Drugs
Chemicals used for curing diseases without causing appreciable side effects.

Chemotherapy
Science which uses chemicals for treatment of diseases.

Classification of Drugs:
(a) on the basis of pharmacological effect: Analgesics have pain killing effect; antiseptics kill or arrest the growth of microorganisms.
(b) on the basis of drug action: All antihistamines inhibit the action of the compound histamine which causes inflammation in the body.
(c) on the basis of chemical structure: Sulphonamides have common structural feature:

\[
\begin{array}{c}
\text{H}_2\text{N} \\
\text{C} \\
\text{S} \\
\text{NHR}
\end{array}
\]

(d) on the basis of molecular targets: Drugs usually interact with biomolecules such as carbohydrates, lipids, proteins and nucleic acids. These are called target molecules or drug targets. [CBSE D 2019 Set 1]

→ Allosteric sites: Some drugs do not bind to the enzymes active site. These bind to a different site of enzyme called allosteric sites.

→ Antagonists: Drugs that bind to the receptor site and inhibit the natural function are called antagonists.
**Therapeutic Action of Different Classes of Drugs**

1. **Antacids:** Those drugs which cure the acidity in stomach known antacids.
   - E.g. Histamine stimulates the secretion of peptic and pepsin in the stomach.
   - 1) ranitidine (Zantac)

2. **Antihistamines:**
   - **Properties**
     1. Histamine is a potent vasodilator.
     2. It contracts the smooth muscles in the bronchi and gut and relaxes other muscles.
     3. Histamine is also responsible for the nasal congestion associated with common cold and allergic response to pollen.
   - **Examples:** dimetapp and sedorep

3. **Why do above mentioned antihistaminus not affect the secretion of acid in stomach?**
   - **Ans:** The reason is that antiallergic and antacid drugs work on different receptors.
Neurologically active Drugs.-

(a) Tranquilizers: The chemical substances used for treatment of stress, fatigue, mild and severe mental diseases are called tranquilizers.
   Eg.: Nosadrenaline, Equanil, sedonal, phenazine, luminal etc.
   veronal, amytal, nembutal.

Antidepressant drugs.- These drugs inhibit the enzymes which catalyse the degradation of noradrenaline.
   Eg.: Iproniazid

(b) Analgesics: Analgesics reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or coma other disturbances of nervous system.

Classification.-

(i) Non-Narcotic Analgesics: These drugs are effective in relieving skeletal pain, reduce fevers and preventing platelet coagulation.
   Eg.: Aspirin, Paracetamol.

(ii) Narcotic Analgesics: These drugs are effective in relieving postoperative pain, cardiac pain and pains of terminal cancer and in child birth.
   Eg.: Morphine.
CHEMICALS IN FOOD

Artificial Sweetening Agents: They are the compounds which make the food sweet in taste without adding calories to the food.

It is useful for diabetic persons and people who need to control intake of calories.

Ex: Aspartame, Saccharin, Sucrose, Aftame.

Q1. Why is the use of Aspartame limited to cold foods?

Ans: Aspartame is an artificial sweetener which is unstable at cooking temperature hence its use is limited to cold foods and drinks. (CBSE D 2019)

Q2. Why the use of Alitame as artificial sweetener is not recommended? (CBSE Delhi 2019)

Ans: It is difficult to control the sweetness after using Alitame hence its use is not recommended.

Food Preservatives: Food preservatives prevent spoilage of food due to microbial growth.

Eg: Sodium benzoate.
Antimicrobials:

(a) Antibiotics: These are the compounds which either inhibit the growth of bacteria or kill bacteria. [CBSE 2019]
Eg: Penicillin.

Classification of Antibiotics based on spectrum:

(i) Broad spectrum Antibiotics: Antibiotics which kill or inhibit a wide range of gram-positive and gram-negative bacteria are known as broad spectrum Antibiotics.
Eg: Ampicillin, ofloxacin etc.

(ii) Narrow spectrum Antibiotics: The Antibiotics which are effective against either gram-positive or gram-negative bacteria are known as narrow spectrum Antibiotics.
Eg: Penicillin G has a narrow spectrum.

(iii) Limited spectrum Antibiotics: Antibiotics which are effective against a single organism or single disease known as limited spectrum Antibiotics.
Eg: Cefixime.
Antiseptic and disinfectants: These are the chemicals used to kill or prevent the growth of microorganisms when applied to the living tissue.

Eg - soframycin, furacine etc.

Some Important antiseptic:

- Bithional: Bithional is added to soaps to impart antiseptic properties.

- Tincture of Iodine: 2-3 percent solution of iodine in alcohol-water mixture is known as tincture of iodine.

Disinfectants: Disinfectants are applied to inanimate objects such as floor, drainage system, instruments etc.

Same substances can act as an antiseptic as well as disinfectant by varying the concentration.

Ex - 0.2% solution of phenol is an antiseptic while 5% solution is disinfectant.

Antifertility drugs: These drugs are used to decrease fertility and decrease population.

Eg - Northindrone, Novestrol.
Cleansing Agents

Soaps
Soaps are sodium or potassium salts of long chain fatty acid and used for cleaning purpose.
Eg: stearic acid, oleate, and palmitic acids

Saponification
Soaps containing sodium salts are formed by heating fat (with glyceryl ester of fatty acid) with aqueous sodium hydroxide soln. This reaction is known as saponification.

\[
\begin{align*}
\text{CH}_2-\text{O}-\text{C}-\text{C}_17\text{H}_{35} + 3\text{NaOH} & \rightarrow 3\text{C}_17\text{H}_{35}\text{COO}\text{Na} + \text{sodium stearate} \\
\text{CH}_2-\text{O}-\text{C}-\text{C}_17\text{H}_{35} & \\
\text{CH}_2-\text{O}-\text{C}-\text{C}_17\text{H}_{35} & \\
\text{glyceryl ester of stearic acid} & \\
\end{align*}
\]

Ans-
Why do soaps not work in hard water?
Hard water contains \( \text{Ca}^{2+} \) and \( \text{Mg}^{2+} \) ions. These ions form insoluble calcium and magnesium soaps respectively when sodium and potassium soaps are dissolved in water.

\[
2\text{C}_17\text{H}_{35}\text{COONa} + \text{CaCl}_2 \rightarrow \text{NaCl} + (\text{C}_17\text{H}_{35}\text{COONa})_2 \text{calcium stearate soap}
\]
SYNTHETIC DETERGENTS

- Synthetic detergents are cleaning agents which have all properties of soap, but which actually do not contain any soap. These can be used both in soft and hard water.

Classification of synthetic detergents:

(i) Anionic Detergents: Anionic detergents are sodium salts of sulphonated long chain alcohol or hydrocarbons.

\[
\text{CH}_3\text{(CH}_2\text{)}_{10}\text{CH}_2\text{OH} + \text{H}_2\text{SO}_4 \rightarrow \text{C}_12\text{(CH}_2\text{)}_{10}\text{CH}_2\text{SO}_4\text{Na} + \text{H}_2\text{O}
\]

Lauryl Alcohol \( \rightarrow \) Lauryl Hydrogen Sulphate

\[
\text{CH}_3\text{(CH}_2\text{)}_{11}\text{H} + \text{H}_2\text{SO}_4 \rightarrow \text{C}_12\text{(CH}_2\text{)}_{11}\text{SO}_4\text{Na} + \text{H}_2\text{O}
\]

Dodecyl Benzene \( \rightarrow \) Dodecyl Benzene Sulphonic acid

Note: Anionic Detergents are used in toothpaste.

(ii) Cationic Detergents: Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions.

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\text{CH}_3\text{(CH}_2\text{)}_{15}\text{N}^+ + \text{CH}_3\text{Cl}^- \rightarrow \text{Cetyltrimethyl ammonium chloride}
\]

\[
\text{CH}_3\text{(CH}_2\text{)}_{15}\text{N}^+ + \text{Cl}^- \rightarrow \text{Cetyltrimethyl ammonium chloride}
\]

E.g. - 

\[
\left[\text{CH}_3\text{(CH}_2\text{)}_{15}\text{N}^+ + \text{CH}_3\text{Cl}^-\right] +
\]

Cetyltrimethyl ammonium bromide
(iii) **Non-Ionic detergents**

Non-Ionic detergents do not contain any ion in their constitution. One such detergent is formed when stearic acid reacts with polyethylene glycol.

**Note:** Liquid dishwashing detergents are non-ionic type.