Chapter 16
Chemistry in Everyday Life

1. efine Drugs.

Ans.Drugs are chemicals of low molecular masses which interact with macromolecular targets and produce a biological response.

2.Define chemo therapy.

Ans. The use of chemicals for therapeutic use is called chemotherapy.

3. What are the various basis of classification of drugs?

Ans. Drugs are classified on the basis of

(a) Pharmacological effect

(b) Drug action

(c) Chemical structure

(d) Molecular targets

4. Give some examples of drug targets.

Ans.Examples of drug targets – Enzymes, Receptors, Lipids, Carbohydrates etc.

5. What are antagonists and agonists?

Ans. Drugs that bind to the receptor site & inhibit its natural action are called antagonists whereas the drugs that mimic the natural messenger by switching on the receptor are agonists.

6. Metal – hydroxides are used an antacids instead of metal hydrogen carbonates. Why?

Ans. Excessive hydrogen carbonates can make the stomach alkaline and trigger the

production of even more acid. Therefore metal hydroxides are better antacids as they are insoluble & do not increase pH above neutrality.

7.What are antihistamines? Give two examples.

Ans. Antihistamines prevent the interaction of histamine with the receptors present in the stomach wall e.g. Rantidine, Soldane etc.

8.Give two examples of barbiturates.

Ans. Examples of barbiturates –

Veronal, amytal, Nebutal, Liminal & Seconal.

9.What are analgesics?

Ans. Analgesics reduce or cure pain without causing impairment of consciousness, mental confusion, incoordiantion or paralysis or some other problem of nervous system.

10. What are tranquilizers?

Ans. Tranquilizers are neurologically active drugs which are used for the treatment of stress and mild or even severe mental diseases.

11.Give two examples of drugs used as antiseptics and disinfectants.

Ans. Drugs used antiseptics on well on disinfectants –

(1) 0.2% solution of phenol is an antiseptic while its one % solution disinfectant.
(2) Dettol.

12.Give two examples of antifertility drugs.

Ans. Antifertility drugs –

1. Norethindrone
2. Novestcof (ethrynylestrediol)

13.Give some examples of artificial sweeteners.

Ans. Examples of artificial sweeteners are Aspartame, Saccharin, Alitame, Sucrolse etc.

14.Which artificial sweetener is preferred for diabetes and why?

Ans. Saccharin is preferred for diabetic persons as it is excreted from body in urine unchanged. It is entirely inert and harmless when taken.

15.What are the limitations of aspartame and alitame?

Ans. Aspartame is of limited use because it in unstable at cooking temperature & is used in cold foods & soft drinks.
Alitame is a high potency sweetener & its sweetness cannot be controlled.

16.Name two food preservatives.

Ans. Two food preservatives are table salt, sodium benzoate etc.

17.How are floating soaps made?

Ans. Floating soaps are made by beating tiny air bubbles before the hardening of soap.

18. Why soaps do not work in hard water?

Ans. Hard water contains calcium and magnesium ions, which form insoluble calcium or magnesium soaps when soap is dissolved in hard water. They separate as scum in water and are useless as cleaning agents. Therefore soaps do not work in hard water.

2 Mark Questions

1. How does an antidepressant work? Explain with example.

Ans. Antidepressants are used in case of a person suffering from depression e.g. noradrenalin is a neurotransmitter that plays a role in mood change. If the level of noradrenaline is low, the person suffers from depression. An antidepressants inhibits the enzyme which catalyses the degradation of noradrenalin. If the enzyme is inhibits, the neurotransmitter is slowly metabolized & can activate the receptor for longer time & counteracts the effect of depression.

2. Explain the types of analgesics with example.

Ans.Analgesics are classified an

(i) Non narcotic analgesics – These drugs are effective in relieve skeletal pain & are non – addictive. They may have many other effects like reducing fever and preventing platelet coagulation. e.g. Aspirin & Paracetamol.

(ii) Narcotic analgesics – These are habit forming or addictive drugs e.g. morphine & its homologues. They, when administered in medicinal doses relieve pain & produce sleep but in poisonous doses, they can produce coma, convulsions & even death.

3. What are antibiotics?

Ans.Antibiotics are the drugs used to treat infections because of their low toxicity for humans & animals. They are the substances produced wholly or partly by chemical synthesis, which in low concentration inhibit the growth or destroys the microorganisms by intervening in their metabolic processes.

4. How are antibiotics classified? Explain with example.

Ans. Antibiotics are classified on the basis of –

(1) Their cidal (killing) or. Static (inhibitory) effect. They can be Bactericidal (inhibits the actinty) e.g. penicillin in bactericidal white Tetracycline is bactereostatic.

(2) Their spectrum of action i.e. the range of bacteria or other microorganisms that are affected by them. Antibiotics which are effective against a wide range of Gram – positive are broad spectrum antibiotics, those effective mainly against Gram – positive or gram negative bacteria are narrow spectrum antibiotics wherever those effective against only a single bacteria are limited spectrum antibiotics. e.g. Penicillin G is narrow spectrum while Arnpicillin in broad spectrum antibiotic.

5. What in the difference between antiseptics & disinfectants?

Ans.Antiseptics are those antimicrobials which are applied to the living tissues such an wounds cuts, ulcers and diseased skin surfaces e.g. sofracmicine etc. these are not ingested like antibiotics. Disinfectants are applied to inanimate objects such as floors, drainage system instruments etc. e.g. phenol.

6. How is the problem of non – biodegradable detergents solved?

Ans.The detergents having highly branched hydrocarbon part is non – biodegradable & causes water pollution. This problem can be overcome if the branching of hydrocarbon chain is controlled & kept to minimum – unbranched detergents are biodegradable and cause less pollution.

3 Mark Questions

1. How are detergents classified?

Ans. Synthetic detergents are classified as –

(a) Anionic detergents – these are sodium salts of sulphonated long chain alcohols or hydrocarbon. Here the anionic part of the molecule is involved in the cleansing action. e.g. sodium laurylsulphate.

(b) Cationic detergents – these are quaternary ammonium salts of amines with acetates, chlorides or bromides anions. e.g. cetyletrimethyl – ammonium bromide.

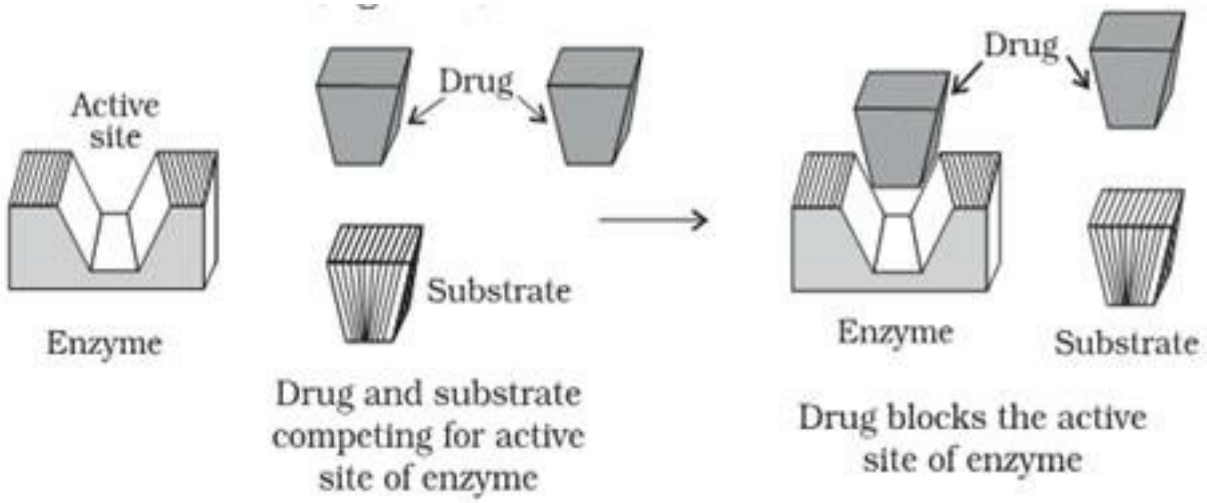
(c) Non – ionic detergents – these detergents do not contain any ion in their constitution. e.g. $CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$

5 Mark Questions

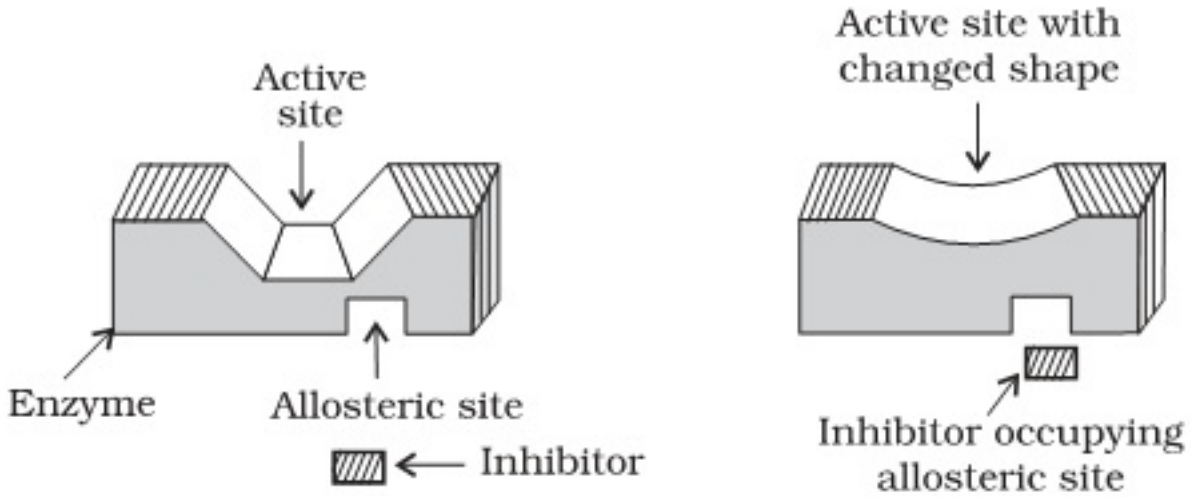
1. Explain drug – enzyme interaction.

Ans. Drug – Enzyme interaction – Drugs can block the binding site of the enzyme and prevent the binding of substrate or can inhibit the catalytic activity of enzyme acting as enzyme inhibitors. Drugs inhibit the attachment of substrate on active site of enzyme in two different ways –

(i) They compete with the natural substrate for their attachment on the active site of enzyme acting as competitive inhibitors.



(ii) Some drugs bind to a different site, called allosteric site so as to change the shape of active site in such a way that substrate cannot recognise it.



If the bond formed between an enzyme & an inhibitor is a strong covalent bond, the enzyme is blocked permanently & is degraded by the body.

2. Why do we need to classify drugs in different ways?

Ans. The classification of drugs and the reasons for classification are as follows:

(i) On the basis of pharmacological effect:

This classification provides doctors the whole range of drugs available for the treatment of a particular type of problem. Hence, such a classification is very useful to doctors.

(ii) On the basis of drug action:

This classification is based on the action of a drug on a particular biochemical process. Thus, this classification is important.

(iii) On the basis of chemical structure:

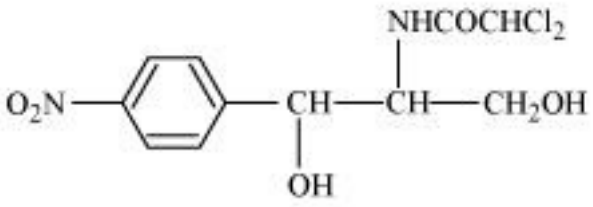
This classification provides the range of drugs sharing common structural features and often having similar pharmacological activity.

(iv) On the basis of molecular targets:

This classification provides medicinal chemists the drugs having the same mechanism of action on targets. Hence, it is the most useful to medicinal chemists.

3. **What is meant by the term 'broad spectrum antibiotics'? Explain.**

Ans. Antibiotics that are effective against a wide range of gram-positive and gram-negative bacteria are known as broad spectrum antibiotics. Chloramphenicol is a broad spectrum antibiotic.



Chloramphenicol

It can be used for the treatment of typhoid, dysentery, acute fever, pneumonia, meningitis, and certain forms of urinary infections. Two other broad spectrum antibiotics are vancomycin and ofloxacin. Ampicillin and amoxicillin -synthetically modified from penicillin - are also broad spectrum antibiotics.

4. How do antiseptics differ from disinfectants? Give one example of each.

Ans. Antisepticsand disinfectants are effective against micro-organisms. However, antiseptics are applied to the living tissues such as wounds, cuts, ulcers, and diseased skin surfaces, while disinfectants are applied to inanimate objects such as floors, drainage system, instruments, etc. Disinfectants are harmful to the living tissues.

Iodine is an example of a strong antiseptic. Tincture of iodine (2 - 3 percent of solution of iodine in alcohol - water mixture) is applied to wounds. 1 percent solution of phenol is used as a disinfectant.

5. Why are cimetidine and ranitidine better antacids than sodium hydrogen carbonate or magnesium or aluminium hydroxide?

Ans. Antacids such as sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide work by neutralising the excess hydrochloric acid present in the stomach. However, the root cause for the release of excess acid remains untreated.

Cimetidine and rantidine are better antacids as they control the root cause of acidity. These drugs prevent the interaction of histamine with the receptors present in the stomach walls. Consequently, there is a decrease in the amount of acid released by the stomach. This is why cimetidine and rantidine are better antacids than sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide.

6. Explain the following terms with suitable examples

(i) Cationic detergents

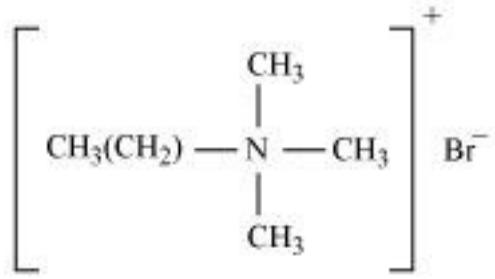
(ii) Anionic detergents and

(iii) Non-ionic detergents

Ans. (i) Cationic detergent

Cationic detergents are quaternary ammonium salts of acetates, chlorides, or bromides. These are called cationic detergents because the cationic part of these detergents contains a long hydrocarbon chain and a positive charge on the N atom.

For example: cetyltrimethylammonium bromide



Cetyltrimethylammonium bromide

(ii) Anionic detergents

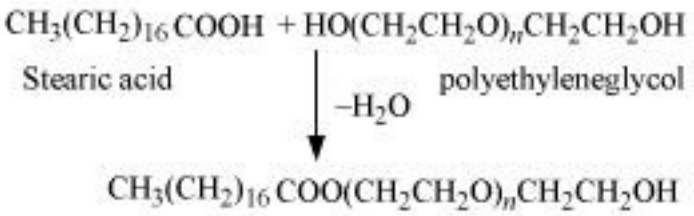
Anionic detergents are of two types:

1.Sodium alkyl sulphates: These detergents are sodium salts of long chain alcohols. They are prepared by first treating these alcohols with concentrated sulphuric acid and then with sodium hydroxide. Examples of these detergents include sodium lauryl sulphate ($C_{11}H_{23}CH_2OSO_3$ -Na+) and sodium stearyl sulphate ($C_{17}H_{35}CH_2OSO_3$ -Na+).

2.Sodium alkylbenzenesulphonates: These detergents are sodium salts of long chain alkylbenzenesulphonic acids. They are prepared by Friedel-Crafts alkylation of benzene with long chain alkyl halides or alkenes. The obtained product is first treated with concentrated sulphuric acid and then with sodium hydroxide. Sodium 4-(1-dodecy) benzenesulphonate (SDS) is an example of anionic detergents.

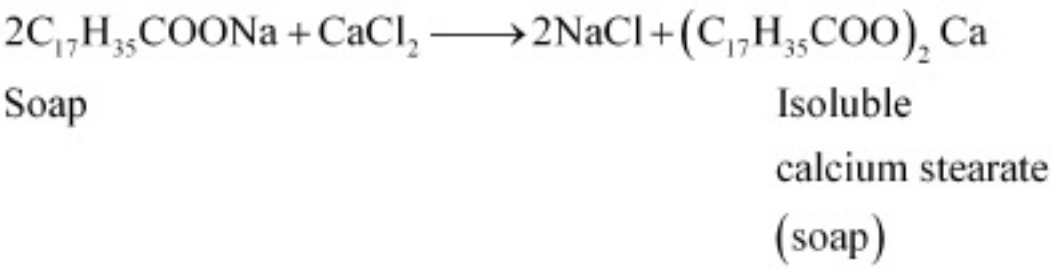
(iii)Non-ionic detergents

Molecules of these detergents do not contain any ions. These detergents are esters of alcohols having high molecular mass. They are obtained by reacting polyethylene glycol and stearic acid.



7. Why do soaps not work in hard water?

Ans. Soaps are sodium or potassium salts of long-chain fatty acids. Hard water contains calcium and magnesium ions. When soaps are dissolved in hard water, these ions displace sodium or potassium from their salts and form insoluble calcium or magnesium salts of fatty acids. These insoluble salts separate as scum.



This is the reason why soaps do not work in hard water.

8. Explain the cleansing action of soaps.

Ans. Soap molecules form micelles around an oil droplet (dirt) in such a way that the hydrophobic parts of the stearate ions attach themselves to the oil droplet and the hydrophilic parts project outside the oil droplet. Due to the polar nature of the hydrophilic parts, the stearate ions (along with the dirt) are pulled into water, thereby removing the dirt from the cloth.