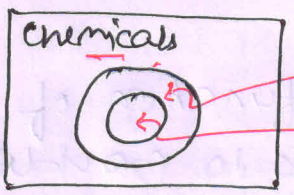
CHEMISTRY IN EVERYDAY LIFE

(i) Medicines - (60%) (ii) Food Materials (15%) (iii) Cleansing Agents (25%)

Drugs:- # Chemicals of low molecular mass (100 – 500 u).
Interact with Macromolecular "Targets" to produce a biological response.
When biological response is therapeutic & useful → Then such chemicals are called - **Medicines**.



→ diagnosis
→ prevention
→ Treatment.

Higher dose than recommended may cause potential harm to the human.

"Use of chemicals for therapeutic effect is called chemo-therapy."

Classification of Drugs:

(i) **pharmacological Effect:-** The meaning of pharmacological effect is how a drug interacts with the cell, tissue, organ or organism. pharmcological effects are studied under the branch of science called - pharmacology.

(ii) **Drug Action:-** Drug action on a particular biochemical process.

(iii) **chemical structure:-** Drugs classified in this way share common structural features and often have similar pharmacological Activity.

(iv) **Molecular Targets:-** The biomolecules such as - protein, lipids, nucleic acids & carbohydrate are targeted by drug molecules. These are called target molecule or drug targets -

Macromolecules of biological origin perform various functions in the body:

(1) Enzymes:- proteins with biological catalytic property.
(2) Receptors:- crucial to communication system in body.
(3) Nucleic Acid:- coded genetic information of the cell.
(4) Lipids & Carbohydrates:- structural parts of cell membrane.

"Enzyme As Drug Target"

Complex Nitrogenous Molecule working as Biological catalyst → (1)

Enzyme holds the substrate for a chemical Reaction at Active sites. Binding b/w Enzyme and substrate may because of any reason - Ionic Bonding, H-bonding, Van-der Waal's bonding or dipole-dipole interaction.

If such bonding is very strong b/w enzyme & inhibitor - Enzyme is called to be blocked permanently.

(2) → Second function of an enzyme is to provide functional groups that will attack the substrate and carry out chemical reaction.

Drug-Enzyme Interaction:- Read NCERT.,
(i) competetive inhibitors. (ii) Allosteric site.

Receptors As Drug Targets. - Read NCERT.

Receptors are proteins that are crucial to body's communication process. Majority of these are embedded in cell membranes. their small parts possessing active site project out of the surface of the membrane and opens up the outside region of the cell - membrane for chemical messanger.

Chemical Messanger gives message to the cell without entering the cell.

The receptors show selectivity for one chemical messanger over the other because their binding sites have different shape, structure and amino-acid composition.

Agonists: Mimic the natural messanger. Useful when there is a lack of natural chem. messanger.

Antagonists: Drug that binds to the receptor site and inhibit its natural function. Useful when blocking of message is required.

Therapeutic Action of Different classes of Drug:-

(i) Antacids - To control production of acid in stomach.

(ii) Antihistamines - works against Histamines by competing with it.

(iii) Tranquilizers → Relieves in mental disorders.

(iv) Analgesics → Pain killer.

Neurologically Active Drugs → Affect Message transfer mechanism from nerve to receptor.

(v) Antibiotics

(vi) Antiseptics & Disinfectants

Antimicrobials

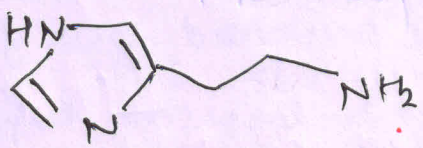
(vii) Anti-fertility Drugs.

① Antacids:- # overproduction of acid in the stomach causes irritation & pain.

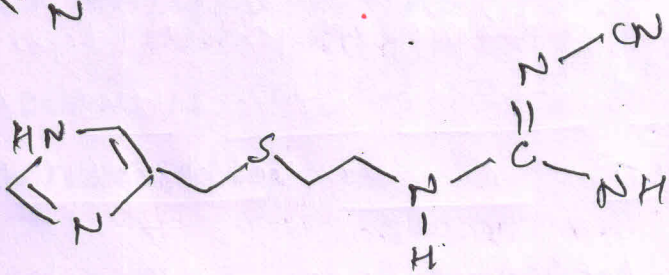
Earlier antacids are - Sodium Hydrogen carbonate or a mix. of Aluminium and Magnesium Hydroxide, However these treatment can only give relief in symptoms, not on cause.

Hyper Acidity can be treated. ~~by~~ - Histamine which stimulates the secretion of pepsin & HCl in the stomach.

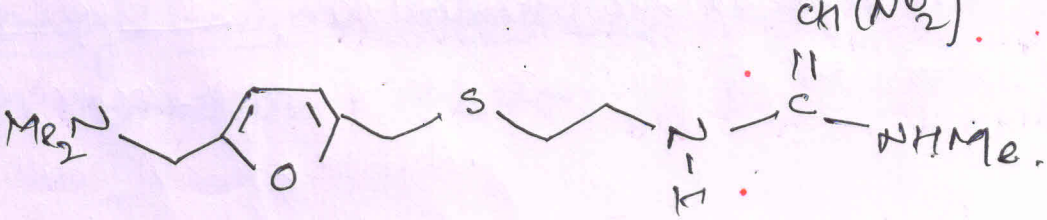
The drug cimetidine (Tegamet) prevents the interaction of Histamine with the receptors present in stomach wall, which results in lesser amount of acid.



- Histamine - stimulats production of HCl.

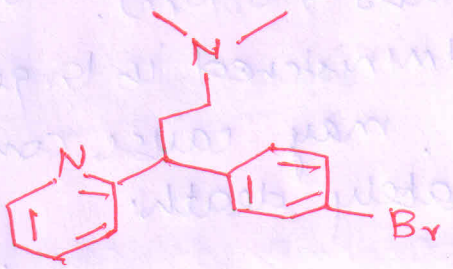


Cimetidine prevents contact (Tegamet) of Histamine with stomach wall.

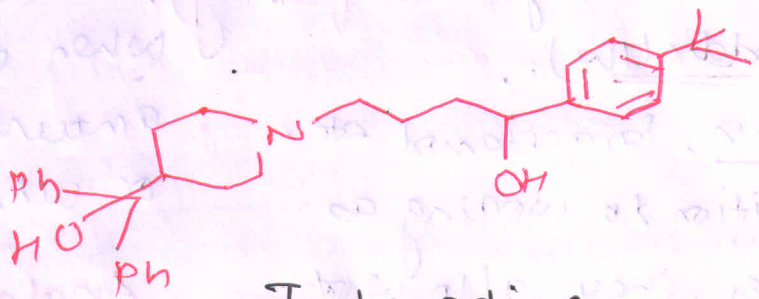


Ranitidine - (Zantac) - Another drug with some use.

Antihistamines:- Histamine is a potent vasodilator. It is responsible for nasal congestion associated by common cold or allergic response to pollen.



Brompheniramine
(Dimetapp, Dimetane)



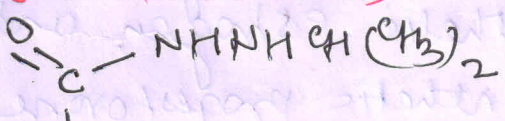
Terfenadine
(Seldane).

Tranquilizers:- # used for stress and mild or severe mental disease

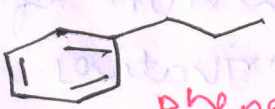
Affects message transfer mechanism from nerve to receptor.

These relieve in stress, anxiety, irritability or excitement.

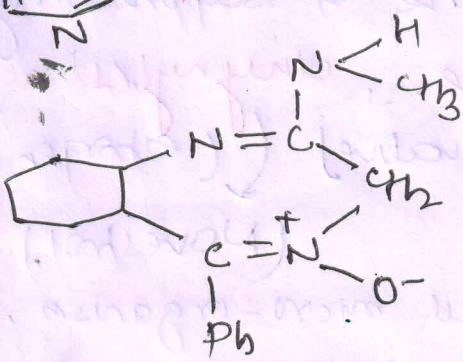
Ex:- Anti-depressants:- Iproniazid & Phenelzine etc. (Mood elevators). Benzedrine.



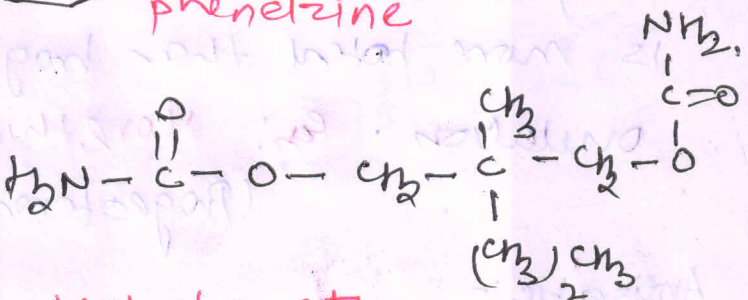
Iproniazid



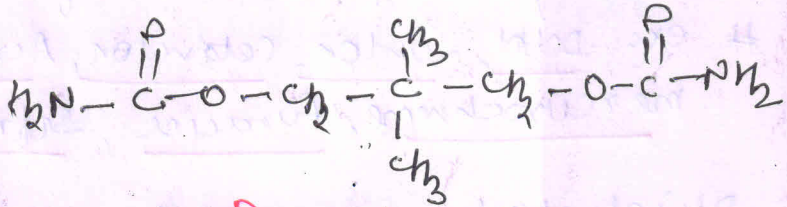
phenelzine



Chlordiazepoxide

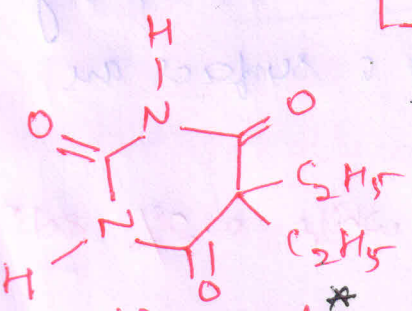


Meprobamate

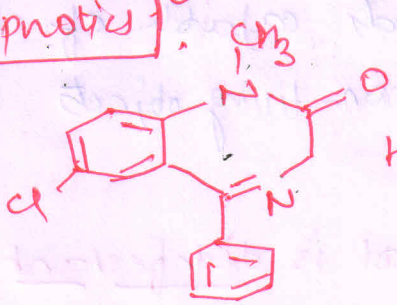


Equanil.

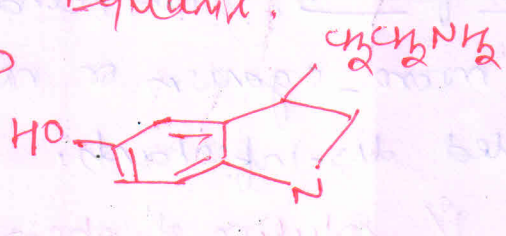
* Barbiturates → Sedatives, Hypnotics.



Veronal*



Valium*



Serotonin*

Analgesics:- Reduce/Abolish pain - pain killer.

Narcotic Drug → ex:- Morphine & its homologs (Opiates → opium). (Habit forming), when administered in large amounts, may cause coma or ultimately death.

Non-Narcotic Drug (Non-Addictive).

ex: Aspirin, Paracetamol etc.

In addition to working as pain-killer, they also work as Antipyretic (reducing fever) and preventing platelet coagulation.

Aspirin finds use in prevention of Heart Attack, Analgin

other ex: Novalgin, Ibuprofen etc.

Morphine Homologues - Heroin, codeine etc.

Analgesics are chiefly used for the relief of post-operative pain, cardiac-pain, terminal cancer and in child birth.

Antifertility Drugs:- These are birth controlling pills. They contain mixture of synthetic estrogen and progesterone derivatives. Synthetic progesterone is more potent than progesterone in suppressing ovulation. Ex: Norethindrone, ethynylestradiol. (Progesterone derivative) ((estrogen deri).

(Norestrol.)

Antiseptic:-

Prevent/destroy the growth of harmful micro-organism.

ex: Dettol, Savlon, Cetavelon, Acriflavin, Iodine, Methylene blue, mercurochrome, Furacine, Soframicine etc. Boric Acid (eyes).

Disinfectants:- compounds capable of completely destroying the micro-organism or non-living objects on a surface are called dis-infectants.

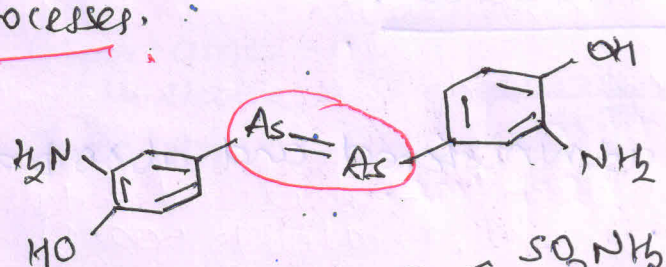
Ex:- 1% solution of phenol is disinfectant while 0.2% sol^n of phenol is Antiseptic

common examples.
- # Deltol - chloroxylenol & terpineol.
- # Soaps - Biothional (Biothional)
- # Tincture of Iodine - 2-3% solution of Iodine in alcohol.
- # Iodoform -

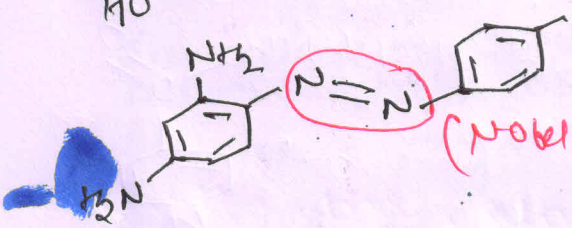
ANTIBIOTICS.

Antibiotics are used as drugs to treat infections because of their low toxicity for humans and animals.

An antibiotic is a substance which is wholly or partly synthesised & in low concentrations inhibits the growth or destroys micro-organisms by intervening in their metabolic processes.

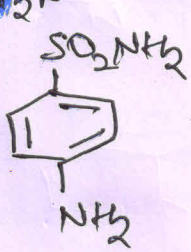


Arsphenamine (Salvarsan) → fights against Syphilis

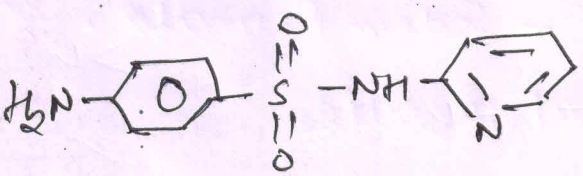


Prontosil* - effective First Antibacterial agent.

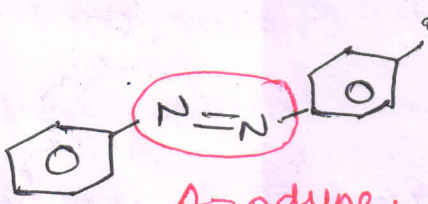
(Nobel prize)



Sulphanilamide



Sulphapyridine



Azodyne.

Antibiotics have either cidal (killing) effect or a static (inhibitory) effect on microbes.

Bactericidal.

Penicillin*
Aminoglycosides.
ofloxacin

Bacteriostatic

Erythromycin*.
Tetracycline
Chloramphenicol.

(i) Broad spectrum Antibiotics – kill/inhibit wide range of Gram-positive and gram- negative bacteria.

(ii) Narrow spectrum Antibiotics - Mainly against Gram-positive or gram- negative bacteria.

(iii) limited spectrum - Against a single organism or disease.

Penicillin G, Ampicillin, Amoxycilin vancomycin, Ofloxacin,
↓ Narrow — Broad spectrum Antibiotics.

It is advised to test the patients for allergy to penicillin before it is administered.

Other examples:

chloromphenicol - orally administered and absorbed by gastrointestinal tract.

CHEMICALS IN FOOD:
→ Preservation of food
→ Enhancing their appeal
→ Adding Nutritive value.

Food Additives:

(i) Food colours
(ii) Flavours & sweeteners. Imp
(iii) fat ~~sauce~~ emulsifiers & stabilising Agents.
(iv) Flour improvers → bleaches.
(v) Anti oxidants
(vi) Preservatives. Imp
(vii) Nutritional supplements. → Add Nutritional value to the food.

donot calories to food, good for diabetic patients.

Artificial Sweetening Agents:- Sweetness compared to cane sugar.

Aspartame → used in cold foods mainly. unstable at cooking temp. — 100

Saccharin (ortho - sulpho benzimide) — 550

Sucralose :- Trichloro derivative of sucrose. stable at cooking temp. — 600

Alitame :- very sweet. control of sweetness is difficult. — 2000.

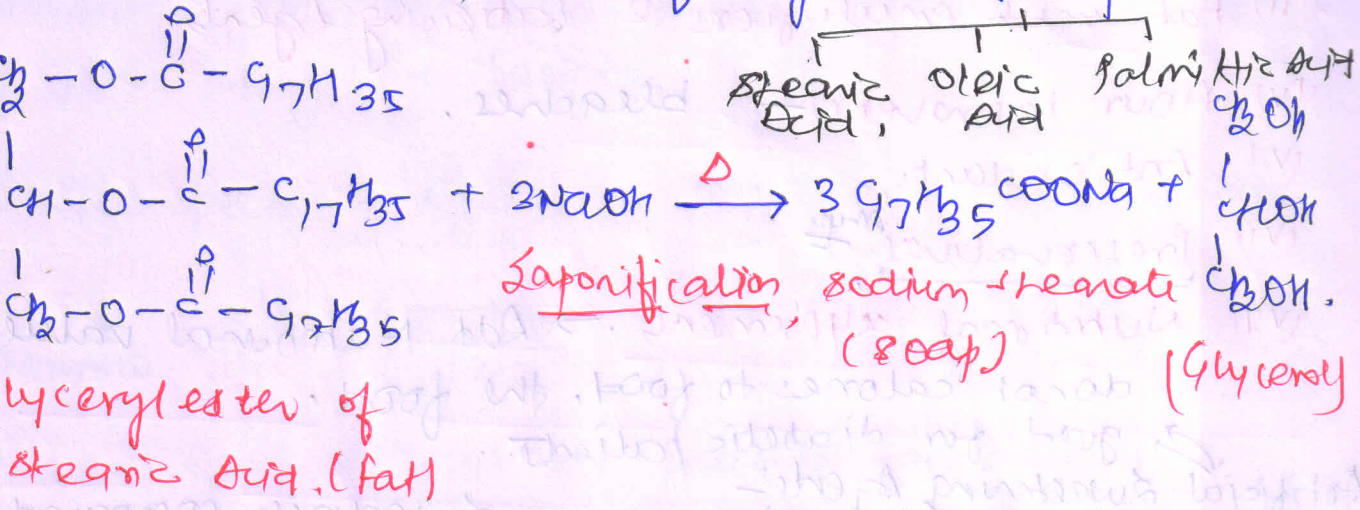
Food Preservatives:- They prevent spoilage of food due to microbial growth — salt, sugar, vegetable oil, & sodium benzoate C_6H_5COONa. — limited quantity is metabolised in body.

other ex:-
Salts of sorbic Acid & propanoic Acid also

Cleansing Agents
- soaps
- Synthetic Detergents

Soap:-

Sodium or Potassium salts of long chain fatty acids.



Potassium soaps are softer than sodium soaps.

Types of Soaps:-

Additions.

(i) Toilet Soap- colour & perfume.

(ii) Medicated soap - Medicines.

(iii) Shaving soap - Glycerol.

(iv) Laundry soap. - Sodium Resinate, sod. silicate etc.

(v) Soaps that float in water.

Hard water contains calcium and magnesium ions. These ions form insoluble Mg & Ca soaps respectively.

$$2\,C_{17}H_{35}COONa + CaCl_2 \longrightarrow 2NaCl + (C_{17}H_{35}COO)_2Ca.$$

Insoluble soap.

↓

Hindrance to good wash.

Synthetic Detergents:- Actually doesnot contain soap but have all the properties of soap. Can be used in hard as well as ~~soft~~ water.

Anionic Detergents - Household work & toothpaste.

Cationic detergents. - germicidal property, expensive.

Non-Ionic Detergents - liquid dishwashing detergents.

"Highly branched hydrocarbon chain can not be degraded easily by bacteria & thus this waste accumulates in ponds, rivers etc & causes foam!".

Read NCERT ① Medicines. - 60%

② Artificial sweeteners. - 10%

③ Soaps & detergents. - 25%.