be most effective in order to cure that disease.

Forms :

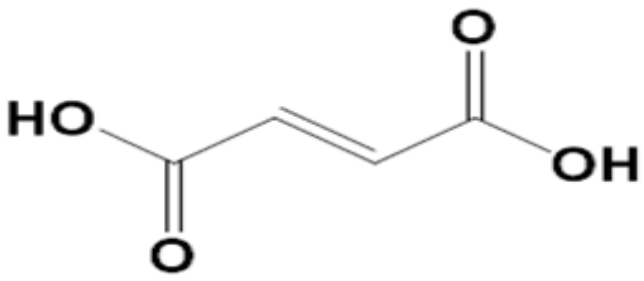
In addition to tablets, Ferrous sulfate is available as drops, syrup شراب, elixir, and capsules

2.Ferrous fumarate:

It is resistant to oxidation on exposure to air so it may be superior يتفوق علىto both ferrous sulphate and gluconate.

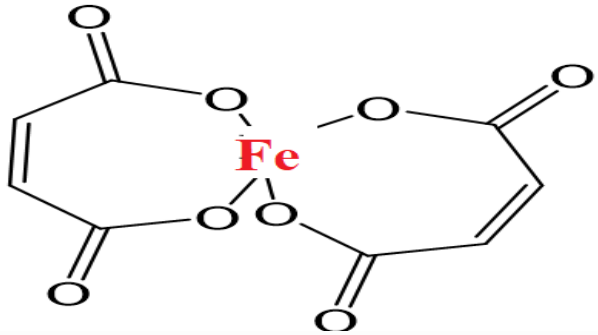
concentration
220mg/5ml.

Q)Fumaric acid is bidentate ligand



Fumaric acid

Complex of Ferrous fumarate



3.Ferrous gluconate:

This medication is used to treat or prevent low blood levels of iron (such as those caused by anemia or pregnancy).

Notes:

1.Iron is best absorbed on an empty stomach (usually if taken 1 hour before or 2 hours after meals).

2. If stomach upset occurs, this medication must taken with food.

Contraindications :

i)Antacids ii)Dairy productsمنتجات الالبان

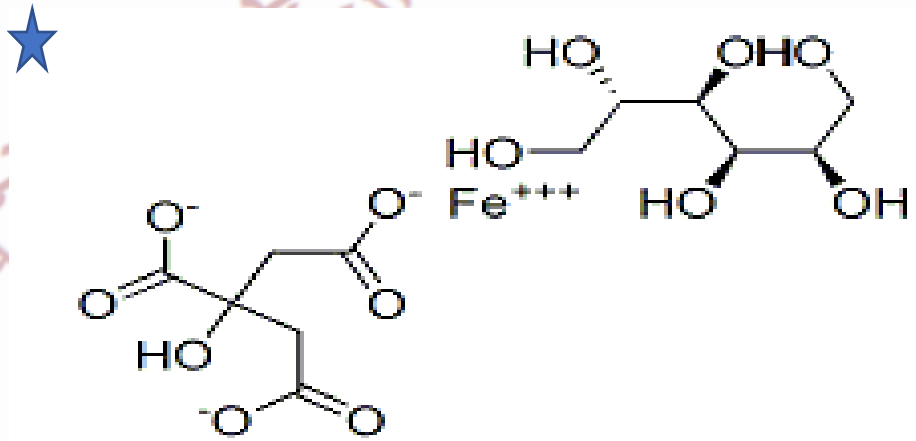
iii)Tea, or iv)Coffee within 2 hours before or after this medication because they will decrease its effectiveness. Take tablets or capsules with a full glass of water.

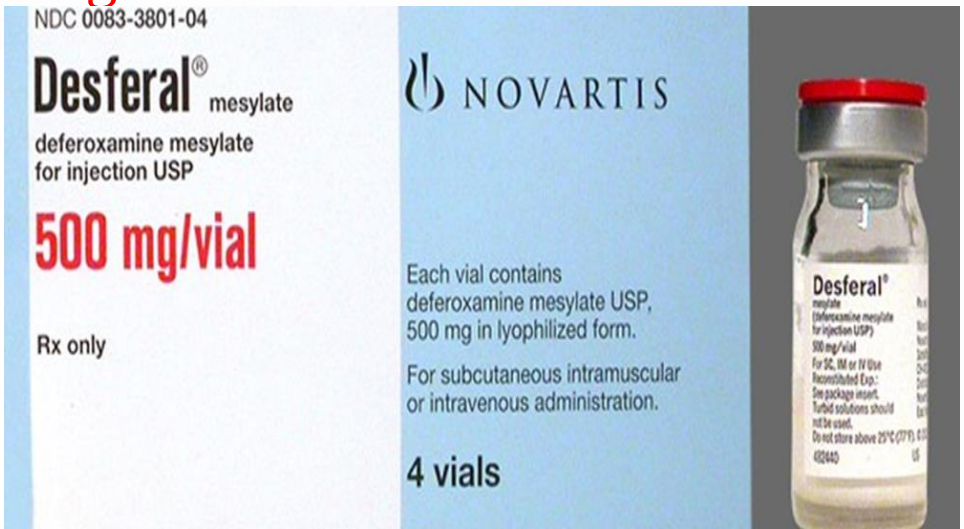
Parenteral بالحقن preparations

1)Iron dextran:

Is a dark brown, slightly viscous liquid complex of ferric hydroxide and dextran for IV or IM ,it is used for the treatment of patients with documented **iron** deficiency in which oral administration is unsatisfactory or impossible.

b)Iron sorbitol citric acid complex 50 mg/ml



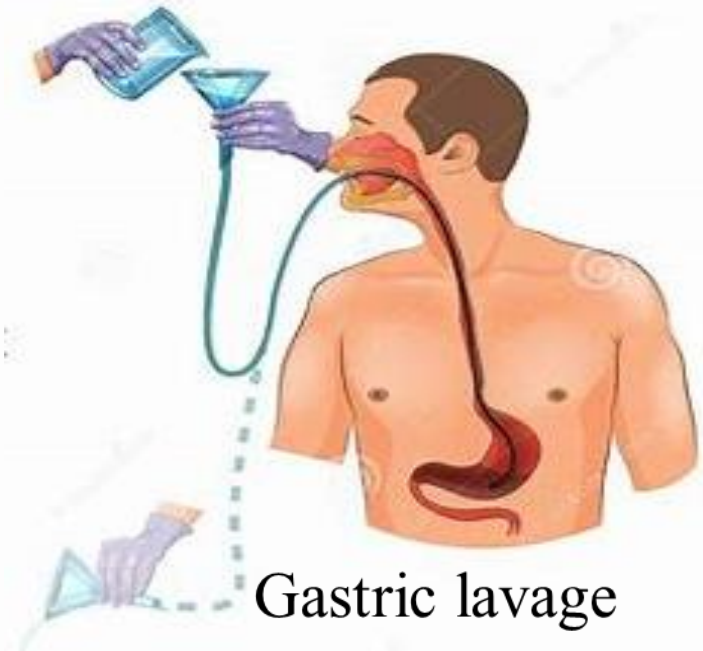


Acute iron poisoning

If element iron in the body > 60 mg/kg

Symptoms: Vomiting, abdominal pain, bloody diarrhea, shock, dehydration, cyanosis زرقة, coma.

Treatment: Gastric lavage with sodium bicarbonate solution Desferrioxamine (deferral) 15mg/kg per hour i.v., Correction of acidosis & shock.



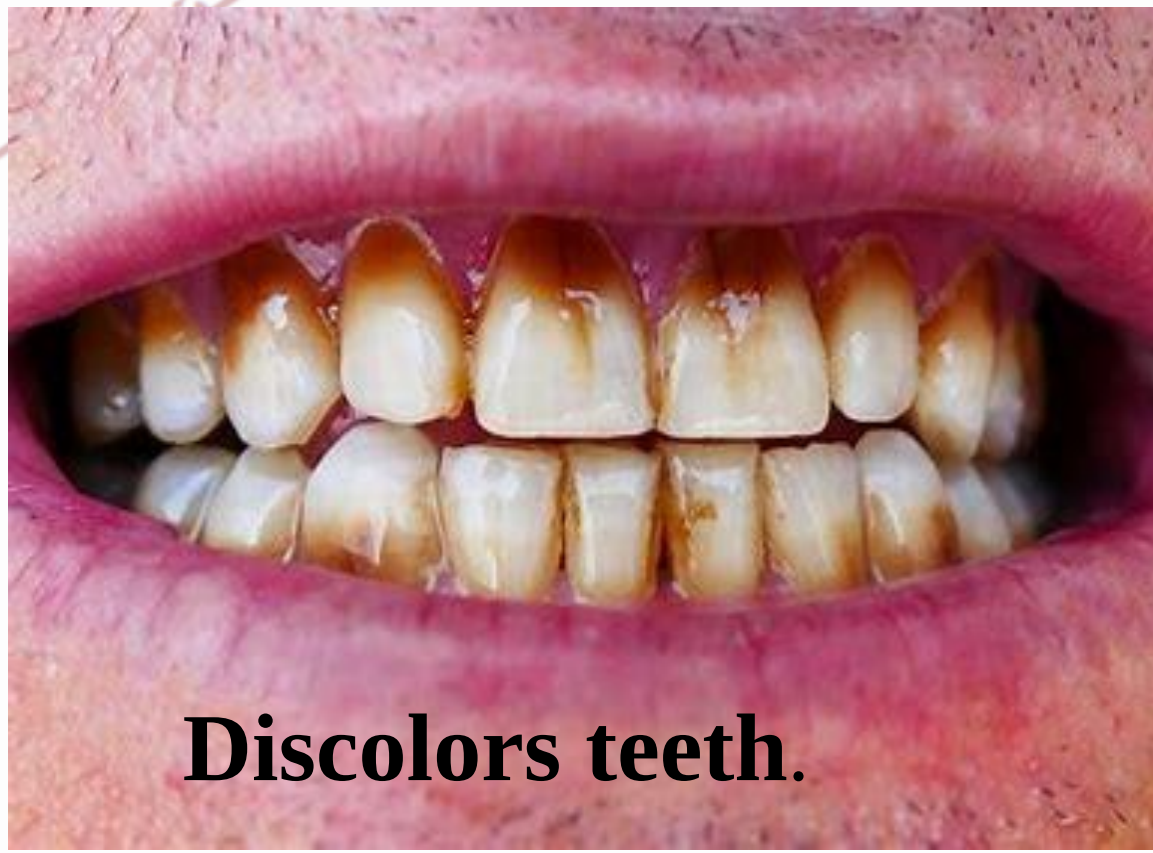
Gastric lavage

Iron Supplements Side Effects:

ii)Nausea (NO. ES.YA.) iii) Black stools and iv) Taste disturbances.

NOTE THAT :

Liquid iron supplements may be better tolerated than tablets but can discolors teeth.

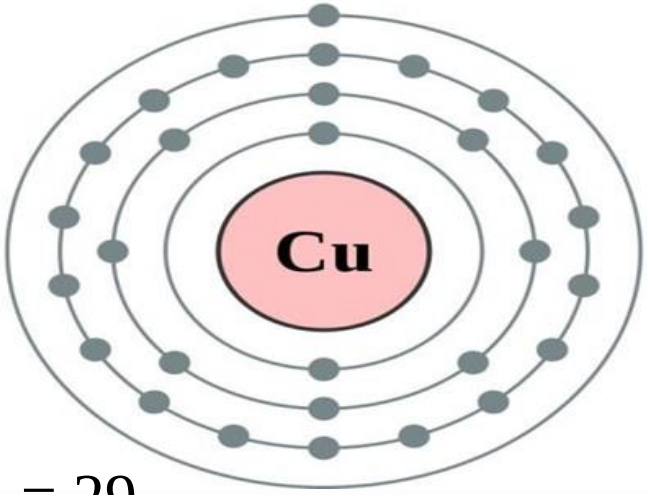


Discolors teeth.

ii)Cupper (ion = Cu^{+2})

$Z = 29 = [Ar] , 4S^2 3d^9$

Bohr model of cupper,



Cupper :

i. Is a red-brown metal,

ii. With atomic number Z = 29.

iii. Body content of copper is 80 – 120mg.

iv.40-60% Absorbed in duodenum(dodecane??)

v.Transported through metallozymes

(Ascorbic acid oxidase)

vi.90% bound to ceruplasmin , 9% to albumin

In the liver the copper become part of copper protein (Ceruloplasmin) .

Ceruloplasmin is the major copper-carrying protein in the blood, and in addition plays a role in iron metabolism.

Copper is found in the brain in form of (Cerebrocuprein) cerebro =brain, in blood cells as (Erythrocuprein) erythro = red. It play role in Heamoglobin formation

Copper is required to prevent anemic conditions through:

1. Facilitate iron absorption.
2. Stimulates enzymes involve haeme and globin biosynthesis.
3. Could involve in metabolism of stored iron .

Another importance of cupper:

i)Important in oxidative phosphorylation (ATP) production .

ii)Associated with the formation of aortic elastin الايلاستين

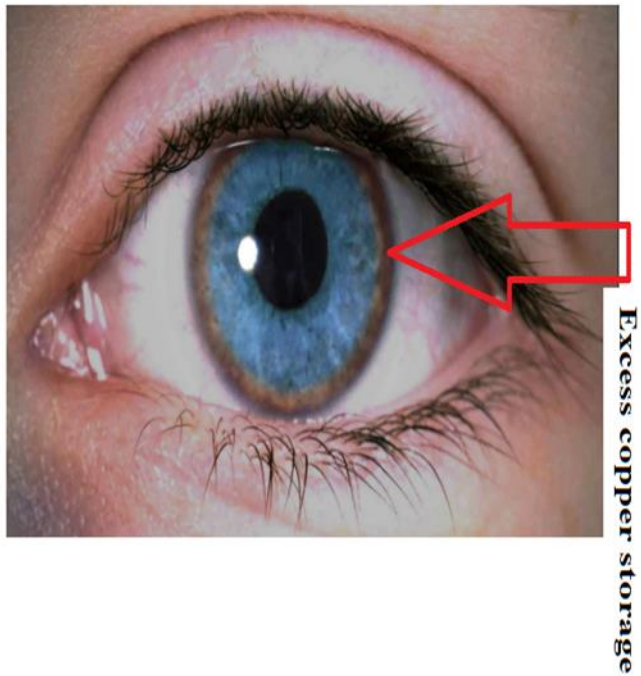
الابهري في صمام القلب .

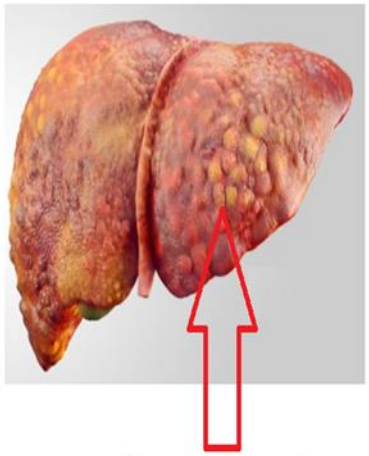
iii)A component of tyrosinase enzyme, which responsible for conversion of tyrosine to the bl

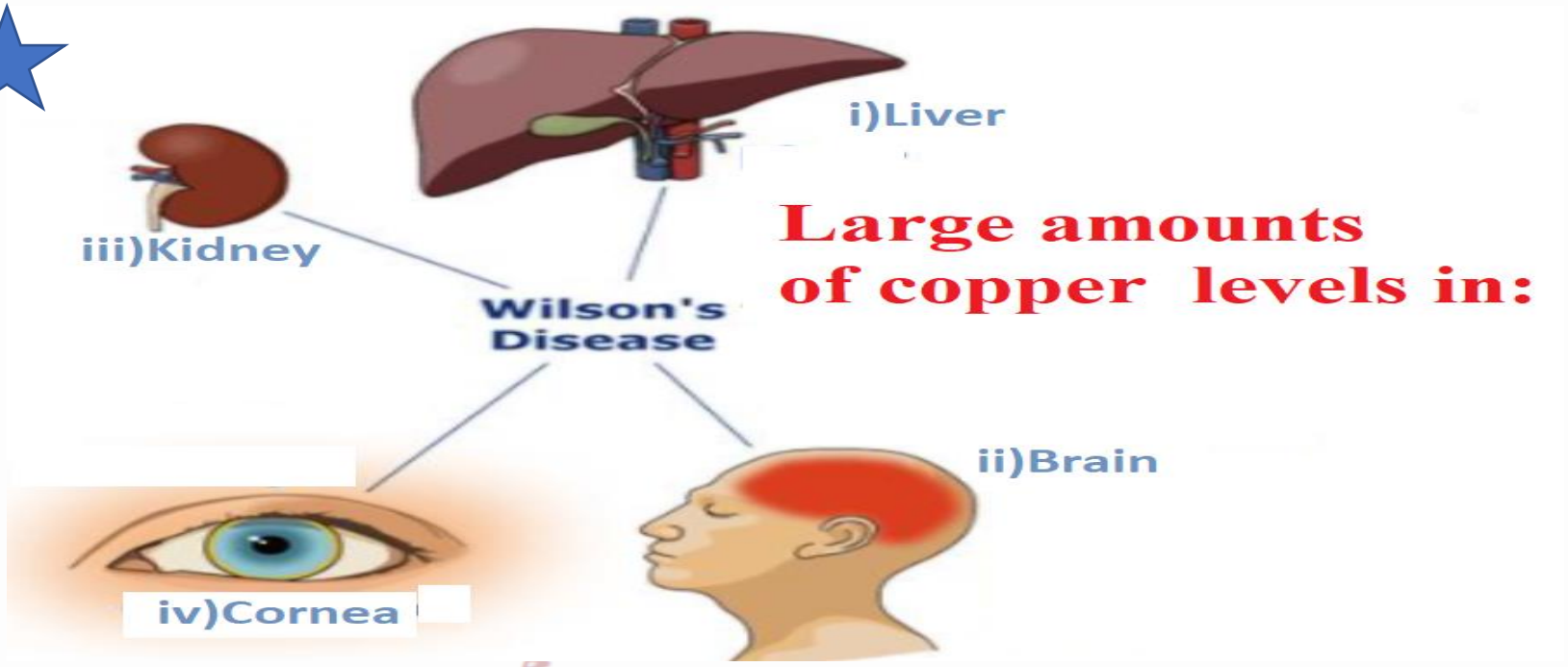
Wilson disease:

A condition of excess copper storage levels in :

i)liver, ii)brain, iii)kidney and iv)cornea.



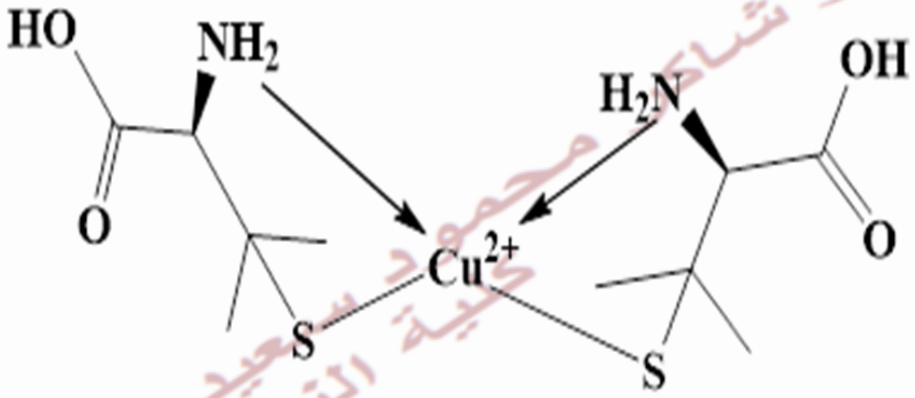




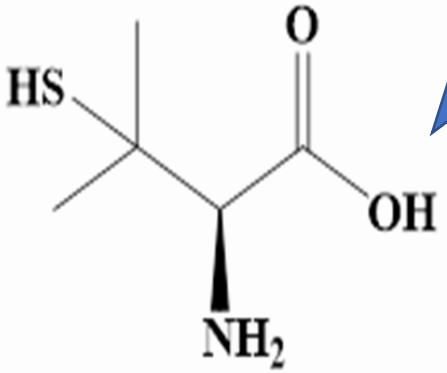
Treatment of Wilson's disease :

Pencillamine (cuprimine), is the drug of choice

which is a chelating agent (bidentate ligand) form complex with cupper in addition to diet restriction تقييد,(also it is used for rheumatoid arthritis, kidney stones and various heavy metal poisonings).



Cupper-penicillamine complex



Penicillamine

Q))Answer the following:

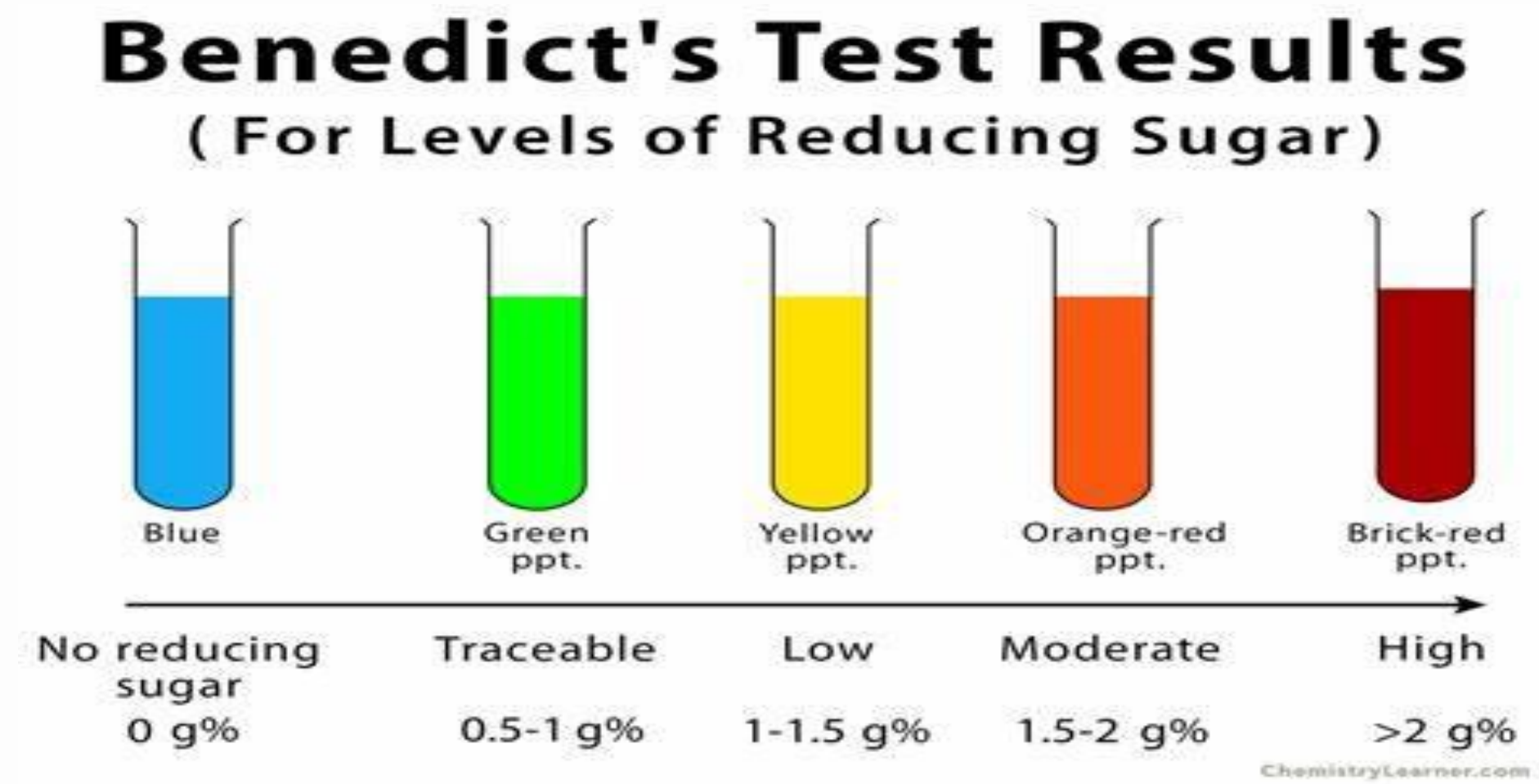
a)Name of the central atom. b)Name of ligand c)Type of ligand dentate.
d)Name of complex compound. e)Names of Donating atoms.
f)Enumerate four uses of this ligand

Uses of copper:

1. Topically as fungicide and astringent (as. Ren. Gent) ("to bind fast")مادة قابضة, e.g Copper sulfate.

2. Antidote for phosphorous poisoning.

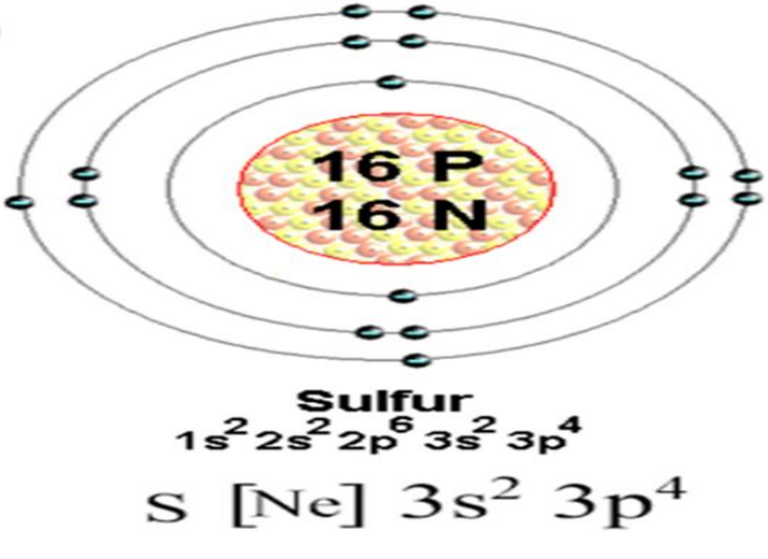
3. Also essential component of Fehling and Benedict sol are used for determination of glucose, a positive test is production of cuprous oxide.



Cuprous oxide
orange red to red

Traceable = اقل ما يمكن

iii) Sulphur S: (Non-metallic)



Sulfur is a chemical element that is present in

i. All living tissues.(After calcium and phosphorus, it is the third most abundant الفلز الأكثر وفرة بعد الكالسيوم والفسفورmineral in the human body).

ii. Sulfur is also found in: a. Garlic b. Onions, and c. Broccoli

Flower of sulfur is the naturally occurring, unpurified form.

It comes in yellow flakes and has been used in traditional and alternative medicine for humans and animals.

Uses: Sulfur is used to treat many kinds of skin disorders such as :

i)Dandruff and an itchy skin infection caused by mites العث(scabiesالجرب).

ii)Acne and skin redness (rosacea), (ro. ze. shya);

Itchy skin

Also it use in **balneotherapy:**

(balneo = bath)

The minerals found in hot springs (such as sulfur and magnesium) are Promote healing by increase circulation encouraging detoxing stress

Also, fight off illness by nourishing تنشيط

the organs and stimulating the immune system.

This help ion treatment of Arthritis, Insomnia الارق, Skin disease and Fibromyalgia(musculosketal pain).

Sulfur forms:

Cream, lotion, ointment, and bar soap(SO.OPسواوب) (Soup(so.p سوب)

are used to treat acne.

Sulfur ointment is used to treat seborrheic (seb.roo.yik) dermatitis

جربand scabies.التهاب الجلد

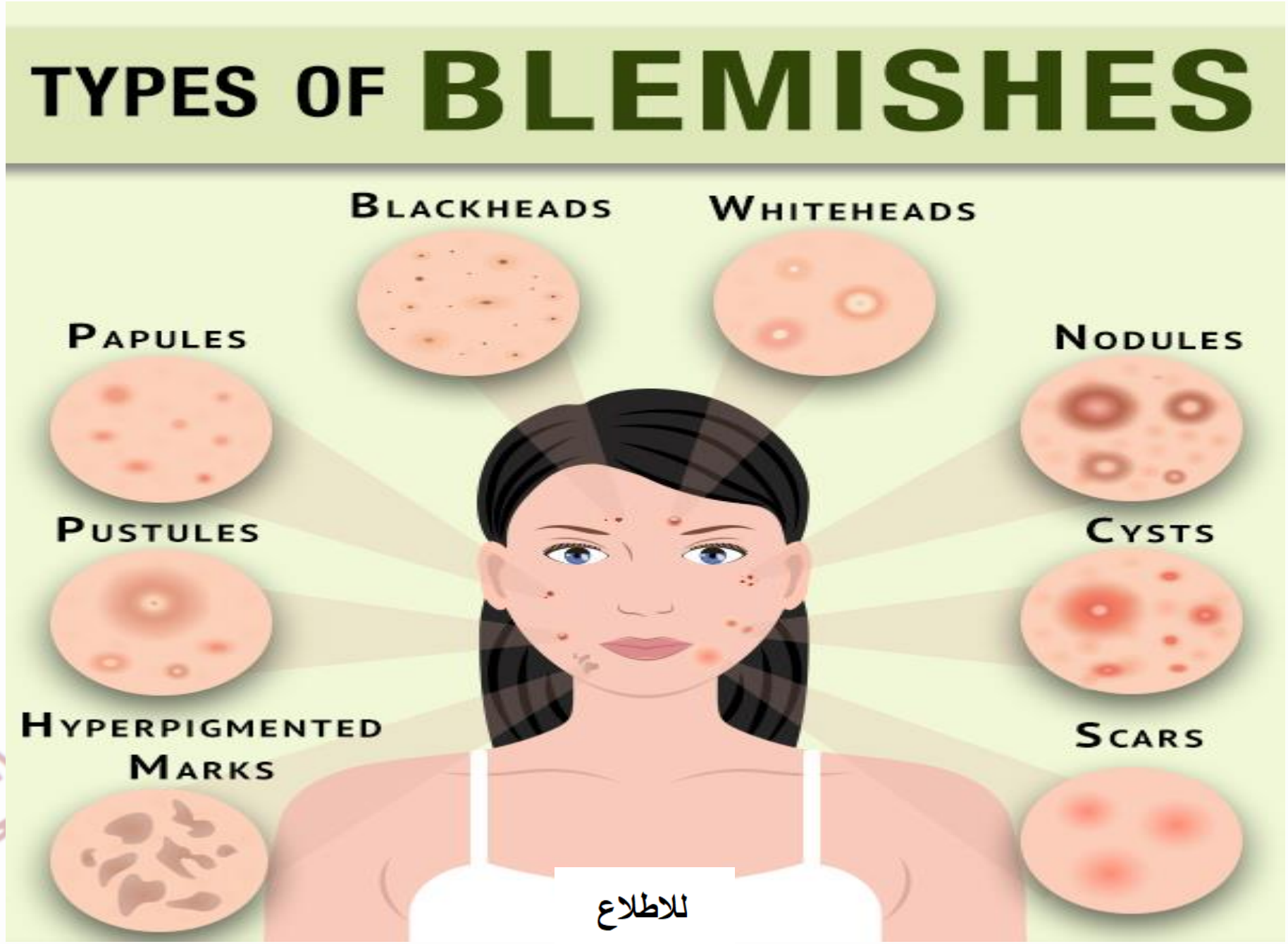
Mode of action:

Sulfur is converted to hydrogen sulfide of the formula H_2S through reduction(by bacteria).

This H_2S kills the (Propionibacterium) acnes which plays a role in acne, fungi, and parasites such as scabies mites.

Example:

Saturn, the sulfur acne ointment, a medication of 10% sulfur use as mask for dries and clears up acne, while preventing new blemishes عيوب from forming.


TYPES OF BLEMISHES
BLACKHEADS
WHITEHEADS
PAPULES
NODULES
PUSTULES
CYSTS
HYPERPIGMENTED MARKS
SCARS
للاطلاع

ESSENTIAL TRACE IONS, continuous

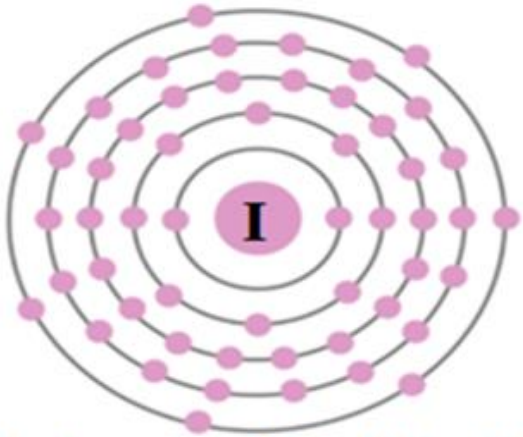
IV. Iodine I_2

When the element Iodine combines with another element called iodide, such as the combination of potassium and iodine together forms potassium iodide, KI.

$$Z = P = 53 = e_s$$

Calculate the [Kr] atomic number given that the atomic number Z of Iodine = 53, and iodine has an electronic configuration of :

$$[Kr]\ 4d^{10}\ 5S^2\ 5P^5$$



Bohr model of Iodine

i.e. Kr atomic number = 36

*Iodine (I_2) is probably the oldest germicide still in use today. It was listed in 1830 as a tincture and an Ointment.

Types of iodine preparations(Q.Enumerate):

a. Iodine tincture:

*or weak iodine solution 2.5% iodine in 50% alcohol with 2.5%sodium iodide KI.

Uses:

i)In emergency survival kits or applicators,

كتات طوارئ لإبقاء الجروح سليمة بتعقيمهاوتعقيم المياه السطحية

to disinfect wounds and to sanitize(sane.tize) surface water for drinking.

ii. When an alcohol solution is not desirable, the alcohol-free

Lugol's iodine, an aqueous solution of iodine in potassium iodide solution, or povidone-iodine can be used.

iii)Sanitize the surface of fruit and vegetables for bacteria and viruses.

b. Lugol’s iodine solution:

Jean Lugol

i. *Also known as aqueous iodine or strong iodine solution:

*ii. Lugol's iodine is available in various strengths but the most commonly used consists of 5% (wt/v) metallic iodine (I_2) and 10% (wt/v) potassium iodide (KI) mixed in distilled water (D.W.).

iii. It is a medication and disinfectant

iv. It is taken by mouth

Uses: مهم

1- As germicides (antiseptic and disinfectant).

2-For emergency disinfection of drinking water.

and

3- A first-line treatment

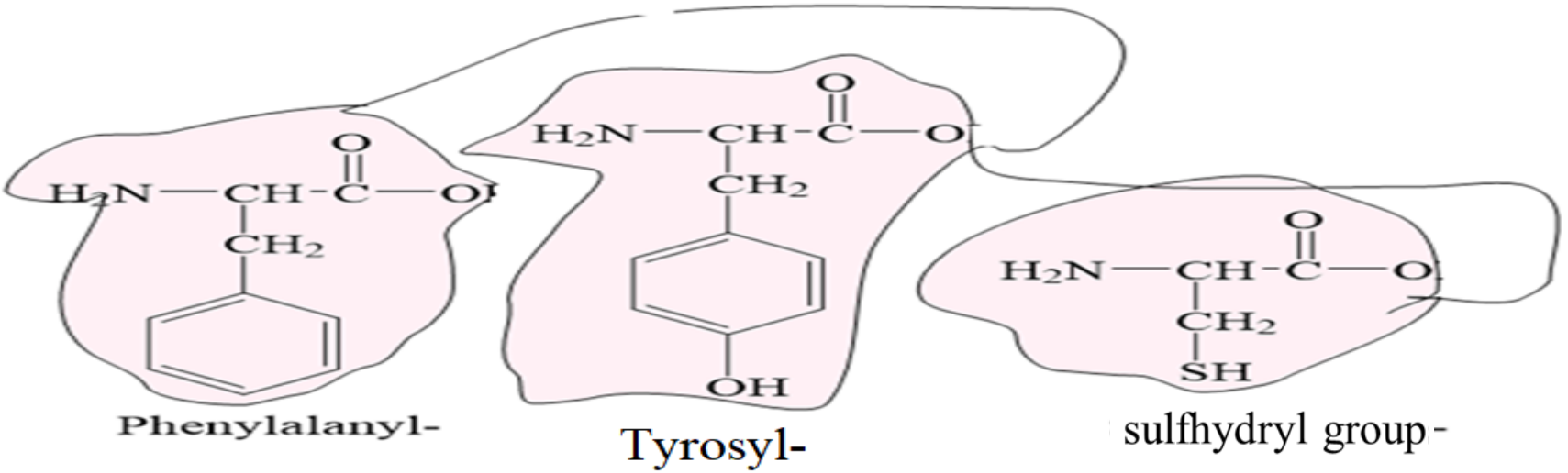
for hypothyroidism

(reduction in thyroid

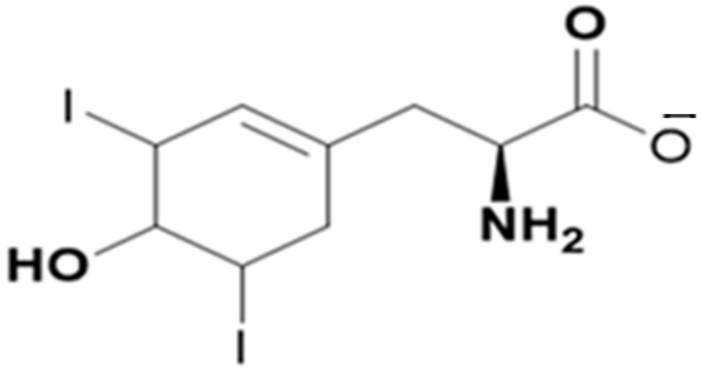
hormone levels) in adults.

Q. Mode of action as germicide: مهم

It probably inactivates bacterial proteins by the iodination of aromatic residues (phenylalanyl and tyrosyl) and oxidation (sulfhydryl groups).



Aromatic residues



Denatured Tyrosinyl- group by iodination

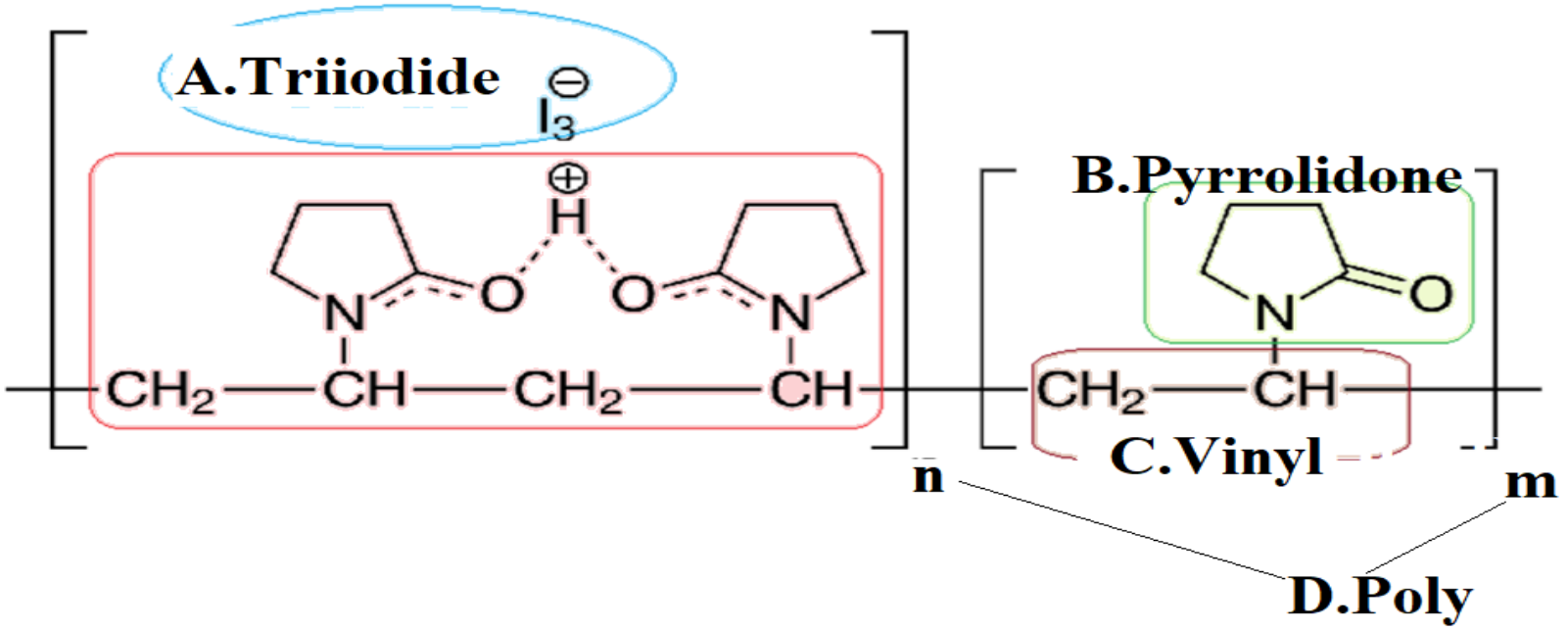
c.Povidone–Iodine Solution(PVP-I)(Betadine) :

Povidone-iodine applied to an abrasion using cotton swab

abrasion = خدش

A chemical polymer povidone (polyvinylpyrrolidone) and triiodide (I_3^-) . Free iodine, slowly liberated from the povidone-iodine (PVP-I) complex.

Q))What is A,B,C and D?



Chemical structure of Povidone and its functional groups

Betadine Forms

Betadine

i)powder ii)Sol. iii)Cream iv. Spray

Povidone–Iodine Properties: *

i.It is not: Toxic, Volatile, Staining, Irritating to the skin or to wounds and

ii. Approximately 10% of the iodine in the complex is bioavailable.

Uses:

It is a broad-spectrum antiseptic for topical application

i. Aqueous solution for pre-and post-operative (surgical) disinfection of the incision.

ii. The site and skin cleansing.

iii. It can also be used to treat infected wounds, ulcers, cuts, and burns.

iv. It is effective for local bacterial and fungal infections.

iv. *For treatment in gynecology نسائيةfor vaginitis التهاب

المهبلassociated with candidal, *trichomonal or mixed infections.

---

*Trichomoniasis (trich) is an infectious disease caused by the parasite Trichomonas vaginalis.

Forms:

i-Aerosols ii- Foams
iii-Ointments
iv-Surgical scrubs مسح
v-Antiseptic gauze pads
vi- Sponges
vii-Mouthwashes
viii- Betadine Solution for douche

Betadine®

A topical aqueous Solution (povidone-iodine, 10%);
Antiseptic Non-Sterile Solution

Surgical scrubs

Sponges

Mode of action:

The polymer povidone carries the free iodine to the specific site of the pathogenمسببات الأمراض, which directly inter to the cell membrane where it denatures the nucleotide, fatty acids, phospholipids, and enzymes.

Also the free iodine irreversible reacts with the genetic materials (DNA and RNA) causing loss of materials in the cell membrane and resulting in cell death.

This will activate the immunity system.

Non-Essential Ions
i. Fluoride, ii. Bromide and iii. Lithium

Nonessential ions:

Are a number of metals or metals ions that do not fully know biological functions, and exposure to some of these can adverse health consequencesعواقب.

a. Fluorine is element F

Or fluorine gas, in compounds = fluorid (e.g. sodium fluoride)

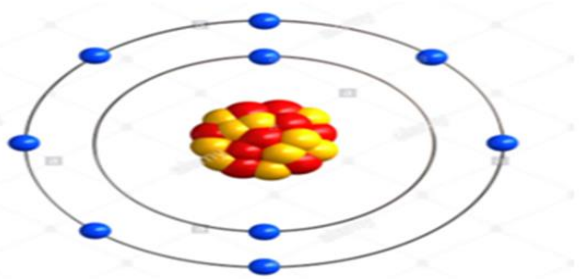
F^- (fluoride anion), is an inorganic, monoatomic* anion which is a mineral ion that is found in all natural water sources (Fluoride reaches from soil and rocks into groundwater.يرشحwater sources by leaching

---

* Having one atom in the anion, but fluorine F_2 is a gas of diatomic molecules.

The ionic form of the trace element fluorine F, which is commonly found in the environment as fluorides compounds.

The fluorine anion, F^-, any of the compounds containing the anion are termed fluorides. When you hear about fluoride in drinking water, it comes from adding a fluorine compound.



Bohr model of Fluorine

Advantages:

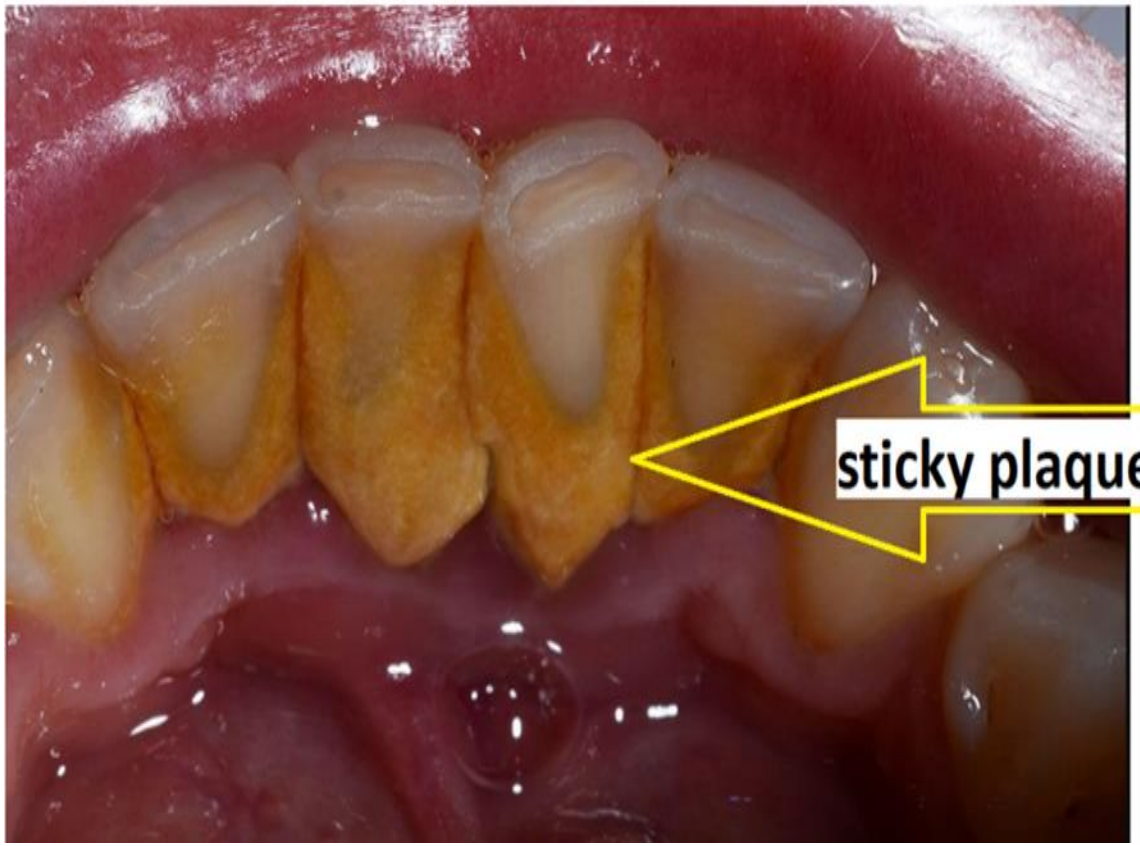
1. Fluoride is added to public drinking water to prevent tooth decay.

Fluorite

2. Children who do not drink fluorinated public water because their homes use water from a private well often take fluoride tablets to prevent tooth decay.

*3.Fluoride is added to toothpaste such as (1-4):

4. It is added to mouthwashes, (e.g. alcohol-free Colgate Neutral Fluor 220)so it can be applied directly to the teeth to reduce the formation of a sticky plaque on the teeth and prevent the swelling of gums and tooth decay.

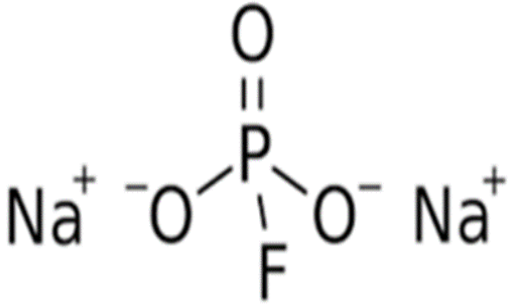


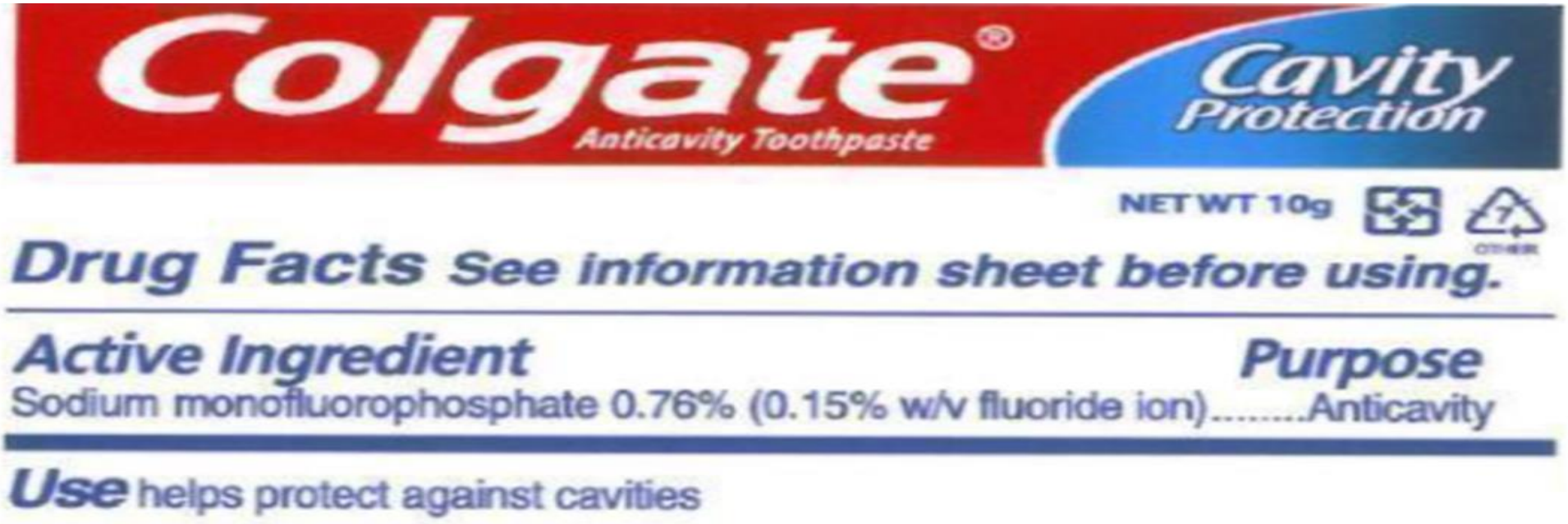
An example of fluorine compounds is:

Sodium monofluorophosphate (SMFP), a salt with the

chemical formula Na_2PO_3F.

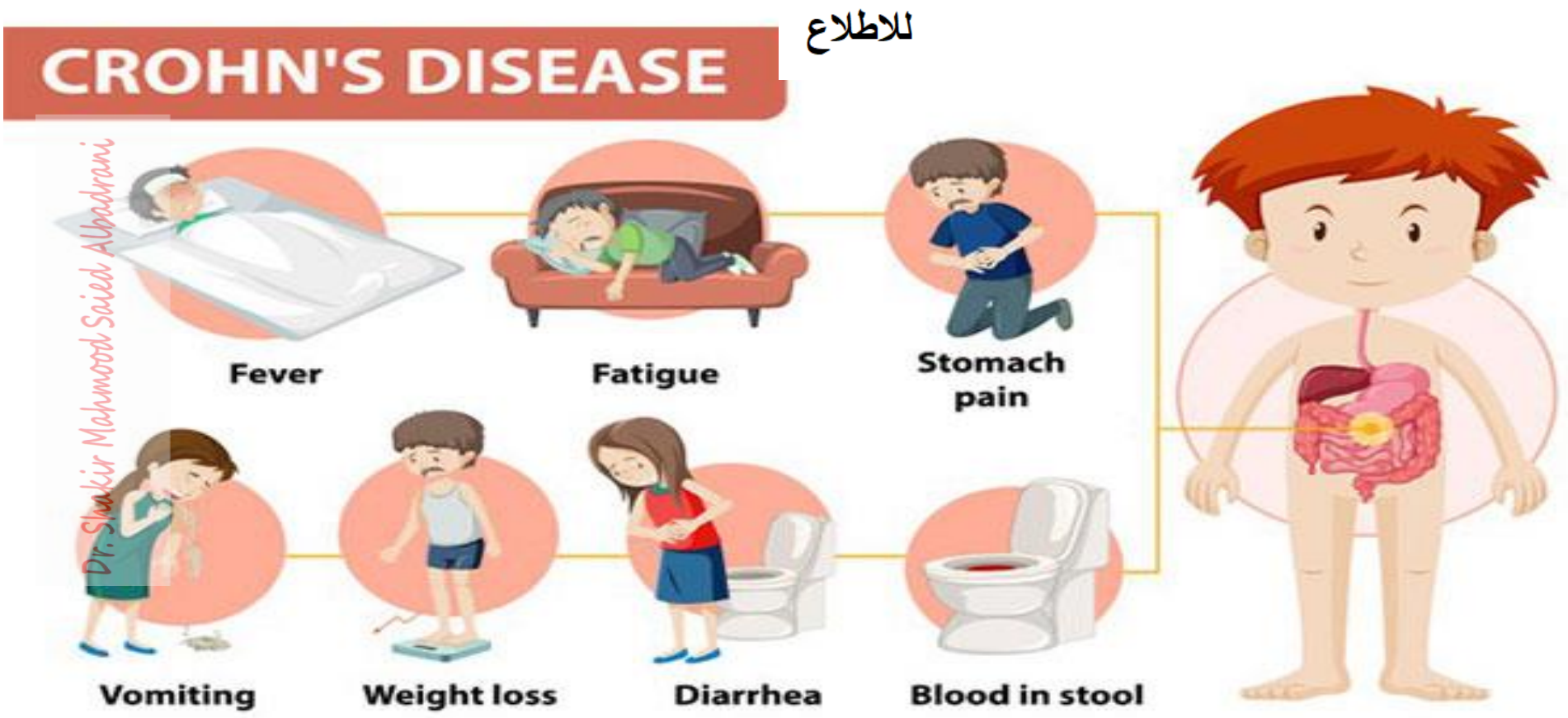
It is the active ingredient in some toothpaste.





4. Fluoride is also taken by mouth for treating weakened bones (osteoporosis) and for preventing bone loss in people with rheumatoid arthritis and

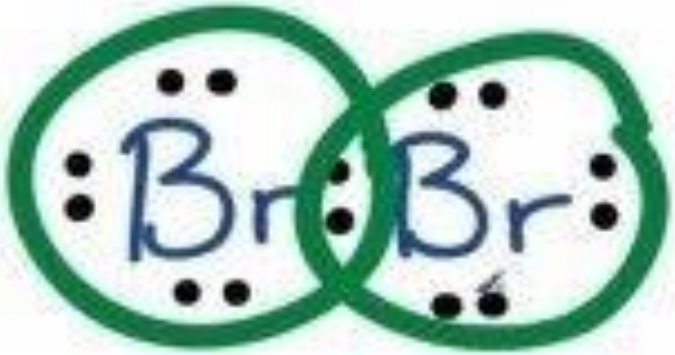
Crohn's disease: (inflammatory bowel disease (IBD) that may affect any segment (part) of the GIT from the mouth to the anus.).



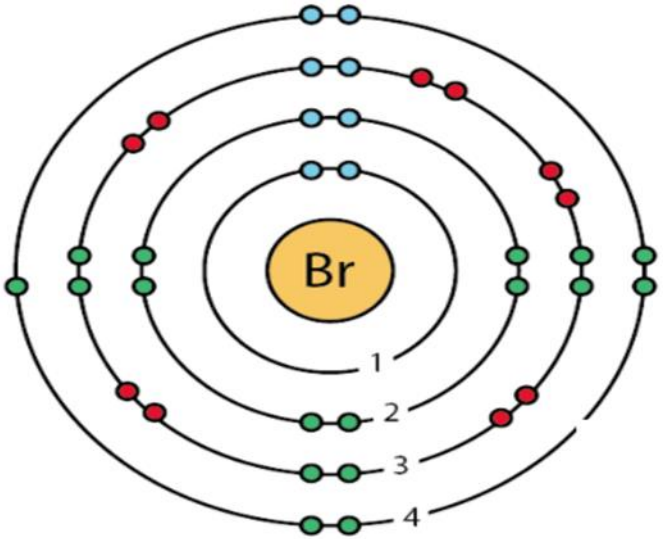
b) Bromine element Br or Br_2

A bromine element or (Br_2 gas)is an element with atomic number 35, and the symbol Br.

Bromine Gas
(Dibromine)



35
Br
Bromine
79.904



Bromine is element of a dark red fuming toxic liquid with a choking خانق, irritating smell. It is a member of the halogen group (F, Cl , and I), and occurs chiefly in the form of salts in seawater and brines على شكل محاليل ملحية

Bromide compounds:

Humans appear to biosynthesize traces of an α-bromo keto ester (2-octyl 4-bromo-3-oxobutanoate), which is found in their cerebrospinal fluid

and appears to play a yet unclarified role in inducing REM* sleep.

***Rapid eye movement sleep, is a unique phase of sleep in mammals**

حركة العين السريعة (REM)

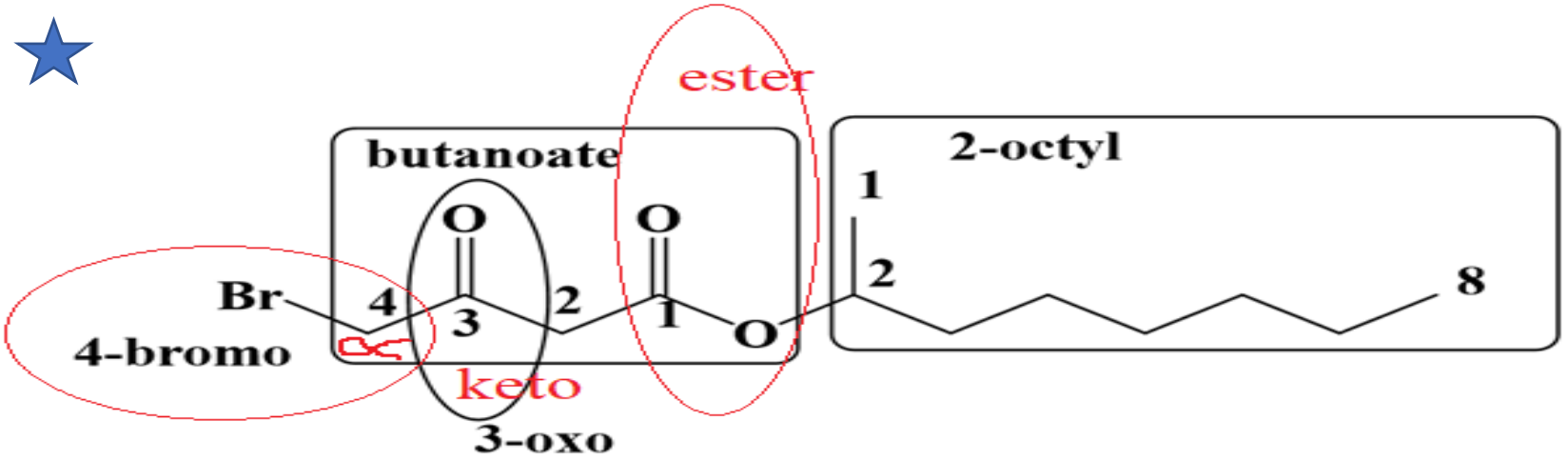
هي مرحلة من النوم يكون دماغك أثنائها شديد النشاط وعرضة للأحلام. أثناء هذه المرحلة تقوم العينان بحركات بسرعة.

تتوقف كمية نوم حركة العين السريعة لديك على عمرك وعوامل أخرى، حيث يقضي الرُضّع ٥٠% من نومهم في هذه المرحلة وتستغرق لدى الكبار ما يقارب ٢٠% من وقت النوم.

أظهرت الدراسات أن زيادة فترة نوم حركة العين السريعة يُحسِّن استدعاء المعلومات من الذاكرة والقدرات العقلية بشكل عام.

يمكن أن ترى أحلامًا واضحة وأنت في مرحلة REM من دورة النوم وربما ترغب بإطالة أحلامك ليلًا

للاطلاع

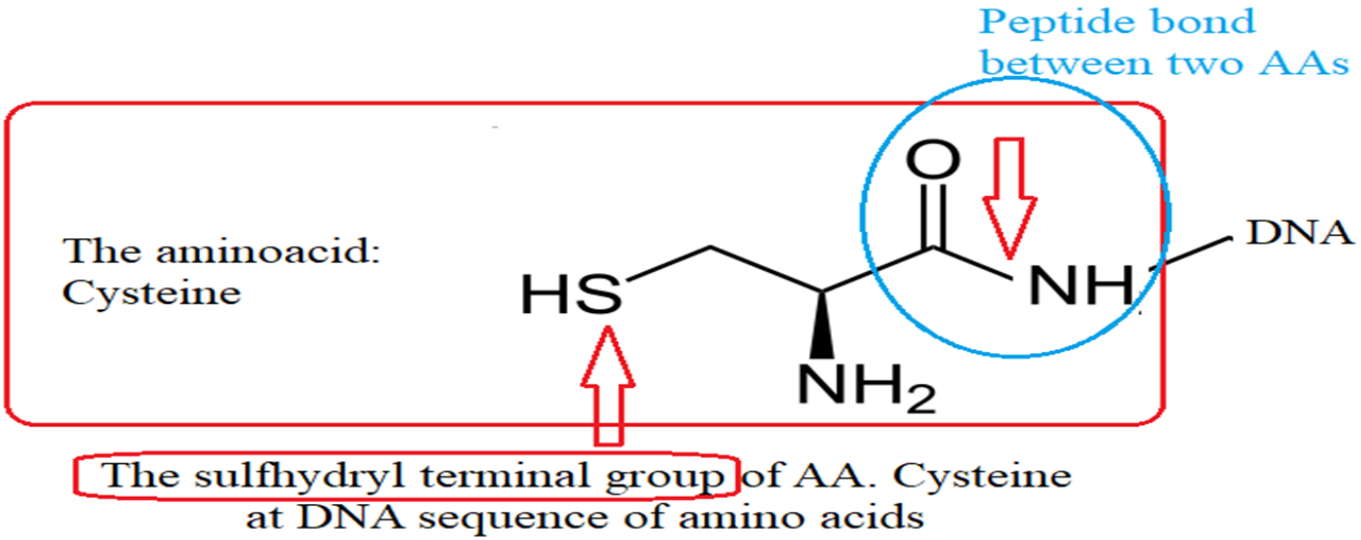


An alpha-bromo keto ester
2-Octyl 4-bromo-3-oxobutanoate

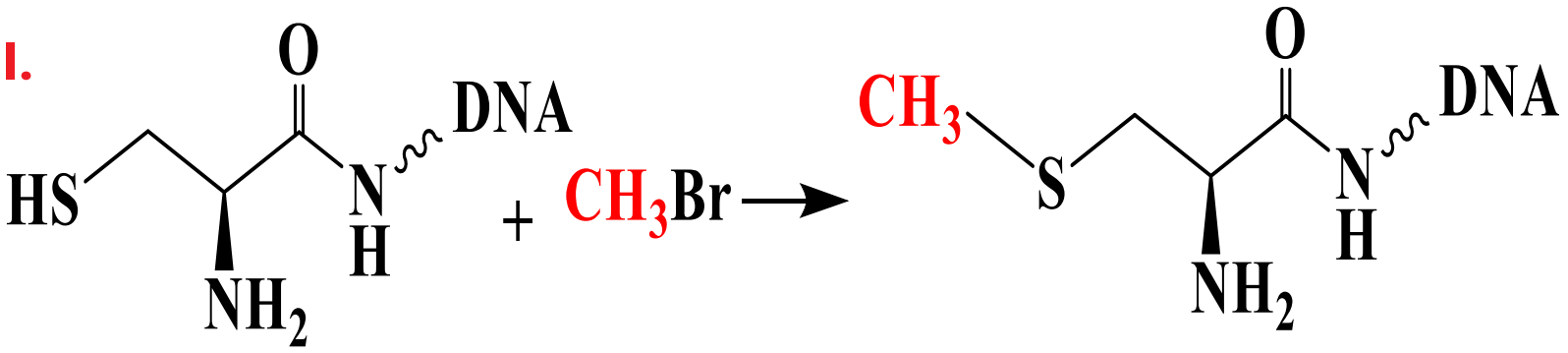
Sea foods and deep sea plants generally have high levels of bromide, while foods derived from the land have variable amounts.

Mode of action as pest control :

Methyl bromide alkylated the DNA of pests (by alkylated the AA sulfhydryl group), and thus impairment يخرب of DNA, this is the reason for the extremely lethal effect of methyl bromide.



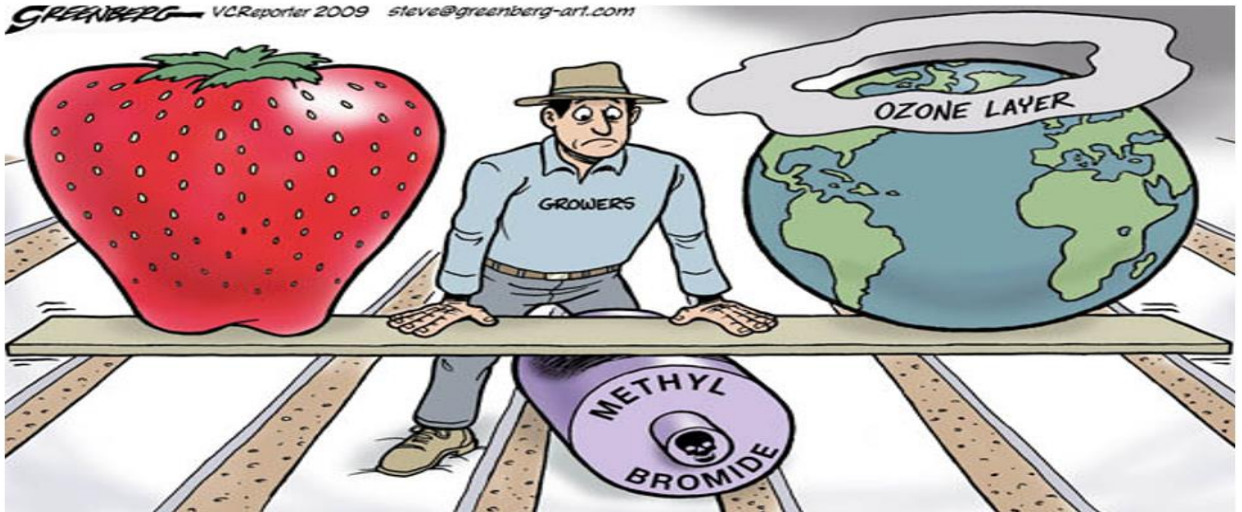
V.I.



Equation of Methylbromidee Mode of Action:

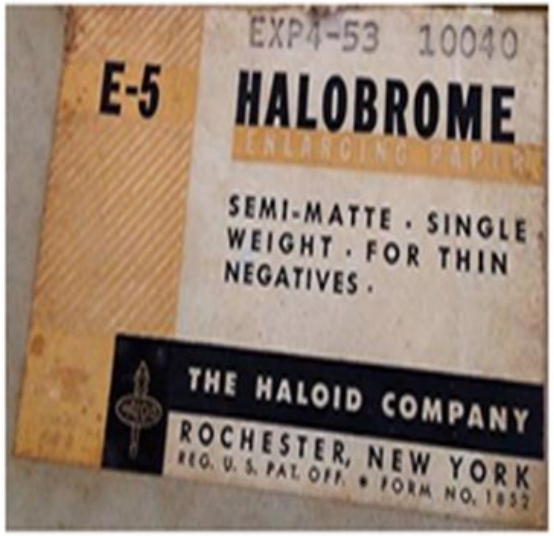
The lethal effects of methylbromide by alkylation the DNA of the pest via methylated the cysteine AA sulfhydryl group and thus irreversible damages the reproduction process of the pest and impairs it.

Methyl bromide also causes damaging the earth's ozone layer.



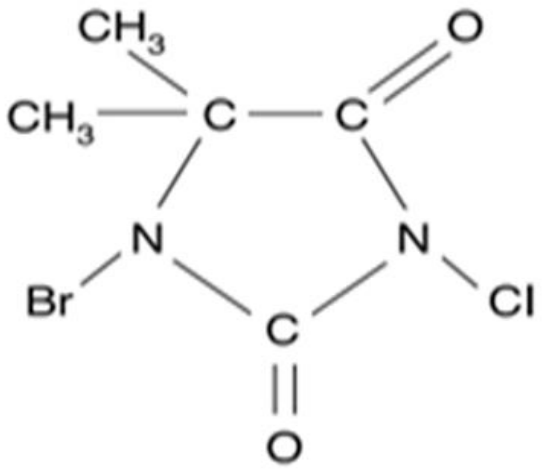
Example of Bromo Biocides مبيد احيائي:

1-Bromo,3-chloro,5,5- dimethyl hydantoin, “Halobrom”

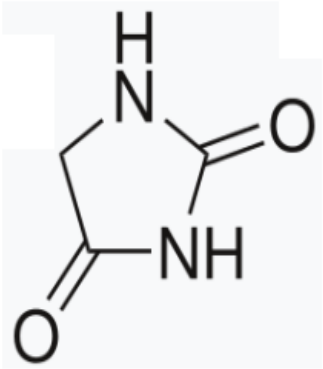


Imidazolidine ring

مهم



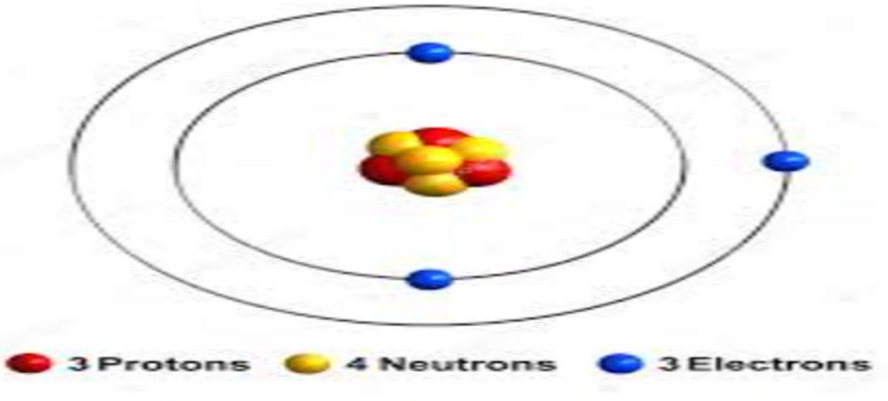
Hydanoin = Imidazoline-2,4-dione



c.Lithium Li^+

Lithium (Greek = lithos, lit. 'stone') element with atomic number 3.

*It never occurs freely in nature, but only in ionic.



Bohr model of Lithium

USES:

1.As a psychiatricنفسية (saiy. Cai.et.rek.سايكيترك) medication.

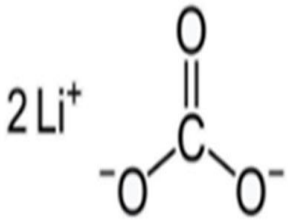
2. Treat bipolar disorder (mental condition الهوس اواختلاجات ثنائي القطب).

Lithium is taken by mouth: e.g. Lithium carbonate:

3. Treat major depressive. A disorder that does not improve following the use of antidepressants.

In these disorders, it reduces the risk of suicide (so. Side) انتحار

The Lithium carbonate chemical structure is:



Lithium carbonate is used to treat (manic syndrome) , the elevated phase of bipolar disorder i.e. abnormally elevated arousalاستثارة effect and energy level.

"Doc, if I were Manic, could I do this for 12 hours and still keep my appointment?"

Mode of action:

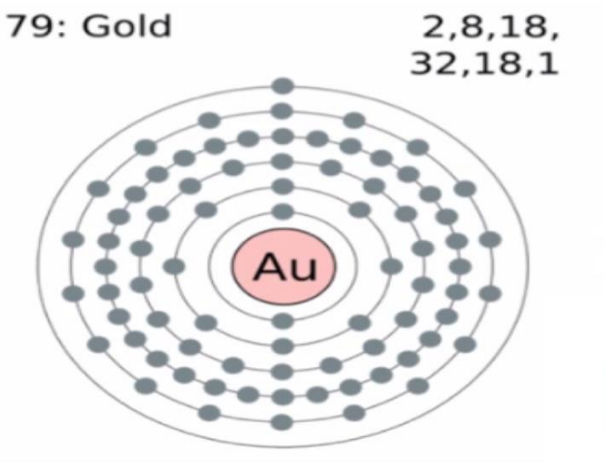
Mania is associated with irregular increases in protein kinase C (PKC) activity within the brain.

Lithium ions interfere with ion transport processes that relay and amplify messages carried to the cells of the brain, inhibiting PKC's activity.

NON ESSENTIAL IONS (continue)
iv. Gold v. Silver and vi. Mercury

iv)Gold = Aurum = Au(or . ram.)

*One of the higher atomic number elements that occur naturally.



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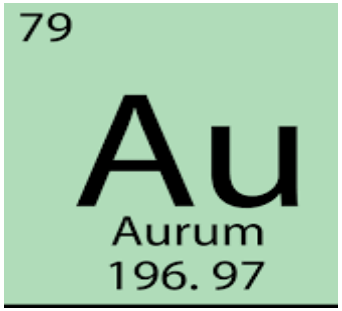
$$[Xe]\ 4f^{14}\ 5d^{10}\ 6s^{1}$$



*Uses of Gold in medicine:

1. Cancer treatment:

Gold nanoparticles which are biocompatible * can be injected IV and accumulate in the specific area of leaking vascularity تسريب وعائيsuch as tumours. The use of gold is encouraging in the treatment of prostate cancer.

Human immunodeficiency virus infection and acquired immunodeficiency syndrome

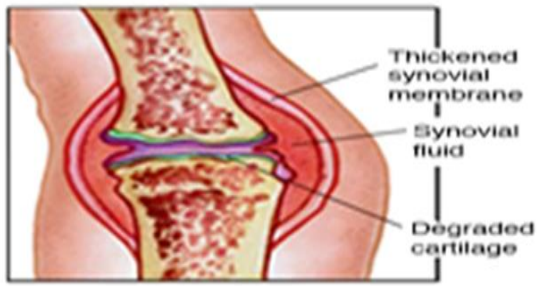
2. HIV/AIDS detection:

Gold nanoparticles techniques are able to sense the presence of a target molecule at ultra-low concentration, thus enabling early detection.

***متوافق بايلوجيا Biocompatibility**

Compatibility with living tissue or a living system by not being toxic, injurious, or physiologically reactive and not causing immunological rejection.

3. Rheumatoid arthritis treatment:



Gold therapy is used to treat rheumatoid arthritis and other inflammatory conditions such as:

i. Psoriatic arthritis التهاب المفاصل الصدفي

And

ii. Juvenile rheumatoid arthritis. التهاب المفاصل الروماتزمية لليافعين

The treatment appears to be most effective when given in the early stages of arthritis.

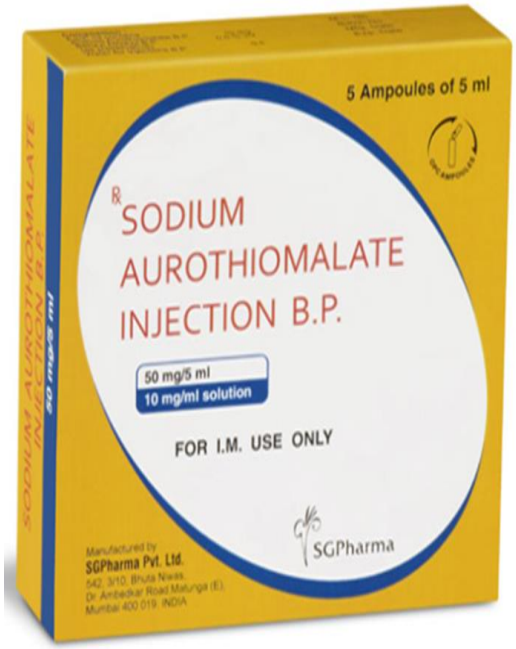
★

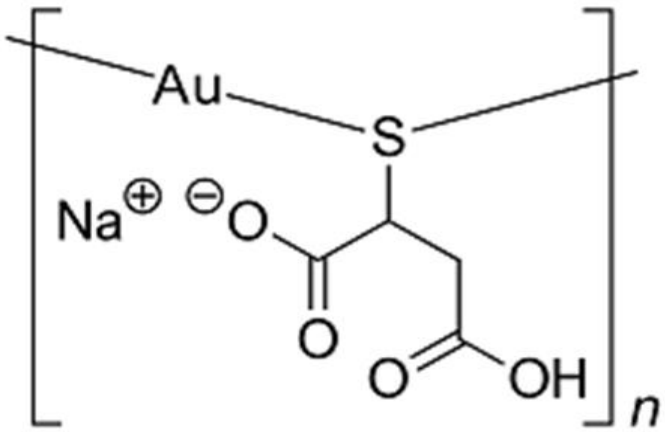
Products:

Sodium aurothiomalate or Gold sodium thiomalate (Myochrysine):

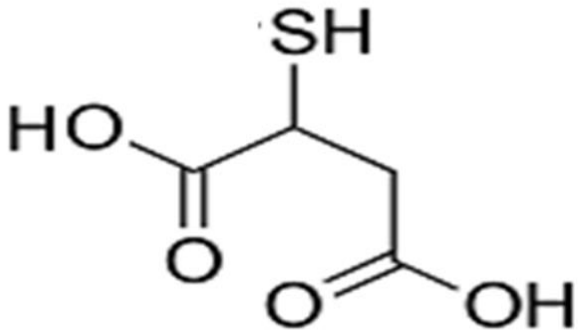
i. It is the gold compound that is used for its immunosuppressive anti-rheumatic effects.

ii . It is supplied as a solution for IM injection containing 50 mg/ml of Gold sodium thiomalate (Myochrysine)





Myochrysine



Thiomalic acid

vi)Silver = Argentum = Ag

Atomic weight = 47

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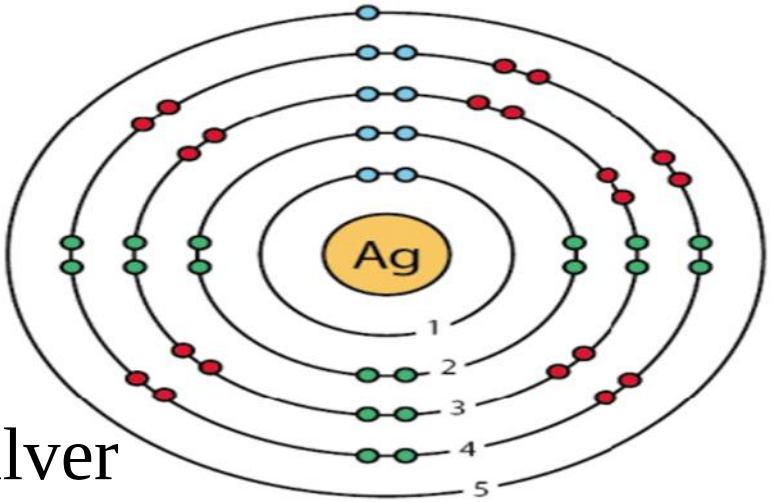


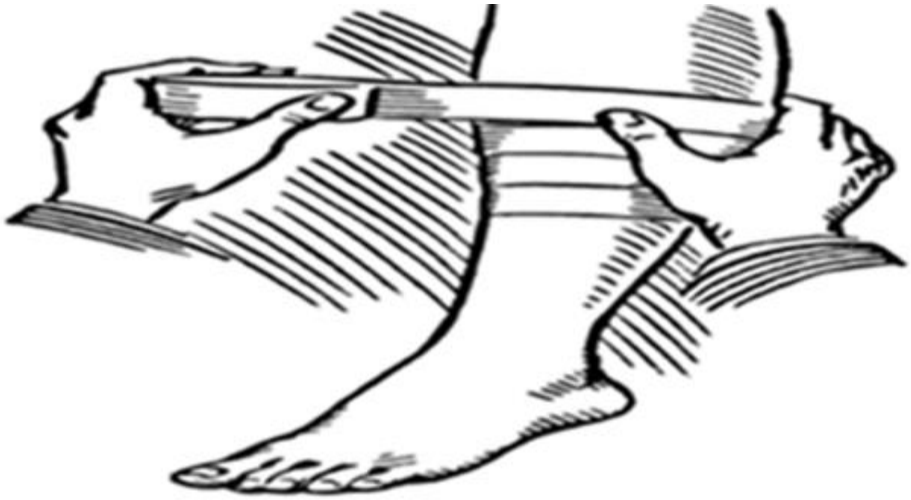
Bohr model of silver

$[Kr]_{36}, 4d^{10}5S^{1}$

The medical uses of silver:

Its use in wound dressingsالضمادات as creams, and as an antibiotic coating on medical devices.

Wounds dressings containing Silver sulfadiazine or silver nanomaterials may be used to treat external infections



Silver is added to some bandages for its antimicrobial effect.

Silver sulfadiazine (SSD) :

*It is a topical antibiotic used in partial thickness سطحيةand full thickness العميقةburns to prevent infection.

There are two types of (SSD):

a. Ascend: Antibacterial cream (1% on gauze dressing).

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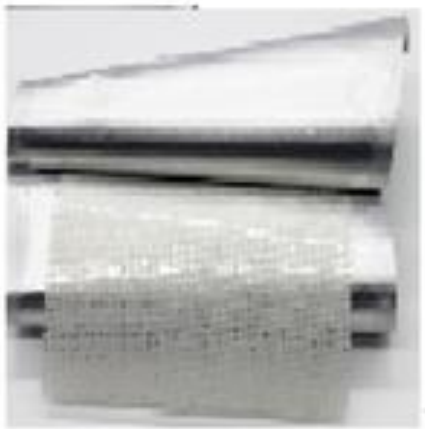
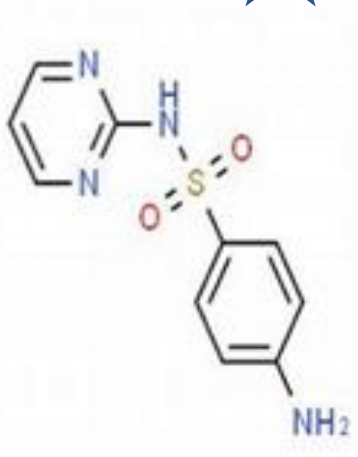
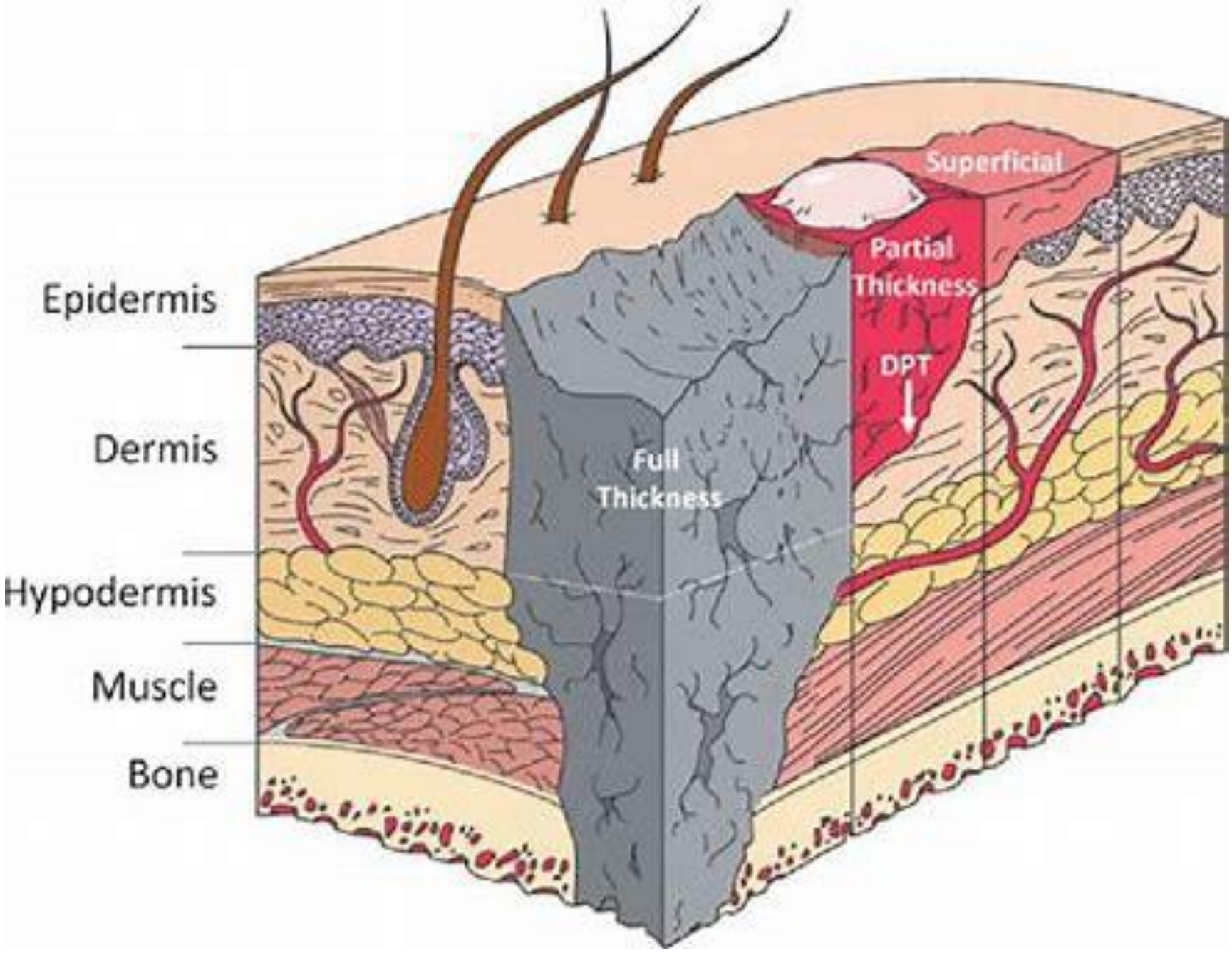


Gauze dressing



Sulfadiazine


Epidermis
Dermis
Hypodermis
Muscle
Bone
Superficial
Partial Thickness
DPT
Full Thickness

*b. Burnheal : a broad spectrum antimicrobial which composes of (SSD) with Chlorhexidine gluconate cream.

Mode of action of Silver and Silver compounds.

Silver and most silver compounds are toxic for bacteria, algae (al.ge.ya) طحالب, and fungi in vitro.

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a. **The effectiveness of silver compounds as an antiseptic** is based on the ability of the biologically active silver ion (Ag^+) to irreversibly damage key enzyme systems in the cell membranes of pathogens.

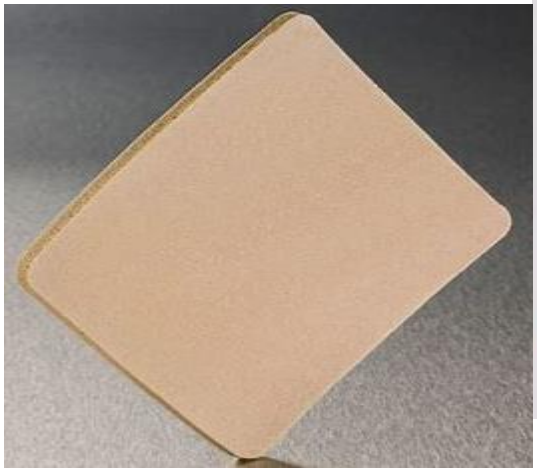
***b. The effectiveness of silver compounds in dressings:**

Silver-containing dressings may increase the probability of healing for venous leg ulcers.

***With two dressings types:**

a. Biatain Silver dressings:

Soft and conformable متوافقsilver foam dressing that is proven to help infected wounds heal faster.



*b. Antimicrobial Silver alginate dressing:

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It is made of silver particles and natural alginates derived from seaweedاعشاب. Alginates are hydrophilic polysaccharide

*c. Coated Endotracheal (tre. esh. yal)tubes

أنبوب لتسليك القصبة الهوائية عند انسدادها

يطلى بالفضة

لتقليل التهاب الرئة الناشئ من تعقيدات انابيب التهوية

The using silver-coated endotracheal

(endo. treg. yal) breathing tubes reduces the risk of

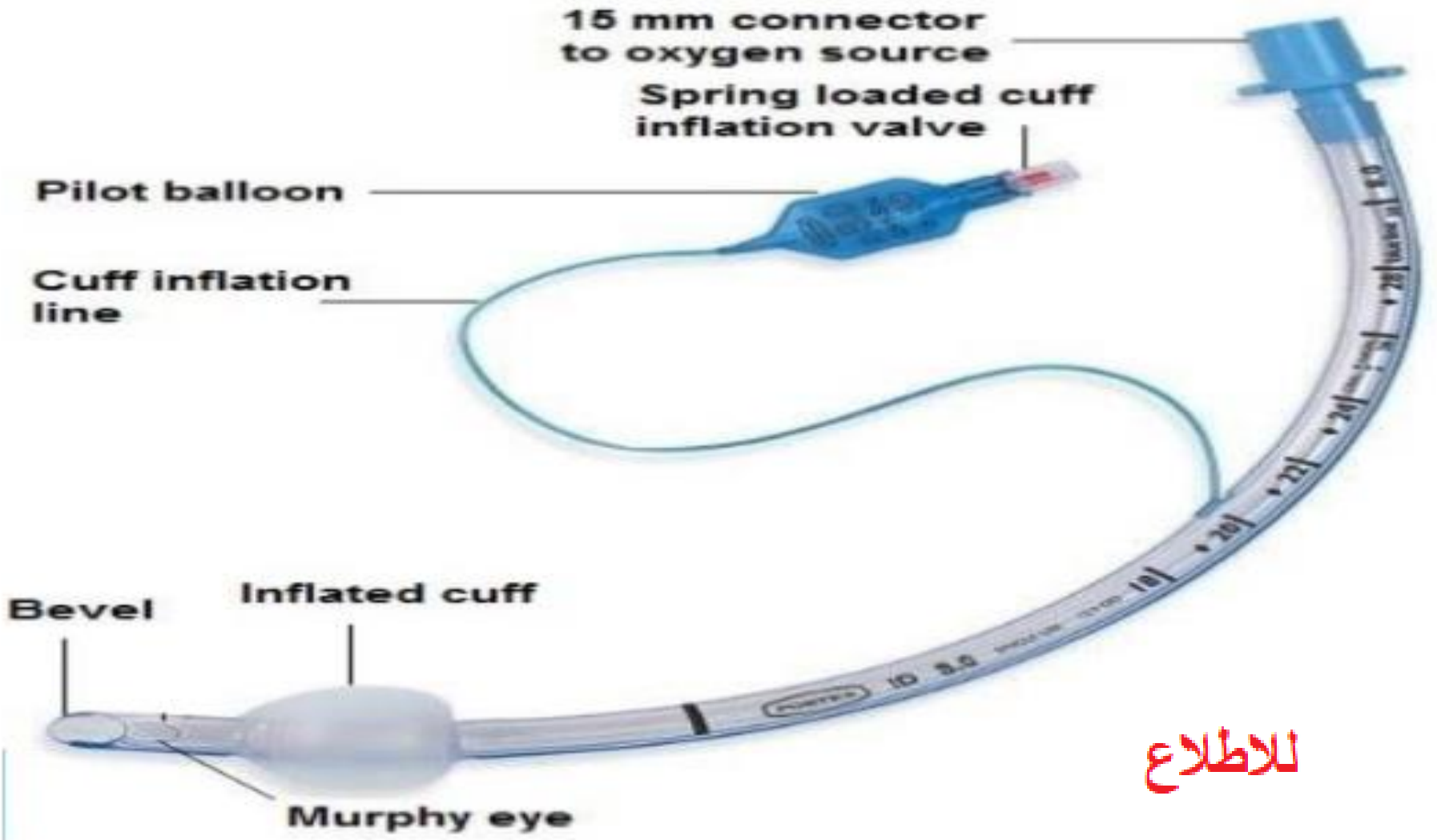
contracting ventilator-associated pneumonia الإصابة بالالتهاب

الرئوي المرتبط بأجهزة التنفس الصناعي, especially during the initial

days of utilization. اول أيام الاستخدام

nucleus
MEDICAL MEDIA

PARTS OF ENDOTRACHEAL TUBE

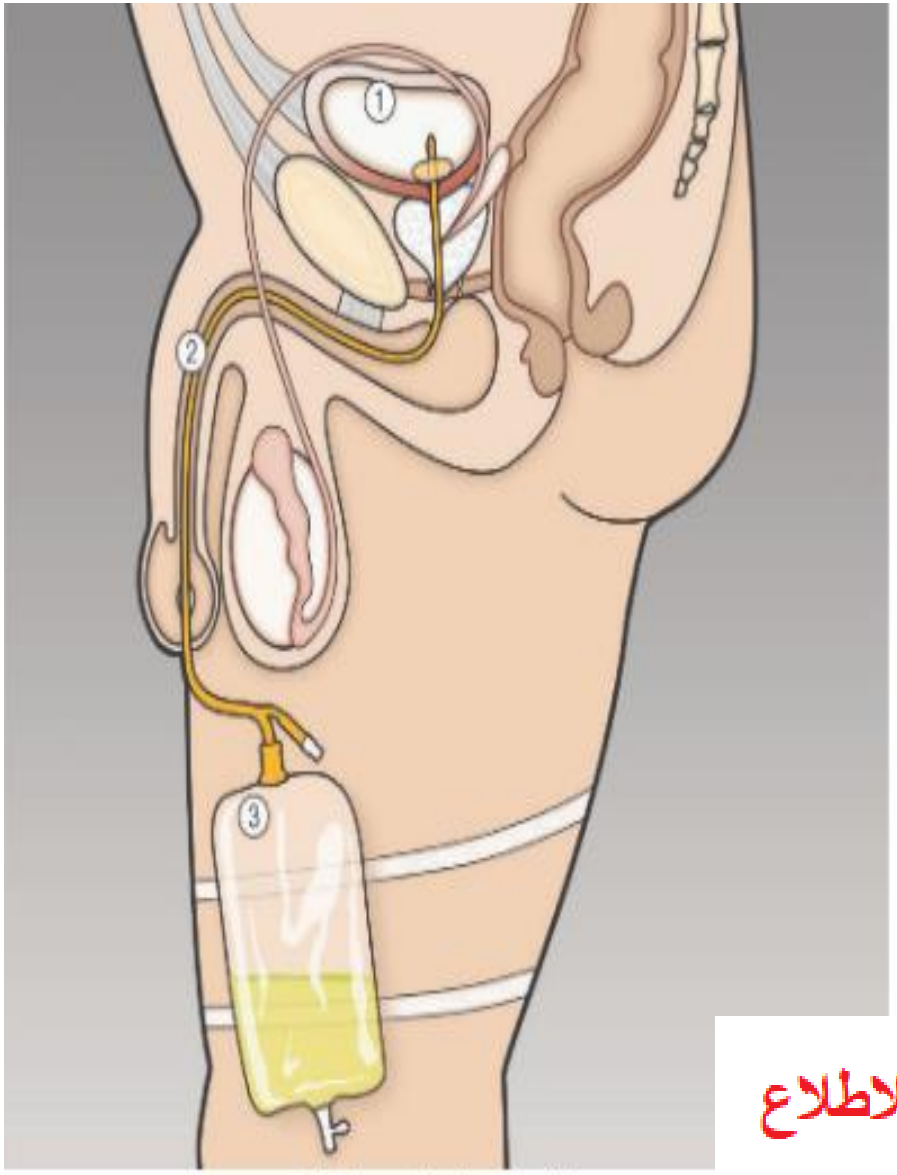


للاطلاع

d. Silvamax, Silver alloy Catheters قسطرات (ka. the. ters):

Using silver-alloy urinary catheters will reduce infections in adult patients, and would significantly improve patient care.

Silvamax is a combination of chlorhexidine gluconate 0.2% & silver-sulfadiazine 1% used to coat central venous catheters reduces the rate of catheter-related bloodstream infections.



Male catheter in situ

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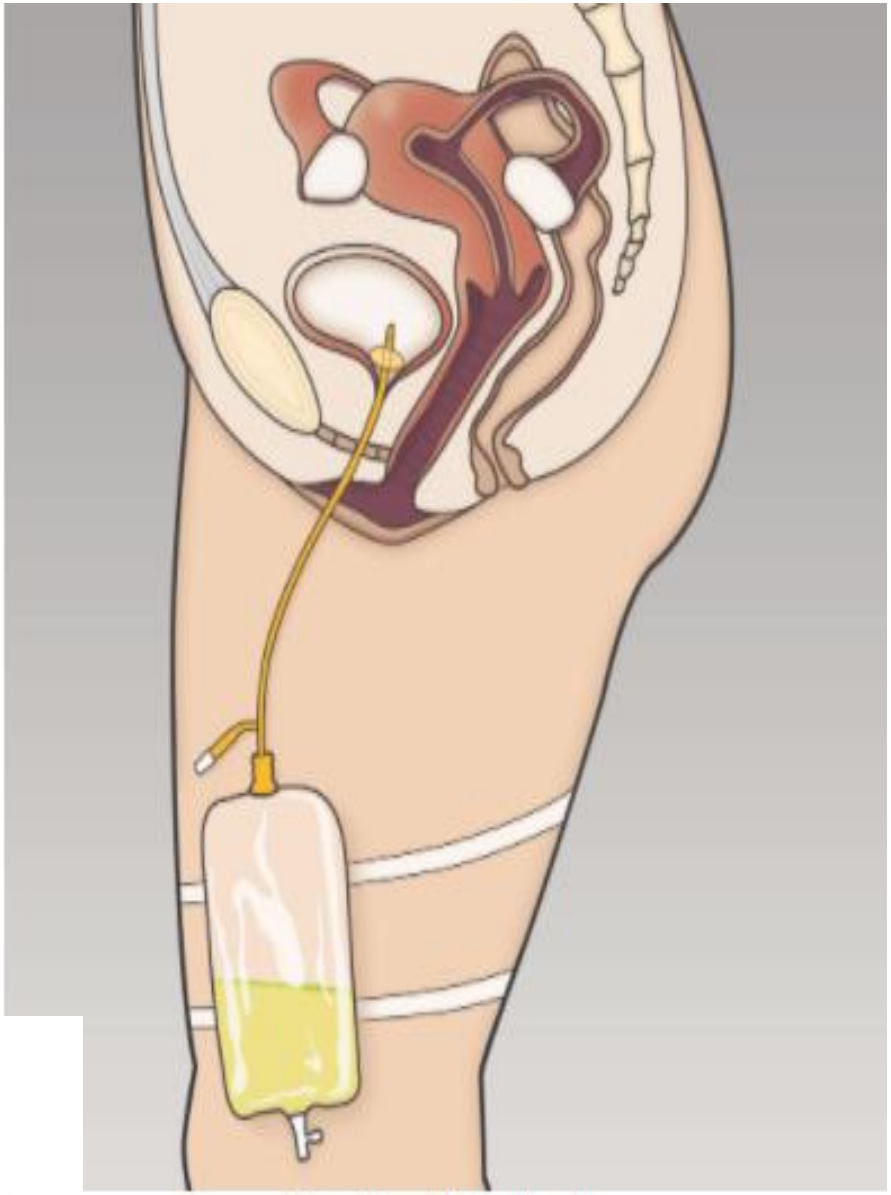
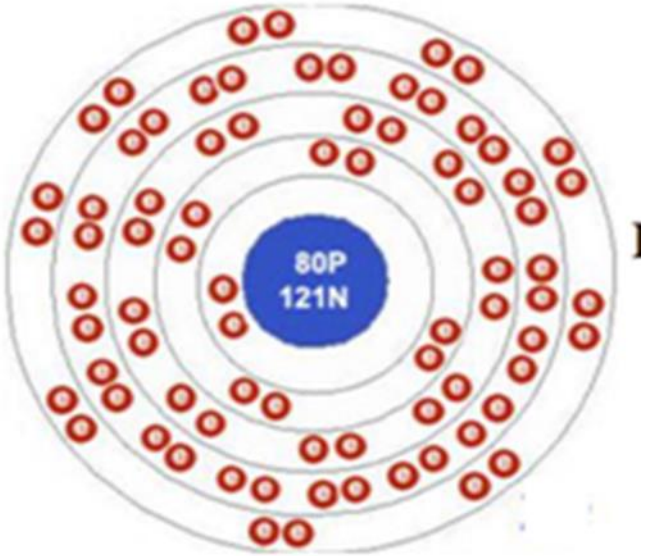


Female catheter in situ

vi)Mercury = Hg = Hydrargyrum (Hydrar. gyrum)

*The only metallic element that is liquid. It is commonly known as quicksilver.

$Hg=[Xe](54), 4f^{14}\ 5d^{10}\ 6s^2$

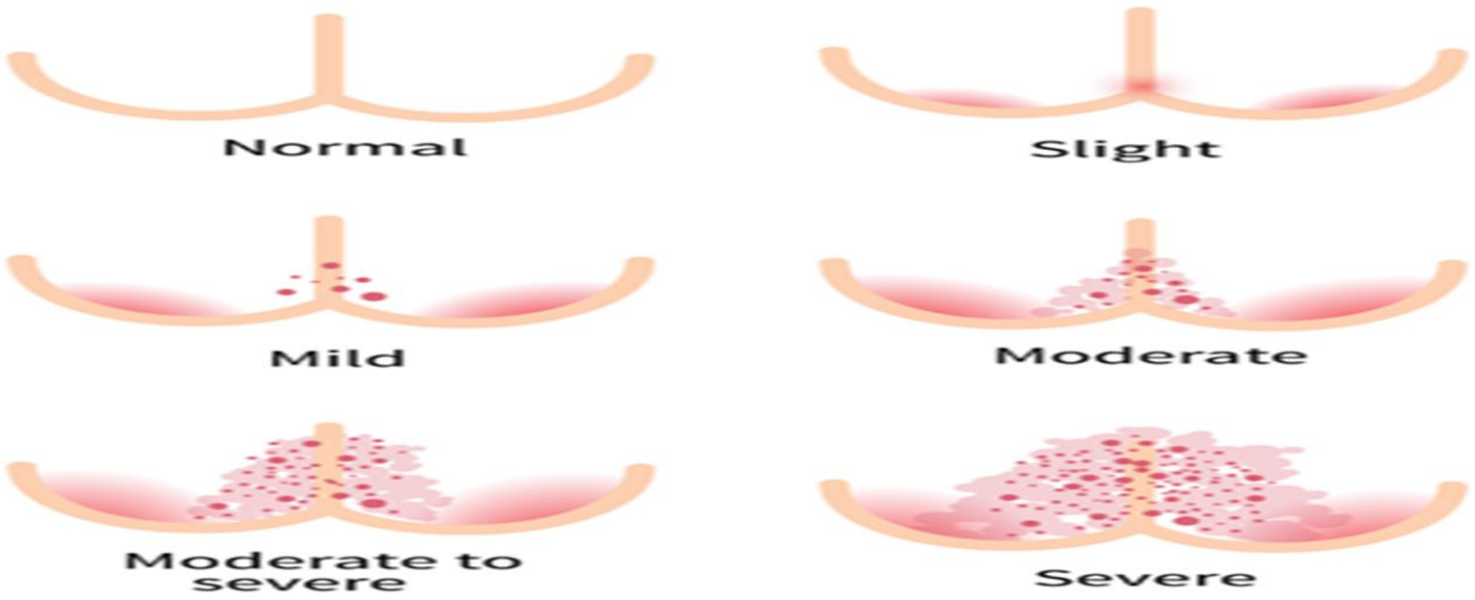


Bohr model of Hg

Mercury compounds are found in some OTC drugs

*OTC = Over-the counter = without prescription

Use to avoid diaper-rash (ointment)



*The uses of mercury compounds **including:**

i. Topical antiseptics

ii. Stimulant laxatives ملين

iii. Diaper-rash ointment

iv. Eye drops

v. Nasal sprays.

vi. Mercury is still used in some diuretics although substitutes now exist for most therapeutic uses.

ii. ANTACIDS (ALKALIS)

A class of medicines that neutralize acid in the stomach.

They contain ingredients such as:

i.Aluminum bicar. ii.Calcium bicab.

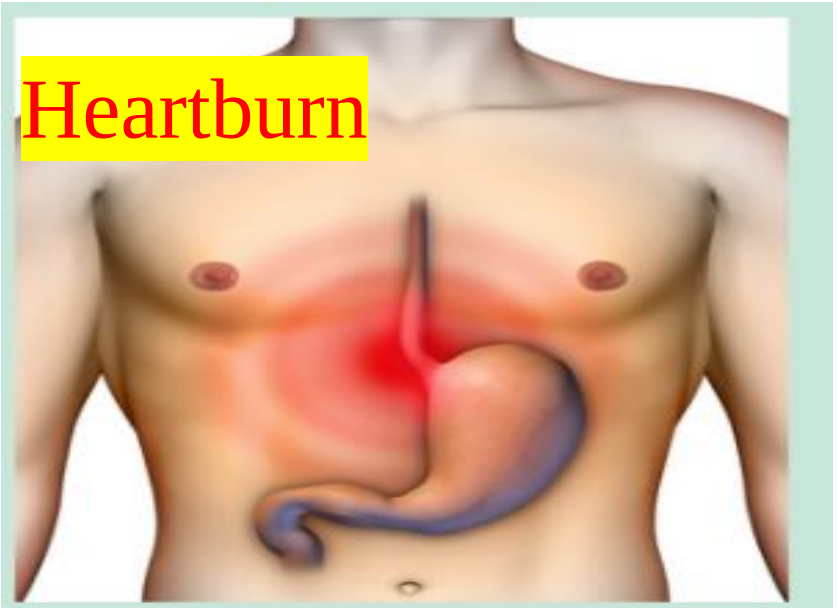
iii.Magnesium bicarb. or iv.Sodium bicarbonate which act as bases (alkalis) to neutralize stomach acid and make its pH more neutral.

Uses of Antacids :

Antacids are used to relieve the symptoms of GIT disorders such as:

i.Heartburn (dyspepsia(des. epsha) or acid reflux) by neutralizing stomach acid.

ii.Gastroesophageal المريء reflux disease (GERD)



In addition to :

i. Burning in the chest or throat area caused by acid reflux.

ii. A bitter المر taste in the mouth.

iii. A persistent المستمرةdry cough.

iv. Pain when lying down الاستلقاء and

v. Regurgitation(expulsion of material from the esophagus,) الترجيع

Examples:

a)Acid Gone (Away):

Taken by mouth, usually after meals and at bedtime as needed.

Compositions:

i.Aluminium Hydroxide $Al(OH)_3$

ii.Magnesium Hydroxide Suspension $Mg(OH)_2$

Acid gone % compositions are:

% of acid gone compositions

Active ingredient (in each 15mL tablespoonful)	
Aluminum hydroxide	95mg
Magnesium carbonate	358mg

Products:

1. Rennie:

It is used to relives:

i. Heartburn. ii. Acid indigestion. iii. Sour (sa. Wr) stomach

2.Maalox:

The same composition of acid gone.

But Maalox plus containing:

3.Simethicone, which is used to relieve the symptoms of excessive gas in GIT namely bloating انتفاخ, burping (فهقة)تجشأand flatulence (fla. you. lenc) غازات..

★ It has not been fully established that Simethicone is useful to treat colic مغصin babies, and it is not recommended for this purpose.

Mode of action: مهم

Simethicone is an anti-foaming agent That decreases the surface tension of gas bubbles, causing them to combine into larger bubbles in the digestive tract. Its effectiveness has been shown in several in vitro studies

Simethicone chewable tablets (Metsil): ★
80mg Simethicone

Simethicone Doses:

1. Adults:

40-125 mg four times

2.Infants:

20 mg four times a day, Max 240 mg per day.

May be mixed with formula or other liquids.

4.Dulcolax:

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Active ingredient: Magnesium hydroxide $Mg(OH)_2$. This liquid is laxative which helps in draw water into the colon.

Dulcolax is used to treat constipation or to empty the bowels :

i. before surgery ii. Colonoscopy iii. x-rays, or other intestinal medical procedure.

Duration of action:

It generally produce a bowel movement in 6 to 12 hours.

Onset:

Dulcolax suppositories generally produces bowel movements in 15 minutes to 1 hour.

أ.م.د. شاكر محمود سعيد

Notes:

i. Take with a full glass of water.

ii. Do not take other drugs within 2 hours of Dulcolax

iii. Shake well before use.

5.Gaviscon:

Gaviscon is Over-the-counter (OTC), which is taken by mouth to treat heartburn and gastroesophageal reflux disease.

It is use for fast-acting , long - lasting heartburn relief.

(short onset and long duration of action)

The main ingredients of Gaviscon are:

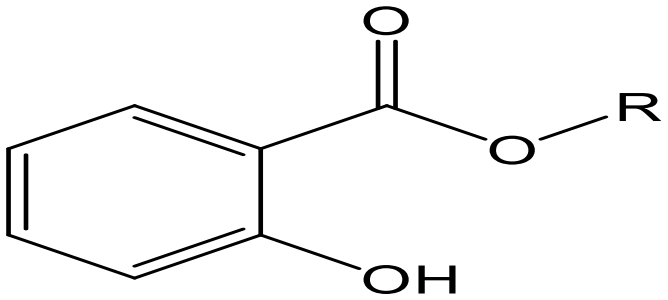
i. Sodium alginate (al.ge.net)(500 mg.).

ii. Sodium bicarbonate (sodium hydrogen carbonate)(267mg.):

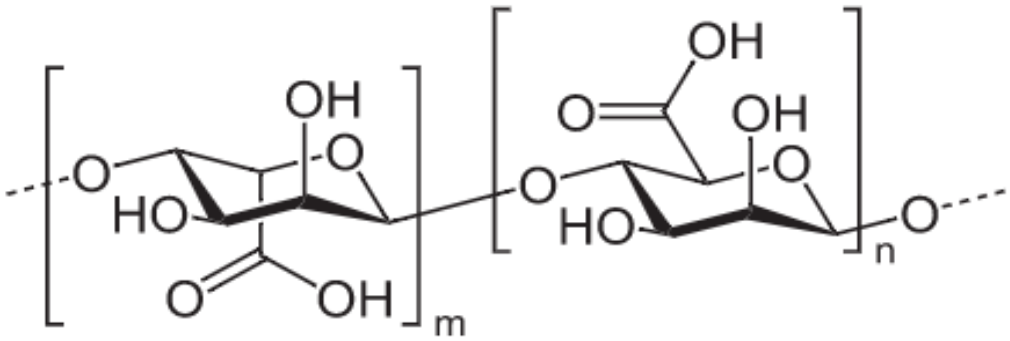
$NaHCO_3$

iii.Calcium carbonate(16mgm/ml. solution) $CaCO_3$

iv.Methyl and propyl hydroxybenzoates.



R = Me Methyl 2-hydroxybenzoate
= Pr Prpopyl 2-hydroxybenzoate



Alginic acid, also called algin, is a polysaccharide distributed widely in the cell walls of brown algae that is hydrophilic and forms a viscous gum when hydrated. With metals such as sodium and calcium, its salts are known as alginates.

Sodium alginate(al. gen. ate):

It is a salt of Alginic (al.gen.ek.) acid,

is polysaccharide significant component of the biofilms produced by the bacterium Pseudomonas aeruginosa.

Mode of action: مهم

Sodium alginate in Gaviscon double action begins by:

i. Forming a thick layer (raft) on top of the stomach contents and protects its contact from the stomach acid.

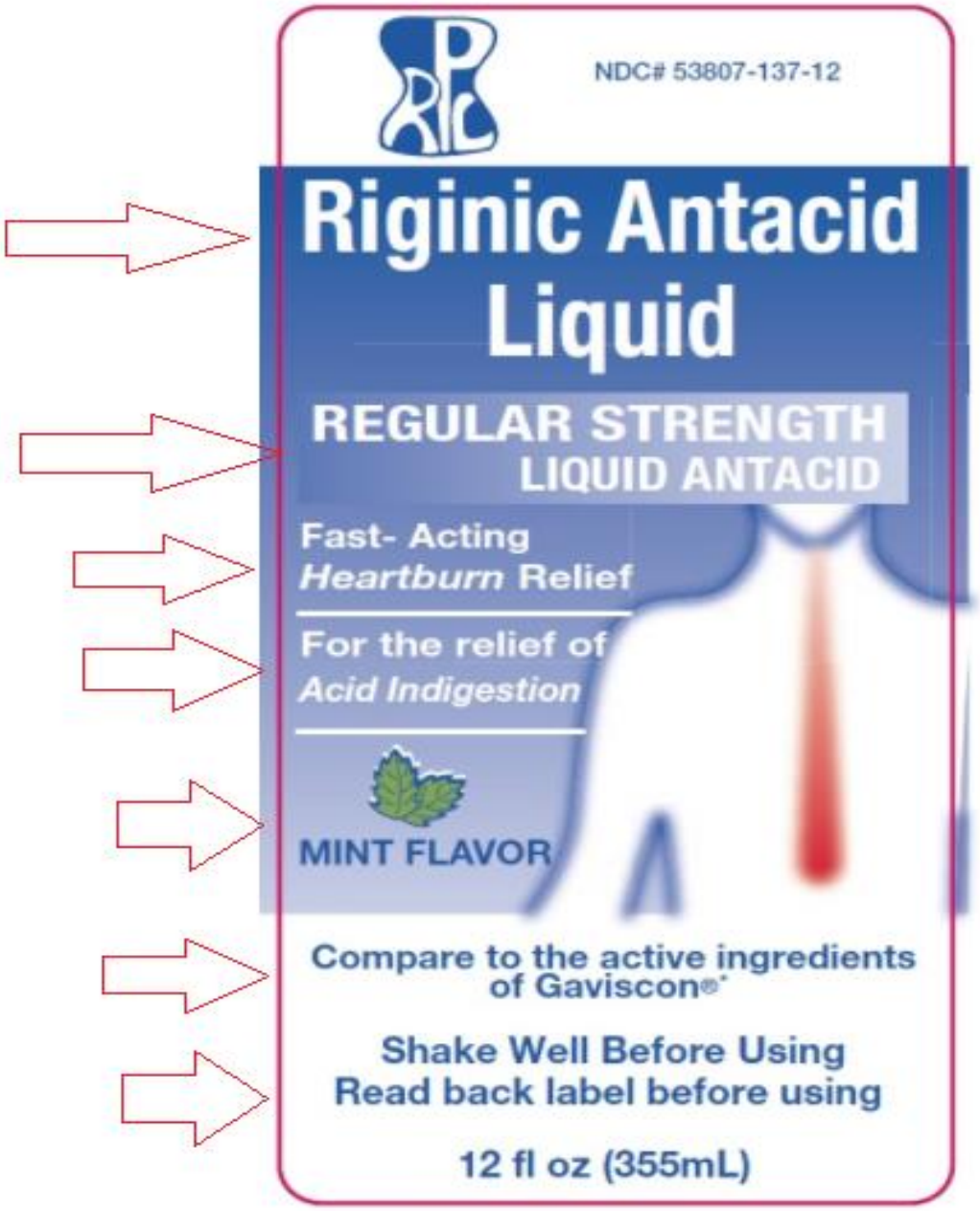
2. Neutralizes excess stomach acid thus relieves pain and discomfort of indigestion.

Classification of antacid according to its form:

i. Liquid, e.g. Riginic Antacid Liquid composed of Aluminium hydroxide 95mg in 15ml water.

Magnesium carbonate 358mg in 15ml water.

ii. Chewable gummy or tablet.



RIGINIC ANTACID LIQUID

Drug Facts

Active ingredients (in each tablepoonful)	Purpose
Aluminum Hydroxide 95 mg	Antacid
Magnesium Carbonate, Anhydrous 358 mg	Antacid

Uses relieves ■ heartburn ■ acid indigestion ■ sour stomach ■ upset stomach associated with these symptoms

Warnings

Ask a doctor before use if you have
■ kidney disease ■ a magnesium-restricted diet ■ a sodium-restricted diet

Ask a doctor or pharmacist before use if you are ■ taking a prescription drug. Antacids may interact with certain prescription drugs.

When using this product, it may have a laxative effect

Stop use and ask a doctor if symptoms last more than 2 weeks

Keep out of reach of children

Directions ■ shake well before using ■ do not take more than 8 tablespoons in 24 hours ■ do not use the maximum dosage for more than 2 weeks ■ *dosage:* 1-2 tablespoons after meals and at bedtime followed by milk or water

Other information
■ TAMPER EVIDENT: DO NOT USE IF BREAKAWAY BAND ON CAP IS BROKEN OR MISSING
■ *each tablespoon contains:* sodium 19 mg, magnesium 124 mg, Calcium 3 mg ■ store at room temperature 15°-25°C (59°-77°F)
■ keep tightly closed ■ avoid freezing

Inactive ingredients: colors, edetate disodium, flavors glycerin, methylparaben, propylparaben, saccharin, sodium alginate, sodium hypoclorite, sorbitol solution, water, xanthan gum

*This product is not manufactured or distributed by the owner of the registered trademark Gaviscon®.

Rev. 13712-310

RLI PHARMACEUTICAL CORP.
40 Commercial Avenue
Middletown, NY 10941

N 0 53807-137-12 7

iii. Effervescent tablet or powder that must dissolve in water to drink :

ENO, James Crossley Eno (1827–1915) is an OTC antacid , with main ingredients:

Sodium carbonate, Sodium bicarbonate and citric acid.

Precautions:

These people should ask their doctor before using antacids.

1. People with heart failure may have sodium restrictionsمحددات to help decrease fluid buildup. However, antacids often contain a lot of sodium.

2.People with kidney failure:

a. May develop a accumulation of aluminum after using antacids. This can lead to aluminum toxicity.

b. Also, they tend to have problems with electrolyte balance. All antacids contain electrolytes, which could make electrolyte balance problems worse.

4.Talk to your child's doctor before giving your child antacids. Children don't typically develop symptoms of excess stomach acid, so their symptoms could be related to another condition.

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