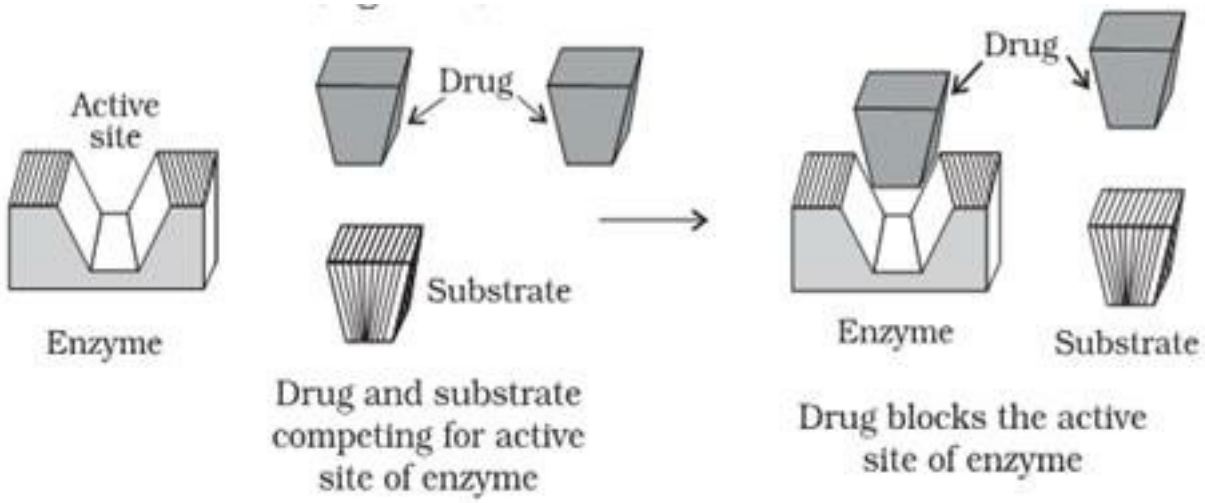
CBSE Class 12 physics
Important Questions
Chapter 16
Chemistry in Everyday Life

5 Mark Questions

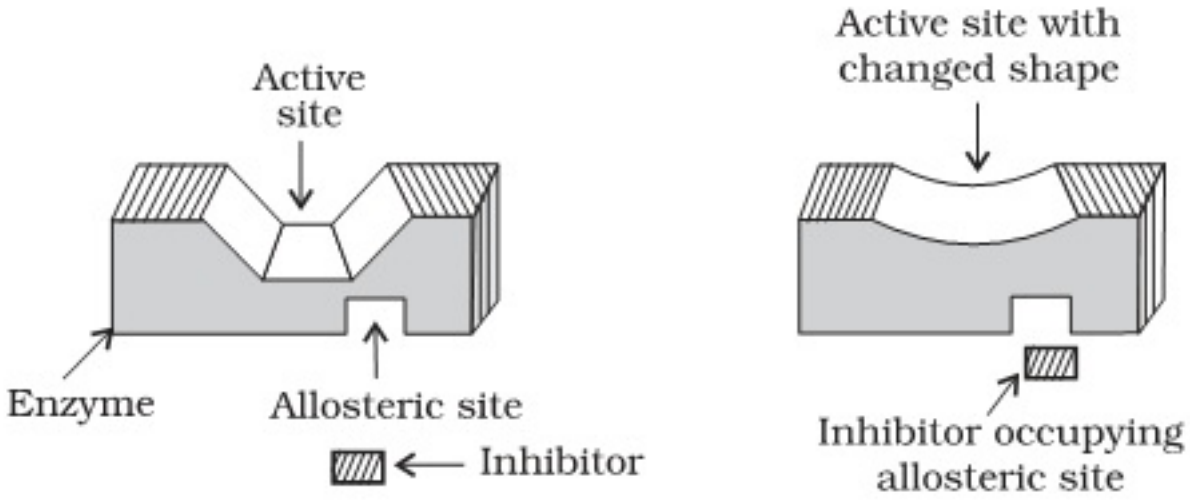
1. Explain drug – enzyme interaction.

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:

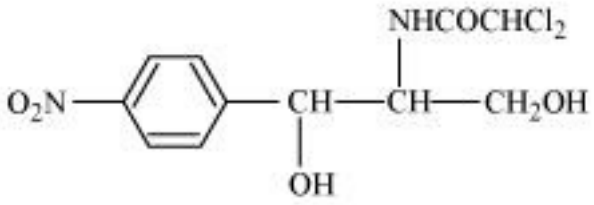
This classification provides the range of drugs sharing common structural features and often having similar pharmacological activity.

(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

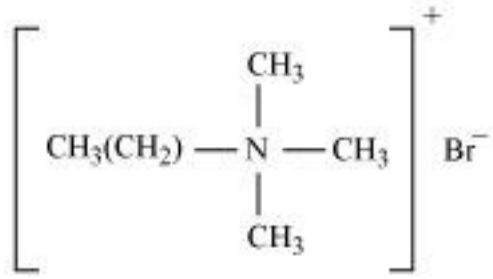
(ii) Anionic detergents and

(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.

$$CH_3(CH_2)_{16}COOH + HO(CH_2CH_2O)_nCH_2CH_2OH \xrightarrow{-H_2O} CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$$

Stearic acid — polyethyleneglycol

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.

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

Soap — Isoluble calcium stearate (soap)

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.